

5ESS® Switch
CORRECTIVE MAINTENANCE PROCEDURES
5E12 and Later Software Releases

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Acknowledgment

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1. INTRODUCTION

1.1 PURPOSE

This manual contains a series of "task-oriented" procedures and/or subprocedures that can be used when performing corrective maintenance (trouble clearing) on hardware (HW) (units/circuits) and software [Office Dependent Data (ODD)] of the 5ESS[®] switch.

It is not practical to provide a set of procedures that exhaustively covers all potential HW fault states or all potential data base error states. The intent of this manual is to provide procedures covering the most common fault/error conditions that trained personnel are generally expected to handle on a daily basis.

This is a manual of procedures that suggest what to do given certain easily recognizable trouble symptoms. It does not describe designs of any hardware, software, data bases, or tools. Other documents provide this kind of descriptive information. In particular, 235-105-110, *System Maintenance Requirements and Tools*, provides much of the descriptive (background) information that one should be familiar with in order to make the most effective use of these corrective maintenance procedures.

The information contained in this manual is designed and structured to support any 5ESS[®] switch with the 5E12 through the 5E14 software releases. It is primarily intended for operating telephone company (OTC) personnel who have been technically trained to perform corrective maintenance on the 5ESS[®] switch. It may also be used to support technical training of maintenance personnel. Users of this manual need to be aware that this manual must be used in conjunction with other 5ESS[®] switch documentation when performing some corrective maintenance tasks.

In accordance with the 5ESS[®] Switch Software Support Plan, the 5E11 and earlier software releases are rated Discontinued Availability (DA) as of November 13, 1999. The actual removal of the information will occur over time instead of concurrently.

If you are supporting offices using a software release prior to 5E12 and therefore have a need for the information being removed, retain the associated pages as they are removed from the paper document or retain the earlier copy of the CDROM.

This 5ESSTM switch document may contain references to the 5ESSTM switch, the 5ESSTM-2000 switch, and the 5ESS AnyMediaTM Switch. The official name of the product has been changed back to the 5ESSTM switch. The documentation will not be totally reissued to change these references. Instead, the changes will be made over time, as technical changes to the document are required. In the interim, assume that any reference to the 5ESSTM-2000 switch or the 5ESS AnyMediaTM Switch is also applicable to the 5ESSTM switch. It should be noted that this name change may not have been carried forward into software-influenced items such as input and output messages, master control center screens, and recent change/verify screens.

As of March 18, 1999, Bellcore officially changed its name to Telcordia Technologies. Not all pages of this document will be reissued to reflect this change; instead, the pages will be reissued over time, as technical and other changes are required. Customers on standing order for this document may see that, on previous-issue pages, the Bellcore name is still exclusively used.

Customers receiving new orders for this document will see the Telcordia Technologies name used as appropriate throughout the document, and the Bellcore name used only to identify items that were produced under the Bellcore name. Exceptions may exist in software influenced elements such as input/output messages, master control center screens, and recent change/verify screens. These elements will not be changed in this document until such time as they are changed in the software code. Document updates will not be made specifically to remove historical references to Bellcore.

1.2 UPDATE INFORMATION

This Issue 14.00 of the 235-105-220 provides coverage associated with the 5E14 software release. This issue supersedes Issue 13 (November 1998).

For the 5E14 software release, Issue 14.00 of this document is updated for the following reasons:

- Update reference section for Distinctive Remote Module (DRM) (Section 1.7).
- Update the procedure to replace the DAT Drive (Section 3.1).
- Update the procedure to analyze and clear nondiagnosable CMP memory errors (Section 5.7).
- Update the following fan maintenance procedures:
 - Section 9.1
 - Section 9.2
 - Section 9.5
- Include the procedures to analyze and clear the Administrative Services Module (ASM) (Section 10.9).
- Include the procedures to replace a Digital Audio Tape (DAT) Drive (Section 10.10).
- Update of the information for replacing an optical data transceiver (Section 13.1).
- Update the glossary terms.

Additional changes have been made per comments from customers and other sources.

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

1.3 ORGANIZATION

This manual is divided into the following sections:

- **SECTION 1 - INTRODUCTION:** This section contains information about this manual. Table 1-1 provides aid for 5ESS[®] switch users in their overall maintenance program and the usability of the procedures in this document. Table 1-1 is an overall maintenance checklist and is subdivided into the following:
 - (a) Continuous Checks/Monitoring
 - (b) Daily Checks
 - (c) Scheduled Tasks.

In Table 1-1 , a brief statement is given on the item(s) to check, how to check, and how to clear a problem in the event that corrective maintenance is required. Also included is a reference to the appropriate procedure and manual to be used when performing the corrective maintenance. It is extremely important that all of these checks and the scheduled routine preventive maintenance tasks (outlined in 235-105-210, *Routine Operations and Maintenance Procedures*) be done on a timely basis. If the checks in Table 1-1 and the Equipment Test List (ETL) are performed properly, the service provided by the 5ESS[®] switch will be of the highest performance and quality.

- **SECTION 2 - TEST EQUIPMENT PROCEDURES:** This section contains calibrating procedures and/or maintenance procedures for the test equipment used for the 5ESS® switch.
- **SECTION 3 - DIAGNOSTIC FAILURE PROCEDURES:** This section contains the procedures for clearing trouble that caused a diagnostic failure.
- **SECTION 4 - DIAGNOSTIC TEST SUPPORTING INFORMATION:** This section contains supporting information in the form of Diagnostic Phase Descriptions tables and ISLU U-DSL BRI troubleshooting diagrams.
- **SECTION 5 - ANALYSIS AND CLEARING PROCEDURES:** This section contains procedures for the task of analyzing and clearing troubles.
- **SECTION 6 - ALARM RESPONSE PROCEDURES:** This section contains procedures for responding to alarms.
- **SECTION 7 - LINE MAINTENANCE PROCEDURES:** This section contains procedures for performing maintenance to line units.
- **SECTION 8 - TRUNK MAINTENANCE PROCEDURES:** This section contains procedures for performing maintenance to trunk units.
- **SECTION 9 - FAN MAINTENANCE PROCEDURES:** This section contains procedures for performing maintenance to fan equipment.
- **SECTION 10 - ADMINISTRATIVE MODULE MAINTENANCE PROCEDURES:** This section contains procedures for maintenance of Administrative Module (3B20D and/or 3B21D) equipment.
- **SECTION 11 - COMMUNICATION MODULE MAINTENANCE PROCEDURES:** This section contains procedures for maintenance of Communication Module equipment. Included is the Quad Link Packet Switch (QLPS).
- **SECTION 12 - CIRCUIT PACK MAINTENANCE PROCEDURES:** This section contains procedures for proper maintenance and/or replacement of circuit packs.
- **SECTION 13 - MISCELLANEOUS EQUIPMENT MAINTENANCE PROCEDURES:** This section contains procedures for maintenance of miscellaneous equipment.

NOTE: It is intended that this section is only for equipment that has no specific function/location in the switch. As the 5ESS® switch grows and changes and/or improvements are made, then the procedures in this section will be moved to other sections.

- **SECTION 14 - POWER-UP/POWER-DOWN EQUIPMENT PROCEDURES:** This section contains procedures to correctly power-up/power-down equipment.
- **SECTION 15 - UTILITY CALL TRACE PROCEDURES:** This section contains procedures to perform the utility call trace function.
- **SECTION 16 - OFFICE DEPENDENT DATA - MAINTENANCE PROCEDURES:** This section contains procedures for the office dependent data (ODD).
- **GLOSSARY:** This section includes a listing of all the abbreviations/acronyms and their significant meanings.
- **INDEX:** This section includes an alphabetical listing (cross-referenced to applicable page numbers) for all procedures and subprocedures within the manual.

1.4 USER FEEDBACK

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

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1.6 TECHNICAL ASSISTANCE

Technical assistance for the 5ESS[®] 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 REFERENCES

The Compact Digital Exchange (CDX) and the Very Compact Digital Exchange (VCDX) are switching systems based on the 5ESS[®] switch. This document is a standard 5ESS[®] switch document that is also applicable to the CDX and VCDX switching systems. Information applicable only to CDX, VCDX or Distinctive Remote Module (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*
- 235-120-110, *Very Compact Digital Exchange (VCDX) Reference Guide*
- 235-120-120, *Very Compact Digital Exchange (VCDX) User's Guide*
- 235-200-150, *Distinctive Remote Module (DRM) User's Guide*.

When appropriate, this document contains references to the applicable CDX or VCDX documents.

Table 1-1 5ESS[®] Switch — Maintenance Checklist

CHK#	ITEM(s) FOR CHECK	HOW TO CHECK	HOW TO CLEAR
A. CONTINUOUS CHECKS/MONITORING			
1	Critical alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the Master Control Center (MCC) display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the receive-only printer (ROP) for alarmed output messages.	Use Procedure 6.1 , Respond to 5ESS [®] Switch Alarms, to perform an immediate analysis of the problem and, if repairs are necessary, initiate them without delay. For most critical failures, analysis and recovery procedures are located in the 235-105-250 , <i>System Recovery</i> manual. Some examples of critical failures include administrative module (AM) and switching module (SM) initializations, loss of communication to an SM, and craft interface lockout. If automatic system recovery actions are in progress, allow time for them to complete before attempting manual intervention.
2	Major alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the MCC display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the ROP for alarmed output messages.	Use Procedure 6.1 , Respond to 5ESS [®] Switch Alarms, to perform an immediate analysis of the problem. If repairs are necessary, schedule them as soon as possible (within an hour or so). An example of a problem causing a major alarm is a simplex failure of a critical duplicated unit such as a communication module processor (CMP) or module controller time slot interchanger (MCTSI).
3	Minor alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the	Use Procedure 6.1 , Respond to 5ESS [®] Switch Alarms, to analyze

		MCC display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the ROP for alarmed output messages.	the problem and perform any necessary repairs. This action may be deferred for several hours, but minor alarm conditions should be resolved on at least a daily basis.
Note: Using the OMS5 program is recommended as a time-saver in doing the daily checks identified in checks 1 through 15. The OMS5 program can run in the Switching Control Center System (SCCS) and the Total Network Management (TNM) environments. Refer to 235-105-119, <i>5ESS® Switch Maintenance Guide — Utilizing OMS5-SCC</i>, or 235-105-130, <i>5ESS® Switch Maintenance Guide — Utilizing OMS5-TNM</i>, as appropriate.			
1	Excessive Administrative Module (AM), Switching Module (SM/SM-2000), Communication Module Processor (CMP), or Common Network Interface (CNI) Initializations	Use OMS5 Daily Report or scan the receive-only printer (ROP) printouts for INIT... output messages associated with the AM, SM/SM-2000, CMP, CNI, module controller time slot interchanger (MCTSI) or quad-link packet switch gateway processor (QGP). Also scan the ROP for processor recovery messages (PRMs).	Use 235-600-750, <i>Output Message Manual</i> , and/or 235-600-602, <i>Processor Recovery Messages Guide</i> , to analyze the INIT (and related) output messages and/or PRMs. The severity of recovery actions taken during an initialization varies depending on the initialization level (usually identified by the LVL= field in the output messages). Low-level initializations take recovery actions such as "return-to-point-of-interrupt" (RPI) or "single-process-purge" (SPP). Examples of recovery actions taken during high-level initializations include "full process initialization" (FPI), "selective initialization" (SI), and "full initialization" (FI). Refer to 235-105-250, <i>System Recovery</i> , for a detailed description of initialization levels. Determine and correct the cause (or "trigger") of the initialization (if not already corrected by automatic initialization recovery actions). Problems that result in low-level initializations should be resolved promptly to avoid escalation to more severe recovery actions.
2	Excessive interrupts	Use OMS5 Daily Report or scan the ROP printouts for REPT... output messages.	Use Procedure 5.8, Analyze and Clear Trouble Causing Excessive Interrupts.
3	Grid fabric failures	Use OMS5 Daily Report or scan ROP printouts for TST GRID ...STF or TST GRIDBD ...STF output messages.	Use Procedure 3.3, Clear LU Grid Exercise Test Failure.
4	Equipment, out-of-service (OOS)	Equipment that is OOS is reflected on the MCC display pages and reported in the OMS5 Daily Report. In addition, some output messages that report the status of OOS units include OP OOS , OP CFGSTAT , and OP	For OOS communication module (CM) units, use Procedure 11.1, Analyze Communication Module Problems, to resolve the problem and restore the units to service.

		QNETSTAT . The corresponding input messages can be used to manually check equipment status. Refer to 235-600-700, <i>Input Message Manual</i> , and 235-600-750, <i>Output Message Manual</i> , for additional information.	For other OOS units/circuits that have failed diagnostics obtain the diagnostic output messages from the ROP and then use Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS [®] Switch.
5	Lines, OOS	Use OMS5 Daily Report or enter OP:LIST,LINES ; OOS and check resulting output message.	For each OOS line, use Procedure 7.2, Analyze and Resolve OOS Line List Entries.
6	Trunks, OOS	Use OMS5 Daily Report or enter OP:LIST,TRUNKS ; OOS and check resulting output message.	For each OOS trunk, use Procedure 8.2, Analyze and Resolve OOS Trunk List Entries.
7	Excessive Machine Detected Interoffice (MDII) reports	Use OMS5 Daily Report, the RC/V view, or scan the ROP printouts for REPT: MDII... output messages.	Use ROP printouts to identify a specific trunk or Trunk Unit (TU) equipment. For trunk testing, use Procedure 8.1, Perform Trunk Maintenance.
8	Excessive call failure reports (operational, per-call test, or call cutoff)	Use OMS5 Daily Report or scan the ROP printouts for REPT ... output messages.	Using 235-600-750, <i>Output Message Manual</i> , correlate the reports for specific circuits to be removed and repaired (if this has not already been done). For REPT ALINK problems, use Procedure 3.2, Clear A-LINK Failure in Line Unit. For REPT BLINK (or LUCHAN) problems, use Procedure 3.4, Clear B-LINK or LUCHAN Failure in Line Unit Grid. For REPT LEN (or PCTF) problems, use Procedure 3.5, Clear LEN Failure in Line Unit Grid. For call cutoffs, the input message ALW:SCORPT, TRC... may be helpful.
9	Data base relation REORG failures	Use OMS5 Daily Report or scan the ROP printouts for REORG NEEDED... or CANCELLED...	Use Procedure 16.7, Perform Manual Reorganization of Hashed Relations Using Access Editor (ACCED).
10	Excessive Asserts or Defensive Check Failures (DCF's)	Use OMS5 Daily Report or scan the ROP printouts for REPT output messages. Note that some DCFs (or "asserts") are also reported by INIT... output messages.	Use 235-600-500, <i>Asserts Manual</i> , and 235-600-750, <i>Output Message Manual</i> , to analyze DCF output messages. Resolve these problems promptly, since escalation to more severe automatic recovery actions may result from repeated DCFs.
11	Excessive audit reports	Use OMS5 Daily Report or scan the ROP printouts for AUD... output messages.	Use 235-600-400, <i>Audits Manual</i> , for possible resolution. If unable to resolve, seek next higher level of technical assistance.
12	ODD Backup failures	Use OMS5 Daily Report or scan the ROP	Try to do the backup again. If it still

		printouts for BKUP ODD, NRODD RODD=X (or AM or CMP) ABORTED output messages.	fails, some data base audits (OPNDC, TRNDC, or MEMMAN) and a CLR:TRN may clear the problem. If an assert message (in DAYLOG file) is involved, use 235-600-500, <i>Asserts Manual</i> . If unable to resolve, seek next higher level of technical assistance.
13	Manual inhibits of automatic checks and functions	When a normal system function is inhibited, the MCC display reflects this off-normal condition. Some of the input messages that can be used to check for inhibits are: OP:BREVC, OP:ERRCHK, OP:HDWCHK, OP:OFFNORM, and OP:REXINH.	Unless there is a valid reason for the function to be inhibited, clear each inhibit using the appropriate ALW:... input message. If the function is inhibited due to a problem, resolve that problem before clearing the inhibit.
14	Excessive ALE hourly alerts	Use OMS5 Daily Report or scan the ROP printouts for REPT ALE HOURLY ALERT .	For each line reported, use Procedure 7.13, Digital Subscriber Line Automatic Line Evaluation.
15	Excessive ALE daily alerts	Use OMS5 Daily Report or scan the ROP printouts for REPT ALE DAILY ALERT .	For each line reported, use Procedure 7.13, Digital Subscriber Line Automatic Line Evaluation.
C. SCHEDULED TASKS			
—	All scheduled routine maintenance tasks	Per the equipment test list (ETL) in 235-105-210, <i>Routine Operations and Maintenance Procedures</i> .	Each 5ESS [®] switch may have variations of the ETL due to specific hardware and software configurations.

2. TEST EQUIPMENT PROCEDURES

GENERAL

This section contains calibrating procedures and/or maintenance procedures for the test equipment used for the 5ESS[®] switch.

Procedure 2.1: CALIBRATION CHECK FOR DIRECTLY CONNECTED TEST UNIT (DCTU) PRECISION MEASUREMENT UNIT (PMU) CIRCUIT PACKS

OVERVIEW

In the Directly Connected Test Unit (DCTU) Precision Measurement Unit (PMU), there is an interaction problem between the SM253, SM258, and SM258B circuit packs. If the voltage regulators on either of the SM253, SM258, or SM258B circuit packs are out of tolerance, the DCTU PMU diagnostics may fail phase 3-7-4, 4-6-3, 4-6-4, 5-2-3, or 5-2-4, and not clearly indicate the bad circuit pack. This causes an excessive failure rate, even though many of the associated packs are actually good.

This procedure is to be used to check the calibration of the SM253, SM258, and SM258B circuit packs to determine which are bad when the previously mentioned DCTU-PMU diagnostics fail.

PROCEDURE

1. **NOTE:** A Fluke 8024B Digital Multimeter (or equivalent) with 4-digit display and 0.5% basic Direct Current (DC) accuracy and 2 grabber-type clip leads (12 inches or longer) are required.

CAUTION 1: Do not use alligator-type clip leads as they may accidentally short to adjacent terminals.

CAUTION 2: Wear an anti-static wristband grounded to the frame throughout this procedure.

At the DCTU, slide the SM250 (MC2P002-C1) partially out of the PMU.

2. Remove either an SM253, SM258(B)-0, or SM258(B)-1 circuit pack from the PMU.
3. Using one clip lead, attach the negative lead of the voltmeter to the large silver 25 μ F capacitor onto the exposed metal lead. Refer to Figure 2.1-1 or 2.1-2, whichever is applicable, for the location of the capacitor and proper placement of the clip lead.
4. Using the other clip lead, attach the positive lead of the voltmeter to pin 024 of the circuit pack under test by clipping onto the exposed metal of the pin close to where it is soldered onto the circuit pack. Refer to Figure 2.1-1 or 2.1-2, whichever is applicable, for the location of pin 024.
5. With the voltmeter attached, carefully reinstall the circuit pack under test into the PMU.

NOTE: If the clip leads prevent the circuit pack from sliding into the PMU slot, the adjacent circuit pack may be temporarily removed for this measurement.

6. Compare the voltage readings with the voltage bands given in Table 2.1-1.
 - (a) If the reading is "bad", replace the circuit pack with a spare circuit pack and return to Step 3.
 - (b) If the reading is "good" or "marginal", remove the circuit pack from the PMU, remove the clip leads, reinstall it in the PMU, and continue to Step 7.

NOTE: Marginal circuit packs could fail in the near future. Those packs may be returned to the factory for recalibration at your discretion or following local policies.

7. Return to Step 2 for each circuit pack to be tested.
8. Reinstall the SM250 (MC2P002-C1) in the PMU.

9. Return to Step 1 for each PMU.
10. Run diagnostics. If any of the diagnostic failures listed in the Overview fail, replace the previously identified "marginal" circuit packs, starting with the "worst" case, until diagnostics pass.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 2.1-1 DCTU Circuit Pack Voltage Readings

CIRCUIT PACK	VOLTAGE BANDS		
	GOOD	MARGINAL	BAD
SM253	8.82 V - 9.10 V	8.64 V - 8.81 V	0.00 V - 8.63 V
SM258(B)-0	7.66 V - 8.10 V	7.57 V - 7.65 V	0.00 V - 7.56 V
SM258(B)-1	7.66 V - 8.10 V	7.57 V - 7.65 V	0.00 V - 7.56 V

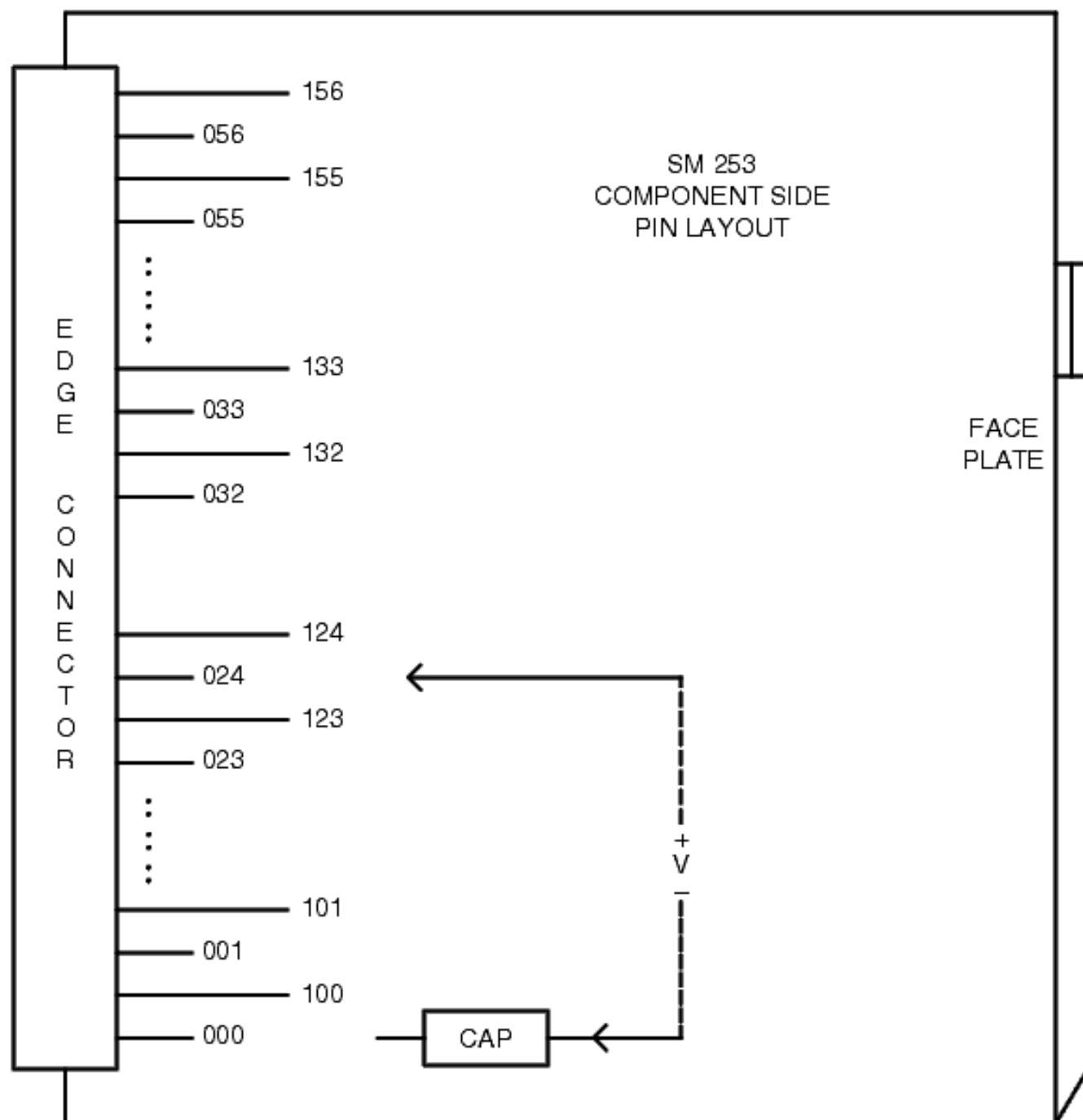


Figure 2.1-1 SM253 Circuit Pack Pin Layout

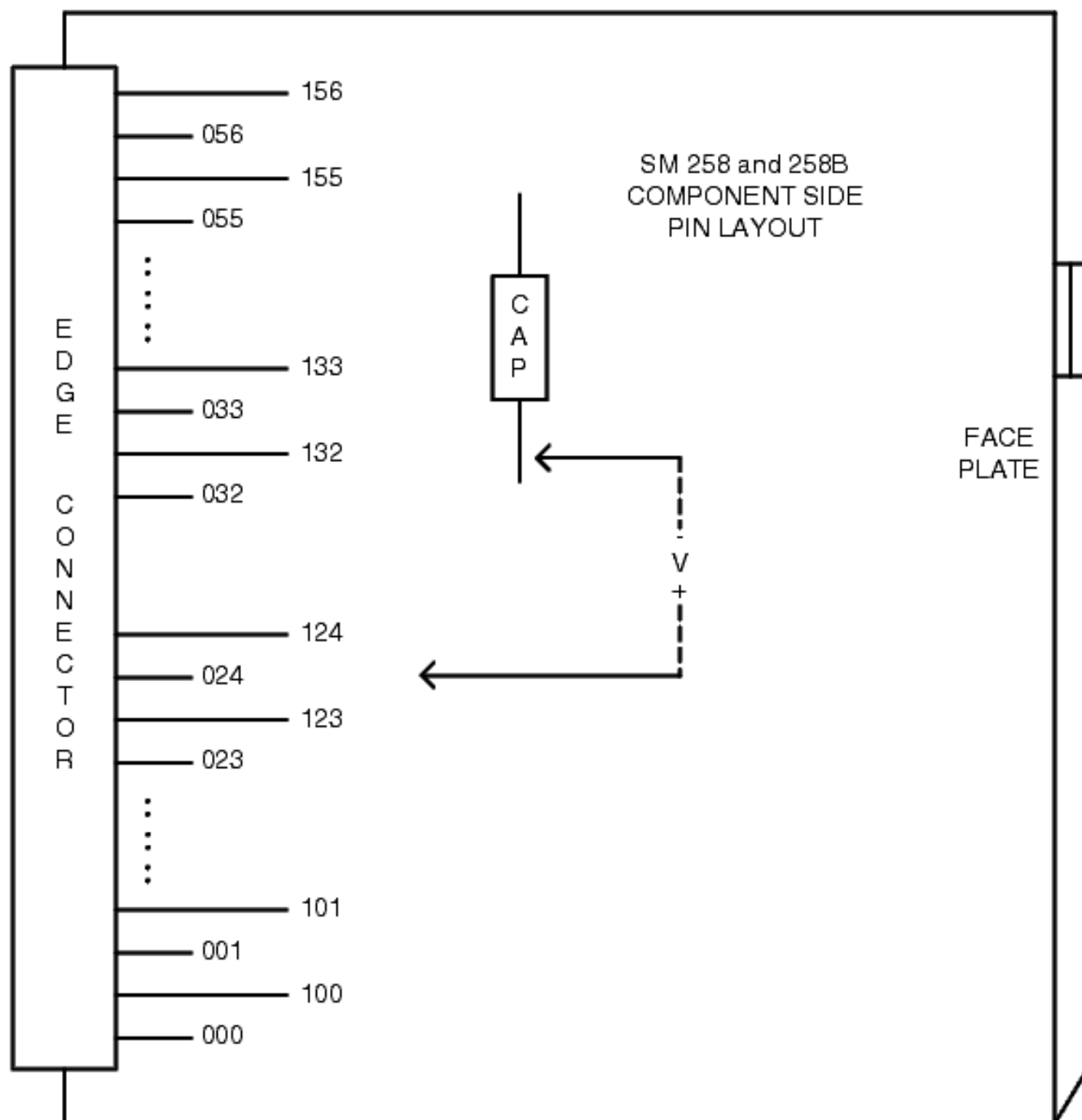


Figure 2.1-2 SM258(B) Circuit Pack Pin Layout

Procedure 2.2: CALIBRATING TLWS MEASUREMENTS

OVERVIEW

The Trunk and Line Work Station (TLWS) performs various measurements from the Directly Connected Test Unit (DCTU). Unless compensated for, all results are measured relative to this device. In particular, two measurements, distance-to-open (DTO) and resistance, give better results if they are calibrated to the Main Distributing Frame (MDF). Once calibrated, a DTO measurement could identify inside plant versus outside plant opens. The same is true for resistance measurements.

NOTE: It is advised that calibration lines be assigned [as regular plain old telephone service (POTS) lines] in the data base; one for DTO and one for resistance. The DTO line must have an open between tip and ring at the point on the MDF where it would normally leave the office (for example, carbon blocks). The resistance line uses a short across tip and ring at the time of measurement where it would normally leave the office. Do not leave the short across tip and ring because this makes the line appear busy.

If dedicated calibration lines are not used, then any POTS line is sufficient. When using a POTS line, apply the open or short when requested. When completed with this procedure, the POTS line must be put back in its initial condition.

NOTE: The calibration line used for the resistance measurements should be on a Line Unit model 2 (LU-2) or model 3 (LU-3). If neither of these types of LUs are available, then the resistance readings obtained from the TLWS should be adjusted before the data base can be updated as follows:

Line Type	Resistance (in Ohms) to be Added
AIU	246
LU-1	-80
LU-2	0
LU-3	0
ISLU-Z	-20
ISLU-U (AMI)	243
ISLU-U (ANSI [®])	246
ISLU2-U ANSI [®]	246

The correct value for the Recent Change/Verify (RC/V) office parameter view field RESIST setting is determined by making the measurement as described in the procedure and adding the appropriate value.

NOTE 1: The RC/V office parameter view fields DISTOPEN and RESIST are for calibration purposes.

NOTE 2: If the office parameter RC/V view does not contain the fields DISTOPEN and RESIST, then the ODBE will need to be used to update these AM-PARAMETERS. The parameters GLCP8DUMMY for resistance and GLCP7DUMMY for DTO should both be set to "0".

PROCEDURE

1. Using a recent change and verify (RC/V) terminal, go to the appropriate RC/V view (office parameters) and update the fields DISTOPEN and RESIST to "0".
2. At the TLWS video terminal, access a TLWS test position **161,X** from the TLWS test position summary page (160).
3. Seize the DTO calibration line (open across tip and ring) with the poke command **4001,DN**.
4. From the metallic measurement page (560 or 5600), use the poke command **5605**, to measure the DTO. Make note of this value to enter into DISTOPEN later.

5. Release the line using the poke command **4999**.
6. Seize the resistance calibration line (short across tip and ring) with the poke command **4001,DN**.
7. Using the same TLWS metallic measurement page, use the poke command **5603**, to measure the resistance internal to the office. Once the measurement has begun to report values at the TLWS, place a dead short across tip and ring (the TLWS will take about 8 seconds to update the screen). Make note of this value to enter into RESIST later. Also note whether the value is in ohms or K-ohms.
8. Remove the short from the line and release it using the poke command **4999**.
9. Using a RC/V video terminal, go to the appropriate RC/V view (office parameters) and enter the obtained values as positive numbers. The values being entered are in feet and ohms (**USE CAUTION** as the measurement may have been in K-ohms). The DTO measurement is updated on DISTOPEN; and the resistance measurement is updated on RESIST.
10. Repeat Steps 3-8. The values should now be "0" feet for the DTO measurement and "0" ohms for the resistance measurement. If not, begin this procedure over again at Step 1. If correct, then continue on.
11. Access the TLWS test position summary page (160) and release the TLWS test position (**201,X**).

NOTE: If using an active POTS line for calibration, restore the wiring to initial condition at this time.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 2.3: CHECK/ADJUST AC JACK AMPLIFIERS IN TEST ACCESS UNIT

OVERVIEW

This procedure outlines a method to check/adjust the AC1 and AC2 receive amplifiers in the Test Access Unit (TAU) located at the Master Control Center (MCC).

PROCEDURE

- Are trunk group and member numbers of AC1 and AC2 known?

If YES, proceed to Step 15.

If NO, continue with Step 2.

- Access MCC display Page 196.

Response: Input **CLASS, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM** or **N > ____**

- Enter "14.3V" to select Verify_MISC TLWS VIEW.

Response: **Verify_MISC--TRUNK LINE WORK STATION VIEW - 14.3**

- For software releases 5E9(1) and later, enter the TLWS ID number which is the key to the RLtlwsr tuple specifying the TLWS AC jack. For more information, refer to 235-105-110, *System Maintenance Requirements and Tools*.

For software releases 5E8 and earlier, obtain and enter the device identification (ID) for Table 2.3-1 for the current Trunk and Line Work Station (TLWS).

Table 2.3-1 TLWS Device ID

TLWS NUMBER	DEVICE ID
1 a	a
2 b	z
3 c	l
4 c	m
5 c	n
6 c	o
7 c	j
8 c	k
Notes: a. Main TLWS at MCC. b. Remote TLWS at remote Switching Control Center (SCC). c. STLWS (Supplementary TLWS).	

Response: Information in view filled in.

- Record Trunk Equipment Numbers (TENs) listed as attributes for AC JACK 1 and AC JACK 2.
- Enter the "<" character.

Response: Input **VIEW, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM, <, or N > ____**

7. Enter "5.9V" to select the VERIFY TRUNK MEMBER VIEW.

Response: Blank **VERIFY--VERIFY TRUNK MEMBER- 5.9**

8. Enter "T" (for analog trunk unit) and the TEN for AC JACK 1 obtained from View 14.3.

Response: Information in view filled in.

9. Record the Trunk Group Number (TGN) and MEM for AC JACK 1.

10. Enter an "R" to start another review.

Response: **VERIFY--VERIFY TRUNK MEMBER- 5.9**

11. Enter "T" (for analog trunk unit) and the TEN for AC JACK 2 obtained from View 14.3.

Response: Information in view filled in.

12. Record the TGN and MEM for AC JACK 2.

13. Enter the "<" character.

Response: **VIEW_MENU 5**
Input **VIEW, CLASS.VIEW, H, Q, R, V, BI, BD, BR, I or < _____**

14. Enter a "q".

Response: **RCV MENU APPRC COMPL**

NOTE: Exit the Recent Change/Verify (RC/V) mode.

15. **CAUTION:** If the TAU is located under the access panel of the TAU, do not let the access panel drop fully open. The circuit pack in the TAU could slip out and be damaged.

At the MCC console, turn the latch screw on the bottom of the TAU assembly until the access panel drops open.

16. On MCC display Page 160, enter command (CMD) **16X** for 5E8 and earlier or **161,X[,Y]** for 5E9(1) and later.

Where:

X = test position number (1-8) for 5E7 and 5E8
X = test position number (1-32) for 5E9(1) and later
Y = ID number for 5E9(1) and later.

17. To seize the trunk, enter either CMD **412,X** or **4102,X**, depending on the software release.

Where:

X = **GRP, MEM** for AC1 JACK.

18. To add the talk and monitor (T&M) phone, enter either CMD **433** or **4303**, depending on the software release. (Test to be conducted in monitor mode only.)

19. To send 1004-Hz at 0 dBm, enter either CMD **505** or **5005**, depending on the software release.
20. Connect the transmission test set per Figure 2.3-1.

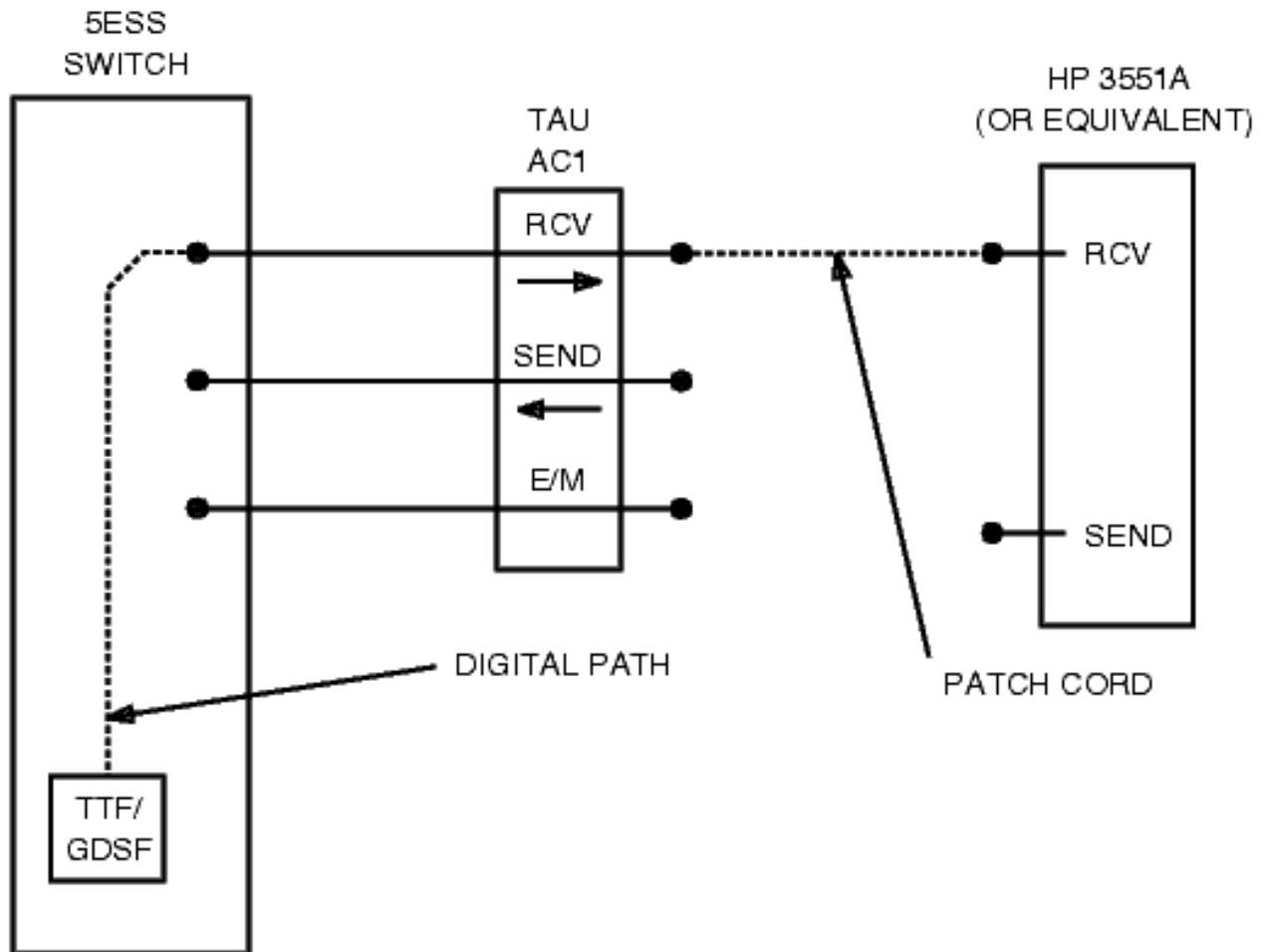


Figure 2.3-1 Connections Required to Adjust AC1 Amplifier

21. Set the transmission test set terminating impedance to 600 ohms.
22. Adjust the AC1 RECEIVE amplifier per Figure 2.3-2 until the test set measures 0 dBm at 600 ohms.

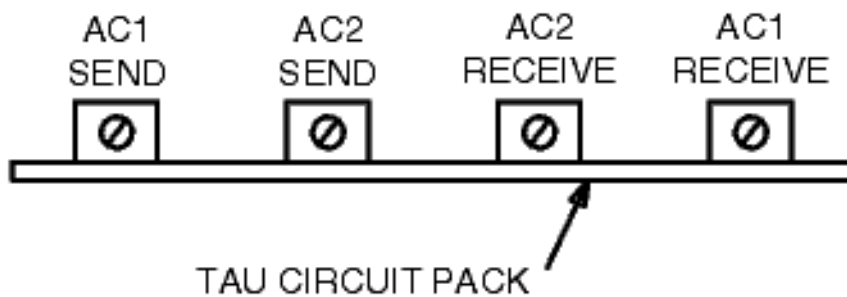


Figure 2.3-2 Location of AC1 and AC2 Amplifier Screws

23. To stop tone, enter either CMD **599** or **5999**, depending on the software release.

24. To release the connection, enter either CMD **499** or **4999**, depending on the software release.
25. To seize the trunk, enter either CMD **412,X** or **4102,X**, depending on the software release.

Where:

X = **GRP, MEM** numbers for AC2 JACK.

26. To add the T&M phone, enter either CMD **433** or **4303**, depending on the software release. (Test to be conducted in monitor mode only.)
27. To send 1004-Hz at 0 dBm, enter either CMD **505** or **5005**, depending on the software release.
28. Move the plug from the AC1 JACK to the AC2 JACK.
29. Adjust the AC2 RECEIVE amplifier per Figure 2.3-2 until the test set reads 0 dBm at 600 ohms.
30. To stop tone, enter either CMD **599** or **5999**, depending on the software release.
31. To select the AC1 JACK, enter either CMD **581** or **5801**, depending on the software release.
32. Set the T&M phone to the "MNTR" mode.
33. Connect the transmission test set per Figure 2.3-3 .

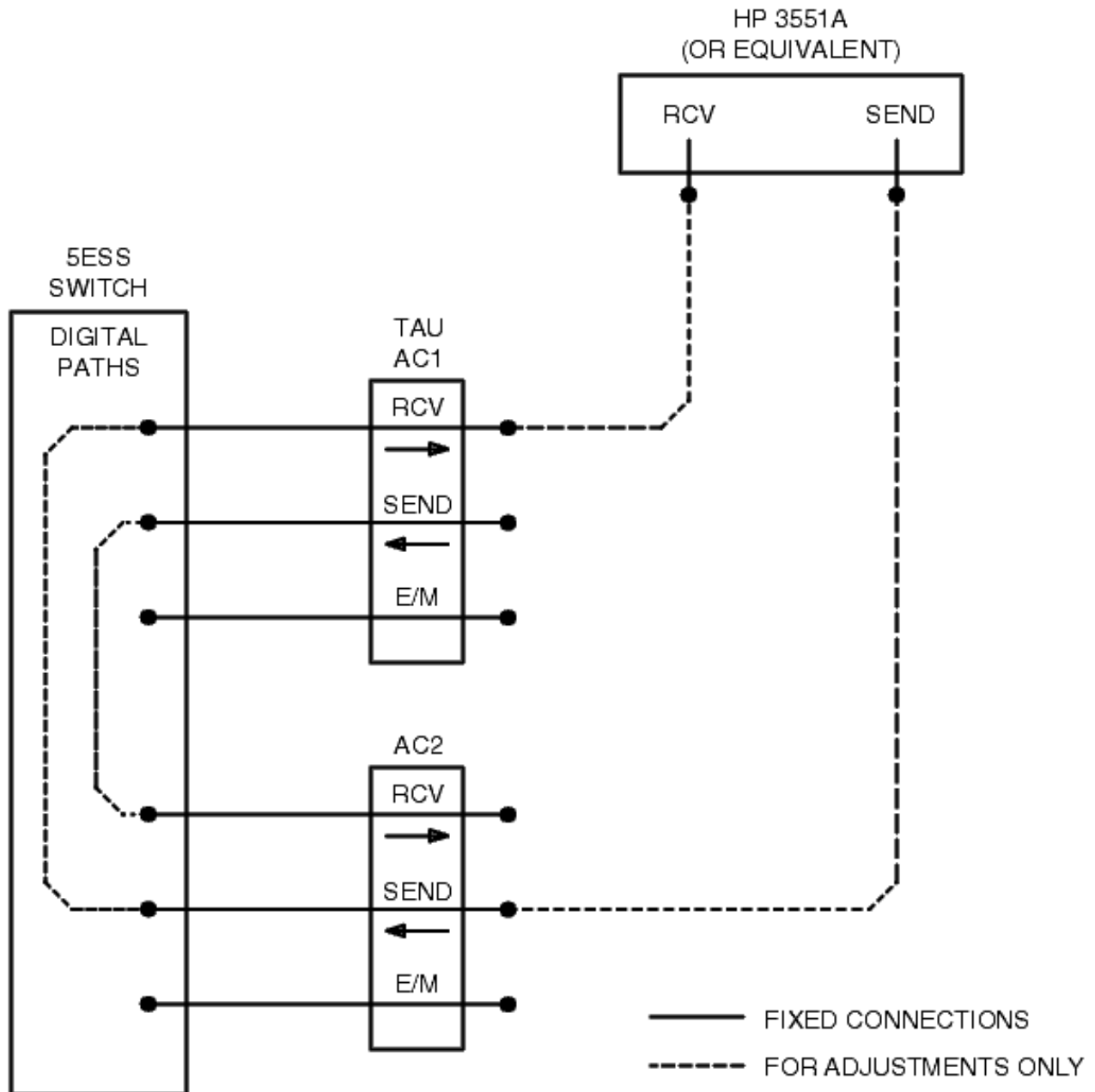


Figure 2.3-3 Connections Required to Adjust AC2 SEND Amplifier

34. Set the test set to send a 1004-Hz tone at 0 dBm.
35. Adjust the SEND amplifier of AC2 so that the transmission test set is receiving 0 dBm at 600 ohms from AC1.
36. Connect the transmission test set per Figure 2.3-4 .

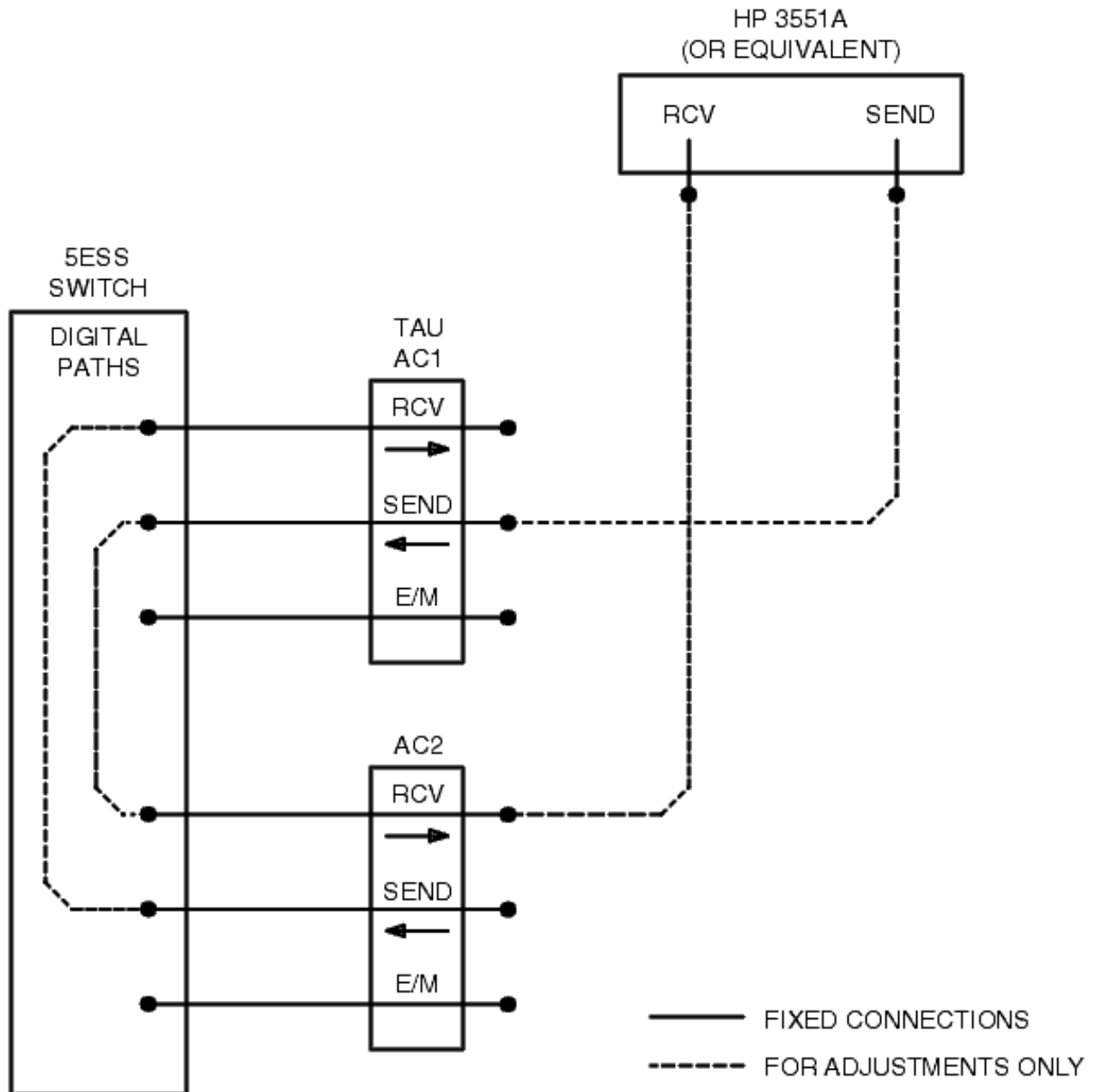


Figure 2.3-4 Connections Required to Adjust AC1 SEND Amplifier

37. Adjust the SEND amplifier of AC1 so that the transmission test set is receiving 0 dBm at 600 ohms from AC2.
38. To release the connection, enter either CMD **499** or **4999**, depending on the software release.
39. Disconnect the test set.
40. Close the TAU panel.
41. On MCC display Page 160, release the test position by entering CMD **20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later.

Where:

X = test position number (1-8) for 5E7 and 5E8
X = test position number (1-32) for [5E9(1) and later].

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

Procedure 2.4: PERFORM MANUFACTURER'S TESTS ON *KEYSTONE*[®] III TAPE DRIVE

OVERVIEW

The tests performed in this procedure will verify the operation of the *KEYSTONE*[®] III tape drive and ensure that the write head current is optimal. This procedure must be run using the Lucent Technologies KS-23113 List 900 Calibration Tape (Hc) or an equivalent 295 (+ or - 5) oERSTED tape which is writable at 6250 bits per inch (bpi). The tapes should also be usable across the *ANSI*[®] standard defined temperature range (16 degrees C to 32 degrees C) and humidity (RH 20% to 80%). After calibration, to ensure system recovery via backup tapes, verify readability of the most current **GENBKUP** tapes. Also, create a new full set of **GENBKUP** tapes with the newly calibrated tape drive characteristics. These tests are internal drive tests.

Note: An optional jumper (W1) located on the servo/control circuit board (if equipped) will have to be moved so that the tape drive will store the test adjustment results.

PROCEDURE

1. Verify that the following correct firmware is installed in the Administrative Module (AM):
 - **TN84:** MC4C151A1 at EQL 033-132 [Input/Output Processor 0 (IOP 0)]
 - **UN145:** MC4C160A1 or A1B at EQL 033-078 (IOP 0)
 - **UN28B:** MC4C077A1C (extra main memory) or MC3T003A1 (very large main memory) at EQL 060-036 & 160-036 [Both Control Units (CU)].

2. Take the drive offline.

3. **CAUTION 1:** Take appropriate ESD precautions (that is, use ground strap) when handling circuit boards.

CAUTION 2: If it is necessary to remove the brackets at the top and bottom of the board assembly, use caution and protect the area under the drives in case hardware is dropped.

Determine if an optional jumper (W1) exists on the servo/control circuit board and move it as follows:

- (a) On the rear of the tape drive, loosen the large thumb screws on the right-hand board assembly. This assembly does not extend to the rear as far as the left-hand board assembly (which has ribbon cables connected to it) and the right-hand board assembly is secured to an aluminum cage by the large thumb screws. On the newer drives, it may be necessary to remove brackets at the top and bottom of the board assembly.
 - (b) Slowly swing the right-hand board assembly to the right.
 - (c) Determine if the jumper (W1) exists. If so, slide the jumper off pins 2-3 and slide it back onto pins 1-2. The jumper is rectangular shaped (normally a blue color) and is located in the lower middle area on the component side of the board. Count the pins from right to left (1-3).
4. Perform customer engineer (CE) test 37 as follows:

NOTE 1: Test 37 sets up the velocity correction multiplier for the velocity DAC.

NOTE 2: A tape *must not* be threaded for test 37.

- (a) While holding down the **CE** switch, press the **TEST** switch.

Response: The **DIAGNOSTICS** indicator lights and the display reads **00**.

- (b) Press the **STEP** switch until **03** appears on the display panel.
- (c) Press the **TEST** switch.

Response: Display reads **30**.

- (d) Press the **STEP** switch until the display increments from **30** to **37**.
- (e) In order to initiate the test, press the **EXECUTE** switch.

Response: Termination code **00** is displayed if test 37 is successful.

- (f) If a termination code other than **00** is displayed, refer to the TEST DESCRIPTIONS section of the *CPI Hardware Reference Manual 4976300* for information on possible fault codes and/or seek technical assistance. Otherwise, continue with the next step.

5. Perform CE test 48 as follows:

NOTE: Test 48 sets up the compressor power-down timer for 1 minute if no tape motion has occurred.

- (a) While holding down the **CE** switch, press the **TEST** switch.

Response: The **DIAGNOSTICS** indicator lights and the display reads **00**.

- (b) Press the **STEP** switch until **04** appears on the display.
- (c) Press the **TEST** switch.

Response: Display reads **40**.

- (d) Press the **STEP** switch until the display increments from **40** to **48**.
- (e) In order to initiate the test, press the **EXECUTE** switch.

Response: Termination code **00** is displayed if test 48 is successful.

- (f) If a termination code other than **00** is displayed, seek technical assistance. Otherwise, continue with the next step.

6. Perform CE test 64 as follows:

NOTE: Test 64 determines the optimum write current level for all 9 tracks. The write currents are determined for 25 ips PE, 25 ips GCR, 75 ips PE, and 75 ips GCR. The values are stored in backup memory.

- (a) Using a standard 300 oERSTED tape as described in the overview, with the write ring in place, mount the tape on the tape drive. **Do not** press the **ON-LINE** switch.
- (b) Press the **LOAD** switch.
- (c) While holding down the **CE** switch, press the **TEST** switch.

Response: The **DIAGNOSTICS** indicator lights and the display reads **00**.

- (d) Press the **STEP** switch until **06** appears on the display.
- (e) Press the **TEST** switch.

Response: Display reads **60**.

- (f) Press the **STEP** switch until the display reads **64**.
- (g) Press the **EXECUTE** switch to run test 64. This test determines the optimum write current level for all nine tracks.

Response: The display reads **00** if the test is complete.

- (h) After test 64 completes, press the **RESET** switch.

7. Perform CE test 31 as follows:

NOTE: Test 31 sets up and checks read amplitudes at 25 and 75 ips. At 25 ips, it determines the minimum gain value for each track, and stores them in backup memory. It again determines the minimum gain value for each track and compares it to the previously stored value. If the difference in gain between the 2 values for any track is such that it causes an amplitude difference of 0.1 volt, the test is repeated. Also, if any fault is detected while determining the minimum gain values, the test is repeated. If, after 5 attempts, the operation is not successful, a fault is reported.

- (a) While holding down the **CE** switch, press the **TEST** switch.

Response: The **DIAGNOSTICS** indicator lights and the display reads **00**.

- (b) Press the **STEP** switch until **03** appears on the display.
- (c) Press the **TEST** switch.

Response: The display reads **30**.

- (d) Press the **STEP** switch until the display reads **31**.
- (e) Press the **EXECUTE** switch to start test 31. This test checks read amplitudes on successive tries and compares them.

Response: The display indicates **00** if the test is successful.

- (f) If the display did not indicate **00**, seek technical assistance. Otherwise, continue with the next step.

- 8. Maintain power on (do not power down) the tape drive while performing these final steps or else the test results will be lost and the tests will have to be repeated.
- 9. If previously moved, return the servo/control board jumper (W1) to its original position (pins 2-3).
- 10. Secure circuit boards to cage using top and bottom thumb screws.

Results: Manufacturer's tests performed and completed on tape drive.

3. DIAGNOSTIC FAILURE PROCEDURES

GENERAL

This section contains the procedures for clearing trouble that caused a diagnostic failure.

Procedure 3.1: CLEAR DIAGNOSTIC FAILURE IN HARDWARE (UNITS/CIRCUITS) OF 5ESS® SWITCH

OVERVIEW

When an automatically scheduled (by fault recovery or routine exercise) diagnostic fails, the appropriate alarm is activated, the affected unit (or service group) is left out of service (OOS), and a diagnostic (DGN) some test failed (STF) message is printed. The DGN STF printout includes a SUSPECTED FAULTY EQUIPMENT list to aid in trouble resolution and repair. Information is presented here for clearing a hardware trouble causing a diagnostic failure in the 5ESS® switch.

The DEGRADED GRID feature allows a grid(bd) to be placed in the degraded state when grid exercise fails (with **TST:_STF** output message) or an A-Link is automatically or manually removed and placed in the OOS state. A grid(bd) in the degraded state appears on both the switching module/switching module-2000 (SM/SM-2000) active (ACT) and SM/SM-2000 OOS **OP:CFGSTAT** lists. The grid(bd) can be restored to the ACT state using the **RST** command.

NOTE: With the exception of some of the diagnostic tests for line units (LUs), this procedure is considered the **standard repair procedure** for **ALL** hardware (units/circuits) of the 5ESS® switch. Included is the Common Network Interface (CNI) equipment. For additional diagnostic procedures associated with LUs, refer to (a) through (e) as follows:

- (a) Clear A-Link Failure in Line Unit—Procedure 3.2
- (b) Clear Line Unit Grid Exercise Test Failure—Procedure 3.3
- (c) Clear B-Link or LUCHAN Failure in Line Unit Grid—Procedure 3.4
- (d) Clear LEN Failure in Line Unit Grid—Procedure 3.5
- (e) Test a Specific Line Unit Grid Path—Procedure 3.6 .

Before performing this procedure, craftspersons should be aware of the general requirements for the handling and care of circuit packs as outlined in 235-105-110, *System Maintenance Requirements and Tools*.

If a reference is made to the use of a POKE command, access to the appropriate display pages on the video terminal located at the Master Control Center (MCC) is assumed. If the MCC terminal is not available, the appropriate DGN Input/Output (I/O) messages may also be used. These I/O messages are documented in 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

Section 4 — Diagnostic Test Supporting Information, contains the diagnostic phase descriptive information (in the form of tables) for all hardware (units/circuits) of the 5ESS® switch.

The LU2 (J5D004AC-1) and LU3 (J5D004AD-1) are very similar LUs. There are several places in these procedures where LU1 (J5D004AB-1) and LU2 are referenced, but LU3 is not. In these cases, the LU3 has the same procedures/descriptions as the LU2. For example, line unit high-level service circuit (LUHLSC) diagnostic phase descriptions (Table 4-76) are applicable to both LU2 and LU3. Similarly, any reference to TN838 grids also apply to the TN1048 and TN1058 grid packs.

The entry, [PR Name=xxxxxxx] in the DESCRIPTION/WHAT IS TESTED column is a mnemonic reference to the appropriate diagnostic program (PR) listing.

Before performing this procedure, craftspersons should review and conform to the following **Cautions**:

CAUTION 1: Before replacing a circuit pack or backside paddleboard in an SM/SM-2000's Module Controller/Time Slot Interchange (MCTSI), Dual Link Interface (DLI), Remote Link Interface (RLI), or any Administrative Module (AM) or Communication Module (CM) unit, remove power at the unit as follows:

- (a) *Locate the unit's power control pack (for example, SN516, 414AA, TN1077, TN5, TN6, etc.).*
- (b) *Verify that the unit is OOS and associated OOS lamp is on.*

Before replacing a Message Switch (MSGS) or Input/Output Processor (IOP) subunit pack such as a Foundation Peripheral Controller (FPC), Pump Peripheral Controller (PPC), Module Message Processor (MMP), Communication Module Processor (CMP), Quad Link Packet Switch Gateway Processor (QGP), Teletypewriter Controller (TTYC), Maintenance TTYC (MTTYC), Magnetic Tape Controller (MTC), Synchronous Data Link Controller (SDLC), etc., all subunits in the affected community must be removed from service [via "ROS/RST" (request OOS/restore to service) switch] before power is removed from the community.

- (c) *Remove power from the unit (via OFF switch).*

The SM-2000 NLI is an exception to the above caution. NLI paddleboards, which connect to 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).

CAUTION 2: If instructed to remove, replace, or swap a pack, in a powered up LU, do not replace a TN340 without first pulling the two TN338s in the same LU GRID. Do not replace a TN332 or TN832 without first pulling the associated TN331 or TN831, respectively. See Procedure 12.5, Perform Sequential Removal and Insertion of LU Circuit Packs.

CAUTION 3: In replacing a TN878 or a TN1418 board in an SM/SM-2000 to resolve a Bootstrapper (BTSR) diagnostic failure, do the following to avoid causing MCTSI hardware errors:

- (a) *Remove the associated standby (STBY) MCTSI from service.*
- (b) *Replace the TN878 or the TN1418. The replacement board must be the same type as the removed board (for example, a TN1418 replaces a TN1418 only).*
- (c) *Restore the MCTSI unconditionally with the unconditional (UCL) option of the RST command before running the BTSR diagnostic.*

CAUTION 4: In an Optically Remote Module (ORM) application, there may be a special concern when repairing the Time Multiplexed Switch (TMS), ORM DLI, or Transmission Rate Converter Unit (TRCU). Normally, the TRCUs are directly connected via optical fibers and no special precautions are required. However, some Operating Companies have installed High Speed Transmission Systems that multiplex several TMS TRCU to ORM TRCU signals. This is usually for the purpose of reducing transmission equipment costs. A special concern may exist when the separate Transmission System includes "Protection Switching" capabilities.

In some applications that include a Transmission System between the TRCUs, repair activities that result in the loss of the DS3 signal from the TRCU at either end can cause the Transmission System to perform a "Protection Switch." The execution of a "Protection Switch" introduces a short break in all signals that are multiplexed onto the Transmission System. For those applications where repair activities result in the execution of a Transmission System "Protection Switch", it may be desirable to take

appropriate actions that prevents the "Protection Switch" from occurring before the repair activity on the TMS, TRCUs, or ORM DLIs are performed. The actions necessary to prevent the "Protection Switch" are dependent on the type of Transmission System installed and local procedures.

CAUTION 5: Protocol Handlers (PHs) must be removed from service before being physically removed for replacement (even if the Packet Switch Unit Common (PSUCOM) is already removed from service). The input command for removing a PH is contained in the 235-600-700, *Input Message Manual*. The PHs are located in slots 006-062 and 128-184.

PROCEDURE

1. Determine if the failure pattern is consistent or intermittent by performing Substeps (a) through (i) as follows:

- (a) Obtain the original diagnostic failure (DGN STF) printout with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.
- (b) Determine if there is also a power alarm or fuse alarm active at the failing unit. If so, use Procedure 6.4, Respond to a Fuse Alarm (FA)/Power Alarm (PWR ALM) Failure, to clear the power problem in the unit.
- (c) Use the **DIAGNOSE** poke command (on appropriate display page) or **DGN** input message (from 235-600-700) to diagnose the unit/circuit and get a second STF printout and SUSPECTED FAULTY EQUIPMENT list. Refer to the following note.

NOTE: 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). Also, these diagnostics causes the ONTC to be simplexed. This may cause stable calls to be dropped if the mate ONTC is degraded. Therefore, it may be best to wait for a low-traffic period.

- (d) Compare the two diagnostic failure printouts. Refer to the following note.

NOTE: When comparing the diagnostic printouts to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) numbers.

- (e) If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Step 3.
- (f) If the diagnostic now passes, diagnose the unit/circuit at least two more times. If the failure was **LU TST:GRID** or **TST:GRIDBD** and intermittent behavior is suspected, Procedure 3.6, Test a Specific LU Grid Path, may be used to quickly execute repeated tests on the specific path that failed.
- (g) If the failure is inconsistent/intermittent, determine the dominant pattern.
- (h) If there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list.
- (i) If the unit/circuit is no longer failing, go to Step 6 (making a note of this incident and the failure pattern

for future reference).

2. Examine the next pack on SUSPECTED FAULTY EQUIPMENT list by performing Substeps (a) through (g) as follows:
 - (a) If entries on SUSPECTED FAULTY EQUIPMENT list have been exhausted, go to Step 7.
 - (b) If a Small Computer System Interface (SCSI) disk unit/pack is implicated, perform Procedure 10.6 , Troubleshoot Small Computer System Interface Disk Unit Package (DUP), to clear the problem.
 - (c) If a Digital Audio Tape (DAT) drive is implicated, perform Procedure 10.10 to clear the problem.
 - (d) 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. The text for the note can be obtained by entering the **OP:TLPNOTE n** command, where **n** is the note number.
 - (e) If the next pack is in the circuit under test, continue to Step 3.
 - (f) If the pack is in another circuit, remove and diagnose the other circuit.

NOTE 1: A "forced switch" may be required before the other "on-line/active" unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and call for technical assistance.

NOTE 2: If a "forced switch" of the AM Control Unit (CU) is required, special precautions are required to insure the appropriate initialization level of the OOS CU to the active state. An RTR level 4 is always required if the side to be forced active has been previously powered down. Seek technical assistance with 3B Customer Technical Support for appropriate procedures for forcing active an OOS CU.

- (g) If the diagnostic for the other circuit is STF, choose which diagnostic (and SUSPECTED FAULTY EQUIPMENT list) to continue working (it is usually best to work the circuit that is highest in the control hierarchy).
3. Observe the **Cautions** in the OVERVIEW and replace the suspect circuit pack.

NOTE: The replacement pack vintage should be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list printout (per "DGN" pages in the Output Message Manual). For example, when code "TN1077" minimum series "5" is printed, the replacement pack could be either a TN1077 Series 5 (or later series), or TN1077B (any series), or TN1077C (any series), etc. The microcode number (for example, MC5D045A1) is printed for "microcoded" packs. In all cases, the replacement pack vintage should be equal to or greater than that printed. For example, when code "MC5D045A3D" minimum issue "2" is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later issue), or an MC5D045A4D (any issue) or an MC5D045A3E (any issue), etc.

4. Check to see if the pack replacement cleared the failure by performing Substeps (a) through (c) as follows:
 - (a) Diagnose the circuit. Refer to the following notes in this substep:

NOTE 1: Time can be saved in this substep by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request.

NOTE 2: When working an intermittent/inconsistent failure, several runs of the diagnostic/phase may be required to know if the pack replacement has cleared the problem.

- (b) If the diagnostic result is all tests passed (ATP), go to Step 5.
 - (c) If identical STF is output (PH, SEG, TEST, and MM), return original pack to the unit and proceed to the next pack on the SUSPECTED FAULTY EQUIPMENT list (Step 2). If different STF is output, diagnose the circuit again.
 - (1) If a repeat of the previous dominant failure, return the original pack to the unit and proceed to the next pack on the list (Step 2).
 - (2) If the dominant failure is now different from the original failure, the spare pack is probably faulty (or wrong series, etc.) and another spare pack should be tried (Step 3).
5. Verify that the failure follows the suspected faulty pack by performing Substeps (a) through (c) as follows:
- (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 3 and diagnose the circuit again.
 - (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack and go to Step 6.
 - (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the problem is apparently cleared with no faulty pack identified. Go to Step 6 (make a note of this incident and the failure pattern for possible future reference).
6. Request a RESTORE of the unit/circuit to service by performing Substeps (a) through (c) as follows:
- NOTE:** If a QLPS was repaired **and** its parent ONTCCOM was originally OOS/UNAV-FRC, but thought to be fault-free, do not attempt to restore the QLPS after repair is complete. Also, if repair of an UNAV-FRC MSCU or ONTCCOM is required, do not attempt to restore the unit after repair is complete.
- (a) If the restore diagnosis is STF, the problem has not been cleared. Go to Step 4.
 - (b) If the circuit restored is an LU GRID or GRIDBD, go to Step 8.
 - (c) 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 be scheduled for **both** the **original** unit, and also the **parent** of the suspect/replaced circuit pack. If the restore diagnosis fails on the **interface unit**, treat it as a **different** problem starting at Step 1.
 - (d) Else, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
7. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, proceed as follows:
- (a) Replace (one at a time) any power converter packs (for example, 495FB) in the unit that supplies power to packs on the SUSPECTED FAULTY EQUIPMENT list (low voltage from a power converter can cause other packs to misbehave).

NOTE 1: If an LU is found with multiple grids OOS, with strings of GDXGRID power alarms associated with the OOS gridboard, replace the OOS gridboards before attempting to restore the LU.

NOTE 2: If the problem has not been cleared at this point, make a judgment on which of the following Substeps (b) through (g) is the appropriate alternative, depending on the situation.

- (b) 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 1 after completing those repairs.
 - (c) Call for next higher level of technical assistance, particularly if the trouble is in a critical duplex unit such as Control Unit (CU), CMP, Office Network Timing Complex (ONTC), ONTC Common (ONTCCOM), or MCTSI.
 - (d) Replace (one at a time) the remaining packs in the unit not previously tried.
 - (e) Replace (one at a time) the packs in adjacent unit(s) with interfaces to the failing unit.
 - (f) Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. Multiple-pack swaps must be done very carefully so as not to create additional problems.
 - (g) Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Section 4 , — Supporting Information, as an aid in locating the appropriate PR. The prologue for the diagnostic phase and comments and code associated with the failing segment and test may give insight as to what is being tested and which control/data paths are being used.
8. Verify in-service grid exercise test as a final check of LU GRID or GRIDBD by performing Substeps (a) through (d) as follows:
- (a) Use the **RST:LINE** input message to restore any LINE previously placed OOS due to the grid trouble.
 - (b) Check the results of the grid exercise test on the GRID or GRIDBD.
 - (c) If the grid test fails (STF), perform Procedure 3.3 , Clear LU Grid Exercise Test Failure.
 - (d) If the grid test passes (ATP), **STOP. YOU HAVE COMPLETED THIS STEP.**
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 3.2: CLEAR A-LINK FAILURE IN LINE UNIT

OVERVIEW

This procedure contains information for clearing an A-LINK failure in a Line Unit (LU).

PROCEDURE

1. Using Figures 3.2-1 and 3.2-2 for J5D004AB-1 or Figure 3.2-3 for J5D004AC-1, determine which grids are associated with the failing A-LINK.
2. At the Master Control Center (MCC) video terminal, enter a request to restore the A-LINK (so that it will be tested in the next step).
3. At the MCC video terminal, use the **TEST** poke to run the in-service test or the **TST:LEN** command of Procedure 3.6, Test a Specific Line Unit Grid Path, on each associated grid, observing Substeps (a) through (c) as follows:
 - (a) If grids are all tests passed (ATP), go to Step 4.
 - (b) If grids are not ATP, try using Procedure 3.3, Clear LU Grid Exercise Test Failure, to clear the trouble.
 - (c) If use of Procedure 3.3 is unsuccessful, then continue to Step 4.
4. Using Sheet D3 of the Circuit Pack Schematic (CPS) for the first stage grid pack (TN338 in J5D004AB-1 or TN838 in J5D004AC-1), determine the backplane pins and wires associated with the A-LINK.
5. Check the backplane for wiring shorts, breaks, bent pins, etc.
6. If the trouble cannot be found, enter a request to remove the A-LINK from service and seek the next higher level of technical assistance.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

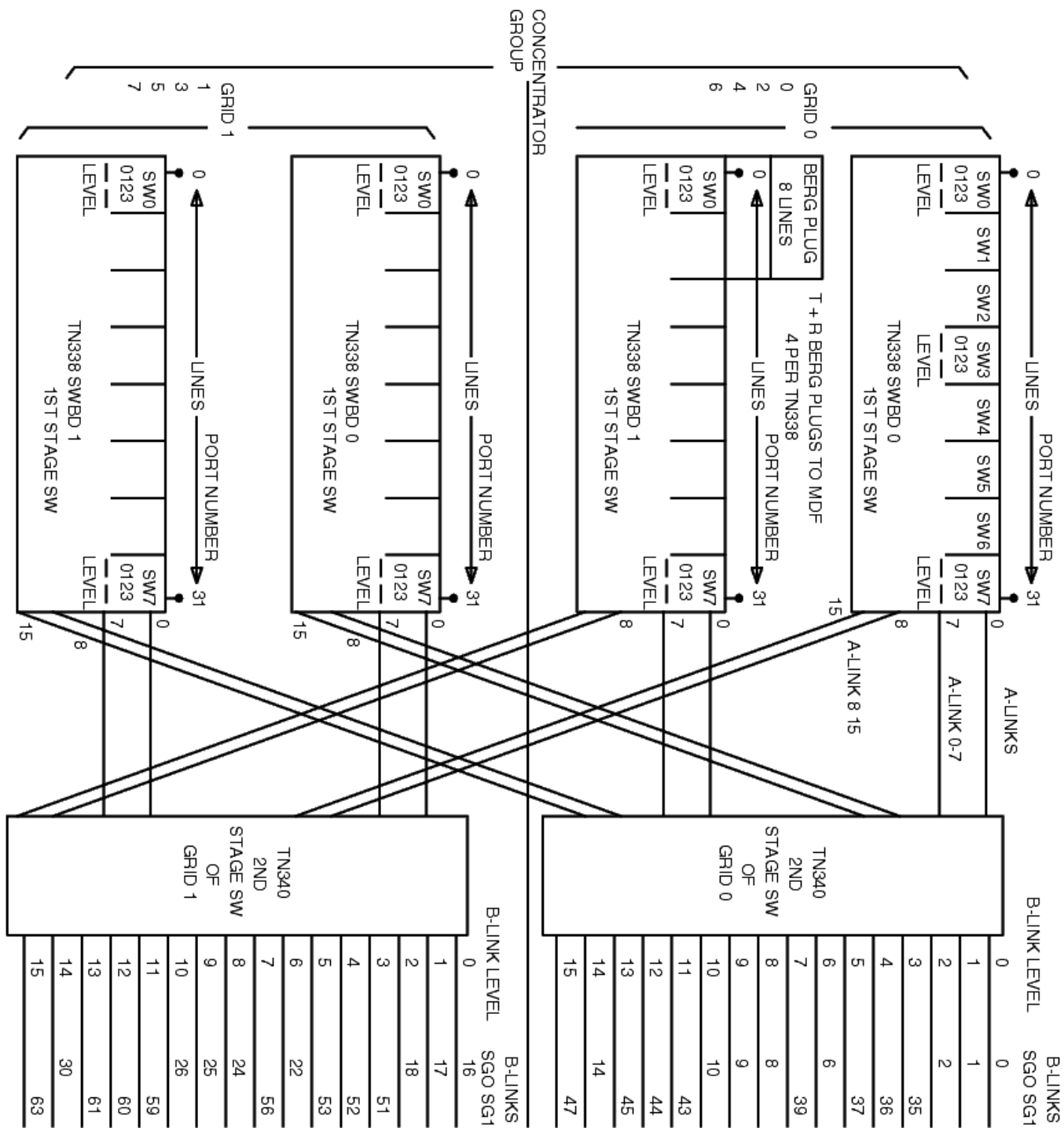


Figure 3.2-1 J5D004AB-1 Line Unit Concentrator Group

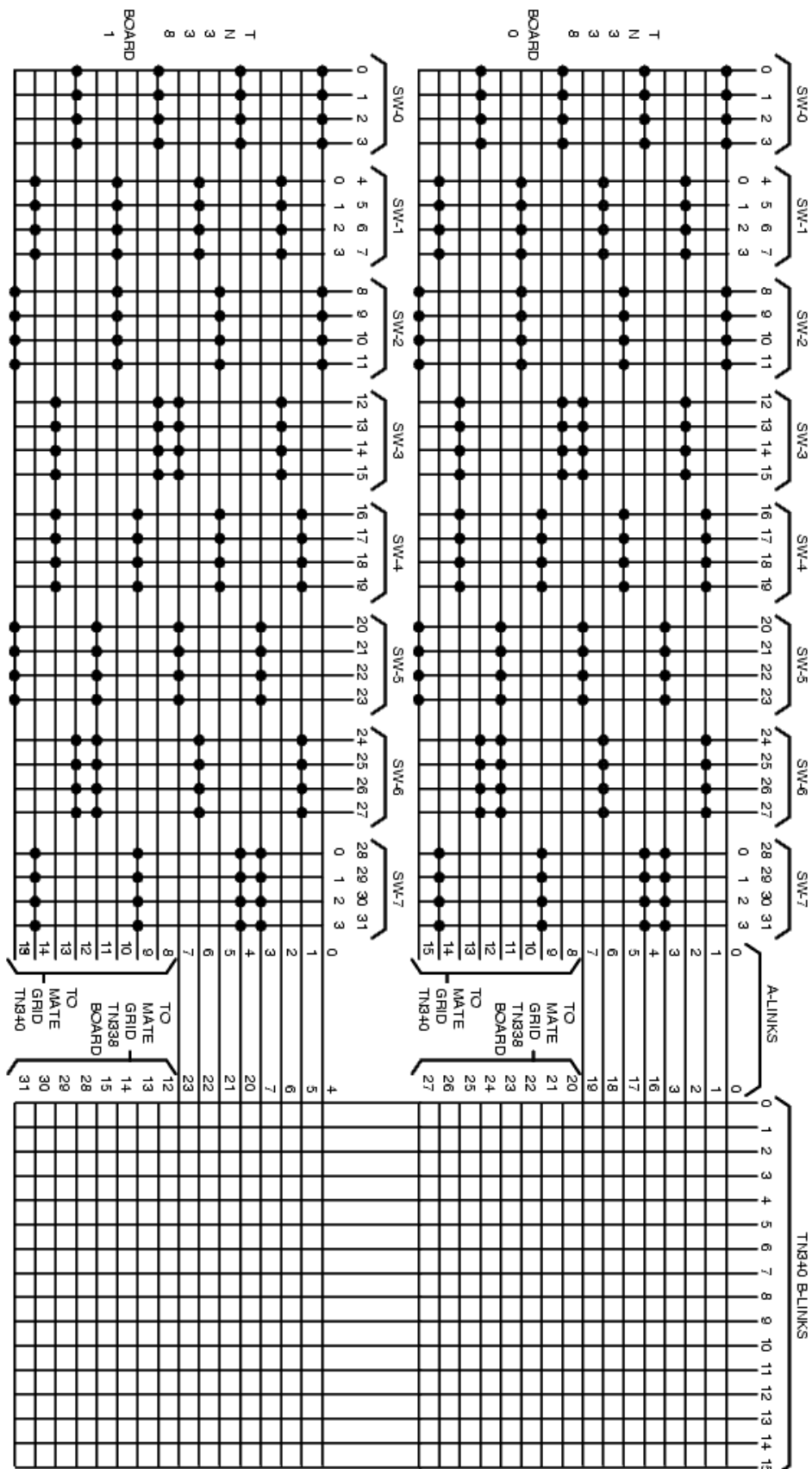
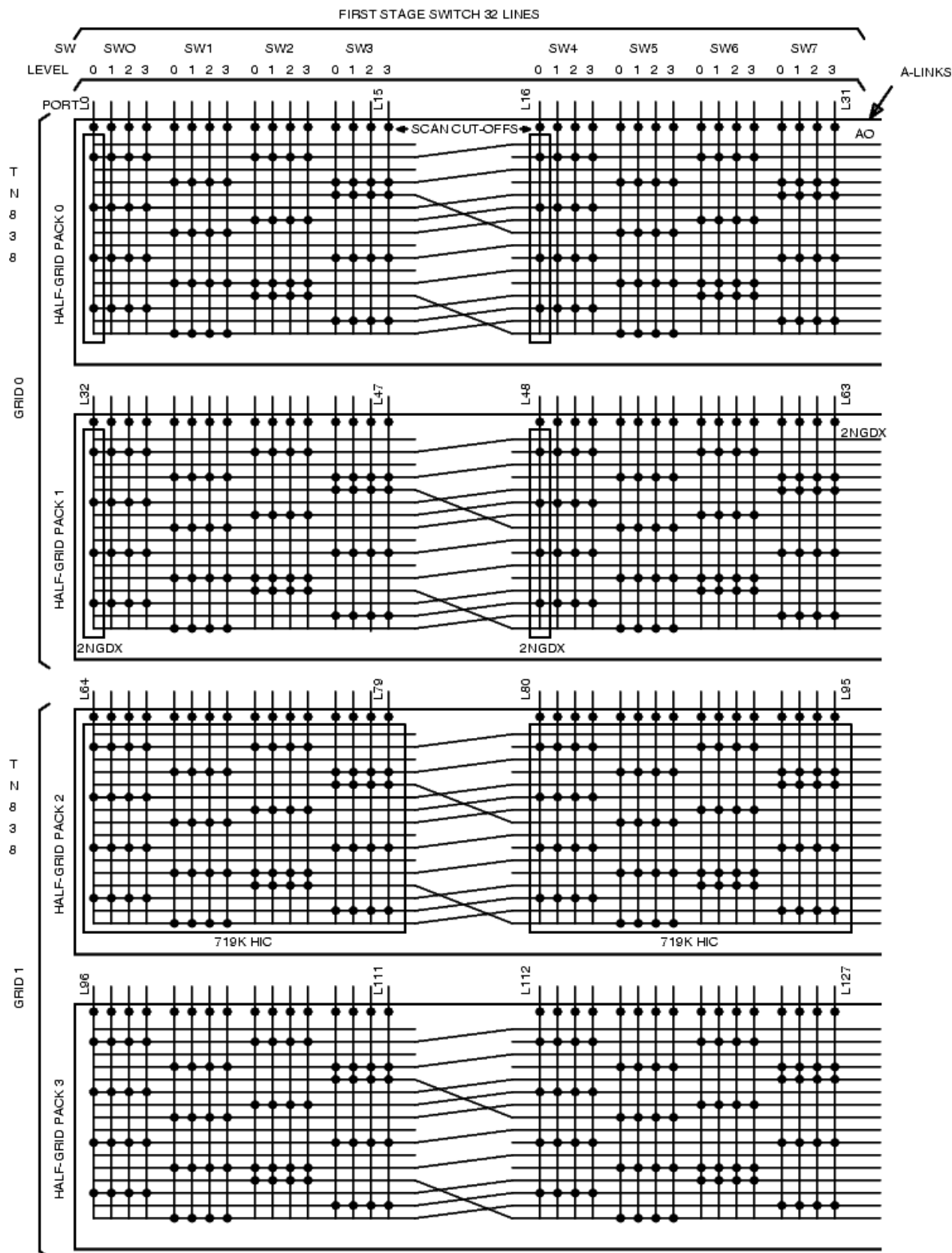
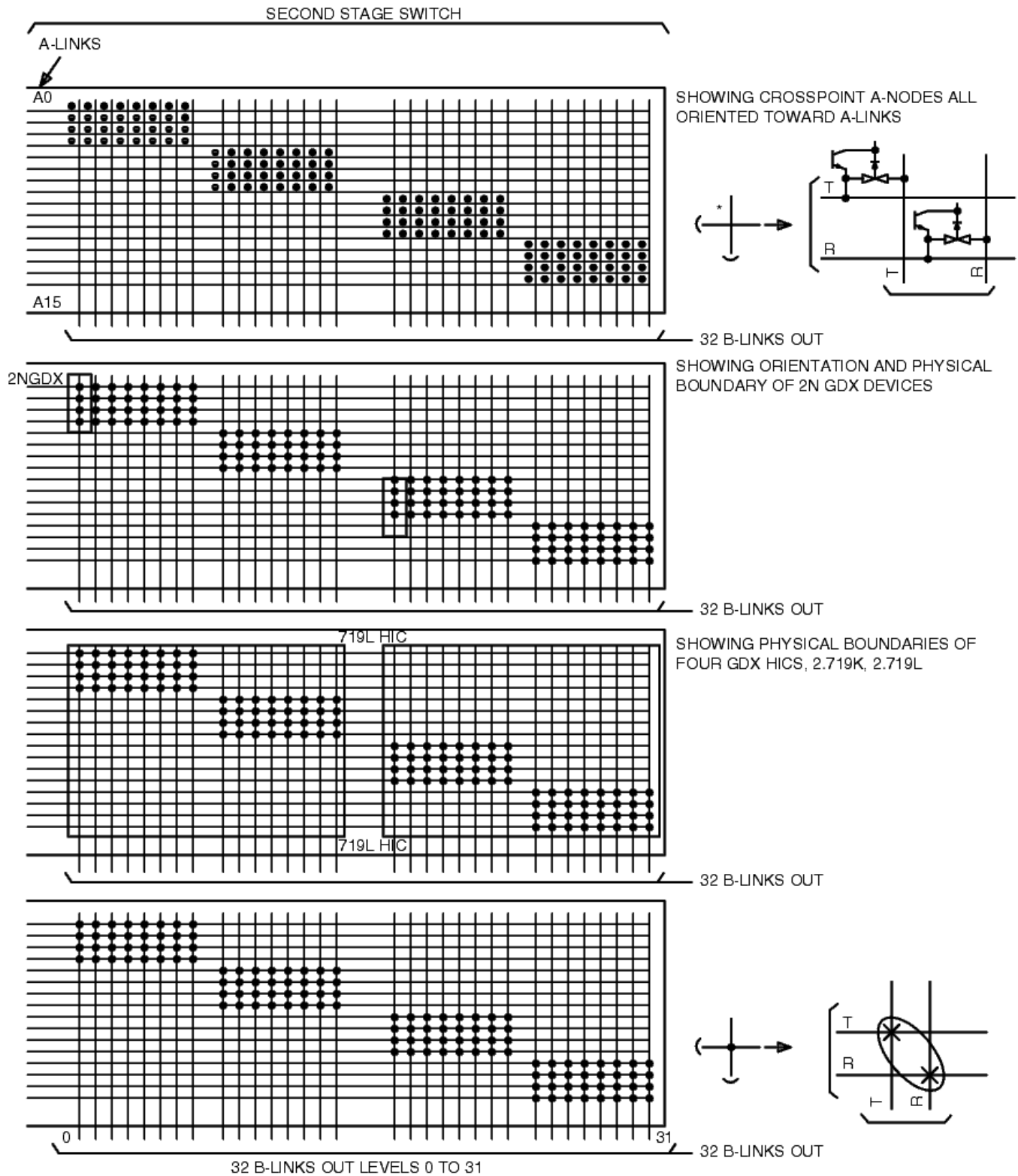


Figure 3.2-2 J5D004AB-1 Line Unit Switch Grid





NOTE: ALL PATHS ON THIS SHEET ARE 2-WIRE TIP AND RING.

Figure 3.2-3 J5D004AC-1 Line Unit Concentrator Group

Procedure 3.3: CLEAR LINE UNIT GRID EXERCISE TEST FAILURE

OVERVIEW

This procedure contains information for clearing a Line Unit (LU) Grid Exercise test failure. For fail types and related test execution dependencies, refer to Table 3.3-1.

Table 3.3-1 reflects the basic and typical usage of the Fabric Exerciser (FABEX). The effect of options such as **UCL** or **RAW** are not considered. The purpose of the data is to provide the fundamental execution of the FABEX. The final completion code in multi-phase requests is that of the most severe phase completion code. The grid state will be "DGR" on final completion code of STF.

PROCEDURE

1. Determine if the failure pattern is consistent by performing Substeps (a) through (f) as follows:
 - (a) Use the **TEST** poke (or **TST** input message) to run an in-service grid exercise test again and get a SUSPECTED FAULTY EQUIPMENT list.

NOTE: When comparing SUSPECTED FAULTY EQUIPMENT lists to determine a failure pattern, be sure to examine phase number, segment number, test number, and mismatch number.
 - (b) If the grid test fails and the some test failed (STF) output message is the same as the original failure, continue to Step 2.
 - (c) If the grid test does not fail, run an in-service grid test again at least twice.

NOTE: If intermittent behavior is suspected, Procedure 3.3 Test a Specific Line Unit Grid Path, may be used to execute repeated tests on the specific path that failed.
 - (d) If the failure is inconsistent or intermittent, try to determine the dominant failure pattern and use the associated SUSPECTED FAULTY EQUIPMENT list.
 - (e) If there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list.
 - (f) If the unit/circuit is no longer failing, go to Step 6 (make a note of this incident and the failure pattern for future reference).
2. Examine the STF output message and observe the following note.

NOTE: If the FAIL_TYPE is either FALSE CROSS, POWER CROSS, or FOREIGN POTENTIAL, use Procedure 7.1, Perform Line Maintenance, on the indicated line equipment number (LEN) before attempting LU circuit pack replacements.
3. Examine the circuit packs on the SUSPECTED FAULTY EQUIPMENT list by performing Substeps (a) through (c) as follows:
 - (a) If a pack in another circuit (not another grid pack) is listed [for example, LU High-Level Service Circuit (LUHLSC)], remove and diagnose that circuit.
 - (b) If the other circuit's diagnosis is STF, use the associated SUSPECTED FAULTY EQUIPMENT list and Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS® switch, to clear the diagnostic failure.

- (c) If the other circuit's diagnosis is not STF, continue to Step 4.
- 4. Remove and diagnose the grid under test by performing Substeps (a) through (c) as follows:
 - CAUTION:** Removing a grid will interrupt service to either 32 or 64 customers, depending on the LU model. Refer to local practices before proceeding.
 - (a) Use the **DIAGNOSE** poke to remove and diagnose the grid.
 - (b) If the grid diagnosis is STF, use the associated SUSPECTED FAULTY EQUIPMENT list and Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS® switch, to clear the diagnostic failure.
 - (c) If the grid diagnosis is not STF, select the first pack on the grid test failure SUSPECTED FAULTY EQUIPMENT list as the first suspect pack and continue to Step 5.
- 5. Observe the caution and replace the suspect circuit pack with a spare.
 - CAUTION:** Do not replace a TN340 without first pulling the two TN338s in the same LU GRID. Do not replace a TN332 or TN832 without first pulling the TN331 or TN831, respectively, in the same LU GDXACC. See Procedure 12.5, Perform Sequential Removal and Insertion of LU Circuit Packs.
- 6. Check to see if the circuit pack replacement cleared the failure by performing Substeps (a) through (c):
 - (a) Use the **RESTORE** poke to request diagnosis and restoral of the grid.
 - (b) If restore diagnosis is STF, the spare circuit pack is probably faulty and another spare pack should be tried (Step 5).
 - (c) If the grid diagnosis is ATP and the grid is restored, use the **TEST** poke to run in-service grid exercise test and analyze per Substeps 1 through 4 as follows:
 - (1) If the grid test result is ATP, the problem has apparently been cleared.
STOP. YOU HAVE COMPLETED THIS PROCEDURE.
 - (2) If the grid test failed, but the STF output message is different, the spare pack is probably faulty and another spare pack should be tried (Step 5).
 - (3) If the grid test failed with same STF output message as the original failure, return the original pack to the grid, select the next pack on the SUSPECTED FAULTY EQUIPMENT list and return to Step 5.
 - (4) If the SUSPECTED FAULTY EQUIPMENT list has been exhausted, continue to Step 7.
- 7. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, make a judgment on which of the following Substeps (a) through (e) is the appropriate alternative depending on the situation:
 - (a) Replace other circuit packs in the grid not previously tried.
 - (b) If the grid exercise test STF output message indicates a specific failing A-LINK, B-LINK, or LEN, then go to:
 - (1) Clear A-Link Failure in Line Unit—Procedure 3.2.
 - (2) Clear B-Link or LUCHAN Failure in Line Unit Grid—Procedure 3.4.

(3) Clear LEN Failure in Line Unit Grid—Procedure 3.3 .

- (c) If the grid test result is inconsistent, it may be due to a faulty LUHLSC. Try removing (one at a time) each LUHLSC and running the grid test.
- (d) If the grid test runs consistently ATP with an LUHLSC removed, then that LUHLSC pack is probably faulty.
- (e) If suggested actions have not been successful, seek the next higher level of technical assistance.

8. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Table 3.3-1 Response of FAB to Failures and Other Encountered Conditions

FAILURE TYPE	TYPE	ROP PRINTS	FAB STOPS	COMPL. CODE IF FAILS IN: ^a			
				(P)	PH 1	PH 2	PH 3
A-Link Busy	Auto	No	No	N/A	n	c	n
	Man	No	No	N/A	n	c	n
B-Link Busy	Auto	No	No	N/A	n	n	c
	Man	No	No	N/A	n	n	c
Control To Grid	Auto	Yes	Yes	STF	N/A	N/A	N/A
	Man	Yes	Yes	STF	N/A	N/A	N/A
False Cross	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Foreign Potential	Auto	No	No	N/A	CATP	CATP	CATP
	Man	Yes	No	N/A	CATP	CATP	CATP
Latch Read	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Off Hook Recognition	Auto	No	No	N/A	N/A	N/A	N/A
	Man	Yes	No	N/A	CATP	N/A	N/A
Open X-Pt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Power Alarm	Auto	Yes	Yes	STF	N/A	N/A	N/A
	Man	Yes	Yes	STF	N/A	N/A	N/A
Power Cross	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Resource (Before Test State)	Auto	Yes	Yes	NTR	NTR	CATP	CATP
	Man	Yes	Yes	NTR	NTR	CATP	CATP
Resource (During Ph Tests)	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Scanner Ckt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Shorted X-Pt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
V+ Low	Auto	Yes	Yes	STF	STF	STF	STF
	Man	Yes	Yes	STF	STF	STF	STF
V+ Restored	Auto	Yes	Yes	STF	STF	STF	STF
	Man	Yes	Yes	STF	STF	STF	STF
X-Pt Left On (AUD Option)	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Bad Data On Request	Auto	No	Yes	NTR	N/A	N/A	N/A
	Man	Yes	Yes	NTR	N/A	N/A	N/A
Can't Send Message	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Data Base Error	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Early	Auto	Yes	Yes	N/A	NTR	CATP	CATP
	Man	Yes	Yes	N/A	NTR	CATP	CATP

Termination							
Release	Auto	No	Yes	N/A	CATP	CATP	CATP
	Man	Yes	Yes	N/A	CATP	CATP	CATP
Failed							
Timeout	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Seized Resource	Auto	No	Yes	N/A	CATP	CATP	CATP
	Man	Yes	Yes	N/A	CATP	CATP	CATP
Unavailable							
Stopped By	Auto	a	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Request							
Notes: a. Prints only if STF occurred in a test phase. CATP = conditional all tests pass. NTR = no tests run. STF = some tests fail. N/A = not applicable. c = changes ATP to CATP. n = changes ATP to CATP only if all associated ports/links busy. (P) = fails in pre-phase inits/resource seizure.							

Procedure 3.4: CLEAR B-LINK OR LUCHAN FAILURE IN LINE UNIT GRID

OVERVIEW

This procedure contains information for clearing a B-LINK or line unit channel circuit (LUCHAN) failure in a line unit (LU) grid.

PROCEDURE

1. If working a B-LINK failure, determine which LUCHAN is associated with the B-LINK using Figure 3.4-1 for J5D004AB-1, Figure 3.4-2 for J5D004AC-1, or Figure 3.4-3 for J5D004AD-1.
2. Diagnose the LUCHAN circuit by performing Substeps (a) through (c) as follows:
 - (a) If the diagnosis is all tests passed (ATP), go to Step 3.
 - (b) If the diagnosis is not ATP, try using Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] switch, and the LUCHAN diagnostic to clear the trouble.
 - (c) If the previous step does not clear the trouble, continue to Step 3.
3. Diagnose the GDXACC circuit (SG 0 or 1) associated with the LUCHAN by performing Substeps (a) through (c) as follows:
 - (a) If the diagnosis is ATP, go to Step 4.
 - (b) If the diagnosis is not ATP, try using Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] switch, and the GDXACC diagnostic to clear the trouble.
 - (c) If the previous step does not clear the trouble, continue to Step 4.
4. If this procedure is entered with a LUCHAN failure, determine the associated B-LINK and grid circuit packs using Figure 3.4-1 for J5D004AB-1, Figure 3.4-2 for J5D004AC-1, or Figure 3.4-3 for J5D004AD-1.
5. Use the **TEST** poke to run in-service grid exercise tests on GRID or GRIDBD (not previously tested) by performing Substeps (a) through (c) as follows:
 - (a) If grid test is ATP, go to Step 6.
 - (b) If grid test is not ATP, try using Procedure 3.2, Clear A-Link Failure in Line Unit, and Procedure 3.3, Clear LU Grid Exercise Failure.
 - (c) If the previous step does not clear the trouble, continue to Step 6.
6. Use sheet D3 of the Circuit Pack Schematic (CPS) for the grid pack (either TN340 or TN838), to determine the backplane pins associated with the B-LINK.
7. Check the backplane for wiring shorts, breaks, bent pins, etc.
8. If the trouble is not yet been cleared, seek the next higher level of technical assistance.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

MODEL 1 LINE UNIT SERVICE GROUP 0
LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

TN340 B-LINK LEVEL	CONCENTRATOR GROUP 0										GDXACC	BOARD CHAN	TN335
	GRID 0		GRID 1		CG1 G2 G3		CG2 G4 G5		CG3 G6 G7		B-LINK		
0	X				X						0	▲	0-0
1	X						X				1		1-0
2	X								X		2		2-0
3					X		X				3		3-0
4					X				X		4		0-1
5							X		X		5		1-1
6	X						X				6	T	2-1
7					X				X		7	N	3-1
												3	
8	X				X						8	3	0-2
9	X						X				9	2	1-2
10	X								X		10		2-2
11					X		X				11		3-2
12					X				X		12		0-3
13							X		X		13		1-3
14	X						X				14		2-3
15					X				X		15	▼	3-3
0		X				X					16	▲	0-4
1		X						X			17		1-4
2		X							X		18		2-4
3					X		X				19		3-4
4					X				X		20		0-5
5							X		X		21		1-5
6		X					X				22	T	2-5
7					X				X		23	N	3-5
												3	
8		X			X						24	3	0-6
9		X					X				25	1	1-6
10		X							X		26		2-6
11					X		X				27		3-6
12					X				X		28		0-7
13							X		X		29		1-7
14		X					X				30		2-7
15					X				X		31	▼	3-7

≡≡≡ A-LINKS

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE GRID B-LINK INPUT LEVEL FROM THE B-LINKS OF THE GDXACC OF SG0. ONE B-LINK HAS MULTIPLE CONNECTIONS TO TWO GRIDS.

MODEL 1 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

TN340 B-LINK LEVEL	CONCENTRATOR GROUP 0										B-LINK	GDXACC	TN335 BOARD CHAN
	GRID 0 GRID 1		CG1 G2 G3		CG2 G4 G5		CG3 G6 G7						
0							X	X	X	0/32	▲	0-0	
1					X	X		X		1/33		1-0	
2					X		X			2/34		2-0	
3	X	X						X		3/35		3-0	
4	X						X			4/36		0-1	
5	X				X					5/37		1-1	
6					X			X		6/38	T	2-1	
7	X						X			7/39	N	3-1	
											3		
8							X		X	8/40	3	0-2	
9					X			X		9/41	2	1-2	
10					X		X			10/42		2-2	
11	X							X		11/43		3-2	
12	X						X			12/44		0-3	
13	X				X					13/45		1-3	
14					X			X		14/46		2-3	
15	X						X			15/47	▼	3-3	
0							X	X	X	16/48	▲	0-4	
1					X				X	17/49		1-4	
2					X		X			18/50		2-4	
3	X	X							X	19/51		3-4	
4		X					X			20/52		0-5	
5		X			X					21/53		1-5	
6					X				X	22/54	T	2-5	
7		X					X			23/55	N	3-5	
											3		
8							X		X	24/56	3	0-6	
9					X				X	25/57	1	1-6	
10					X		X			26/58		2-6	
11		X							X	27/59		3-6	
12		X					X			28/60		0-7	
13		X			X					29/61		1-7	
14					X				X	30/62		2-7	
15		X					X			31/63	▼	3-7	

≡≡≡ A-LINKS

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE GRID B-LINK INPUT LEVEL FROM THE B-LINKS OF THE GDXACC OF SG1. ONE B-LINK HAS MULTIPLE CONNECTIONS TO TWO GRIDS.

Figure 3.4-1 J5D004AB-1 Line Unit Channel-to-B-LINK-to-Grid Assignment

MODEL 2 LINE UNIT SERVICE GROUP 0
LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

TN838 B-LINK LEVEL																	TN335		
	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7		B- L I N K	B O A R D	C H A N
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13	HG 14	HG 15			
0	*		*		*		*		*		*		*		*		0	0-0	
1		*	*			*		*		*	*			*		*	1	1-0	
2	*			*	*			*	*			*	*			*	2	2-0	
3		*		*		*	*			*		*		*	*		3	3-0	
4	*		*			*		*	*		*			*		*	4	0-1	
5		*	*		*		*			*	*		*		*		5	1-1	
6	*			*		*	*		*			*		*	*		6	2-1	
7		*		*	*			*		*		*	*			*	7	3-1	
8		*		*		*		*		*		*	*		*		8	0-2	
9	*			*	*		*		*		*			*		*	9	1-2	
10		*	*		*	*			*	*			*		*		10	2-2	
11	*		*		*			*	*		*			*	*		11	3-2	
12		*		*	*		*			*		*		*		*	12	0-3	
13	*			*		*		*	*			*	*		*		13	1-3	
14		*	*		*			*		*	*			*	*		14	2-3	
15	*		*			*	*		*		*		*			*	15	3-3	
16		*	*		*		*		*		*		*		*	*	16	0-4	
17	*		*			*		*		*		*	*		*		17	1-4	
18		*		*	*			*	*		*			*	*		18	2-4	
19	*			*		*	*			*	*		*			*	19	3-4	
20		*	*			*		*	*			*	*		*		20	0-5	
21	*		*		*		*			*		*		*		*	21	1-5	
22		*		*		*	*		*		*		*			*	22	2-5	
23	*			*	*			*		*	*			*	*		23	3-5	
24	*			*		*		*		*	*			*		*	24	0-6	
25		*		*	*		*		*		*		*		*		25	1-6	
26	*		*			*	*			*		*		*	*		26	2-6	
27		*	*		*			*	*			*	*			*	27	3-6	
28	*			*	*		*			*	*		*		*		28	0-7	
29		*		*		*		*	*		*			*		*	29	1-7	
30	*		*		*			*		*		*	*			*	30	2-7	
31		*	*			*	*		*			*		*	*		31	3-7	

NOTE: THE (X) INDICATES A HARDWARE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL FROM THE SG0 B-LINKS OF THE GDXACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 8 HALF-GRIDS.

MODEL 2 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

TN838 B-LINK LEVEL																	B- L I N K	TN335	
	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7			B O A R D	C H A N
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13	HG 14	HG 15			
0		*		*		*		*		*		*		*		*	0	0-0	
1	*			*	*		*		*		*	*		*	*		1	1-0	
2		*	*			*	*			*	*			*	*		2	2-0	
3	*		*		*			*	*		*		*			*	3	3-0	
4		*		*	*		*		*		*	*		*	*		4	0-1	
5	*			*		*		*	*		*		*		*	*	5	1-1	
6		*	*		*			*		*	*		*			*	6	2-1	
7	*		*			*	*		*		*			*	*		7	3-1	
8	*		*		*		*		*		*			*		*	8	0-2	
9		*	*			*		*		*	*		*		*		9	1-2	
10	*			*	*		*	*		*		*		*	*		10	2-2	
11		*		*		*	*			*		*	*			*	11	3-2	
12	*		*			*		*	*		*		*		*		12	0-3	
13		*	*		*		*		*	*		*		*		*	13	1-3	
14	*			*		*	*		*			*	*			*	14	2-3	
15		*		*	*			*		*		*		*	*		15	3-3	
16	*			*		*		*		*	*		*		*		16	0-4	
17		*		*	*		*		*		*			*		*	17	1-4	
18	*		*			*	*		*		*	*	*			*	18	2-4	
19		*	*		*			*	*		*			*	*		19	3-4	
20	*			*	*		*			*	*			*		*	20	0-5	
21		*		*		*		*	*		*		*		*		21	1-5	
22	*		*		*			*		*		*		*	*		22	2-5	
23		*	*			*	*		*			*	*			*	23	3-5	
24		*	*		*		*		*			*	*		*		24	0-6	
25	*		*			*		*		*		*		*		*	25	1-6	
26		*		*	*			*	*		*		*			*	26	2-6	
27	*			*		*	*		*	*				*	*		27	3-6	
28		*	*			*		*	*		*		*		*	*	28	0-7	
29	*		*		*		*		*		*	*	*		*		29	1-7	
30		*		*		*	*		*		*			*	*		30	2-7	
31	*			*	*			*		*	*		*			*	31	3-7	

NOTE: THE (X) INDICATES A HARDWARE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL FROM THE SG1 B-LINKS OF THE GDXACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 8 HALF-GRIDS.

Figure 3.4-2 J5D004AC-1 Line Unit Channel-to-B-LINK-to-Grid Assignment

MODEL 3 LINE UNIT SERVICE GROUP 0
 LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

GRID BLINK LEVEL	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7		GRID 8		GRID 9		B- L I N K	TN335	
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13	HG 14	HG 15	HG 16	HG 17	HG 18	HG 19		B O A R D	C H A N
0	*		*		*		*		*		*		*		*		*		*		0	0-0	
1		*	*		*		*		*		*		*		*		*		*		1	1-0	
2	*			*	*			*	*			*	*			*	*		*		2	2-0	
3		*		*		*	*			*		*		*	*		*			*	3	3-0	
4	*		*		*		*	*		*		*		*		*		*	*		4	0-1	
5		*	*		*		*		*	*		*		*		*		*		*	5	1-1	
6	*			*		*	*		*			*		*	*		*			*	6	2-1	
7		*		*	*			*		*		*	*			*	*		*		7	3-1	
8		*		*		*		*		*		*	*		*		*			*	8	0-2	
9	*			*	*		*		*			*		*		*	*		*		9	1-2	
10		*	*			*	*			*	*		*			*		*	*		10	2-2	
11	*		*		*			*	*		*			*	*			*		*	11	3-2	
12		*		*	*		*			*		*		*		*	*		*		12	0-3	
13	*			*		*		*	*			*	*		*		*			*	13	1-3	
14		*	*		*			*		*	*			*	*			*		*	14	2-3	
15	*		*			*	*		*		*		*			*		*	*		15	3-3	
16		*	*		*		*		*		*		*		*		*	*		*	16	0-4	
17	*		*		*		*		*		*	*		*		*		*		*	17	1-4	
18		*		*	*			*	*		*			*	*			*		*	18	2-4	
19	*			*		*	*		*	*		*		*		*		*	*		19	3-4	
20		*	*			*		*	*		*		*		*		*			*	20	0-5	
21	*		*		*		*			*		*		*		*	*		*		21	1-5	
22		*		*		*	*		*		*		*		*		*		*	*	22	2-5	
23	*			*	*			*		*	*			*	*			*		*	23	3-5	
24	*			*		*		*		*	*			*		*		*	*		24	0-6	
25		*		*	*		*		*		*		*		*		*		*	*	25	1-6	
26	*		*			*	*		*		*		*	*		*		*		*	26	2-6	
27		*	*		*			*	*		*		*	*		*	*		*		27	3-6	
28	*			*	*		*		*	*		*		*		*		*		*	28	0-7	
29		*		*		*		*	*		*		*		*		*	*	*		29	1-7	
30	*		*		*		*		*	*		*	*		*		*	*	*		30	2-7	
31		*	*			*	*		*		*		*		*	*		*		*	31	3-7	

NOTE: THE (X) INDICATES A HARDWARE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL(S) FROM THE SG0 B-LINKS OF THE GDXACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 10 HALF-GRIDS.

MODEL 3 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL TO B-LINK-TO-GRID ASSIGNMENT

GRID BLINK LEVEL	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7		GRID 8		GRID 9		B- L I N K	TN335	
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13	HG 14	HG 15	HG 16	HG 17	HG 18	HG 19		B O A R D	C H A N
0		*		*		*		*		*		*		*		*		*		*		0	0-0
1	*			*	*		*		*		*	*	*	*		*	*	*		*		1	1-0
2		*	*			*	*			*	*			*	*			*		*		2	2-0
3	*		*		*			*	*		*		*			*		*	*	*		3	3-0
4		*		*	*		*			*		*	*		*		*	*		*		4	0-1
5	*			*		*		*	*			*		*		*	*	*		*		5	1-1
6		*	*		*			*		*	*		*			*		*	*	*		6	2-1
7	*			*		*	*		*		*			*	*			*		*		7	3-1
8	*		*		*		*		*		*		*		*		*	*	*	*		8	0-2
9		*	*			*		*		*	*		*		*			*		*		9	1-2
10	*			*	*			*	*			*		*	*	*		*			*	10	2-2
11		*		*		*	*			*		*	*	*		*	*		*	*		11	3-2
12	*		*			*		*	*		*		*		*			*		*		12	0-3
13		*	*		*		*			*	*			*		*		*	*	*		13	1-3
14	*			*		*	*		*			*	*			*	*	*		*		14	2-3
15		*		*	*			*		*		*		*	*	*	*	*		*		15	3-3
16	*			*		*		*		*	*		*		*			*		*		16	0-4
17		*		*	*		*		*		*			*		*		*	*	*		17	1-4
18	*		*			*	*			*		*	*			*	*	*		*		18	2-4
19		*	*		*			*	*		*		*	*	*	*	*	*		*		19	3-4
20	*			*	*		*			*	*			*		*		*	*	*		20	0-5
21		*		*		*		*	*		*		*		*			*		*		21	1-5
22	*		*		*			*		*		*		*	*	*		*		*		22	2-5
23		*	*			*	*		*			*	*			*	*		*	*		23	3-5
24		*	*		*		*		*			*	*		*		*			*		24	0-6
25	*		*			*		*		*		*		*		*	*	*		*		25	1-6
26		*		*	*			*	*		*		*			*		*	*	*		26	2-6
27	*			*		*	*			*	*			*	*	*		*		*		27	3-6
28		*	*			*		*	*		*		*		*	*	*	*		*		28	0-7
29	*		*		*		*			*		*	*	*	*	*	*	*		*		29	1-7
30		*		*		*	*		*		*			*	*	*		*		*		30	2-7
31	*			*	*			*		*	*		*			*		*	*	*		31	3-7

NOTE: THE (X) INDICATES A HARDWARE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL(S) FROM THE SG1 B-LINKS OF THE GDXACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 10 HALF-GRIDS.

Figure 3.4-3 J5D004AD-1 Line Unit Channel-to-B-LINK-to-Grid Assignment

Procedure 3.5: CLEAR LEN FAILURE IN LINE UNIT GRID

OVERVIEW

This procedure contains information for clearing a line equipment number (LEN) failure in a line unit (LU) grid.

PROCEDURE

1. At the Master Control Center (MCC) video terminal, use the **TEST** poke or the **TST:LEN** command (refer to Procedure 3.6 , Test a Specific Line Unit Grid Path), to run the in-service grid exercise test on the grid as follows in Substeps (a) through (c):
 - (a) If the grid test is all tests passed (ATP), go to Step 2.
 - (b) If the grid test is not ATP, try using Procedure 3.3 , Clear LU Grid Exercise Test Failure, and the grid exercise test to clear the trouble.
 - (c) If use of Procedure 3.3 is unsuccessful, continue to Step 2.
2. At the Main Distributing Frame (MDF), take measurements on the line tip and ring pair associated with the LEN to check for a power cross or short on the line. If any problem is found, clear it per local practice.
3. If the trouble has not yet cleared, use Sheet D3 of the Circuit Pack Schematic (CPS) for the first stage grid pack (TN338 for J5D004AB-1 or TN838 for J5D004AC-1) to determine the backplane pins and wires associated with the LEN.
4. Check the backplane for wiring shorts, breaks, bent pins, etc.
5. If the trouble cannot be found, seek the next higher level of technical assistance.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 3.6: TEST A SPECIFIC LINE UNIT GRID PATH

OVERVIEW

This procedure provides for testing a Line Unit (LU) grid path using the LU Path Exerciser (LUPEX). Similar to the Fabric Exerciser (FABEX), it can be used for failure verification and tracking intermittent failures in a grid. In addition to being much faster, LUPEX can perform tests either individually or as a group, test a specific path, or select a specific High-Level Service Circuit (HLSC). For details, refer to **TST:LEN** in 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*.

CAUTION: While LUPEX is running, the seized line equipment number (LEN) and all equipment specified by the input message will be out of service (OOS).

NOTE: HLSCs known to fail diagnostics should not be used to perform this test. Also, the execution of this test using the **RAW** and **UCL** options with the maximum repeat (RPT) value may generate in excess of 1000 Receive-Only Printer (ROP) messages. This could delay the more critical output messages.

PROCEDURE

1. Using the results from the FABEX test **TST:GRID[BD]** some test failed (STF) output message, determine the path input parameters. Refer to the following tables for the values needed for the LU model being tested.
 - Table 3.6-3 , A-Links Accessible to Each LEN Switch for LUs J5D004(AB1-1) (AC1-1) (AD-1) (AN-1)
 - Table 3.6-1 , B-Links Accessible to A-Links for LU J5D004AB1-1
 - Table 3.6-4 , B-Link Number to Channel Number Cross Reference for LUs J5D004(AB1-1) (AC1-1) (AD-1)
 - Table 3.6-5 , B-Links Accessible to A-Links for LUs J5D004(AC1-1) (AD-1)
 - Table 3.6-6 , B-Link (Service Group and Number) for B-Link Output Level in LU J5D004AB1-1
 - Table 3.6-2 , B-Link Service Group for B-Link Output Level - Grid and GridBd in LUs J5D004(AC1-1) (AD-1).
2. Observing the **Caution**, at the Master Control Center (MCC) video terminal, enter the **TST:LEN** command to perform the test on the desired grid. Refer to Substeps (a) and (b) as follows:
 - (a) If the grid is all tests passed (ATP), go back to Step 2 and use the RPT option or proceed to Step 3.
 - (b) If the grid is STF, perform either Procedure 3.2 , Clear A-Link Failure in Line Unit, Procedure 3.3 , Clear Line Unit Grid Exercise Test Failure, Procedure 3.4 , Clear B-Link or LUCHAN Failure in Line Unit Grid, or Procedure 3.5 , Clear LEN Failure in Line Unit Grid.
3. If the trouble cannot be located, seek the next higher level of technical assistance.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 3.6-1 B-Links Accessible to A-Links for LU J5D004AB1-1

A-LINK RANGE	B-LINK RANGE

LEN GRID-GRIDBD-A-LINK		B-LINK GRID-OUTPUT LEVEL	
FROM	TO	FROM	TO
0-0-00	0-0-03	0-00	0-07
0-0-04	0-0-07	0-08	0-15
0-0-08	0-0-11	1-00	1-07
0-0-12	0-0-15	1-08	1-15
0-1-00	0-1-03	0-00	0-07
0-1-04	0-1-07	0-08	0-15
0-1-08	0-1-11	1-00	1-07
0-1-12	0-1-15	1-08	1-15
1-0-00	1-0-03	1-00	1-07
1-0-04	1-0-07	1-08	1-15
1-0-08	1-0-11	0-00	0-07
1-0-12	1-0-15	0-08	0-15
1-1-00	1-1-03	1-00	1-07
1-1-04	1-1-07	1-08	1-15
1-1-08	1-1-11	0-00	0-07
1-1-12	1-1-15	0-08	0-15
2-0-00	2-0-03	2-00	2-07
2-0-04	2-0-07	2-08	2-15
2-0-08	2-0-11	3-00	3-07
2-0-12	2-0-15	3-08	3-15
2-1-00	2-1-03	2-00	2-07
2-1-04	2-1-07	2-08	2-15
2-1-08	2-1-11	3-00	3-07
2-1-12	2-1-15	3-08	3-15
3-0-00	3-0-03	3-00	3-07
3-0-04	3-0-07	3-08	3-15
3-0-08	3-0-11	2-00	2-07
3-0-12	3-0-15	2-08	2-15
3-1-00	3-1-03	3-00	3-07
3-1-04	3-1-07	3-08	3-15
3-1-08	3-1-11	2-00	2-07
3-1-12	3-1-15	2-08	2-15
4-0-00	4-0-03	4-00	4-07
4-0-04	4-0-07	4-08	4-15
4-0-08	4-0-11	5-00	5-07
4-0-12	4-0-15	5-08	5-15
4-1-00	4-1-03	4-00	4-07
4-1-04	4-1-07	4-08	4-15
4-1-08	4-1-11	5-00	5-07
4-1-12	4-1-15	5-08	5-15
5-0-00	5-0-03	5-00	5-07
5-0-04	5-0-07	5-08	5-15
5-0-08	5-0-11	4-00	4-07
5-0-12	5-0-15	4-08	4-15
5-1-00	5-1-03	5-00	5-07
5-1-04	5-1-07	5-08	5-15
5-1-08	5-1-11	4-00	4-07
5-1-12	5-1-15	4-08	4-15
6-0-00	6-0-03	6-00	6-07
6-0-04	6-0-07	6-08	6-15
6-0-08	6-0-11	7-00	7-07
6-0-12	6-0-15	7-08	7-15
6-1-00	6-1-03	6-00	6-07
6-1-04	6-1-07	6-08	6-15
6-1-08	6-1-11	7-00	7-07
6-1-12	6-1-15	7-08	7-15
7-0-00	7-0-03	7-00	7-07
7-0-04	7-0-07	7-08	7-15
7-0-08	7-0-11	6-00	6-07
7-0-12	7-0-15	6-08	6-15
7-1-00	7-1-03	7-00	7-07
7-1-04	7-1-07	7-08	7-15
7-1-08	7-1-11	6-00	6-07
7-1-12	7-1-15	6-08	6-15

Table 3.6-2 B-Link Number to Channel Number Cross Reference for LUs J5D004(AB1-1) (AC1-1) (AD-1)

B-LINK	CHANNEL NUMBER	B-LINK	CHANNEL NUMBER

NUMBER SG-B-LINK	SG-CHBD-CHAN	NUMBER SG-B-LINK	SG-CHBD-CHAN
0-0	0-0-0	1-0	1-0-0
0-1	0-1-0	1-1	1-1-0
0-2	0-2-0	1-2	1-2-0
0-3	0-3-0	1-3	1-3-0
0-4	0-0-1	1-4	1-0-1
0-5	0-1-1	1-5	1-1-1
0-6	0-2-1	1-6	1-2-1
0-7	0-3-1	1-7	1-3-1
0-8	0-0-2	1-8	1-0-2
0-9	0-1-2	1-9	1-1-2
0-10	0-2-2	1-10	1-2-2
0-11	0-3-2	1-11	1-3-2
0-12	0-0-3	1-12	1-0-3
0-13	0-1-3	1-13	1-1-3
0-14	0-2-3	1-14	1-2-3
0-15	0-3-3	1-15	1-3-3
0-16	0-0-4	1-16	1-0-4
0-17	0-1-4	1-17	1-1-4
0-18	0-2-4	1-18	1-2-4
0-19	0-3-4	1-19	1-3-4
0-20	0-0-5	1-20	1-0-5
0-21	0-1-5	1-21	1-1-5
0-22	0-2-5	1-22	1-2-5
0-23	0-3-5	1-23	1-3-5
0-24	0-0-6	1-24	1-0-6
0-25	0-1-6	1-25	1-1-6
0-26	0-2-6	1-26	1-2-6
0-27	0-3-6	1-27	1-3-6
0-28	0-0-7	1-28	1-0-7
0-29	0-1-7	1-29	1-1-7
0-30	0-2-7	1-30	1-2-7
0-31	0-3-7	1-31	1-3-7

Table 3.6-3 B-Links Accessible to A-Links for LUs J5D004(AC1-1) (AD-1)

A-LINK RANGE		B-LINK OUTPUT RANGE	
FROM	TO	FROM	TO
0	3	0	7
4	7	8	15
8	11	16	23
12	15	24	31

Table 3.6-4 A-Links Accessible to Each LEN Switch for LUs J5D004(AB1-1) (AC1-1) (AD-1) (AN-1)

LEN SWITCH	ACCESSIBLE A-LINKS			
0	0	4	8	12
1	2	6	10	14
2	0	5	10	15
3	2	7	8	13
4	1	5	9	13
5	3	7	11	15
6	1	6	11	12
7	3	4	9	14

Table 3.6-5 B-Link (Service Group and Number) for B-Link Output Level in LU J5D004AB1-1

B-LINK OUTPUT LEVEL	GRID (OF B-LINK OUTPUT LEVEL)							
	0	1	2	3	4	5	6	7
0	0-00	0-16	0-00	0-16	1-00	1-16	1-00	1-16
1	0-01	0-17	1-01	1-17	0-01	0-17	1-01	1-17
2	0-02	0-18	1-02	1-18	1-02	1-18	0-02	0-18
3	1-03	1-19	0-03	0-19	0-03	0-19	1-03	1-19
4	1-04	1-20	0-04	0-20	1-04	1-20	0-04	0-20

5	1-05	1-21	1-05	1-21	0-05	0-21	0-05	0-21
6	0-06	0-22	1-06	1-22	0-06	0-22	1-06	1-22
7	1-07	1-23	0-07	0-23	1-07	1-23	0-07	0-23
8	0-08	0-24	0-08	0-24	1-08	1-24	1-08	1-24
9	0-09	0-25	1-09	1-25	0-09	0-25	1-09	1-25
10	0-10	0-26	1-10	1-26	1-10	1-26	0-10	0-26
11	1-11	1-27	0-11	0-27	0-11	0-27	1-11	1-27
12	1-12	1-28	0-12	0-28	1-12	1-28	0-12	0-28
13	1-13	1-29	1-13	1-29	0-13	0-29	0-13	0-29
14	0-14	0-30	1-14	1-30	0-14	0-30	1-14	1-30
15	1-15	1-31	0-15	0-31	1-15	1-31	0-15	0-31

Table 3.6-6 B-Link Service Group for B-Link Output Level - Grid and GridBd in LUs J5D004 (AC1-1) (AD-1)

B-LINK OUTPUT LEVEL	B-LINK SERVICE GROUP GRID/GRID BOARD									
	0 0 0 1	1 1 0 1	2 2 0 1	3 3 0 1	4 4 0 1	5 5 0 1	6 6 0 1	7 7 0 1	8 8 0 1	9 9 0 1
0	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	1 0	1 0
1	1 0	0 1	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1
2	0 1	1 0	0 1	1 0	0 1	1 0	0 1	1 0	0 1	0 1
3	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1	0 1	1 0
4	0 1	0 1	1 0	1 0	0 1	0 1	1 0	1 0	1 0	0 1
5	1 0	0 1	0 1	0 1	1 0	0 1	0 1	0 1	1 0	1 0
6	0 1	1 0	1 0	0 1	0 1	1 0	1 0	0 1	0 1	1 0
7	1 0	1 0	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1
8	1 0	1 0	1 0	1 0	1 0	1 0	0 1	0 1	0 1	1 0
9	0 1	1 0	0 1	0 1	0 1	1 0	1 0	1 0	0 1	0 1
10	1 0	0 1	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1
11	0 1	0 1	0 1	1 0	0 1	0 1	1 0	0 1	1 0	1 0
12	1 0	1 0	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1
13	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1	0 1	1 0
14	1 0	0 1	0 1	1 0	1 0	0 1	1 0	0 1	1 0	1 0
15	0 1	0 1	1 0	0 1	0 1	0 1	0 1	1 0	1 0	0 1
16	1 0	0 1	0 1	0 1	0 1	1 0	1 0	1 0	0 1	0 1
17	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1	0 1	1 0
18	1 0	1 0	0 1	1 0	0 1	0 1	1 0	0 1	1 0	1 0
19	0 1	1 0	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1
20	1 0	0 1	1 0	1 0	0 1	1 0	0 1	0 1	0 1	1 0
21	0 1	0 1	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1
22	1 0	1 0	1 0	0 1	0 1	0 1	0 1	1 0	1 0	0 1
23	0 1	1 0	0 1	1 0	1 0	0 1	1 0	0 1	1 0	1 0
24	0 1	1 0	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1
25	1 0	1 0	0 1	0 1	0 1	0 1	0 1	0 1	1 0	1 0
26	0 1	0 1	1 0	0 1	1 0	1 0	1 0	0 1	0 1	1 0
27	1 0	0 1	0 1	1 0	0 1	1 0	0 1	1 0	0 1	0 1
28	0 1	1 0	0 1	0 1	1 0	0 1	0 1	0 1	1 0	1 0
29	1 0	1 0	1 0	1 0	0 1	0 1	1 0	1 0	1 0	0 1
30	0 1	0 1	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1
31	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1	0 1	1 0

4. DIAGNOSTIC TEST SUPPORTING INFORMATION

4.1 INTRODUCTION

This section contains supporting information in the form of Diagnostic Phase Descriptions tables and ISLU U-DSL BRI troubleshooting diagrams, (Figure 4-1). The Diagnostic Phase Descriptions tables are referenced from other procedures and/or subprocedures within other sections of this manual.

The access to 5ESS[®] Switch Program Listings is provided through the *Electronic Media Networked Service (EMNS) Access to On-Line Program Listings*, 235-410-220. This "document" is actually a dial-up service that allows the user to choose from a menu of selections. These selections include queries that allow a user to view the source code in the 5ESS[®] switch. This access is proprietary; and the appropriate nondisclosure agreements must be signed before access can be provided.

Information on how to order the On-Line Program Listings is available in the *5ESS[®] Switch Documentation Description and Ordering Guide*, 235-001-001. The listings are only provided through the EMNS access and are **not** available on CD-ROM or UNIX[®] System tape. In addition, 235-410-220 is not part of the standard switch documentation.

When using the On-Line Program Listings, the FUNCTION NAME reference is used in conjunction with the search for information on specific functions.

NOTE: There is no conversion for the AM diagnostic products. The following conversion examples are for the SM/SM-2000 and CM only.

The general rule to convert the PR name to the MODULE PRODUCT NAME is to remove the processor name and colon. Then make all characters lowercase except the first two. The processor is the first field (AM or CM or SM/SM-2000).

Example: SM:DNFABEX converts to DNfabex

The method to convert the CM diagnostics is different, the first three characters are DNC. To convert, change all the other characters to lowercase except the first three (DNC).

Example: CM:DNC2NC03 converts to DNC2nc03

However, some CM products are 3B-related, in which case the first 5 characters are DNC3B and the B in 3B is also capitalized.

Example: AM:DNC3BFPC converts to DNC3Bfpc

Customers with login access to 235-410-220 can refer to the *5ESS[®] Switch Software Analysis Guide*, 235-600-510, for the login procedure and basic usage information. Customers can contact the Lucent Technologies Electronic Media Networked Service group for assistance (Call 1-800-225-4672).

4.2 DIAGNOSTIC PHASE DESCRIPTIONS

This section contains the diagnostic phase descriptive information (in the form of tables) for all hardware (units/circuits) of the 5ESS[®] switch. The entries used within the DIAGNOSTIC ID column of are the mnemonics for the different types of units and service groups. The entries closely follow those utilized on the MCC display pages and I/O messages.

The entry, [PR Name=xxxxxxx] in the DESCRIPTION/WHAT IS TESTED column is a mnemonic reference to the appropriate diagnostic program (PR) listing. If in doubt as to the meaning of the entries utilized, refer to the Glossary.

The following is a list of the diagnostic phase description tables:

- Table 4-1 , Diagnostic Phase Descriptions for ACHI
- Table 4-2 , Diagnostic Phase Descriptions for AIU
- Table 4-3 , Diagnostic Phase Descriptions for ALIT
- Table 4-4 , Diagnostic Phase Descriptions for AP
- Table 4-5 , Diagnostic Phase Descriptions for ASC
- Table 4-6 , Diagnostic Phase Descriptions for BTSR
- Table 4-7 , Diagnostic Phase Descriptions for CC (DNU-S)
- Table 4-8 , Diagnostic Phase Descriptions for CD (DNU-S)
- Table 4-9 , Diagnostic Phase Descriptions for CDFI/RDFI
- Table 4-10 , Diagnostic Phase Descriptions for CDI
- Table 4-11 , Diagnostic Phase Descriptions for CMP
- Table 4-12 , Diagnostic Phase Descriptions for COMDAC
- Table 4-13 , Diagnostic Phase Descriptions for CU in the 3B20D (AM)

The following is a list of the diagnostic phase description tables for the 3B20D (AM):

- Table 4-14 , Diagnostic Phase Descriptions for CU CC in the 3B20D (AM)
- Table 4-15 , Diagnostic Phase Descriptions for CU CH in the 3B20D (AM)
- Table 4-16 , Diagnostic Phase Descriptions for CU CSU in the 3B20D (AM)
- Table 4-17 , Diagnostic Phase Descriptions for CU DMA in the 3B20D (AM)
- Table 4-18 , Diagnostic Phase Descriptions for CU MASC in the 3B20D (AM)
- Table 4-19 , Diagnostic Phase Descriptions for CU SAT in the 3B20D (AM)
- Table 4-20 , Diagnostic Phase Descriptions for CU UC in the 3B20D (AM).
- Table 4-21 , Diagnostic Phase Descriptions for CU in the 3B21D (AM)

- The following is a list of the diagnostic phase description tables for the 3B21D (AM):

- Table 4-22 , Diagnostic Phase Descriptions for CU CC in the 3B21D (AM)
- Table 4-23 , Diagnostic Phase Descriptions for CU DCI in the 3B21D (AM)
- Table 4-24 , Diagnostic Phase Descriptions for CU DFCS in the 3B21D (AM)
- Table 4-25 , Diagnostic Phase Descriptions for CU DMA in the 3B21D (AM)
- Table 4-26 , Diagnostic Phase Descriptions for CU DMCH in the 3B21D (AM)

- Table 4-27 , Diagnostic Phase Descriptions for CU IOP in the 3B21D (AM)
- Table 4-28 , Diagnostic Phase Descriptions for CU MASC in the 3B21D (AM)
- Table 4-29 , Diagnostic Phase Descriptions for CU MHDS in the 3B21D (AM)
- Table 4-30 , Diagnostic Phase Descriptions for CU MT in the 3B21D (AM)
- Table 4-31 , Diagnostic Phase Descriptions for CU MTC in the 3B21D (AM)
- Table 4-32 , Diagnostic Phase Descriptions for CU UC in the 3B21D (AM).

- Table 4-33 , Diagnostic Phase Descriptions for DCLU
- Table 4-34 , Diagnostic Phase Descriptions for DCTUCOM
- Table 4-35 , Diagnostic Phase Descriptions for DCTUPORT
- Table 4-36 , Diagnostic Phase Descriptions for DFC-Mod 1
- Table 4-37 , Diagnostic Phase Descriptions for DFC-SCSI
- Table 4-38 , Diagnostic Phase Descriptions for DFI
- Table 4-39 , Diagnostic Phase Descriptions for DFI2
- Table 4-40 , Diagnostic Phase Descriptions for DFIH
- Table 4-41 , Diagnostic Phase Descriptions for DFTAC
- Table 4-42 , Diagnostic Phase Descriptions for DIST
- Table 4-43 , Diagnostic Phase Descriptions for DLI
- Table 4-44 , Diagnostic Phase Descriptions for DLN
- Table 4-45 , Diagnostic Phase Descriptions for DUIC
- Table 4-46 , Diagnostic Phase Descriptions for EAN
- Table 4-47 , Diagnostic Phase Descriptions for FPC
- Table 4-48 , Diagnostic Phase Descriptions for GDSF
- Table 4-49 , Diagnostic Phase Descriptions for GDSUCOM
- Table 4-50 , Diagnostic Phase Descriptions for GDXACC
- Table 4-51 , Diagnostic Phase Descriptions for GDXC
- Table 4-52 , Diagnostic Phase Descriptions for GDXCON
- Table 4-53 , Diagnostic Phase Descriptions for GRID/GRIDBD (SM)
- Table 4-54 , Diagnostic Phase Descriptions for GRID/GRIDBD EXERCISE (SM)

- Table 4-55 , Diagnostic Phase Descriptions for GRID/GRIDBD PATH TEST (SM)
- Table 4-56 , Diagnostic Phase Descriptions for HDFI
- Table 4-57 , Diagnostic Phase Descriptions for IDCU
- Table 4-58 , Diagnostic Phase Descriptions for IOP
- Table 4-59 , Diagnostic Phase Descriptions for ISLUCC
- Table 4-60 , Diagnostic Phase Descriptions for ISLUCD
- Table 4-61 , Diagnostic Phase Descriptions for ISLUHLSC
- Table 4-62 , Diagnostic Phase Descriptions for ISLULC
- Table 4-63 , Diagnostic Phase Descriptions for ISLULGC
- Table 4-64 , Diagnostic Phase Descriptions for ISLUMAN
- Table 4-65 , Diagnostic Phase Descriptions for ISLURG
- Table 4-66 , Diagnostic Phase Descriptions for ISTF
- Table 4-67 , Diagnostic Phase Descriptions for IUN
- Table 4-68 , Diagnostic Phase Descriptions for LC
- Table 4-69 , Diagnostic Phase Descriptions for LDSF3
- Table 4-70 , Diagnostic Phase Descriptions for LDSU
- Table 4-71 , Diagnostic Phase Descriptions for LDSUCOM
- Table 4-72 , Diagnostic Phase Descriptions for LI
- Table 4-73 , Diagnostic Phase Descriptions for LN
- Table 4-74 , Diagnostic Phase Descriptions for LUCHAN/LUCHBD
- Table 4-75 , Diagnostic Phase Descriptions for LUCOMC
- Table 4-76 , Diagnostic Phase Descriptions for LUHLSC
- Table 4-77 , Diagnostic Phase Descriptions for MA
- Table 4-78 , Diagnostic Phase Descriptions for MAB
- Table 4-79 , Diagnostic Phase Descriptions for MCTSI
- Table 4-80 , Diagnostic Phase Descriptions for MCTSI SM-2000
- Table 4-81 , Diagnostic Phase Descriptions for MCTSI (MCTU3)
- Table 4-82 , Diagnostic Phase Descriptions for MHD-Mod 1
- Table 4-83 , Diagnostic Phase Descriptions for MHD-SCSI

- Table 4-84 , Diagnostic Phase Descriptions for MI
- Table 4-85 , Diagnostic Phase Descriptions for MMP
- Table 4-86 , Diagnostic Phase Descriptions for MSCU
- Table 4-87 , Diagnostic Phase Descriptions for MSUCOM
- Table 4-88 , Diagnostic Phase Descriptions for MTC
- Table 4-89 , Diagnostic Phase Descriptions for MTIB
- Table 4-90 , Diagnostic Phase Descriptions for MTIBAX
- Table 4-91 , Diagnostic Phase Descriptions for MTTYC
- Table 4-92 , Diagnostic Phase Descriptions for NC
- Table 4-93 , Diagnostic Phase Descriptions for NLI
- Table 4-94 , Diagnostic Phase Descriptions for PDLI
- Table 4-95 , Diagnostic Phase Descriptions for PMU
- Table 4-96 , Diagnostic Phase Descriptions for PPC
- Table 4-97 , Diagnostic Phase Descriptions for PROTO
- Table 4-98 , Diagnostic Phase Descriptions for PSUCOM
- Table 4-99 , Diagnostic Phase Descriptions for PSUPH
- Table 4-100 , Diagnostic Phase Descriptions for QGP
- Table 4-101 , Diagnostic Phase Descriptions for QLPS
- Table 4-102 , Diagnostic Phase Descriptions for RAF
- Table 4-103 , Diagnostic Phase Descriptions for RAU
- Table 4-104 , Diagnostic Phase Descriptions for RCLK
- Table 4-105 , Diagnostic Phase Descriptions for RG
- Table 4-106 , Diagnostic Phase Descriptions for RLI
- Table 4-107 , Diagnostic Phase Descriptions for RPCN
- Table 4-108 , Diagnostic Phase Descriptions for RRCLK
- Table 4-109 , Diagnostic Phase Descriptions for RUCI
- Table 4-110 , Diagnostic Phase Descriptions for RVPT
- Table 4-111 , Diagnostic Phase Descriptions for SAS
- Table 4-112 , Diagnostic Phase Descriptions for SCAN

- Table 4-113 , Diagnostic Phase Descriptions for SCSDC
- Table 4-114 , Diagnostic Phase Descriptions for SDFI
- Table 4-115 , Diagnostic Phase Descriptions for SDLC
- Table 4-116 , Diagnostic Phase Descriptions for SFI
- Table 4-117 , Diagnostic Phase Descriptions for TAC
- Table 4-118 , Diagnostic Phase Descriptions for TEN/TUCHBD
- Table 4-119 , Diagnostic Phase Descriptions for TMS
- Table 4-121 , Diagnostic Phase Descriptions for TSGRP
- Table 4-122 , Diagnostic Phase Descriptions for TTFCOM
- Table 4-123 , Diagnostic Phase Descriptions for TTYC
- Table 4-124 , Diagnostic Phase Descriptions for UCONF
- Table 4-125 , Diagnostic Phase Descriptions for UTD
- Table 4-126 , Diagnostic Phase Descriptions for UTG.

Table 4-1 Diagnostic Phase Descriptions for ACHI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ACHI (AM)	-	Application Channel Interface (Administration Module)
	1	Tests the CC I/O bus interface. [PR Name=DL: ACHI01]
	2	Performs the data register loop-around tests. [PR Name=DL: ACHI02]
	3	Performs the miscellaneous function tests. [PR Name=DL: ACHI03]

Table 4-2 Diagnostic Phase Descriptions for AIU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIU (SM)	-	Access Interface Unit (Switching Module)
	1	Tests the control/data integrity to each equipped and ACT application pack. If an application pack is OOS, the tests for that application pack are skipped. This phase also runs the COMDAC resident diagnostics. [PR Name= N/A]
	2	Verifies the control data flow between the RG (application pack) and both COMDACs and runs the RG firmware diagnostics. [PR NAME= N/A]
	3	Verifies the RG's isolation relay, programmability, and the ringing bus connections to each AIU it is assigned. At least one in-service COMDAC is required for this phase or the phase completion status is NTR (no tests run). [PR Name= N/A]
	4	Verifies the control data flow between the AP (application pack) and both COMDACs (Common Data and Control Controllers) and runs the AP resident diagnostics. [PR Name= N/A]
	5	Verifies the PCM data paths between the AP and both

		COMDACs. [PR Name= N/A]
	6	Verifies the AP metallic test buses and associated relays including the paths (GPB0/1) from the COMDAC to the AP. Note: The AP metallic bus structure is likely to vary between specific AP types. [PR Name= N/A]
	7	Run for Z-POTS circuit packs only. Verifies the AP's connection to the RG (ring generator) buses. Also verifies that the AP can be isolated from the RG buses. [PR Name= N/A]
	1000	Verifies the LC functionality by requesting the application pack firmware to run tests on the circuits, including PCM path tests between the LC and the controlling COMDAC. [PR Name = N/A]

Table 4-3 Diagnostic Phase Descriptions for ALIT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ALIT (SM)	-	Automatic Line Insulation Testing (Switching Module)
	1	Tests receive control orders from the MSUCOM sanity test and calibration test. [PR Name=SM: DNALIT]

Table 4-4 Diagnostic Phase Descriptions for AP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AP (Z-INTERFACE) (SM)	-	Application Pack (Z-Interface)(Switching Module)
	1	Verifies the control data flow between the AP (application pack) and both COMDACs (Common Data and Control Controllers) and runs the AP resident diagnostics. [PR Name= N/A]
	2	Verifies the PCM data paths between the AP and both COMDACs. [PR Name= N/A]
	3	Verifies the AP metallic test buses and associated relays including the paths (GPB0/1) from the COMDAC to the AP. Note: The AP metallic bus structure is likely to vary between specific AP types. [PR Name= N/A]
	4	Run for Z-POTS circuit packs only. Verifies the AP's connection to the RG (ring generator) buses. Also verifies that the AP can be isolated from the RG buses. [PR Name= N/A]

Table 4-5 Diagnostic Phase Descriptions for ASC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ASC (RSM)	-	Alarm Status Circuit (Remote Switching Module)
	1	Tests the display and report status of alarms and indicators for the remote site. [PR Name=SM: DNASC]

Table 4-6 Diagnostic Phase Descriptions for BTSR

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
BTSR (SM)	-	Bootstrapper (Switching Module)
	1	Tests access to the BTSR board, verification of registers,

		and executes internal self-diagnostic of the BTSR.
	2	[PR Name=SM: DNBTSR] Functional test of the BTSR (attempts to pump to STBY MCTSI memory). [PR Name=SM: DNBTSR]

Table 4-7 Diagnostic Phase Descriptions for CC (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CC (DNU-S)		Common Control (Digital Network Unit - SONET)
	1	Performs PCT loopback at PCTLI and serial PCAMB loopback at CC. PCT loopback is performed using the PCT loopword time slot. The PCT link loopword time slot is looped back at PCTLI. The PCAMB loopback test is usually done for PCAMBs through both CDs. [PR Name=SM2K:DNUSCC1]
	2	Tests the HIFI device's processor-side interface, loopback, internals, and interrupts. [PR Name=SM2K:DNUSCC1]
	4	Verifies operation of the DNU-S CCP (DNU-S) processor that includes timers, sanity (Contd) timer, interrupt priority encoder, and the NMIs. It also tests EPROM, I/O write protection, memory write-protection circuits, and address and data parity generators and checkers. [PR Name=SM2K:DNUSCC1]
	5	Tests the operation of the two control interface (CI) devices on the CC pack. [PR Name=SM2K:DNUSCC1]
	7	Tests fan and fuse alarms, parallel PCAMBs between CC under test and both CDs. Then tests the mate bus, ICB interface and mate hashsum. If there is no active CC, this phase will NTR. The mate bus is tested from the active CC towards the CC under test. The CC under test is initialized into DGN mode before the active CC can access it. [PR Name=SM2K:DNUSCC1]
	8	Tests the mate access circuit from the CC under test to the active CC. It verifies that the CC under test can detect mate errors by putting the Active CC in hold and forcing the mate errors. [PR Name=SM2K:DNUSCC1]
	9	Requests the DNU-S CC to run a ROM-based memory test for the CC memory. [PR Name=SM2K:DNUSCC1]

Table 4-8 Diagnostic Phase Descriptions for CD (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CD (DNU-S)	-	Common Data (Digital Network Unit - SONET)
	1	Tests the PCT link(s) between the SM/SM-2000 and the DNU-S. This phase of the CD diagnostic is a common product shared by all PCT-based peripherals. [PR Name=SM2K:DNUSCD1]
	2	Tests the Internal Control Bus (ICB) and Peripheral Control Interface (PCI) devices and their interface to the ON-LINE and the STBY CC. Also test the general registers and their interface to the PCIBUS. The clock tracking and generating circuits are also tested in this phase. [PR Name=SM2K:DNUSCD2]
	3	Tests the Peripheral Control and Maintenance Bus (PCAMB) interfaces to active and OOS/STBY CC. Both the serial and parallel buses are tested

		as well as the MCTSI IF sink/source registers that access the PCTLIs. [PR Name=SM2K:DNUSCD2]
	4	Tests the 6 PCTLI devices on the CD pack. The PCI between the CD and SM-2000 for each PCT link are also tested. [PR Name=SM2K:DNUSCD2]
	5	Tests the BPIDBs to the TMUXs. [PR Name=SM2K:DNUSCD2]

Table 4-9 Diagnostic Phase Descriptions for CDFI/RDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CDFI/RDFI (RSM)	-	Communication Link Digital Facility Interface/Remote Digital Facility Interface (Remote Switching Module)
	1	Tests CI/CLRT integrity. [PR Name=SM: DNDFIG1]
	2	Tests CCB integrity. [PR Name=SM: DNDFIG1]
	3	Tests μ C integrity. [PR Name=SM: DNDFIG1]
	4	Tests maintenance buffer integrity. [PR Name=SM: DNDFIG2]
	5	Tests LSI exercises I. [PR Name=SM: DNDFIG2]
	6	Tests LSI exercises II. [PR Name=SM: DNDFIG3]
	7	Tests facility alarm clock. [PR Name=SM: DNDFIG3]
	9	Tests STBY CI/CLRT check. [PR Name=SM: DNDFIG3]
	10	Tests DPR, XPC, FDL integrity. [PR Name=SM: DNDFIG4]
	11	Tests T1 clock, T1 status, and RSM reset exercises. [PR Name=SM: DNDFIG4]
	12	Tests signaling and PCM data path test (the ACT and STB FIU). [PR Name=SM: DNDFIG4]

Table 4-10 Diagnostic Phase Descriptions for CDI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CDI (TU) (SM)	-	Control and Data Interface (Trunk Unit) (Switching Module)
	1	Tests loopback register, service request register, ASW register, and ESR. [PR Name=SM:DNCDI]
	2	Tests clock errors, data path integrity and data delay circuits. [PR Name=SM:DNCDI]
	3	Tests the interface with the STBY MCTSI. If MCTSI is not ACT/STBY, then CATP completes. [PR Name=SM:DNCDI]

Table 4-11 Diagnostic Phase Descriptions for CMP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CMP (CM)	-	Communication Module Processor (Communication Module)
	1	Tests interface between the MSCU (IOMI) and TN1368/TN1800 core board. [PR Name=AM:DNC3BPIP]
	2	Tests IP side (including DAM, DRAMs) of TN1368/TN1800 core board. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]
	3	Tests the AP side of the TN1368/TN1800 core board. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
	4	Tests AP-side interface of the TN1368/TN1800 core board to the

		TN1369 external memory board. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
5		Tests memory pump of the TN1368/TN1800 and TN1369. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]
11		(Demand phase only.) More exhaustive tests of memory devices on TN1368/TN1800 and TN1369 boards. This phase should be run when there are reports of CMP memory errors but the normal CMP diagnostic phases above run ATP. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
12		(Demand phase only.) Runs same test sequences as phase 2 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]
13		(Demand phase only.) Runs same test sequences as phase 3 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
14		(Demand phase only.) Runs same test sequences as phase 4 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
15		(Demand phase only.) Runs same test sequences as phase 5 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]

Table 4-12 Diagnostic Phase Descriptions for COMDAC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
COMDAC (SM)	-	Common Data and Control Controller (Switching Module)
	1	Tests the PICB (Control) interface. [PR Name= N/A]
	2	Tests circuitry on the COMDAC. [PR Name= N/A]
	3	Tests the control/data integrity to each equipped and ACT application pack. If an application pack is OOS, the tests for that application pack are skipped. This phase also runs the COMDAC resident diagnostics. [PR Name= N/A]

Table 4-13 Diagnostic Phase Descriptions for CU in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU (3B20D)	-	3B20D Computer Control Unit Complex. The following seven 3B20D Diagnostic IDs (CU CC, CU CH, CU CSU, CU DMA, CU MASC, CU SAT, and CU UC), are specified subunits within an applicable CU (0 or 1). When using DGN input messages to specify a subunit, it is always preceded by the CU designation.

Table 4-14 Diagnostic Phase Descriptions for CU CC in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CC	-	Control Unit - Central Control

1	Performs MCH master tests. [PR Name=DL:CC01]
2	Performs the MCH slave communication tests. [PR Name=DL:CC02]
3	Performs the MCH slave command tests. [PR Name=DL:CC03]
4	Performs the MCH microstore address and data register tests. [PR Name=DL:CC04]
5	Performs the MC clock circuit tests, the microinstruction register tests, and the MC parity tests. [PR Name=DL:CC05]
6	Tests the MC immediate data path, MCH access to test multiplexer, buffered bidirectional gating register parity bits, and path to the CC error register. [PR Name=DL:CC06]
7	Tests the MC address sequencer, verifies basic address path for unconditional branch and nobranch. [PR Name=DL:CC07]
8	Tests the MC address sequencer, conditional jump logic, opcode jam path, MC address stack, INT command to MCH, set interrupt set, and interrupt mask registers. [PR Name=DL:CC08]
9	Performs the address and memory verification of UN 28 ROM in CU frame slot 0. (Requires equipage bits in ECD.) [PR Name=DL:CC09]
10	Performs the microstore address bus parity tests. [PR Name=DL:CC10]
11	Tests the HSR, PSW, and SSR. [PR Name=DL:CC11]
12	Tests the PPR. [PR Name=DL:CC12]
13	Tests the gate through the DMU and the byte rotate. [PR Name=DL:CC13]
14	Tests the DMU bit rotate. [[PR Name=DL:CC14]
15	Tests the ALU matcher. [[PR Name=DL:CC15]
16	Tests the DMU Q-register. [[PR Name=DL:CC16]
17	Tests the DMU X or Z flag and ONES. [PR Name=DL:CC17]
18	Tests the DMU general registers. [[PR Name=DL:CC18]
19	Tests the ALU and gating paths. [[PR Name=DL:CC19]
20	Tests the 24-bit mode. [[PR Name=DL:CC20]
21	Tests the DMU loop-around. [[PR Name=DL:CC21]
22	Tests the temporary and firmware registers. [PR Name=DL:CC22]
26	Performs the MC privileged PROM tests. [PR Name=DL:CC26]
27	Performs the MC privileged PROM tests. [PR Name=DL:CC27]
28	Performs the MC privileged PROM tests.

	[PR Name=DL:CC28]
30	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC30]
31	Writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC31]
32	(Demand, REX, and DEX phase.) Tests the 4K writable microstore (UN48) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC32]
33	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC33]
34	Tests the writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC34]
35	(Demand, REX, and DEX phase.) Performs the address and memory test of the 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC35]
36	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC36]
37	Tests the writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC37]
38	(Demand, REX, and DEX phase.) Performs the address and memory test of the 4K writable microstore (UN48) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC38]
39	Tests the DMU parity. [PR Name=DL:CC39]
40	Tests the SCR/store control field of microinstruction register to SCR. [PR Name=DL:CC40]
41	Tests the SDR, SIR, and IB. [PR Name=DL:CC41]
42	Tests the SAR and PAR. [PR Name=DL:CC42]
43	Tests the IB parity circuit. [PR Name=DL:CC43]
44	Tests the address increment and parity predict. [PR Name=DL:CC44]
45	Tests the address increment (SAR only.) [PR Name=DL:CC45]
46	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC46]

47	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC47]
48	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC48]
49	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC49]
52	Tests the A and B select and rotate amount multiplexer. [PR Name=DL:CC52]
53	Tests the mask ROM. [PR Name=DL:CC53]
54	Tests the FLZ. [PR Name=DL:CC54]
55	Tests the interrupt registers and logic. [PR Name=DL:CC55]
56	Tests the timers (includes CL_PT MCH command check). [PR Name=DL:CC56]
57	Tests the CDR. [PR Name=DL:CC57]
58	Tests CC I/O bus sanity. [PR Name=DL:CC58]
59	(Demand phase only.) Before running this phase, any units that are causing external error signals should be repaired. Also, do not execute these tests unless all CU units have been diagnosed or the CU has been in service since the last time power was restored to the frame. This tests the CC interrupt logic circuits connected to units other than the CC. [PR Name=DL:CC59]
60	Tests error response logic. [PR Name=DL:CC60]
61	Tests the EAI. The following is displayed: PRM_z 0123 4567 89AB CDEF xx xx xx PRM_z 0000 0000 0000 0000 xx xx xx PRM_z FFFF FFFF FFFF FFFF xx xx xx [PR Name=DL:CC61]
62	Performs the off-line MCH master side tests. [PR Name=DL:CC62]
70	Performs the address and memory verification of the UN28 (ROM) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC70]
71	Performs the address and memory verification of the UN28 (ROM) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC71]
93	(Demand and DEX phase.) Tests the EAI lamp display (located next to the power switch on the CU) and the ability of the EAI EAI to transmit PRMs. A series of PRMs appear on the EAI display page and is printed on the ROP. The lamps on the EAI display are cycled through the specific pattern for that phase as follows: PRM_z 0123 4567 89AB CDEF xx xx xx

	PRM_z AAAA AAAA AAAA AAAA xx xx xx PRM_z 5555 5555 5555 5555 xx xx xx PRM_z EEEE EEEE EEEE EEEE xx xx xx PRM_z 1111 1111 1111 1111 xx xx xx PRM_z 0000 0000 0000 0000 xx xx xx PRM_z FFFF FFFF FFFF FFFF xx xx xx The following pattern should now be observed: Digits 0 through F are sequenced on the hexadecimal digit display. The sequence start with 0-F-0 to warn you that this part of the phase is beginning. Next, each LED lights and then goes off in a pattern running down the display. Later lamp flash may occur and should be ignored. If patterns do not occur, the test failed. Lamp display failures indicate the EAI (TN11) is defective. A PRM failure may be due to a defective EAI or a defective MCRT controller (TN83) in the IOP to which the affected MCRT or ROP is connected. Since this failure is indicated visually, it may run ATP in spite of display faults. All forced states on the EAI must be cleared before this phase is run. This is done by activating key "14" on the EAI page. [PR Name=DL:CC93 or CC90]

Table 4-15 Diagnostic Phase Descriptions for CU CH in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CH (AM)	-	Control Unit - Dual Serial Channel or Direct Memory Access Channel (Administrative Module)
	1	Tests the DSCH - I/O bus interface. [PR Name=DL:DSCH01]
	2	Performs the data register (FIFO) tests. [PR Name=DL:DSCH02]
	3	Performs the DSCH error tests. [PR Name=DL:DSCH03]
	8	Tests the port 0 selection, interrupts, and service requests. [PR Name=DL:DSCH08]
	9	Tests the port 1 selection, interrupts, and service requests. [PR Name=DL:DSCH09]
	10	Tests the port 2 selection, interrupts, and service requests. [PR Name=DL:DSCH10]
	11	Tests the port 3 selection, interrupts, and service requests. [PR Name=DL:DSCH11]
	12	Tests the port 4 selection, interrupts, and service requests. CATP completes when a CNI ring with DLNs is equipped on this channel. [PR Name=DL:DSCH12]
	13	Tests the port 5 selection, interrupts, and service requests. [PR Name=DL:DSCH13]
	14	Tests the port 6 selection, interrupts, and service requests. [PR Name=DL:DSCH14]

15	Tests the port 7 selection, interrupts, and service requests. [PR Name=DL:DSCH15]
16	Tests the port 8 selection, interrupts, and service requests. [PR Name=DL:DSCH16]
17	Tests the port 9 selection, interrupts, and service requests. [PR Name=DL:DSCH17]
18	Tests the port 10 selection, interrupts, and service requests. [PR Name=DL:DSCH18]
19	Tests the port 11 selection, interrupts, and service requests. [PR Name=DL:DSCH19]
20	Tests the port 12 selection, interrupts, and service requests. [PR Name=DL:DSCH20]
21	Tests the port 13 selection, interrupts, and service requests. [PR Name=DL:DSCH21]
22	Tests the port 14 selection, interrupts, and service requests. [PR Name=DL:DSCH22]
23	Tests the port 15 selection, interrupts, and service requests. [PR Name=DL:DSCH23]
24	Performs the port 0 DSCH - DBS communication tests.[PR Name=DL:DSCH24]
25	Performs the port 1 DSCH - DBS communication tests. [PR Name=DL:DSCH25]
26	Performs the port 2 DSCH - DBS communication tests. [PR Name=DL:DSCH26]
27	Performs the port 3 DSCH - DBS communication tests. [PR Name=DL:DSCH27]
28	Performs the port 4 DSCH - DBS communication tests. [PR Name=DL:DSCH28]
29	Performs the port 5 DSCH - DBS communication tests. [PR Name=DL:DSCH29]
30	Performs the port 6 DSCH - DBS communication tests. [PR Name=DL:DSCH30]
31	Performs the port 7 DSCH - DBS communication tests. [PR Name=DL:DSCH31]
32	Performs the port 8 DSCH - DBS communication tests. [PR Name=DL:DSCH32]
33	Performs the port 9 DSCH - DBS communication tests. [PR Name=DL:DSCH33]
34	Performs the port 10 DSCH - DBS communication tests. [PR Name=DL:DSCH34]
35	Performs the port 11 DSCH - DBS communication tests. [PR Name=DL:DSCH35]
36	Performs the port 12 DSCH - DBS communication tests. [PR Name=DL:DSCH36]
37	Performs the port 13 DSCH - DBS communication tests. [PR Name=DL:DSCH37]
38	Performs the port 14 DSCH - DBS communication tests. [PR Name=DL:DSCH38]

	39	Performs the port 15 DSCH - DBS communication tests. [PR Name=DL:DSCH39]
	40	(Demand and DEX phase.) This phase tests data communication between the CU CH (in the CU) and the BIC (in a DFC or IOP). Specify the the DFC or IOP in the DGN input message as a helper unit; use DFC 0, DFC 1, IOP 0, and IOP 1. The unit must be OOS when the diagnostic is run. [PR Name=DL:DSCH40]
	44	(Demand phase only.) This phase tests reading the normal bootstrap data from the disk into main store. Either DFC 0 or DFC 1 must be OOS for this phase. Run this phase if it is suspected a particular CU and DFC combination does not boot. [PR Name=DL:DSCH44]

Table 4-16 Diagnostic Phase Descriptions for CU CSU in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CSU Model 1	-	Control Unit - Cache Store Unit Model 1
	1	Performs access to cache memories and kernel/interrupt stack enable tests. [PR Name=DL:CSU01]
	2	Performs cache memory match tests. [PR Name=DL:CSU02]
	3	Tests the hit/miss matchers (ATBA to tags A and B). [PR Name=DL:CSU03]
	4	Tests the hit/miss matchers (ATBB to tags A and B). [PR Name=DL:CSU04]
	5	Tests the hit/miss matchers (ATBA to tags C and D). [PR Name=DL:CSU05]
	6	Tests the hit/miss matchers (ATBB to tags C and D). [PR Name=DL:CSU06]
	7	Tests the select enable logic. [PR Name=DL:CSU07]
	8	Tests the write tag control logic (tags A and B). [PR Name=DL:CSU08]
	9	Tests the write tag control logic (tags C and D). [PR Name=DL:CSU09]
	10	Tests the SAT interface (ATBA to tags A and C). [PR Name=DL:CSU10]
	11	Tests the SAT interface (ATBB to tags A and C). [PR Name=DL:CSU11]
	12	Tests the tag parity generators. [PR Name=DL:CSU12]
	13	Tests the tag parity checkers. [PR Name=DL:CSU13]
	14	Tests the hit and miss counters. [PR Name=DL:CSU14]

	15	Tests the cache store write control logic. [PR Name=DL:CSU15]
	16	Tests the cache store write control logic. [PR Name=DL:CSU16]
	17	Tests the error check circuits on the cache memory board. [PR Name=DL:CSU17]
	18	(Demand, REX, and DEX phase.) Exercises the mechanism that writes off-line main store values to the cache. Can be run whenever CU CC, CU SAT, CU CSU, and CU MASC tests pass, but trouble is suspected in those areas. This should be run with the RAW option. While running, a selection of memory addresses are accessed using various modes. Upon completion, the contents of main memory, ATBs, and cache are compared. If no differences (errors) are found, test continues. If no errors, phase runs for 40 seconds. [PR Name=DL:CSU18]
	90	(Demand phase.) This phase is the same as phase 18, except that it runs for 40 minutes if no fault is found. This phase can be run whenever an intermittent or data-dependent fault is suspected. Always run this phase with the RAW option. [PR Name=DL:CSU90]
CU CSU Models 2 & 3	-	Control Unit - Cache Store Unit (Enlarged)(Model 2 and 3)
	1	Access to cache memories and interrupt stack enable tests. [PR Name=DL:CSU01]
	2	Cache tag and cache store memory match tests. [PR Name=DL:CSU02]
	3	Hit/miss matchers (ATBA to tags A and B). [PR Name=DL:CSU03]
	4	Hit/miss matchers (ATBB to tags A and B). [PR Name=DL:CSU04]
	5	Hit/miss matchers (ATBA to tags C and D). [PR Name=DL:CSU05]
	6	Hit/miss matchers (ATBB to tags C and D). [PR Name=DL:CSU06]
	7	Hit/miss matchers (ATBA to tags E and F). [PR Name=DL:CSU07]
	8	Hit/miss matchers (ATBB to tags E and F). [PR Name=DL:CSU08]
	9	Hit/miss matchers (ATBA to tags G and H). [PR Name=DL:CSU09]
	10	Hit/miss matchers (ATBB to tags G and H). [PR Name=DL:CSU10]
	11	Select enable logic. [PR Name=DL:CSU11]
	12	Cache tag memory write control logic (tags A and B).

	[PR Name=DL:CSU12]
13	Cache tag memory write control logic (tags C and D).
	[PR Name=DL:CSU13]
14	Cache tag memory write control logic (tags E and F).
	[PR Name=DL:CSU14]
15	Cache tag memory write control logic (tags G and H).
	[PR Name=DL:CSU15]
16	ATBA relocation address to tag memory mod A and E.
	[PR Name=DL:CSU16]
17	ATBA relocation address to tag memory mod B and F.
	[PR Name=DL:CSU17]
18	ATBA relocation address to tag memory mod C and G.
	[PR Name=DL:CSU18]
19	ATBA relocation address to tag memory mod D and H.
	[PR Name=DL:CSU19]
20	Address and data parity generators.
	[PR Name=DL:CSU20]
21	Address and data parity checkers (tags A, B, C, and D).
	[PR Name=DL:CSU21]
22	Address and data parity checkers (tags E, F, G, and H).
	[PR Name=DL:CSU22]
23	Cache store write control logic - stack write and write update operations (all tags; A, B, C, D, E, F, G, and H). [PR Name=DL:CSU23]
24	Cache store write control logic - normal read stack read and test cache mods updated at store complete time (all tags; A, B, C, D, E, F, G, and H).
	[PR Name=DL:CSU24]
25	Error check circuits on cache memory board. [PR Name=DL:CSU25]
26	(Demand, REX, and DEX phase.) Cache exercise test (40 seconds). Run when CC, SAT, cache, and main store tests pass but a trouble is still suspected in one of these areas. A selection of memory address are accessed using various modes. Then the contents of main memory ATBs, and cache are compared. If no differences are found, the test continues. Differences are reported as errors. If no errors are found, this phase runs for 40 seconds. Always run this phase with the RAW option. [PR Name=DL:CSU26]
90	(Demand phase.) Cache exercise test (40 minutes). Run when an intermittent or data dependent fault is suspected. Same as phase 26 except runs more extensive and longer tests. Always run this phase with the RAW option. [PR Name=DL:CSU90]

Table 4-17 Diagnostic Phase Descriptions for CU DMA in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMA	-	Control Unit - Direct Memory Access

1	Tests the DMA CC I/O bus interface. [PR Name=DL:DMA01]
2	Performs the status tests. [PR Name=DL:DMA02]
3	Performs the RAM/register tests. [PR Name=DL:DMA03]
4	Performs the sequencer tests. [PR Name=DL:DMA04]
5	Tests the request priority circuit. [PR Name=DL:DMA05]
6	Performs the store address tests. [PR Name=DL:DMA06]
7	Performs the store data tests. [PR Name=DL:DMA07]
8	Performs the DMA error tests. [PR Name=DL:DMA08]
9	Performs the DMA/Cache interface tests (CAC0). [PR Name=DL:DMA09]
10	Performs the DMA/Cache interface tests (CAC1). [PR Name=DL:DMA10]
11	Tests MASU priority and arbitration functions. [PR Name=DL:DMA11]

Table 4-18 Diagnostic Phase Descriptions for CU MASC in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MASC	-	Control Unit - Main Store Controller
	1	Tests the inactive state of errors B/C and basic MASC response. [PR Name=DL:MASC01]
	2	Tests the address loop-around. [PR Name=DL:MASC02]
	4	Performs the data communication tests. [PR Name=DL:MASC04]
	5	Tests the parity circuit (data, address, control tests, and halfword and byte decoding). [PR Name=DL:MASC05]
	6	Performs the maintenance commands, microstore time-out, microinterrupt, and store go-error tests. [PR Name=DL:MASC06]
	7	Performs the MASC memory array response tests. [PR Name=DL:MASC07]
	8	Performs the refresh rate tests. [PR Name=DL:MASC08]
	9	Performs the MASC timing chain tests. [PR Name=DL:MASC09]
	10	Performs the special memory operations and array parity tests (main store array 0). [PR Name=DL:MASC10]
	11	Tests the destination and source wait states. [PR Name=DL:MASC11]
	12	Performs single-bit hamming correction tests. [PR Name=DL:MASC12]
	13	Performs the double-bit error (hamming) tests. [PR Name=DL:MASC13]
	14 - 28	Performs the same as phase 10 (for memory store arrays 1-15). [PR Name=DL:MASC14 - DL:MASC28]
	29	Tests the address loop-around through main store update (duplex mode). [PR Name=DL:MASC29]
	30	Tests the data communication tests through main store update (duplex mode). [PR Name=DL:MASC30]
	31	Tests the control lead parity and other store error tests through main store update (duplex mode). [PR

		Name=DL:MASC31]
	32	Performs the microstore error B/C tests.
		[PR Name=DL:MASC32]
	33	(Demand and DEX phase.) This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC33]
	34	(Demand and DEX phase.) This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC34]
	35	Performs the memory data pattern tests.
		[PR Name=DL:MASC35]
	36	(Demand and DEX phase.) This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC36]
	37	Tests the ability to trap a failing address on errors A, C, and D. [PR Name=DL:MASC37]
	38	Tests to ensure that the CC and MASC can fetch and execute instructions. [PR Name=DL:MASC38]
	39	Performs the update mode and refresh data parity check functional tests. [PR Name=DL:MASC39]
	40	(Demand and DEX phase.) This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC40]
	41	(Demand phase only.) Update mode and refresh data parity tests to entire main memory. [PR Name=DL:MASC41]
	42	Tests MASU priority and arbitration functions.
		[PR Name=DL:MASC42]
	93	(Demand, REX, and DEX phase.) Tests main and duplicate refresh address counters. [PR Name=DL:MASC93]
	95	(Demand phase only.) Applies memory patterns and access tests to the main memory. Limits are allowed to be set at run time. [PR Name=DL:MASC95]
	96	(Demand, DEX, and REX phase.) Tests update mode and refresh data parity to all main memories. Limits are allowed to be set at run time. [PR Name=DL:MASC96]

Table 4-19 Diagnostic Phase Descriptions for CU SAT in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU SAT	-	Control Unit - Store Address Translator
	1	Tests the SCR control flip-flops. [PR Name=DL:SAT01]
	2	Tests the ATB access and parity. [PR Name=DL:SAT02]
	3	Tests the ATB memory. [PR Name=DL:SAT03]
	4	Tests the counter and invalidate circuit.
		[PR Name=DL:SAT04]
	5	Tests the address multiplexer. [PR Name=DL:SAT05]
	6	Tests the write control circuit. [PR Name=DL:SAT06]
	7	Tests the ATB hit and ATB miss logic. [PR Name=DL:SAT07]
	8	Tests the protection circuit. [PR Name=DL:SAT08]
	9	Tests the matchers. [PR Name=DL:SAT09]
	10	Tests the main store interface. [PR Name=DL:SAT10]

Table 4-20 Diagnostic Phase Descriptions for CU UC in the 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU UC	-	Control Unit - Utility Circuit
	1	Tests the BGB - access and enable. [PR Name=DL:UC01]
	2	Performs the access matcher, address leads, and read/write tests. [PR Name=DL:UC02]

3	Performs the block address matcher, address leads, and read/write tests. [PR Name=DL:UC03]
4	Performs the address matcher, address leads, and read/write tests. [PR Name=DL:UC04]
5	Performs the unit identification matcher, address leads, and read/write tests. [PR Name=DL:UC05]
6	Performs the data matcher, address leads, and read/write tests. [PR Name=DL:UC06]
7	Performs the event and transfer trace counters and the read/write tests. [PR Name=DL:UC07]
8	Performs the transfer trace access path unit identification buffers tests. [PR Name=DL:UC08]
9	Performs the trace memory and read/write tests. [PR Name=DL:UC09]
10	Performs the trigger function in freeze mode tests. [PR Name=DL:UC10]
11	Performs the block address matcher adder tests. [PR Name=DL:UC11]
12	Performs the trigger functions in run mode without match conditions. [PR Name=DL:UC12]
13	Performs the access matcher run mode tests. [PR Name=DL:UC13]
14	Performs the data matcher run mode tests. [PR Name=DL:UC14]
15	Performs the address matcher virtual address leads (SAR), run mode tests. [PR Name=DL:UC15]
16	Performs the address matcher physical address leads cache address A bus - run mode tests. [PR Name=DL:UC16]
17	Performs the address matcher physical address leads cache address B bus - run mode tests. [PR Name=DL:UC17]
18	Performs the unit identification matcher and transfer trace run mode tests. [PR Name=DL:UC18]
19	Performs the trigger functions in run mode with match conditions. [PR Name=DL:UC19]
20	Performs the transfer trace run mode tests. [PR Name=DL:UC20]
90	(Demand phase only.) Run this phase to test the external output of trigger function 0 and the external inputs to trigger functions 1, 2, and 3. To run this phase, clip pin 400 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC90]
91	(Demand phase only.) Run this phase to test the external output of trigger function 1 and the external inputs to trigger functions 0, 2, and 3. To run this phase, clip pin 401 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC91]
92	(Demand phase only.) Run this phase to test the external output of trigger function 2 and the external inputs to trigger functions 0, 1, and 3. To run this phase, clip pin 402 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC92]
93	(Demand phase only.) Run this phase to test the external output of trigger function 3 and the external inputs to trigger functions 0, 1, and 2. To run this phase, clip pin 403 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC93]

Table 4-21 Diagnostic Phase Descriptions for CU in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU (3B21D)	-	3B21D Computer Control Unit Complex. The following eleven 3B21D Diagnostic IDs (CU CC, CU DCI, CU DFCS, CU DMA, CU DMCH, CU IOP, CU MASC,

CU MHDS, CU MT, CU MTC, and CU UC) are specified subunits within an applicable CU (0 or 1). When using DGN input messages to specify a subunit, it is always preceded by the CU designation.

Table 4-22 Diagnostic Phase Descriptions for CU CC in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CC	-	Control Unit - Central Control
	1	Performs on-line MCH master side tests. [PR Name=DL:CC01]
	2	Performs the MCH slave communication tests. [PR Name=DL:CC02]
	3	Performs the MCH slave command tests. [PR Name=DL:CC03]
	4	Performs microstore address (MSA) and microstore data (MSD) registers in off-line MCH. [PR Name=DL:CC04]
	5	Performs BIST and boundary scan tests on CC pack. [PR Name=DL:CC05]
	6	Performs the individual application specific integrated circuit (ASIC) BISTs on CC packs. [PR Name=DL:CC06]
	7	Performs the microcontrol (MC) clock circuit tests, microinstruction register (MIR), and MC parity tests. [PR Name=DL:CC07]
	8	Tests the MC immediate data path, MCH access to test multiplexer, buffered bidirectional gating register (BGR) parity bits, and path to the central control error. [PR Name=DL:CC08]
	9	Tests the MC address sequencer, verifies basic address path for unconditional branch and no branch. [PR Name=DL:CC09]
	10	Tests the MC address sequencer, conditional jump logic and MC address stack. [PR Name=DL:CC10]
	11	Performs verification on read-only memory (ROM) in microstore. [PR Name=DL:CC11]
	12	Performs the microstore address bus parity tests. [PR Name=DL:CC12]
	13	Verifies the status register. [PR Name=DL:CC13]
	14	Tests the pulse point register. [PR Name=DL:CC14]
	17	Tests gate through data manipulation unit (DMU) and barrel shifter to rotate bit function. [PR Name=DL:CC17]
	19	Tests the arithmetic logic unit (ALU) matcher. [PR Name=DL:CC19]
	20	Tests the DMU Q-register. [PR Name=DL:CC20]
	21	Tests the DMU X or Z flag and ONES. [PR Name=DL:CC21]
	22	Tests the DMU general registers. [PR Name=DL:CC22]
	23	Tests the ALU and gating paths. [PR Name=DL:CC23]
	24	Tests the 24-bit mode. [PR Name=DL:CC24]
	25	Tests the DMU loop-around. [PR Name=DL:CC25]
	26	Tests the temporary and firmware registers. [PR Name=DL:CC26]
	29	Performs the MC privileged bits tests. [PR Name=DL:CC29]
	31	Performs the MC privileged bits tests. [PR Name=DL:CC31]
	32	Tests the writable microstore: bidirectional gating bus (BGB), microstore data bus, and microstore address bus access. [PR Name=DL:CC32]
	33	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. [PR Name=DL:CC33]
	34	Tests the demand only writable microstore: BGB, microstore data bus, and microstore address bus access. [PR Name=DL:CC34]
	35	Tests the DMU parity check. [PR Name=DL:CC35]
	38	Tests the store control register (SCR). [PR Name=DL:CC38]
	39	Tests the store data register (SDR), store instruction register

	(SIR), and instruction buffer (IB). [PR Name=DL:CC39]
40	Tests the store address register (SAR) and program address register (PAR). [PR Name=DL:CC40]
41	Tests the IB parity circuit. [PR Name=DL:CC41]
42	Tests the address increment and parity predict. [PR Name=DL:CC42]
44	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC44]
45	Tests the SIR path to IB halfword multiplexer. [PR Name=DL:CC45]
46	Tests the SIR path to path to halfword multiplexer to IB. [PR Name=DL:CC46]
47	Tests the SIR to halfword multiplexer to IB. [PR Name=DL:CC47]
50	Tests the A and B select and rotate amount multiplexer. [PR Name=DL:CC50]
51	Tests the linecard register for masking out errors noted by the ERROR register (MASK). [PR Name=DL:CC51]
52	Tests the find-low-zero (FLZ) of DMU. [PR Name=DL:CC52]
53	Tests the interrupt registers and logic. [PR Name=DL:CC53]
54	Tests the timers. [PR Name=DL:CC54]
55	Tests the channel data register. [PR Name=DL:CC55]
58	Tests central control input/output (CCIO) bus sanity. [PR Name=DL:CC58]
59	Performs the off-line MCH master side tests. [PR Name=DL:CC59]
60	Tests other unit interrupt (demand only). [PR Name=DL:CC60]
61	Tests error response logic. [PR Name=DL:CC61]
64	Tests the emergency action interface. [PR Name=DL:CC64]
65	Tests the EAI commands and display tests (demand only). [PR Name=DL:CC65]
68	Tests the SCR and store address translator (SAT) control bits. [PR Name=DL:CC68]
69	Tests the address translation buffer (ATB) access and parity. [PR Name=DL:CC69]
70	Tests the ATB memory. [PR Name=DL:CC70]
71	Tests the counter and invalidate circuit. [PR Name=DL:CC71]
72	Tests the SAT address multiplier. [PR Name=DL:CC72]
73	Tests the ATB write control logic. [PR Name=DL:CC73]
74	Tests the ATB hit and miss logic. [PR Name=DL:CC74]
75	Tests the ATB protection logic. [PR Name=DL:CC75]
76	Tests the ATB matching of duplicate circuits. [PR Name=DL:CC76]
77	Tests the main store interface. [PR Name=DL:CC77]
80	Tests the access to cache memories. [PR Name=DL:CC80]
81	Tests the cache tag and cache memory match. [PR Name=DL:CC81]
82	Tests the hit/miss matcher. [PR Name=DL:CC82]
83	Tests the write enable logic. [PR Name=DL:CC83]
84	Tests the ATB relocation address tag memory. [PR Name=DL:CC84]
85	Tests the address and data parity generator. [PR Name=DL:CC85]
86	Tests the address and data parity checker. [PR Name=DL:CC86]
87	Tests the cache store write control logic. [PR Name=DL:CC87]
88	Tests the cache error check circuitry. [PR Name=DL:CC88]
89	Tests the cache exercise (REX). [PR Name=DL:CC89]
90	Test the phase cache exercise (demand only).

Table 4-23 Diagnostic Phase Descriptions for CU DCI in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DCI	-	Control Unit - Dual Serial Channel Computer Interconnect

	1	Tests the dual serial channel (DSCH) with the duplex dual serial bus selector (DDSBS) interface. [PR Name=DL:DCI01]
	2	Tests the DDSBS with the BIC interface. [PR Name=DL:DCI02]
	3	Tests the BIC with the peripheral interface controller (PIC) interface. [PR Name=DL:DCI03]

Table 4-24 Diagnostic Phase Descriptions for CU DFCS in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DFCS	-	Control Unit - Disk File Controller 2
	1	Tests the demand-only phase with the BIST boundary scan. [PR Name=DL:DFCS01]
	2	Tests the DDSBS interface and the DDSBS/BIC interface. [PR Name=DL:DFCS02]
	3	Tests BIC to the PIC interface. [PR Name=DL:DFCS03]
	4	Tests the central processing unit (CPU) Test 1. [PR Name=DL:DFCS04]
	5	Tests to verify the ROM contents. [PR Name=DL:DFCS05]
	6	Performs the Test 1-MB static random access memory (SRAM). [PR Name=DL:DFCS06]
	7	Performs the host adapter register test. [PR Name=DL:DFCS07]
	8	Performs the WE32104 direct memory access controller (DMAC) test. [PR Name=DL:DFCS08]
	9	Performs the dual universal asynchronous receiver/transmitter (DUART) test. [PR Name=DL:DFCS09]
	10	Tests the system timing controller (STC). [PR Name=DL:DFCS10]
	11	Performs the small computer system interface (SCSI) protocol controllers tests on both SCSI buses. [PR Name=DL:DFCS11]
	12	Tests only differential type devices attached to the bus. [PR Name=DL:DFCS12]
	13	Tests the bus reset capability. [PR Name=DL:DFCS13]
	14	Performs the demand exercise (DEX) bit wise independent test for host adapter (HA) FIFO. [PR Name=DL:DFCS14]
	15	Tests the interface to nonactive CU (demand only). [PR Name=DL:DFCS15]
	90	Performs demand only test and the bus loop test. [PR Name=DL:DFCS90]

Table 4-25 Diagnostic Phase Descriptions for CU DMA in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMA	-	Control Unit - Direct Memory Access
	1	Performs the BIST/boundary scan tests. [PR Name=DL:DMA01]
	2	Tests the DMA/CCIO bus interface. [PR Name=DL:DMA02]
	3	Performs the status tests. [PR Name=DL:DMA03]
	4	Performs the random access memory (RAM) register tests. [PR Name=DL:DMA04]
	5	Performs the sequencer tests. [PR Name=DL:DMA05]
	6	Tests the request priority circuit. [PR Name=DL:DMA06]
	7	Performs the store address tests. [PR Name=DL:DMA07]
	8	Performs the store data tests. [PR Name=DL:DMA08]
	9	Performs the DMA error tests. [PR Name=DL:DMA09]
	10	Performs the DMA/CCIO bus interface (demand only). [PR Name=DL:DMA10]

		Name=DL:DMA10]
	11	Perform the DMA/Cache interface tests. [PR Name=DL:DMA11]
	13	Perform the MASU priority and arbitration tests. [PR Name=DL:DMA13]

Table 4-26 Diagnostic Phase Descriptions for CU DMCH in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMCH	-	Control Unit - Direct Memory Access Channel
	1	Tests the direct IO bus interface. [PR Name=DL:DMCH01]
	2	Performs the data register FIFO tests.[PR Name=DL:DMCH02]
	3	Performs the error tests. [PR Name=DL:DMCH03]
	4	Tests the quad word transfer. [PR Name=DL:DMCH04]
	10	Performs the Port 0 selection, interrupt, and service requests. [PR Name=DL:DMCH10]
	11	Performs the Port 1 selection, interrupt, and service requests. [PR Name=DL:DMCH11]
	12	Performs the Port 2 selection, interrupt, and service requests. [PR Name=DL:DMCH12]
	13	Performs the Port 3 selection, interrupt, and service requests. [PR Name=DL:DMCH13]
	20	Performs the Port 0 DSCH/DDSBS communication tests. [PR Name=DL:DMCH20]
	21	Performs the Port 1 DSCH/DDSBS communication tests. [PR Name=DL:DMCH21]
	22	Performs the Port 2 DSCH/DDSBS communication tests. [PR Name=DL:DMCH22]
	23	Performs the Port 3 DSCH/DDSBS communication tests. [PR Name=DL:DMCH23]

Table 4-27 Diagnostic Phase Descriptions for CU IOP in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU IOP	-	Control Unit - Input/Output Processor 2
	1	Performs the BIST/boundary scan for the demand-only phase. [PR Name=DL:IOP01]
	2	Tests the DSCH with the DDSBS interface. [PR Name=DL:IOP02]
	3	Tests the DDSBS with the BIC interface and BIC circuitry excluding PIC interface. [PR Name=DL:IOP03]
	4	Tests the BIC with the PIC interface using PIC resident firmware. [PR Name=DL:IOP04]
	5	Tests the BIC with the PIC communication. [PR Name=DL:IOP05]
	6	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:IOP06]
	7	Tests the PIC microsequencer. [PR Name=DL:IOP07]
	8	Tests the PIC register and ALU. [PR Name=DL:IOP08]
	9	Tests the PIC source/destination decoders.

		[PR Name=DL:IOP09]
10		Tests the PIC internal registers. [PR Name=DL:IOP10]
11		Tests the PIC interrupt circuitry. [PR Name=DL:IOP11]
12		Tests the PIC RAM and sequencer. [PR Name=DL:IOP12]
13		Tests the input/output microprocessor interface (IOMI) hardware.
		[PR Name=DL:IOP13]
15		Tests the IOMI power control circuitry peripheral controller community power converter/monitor.
		[PR Name=DL:IOP13]
16		Tests the interface with the nonactive CU for the demand-only phase. The nonactive CU must be specified as the helper unit, and must be OOS and ATP. [PR Name=DL:IOP16]

Table 4-28 Diagnostic Phase Descriptions for CU MASC in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MASC	-	Control Unit - Main Store Controller
	1	Executes the memory controller (MCERT) "power-on" initial test. [PR Name=DL:MASC01]
	2	Performs the boundary scan test. [PR Name=DL:MASC02]
	3	Tests the basic response from MM circuit. [PR Name=DL:MASC03]
	4	Performs the address loop-around test. [PR Name=DL:MASC04]
	5	Performs the data path test. [PR Name=DL:MASC05]
	6	Tests store error A. [PR Name=DL:MASC06]
	7	Performs the maintenance command test. [PR Name=DL:MASC07]
	8	Performs store B and C tests. [PR Name=DL:MASC08]
	11	Performs the destination and source wait state tests. [PR Name=DL:MASC11]
	12	Performs the single-bit hamming tests. [PR Name=DL:MASC12]
	13	Performs the double-bit error (hamming) tests. [PR Name=DL:MASC13]
	14	Tests the address trap logic. [PR Name=DL:MASC14]
	15	Performs the arbiter RAM testing.
		[PR Name=DL:MASC15]
	20	Performs the short march test to Bank 0.
		[PR Name=DL:MASC20]
	21	Performs the short march test to Bank 1. [PR Name=DL:MASC21]
	22	Performs the short march test to Bank 2. [PR Name=DL:MASC22]
	23	Performs the short march test to Bank 3. [PR Name=DL:MASC23]
	24	Performs the short march test to Bank 4.
		[PR Name=DL:MASC24]
	25	Performs the short march test to Bank 5. [PR Name=DL:MASC25]
	26	Performs the short march test to Bank 6. [PR Name=DL:MASC26]
	27	Performs the short march test to Bank 7.
		[PR Name=DL:MASC27]
	30	Performs the memory operations and parity tests to Bank 0. [PR Name=DL:MASC30]

31	Performs the memory operations and parity tests to Bank 1. [PR Name=DL:MASC31]
32	Performs the memory operations and parity tests to Bank 2. [PR Name=DL:MASC32]
33	Performs the memory operations and parity tests to Bank 3. [PR Name=DL:MASC33]
34	Performs the memory operations and parity tests to Bank 4. [PR Name=DL:MASC34]
35	Performs the memory operations and parity tests to Bank 5. [PR Name=DL:MASC35]
36	Performs the memory operations and parity tests to Bank 6. [PR Name=DL:MASC36]
37	Performs the memory operations and parity tests to Bank 7. [PR Name=DL:MASC37]
38	Tests the address loop-around through main store update (duplex mode). [PR Name=DL:MASC38]
39	Tests the data loop-around through main store update (duplex mode). [PR Name=DL:MASC39]
40	Performs the main store update control and error tests. [PR Name=DL:MASC40]
41	Performs the memory data pattern tests. [PR Name=DL:MASC41]
42	Tests the fetch/execute instruction from main store. [PR Name=DL:MASC42]
43	Performs the function testing of update mode and refresh data parity checks (some memory locations). [PR Name=DL:MASC43]
45	Performs the memory data to March pattern tests. [PR Name=DL:MASC45]
46	Performs the memory data to March pattern tests. [PR Name=DL:MASC46]
48	Performs the memory data pattern tests using byte, half, and read-modify-write commands. [PR Name=DL:MASC48]
50	Performs the memory data to March pattern tests (demand only). [PR Name=DL:MASC50]
51	Performs the memory data to March pattern tests (demand only). [PR Name=DL:MASC51]
52	Performs the memory data to March pattern tests (demand only). [PR Name=DL:MASC52]
53	Performs the memory data to March pattern tests (demand only). [PR Name=DL:MASC53]
95	Performs the run user-specified to March pattern tests (demand only). [PR Name=DL:MASC95]
96	Performs the function testing of update mode and refresh data parity checks (all memory locations). User may specify test parameters. [PR Name=DL:MASC96]

Table 4-29 Diagnostic Phase Descriptions for CU MHDS in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MHDS	-	Control Unit - SCSI Moving Head Disk (MHD)
	1	Performs the SCSI moving head disk test. [PR Name=DL:MHDS01]

Table 4-30 Diagnostic Phase Descriptions for CU MT in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MT	-	Control Unit - SCSI Magnetic Tape
	1	Diagnose the SCSI Device identified in the command: (a) Reset and verify reset condition. (b) Execute the built-in, self-test of the tape unit.

		[PR Name=DL:MT01]
	90	Verify read/write of blocked data to tape. (Writable tape must be installed). [PR Name=DL:MT90]
	91	Verify write protection mechanism of the tape unit. (Write protected tape must be installed). Phase mt90 must be successfully executed before this phase. [PR Name=DL:MT91]

Table 4-31 Diagnostic Phase Descriptions for CU MTC in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MTC	-	Control Unit - SCSI Magnetic Tape Controller
	1	Performs the SCSI tape test. [PR Name=DL:MTC01]
	90	Performs the SCSI demand-only test for read/write. [PR Name=DL:MTC90]
	91	Performs the SCSI demand-only test for write protect. [PR Name=DL:MTC91]

Table 4-32 Diagnostic Phase Descriptions for CU UC in the 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU UC	-	Control Unit - Utility Circuit
	1	Performs the bidirectional gating bus access and enable. [PR Name=DL:UC01]
	2	Performs the access matcher, address leads, and read/write test. [PR Name=DL:UC02]
	3	Performs the block address matchers, address leads, and read/write test. [PR Name=DL:UC03]
	4	Performs the address matcher, address leads, and read/write test. [PR Name=DL:UC04]
	5	Performs the unit identification matcher, address leads, and read/write test. [PR Name=DL:UC05]
	6	Performs the data matcher, address leads, and read/write test. [PR Name=DL:UC06]
	7	Performs the event and trace memory addresses counters, and read/write test. [PR Name=DL:UC07]
	8	Performs the transfer trace memory access path unit identification buffers test. [PR Name=DL:UC08]
	9	Performs the trace memory and read/write test. [PR Name=DL:UC09]
	10	Performs the trigger functions in freeze mode tests. [PR Name=DL:UC10]
	11	Performs the trigger functions in run mode without match conditions. [PR Name=DL:UC11]

12	Performs the access matcher and run mode tests. [PR Name=DL:UC12]
13	Performs the data matcher and run mode tests. [PR Name=DL:UC13]
14	Performs the address matcher, virtual address bus (store address register), and run mode tests. [PR Name=DL:UC14]
15	Performs the address matcher, physical address bus, and run mode tests. [PR Name=DL:UC15]
16	Performs the unit identification matcher and run mode tests. [PR Name=DL:UC16]
17	Performs the trigger functions in run mode with match conditions. [PR Name=DL:UC17]
18	Performs the transfer trace and run mode tests. [PR Name=DL:UC18]
19	Performs the trace memory read/write indicator bit test. [PR Name=DL:UC19]
90	Performs the demand-only phase with special procedure. External input and external output trigger function 0.
91	Performs the demand-only phase with special procedure. External input and external output trigger function 1.
92	Performs the demand-only phase with special procedure. External input and external output trigger function 2.
93	Performs the demand-only phase with special procedure. External input and external output trigger function 3.

Table 4-33 Diagnostic Phase Descriptions for DCLU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCLU (SM)	-	Digital Carrier Line Unit (Switching Module)
	1	Tests the CI/CLRT integrity [PR Name. SM:DNDCLU1]
	2	Verifies operation of DFI select register and the "dummy" CLRT. [PR Name. SM:DNDCLU1]
	3	Tests operation of the TSSR (Time Slot Select Register). [PR Name. SM:DNDCLU1]
	4	Verifies the PIDB to the ACT MCTSI. [PR Name. SM:DNDCLU2]
	5	Verifies the interface between the CI/CLRT for STDBY MCTSI and the PIDB to the STDBY MCTSI. [PR Name. SM:DNDCLU2]

Table 4-34 Diagnostic Phase Descriptions for DCTUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCTUCOM (SM)	-	Directly Connected Test Unit Common (Switching Module)
	1	Tests the CI/CLRT integrity. [PR Name=SM:DNDCTC]
	2	Runs DCTU special diagnostic: CPU test, RAM/ROM tests, GPIB loopback, and arithmetic processor. [PR Name=SM:DNDCTC]
	3	Tests the CI/CLRT integrity to STBY MCTSI. [PR Name=SM:DNDCTC]

Table 4-35 Diagnostic Phase Descriptions for DCTUPORT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCTUPORT (SM)	-	Directly Connected Test Unit Port (Switching Module)
	1	Runs Group J DCTU tests. [PR Name=SM:DNPORT]

Table 4-36 Diagnostic Phase Descriptions for DFC-Mod 1

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFC-Mod 1 (AM)	-	Disk File Controller - Mod 1 (Administrative Module)
	1	Tests the DSCH - DDSBS interface. [PR Name=DL:DFC01]
	2	Tests the DDSBS - BIC interface and BIC circuitry. Excludes the PIC's interface. [PR Name=DL:DFC02]
	3	Tests the BIC - PIC interface using PIC resident firmware. [PR Name=DL:DFC03]
	4	Tests the BIC - PIC communication. [PR Name=DL:DFC04]
	5	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:DFC05]
	6	Tests the PIC microsequencer. [PR Name=DL:DFC06]
	7	Tests the PIC register and ALU. [PR Name=DL:DFC07]
	8	Tests the PIC source/destination decoders. [PR Name=DL:DFC08]
	9	Tests the PIC internal registers. [PR Name=DL:DFC09]
	10	Tests the PIC interrupt circuitry. [PR Name=DL:DFC10]
	11	Tests the PIC RAM and sequencer. [PR Name=DL:DFC11]
	12	Parallel/serial data interface and MHD control source and destination decoders. [PR Name=DL:DFC12]
	13	MHD control register. [PR Name=DL:DFC13]
	15	(Demand phase.) Tests the interface with the off-line CU. Off-line CU must be specified as a helper unit, and it must be OOS and ATP prior to running this phase. [PR Name=DL:DFC15]

Table 4-37 Diagnostic Phase Descriptions for DFC-SCSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFC-SCSI (AM)	-	Disk File Controller - Small Computer System Interface (Administrative Module)
	1	DSCH—DDSBS interface. [PR Name=DL:DFCS01]
	2	DDSBS—BIC interface and BIC circuitry excluding HA CI. No BIC FIFO buffer memory testing. [PR Name=DL:DFCS02]
	3	BIC—HA CI using HA resident firmware. [PR Name=DL:DFCS03]
	4	WE32100 CPU test. [PR Name=DL:DFCS04]
	5	Verifies ROM's contents. [PR Name=DL:DFCS05]
	6	Test 1 MB SRAM. [PR Name=DL:DFCS06]
	7	HA register tests. [PR Name=DL:DFCS07]
	8	WE32104 DMAC test. [PR Name=DL:DFCS08]
	9	DUART test. [PR Name=DL:DFCS09]
	10	STC test. [PR Name=DL:DFCS10]
	11	SCSI protocol controllers test. Tests both SCSI buses. [PR Name=DL:DFCS11]
	12	Test (validate) only differential type devices attached to buses.

		[PR Name=DL:DFCS12]
	13	Test ability of SCSI devices to recognize and acknowledge bus reset.
		[PR Name=DL:DFCS13]
	14	(Demand and DEX phase.) Bit-wise independence test for the HA FIFO buffer memory.
		[PR Name=DL:DFCS14]
	15	(Demand-only phase.) Tests the interface with the STBY CU. The STBY CU must be specified as the helper unit, and must be OOS and ATP prior to running this phase. [PR Name=DL:DFCS15]
	90	(Demand phase.) SCSI bus loop test. This phase requires that existing cables from the DFC be disconnected and the loop-around cable be connected between the two buses where they connect to the DFC before running the phase. [PR Name=DL:DFCS90]

Table 4-38 Diagnostic Phase Descriptions for DFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFI (SM) (ANN3, ANN5)	-	Digital Facility Interface (Switching Module) (Announcement3, Announcement 5)
	1 ^a	Tests the active side CI-CLRT. The functions that are verified: 1. Serial transmission capabilities including the PICB transmission paths, order start code, order parity, and serial loop back checks. 2. Parallel loop back capabilities including the subaddresses register, the 4 subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities including output-piso, the 4 subaddress registers, and PCL edercise clear. 4. ASW integrity which includes a check for ASW response and an exercise to check the checker. 5. Status latch control which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test which checks the PSR function and a PSR exercise. [PR Name = SM:DNec5_1] ^a
	2 ^a	Tests the mate CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions that are verified: 1. Serial transmission capabilities including the PICB transmission paths, order start code, order parity, and serial loop back checks. 2. Parallel loop back capabilities including the subaddress Control Link (PCL) exercise register. 3. CLRT clear capabilities including output-piso, the 4 subaddress registers, and PCL exercise clear. 4. ASW integrity which includes a check for ASW response and an exercise to check the checker. 5. Status latch control which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test which checks the PSR function and a PSR exercise. [PR Name = SM:DNec5_1] ^a
	3 ^a	Tests the mate CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions that are verified: 1. Serial transmission capabilities including the PICB transmission paths, order start code, order parity, and serial loop back checks. 2. Parallel loop back capabilities including the subaddress Control Link (PCL) exercise register.

	3. CLRT clear capabilities including output-piso, the 4 subaddress registers, and PCL exercise clear. 4. ASW integrity which includes a check for ASW response and an exercise to check the checker. 5. Status latch control which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test which checks the PSR function and a PSR exercise. [PR Name = SM:DNec5_1] ^a
4 ^a	This phase insures that the up can be brought up from a cold start and that the firmware enters its process schedule routine. The funtions that are verified in this phase are: 1. Partial check of up to CCB data access and flag protocol. 2. Sanity time-out indicator (shows that the firmware is cycling in process scheduler). [PR Name = SM:DNec5_2] ^a
5 ^a	This phase tests the PMTG parity walker and the firmware parity error reporting mechanism. It also verifies that the PMTG does not corrupt data passed through it on the active or mate PIDB. The functions verified by this phase are: 1. The circuit's ability to pass PCM and signaling information at the circuit interface is verified by looping through the PMTG over the active and mate PIDBs. 2. The firmware error reporting mechanism is enabled and verified by detecting transmit and receive errors with the PMTG. 3. The circuit's ability to pass PCM and signaling information through the circuit is verified by looping PCM and signaling information through the companion DFI over the far-end active and mate PIDBs. 4. The PMTG parity walker circuitry is verified by forcing the companion DFI to loose synchronization. [PR Name = SM:DNec5_2] ^a
6 ^a	The functions verified by this phase are: 1. That the LST can both transmit and receive 2400 HZ, 2600 Hz and 2400/2600 Hz combined tones for all 30 channels. [PR Name = SM:DNec5_2] ^a
7 ^a	This phase verifies that echo cancellation can be disabled using the 2100Hz disabling tone. This phase verifies: 1. The 2100Hz tone recognition and echo cancellation control circuitry. 2. Echo Cancellation and Voice Path Assurance tests. [PR Name = SM:DNec5_2] ^a
9 ^a	This phase initializes and tests the CI-CLRT communication paths and provides a comprehensive system test for the CLRT. [PR Name = SM:DNec5_2] ^a
10	This segment clears all CCB latches and registers except the flag and data registers. [PR Name = SM:DNuci]
11	This phase insures that the uC can be brought up from a cold start and that the firmware enters its process schedule routine. The DFI is automatically looped on itself by the firmware as part of the initialization process. [PR Name = SM:DNuci]
12	This phase provides a comprehensive check of the Maintenance Buffer and its internal latches. [PR Name = SM:DNdfig1]
13	This phase writes various exercise patterns to the control streams of each of the three LSI devices and checks for the correct response. Interaction among the MB, TF, RS, FR, CCB and the firmare is quite extensive, so this phase should give a good indication of the health of the LSI. [PR Name = SM:DNdfig1]
14	Like the previous phase, this phase writes exercises to the LSI devices. However, these exercises bring up facility alarms that

		are service affecting. Hence, these exercises must be run out-of-service. Also note that the facility response register in the CCB contains the exercise response. [PR Name = SM:DNdfg1]
	15	This phase checks the address and data bus of the uC as well as the integrity of the firmware via the firmware fault flag. [PR Name = SM:DNdfg2]
	16	This phase verifies the integrity of the signaling and PCM data paths in the DFI. Both the active and mate PIDB's are checked. [PR Name = SM:DNdfg2]
	17	This phase tests the mate-side CI by running the same tests as in Phase 1. The only difference is that the CLRT is now accessed via the mate CI. [PR Name = SM:DNdfg3]
	18	Tests the XPC-8 Protocol Controller chip, the Dual Port Ram (DPR), and the internal Facility Data Link (FDL) path. [PR Name = SM:DNdfg3]
	19	This phase uses the active and standby FIU to test the operation of the T1 Clock and T1 Status leads from the RSM DFI to both FIU sides. [PR Name = SM:DNdfg3]
	20	This phase loops PCM and Signaling data from the Active TSI to the looped RSM DFI. [PR Name = SM:DNdfg3]
Notes:		
a. The first eight test phases are associated with the ECSU. Phase 9 is a demand phase and is only used when DFI under test is equipped with an ECSU.		

Table 4-39 Diagnostic Phase Descriptions for DFI 2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFI 2 (SM)	-	Digital Facility Interface 2 (Switching Module)
	1	Tests the active side CI-CLRT. The functions that are verified: 1. Serial transmission capabilities including the PICB transmission paths, order start code, order parity, and serial loop back checks. 2. Parallel loop back capabilities including the subaddress register, the 4 subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities including output-piso, the 4 subaddress registers, and PCL exercise clear. 4. ASW integrity which includes a check for ASW response and an exercise to check the checker. 5. Status latch control which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test which checks the PSR function and a PSR exercise. [PR Name = DNec5_1]
	2	Tests the mate CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions that are verified: 1. Serial transmission capabilities including the PICB transmission paths, order start code, order parity, and serial loop back checks. 2. Parallel loop back capabilities including the subaddress register, the 4 subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities including output-piso, the 4 subaddress registers, and PCL exercise clear. 4. ASW integrity which includes a check for ASW response and an exercise to check the checker. 5. Status latch control which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test which checks the PSR function and a PSR exercise. [PR Name = DNec5_1]
	3	Tests the integrity of the CCB interface. The functions verified

	by this phase are: 1. The integrity of the transmission path between CLRT & CCB. 2. The CCB Data Ram is accessible both for reading and writing. 3. The Flag Ram is accessible both for reading and writing. 4. The decision tree for pinpointing raised flags works (activity flags, summary flags). 5. All error reporting mechanisms are in working order (address, matching, parity errors). 6. That the clear operation visibly works. [PR Name = DNec5_1]
4	This phase insures that the uP can be brought up from a cold start and that the firmware enters its process schedule routine. Functions that are verified in this phase are: 1. Partial check of up to CCB data access and flag protocol. 2. Sanity time-out indicator (shows that the firmware is cycling in process scheduler). [PR Name = DNec5_2]
5	This phase tests the PMTG parity walker and the firmware parity error reporting mechanism. It also verifies that the PMTG does not corrupt data passed through it on the active or mate PIDB. The functions verified by this phase are: 1. The circuit's ability to pass PCM and signaling information at the circuit interface is verified by looping through the PMTG over the active and mate PIDBs. 2. The firmware error reporting mechanism is enabled and verified by detecting transmit and receive errors with the PMTG. 3. The circuit's ability to pass PCM and signaling information through the circuit is verified by looping PCM and signaling information through the companion DFI over the far-end active and mate PIDBs. 4. The PMTG parity walker circuitry is verified by forcing the companion DFI to loose synchronization. [PR Name = DNec5_2]
6	The functions verified by this phase are: 1. That the LST can both transmit and receive 2400 Hz, 2600 Hz and 2400/2600 Hz combined tones for all 30 channels. [PR Name = DNec5_2]
7	This phase verifies that echo cancellation can be disabled using the 2100Hz disabling tone. This phase verifies: 1. The 2100 Hz tone recognition and echo cancellation control circuitry. 2. Echo Cancellation and Voice Path Assurance tests. [PR Name = DNec5_2]
9	This phase verifies the PICB interface between the active/standby MCTSI and the DFI control interface. The PICB interface circuits (parity check, start code check, and ability to force ASW errors) are verified. If the MCTSI is not duplex (ACT/STBY), only the interface to the active processor is tested and the phase completes CATP. [PR Name = DNuci]
10	This phase tests interface functions which are accessible through the module processor (MP) port. This includes testing of the first in - first out (FIFO) registers RAM, RAM parity checker/generator, summary scan registers, error source registers, mailbox registers, and mask registers. [PR Name = DNuci]
11	This phase tests the interface between the MP and local processor (LP) via the universal control interface (UCI) device. The specific tests are summary scan, interrupts and masks for the LP, access to registers, and interrupt in the hardware error source register (ESR) for errors on the LP. [PR Name = DNuci]
12	This phase tests that the uP can be brought up from a cold start and that the firmware enters its process scheduler routine. The sanity time-out indicator is verified which shows that the

		firmware is cycling in the process scheduler. A check of the equalizer value leads to the digital signal interface (DSI) is also performed. [PR Name = DNdfid1]
13		This phase checks the response of firmware that runs EPROM and RAM diagnostics. [PR Name = DNdfid1]
14		This phase verifies the integrity of the transceiver (XCVR) uP interface. The transmitter, receive synchronizer, and framer functions are checked via demand exercises performed in firmware. This phase also checks the XCVR framer, remote frame alarm, remote multiframe alarm, and receive synchronizer counter functions. The XCVR RAM is checked by running facility side for all the above tests. [PR Name = DNdfid2]
15		This phase verifies the integrity of the signaling and PCM data paths in the DFI. Both the active and standby MCTSI PIDBs are checked. The alternate data RAM is used to source 8-bit PCM data toward the DFI. Signaling bits are supplied by the SP. Since the DFI is looped on itself, the data and signaling bits are sent back to the alternate data RAM where they are verified. [PR Name = DNdfid3]
16		(TN1612 only). This phase tests the XPC (X.25 protocol controller) by writing different patterns to the talk-back channel and verifies a response pattern. With both paths of the RSM DFI looped at the far-end, the talk-back channel is used as a means of checking the XPC. [PR Name = DNdfid3]
17		(TN1612 only). This phase sends PCM data and signaling from the MCTSI to the looped RSM DFI. A single time slot is sourced from the MCTSI and sent through the FIU-DLI to the DFI. Both active and mate FIU-DLI paths are verified. [PR Name = DNdfid3]
18		(TN1612 only). This phase tests the operation of the T1 status leads from the RSM DFI to both FIU sides of an RSM. [PR Name = DNdfid3]

Table 4-40 Diagnostic Phase Descriptions for DFIH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFIH (SM)	-	Digital Facility Interface Host (Switching Module)
	1	Verifies (if the HDFI is the H1DFI) the PICB interface to the UCI from the ACT/STBY MCTSI. [PR Name=SM:DNUC]
	2	Verifies (on the H1DFI) operation of the UCI chip from the SMP end. [PR Name=SM:DNUC]
	3	Tests (on H1DFI) the UCI interface to LP side. Also verifies communication between the SMP and LP via the UCI and the associated interrupts to the LP. [PR Name=SM:DNUC]
	4	Initializes (on the HDFI) and tests the CI/CLRT communication paths and provides a comprehensive system test for the CLRT. [PR Name=SM:DNDFRI1]
	5	Ensures (on the HDFI) the following: (1) The integrity of the transmission path between the CLRT and the CCB. (2) The CCB data RAM and flag RAM are accessible both for reading and writing. (3) The decision tree for pinpointing raised flag works. (4) All error reporting mechanisms are in working order. (5) The clear operation visibly works.

	[PR Name=SM:DNDFRI1]
6	Ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine on the HDFI. It partially checks the microprocessor to CCB data access and flag protocol, sanity time-out indicator, and loop monitor indicator. [PR Name=SM:DNDFRI1]
7	Provides a comprehensive check of the maintenance buffer and its internal latches including the report synchronizer, transmit formatter, framer control and report stream registers, register clear register, ESR, and general purpose latch on the HDFI. [PR Name=SM:DNDFRI1]
8	Writes various exercise patterns to the control streams of each of the three LSI devices on the HDFI and checks for the correct response. Interaction among the MB, TF, RS, FR, CCB, and the firmware is extensive, so this phase gives a good indication of the health of the LSI. [PR Name=SM:DNDFRI2]
9	Writes (like phase 8) exercises to the LSI devices. However, these exercises bring up facility alarms that are service affecting. The TF does not have any facility alarm exercises. [PR Name=SM:DNDFRI2]
10	Checks facility alarm reporting on the HDFI in an indirect manner by taking advantage of the fact that the microprocessor, when functioning properly, reports facility alarms routinely (via firmware). Hence, this phase checks the address and data bus of the microprocessor as well as the integrity of the firmware via the device summary register. [PR Name=SM:DNDFRI2]
11	Verifies the integrity of the signaling and PCM data paths in the HDFI. Both ACT and STBY PIDBs are checked. [PR Name=SM:DNDFRI2]
12	Tests the STBY side CI by running the same tests as in phase 4. The only difference is that the CLRT is now accessed via the STBY CI. [PR Name=SM:DNDFRI2]
13	Tests the XPC (in the HDFI) by writing different patterns to talk back channel and verifying a response of a true data pattern. In H1s, this test is performed for the different number of time slots that can be used for the control channel in the DLI. [PR Name=SM:DNDFRI2]
14	Checks microprocessor EPROM and RAM on the HDFI. [PR Name=SM:DNDFRI2]
15	Ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine on the RDFI. It partially checks microprocessor (R1, R2) to CCB (H1, H2) data access and flag protocol and sanity time-out. [PR Name=SM:DNDFRI2]
16	Provides a comprehensive check of the maintenance buffer and its internal latches including receive synchronizer, transmit formatter, framer control and report stream registers, register clear register, ESR, and general purpose latch on the RDFI. [PR Name=SM:DNDFRI3]
17	Writes various exercise patterns to the control streams of each of the three LSI devices on the RDFI and checks the correct response. Interaction among the MB, TF, RS, FR, CCB, and the firmware is quite extensive, so this phase should give a good indication of the health of the LSI. [PR Name=SM:DNDFRI3]
18	Writes (like phase 17) exercises to the LSI devices. However, these exercises bring up facility alarms that are service affecting. The TF does not have any facility alarm exercises.

		[PR Name=SM:DNDFRI3]
	19	Checks XPC function in the RDFI. Also checks facility alarm reporting in an indirect manner by taking advantage of the fact that the microprocessor, when functioning properly, reports facility alarms routinely (via firmware). The address and data bus of the microprocessor as well as the integrity of the firmware is checked via the device summary register. [PR Name=SM:DNDFRI4]
	20	Verifies the integrity of the signaling and PCM data paths in the RDFI. Both ACT and STBY PIDBs are checked. For one segment, the remote DFI is looped on itself. The looping takes place in the PMTB so that time slot 7 is returned directly to the transmit formatter. For another segment, the RDFI is unlooped and a CD is looped. [PR Name=SM:DNDFRI4]
	21	Checks the microprocessor EPROM and RAM on the RDFI using on-board test routines. [PR Name=SM:DNDFRI4]
	22	Checks the PMTG functions on the RDFI including the walking parity mask and error registers, control register, and remote loss of clock register. [PR Name=SM:DNDFRI4]
	23	Checks the operation of the CI in the R1DFI. The primary responsibility of the CI is to recreate the PICB interface at the remote site in a manner similar to that in the nonremoted application. [PR Name=SM:DNDFRI4]
	24	Tests the communication between the SMP and the H1DFI through the PICB bypass FIFO circuit by writing data in various RAM locations in the UCI and verifying that the same data is returned in the corresponding locations. [PR Name=SM:DNDFRI4]

Table 4-41 Diagnostic Phase Descriptions for DFTAC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFTAC (SM)	-	Digital Facility Test Access Unit (Switching Module)
	1	Verifies board ID and basic register operation. [PR Name=SM:DNDFTAC]
	2	Tests junctor network and monitor and talk circuits. [PR Name=SM:DNDFTAC]

Table 4-42 Diagnostic Phase Descriptions for DIST

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DIST (SM)	-	Distribute (Switching Module)
	1	Tests send and receive data via MSUCOM operation of relay drivers. [PR Name=SM:DNDIST]

Table 4-43 Diagnostic Phase Descriptions for DLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DLI (SM/ORM)	-	Dual Link Interface (Switching Module and Optically Remote Module)
	1	Active MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests (I). [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests (II). [PR

		Name=SM:DNPDLI1]
6		Performs ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
7		Performs STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
8		Performs STBY MP SDLC to DLI interrupt and data tests. [PR Name=SM:DNPDLI2]
9		Performs STBY TSI to DLI interface (data loopback) tests. Also tests the STBY TSI to TRCU loopback tests in an ORM. [PR Name=SM:DNPDLI3]
10		Performs switch/monitor tests. [PR Name=SM:DNPDLI3]
11		Performs the TMS NCT link loop-around tests. [PR Name=SM:DNPDLI3]

Table 4-44 Diagnostic Phase Descriptions for DLN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DLN (CNI)	-	Direct Link Node (Common Network Interface)
	1,2,10, 11,12, 13,20, 23,24, 26,27	Same as LN phases 1, 2, 10, 11, 12, 13, 20, 23, 24, 26, and 27, respectively.
	30	Tests interface between the DSCH (UN9 at CU) and the DDSBS (TN69B). [PR Name=iun30.1]
	31	Tests the DDSBS (TN69B) and the 3B20D interface (TN914). [PR Name=iun31.1]
	32	Tests ability of NP (TN922) to go "insane" and set the interrupt request flag when the 3B20D interface (TN914) has an error. [PR Name=iun32.1]
	33	Tests the interface between the 3B20D (TN914) and the NP (TN922). [PR Name=iun33.1]
	34	(Demand phase only.) Off-line CU to DDSBS (TN69B) tests. [PR Name=iun34.1]
	35	Cooperates with the 3B20D driver to test the DMA capability via the 3B20D interface (TN914). [PR Name=iun35.1]
	40	Tests the AP (TN1340) Dual Port Memory from the NP side. [PR Name=iun40.1]
	41	Tests the AP (TN1340) and sends the results back to the 3B20D computer. [PR Name=iun41.1]
	42	Tests between DMA and 3B20D interfaces. [PR Name=iun42.1]

Table 4-45 Diagnostic Phase Descriptions for DUIC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DUIC (AM)	-	Direct User Interface Controller (Administrative Module)
	1	Request isolate, control signal, and control signal acknowledge from the PIC. [PR Name=DL:DUIC01]
	2	Read/write access of DAM. [PR Name=DL:DUIC02]
	3	DAM parity checker. [PR Name=DL:DUIC03]
	4	Microdiagnostic. [PR Name=DL:DUIC04]
	5	(Demand-only phase.) Loopback mode. The DUICs must be equipped. [PR Name=DL:DUIC05]
	6	(Demand-only phase.) Send-frames mode. The DUICs must be equipped. [PR Name=DL:DUIC06]

Table 4-46 Diagnostic Phase Descriptions for EAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
EAN (SM)	-	Equipment Access Network (Switching Module)
	1	Runs Group H DCTU tests. [PR Name=SM:DNEAN]

Table 4-47 Diagnostic Phase Descriptions for FPC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
FPC (CM1)	-	Foundation Peripheral Controller (Part of MSGS) (Communication Module 1)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board (TN856) of the FPC. [PR Name=AM:DNC3BFPC]
	2	Tests the microprocessor board (TN856) of the FPC. [PR Name=FPC:DNCFP22-25 and AM:DNC3BFPC]
	3	Tests the application board (UN173) of the FPC. [PR Name=FPC:DNCFP32-35 and AM:DNC3BFPC]
FPC (CM2)	-	Foundation Peripheral Controller (Part of MSGS) (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board (TN856) of the FPC. [PR Name=AM:DNC3BFPC]
	2	Tests the controller board (TN856) of the FPC. [PR Name=AM:DNC3BFPC and FPC:DNCFP22-25]
	3	Tests the application board (UN173) of the FPC. [PR Name=AM:DNC3BFPC and FPC:DNCFP32-35]

Table 4-48 Diagnostic Phase Descriptions for GDSF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDSF (SM/SM-2000)	-	Global Digital Service Function (Switching Module or Switching Module-2000)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]

	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, upon receipt of the messages, performs the required read and write to the UCI. Then internal read and write to verify interrupts to the LP. [PR Name=SM:DNUC]
	4	Verifies all hardware of the circuit pack and its interface to PICBs and PIDBs. All segments executed by resident software have the "LP" prefix; all others use the resident software indirectly. [PR Name=DNds3 4]

Table 4-49 Diagnostic Phase Descriptions for GDSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDSUCOM (SM)	-	Global Digital Service Unit Common (Switching Module)
	1	Tests CI with the ACT MCTSI. CATP completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNGDSC1]
	2	Tests CI with the STBY MCTSI. NTR completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNGDSC1]
	3	Tests the TSSR. [PR Name=SM:DNGDSC1]
	4	Tests the parity checkers and generators. [PR Name=SM:DNGDSC2]
	5	Tests interrupt registers, DSC parity error, and DSC fault and summary scan. [PR Name=SM:DNGDSC2]
	6	Tests data links to/from ACT and STBY MCTSI (if STBY MCTSI is OOS - then CATP executes). [PR Name=SM:DNGDSC2]

Table 4-50 Diagnostic Phase Descriptions for GDXACC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXACC (SM)	-	Gated Diode Crosspoints Access Code (Switching Module)
	1	Tests initialization. For LU1 [PR Name=SM:DNAXS1]. For LU2 and LU3 [PR Name=SM:DNCAXS1]
	2	Verifies crosspoints which make up the 6-by-6 test access network. If cannot test access to all HLSCs (HLSC is busy), then CATP completes. For LU1 [PR Name=SM:DNAXS1] For LU2 and LU3 [PR Name=SM:DNCAXS1]
	3	Verifies operation of crosspoints which make up the 32-by-8 B-LINK access network. If cannot test access to all HLSCs (HLSC is busy), then CATP completes. For LU1 [PR Name=SM:DNAXS2] For LU2 and LU3 [PR Name=SM:DNCAXS1]
	4	Verifies operation of crosspoints of the 32 forward/reverse networks associated with the channel circuits in this SG. For LU1 [PR Name=SM:DNAXS3] For LU2 and LU3 [PR Name=SM:DNCAXS2]
	5	Verifies access network crosspoints which connect B-LINKS to the GDX linearization circuit. For LU1 [PR Name=SM:DNAXS3] For LU2 and LU3 [PR Name=SM:DNCAXS2]
	6	Verifies operation of the GDX linearization circuit. For LU1 [PR Name=SM:DNAXS3] For LU2 and LU3 [PR Name=SM:DNCAXS2]

Table 4-51 Diagnostic Phase Descriptions for GDXC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXC (SM)	-	Gated Diode Crosspoint Compensator Pack (Switching Module)
	1	Tests receive control orders from the MSUCOM and performs a compensation. [PR Name=SM:DNMCOMP]

Table 4-52 Diagnostic Phase Descriptions for GDXCON

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXCON (SM)	-	Gated Diode Crosspoints Concentrator (Switching Module)
	1	Tests the load and read data from the source gate array and the alarm mask destination. [PR Name=SM:DNGCTR]
	2	Tests the enable checking and reporting circuits. [PR Name=SM:DNGCTR]
	3	Tests the power alarm reporting, storing, and inhibiting circuits. [PR Name=SM:DNGCTR]
	4	Tests transmission, loading, and reading of data to the concentrator LGs. [PR Name=SM:DNGCTR]
	5	Tests circuits which inhibit writes and reads to the concentrator when a multiple enable is detected. [PR Name=SM:DNGCTR]
	6	Turns on the network controller lamp for 1 second, then off for 1 second. Test is repeated 7 times, and then the lamp is left on. [PR Name=SM:DNGCTR]

Table 4-53 Diagnostic Phase Descriptions for GRID/GRIDBD (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD (SM)	-	Grid/Grid Board (Switching Module)
	1	Tests the grid alarm status, verifies the loopable test bit positions of both grid destination gate arrays, initializes all grid crosspoints to their ``off" state, and verifies the pseudo alarm capability of the grid to both SG network controllers. For LU1 [PR Name=SM:DNGRD] For LU2 and LU3 [PR Name=SM:DNCGRD]
	2	Verifies ability to write and read state of each crosspoint control latch for scan cutoff crosspoints. Actual connect/disconnect state not verified. For LU1 [PR Name=SM:DNGRD] For LU2 and LU3 [PR Name=SM:DNCGRD]
	3	Verifies ability to write and read state of each crosspoint control latch for second stage crosspoints. Actual connect/disconnect state of crosspoint are not verified. Also, crosspoint address decoding is tested for the possibility of stuck bits of ``do not care" states which could cause erroneous or multiple operation of crosspoints. For LU1 [PR Name=SM:DNGRD] For LU2 and LU3 [PR Name=SM:DNCGRD]
	4	Verifies ability to write and read state of each crosspoint control latch for first stage crosspoints. Actual connect/disconnect states of crosspoints are not verified. For LU1 [PR Name=SM:DNGRD] For LU2 and LU3 [PR

		Name=SM:DNCGRD]
	5	Checks operation of summary scan transition latch programming on the grid. For LU1 [PR Name=SM:DNGRD] For LU2 and LU3 [PR Name=SM:DNCGRD]

Table 4-54 Diagnostic Phase Descriptions for GRID/GRIDBD EXERCISE (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD EXERCISE (SM)	-	Grid/Grid Board Exercise (Switching Module) (LU1, LU2, and LU3)
	1	Tests the scan cut-off crosspoints and associated scan circuitry on each of the ports. [PR Name=SM:DNFABEX]
	2	Tests the first stage crosspoints along the A-LINKS. [PR Name=SM:DNFABEX]
	3	Tests the second stage crosspoints along with the B-LINKS. [PR Name=SM:DNFABEX]

Table 4-55 Diagnostic Phase Descriptions for GRID/GRIDBD PATH TEST (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD PATH TEST (SM)	-	Grid/Grid Board Path Test (Switching Module)
	1	Tests grid portion of the path for a resistive leak to ground. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	2	Tests the path (grid and loop facility) for a dangerously high voltage (AC and/or DC). [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	3	Tests the path (grid and loop facility) for an extraneous voltage. Also tests loop facility for a resistive leak and short between tip and ring leads. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	4	Verifies the scan origination circuit's ability to detect off-hook for 200 and 2500 ohm loops and tests scan cutoff crosspoints for stuck open failures. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	5	Tests scan cutoff crosspoints for stuck closed failures. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	6	Tests the first stage crosspoint of the path for stuck open failures. Tip, ring, or failures on both leads are specifically indicated. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	7	Tests the first stage crosspoint of the path for stuck closed failures. Tip, ring, or failures on both leads are specifically indicated. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	8	Tests the second stage crosspoint of the path for stuck open failures. Tip, ring, or failures on both leads are specifically indicated. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	9	Tests the second stage crosspoint of the path for stuck closed failures. Tip, ring, or failures on both leads are specifically indicated. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
	94 a	Reverse channel battery is applied, scan cutoff crosspoints are open, and first and second stage crosspoints are closed. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and

		LU3)]
95	a	Forward channel battery is applied, scan cutoff crosspoints are open, and first and second stage crosspoints are closed. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
96	a	First and second stage crosspoints are closed. Both tip and ring scan crosspoints are open. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
97	a	Ring scan and first and second stage crosspoints are closed. Tip scan crosspoint is open. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
98	a	Tip scan and first and second stage crosspoints are closed. Ring scan crosspoint is open. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
99	a	Both tip and ring scan crosspoints and the first and second stage crosspoints are closed. [PR Name=SM:DNLUP2 (for LU1) or SM:DNLUP3 (for LU2 and LU3)]
Notes: a. Phases 94-99 hold a path up to 15 minutes allowing testing of grid and loop characteristics with special instrumentation or procedures. The HLSC is never used in the hold tests but the channel battery is used for some phases.		

Table 4-56 Diagnostic Phase Descriptions for HDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
HDFI (HSM)	-	Host Digital Facilities Interface (Host Switching Module)
	1	Tests the CI/CLRT integrity. [PR Name=SM:DNDFIG1]
	2	Tests CCB integrity. [PR Name=SM:DNDFIG1]
	3	Tests μ C integrity. [PR Name=SM:DNDFIG1]
	4	Tests maintenance buffer integrity. [PR Name=SM:DNDFIG2]
	5	Tests LSI exercises I. [PR Name=SM:DNDFIG2]
	6	Tests LSI exercises II. [PR Name=SM:DNDFIG3]
	7	Tests facility alarm check. [PR Name=SM:DNDFIG3]
	8	Tests transmit and receive signaling and PCM data paths. [PR Name=SM:DNDFIG3]
	9	Tests STBY CI/CLRT check. [PR Name=SM:DNDFIG3]
	10	Tests DPR, XPC, and FDL integrity. [PR Name=SM:DNDFIG4]

Table 4-57 Diagnostic Phase Descriptions for IDCU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IDCU (SM)	-	Integrated Digital Carrier Unit (Switching Module)
	1	Verifies the PICB interface from the active and standby MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the CCP (Common Control Processor) UCI (Unified Control Interface) chip from the SMP end. [PR Name=SM:DNUCI]
	3	Tests the LP (Local Processor) of the CCP UCI. The MC (module controller) sends messages through the UCI for the LP, which upon receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies operation of the timers, sanity timer, processor interrupts, and NMIs. It also tests EPROM, I/O write protection circuits, and address and data parity generators and

	checkers. [PR Name=SM:DNIDCOM]
5	Verifies the control interface between the PTI (PIDB Transmission Interface) control logic and all PTI VLSI devices: PRF (PIDB Receive Formatter), TSI (Timeslot Interchanger), SP (Signal Processor), and CI (Control Interface). The VLSI devices are tested to the extent possible (e.g. alarms, BIST, etc.) without using the data paths. The interrupt masking and clock selection/detection circuitry is also tested. [PR Name=SM:DNIDCOM]
6	Verifies the functionality of the PTI internal data paths and interconnection of the PRF, SP, and TSI devices. All modes of SP signaling state change detection are tested. [PR Name=SM:DNIDCOM]
7	This phase tests the mate access bus by verifying communication from the ACT CCP to the CCP under test with the side under test in hold. A mate memory hashsum check is also performed. [PR Name=SM:DNIDCOM]
8	This phase tests the mate access bus by verifying communication from the CCP under test to the ACT CCP with the ACT CCP put in hold. The PTI mate clock selection and LSI DSI driver enable/override circuits are also tested in this phase. [PR Name=SM:DNIDCOM]
9	This phase verifies all (D)PIDB connections and associated (D)PIDB interface circuitry.
10	This phase runs a memory test on the CCP memory (RAM). [PR Name=SM:DNIDCOM]
21	Verifies the ICB (Internal Control Bus) interface from the PTI to the LSI (Loop Side Interface) pack. [PR Name=SM:DNLSI1]
22	Verifies operation of the LSI UCI chip from the PTI end. [PR Name=SM:DNLSI1]
23	Tests the LP of the LSI. The CCP sends messages through the UCI for the LP, which upon receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNLSI1]
24	This phase runs a memory test on all of the LSI memory (RAM). [PR Name=SM:DNLSI1]
25	Verifies the LSI processor, processor clock, interrupts, timers, sanity timer, 4 MHz clock detector circuit, and EPROM. It also verifies communication from LSI to DLPs (Data Link Processor) and functionality of the DLP, DLP RAM, DLP timers and interrupts, and control to SCC (Serial Communications Controller) devices. Lastly it verifies control to the rest of the devices on the pack such as the transceivers and the timeslot multiplexer/demultiplexer. [PR Name=SM:DNLSI1]
26	Verifies the functionality of the LSI internal data paths and interconnection of the timeslot multiplexer/demultiplexer, transceiver, SCC, and DSI (digital signal interface) devices. [PR Name=SM:DNLSI1]
27	Verifies all IDB (Internal Data Bus) connections and associated IDB interface circuitry. [PR Name=SM:DNLSI1]
28	(Demand phase only for factory and installation use). Verifies the LSI switch circuitry mainly that on the DSI device and the sync signals between the two SGs. The LSIs in both SGs must

		be in the growth state. [PR Name=SM:DNLSI2]
	29	(Demand phase only for factory and installation use). Verifies the DSI output drivers and the data paths between the LSI and Electrical Line Interface (ELI) along with the output of the ELI. This phase requires a special loopback connector on the backplane, or all facilities looped back at the DSX. The LSIs in both SGs must be in the growth state, or the unit must be duplex failed. [PR Name=SM:DNLSI2]
	30	(Demand phase only for factory and installation use). Verifies a HITLESS switch can be performed. This phase requires a special loopback connector on the backplane, or all facilities looped back at the DSX. The LSIs in both SGs must be in the growth state. [PR Name=SM:DNLSI2]

Table 4-58 Diagnostic Phase Descriptions for IOP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IOP (AM)	-	Input/Output Processor (Administrative Module)
	1	Tests the DSCH - DDSBS interfaces. [PR Name=DL:IOP01]
	2	Tests the DDSBS - BIC interface and BIC circuitry. Excludes the PIC. [PR Name=DL:IOP02]
	3	Tests the BIC - PIC interface, using the PIC resident firmware. [PR Name=DL:IOP03]
	4	Tests the BIC - PIC communications. [PR Name=DL:IOP04]
	5	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:IOP05]
	6	Tests the PIC microsequencer. [PR Name=DL:IOP06]
	7	Tests the PIC and ALU. [PR Name=DL:IOP07]
	8	Tests the PIC source/destination decoders. [PR Name=DL:IOP08]
	9	Tests the PIC internal registers. [PR Name=DL:IOP09]
	10	Tests the PIC interrupt circuitry. [PR Name=DL:IOP10]
	11	Tests the PIC RAM and sequencer. [PR Name=DL:IOP11]
	12	Tests the I/O microprocessor interface hardware. [PR Name=DL:IOP12]
	13	Tests the I/O microprocessor interface power control circuitry peripheral controller community power converter/monitor. [PR Name=DL:IOP13]
	15	(Demand phase only.) Tests the interface with the off-line CU. The off-line CU must be specified as a helper unit and it must be OOS and ATP. [PR Name=DL:IOP15]

Table 4-59 Diagnostic Phase Descriptions for ISLUCC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUCC (SM)	-	Integrated Services Line Unit Common Control (Switching Module)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, which, upon receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies operation of the timers in the CC microprocessor

		sanity timer, PIC, and NMIs. Also tests EPROM, I/O write protection circuits, and address and data parity generators and checkers. [PR Name=SM:DNICC]
	5	Verifies operation of the control sequencer on the CC under test. This includes the CS register, the sync circuitry, the CS memory, the CS memory parity generators and checkers, the 2-MHz interface and its error detection and propagation, and the 4-MHz interface and its error detection and propagation. [PR Name=SM:DNICC]
	6	Verifies the interface between the CC and peripheral boards. It also verifies operation of the enable controller, ASW controller, and the service request controller. [PR Name=SM:DNICC]
	7	Verifies operation of the STBY access bus from the ACT CC to the CC under test. It also verifies peripheral select bit and the CIDB interface to the ACT CD. [PR Name=SM:DNICC]
	8	Verifies operation of the STBY access bus from the CC under test to the ACT CC. [PR Name=SM:DNICC]
	9	Runs memory test on the CC memory (RAM). [PR Name=SM:DNICC]

Table 4-60 Diagnostic Phase Descriptions for ISLUCD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUCD (SM)	-	Integrated Services Line Unit Common Data (Switching Module)
	1	Verifies the interface between the CD under test and the ACT and STBY CCs. It also tests the peripheral register access controller's service request register and its mask register. [PR Name=SM:DNICD]
	2	Tests the parity generators and checkers used in the PCM - MUX for its different control memory banks (A, B, and T). [PR Name=SM:DNICD]
	3	Runs a memory test on all of the CDs in the PCM - MUX control memory. [PR Name=SM:DNICD]
	4	Tests the CIDB interface to the ACT and STBY CC from the CD under test and the corresponding configuration bits. This phase does not perform any test if the CCs are not duplex. [PR Name=SM:DNICD]
	5	Verifies multiplexing function of the CD between all PIDBs and equipped LGCs by looping data at the LGC, using on-board signature only. [PR Name=SM:DNICD]
	6	Verifies data interface between the CD packs and the ACT/STBY DI and the ACT/STBY DFs. [PR Name=SM:DNICD]

Table 4-61 Diagnostic Phase Descriptions for ISLUHLSC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUHLSC (SM)	-	Integrated Services Line Unit High-Level Service Circuit (Switching Module)
	1	Verifies communication between the ACT/STBY CCs and the HLSC. Also tests the ability to shut down the power converter on the HLSC and ring trip service request. Finally, it verifies the firmware version. [PR Name=SM:DNIZHSC]
	2	Tests internals of the HLSC with self-test routines. [PR Name=SM:DNIZHSC]
	3	Tests the HLSC buses 0 and 1 output relays. It also verifies

ring trip function and the ability of the HLSC to supply DC voltages. [PR Name=SM:DNIZHSC]

Table 4-62 Diagnostic Phase Descriptions for ISLULC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLULC (T-CARD) (SM)	-	Integrated Services Line Unit Line Card (T-Interface Card) (Switching Module)
	1	Verifies the CIs to the LC, the function of the maintenance circuitry and its masks, and the directed scanning and isolation functions. [PR Name=SM:DNITC]
	2	Verifies a test for single bit errors in the time slot comparator and parity of the B and D channels. It also tests the ability of the T-Interface Card to communicate over a path to the TSI. [A duplex path (two time slots at the TSI, the same time slot number on LIDB sides 0 and 1 to the card under test) is set up between the ACT TSI and the T-Interface Card under test. The dual upstream mode of the card is also tested over this duplex path] [PR Name=SM:DNITC]
	3	Only runs on ISLULGC diagnosis with LC option requested. Verifies the time slot comparator, the origination and fault scan operation, and the broadcast mode operation. [PR Name=SM:DNITC]
ISLULC (AMI/ANSI™ U-TYPE CARD) (SM)	-	Integrated Services Line Unit Line Card (Alternate Mark Inversion/ANSI U-Type Interface Card) (Switching Module) — Unless otherwise specified, these descriptions are for both the AMI and ANSI U-Type Interface cards. The segment numbers for the AMI cards begins with 4000 and the segment numbers for the ANSI cards begins with 5000.
	1	Runs for all sources. Concerned with the control access to the LC through primitive reads and writes provided by ISLU base software. Checks the control path to the LC and checks for proper register access as a foundation to other tests. Also verifies the time slot selection feature of the LC. [PR Name=SM:DNISUC]
	2	Runs for all sources. Concerned with the various channel's mode of operation. The GIDB data path, e-bit control, and data parity are examined. Also checks local loopback of data, U-K logic, and verification of the echo canceler. Finally, this phase checks the operation of the spare U-DSL card and the U-DSL card crosspoints via the LG bus, and the ability to spare the LC is examined via the spare bus. [PR Name=SM:DNISUC]
	3	Can only be run if the ISLULGC is OOS. The ISLULGC diagnostic must be run with the LC option. Checks broadcast features of the LC and performs fault and summary LG scan tests. Also does a full test of the B and D time slot comparator. [PR Name=SM:DNISUC]
	4	(Demand phase only.) For the AMI U-Type Interface Card, examines the upstream responses to changes in the downstream N-channel signaling using the NT1. For the ANSI U-Type Interface Card, examines the upstream response to the downstream EOC messages sent to the NT1. For both the AMI and ANSI U-Type Interface Cards, verifies that each channel can transmit/receive without data corruption through loopbacks and a digital source. Each channel is also

		checked for data integrity. Also does a metallic mismatch test to check for a mismatch between the LC/NT1 installed and the ODD and also a check for a tip and ring open or short. For AMI, checks for a tip and ring reversal. [PR Name=SM:DNISUC]
	5	Used only by the ANSI U-Type Interface Card. Runs for all sources except automatic, which is called by fault recovery. Performs tests to check the PM circuitry. [PR Name=SM:DNISUC]
ISLULC (Z-CARD) (SM)	-	Integrated Services Line Unit Line Card (Z-Interface Card) (Switching Module)
	1	Verifies the CIs to the LC. Also verifies the function of the maintenance circuitry and its masks. Also tests the digital circuitry to the MCTSI and e-bit control. [PR Name=SM:DNIZC1]
	2	Tests the DC portion of the LC which can be tested without closing the tip and ring crosspoints. Also tests spare bus continuity if the card is a spare card. [PR Name=SM:DNIZC1]
	3	Tests the remaining DC portion of the LC and the metallic connections to access buses 0 and 1. [PR Name=SM:DNIZC1]
	4	Tests the ring trip circuit on the LC. [PR Name=SM:DNIZC1]
	5	Performs basic transmission testing within the ISLU. [PR Name=SM:DNIZC3]
	6	(Demand phase only.) Performs comprehensive transmission tests including auto-out, idle channel noise, receive and transmit filters, balance network, and gain states. [PR Name=SM:DNIZC2]
	7	Performs basic time slot comparator check. [PR Name=SM:DNIZC3]
	8	(Demand phase only.) Runs the tests that may interfere with a PBX if the line is a PBX line. [PR Name=SM:DNIZC2]
	9	Runs only if the ISLULGC diagnostic is requested with the LC option. Tests the summary scan, fault scan, and performs a comprehensive time slot comparator check. [PR Name=SM:DNIZC2]

Table 4-63 Diagnostic Phase Descriptions for ISLULGC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLULGC (SM)	-	Integrated Services Line Unit Line Group Controller (Switching Module)
	1	Verifies the interface to the LGC from the ACT/STBY major and minor CD. It also tests the internal logic and bit decoding, and verifies the ability to communicate with a LC both GIDBs. [PR Name=SM:DNLGC]
	2	Verifies the interface from the LGC to each equipped LC in the SG - not OOS due to a faulty condition. Also, each LC in an OOS faulty condition is verified that no directed scan is detected when it is isolated. [PR Name=SM:DNLGC]
	3	Verifies the directed, faulty, and summary scan from each equipped LC in the SG - not OOS due to a faulty condition. [PR Name=SM:DNLGC]
	4	Verifies operation of the loopback mode for the LGC. In this mode, data and control are looped back to the STBY CC from the LGC under test. [PR Name=SM:DNLGC]

Table 4-64 Diagnostic Phase Descriptions for ISLUMAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUMAN (SM)	-	Integrated Services Line Unit Metallic Access Network (Switching Module)
	1	Verifies communication between ACT/STBY CCs and the MAN circuit pack. It also verifies the reset function that deenergizes all relays and associated latches. [PR Name=SM:DNMAN]
	2	Tests the MTB relays, test termination relays, ringing generator maintenance relays, and spare relays. Also tests protocol circuit, MTB protection circuit, and verifies that the MAN circuit pack is disconnected from STBY MAN circuit pack on the spare bus. [PR Name=SM:DNMAN]
	3	Tests all RG relays on the MAN circuit pack. [PR Name=SM:DNMAN]
	4	Tests all relays on the MAN circuit pack associated with HLSCs. [PR Name=SM:DNMAN]
	5	(Demand phase only.) Verifies that there are no foreign TR shorts and/or voltage potentials connected to the MAN circuit pack and more testing is done on the MTB relays. [PR Name=SM:DNMAN]

Table 4-65 Diagnostic Phase Descriptions for ISLURG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLURG (SM)	-	Integrated Services Line Unit Ringing Generator (Switching Module)
	1	Verifies communication between ACT/STBY CCs. [PR Name=SM:DNIRG]
	2	Tests the RG voltages and the following modes: (1) earth backed with ring on tip lead (2) earth backed with ring on ring lead (3) battery backed with ring on ring lead (4) battery backed with ring on tip lead. Also tests the sources of service request on the RG and verifies that the RGs ringing frequency agrees with that of ODD. [PR Name=SM:DNIRG]
	3	Verifies that the RG can output its ringing voltage to each of the four MAN CPs. In addition, the BCF service request is also tested. [PR Name=SM:DNIRG]

Table 4-66 Diagnostic Phase Descriptions for ISTF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISTF (SM)	-	Integrated Services Test Facility (Switching Module)
	1	Same as phase 1 LDSU (SM). [PR Name=SM:DNUCI]
	2	Same as phase 2 LDSU (SM). [PR Name=SM:DNUCI]
	3	Same as phase 3 LDSU (SM). [PR Name=SM:DNUCI]
	4	Same as phase 4 LDSU (SM). [PR Name=SM:DNDU2]
	5	Same as phase 5 LDSU (SM). [PR Name=SM:DNDU2]
	6	Same as phase 6 LDSU (SM). [PR Name=SM:DNDU2]
	8	Performs memory test and operational image pump

		verification.
		[PR Name=SM:DNDSU2]

Table 4-67 Diagnostic Phase Descriptions for IUN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IUN (CNI)	-	Interprocess Message Switch User Interface (Common Network Interface)
	1, 2, 10, 11, 12, 13, 20, 23, 24, 26, 27	Same as LN phases 1, 2, 10, 11, 12, 13, 20, 23, 24, 26, and 27 respectively.

Table 4-68 Diagnostic Phase Descriptions for LC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LC (SM)	-	Line Circuit (Switching Module)
	1000	Verifies the LC functionality by requesting the application pack firmware to run tests on the circuits, including PCM path tests between the LC and the controlling COMDAC. [PR Name= <i>N/A</i>]

Table 4-69 Diagnostic Phase Descriptions for LDSF3

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSF3 (SM-2000)	-	Local Digital Service Function 3 (Switching Module-2000)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, upon receipt of the messages, performs the required read and write to the UCI. Then internal read and write to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies all hardware of the circuit pack and its interface to PICBs and PIDBs. All segments executed by resident software have the "LP" prefix; all others use the resident software indirectly. [PR Name=DNds3_4]

Table 4-70 Diagnostic Phase Descriptions for LDSU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSU (SM)	-	Local Digital Service Unit (Switching Module)
	1	Tests CI with ACT and STBY MCTSI. If STBY MCTSI is OOS, then CATP completes. [PR Name=SM:DNUCI]
	2	Tests the internal functions of the UCI chip on the LDSU. [PR Name=SM:DNUCI]
	3	Tests the LP - UCI interface. [PR Name=SM:DNUCI]
	4	Tests LDSU bus interface to DSU2. [PR Name=SM:DNDSU2] <i>For TN1890 only</i> - [PR Name=DNds3_4]
	5	Performs LP tests - interrupt controller, timers, parity, and write protect. [PR Name=SM:DNDSU2]
	6	Tests DSPs, SDI, and data to/from LDSU bus. [PR Name=SM:DNDSU2]

	8	Performs memory test and operational image pump verification. [PR Name=SM:DNDSU2]

Table 4-71 Diagnostic Phase Descriptions for LDSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSUCOM (SM)	-	Local Digital Services Unit Common (Switching Module)
	1	Tests CI with the ACT MCTSI. If the MCTSI is not ACT/STBY, then CATP completes. [PR Name=SM:DNLDSC1]
	2	Tests CI with the STBY MCTSI. If the MCTSI is not ACT/STBY, then NTR completes. [PR Name=SM:DNLDSC1]
	3	Tests the TSSR. [PR Name=SM:DNLDSC1]
	4	Tests the parity checkers and generators. [PR Name=SM:DNLDSC2]
	5	Tests the interrupt registers, DSC parity error, DSC fault and summary scans. [PR Name=SM:DNLDSC2]
	6	Tests data links to/from ACT and STBY MCTSI. If STBY MCTSI is OOS, then CATP completes. [PR Name=SM:DNLDSC2]

Table 4-72 Diagnostic Phase Descriptions for LI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LI (CM1)	-	Link Interface (Communication Module 1)
	1	Tests the communication interface between the the FPC and LI, and the ability to read and write the LI control registers. [PR Name=FPC:DNCL01]
	2	Tests the A and B links framing, transmit and receive parity, the parity to/from the FPC, and the phase lock loop clock slip. [PR Name=FPC:DNCL02]
	3	Tests the A and B link receive message time slot parity, and the A and B link transmit message time slot parity. [PR Name=FPC:DNCL03]

Table 4-73 Diagnostic Phase Descriptions for LN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LN (CNI)	-	Link Node (Common Network Interface)
	1	Tests RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable. [PR Name=iun01.1]
	2	Tests RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable. [PR Name=iun02.1]
	10	Tests the NP (TN913/TN922), RI0 (UN122), and RI1 (UN123). [PR Name=iun10.1]
	11	Tests the NP (TN913/TN922), RI0 (UN122), and RI1 (UN123). [PR Name=iun11.1]
	12	Tests RI0 (UN122). CATP completes when more than one node is isolated. [PR Name=iun12.1]
	13	Tests RI1 (UN123). CATP completes when more than one node is isolated.

		[PR Name=iun13.1]
20		Tests the NP (TN913/TN922). [PR Name=iun20.1]
23		Tests the NP (TN913/TN922). [PR Name=iun23.1]
24		Tests the NP (TN913/TN922). [PR Name=iun24.1]
26		Tests the NP (TN913/TN922). [PR Name=iun26.1]
27		Tests the NP (TN913/TN922). [PR Name=iun27.1]
40		Tests the NP (TN913/TN922), LI (TN916) - not encrypted, and LI (TN917) - encrypted. [PR Name=CBph40.1]
41		Tests the NP (TN913/TN922), LI (TN916) - not encrypted, and LI (TN917) - encrypted. [PR Name=CBph41.1]
47		Tests the NP (TN913/TN922), LI (TN916) - not encrypted, LI (TN917) - encrypted, and TN919 data sets and VFL. [PR Name=CBph47.1]
48		Tests the NP (TN913/TN922), LI (TN916) - not encrypted, LI (TN917) - encrypted, and TN919 data sets and VFL. [PR Name=CBph48.1]

Table 4-74 Diagnostic Phase Descriptions for LUCHAN/LUCHBD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUCHAN/ LUCHBD (SM)	-	Line Unit Channel Circuit/Line Unit Channel Board (Switching Module)
	1	Tests control to channel circuit. [PR Name=SM:DNCHN (for LU1) or SM:DNCCHN1 (for LU2 and LU3)]
	2	Tests DC portion of channel circuit - battery feed, cutoff, scan encoding, loop bias, and power up/down. Initializes all GDX crosspoints associated with the channel under test. [PR Name=SM:DNCHN (for LU1) or SM:DNCCHN1 (for LU2 and LU3)]
	3	Tests AC portion of channel circuit - parity bit, CODEC power down, CODEC circuit, hybrid gain, idle channel noise, and CODEC filter balance network. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. [PR Name=SM:DNCHN (for LU1) or SM:DNCCHN1 (for LU2 and LU3)]
	4	Performs more exhaustive test of CODEC. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. [PR Name=SM:DNCHN (for LU1) or SM:DNCCHN1 (for LU2 and LU3)]
	5	Checks the crosspoints associated with the path to the channel being tested. [PR Name=SM:DNCHN (for LU1) or SM:DNCCHN1 (for LU2 and LU3)]

Table 4-75 Diagnostic Phase Descriptions for LUCOMC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUCOMC (LU1)(SM)	-	Line Unit Common Data and Control (Line Unit 1) (Switching Module)
	1	Tests CI with the MCTSI. Completes NTR if the MCTSI is not ACT/STBY. [PR Name=SM:DNCD]
	2	Tests remaining control to registers on COMDAC. Reports CI errors - does not check interface to COMDAC subtending circuits. [PR Name=SM:DNCD]
	3	Tests CI with the STBY MCTSI. NTR completes if MCTSI not ACT/STBY. [PR Name=SM:DNCD]
	4	Verifies operation of the common data circuit. NTR completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNCD]
	5	(Demand, automatic, or growth phase.) Tests the interface of COMDAC and its subtending circuits. [PR Name=SM:DNCD]

LUCOMC (LU2 and LU3) (SM)	-	Line Unit Common Data and Control (Line Unit 2 and Line Unit 3) (Switching Module)
	1	Tests CIs with MCTSI, peripheral sequencer and maintenance register. CATP completes if MCTSI not ACT/STBY. [PR Name=SM:DNCCD1]
	2	Tests service request controller. [PR Name=SM:DNCCD1]
	3	Tests board - enable multiplexer. [PR Name=SM:DNCCD1]
	4	Tests ASW controller. [PR Name=SM:DNCCD1]
	5	Tests CI with STBY MCTSI. NTR completes if MCTSI not ACT/STBY. [PR Name=SM:DNCCD2]
	6	Tests PIDB interface with ACT and STBY MCTSI. CATP completes if MCTSI is not ACT/STBY. [PR Name=SM:DNCCD2]
	7	(Demand, automatic, or growth phase only.) Tests interface of COMDAC with its subtending circuits. [PR Name=SM:DNCCD2]

Table 4-76 Diagnostic Phase Descriptions for LUHLSC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUHLSC (LU1)(SM)	-	Line Unit High-Level Service Circuit (Line Unit 1) (Switching Module)
	1	Verifies basic operations - control of power converter, bridge switch, amplifier detect overcurrent, overvoltage protection and output reversal. [PR Name=SM:DNHLSC1]
	2	Tests operation of the MABs. [PR Name=SM:DNHLSC1]
	3	(Demand phase only.) Generates and detects DC voltages and operation of the voltage flip-flop. [PR Name=SM:DNHLSC2]
	4	(Demand phase only.) Tests filtered current crosspoints, reset time constant, ring flip-flop and ring trip RG. [PR Name=SM:DNHLSC2]
	5	(Demand phase only.) Performs DC current generation/detection and the current sensing modes single-ended, differential, and single-ended-times-four. [PR Name=SM:DNHLSC3]
LUHLSC (LU2 and LU3) (SM)	-	Line Unit High-Level Service Circuit (Line Unit 2 and Line Unit 3) (Switching Module)
	1	Tests CI to HLSC, runs firmware self-tests and verifies version. [PR Name=SM:DNCHLSC1]
	2	Tests HLSC output connections through A and B relays. [PR Name=SM:DNCHLSC1]

Table 4-77 Diagnostic Phase Descriptions for MA

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MA (SM)	-	Metallic Access (Switching Module)
	1	Tests send and receive data with MSUCOM, generates interrupt to MSUCOM, and operation of relay drivers. [PR Name=SM:DNMAXS]
	2	(5E11 and earlier) Tests MTBs to far-end units. [PR Name=SM:DNMAXS]
	3	(5E11 and earlier) (Demand phase only.) Tests the MTBs for Subscriber Loop Carrier RTs. [PR Name=SM:DNMAXS]
	102	(5E12 and later) Tests the MTBs for proper operations. This

		phase test and checks the following: - Relay operations in the MA circuit pack that are connected to the MTB. - Connections to the TBCU for integrated subscriber loop carriers (5E12 only) [PR Name=0] (5E13 and later) [PR Name=SM:DNMAXS]
	103	(5E12 and later) Tests integrated subscriber loop carrier terminations on each RT connected to the MTB. (5E12 only) [PR Name=0] (5E13 and later) [PR Name=SM:DNMAXS]

Table 4-78 Diagnostic Phase Descriptions for MAB

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MAB (SM)	-	Metallic Access Bus (Switching Module)
	1	Tests access bus and all connecting relays in MSU shelf. [PR Name=SM:DNJUNC]

Table 4-79 Diagnostic Phase Descriptions for MCTSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (SMP1/12/23) (SM)	-	Module Controller/Time Slot Interchange (Switching Module Processor 1/12/23) (Switching Module)
	1	Tests static RAM, PICs address, data latches access to all boards of IMP, and all equipped memory boards in SMP 1/12/23. Skips PIC test if either DLI is OOS and completes CATP. [PR Name=SM:DNMP1]
	2	Processor sanity test, tests dormant logic and parity checkers on TN871/TN1397/TN1407 in SMP 1/12/23. [PR Name=SM:DNMP2]
	3	Tests ROM checksum, write protect, stack protect, address decoder, and microcode number on TN874 in SMP 1/12/23. [PR Name=SM:DNMP3]
	4	Tests ESRs, sanity and I/O timers, reset handling circuits, status registers, BCR and its shadow register, subunit mismatch error detection, and address decoders on the TN873/TN1533 in SMP 1/12/23. [PR Name=SM:DNMP4]
	5	Tests SDLC and DMA circuits, and DLI interface on the TN872 in SMP 1/12/23. Completes CATP if either DLI is OOS. [PR Name=SM:DNMP5]
	6	Tests TN875/TN1409/TN1527 and all memory boards - row and column parity, hamming and a 2-pass memory test in SMP 1/12/23. [PR Name=SM:DNMP6]
	7	(Demand and Manual phase only, not REX.) Memory tests - a more exhaustive (8-pass) memory test in SMP 1/12/23. Use when suspected marginal memory board, but normal MCTSI is ATP. [PR Name=SM:DNMP6]
	8	Tests the power alarm circuitry on the TN874B and ASC in

		SMP 1/12/23. [PR Name=SM:DNMP7]
	9	Tests the CPI in SMP 1/12/23. Will not perform test if either DLI or any TMS link is OOS and completes CATP. [PR Name=SM:DNMP7]
	10	Performs update bus test for SMP 1/12/23. [PR Name=SM:DNMP8]
	11	Performs the subunit access test for SMP 1/12/23. [PR Name=SM:DNMP8]
	90	(Demand phase only.) Tests the TN874. Primary use is during software update when TN874 has been changed on one side of the MCTSI and needs to be tested (including the EPROM microcode number and checksum over the code in the EPROMs). [PR Name=SM:DNMP8]
	-	Module Controller/Time Slot Interchange (Switching Module Processor 20) (Switching Module)
	1	Tests the ACT processor's ability to write and read the STBY via the update bus, the dynamic memory, and the interconnections between circuit packs in an SMP20 (UN515/UN520). [PR Name=SM:DNMC2_1]
	2	Verifies sanity for off-line execution, tests STBY module controller, interrupt controller, 10 ms timer, ability for STBY to be awakened and put to sleep, reset and total hold masks, sanity maze, address and data parity checkers, shadow operation register, internal and external cache, processor performance, and cross coupled interrupts/DLI interrupts in SMP20 (UN515/UN520). [PR Name=SM:DNMC2_2]
	3	Tests the UN517 board, billing counter, stack protect, 10 ms timer, and verifies the microcode number in SMP20. [PR Name=SM:DNMC2_3]
	4	Tests all circuitry on UN516 CS1 board not previously tested in SMP20. Tests ASR, PSRs 1&2, SPR "A"FF, 8255 port hardware, software and global memory ESRs, sanity and I/O timer, reset handling circuitry, BCR, shadow BCR, and MPF circuitry. [PR Name=SM:DNMC2_3]
	5	Tests the applications board (UN518), SDLC and DMA circuitry in SMP20. [PR Name=SM:DNMC2_4]
MCTSI (SMP20) (SM)	6	Tests the dynamic memory boards, EDC circuits, write protect circuits, memory refresh circuits, dynamic RAM devices, and memory self-test in SMP20 (TN1374, TN1376, and TN1661). [PR Name=SM:DNMC2_5]
	7	(Demand phase only.) Tests dynamic memory boards by doing reads and writes from software in addition to self-tests in SMP20 (TN1374, TN1376, and TN1661). [PR Name=SM:DNMC2_6]
	8	(Demand phase only.) Tests RSM lamp circuitry on UN516 (CS1) board and the ASC in SMP20. [PR Name=SM:DNMC2_6]
	9	Tests CPR hardware in SMP20. [PR Name=SM:DNMC2_5]
	10	Tests the OOS processor's ability to access the ACT side over the update bus, as well as local and STBY side pump DMA activity to memory in SMP20. [PR Name=SM:DNMC2_5]
	11	Tests SIB in SMP20. [PR Name=SM:DNMC2_5]
	66	Tests interface to the B TSR circuit on the UN518 - the PIDB

MCTSI (SMP1/12/20/23) (SM)		interface from the DI, and level 6 interrupt to UN516 in SMP20. [PR Name=SM:DNMC2_66]
	-	Module Controller/Time Slot Interchange (Switching Module Processor 1/12/20/23) (Switching Module)
	31	Tests TSI - MP interface, TSI control circuitry, control RAMs A-E, ADR, and RCV and TMT TSIs, attenuator ROM, e-bit buffer, and TSI data paths. [PR Name=SM:DNTSI1]
	32	Tests TSI - DLI interface. NTR completes if either DLI is OOS. [PR Name=SM:DNTSI2]
	51	Tests the SP - mode latch, M-RAM, ignore RAM, and immediate access RAM. [PR Name=SM:DNISP]
	52	Tests the SP - FIFO, parity check circuits, ESR, interface to programmable interrupt controller on the TN872, and ready time-out error. [PR Name=SM:DNISP]
	61	Tests the DI circuits. [PR Name=SM:DNDI]
	62	Tests the DI parity check from peripheral. [PR Name=SM:DNDI]
	63	Tests the DI fanout on TN1377. [PR Name=SM:DNDI]
	64	Performs no testing at this time and is reserved for future use. [PR Name=SM:DNDI]
	71	Tests CI - MP interface and CI register access. [PR Name=SM:DNCI1]
	72	Tests the CI - CI transmit/receive sequencers. [PR Name=SM:DNCI1]
	73	CI - tests integrity of PICB paths to/from peripherals. [PR Name=SM:DNCI1]
	81	Verifies SUIB interface of the PI. Fundamental communication and error reporting are verified. The port processor and DARAM are not accessed except to initialize them into a noninterfering configuration. [PR Name=SM:DNPI1]
	82	Verifies access to full range of DARAM from SUIB side of PI. A complete memory test is provided from port processor side of PI. This phase is only used to verify addressing, the ability to reset memory, the write protect of memory, and auto increment of address register when reading or writing data to the DARAM. [PR Name=SM:DNPI1]
	83	Verifies operation of the error correction and detection circuits from SUIB side of DARAM. Also verifies ability to detect and correct single-bit errors and to detect and report multiple-bit errors. [PR Name=SM:DNPI1]
	84	Verifies port processor side of the PI. The PI is reset and pumped. Basic communication of PB is verified. If communication looks good, a sanity maze and memory test are run. This phase does not continue its operation if the initial pump fails or if set up of PB from on-line PSUCOM fails. Port processor is in a diagnostic mode. [PR Name=SM:DNPI1]
	85	Verifies packet bus from PI to STBY side of PSUCOM. Only attempts test if PSUCOM is in STBY mode. If PSUCOM is OOS, test reports a CATP. The port processor in the PI is in a diagnostic mode during this phase. [PR Name=SM:DNPI1]

Table 4-80 Diagnostic Phase Descriptions for MCTSI SM-2000

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (SM-2000)	-	Module Controller/Time Slot Interchange (Switching Module-2000)

1	Verifies the sanity of the OOS MCTSI for power (SN410AA/UN589), SMP state, SMP equipage with respect to the database, ability to perform the accesses across the SMP update bus to the I/Os on CORE (UN540/UN540B/UN560), Bus Service Node (KBN8/KBN8B), equipped external memory boards (TN1685/TN1806), Application Controller (UN539) and Message Handler (UN538). It also verifies parity checkers and generators connected to update bus, interconnections between circuit packs, and SMP error source hierarchy. Tests the external memory and its initialization using on-board self-tests. For the UN560, it also tests the internal timer and on-CORE memory and external cache using self-test. [PR Name=SM2000:DNmc4_01]
2	Tests circuits on CORE (UN540/UN540B/UN560) and BSN (KBN8/KBN8B). Verifies power-up reset (exception 0) circuit to and from OOS SMP, cross coupled processor status signals between ACTIVE and OOS SMP, ability to wake-up and stop the OOS processor for off-line execution, sanity and mate lockout, short ready timeout, A-FF and loss-of-clock detector, sanity maze, cache, SPFMR operation, parity checkers and generators on the Local System (LS) bus, conditional suspend timer, processor performance, CRC checks of the generic firmware (5E10 - Firmware Identification check). For the UN560, the external cache maintenance modes, internal timers, lock protocol, loss of sync and write posting buffer are also tested. [PR Name=SM2000:DNmc4_02]
3	Tests circuits on CORE and BSN. Verifies processor status registers, PICs, to/from mate interrupt signals between the ACT and OOS SMPs, control/display circuits (SN516 for SM-2000 with SMPU4/UN589 for SM-2000 with SMPU5), sanity timer, I/O timers, bus error circuits, and MPF circuits for ACT and OOS SMPs. [PR Name=SM2000:DNmc4_03]
4	Tests the circuits on BSN (KBN8/KBN8B). The BSN is the interface between the LS, RS bus, and SMP update bus. Verifies bus control circuits and shadow bus control, address, data, control shadow registers, BSN write protects, matchers, shadow circuits and parity checkers and generators on the RS bus. [PR Name=SM2000:DNmc4_04]
5	Tests the circuits on APC (UN539). Verifies address decoders on APC, stuck at faults on the APC I/Os, Bootstrapper DLI interface circuit (BDL), Bootstrapper Direct Memory Access (BTSR-DMA) circuits, Sub Unit Interface Bus (SUIB), and the hardware delay register. [PR Name=SM2000:DNmc4_05]
6	Tests the circuits on the external memory boards and the circuits associated with on-CORE (UN560) memory. For the UN560, it tests the on-CORE memory circuit, scrubbing, and address comparators on Dynamic Ram Controller. Verifies memory equipage, address decoder and I/O registers, different size memory accesses, refresh circuits, corr-bit counter and threshold circuits, Error Detection and Correction (EDC) circuits, memory self-test logic including the comparators, pattern matchers, system address leads, different self-test modes and its interactions with HW reset, NMI. [PR Name=SM2000:DNmc4_06]

7	Tests the circuits on the external memory boards and the circuits associated with on-CORE (UN560) memory. Verifies self-test inhibit circuit, which prevents the running of the memory board self-test on the ACT side. This phase is a DEMAND only phase which typically would only be executed on those occasions where the memory self-test is suspect of not finding faulty memory boards or when new memory boards are being grown in the unit. [PR Name=SM2000:DNmc4_07]
8	Tests the circuits on KBN8/KBN8B, Alarm Status Unit (ASU) paddle board (9822DU), and StAlone Monitor circuit in ASU, when ASU is equipped (EXM2000 configuration). Verifies the ASU equipage and then tests the RSM sanity and stand-alone indicator logic on BSN and SAM in ASU. This is DEMAND only phase. [PR Name=SM2000:DNmc4_08]
9	Tests the central processor intervention (CPI) circuit on KBN8. [PR Name=SM2000:DNmc4_09]
10	Tests the SMP update bus circuits on CORE and BSN. Verifies the update bus status signals, parity, ability to drive address, data, control signals, various access modes from OOS to ACTive SMP. Tests the operation of mate ready-time-out and internal global system-ready-timeout circuits. [PR Name=SM2000:DNmc4_10]
21	Tests the local processor of MH (UN538), the RAM, and BRICPIT devices. Tests the OOS MH interfaces to ACTive SMP and ACTive MH. Includes tests of sanity maze, MMU, cache, interrupts, interrupt handlers, parity circuits, and MH update buses. [PR Name=SM2000:DNmc4_21]
22	Tests the SPYDER-T (synchronous/asynchronous protocol data formatter) device functions of all equipped MH boards (UN538). Includes tests of lost clock and sync circuit, transmit and receive (internal loop-back), dynamic configuration, interrupt (EOL, EOF, and EOB), CRC, parity, and transmit and receive paths. [PR Name=SM2000:DNmc4_22]
23	This phase is used to test the System-Oriented Network Interface Controller (SONIC) device of all equipped Message Handler for Ethernet Interface Boards (MHEIB) boards (UN584). This includes SONIC registers access, initialization of SONIC Content Addressable Memory (CAM) and SONIC buffer, internal loopback, CRC checking, SONIC interrupt, SONIC read parity error, and Ethernet test to far-end system or hub (if so equipped). [PR Name=SM2000:DNmc4_23]
33	Tests all circuits of TSICOM circuit pack (UM74/UM74B/UM74C): Basic TSICOM access from SMP, TSICOM version check, SMP to TSICOM interfaces via UN539, function of TSICOM error source/mask register, function of TSIU4 service request register (with mask), function of TSIU4 interrupt source/mask register, function of the clock-control register and other TSICOM registers, and device self-tests on the TSICOM. This phase also tests TSIU4 unit equipage and all registers on all equipped TSIS boards and for EXM-2000 and VCDX switches the device BIST test. Also tests all registers on all equipped TSIS (KLU1) boards. Segments 2-11 test the TSICOM, and segments 20-49 do partial tests of the TSIS boards. [PR Name=SM2000:DNts_33]
34	Tests each equipped TSIS (KLU1) board. Segments 2-80 test

	basic TSICOM access from SMP, function of TSIS diagnostic control and error source/mask registers, CRC error propagation on each TSIS, and TSIS-link equipage and version. Segments 100-149 are B-S master based tests, including B-S master self-test, intra-board interconnect and cluster tests. Segments 160-169 are device self-tests of all ASICs on the TSISs. Segment 171 tests the CTS number registers. Segments 300-309 test the active signal logic from the SMP to the TSI. [PR Name=SM2000:DNts_34]
35	Tests each equipped TSIS (KLU1) board more exhaustively. Segments 400-409 are functional board-level self-tests. [PR Name=SM2000:DNts_35]
36	Tests TSIS board interfaces to: Interfaces to APC (UN539) MCP link to TSIS-0 are tested in segment 10, reference clock interfaces (either CM-sourced or external references) are tested in segments 50-52, the (E)NLI interfaces to the TSI-links are tested in segments 60-69, and any equipped PLI interfaces to the TSI-links are tested in segments 70-79. [PR Name=SM2000:DNts_36]
37	Reserved for future use.
38	Performs additional TSIS (KLU1) functional unit-level BIST tests, concentrating on inter-TSIS board connections. [PR Name=SM2000:DNts_38]
41	Tests the DX which includes; DX equipage and version register, TSIU4 to DX control interface, DX error source and error mask registers and all other DX registers, DX PIDB parity enable control RAM, DX Fan-Out control RAM, DX Fan-In control RAM, DX device reset, DX device BIST, DX to TSIS TSI-Links, DX PIDB inputs, and DX Fan-Out/Fan-In. [PR Name=DNts_41] Note: This phase is not used in 5E11 and later software releases.
42	Tests the DX which includes; DX equipage and version register, and DX PIDB inputs and outputs. DX demand phase which extensively tests PCM throughput. [PR Name=DNts_42] Note: This phase is not used in 5E11 and later software releases.
44	Tests all circuits of equipped DX(UM73)/XDX(UN553 in TSIU4-2) boards. Included are: initial access test of control RAMs, board configuration, and inter-board crosstalk tests (segments 9 - 11), TSICOM to DX/XDX communication tests (segments 20, 21), control RAM tests of parity, rd/mod/write masking and memory tests (segments 30-32), and board reset, device BIST tests (segments 40-43). [PR Name=DNts_44]
45	Tests further the DX/XDX boards individually and in looped back configurations. These tests include TSI-link CRC tests (segment 50), PIDB parity buffer tests (segment 51), fanout-fanin tests (segment 60), PIDB monitoring of active/standby peripheral sides for valid parity (segment 70), and a multi-access-board PCM-looping test at the DX/XDX PIDB outputs (segment 9975). [PR Name=DNts_45]
46	DX/XDX demand phase not available to craft (this phase requires additional test equipment).
66	Tests circuits on CORE, BSN, APC, and MH-APC interface. Verifies pump data assembler circuit on APC, billing counter

	clock input, pump circuits on APC-MH interface, APC_MH SPYDER interface. [PR Name=DNmc4 66]
71	Diagnoses the interface between the micro-processor and the CI. At the completion, if no errors have occurred, then the data bus, address bus, and interface registers can be considered operational. Also, the address and data parity generators and checkers are exercised. [PR Name=DNSU CI1]
72	Diagnoses the internal hardware of the CI in as much as is possible without actually attempting to communicate with the peripheral unit over a peripheral interface control bus. Assumes that the interface to the microprocessor is operable and that the microprocessor can communicate with all of the registers in the CI. If no errors occurred, then all of the CI hardware except the selectors and buffers connecting to the peripheral units, interrupt source register, and the interrupt mask registers can be considered operational. [PR Name=DNci72]
73	Diagnoses the interface between the CI and all equipped peripheral units. Assumes that the CI can communicate with the module processor. Upon completion, the balance of all CI hardware used to connect the equipped PICBs with PUs are verified (including, multiplexers, incoming and outgoing buffers, and local and remote interrupt structures. [PR Name=DNci73]
81	This is the first phase of the Packet Interface diagnostic; packet interface circuit (TN-1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the SUIB interface of the packet interface and basic communication across the SUIB; also, all register functions (excluding the memory and error correction. The port processor and DARAM are not accessed except to initialize them into a noninterfering configuration. [PR Name=DNpi81]
82	This is the second phase of the Packet interface diagnostic; packet interface circuit (TN-1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies access to the full range of DARAM from the SUIB side of the PI. Verifies addressing, the ability to clear the memory, ability to write protect the memory, and the auto increment of the address registers when reading or writing data to the DARAM. [PR Name=DNpi82]
83	This is the third phase of the Packet Interface diagnostic; packet interface circuit (TN-1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the subunit interface bus (SUIB) interface to the PI. Verifies the operation of the error correction and detection circuits from the SUIB side of the DARAM and also, detect and correct single-bit errors and multiple-bit errors. [PR Name=DNpi83]
84	This is the fourth phase of the Packet Interface diagnostic; packet interface circuit (TN-1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the port processor side of the packet interface and the basic communication across the packet bus. The PI is reset and pumped. If communication looks good; a sanity maze and memory test is run on the PI. The phase does not continue its operation if the initial "pump" fails or if the setup of the packet bus from the

		on-line PSIUCOM fails. The port processor is in a "diagnostic" mode during this under OSDS in the PI. Communicates with the diagnostic system process via packet bus messages. [PR Name=DNpi84]
	85	This is the fifth phase of the Packet Interface diagnostic; packet interface circuit (TN-1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the packet bus from the PI to the standby side of the PSIUCOM (this phase only tests if the PSIUCOM is in a standby mode). If the PSIUCOM is in an OOS mode, it reports a CATP. The port processor in the PI is in a "diagnostic" mode during this phase. A diagnostic system process is running under OSDS in the PI. This phase communicates with the diagnostic system process through the packet bus messages. [PR Name=DNpi85] Note: This phase executes for PI in software releases 5E9(2) and earlier. This phase is replaced by phase 87 in 5E10 and later software releases.
	86	This phase tests the PI2 system command block in the DSRAM, initiates the ROM resident RAM test for both the DSRAM and LSRAM, and pumps the PI2. This phase executes for the PI2 only. This phase will automatically ATP if PI circuit packs are equipped. [PR Name=DNpi86]
	87	Verifies the packet bus from the PI to the standby side of the PSUCOM. This phase only attempts the test if the PSUCOM is in a standby mode. If the PSUCOM is in an OOS mode, the test reports a CATP. The port processor in the PI is in a diagnostic mode during this phase. This phase executes for PI and PI2 in 5E10 and later software releases. [PR Name=DNpi87]

Table 4-81 Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (MCTU3) (SM)	-	Module Controller/Time Slot Interchange (Module Controller and Time Slot Interchange Unit 3) (Switching Module)
	1	Tests circuits on SB20CORE (KBN17, KBN18, or KBN19). Verifies the sanity of the OOS MCTSI for power, SMP state, SMP equipage with respect to the database, ability to perform the accesses across the SMP update bus. It also verifies parity checkers and generators, Ready Time Out (RTO) detection, and SMP error source hierarchy. Test address aliasing between DRAM, I/O and the QUICC (quad integrated communications controller) device on the SB20CORE. Tests the on-board memory using self-test. [PR Name=SM:DNMC3_1]
	2	Tests circuits on SB20CORE. Verifies power-up reset (exception 0) circuit to and from the OOS SMP. Rough test of timers. Verifies cross coupled status signal between ACTIVE and OOS SMP, ability to wake-up and stop the OOS processor for the off-line execution, sanity and mate lockout. Tests internal address and databus, bus arbiter error, sanity maze, processor performance, I/O accesses with instruction cache enabled, SPFMR operation, A-FF, shadow operations register, ROM checksum. [PR Name=SM:DNMC3_2]
	3	Tests circuits on SB20CORE. Verifies processor status

	registers Verifies the SBPCD (TN1424) functions, write and stack protection, resets, sanity timer, MPF (mate power fail) signal, I/O timers, BCR (Bus Control Register) and shadow BCR, fan alarm verification, bus errors, and the SUIB (sub-unit interface bus). [PR Name=SM:DNMC3_3]
4	Tests parts of the TPC (timers, programmable interrupt controllers) device on SB20CORE. Verifies billing counter, timers, PIC's, to/from mate interrupts signals between ACT and OOS SMP's, DLI interrupts, SDLC parity, DLI register access. [PR Name=SM:DNMC3_4]
5	Tests the QUICC device and its interfaces on SB20CORE. Includes QUICC dual port RAM test, write protection test, hardware and software reset, timer tests, SDLC (synchronous data link controller) transmitter/receiver tests, IDMA [internal (QUICC) direct memory access] tests, and BTSR (Bootstrapper) tests. [PR Name=SM:DNMC3_5]
6	Tests dynamic memory (DRC device, SIMM modules) on SB20CORE. Verifies address decoding, EDC (error detection and correction) circuits, scrubbing, memory refresh. Tests DRAM initialization, and DRAM using self-test. [PR Name=SM:DNMC3_6]
7	Demand phase only. Tests dynamic memory on SB20CORE. Verifies BIST inhibit logic, which prevents the running of the memory selftest/initialization on the ACT SMP. Verifies internal data lead coupling in the memory complex. [PR Name=SM:DNMC3_7]
8	Verifies the ASU (alarm status unit) equipage and then tests the RSM sanity and stand-alone indicator logic on the SBPCD and the SB20CORE. [PR Name=SM:DNMC3_8]
9	Tests the CPI (Central Processor Intervention) hardware on the SB20CORE by requesting diagnostic CPI messages from the AM (or VCDX workstation) and verifying that each message is received properly. For a VCDX it verifies the CPI paddle board. [PR Name=SM:DNMC3_8]
10	Tests circuits on SB20CORE. Tests the SMP update bus with the OOS SMP as the master. Tests the ability to drive address, data, and control signals across the ACT SMP to OOS SMP data bus. Tests the ability to receive mate status signals. [PR Name=SM:DNMC3_8]
11	Tests QUICC device and its interfaces on the SB20CORE. Verifies the QUICC hardware and software reset. Verifies that the OOS SMP can transfer data via the DMA (direct memory access) over the update bus to the ACT SMP. Verifies that the BTSR, under IDMA control, can transfer data to the ACT SMP and OOS SMP. Verifies that at least one of the QUICC SDMA devices is capable of driving the update bus. Verifies that at least one of the QUICC IDMA devices is capable of driving the update bus. [PR Name=SM:DNMC3_9]
12	Tests the Ethernet controller part of the QUICC device and its interfaces on the SB20CORE. Tests include Ethernet transmitter and receiver operation (loops, external connections to Ethernet paddle board, error detection) and transmission to/reception from the Ethernet medium. [PR Name=SM:DNMC3_9]
13-30	These phases are not used for MCTU3 testing.
31	Tests TSI-DLI interface, TSI control and alternate data RAMs, TSI-SMP interface, all TSI registers, receive and transmit TSI

	RAMs. [PR Name=SM:DNTSI1]
32	Tests TSI-DLI interface. Will complete CATP if either DLI is OOS. [PR Name=SM:DNTSI2]
33-50	These phases are not used for MCTU3 testing.
51	Tests SP — mode latch, M RAM, ignore RAM and immediate access RAM. [PR Name=SM:DNISP]
52	Tests SP-FIFO, parity check circuits, error source register, interface to programmable interrupt controller on the TN1086, and ready time-out error. [PR Name=SM:DNISP]
53-60	These phases are not used for MCTU3 testing.
61	Tests DI. [PR Name=SM:DNDI]
62	Tests parity on PIDBs from PUs. Verifies receivers on PIDB links. [PR Name=SM:DNDI]
63	Tests DI fanout on TN1377 or TN1524. All PIDBs are checked. [PR Name=SM:DNDI]
64	Tests PIDB driver and receiver on odd DI when PU is OOS. [PR Name=SM:DNDI]
65	This phase is not used for MCTU3 testing.
66	Tests the BTSR circuitry on the SB20CORE. Taking real PIDB data generated in the TSI, this phase verifies that the BTSR loops back true parity from the DI. Also verifies the BTSR to PIDB interface by generating pump data in the TSI. [PR Name=SM:DNMC3 66]
67-70	These phases are not used for MCTU3 testing.
71	Tests parity on PICBs from PUs. Verifies receivers on PICB links. Tests CI-MP interface and CI (UN71/UN71B) register access. [PR Name=SM:DNCI1]
72	Tests CI-CI transmit and receive sequencers (UN71B). [PR Name=SM:DNCI1]
73	CI — tests integrity of control paths to and from all equipped peripherals (UN71/UN71B). [PR Name=SM:DNCI1]
74-80	These phases are not used for MCTU3 testing.
81	Verifies SUIB interface of PI. Fundamental communication and error reporting are verified. In addition, all register functions, excluding memory and error correction, are verified. [PR Name=SM:DNPI1]
82	Verifies access to full range of DARAM from SUIB side of PI. A complete memory test is provided from port processor side of PI. This phase is only used to verify addressing, ability to reset memory, write protect of memory, and auto increment of address register when reading or writing data to DARAM. [PR Name=SM:DNPI1]
83	Verifies operation of error correction and detection circuits from SUIB side of DARAM. It also verifies ability to detect and correct single bit errors and to detect and report multiple bit errors. [PR Name=SM:DNPI1]
84	Verifies port processor side of PI. The PI is reset and pumped. Basic communication of PB is verified. If communication looks OK, a sanity maze and memory test are run on PI. This phase does not continue its operation if initial pump fails or if setup of PB from on-line PSUCOM fails. Port processor is in diagnostic mode during this phase. [PR Name=SM:DNPI1]
85	Verifies packet bus from PI to standby side of PSUCOM. This phase only attempts test if PSUCOM is in STBY mode. If PSUCOM is in an OOS mode, test reports CATP. Port processor in PI is in diagnostic mode during this phase. [PR Name=SM:DNPI1]
86	Verifies 68040 core of a PI2. For a PI, no tests are run. [PR Name=SM:DNPI1]

	87	Verifies the packet bus cabling between the PI/PI2 and the PSUCOM. [PR Name=SM:DNPI1]
	88-90	These phases are not used for MCTU3 testing.

Table 4-82 Diagnostic Phase Descriptions for MHD-Mod 1

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MHD-Mod 1 (AM)	-	Moving Head Disk - Mod 1 (Administrative Module)
	1	Tests the parallel/serial data interface and the MHD control source and destination decoders. [PR Name=DL:MHD01]
	2	Tests MHD control register. [PR Name=DL:MHD02]
	3	Tests the parallel/serial data interface. [PR Name=DL:MHD03]
	4	Tests the MHD control, disk select, and driver enable. [PR Name=DL:MHD04]
	5	Tests the MHD clock. A fully formatted disk must be mounted and spinning on the drive under test. [PR Name=DL:MHD05]
	6	Tests the read/write circuitry and error correction circuitry. A fully formatted disk pack must be mounted and spinning on the drive under test. [PR Name=DL:MHD06]
	7	Tests the seek, seek error detection, servo offset, and fault detection circuitry of the drive. A fully formatted disk pack must be mounted and spinning on the drive under test. [PR Name=DL:MHD07]
	8	Tests data transfer between CU and drive. A fully formatted disk pack must be mounted and spinning on drive under test. [PR Name=DL:MHD08]

Table 4-83 Diagnostic Phase Descriptions for MHD-SCSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MHD-SCSI	-	Moving Head Disk - Small Computer System Interface (Administrative Module)
	1	Diagnoses SCSI disk via self-tests of SCSI device controller buffer and read/write access to the MHD maintenance area. [PR Name=DL:MHDS01]

Table 4-84 Diagnostic Phase Descriptions for MI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MI (CM1)	-	Message Interface (Communication Module 1)
	1	Tests interface from host FPC to MI under test, major buses between MI boards, and access of common registers. [PR Name=FPC:DNCMI1]
	2	Tests the time slot switching functions of the TN861 board. [PR Name=FPC:DNCMI2]
	3	Tests the CPI time slot matching functions of the TN861 board. [PR Name=FPC:DNCMI3]
	4	Tests the clocking functions of the TN860 and TN859 boards. [PR Name=FPC:DNCMI4]
	5	Tests TN862 clocking, the TN861 gate array, MI interrupt lead to the FPC, and CDAL link to the opposite FPC. [PR Name=FPC:DNCMI5]
	6	Tests the CPI loopback and MIBs from the PCs. [PR Name=FPC:DNCMI6]
MI (CM2)	-	Message Interface (Communication Module 2)
	1	Tests interface from host FPC to MI under test and major buses between MI boards, and access of source registers. [PR Name=FPC:DNCMI01]

2	Tests all clocks. [PR Name=FPC:DNCDMI02]
3	Tests time slot switching control and memory and MIB parity by using associated PPC/MMPs as host circuit. [PR Name=FPC:DNCDMI03]
4	Tests the CPI time slot matching functions of the UN187 board. [PR Name=FPC:DNCDMI04]
5	Tests local transmission of the CPI diagnostic message. [PR Name=FPC:DNCDMI05]
6	Tests external transmission of CPI diagnostic messages using TMS. [PR Name=FPC:DNCDMI06]
7	(Demand phase only.) Tests the MIBs by using the PPC/MMPs as host circuits. Both PPC/MMPs are automatically removed and restored during this phase. [PR Name=FPC:DNCDMI07, MMP:DNC2MMP52-57, and PPC:DNCPPC42-43]

Table 4-85 Diagnostic Phase Descriptions for MMP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MMP (CM1)	-	Module Message Processor (Communication Module 1)
	1	Tests interface between microprocessor board of the MMP and MSCU (UN25). [PR Name=AM:DNC3BMMP]
	2	Tests microprocessor board (TN856) of the MMP. [PR Name=MMP:DNCMMP22-25 and AM:DNC3BMMP]
	3	Tests application board (UN170) of the MMP. [PR Name=MMP:DNCMMP32-34 and AM:DNC3BMMP]
	4	Tests application board (TN858A) of the MMP. [PR Name=MMP:DNCMMP42-44 and AM:DNC3BMMP]
	5	Tests application board (TN858B) of the MMP. [PR Name=MMP:DNCMMP52-56 and AM:DNC3BMMP]
	6	(Demand phase only.) Tests MMP's interfaces to both sides of ONTC (if in-service). Use only when fault recovery reports MMP troubles but diagnostics is ATP. [PR Name=MMP:DNCMMP62-63 and AM:DNC3BMMP]
MMP (CM2)	-	Module Message Processor (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board of the MMP. [PR Name=AM:DNC3BMMP]
	2	Tests the microprocessor board (TN856) of the MMP. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP22-25]
	3 a	Tests application board (TN870) of the MMP. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP32-36]
	4 a	Tests application board (TN870) of the MMP and MIB from that MMP by looping data at the TMS. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP42-47]
Notes: a. In a dual MMP configuration, the opposite MMP from that being diagnosed is automatically removed and restored during this phase. This happens because data is delivered over the MIB, and that MMP must be removed.		

Table 4-86 Diagnostic Phase Descriptions for MSCU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MSCU (CM1)	-	Message Switch Control Unit (Communication Module 1)
	1	Tests the interface between the DDSBS and DSCH - TN69 and UN9. [PR Name=AM:DNCMSCU]
	2	Tests interface between BIC and DDSBS - TN70 and TN69.

MSCU (CM2)		[PR Name=AM:DNCMSCU]
	3	Tests BIC and BIC/PIC interface - TN70 and TN61. [PR Name=AM:DNCMSCU]
	4	Tests the PIC - TN61, TN84A and B. [PR Name=AM:DNCMSCU]
	5	Tests the IOMIs - UN25, TN61, TN84A and B. [PR Name=AM:DNCMSCU]
	6	Tests the interface between the IOMIs and the PC communities - UN25 and TN856. [PR Name=AM:DNCMSCU]
	-	Message Switch Control Unit (Communication Module 2)
	1	Tests the PSM boards - SN516, 495FB, and UN33. [PR Name=AM:DNCMSCU]
	2	Tests the DDSBS TN69. [PR Name=AM:DNCMSCU] With MSCU3, the TN69 board is replaced with the KBN10 board.
	3	Tests the BIC - TN70. [PR Name=AM:DNCMSCU] With MSCU3, the TN70 board is replaced with the KBN10 board.
	4	Tests the BIC and BIC/PIC interfaces - TN70 and UN178. [PR Name=AM:DNCMSCU] With MSCU3, the TN70 and UN178 boards are replaced with the KBN10 board.
	5	Tests the PIC - UN178 and UN199. [PR Name=AM:DNCMSCU] With MSCU3, the UN178 and UN199 boards are replaced with the KBN10 board.
	6	Tests the interface between the IOMIs and the PIC and the power circuitry of the IOMIs - UN25 and UN178. [PR Name=AM:DNCMSCU] With MSCU3, the UN25 and UN178 boards are replaced with the KBN10 board.
	7	Tests the interface between the IOMIs and the PC communities - UN25 and TN856. [PR Name=AM:DNCMSCU] With MSCU 3, the UN25 board is replaced with the KBN10 board.

Table 4-87 Diagnostic Phase Descriptions for MSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MSUCOM (SM)	-	Metallic Service Unit Common (Switching Module)
	1	Tests the CI with the MCTSI. [PR Name=SM:DNMSC (for single module office) or SM:DNMMSC (for multimodule office)]
	2	Tests CI with the STBY MCTSI. [PR Name=SM:DNMSC (for single module office) or SM:DNMMSC (for multimodule office)]
	3	Tests the remote interrupt mask and scan registers, interrupt latches and interrupt polarity bit. [PR Name=SM:DNMSC (for single module office) or SM:DNMMSC (for multimodule office)]

Table 4-88 Diagnostic Phase Descriptions for MTC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTC (AM)	-	Magnetic Tape Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:MTC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:MTC02]
	3	Tests the DAM parity checker. [PR Name=DL:MTC03]
	4	Tests the microdiagnostic. [PR Name=DL:MTC04]
	5	(Demand phase only.) Tests the tape transport. A fully formatted diagnostic test tape (J-1P059AB-1 List 1M1) must be mounted on the tape transport under test. With prolonged

		use, the diagnostic test tape can become worn and cause STF results in this phase. Sometimes moving the load point (BOT) a few feet farther into the tape reel and formatting the tape at the new load point temporarily corrects STF results caused by worn tape. To format a diagnostic tape: 1. Mount a 200-foot tape with a write enable ring on an in-service MT. 2. Press the "LOAD" button. This should move the tape to the load point (BOT). 3. Press the "ON LINE" button. The ON LINE light should go on. 4. Enter the command as follows, where "c" is the MT unit number. Enter: COPY:TAPE:DATA.TEST,TD="/dev/mtc8"; [PR Name=DL:MTC05]

Table 4-89 Diagnostic Phase Descriptions for MTIB

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTIB (SM)	-	Metallic Test Interconnect Bus (Switching Module)
	1	Performs end-to-end protocol test of complete interconnect bus. [PR Name=SM:DNMTIB]
	2	Performs step-by-step verification of interconnect bus interfaces to MSU shelves. [PR Name=SM:DNMTIB]

Table 4-90 Diagnostic Phase Descriptions for MTIBAX

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTIBAX (SM)	-	Metallic Test Interconnect Bus Access (Switching Module)
	1	Tests send and receive data switch with MSUCOM, interrupts, and operation of relay drivers. [PR Name=SM:DNMTAC]
	2	Tests relay connections to all MTIBs. [PR Name=SM:DNMTAC]

Table 4-91 Diagnostic Phase Descriptions for MTTYC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTTYC (AM)	-	Maintenance Teletypewriter Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:MTTYC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:MTTYC02]
	3	Tests the DAM parity checker. [PR Name=DL:MTTYC03]
	4	Tests the microdiagnostic. [PR Name=DL:MTTYC04]

Table 4-92 Diagnostic Phase Descriptions for NC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
NC (NC1) (CM1)	-	Network Clock (Network Clock 1) (Communication Module 1)
	1	Tests the communication interface between the host FPC and NC, and the CLRT subunit on the controller board. [PR

		Name=FPC:DNCNC01]
	2	Tests the CCB subunit on the controller board. [PR Name=FPC:DNCNC02]
	3	Tests the microprocessor portion of the controller board. [PR Name=FPC:DNCNC03]
	4	Tests the synchronizer board of the NC - (TN245 or TN249). [PR Name=FPC:DNCNC04]
	5	Tests the DPLL board and the operation of the NC in its entirety. [PR Name=FPC:DNCNC05]
NC (NC/NC2) (CM2)	-	Network Clock (Network Clock/Network Clock 2) (Communication Module 2)
	1	Tests the communication interface between the host FPC and NC, and the CLRT subunit on the controller board. [PR Name=FPC:DNC2NC01]
	2	Tests the CCB subunit on the controller board. [PR Name=FPC:DNC2NC02]
	3	Tests the microprocessor portion of the controller board. [PR Name=FPC:DNC2NC03]
	4	Tests the synchronizer boards (0 and 1) of the NC. [PR Name=FPC:DNC2NC04]
	5	Tests the DPLL board and the operation of the NC in its entirety. [PR Name=FPC:DNC2NC05]
	6	(Demand phase) Determine what hardware units are causing phase 5 to CATP. [PR Name=FPC:DNC2NC06]

Table 4-93 Diagnostic Phase Descriptions for NLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
NLI (SM-2000)	-	Network Link Interface (Switching Module-2000)
	1	Verifies the interface of the LI to the active and mate side Time Slot Interchangers, as well as the functionality of various error checks. [PR Name=DNnli 1]
	2	Verifies the interface of the LI to the ONTC TMS. [PR Name=DNnli 2]

Table 4-94 Diagnostic Phase Descriptions for PDLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PDLI (SM/ORM)	-	Pagable Dual Link Interface (Switching Module/Optically Remote Module)
	1	ACT MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests. [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests. [PR Name=SM:DNPDLI1]
	6	Performs ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
	7	Performs STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
	8	Performs STBY MP SDLC to DLI interrupt and data tests. Also tests the STBY TSI to DLI data loopback on all time slots. [PR Name=SM:DNPDLI2]
	9	Performs STBY TSI to DLI interface (data loopback) tests.

		Also tests the STBY TSI to TRCU loopback tests in an ORM. [PR Name=SM:DNPDLI3]
	10	Performs switch/monitor tests. [PR Name=SM:DNPDLI3]
	11	Performs the TMS NCT link tests. CTS is looped back in the TMS. [PR Name=SM:DNPDLI3]

Table 4-95 Diagnostic Phase Descriptions for PMU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PMU (SM)	-	Precision Measurement Unit (Switching Module)
	1	Runs Group D DCTU tests. [PR Name=SM:DNPMU1]
	2	Runs Group E DCTU tests. [PR Name=SM:DNPMU2]
	3	Runs Group F DCTU tests. [PR Name=SM:DNPMU3]
	4	Runs Group G, Series A through I - DCTU tests. [PR Name=SM:DNPMU4]
	5	Runs Group G, Series J through O - DCTU tests. [PR Name=SM:DNPMU5]

Table 4-96 Diagnostic Phase Descriptions for PPC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PPC (CM1)	-	Pump Peripheral Controller (Communication Module 1)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board of the PPC. [PR Name=AM:DNC3BPPC]
	2	Tests the microprocessor board (TN856) of the PPC. [PR Name=PPC:DNCPPC22-25 and AM:DNC3BPPC]
	3	Tests the application board (TN886) of the PPC. [PR Name=PPC:DNCPPC32-38 and AM:DNC3BPPC]
	4	Tests the MIBs by looping data out of PPC via MIB through MI 0, LI 0, TMS 0 and back. [PR Name=PPC:DNCPPC42-43 and AM:DNC3BPPC]
PPC (CM2)	-	Pump Peripheral Controller (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board of the PPC. [PR Name=AM:DNC3BPPC]
	2	Tests the microprocessor board (TN856) of the PPC. [PR Name=PPC:DNCPPC22-25 and AM:DNC3BPPC]
	3	Tests the application board (TN886) of the PPC. [PR Name=PPC:DNCPPC32-38 and AM:DNC3BPPC]
	4	Tests the MIBs by looping data out of PPC via MIB through MI 0 and TMS 0 and back. In a dual PPC configuration, the opposite side PPC from that being diagnosed is automatically removed and restored. This happens because data is delivered over the MIB and that PPC must be removed. [PR Name=PPC:DNCPPC42-43 and AM:DNC3BPPC]

Table 4-97 Diagnostic Phase Descriptions for PROTO

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PROTO (SM)	-	Protocol Circuit (Switching Module)
	1	Tests operation of the protocol circuit to a termination circuit. [PR Name=SM:DNPROTO]

Table 4-98 Diagnostic Phase Descriptions for PSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUCOM	-	Packet Switch Unit Common Controller (Switching Module)
	1	Tests the PICB communication between the CI and the UCI chip on the CF. [PR Name=SM:DNUCI]
	2	Tests the UCI chip on the CF. [PR Name=SM:DNUCI]
	3	Tests the LP of the CFs UCI chip. The SMP sends messages for the LP, and when the LP sees the messages, performs the required reads and writes (to verify interrupts to the LP). [PR Name=SM:DNUCI]
	4	Tests the CFs LP ESRs and CRC in ROM. [PR Name=SM:DNPS1]
	5	Tests the CIB between the CF, PF, and DF. [PR Name=SM:DNPS1]
	6	Tests the PB between the CF, the PF, and PI. [PR Name=SM:DNPS1]
	7	(Demand phase for factory and growth testing only.) Tests all DUARTS in the CF for unequipped shelves. [PR Name=SM:DNPS1]
	8	(Demand phase for factory and growth testing only.) Tests the internal CF interfaces to all unequipped PFs. [PR Name=SM:DNPS1]
	9	(Demand phase for factory and growth testing only.) Tests the OOS lamps on equipped and growth CFs, PFs, and DFs. The diagnostic cycles through five times, starting by turning all lamps off. [PR Name=SM:DNPS1]
	11	Tests the communication between the CI and the PF. [PR Name=SM:DNPS2]
	12	Tests the LPs ROM and the ability of the PF to be reset. [PR Name=SM:DNPS2]
	13	Tests the communication between the PF and each of the equipped and growth PHs. [PR Name=SM:DNPS2]
	14	Tests the packet arbiter and the packet bus connections through the PF to each equipped PH. [PR Name=SM:DNPS2]
	15	(Demand phase for factory and growth testing only.) Tests the internal communication path on the PF for each unequipped PH. [PR Name=SM:DNPS2]
	16	(Demand phase for factory and growth testing only.) Tests the internal communication path on the PF for each unequipped PH. [PR Name=SM:DNPS2]
	21	Tests the communication path between the CI and DF via the CF. [PR Name=SM:DNPS3]
	22	Tests the LPs ROM for the ability of the DF to be reset. [PR Name=SM:DNPS3]
	23	Performs reads and writes on the DFs 8751 bus. [PR Name=SM:DNPS3]
	24	Provides a memory test for the DFs parity error buffer. [PR Name=SM:DNPS3]
	25	Performs a test on the DFs TSI chip. [PR Name=SM:DNPS3]
	26	Tests the data paths on the DF. [PR Name=SM:DNPS4]
	27	(Demand phase for factory and growth testing only.) Tests the data paths between the DF and the STBY common data board via the DPIDBs. [PR Name=SM:DNPS4]

Table 4-99 Diagnostic Phase Descriptions for PSUPH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (SM)	-	Packet Switch Unit Protocol Handler (Switching Module)
	1	Tests the interface between the ACT PF and PH under test (TN1081 or TN1367). This includes the CB, and the CB and PB leads. [PR Name=SM:DNPH1]
	2	Tests the port processor side of the PH board. [PR Name=SM:DNPH1]
	3	Tests the DMA processor side of the PH board. [PR Name=SM:DNPH1]
	4	Tests the PHDB interfaces from each RA chip to the ACT DF. [PR Name=SM:DNPH2]
	5	Tests the interfaces between the STBY PF and PH under test. [PR Name=SM:DNPH2]
	90	(Demand phase only.) Tests the full range of memory using a high coverage memory algorithm. [PR Name=SM:DNPH2]
	91	(Demand phase only.) More exhaustive test of the SPORT chips on the TN1081 circuit pack. [PR Name=SM:DNPH2]
	92	(Demand phase only.) Runs the same test sequences as phase 2 except each sequence is run as a separate segment to provide more data on failures. This phase is expected to be used primarily in the factory where the additional data may help in component-level fault isolation. This phase only applies to a TN1367 PH, a request for it on a TN1086 PH produces an NTR result. [PR Name=SM:DNPH2]
	93	(Demand phase only.) Runs the same test sequences as phase 3 except each sequence is run as a separate segment to provide more data on failures. This phase is expected to be used primarily in the factory where the additional data may help in component-level fault isolation. This phase only applies to a TN1367 PH, a request for it on a TN1086 PH produces an NTR result. [PR Name=SM:DNPH2]

Table 4-100 Diagnostic Phase Descriptions for QGP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
QGP	-	Quad-Link Gateway Processor
	1	Tests power, interface between MSCU and QGP processor board; RAM that both MSCU and QGP IP can access (DAM)
	2	Tests QGP IP processor.
	3	Tests QGP AP processor.
	4	Tests interface between QGP processor board and QGP link board; QGP link and QGL cable.
	5	Tests verifies that QGP can be pumped.

Table 4-101 Diagnostic Phase Descriptions for QLPS

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
QLPS	-	Quad-Link Packet Switch
	1	Tests interface between TMS controller and QLPS board; BIST; registers; error propagation.
	2	Tests error detection (with and without sending packets through the TMS fabric).
	3	Tests RX detection of Level 2 errors; miscellaneous; QGL connectivity; Packet RAM (PRAM); Routing RAM (RR); stress testing (lots of packets); tests to check TMS fabric between QLPS and all other QLI/QLI2 boards in TMS.

Table 4-102 Diagnostic Phase Descriptions for RAF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RAF (SM)	-	Recorded Announcement Function (Switching Module)
	1	Tests CI with ACT and STBY MCTSI. Completes ATP if STBY MCTSI is OOS. [PR Name=SM:DNUCI]
	2	Tests the internal functions of the UCI chip on the LDSU. [PR Name=SM:DNUCI]
	3	Tests the LP - UCI interface. [PR Name=SM:DNUCI]
	4	Tests LDSU bus interface to DSU2. [PR Name=SM:DNDSU2]
	5	Performs LP tests - interrupt controller, timers, parity, and write protect. [PR Name=SM:DNDSU2]
	6	Tests DSPs, SDI, and data to/from LDSU bus. [PR Name=SM:DNDSU2]
	7	Tests RAF memory. [PR Name=SM:DNDSU2]
	8	Performs memory test. [PR Name=SM:DNDSU2]

Table 4-103 Diagnostic Phase Descriptions for RAU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RAU (RSM)	-	Remote Alarm Unit (Remote Switching Module)
	1	Tests the entire RAU in the RSM. [PR Name=SM:DNRAU]

Table 4-104 Diagnostic Phase Descriptions for RCLK

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RCLK (RSM)	-	Remote Clock (Remote Switching Module)
	1	Performs CLRT tests. [PR Name=SM:DN2NC1]
	2	Performs CCB tests. [PR Name=SM:DN2NC2]
	3	Performs controller and oscillator tests. [PR Name=SM:DN2NC3]
	4	Performs synchronizer board tests. [PR Name=SM:DN2NC4]
	5	Performs DPLL and clock performance tests. [PR Name=SM:DN2NC5]

Table 4-105 Diagnostic Phase Descriptions for RG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RG (SM)	-	Ring Generator (Switching Module)
	1	Verifies the control data flow between the RG (application pack) and both COMDACs and runs the RG firmware diagnostics. [PR Name= <i>N/A</i>]
	4	Verifies the RG's isolation relay, programmability, and the ringing bus connections to each AIU it is assigned. At least one in-service COMDAC is required for this phase or the phase completion status is NTR (no tests run). [PR Name= <i>N/A</i>]

Table 4-106 Diagnostic Phase Descriptions for RLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RLI (RSM)	-	Remote Link Interface (Remote Switching Module)
	1	ACT MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests (I). [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests (II).

		[PR Name=SM:DNPDLI1]
4		ACT CI to FIU communication tests (TN835 and TN618).
		[PR Name=SM:DNFIU1]
5		STBY CI to FIU communication tests (TN835 and TN618).[PR Name=SM:DNFIU2]
6		ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
7		STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
8		STBY MP SDLC to DLI interrupt and data tests. [PR Name=SM:DNPDLI2]
9		STBY TSI to DLI interface (data loop back) tests. [PR Name=SM:DNPDLI3]
10		Power switch/monitor tests. [PR Name=SM:DNPDLI3]
13		Performs the FIU clock circuitry and controller board tests (TN835 and TN618). [PR Name=SM:DNFIU2]
14		Performs the FIU - link A tests (TN834). [PR Name=SM:DNFIU3]
15		Performs the FIU - link B tests (TN834). [PR Name=SM:DNFIU3]
16		Performs the FIU - MUX A tests (TN619). [PR Name=SM:DNFIU4]
17		Performs the FIU - MUX B tests (TN619). [PR Name=SM:DNFIU4]

Table 4-107 Diagnostic Phase Descriptions for RPCN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RPCN	-	Ring Peripheral Controller Node
(CNI)		(Common Network Interface)
	1	Tests RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable. [PR Name=rpc01.1]
	2	Tests RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable. [PR Name=rpc02.1]
	10	Tests the DDSBS (TN69B), DSCH (UN9), and 3B20D interface (TN914). [PR Name=rpc10.1]
	11	Tests the 3B20D interface (TN914) and DDSBS (TN69B). [PR Name=rpc11.1]
	12	Tests the 3B20D interface (TN914), NP (TN913/TN922), RI0 (UN122), and RI1 (UN123). CATP when more than one node is isolated. [PR Name=rpc12.1]
	13	Tests the NP (TN913/TN922) and 3B20D interface (TN914). CATP when more than one node is isolated. [PR Name=rpc13.1]
	14	(Demand phase only.) Tests the DDSBS (TN69B) and the off-line DSCH (UN09). Completes CATP. [PR Name=rpc14.1]
	20	Tests the NP (TN913/TN922). [PR Name=rpc20.1]
	23	Tests the NP (TN913/TN922). [PR Name=rpc23.1]
	24	Tests the NP (TN913/TN922). [PR Name=rpc24.1]
	26	Tests the NP (TN913/TN922). [PR Name=rpc26.1]
	27	Tests the NP (TN913/TN922). [PR Name=rpc27.1]
	30	Tests the NP (TN913/TN922), RI0 (UN122), and RI1 (UN123). [PR Name=rpc30.1]
	31	Tests the NP (TN913/TN922), RI0 (UN122), and RI1 (UN123). [PR Name=rpc31.1]
	32	Tests the RI0 (UN122). [PR Name=rpc32.1]
	33	Tests the RI1 (UN123). [PR Name=rpc33.1]

Table 4-108 Diagnostic Phase Descriptions for RRCLK

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RRCLK	-	Remote Real Clock

(SM)		(Switching Module)
	1	Checks CI/CLRT through DFI - RCLK PICB, CCB, microprocessor talk back and sanity timer. Diagnostics are resident in the R1DFI firmware. [PR Name=SM:DNRRCLK]
	2	Runs RCLK diagnostics which are resident in the RCLK firmware. The RAM and EPROM, the control latches, reference phase registers, DCO, clock generator, and interrupts are checked. [PR Name=SM:DNRRCLK]
	3	Tests the RCLK energy detector circuitry with diagnostics resident in RCLK firmware. Also tests clock's reference from each R1DFI and XCPL wire connecting RCLKs. [PR Name=SM:DNRRCLK]

Table 4-109 Diagnostic Phase Descriptions for RUCI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RUCI	-	Remote Unified Control Interface
(SM)		(Switching Module)
	1	Same as phase 1 LDSU. [PR Name=SM:DNRUCI]
	2	Same as phase 2 LDSU. [PR Name=SM:DNRUCI]
	3	Same as phase 3 LDSU. [PR Name=SM:DNRUCI]

Table 4-110 Diagnostic Phase Descriptions for RVPT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RVPT	-	Revertive Pulsing Transceiver
(SM)		(Switching Module)
	1	Tests failure alarm circuits on the RVPT board. [PR Name=SM:DNRPT1]
	2	Tests TSSR of RVPT pack. [PR Name=SM:DNRPT1]
	3	Tests the parity checker and parity generator of the RVPT. [PR Name=SM:DNRPT1]
	4	Tests the summary scan register on the RVPT. [PR Name=SM:DNRPT2]
	5	Performs run on-board self tests, test overflow bit, and test I/O address and data leads. [PR Name=SM:DNRPT2]
	6	Performs loop test calls through RVPT pack. [PR Name=SM:DNRPT2]

Table 4-111 Diagnostic Phase Descriptions for SAS

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SAS	-	Service Announcement System
	1	Verifies control interface with active and mate MCTSI. Will CATP if mate MCTSI is OOS. [PR Name=SM:DNuci_1]
	2	Verifies all functions of the SASDSC UCI device that are accessible from the MCTSI. [PR Name=SM:DNuci_2]
	3	Tests the SASDSC LP-UCI interface. The diagnostic code is downloaded to the SASDSC via the PICB. [PR Name=SM:DNuci_3]
	4	Tests all the hardware components of the SASDSC. [PR Name=SM:DNdsc3_4]
	5	Tests SAS memory. [PR Name=SM:DNsas_5]
	6	(Demand phase only.) Tests the programmability of each of the SASMEM flash cards. [PR Name=DNsas_6]

Table 4-112 Diagnostic Phase Descriptions for SCAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SCAN (SM)	-	Scan Circuits
	1	Tests the MSU scan pack with exception of actually closing the scan points. [PR Name=SM:DNSCAN]
	2	(Demand phase only.) Tests low state of scan points with no backplane connections. [PR Name=SM:DNSCAN]

Table 4-113 Diagnostic Phase Descriptions for SCSDC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SCSDC (AM)	-	Scanner and Signal Distributor Controller (Administrative Module)
	1	Tests the request isolate control signal and acknowledge from PIC. [PR Name=DL:SCSDC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:SCSDC02]
	3	Tests the DAM parity checker. [PR Name=DL:SCSDC03]
	4	Tests the microdiagnostic. [PR Name=SCSDC04]

Table 4-114 Diagnostic Phase Descriptions for SDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SDFI (SM)	-	Subscriber Loop Carrier Digital Facility Interface (Switching Module)
	1	Tests CI/CLRT integrity. [PR Name=SM:DNDFIS1]
	2	Tests CCB integrity. [PR Name=SM:DNDFIS1]
	3	Tests μ C integrity. [PR Name=SM:DNDFIS1]
	4	Tests maintenance buffer integrity. [PR Name=SM:DNDFIS2]
	5	Tests LSI exercises I. [PR Name=SM:DNDFIS3]
	6	Tests LSI exercises II. [PR Name=SM:DNDFIS3]
	7	Tests facility alarm clock. [PR Name=SM:DNDFIS3]
	8	Tests TSI integrity. [PR Name=SM:DNDFIS4]
	9	Tests signaling and PCM data path test. [PR Name=SM:DNDFIS4]

Table 4-115 Diagnostic Phase Descriptions for SDLC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SDLC (AM)	-	Synchronous Data Link Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:SDLC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:SDLC02]
	3	Tests the DAM parity checker. [PR Name=DL:SDLC03]
	4	Tests the microdiagnostic. [PR Name=SDLC04]

Table 4-116 Diagnostic Phase Descriptions for SFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SFI (DNU-S)	-	STX-1 Facility Interface (DNU-S) (Digital Network Unit - SONET)
	1	Tests the Internal Control Bus (ICB) from both CCs to the SFI, PCI device, the ability to read and write the general registers, the ability to detect PCIBUS errors, and the operation of each SFI reset mode. [PR Name=SM2K:DNUSFI1]

	2	Tests the TSCs, drivers, encoders, receivers, upstream LOS detectors, upstream spare selection and early loopbacks to the spare and service TMUXs. Contains one task dedicated to duplicating the tests performed under PIST. This allows any PIST failures to be reproduced by OOS diagnostics. [PR Name=SM2K:DNUSFI1]
	3	Tests the upstream and downstream relays, downstream LOS, SLI LOS, facility loopback capability, and the SLIs. If the mate SFI is not active, the SLI and second downstream relay (D2) tests are skipped and the phase completes CATP. [PR Name=SM2K:DNUSFI1]
	9	Tests the upstream relay, secondary downstream relay, the service TIDB and the facility loopback capability for facilities in the GROW state using an external loopback manually applied to the SLI. [PR Name=SM2K:DNUSFI1]

Table 4-117 Diagnostic Phase Descriptions for TAC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TAC (SM)	-	Test Access Circuit (Switching Module)
	1	Seizes CDI and finds ACT data side. Interconnects loop outgoing and incoming test circuits, normal battery loop open, and E&M signaling test. Trunk access network is tested in groups of four. Facility test network is tested. [PR Name=SM:DNTAC]
	2	Tests initialization of the T&A destination register and analog termination segment. The D/A converters are tested; the test reference and detector are tested; and a test for shorts between the maintenance leads is performed. [PR Name=SM:DNTAC]

Table 4-118 Diagnostic Phase Descriptions for TEN/TUCHBD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TEN/TUCHBD (SM)	-	Trunk Equipment Number/Trunk Unit Channel Board (Switching Module)
	1	Performs signaling test for the trunk circuit under test (for example, SN102, SN103, SN104, SN105, etc.). [PR Name= a]
	2	Performs transmission tests of the trunk circuit. Verifies correct operation of the CODEC, filter, and transformer. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. [PR Name= a]
Notes: a. The PR having listings for phases 1 and 2 depends on the type of trunk as follows:		
TRUNK TYPE		PR NAME
Loop Start Input		SM:DNLIN
Loop Start Output		SM:DNLOUT
2-Wire E & M		SM:DN2EM
4-Wire E & M		SM:DN4EM
Toll Loop Start Input		SM:DNTLI
Toll Loop Start Output		SM:DNTLO
Toll 2-Wire E & M		SM:DNT2EM
Toll 4-Wire E & M		SM:DNT4EM
Test Trunk		SM:DNTST

Table 4-119 Diagnostic Phase Descriptions for TMS

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TMS	-	Time Multiplexed Switch
(CM1)		(Communication Module 1)
	1	Tests the power and access to the TMS interface and verifies communication to TMS through the TMS interface (TN269). [PR Name=FPC:DNCTM01]
	2	Tests the TMS controller boards (TN269, TN268, and TN265). [PR Name=FPC:DNCTM02]
	3	Tests the TMS controller's RAM, PROM, and microprocessor circuitry (TN268). [PR Name=FPC:DNCTM03]
	4	Tests the TMS maintenance board (TN265). [PR Name=FPC:DNCTM04]
	5	Tests the TMS interface to the host FPC and the interface to the microprocessor (TN269). [PR Name=FPC:DNCTM05]
	6	Tests the TMS interface (TN269), the TMS clock board (TN270), and the TMS maintenance flip-flop. [PR Name=FPC:DNCTM06]
	7	Tests the bidirectional serial data link and the error source lead between the TMS interface (TN269) and the test board (TN267). [PR Name=FPC:DNCTM07]
	8	Tests the test board (TN267) ESR and the test generating circuitry. [PR Name=FPC:DNCTM08]
	9	Tests the bidirectional serial data link and the error source lead between the TMS interface (TN269) and the message link interface (TN252). [PR Name=FPC:DNCTM09]
	10	Tests the message link interface's ability to detect control parity and bad board IDs - as flagged on the message link interface ESR. [PR Name=FPC:DNCTM10]
	11	Tests the bidirectional serial data link and the error source lead between the TMS interface (TN269) and the shelf interface (TN244). [PR Name=FPC:DNCTM11]
	12	Tests the TMS shelf interface (TN244). [PR Name=FPC:DNCTM12]
	13	Tests the bidirectional serial data link between the shelf interface (TN244) and the fabric (TN242) and the error source lead from the fabric to the shelf interface. [PR Name=FPC:DNCTM13]
	14	Tests the bidirectional serial data link between the shelf interface (TN244) and the link interface (TN243) and the error source lead from the link interface to the shelf interface. [PR Name=FPC:DNCTM14]
	15	Tests the ESRs, error source lead, and memory of the fabric (TN242). [PR Name=FPC:DNCTM15]
	16	Tests the link interface's (TN243) ability to detect control parity and bad board IDs. [PR Name=FPC:DNCTM16]
	17	Tests the message interface (TN252) and link interface boards (TN254) by sending various data patterns via the test board (TN267). [PR Name=FPC:DNCTM17]
	18	Tests are the same as phase 17. [PR Name=FPC:DNCTM18]

	19	Tests are the same as phase 17. [PR Name=FPC:DNCTM19]
	20	Tests are the same as phase 17. [PR Name=FPC:DNCTM20]
	21	Tests the fabric data paths for switch half A - (TN252 and TN243). [PR Name=FPC:DNCTM21]
	22	Tests the fabric data paths for switch half B - (TN252 and TN243). [PR Name=FPC:DNCTM22]
	23	Tests the message link interface's (TN252) fabric (TN242) and fanout (UN74). [PR Name=FPC:DNCTM23]
	24	Tests optical link receiver on message link interface (TN252). [PR Name=FPC:DNCTM24]
	25	(Manual diagnosis only.) Tests the NCT links to the local TRCU (TN1344) circuits that interface links to ORMs. [PR Name=FPC:DNCTMS25]
	27	(Demand phase for factory or growth testing only.) Tests the NCT link receivers and transmitters. Requires fiber loop-around straps installed either at the TMS end or the SM end of the NCT link. [PR Name=FPC:DNCCLN3]
	-	Time Multiplexed Switch (Communication Module 2)
	1	Tests the PSM boards and the interface between the FPC and the TMS2. [PR Name=FPC:DNC2TMS01]
TMS (CM2)	2	Tests the operation of the TMS2 controller (TN884, UN183, and TN881) and test the controllers's CIC unit towards switching units. [PR Name=TMS:DNC2TMS02, and FPC:DNC2FTMS02]
	3	Tests communications between the controller and all UN182, KBN2, TN883, and TN888 boards and their registers. [PR Name=TMS:DNC2TMS03 and FPC:DNC2FTMS03] For the CM2C, the UN182, KBN2, TN883 and TN888 boards are changed to the TN1812 and TN1830 boards.
	4	Tests error detecting, propagational masking in KBN1/KBN5, KBN2, TN883, and TN884 boards. [PR Name=TMS:DNC2TMS04 and FPC:DNC2FTMS04] For the CM2C, the KBN1/KBN5, KBN2, TN883 and TN884 boards are changed to the TN1813 and TN1830 boards.
	5	Tests data paths in switch units using test function. [PR Name=TMS:DNC2TMS05 and FPC:DNC2FTMS05]
	6	Tests AUTISS function, KBN2 sequencing, and all fabric paths. [PR Name=TMS:DNC2TMS06, and FPC:DNC2FTMS06]
	11	(Demand phase for factory or growth testing only.) Tests the NCT link receivers and transmitters. Requires fiber loop-around straps installed at the TMS end or SM end of the NCT link. [PR Name=TMS:DNC2TMS11 and FPC:DNC2FTMS11]
	12	Tests the TMS fabric load/stress test. [PR Name=TMS:DNC2TMS12, and FPC:DNC2FTMS12]
	13	(Demand phase for factory or growth testing only.) Tests NCT link receivers/transmitters. All links must have loop-around straps installed at the TMS or SM end of the NCT links. All links

		are tested concurrently. This phase is a more exhaustive test then phase 11. [PR Name=TMS:DNC2TMS13 and FPC:DNC2FTMS13]
	14	(Demand phase to be run when an earlier phase fails with <i>Note No. 36</i> in its Suspected Faulty Equipment List.) Does sectionalized testing of the E-bus circuits to produce a more accurate Suspected Faulty Equipment List. [PR Name=TMS:DNC2TMS14 and FPC:DNC2FTMS14]
	15	A manual diagnostic phase that does NCT link loop-around tests from the TMS link board (TN888) to the local TRCU (TN1344) circuits interfacing links to ORMs. [PR Name=TMS:DNC2TMS15 and FPC:DNC2FTMS15] For the CM2C, the TN888 board is changed to the TN1830 board.

Table 4-120 Diagnostic Phase Descriptions for TMUX (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TMUX (DNSU-S)	-	Transmission Multiplexer (Digital Network Unit - SONET)
	1	Verifies the ICB interface (physical connection) from the CC to the TMUX. The ICB interface circuits (parity check, start code check, ability to force ASW errors) and the ability of the mate CC to access the TMUX are verified. [PR Name=SM2K:DNUSTX1]
	2	Verifies that all functions within the UCI on the TMUX which are accessible via the CC. This includes the FIFO circuitry, RAM, RAM parity checker/generation, and summary scan/error source/mailbox/mask registers. [PR Name=SM2K:DNUSTX1]
	3	Verifies the TMUX interface to the UCI. This includes the summary scan interrupts and masks, access to registers and interrupts in the hardware ESR for errors on the TMUX accesses. [PR Name=SM2K:DNUSTX1]
	4	Verifies the microprocessor-related circuitry on the TMUX including byte enables, timers, maskable interrupts and priority encoder, sanity timer, NMI circuitry, bus error circuitry, I/O write protection, RAM write protection, data parity checkers/generators and on-chip cache. [PR Name=SM2K:DNUSTX1]
	9	Verifies the RAM on the TMUX. [PR Name=SM2K:DNUSTX1]
	11	Verifies the individual SONET devices for read/write parity and protocol errors and the connections of the STS-1 level devices to the VT level devices. Devices that have a built-in, self-test (BIST) are also run. [PR Name=SM2K:DNUSTX2]
	12	Verifies the transmission of SONET payloads through the SONET devices on the TMUX. The C1 overhead byte is used first to verify basic connections between devices. Then, different payloads with different signaling modes are looped through both the transmit and receive portions of each device and verified for accuracy. [PR Name=SM2K:DNUSTX2]

	14	Verifies the BPIB connections to the CD packs and the TDIB connections to the SFI packs. Parity generation/checking is verified for each link. [PR Name=SM2K:DNUSTX2]

Table 4-121 Diagnostic Phase Descriptions for TSGRP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TSGRP	-	Time Slot Group (Switching Module)
(SM)	100	Tests the TSGRP (data) interface. [PR Name= N/A]

Table 4-122 Diagnostic Phase Descriptions for TTFCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TTFCOM	-	Transmission Test Facility Common (Switching Module)
(SM)	1	Tests failure alarm and system maintenance functions associated with the interface board. [PR Name=SM:DNTFC1]
	2	Tests failure alarm and system maintenance functions associated with the processor board. [PR Name=SM:DNTFC1]
	3	Tests failure alarm and system maintenance functions associated with the tone generator Digital Signal Processor (DSP) board (TN304 or TN304B). [PR Name=SM:DNTFC1]
	4	Tests failure alarm and maintenance functions associated with the measurement. The DSP board fails if the dip switches on TN304 or TN304B are configured incorrectly. [PR Name=SM:DNTFC1]
	7	Tests parity check circuit on the interface board. [PR Name=SM:DNTFC1]
	8	Tests firmware's ability to generate a summary scan interrupt. [PR Name=SM:DNTFC2]
	9	Tests write/read of the firmware's pseudo Time Slot Select Register (TSSR). [PR Name=SM:DNTFC2]
	10	Tests parity generator. [PR Name=SM:DNTFC2]
	11	Tests the reset function and verifies the TTF's reports. [PR Name=SM:DNTFC2]
	12	Tests the TTF tone sources - looped back to the TTF responder. Dummy test - if the CLI is equal to 0. [PR Name=SM:DNTFC2]
	13	Tests send and receive paths of each responder and PTC tone detector in the TTF. Dummy test - if the CLI is equal to 0. [PR Name=SM:DNTFC2]
	14	Tests AGC function of the PCT tone detector and the operation of the CDA tone detector. Dummy test - if the CLI is equal to 0.

		[PR Name=SM:DNTFC2]
	15	Tests receive path of each TT test function in the TTF. Dummy test - if the CLI is equal to 0. [PR Name=SM:DNTFC2]

Table 4-123 Diagnostic Phase Descriptions for TTYC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TTYC (AM)	-	Teletypewriter Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:TTYC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:TTYC02]
	3	Tests the DAM parity checker. [PR Name=DL:TTYC03]
	4	Tests the microdiagnostic. [PR Name=DL:TTYC04]

Table 4-124 Diagnostic Phase Descriptions for UCONF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UCONF (SM)	-	Universal Conference Circuit (Switching Module)
	1	Tests failure alarm circuits. [PR Name=SM:DNCONF1 (for 3-port) or SM:DN6CONF1 (for 6-port)]
	2	Test the TSSRs. [PR Name=SM:DNCONF1 (for 3-port) or SM:DN6CONF1 (for 6-port)]
	3	Tests the parity checker. [PR Name=SM:DNCONF1 (for 3-port) or SM:DN6CONF1 (for 6-port)]
	4	Tests the parity generator. [PR Name=SM:DNCONF2 (for 3-port) or SM:DN6CONF2 (for 6-port)]
	5	Performs functional tests, using static data sent from the TSI alternate data RAM. [PR Name=SM:DNCONF2 (for 3-port) or SM:DN6CONF2 (for 6-port)]

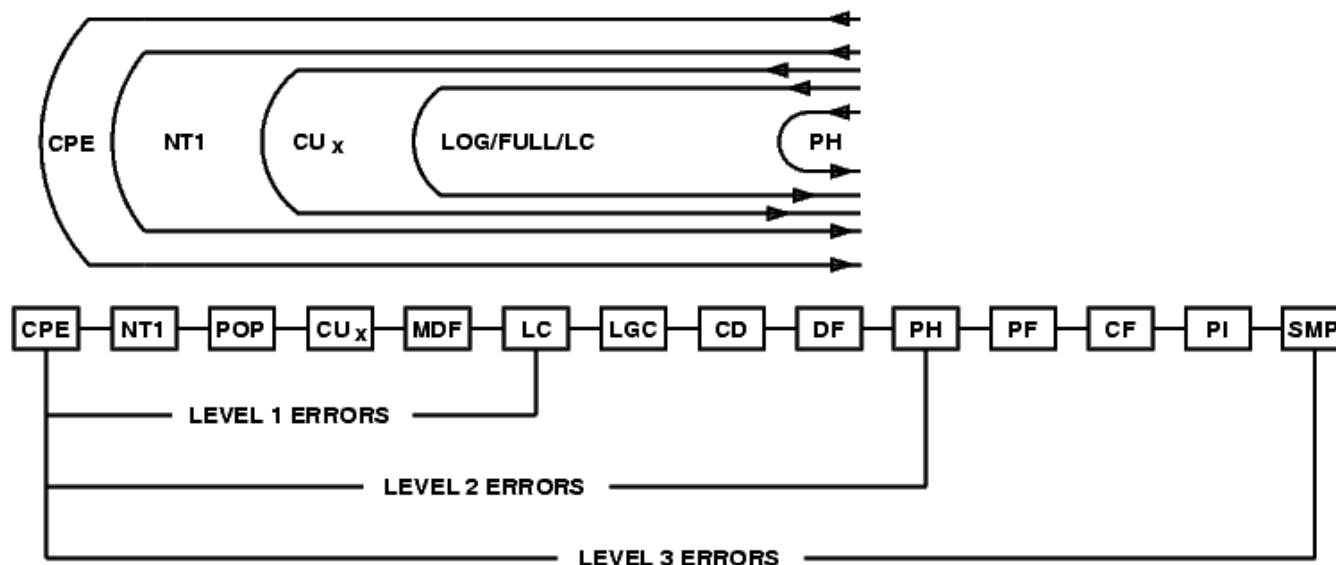
Table 4-125 Diagnostic Phase Descriptions for UTD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UTD (SM)	-	Universal Tone Decoder (Switching Module)
	1	Tests failure alarm circuits associated with the UTD. [PR Name=SM:DNCUTD1]
	2	Tests the TSSR.

		[PR Name=SM:DNCUTD1]
	3	Tests the parity checker.
		[PR Name=SM:DNCUTD1]
	4	Tests SSR, tone decoder, and read and write control registers.
		[PR Name=SM:DNCUTD2]
	5	Performs functional tests with tones from the UTG looped back to the UTD.
		[PR Name=SM:DNCUTD2]

Table 4-126 Diagnostic Phase Descriptions for UTG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UTG (SM)	-	Universal Tone Generator (Switching Module)
	1	Tests the failure alarm circuits. [PR Name=SM:DNUTG1]
	2	Tests the TSSR. [PR Name=SM:DNUTG1]
	3	Tests the parity generator. [PR Name=SM:DNUTG1]
		[PR Name=SM:DNUTG1]



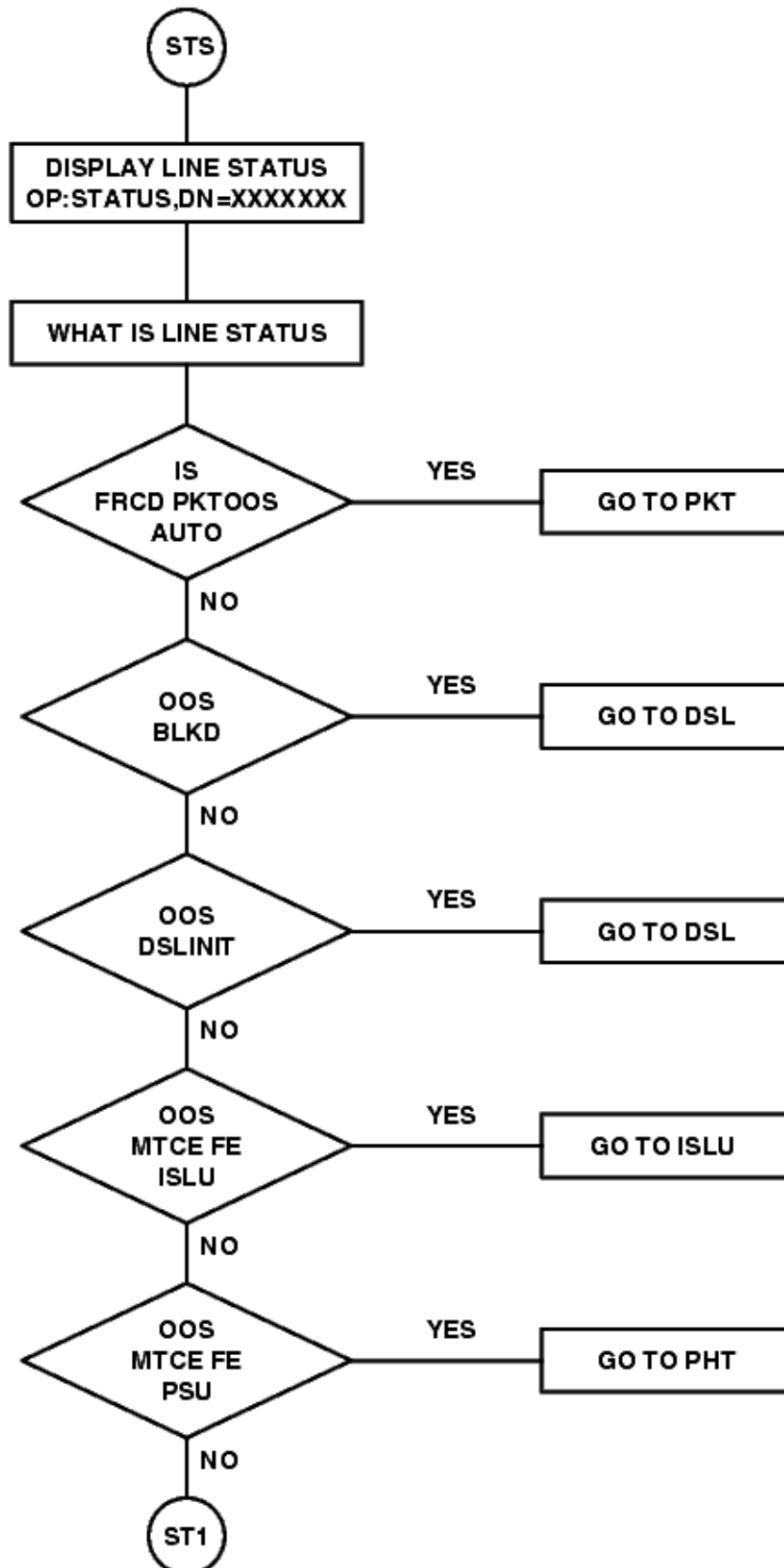
CPE CUSTOMER PREMISES EQUIPMENT
 NT1 NETWORK TERMINATION 1
 POP POINT OF PRESENCE/DEMARC
 CU_x BRITE CHANNEL UNIT
 MDF MAIN DISTRIBUTION FRAME
 LC LINE CARD
 LGC LINE GROUP CONTROLLER

CD COMMON DATA
 DF DATA FANOUT
 PH PROTOCOL HANDLER
 PF PACKET FANOUT
 CF CONTROL FANOUT
 PI PACKET INTERFACE
 SMP SWITCHING MODULE PROCESSOR

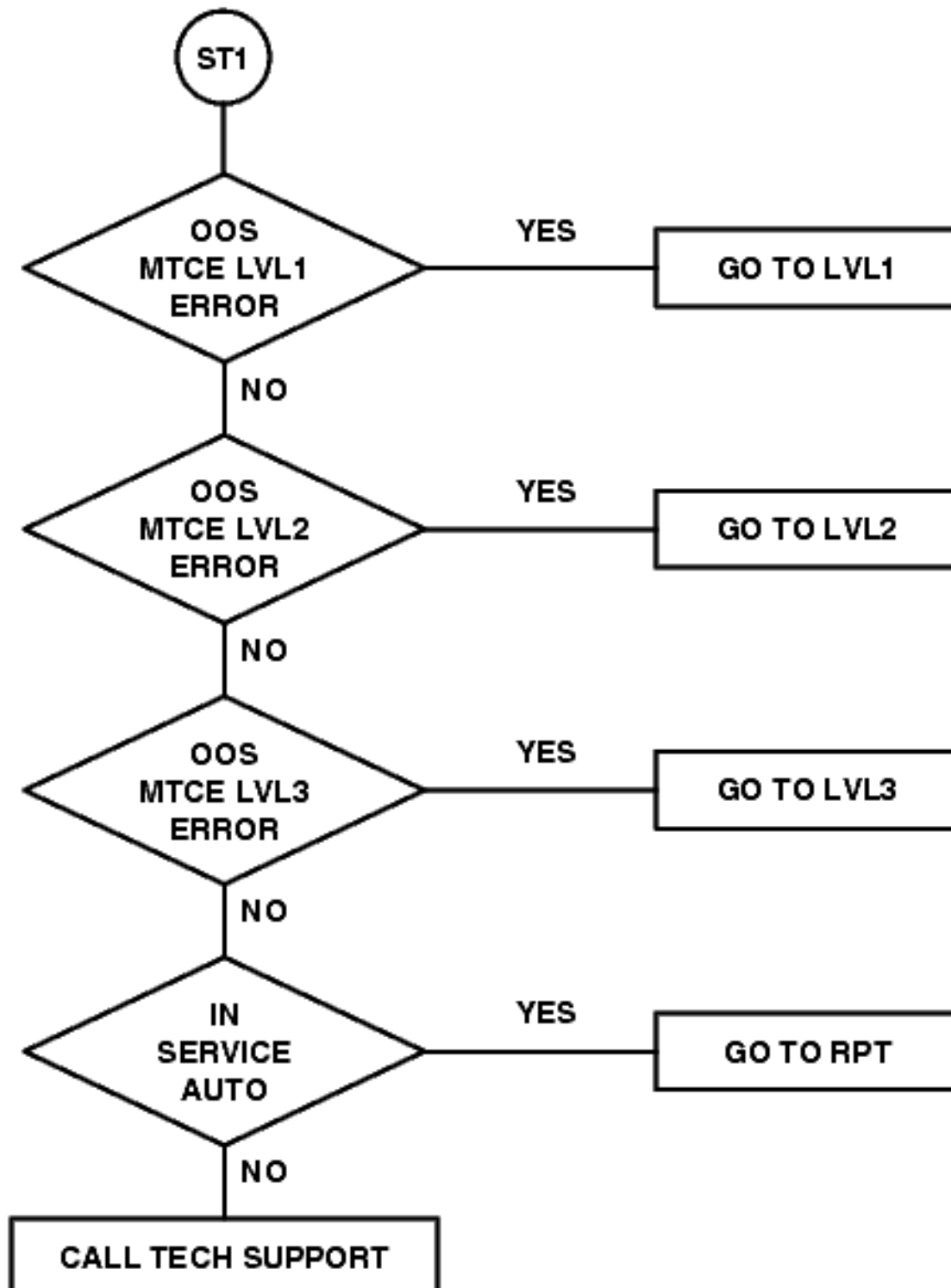
TST : DSL TERM =

CPE LOOPS BACK ONE B-CHANNEL AT CPE.
 NT1 ALL CHANNELS LOOPED BACK TO THE SWITCH AT NT1.
 CU_x LOOPBACK AT CU_x (x=1,2, ... ,6)
 LC LOOPS BACK AT LC.
 PH PACKET CHANNELS TESTED ONLY. LOOPED BACK TO THE PH.

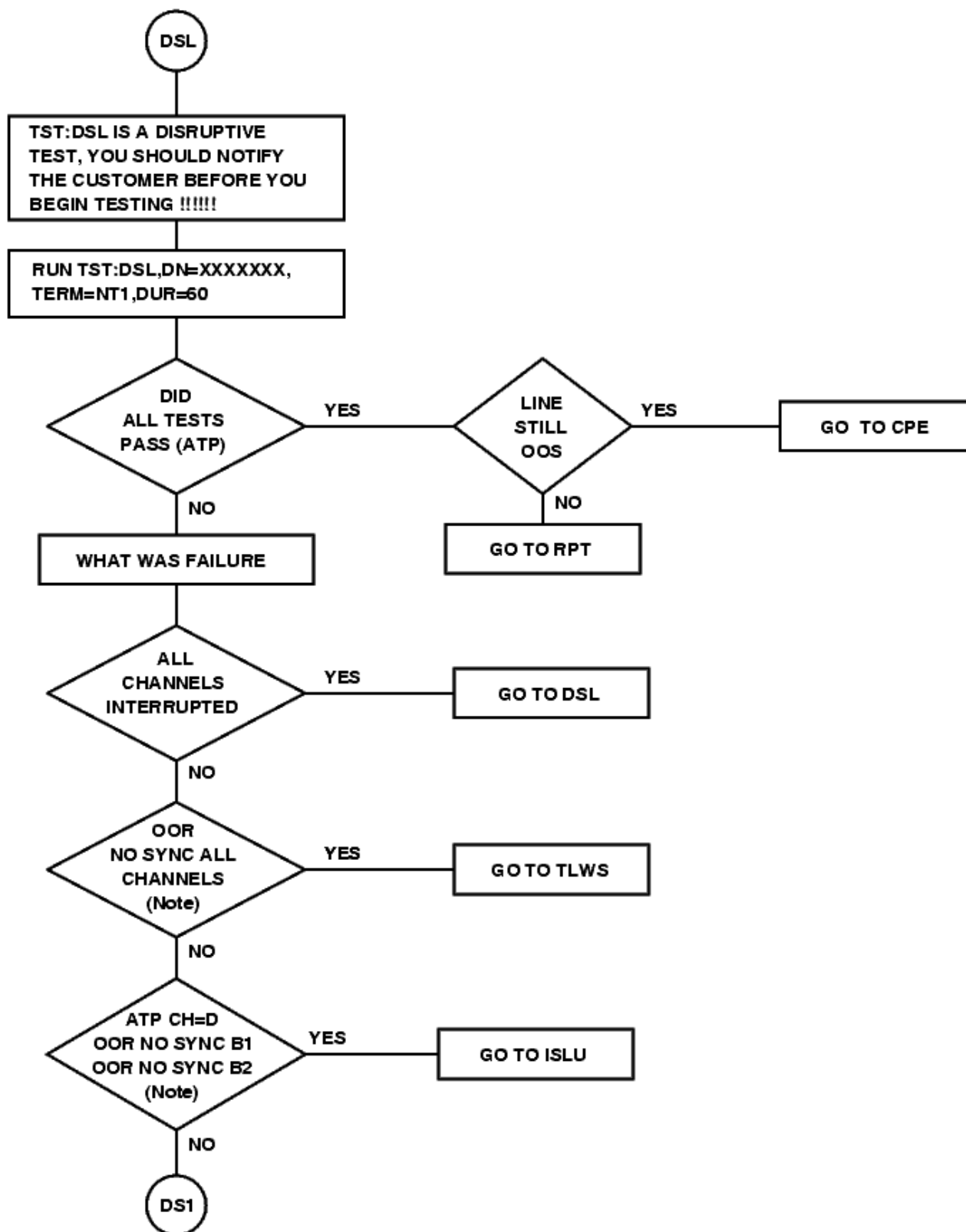
TEST LINE FOR OP STATUS



TEST LINE FOR OP STATUS

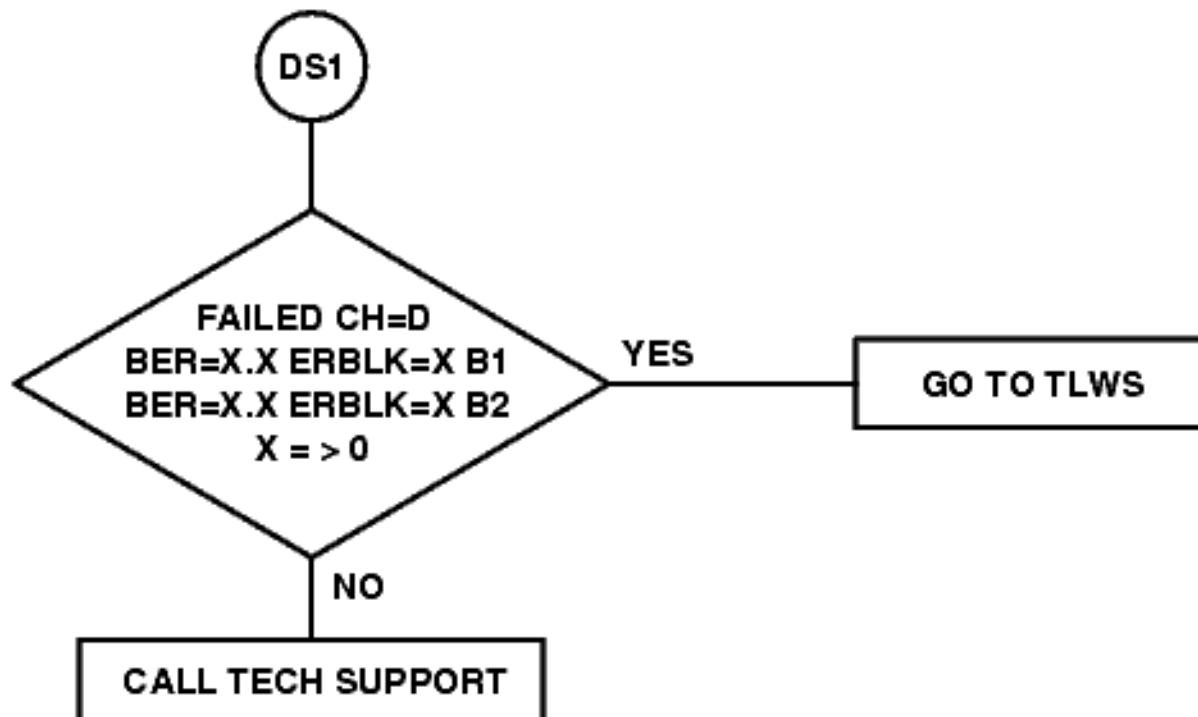


TEST RESULTS FROM TST:DSL

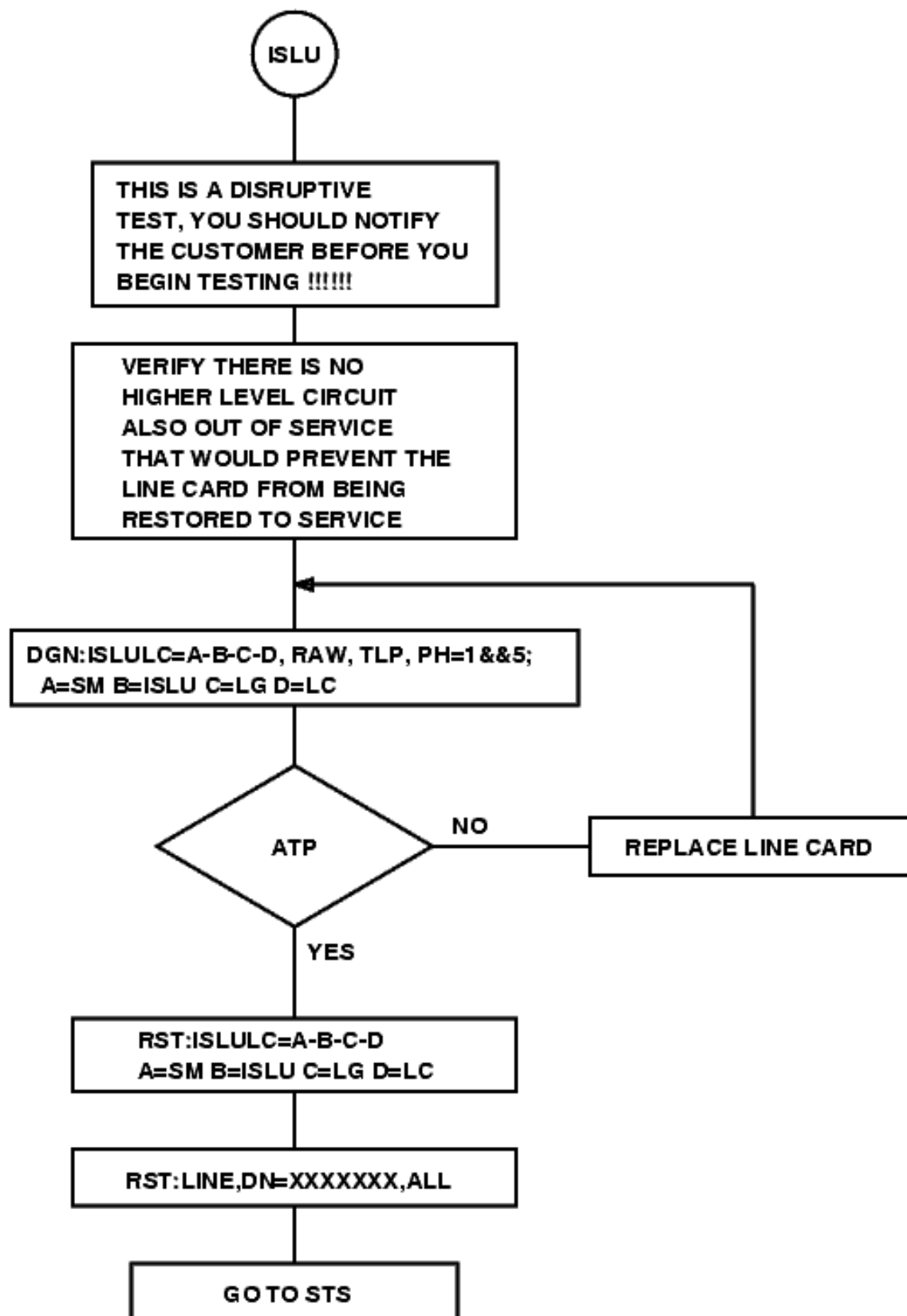


Note: OOR NO SYNC IS THE SAME AS FAULT IN LOOP OR PATH.

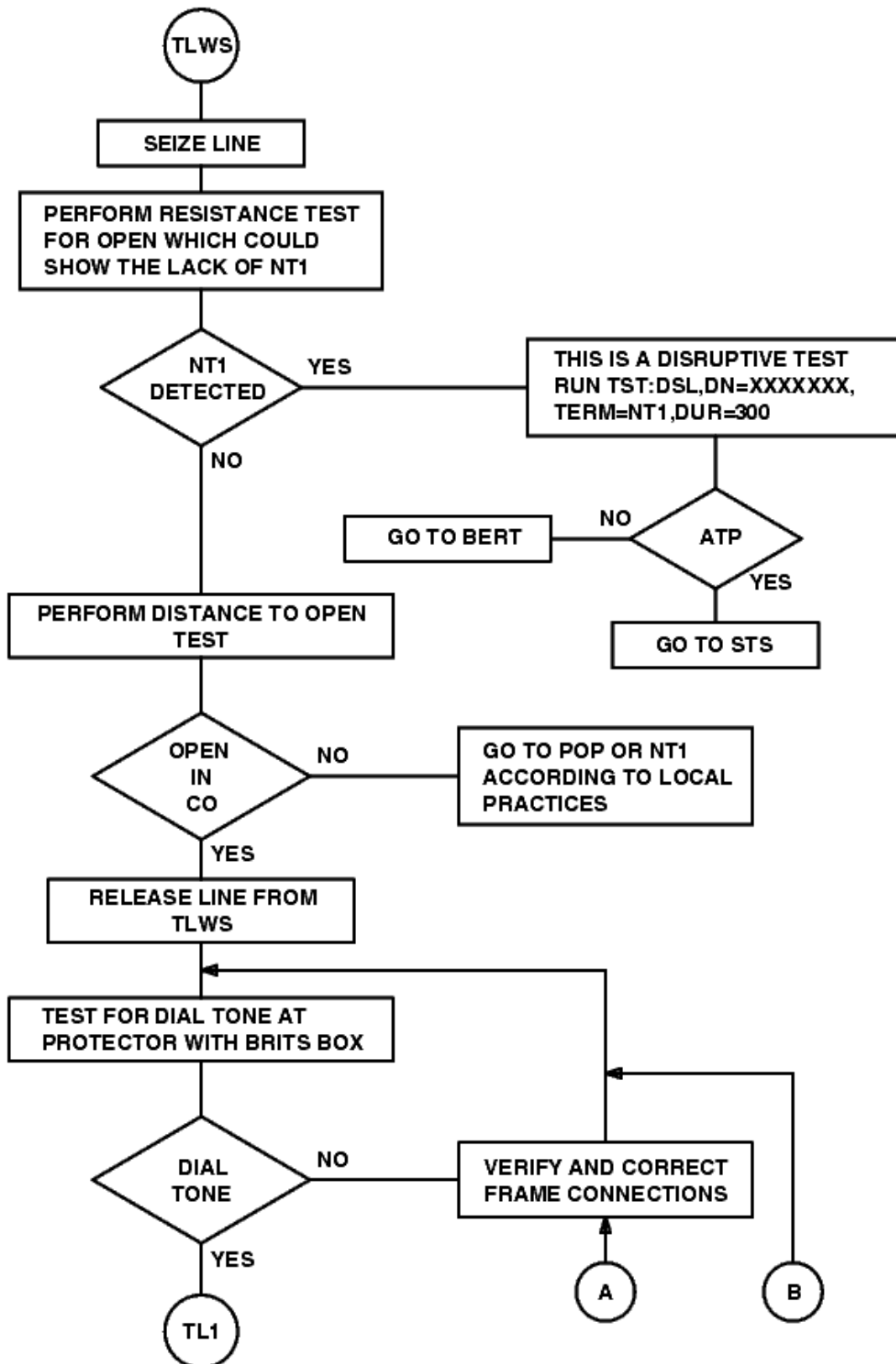
TEST RESULTS FROM TST:DSL



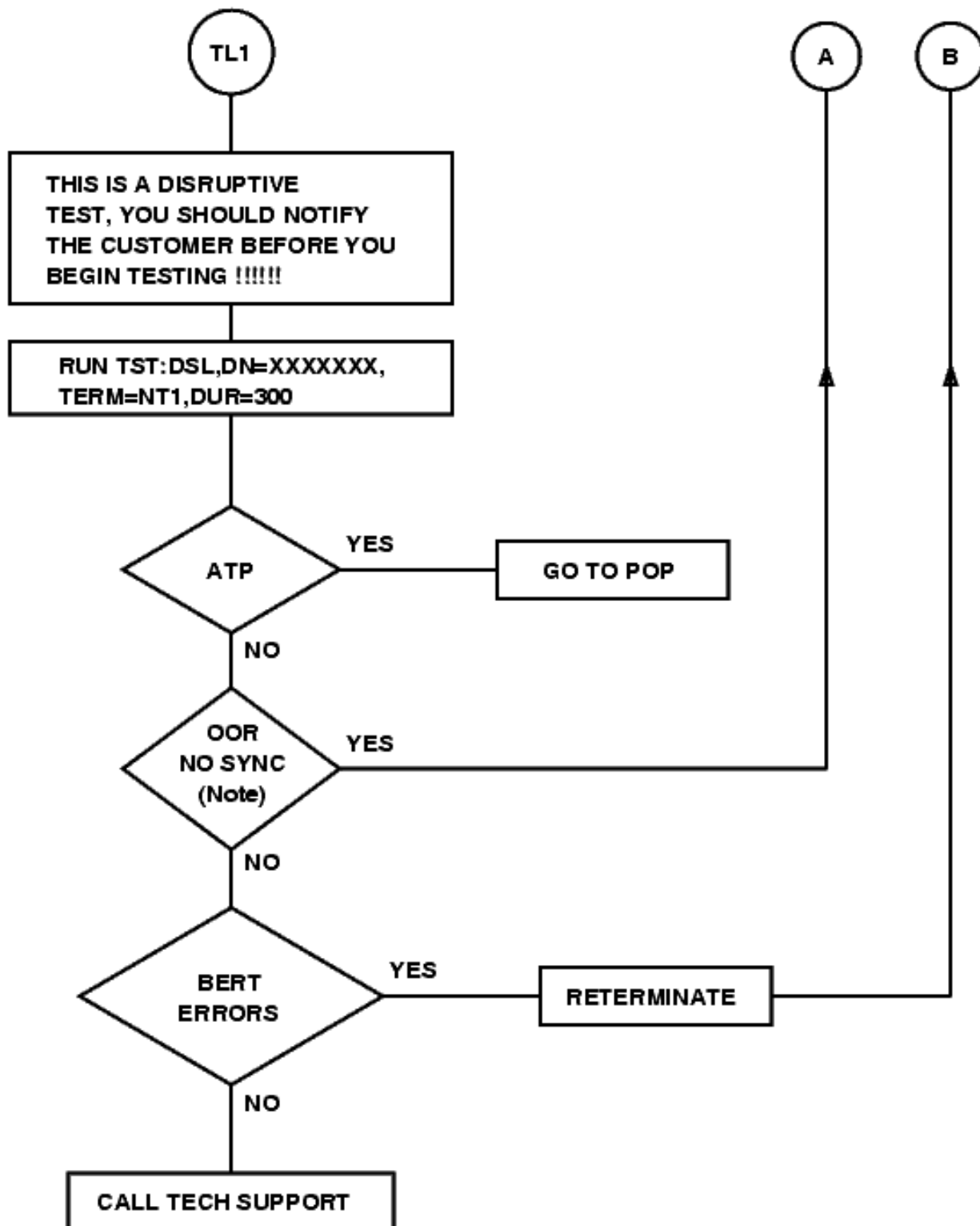
ISLU LINE CARD TESTING



TRUNK AND LINE WORK STATION

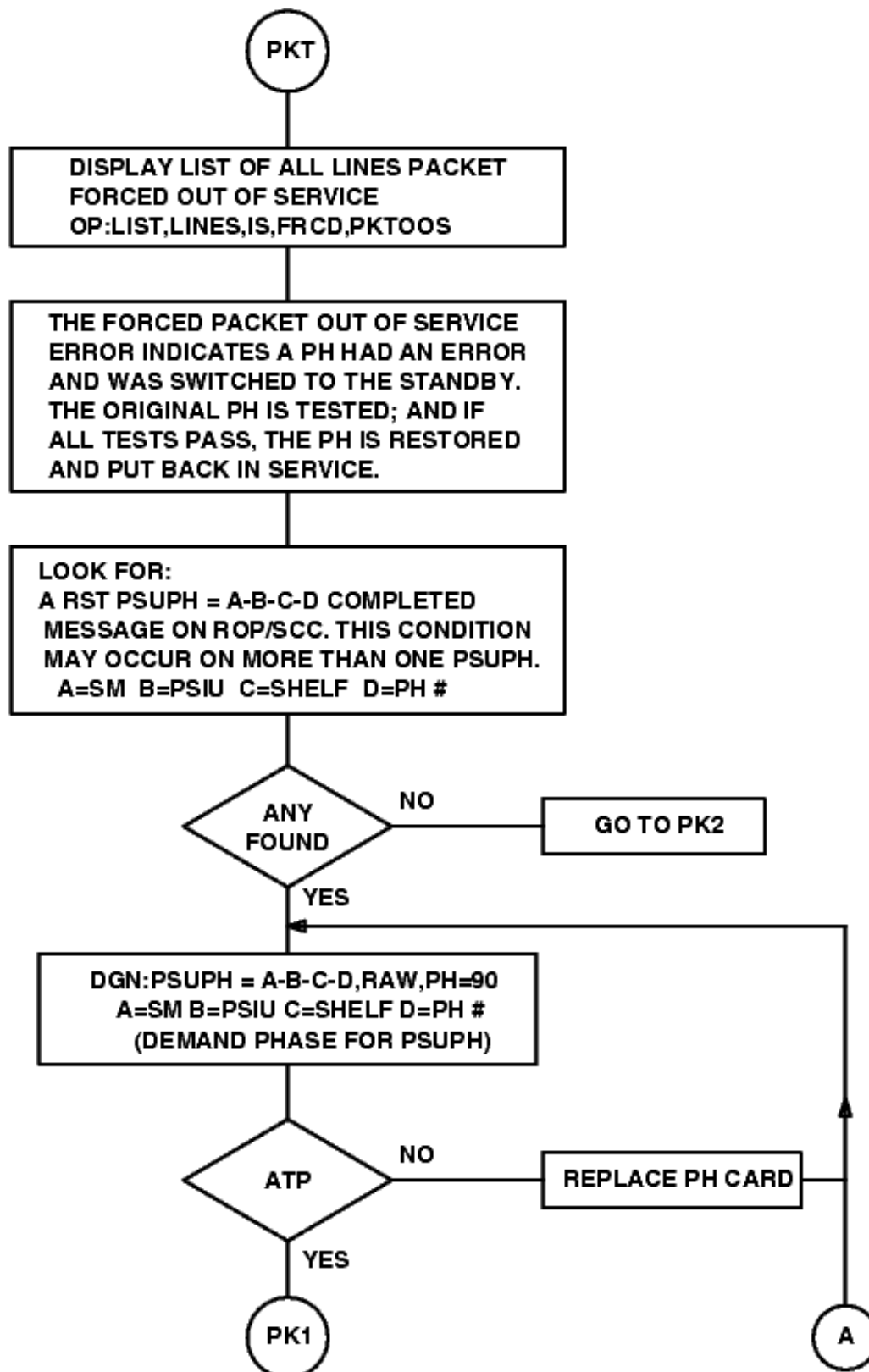


TRUNK AND LINE WORK STATION

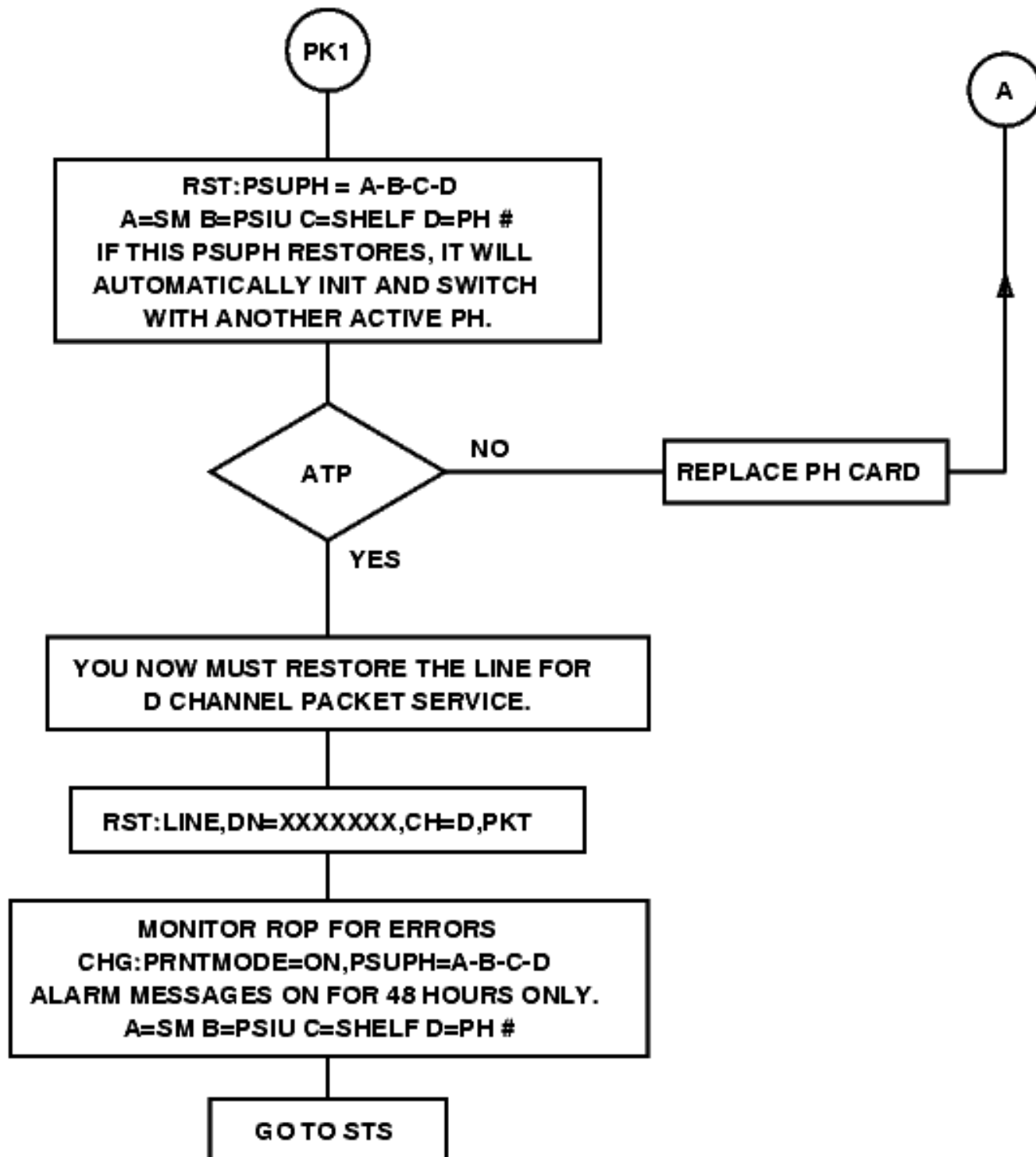


Note: OOR NO SYNC IS THE SAME AS FAULT IN LOOP OR PATH.

PACKET FORCED OUT OF SERVICE



PACKET FORCED OUT-OF-SERVICE



PROTOCOL HANDLER TESTING

PK2

OP:CONV,DN=XXXXXXX

DSLGM X Y Z

X = SM/SM-2000

Y = PROTOCOL HANDLER (GROUP) NUMBER (0-79)

Z = CHANNEL ON PH (MEMBER) NUMBER (0-127)

 CONVERSION OF PH (GROUP) NUMBER TO SHELF AND CHANNEL GROUP NUMBER
 SHELF PH GROUP NUMBER TO CHANNEL GROUP NUMBER

4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
0	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #

 THE ABOVE CHART GIVES THE SHELF AND THE CHANNEL GRP NUMBER TO USE TO
 DETERMINE THE PH NUMBER.

AT THE MCC/TLWS, ENTER THE FOLLOWING POKE COMMANDS:

1186,XX XX=SM/SM-2000

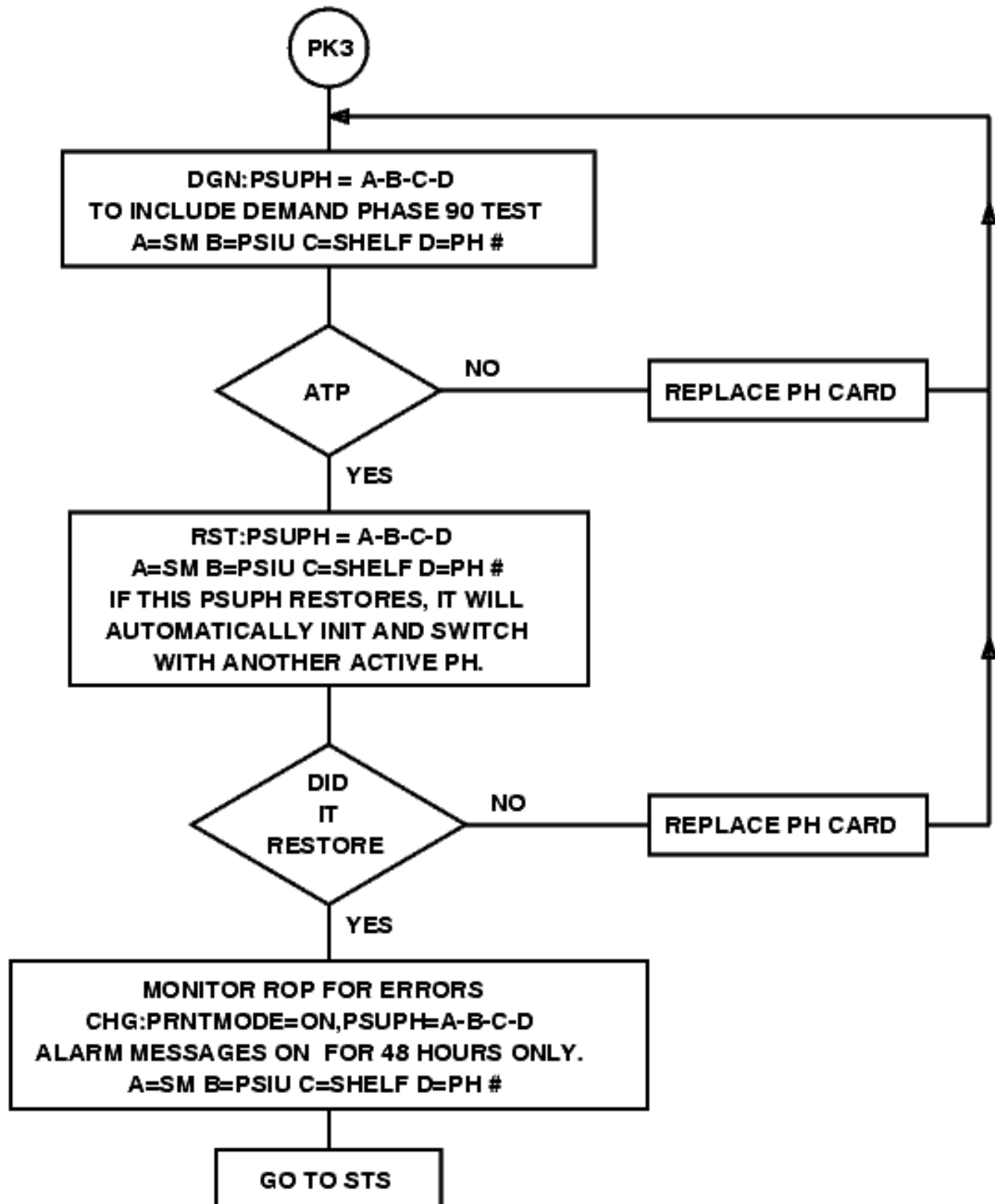
118X X=SHELF

THIS SHOWS THE SM/SM-2000 AND ALL SHELVES EQUIPPED.

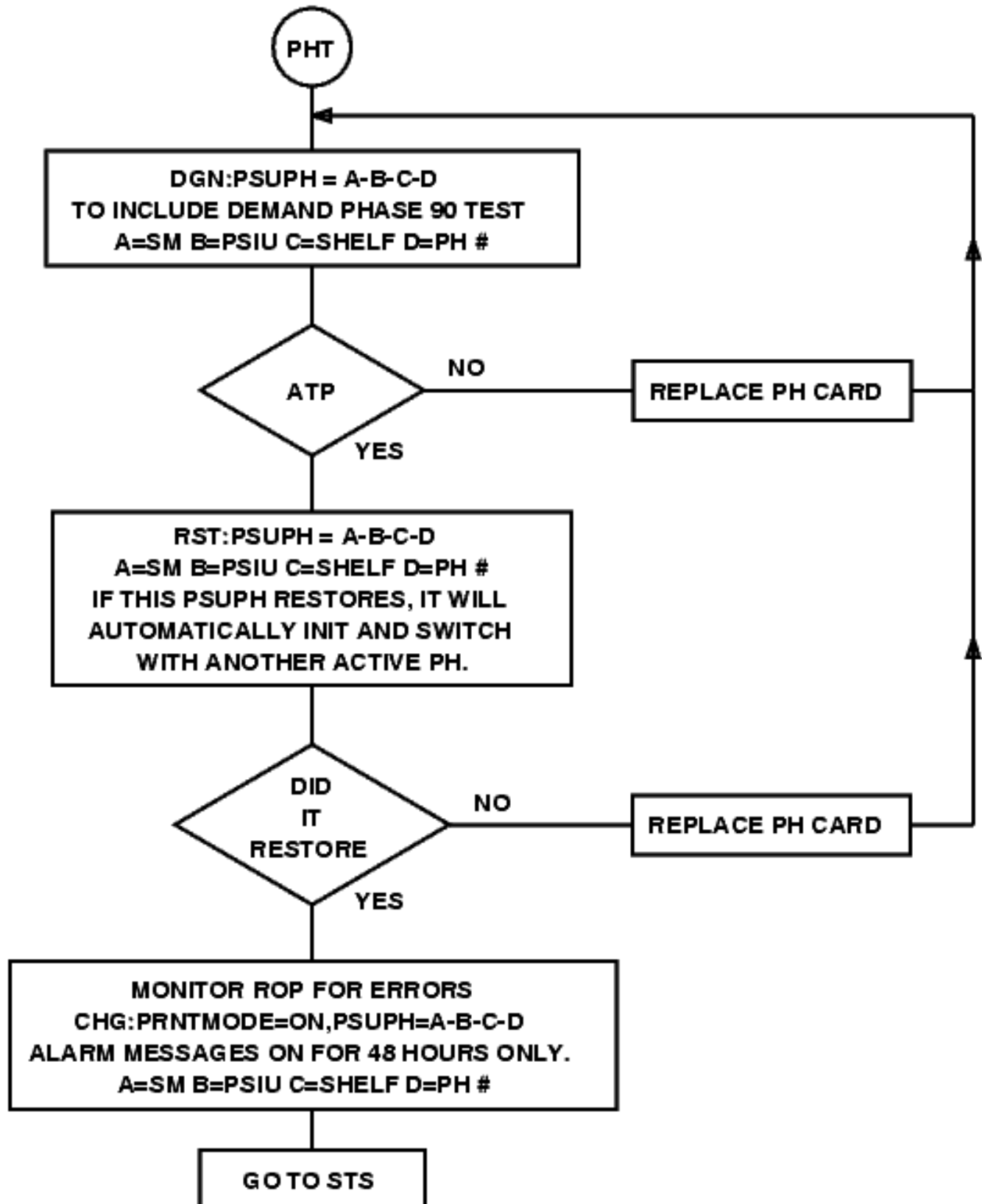
 USING THE CHANNEL GRP NUMBER FROM ABOVE AND THE 118X VIEW,
 ASSOCIATE THE CHANNEL GRP NUMBER WITH A PHYSICAL PSUPH PACK.

PK3

PACKET FORCED OUT-OF-SERVICE



PROTOCOL HANDLER TESTING



LEVEL 1 ERROR TESTING


 LVL1
LVL1ERR

INDICATES THAT THE LINE HAS BEEN REMOVED FROM SERVICE DUE TO AN EXCESSIVE NUMBER OF LAYER 1 ERRORS. FOR EXAMPLE, LAYER 1 ERRORS DETECTED BY THE SWITCH ARE CHANGES IN THE INFORMATION STATES AT THE T-INTERFACE AND OUT OF FRAMES AT THE U-INTERFACE.

LEVEL 1 TESTING**TEST AT THE CENTRAL OFFICE**

IF CPE SUPPORTS LOOPBACK,

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

IF U-CARD, TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

TST:DSL,DN=XXXXXXX,TERM=LC,DUR=300

TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF CPE DOES NOT SUPPORT LOOPBACK,

TST:DSL,DN=XXXXXXX

- FAILURES

IF U-CARD, TST:DSL,DN=XXXXXXX,TERM=LC,DUR=300

TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF DSL SUPPORTED BY BRITE SYSTEM

TST:DSL,DN=XXXXXXX,TERM=CUX,DUR=300

- FAILURES

TST:DSL,DN=XXXXXXX,TERM=CUX-1,DUR=300

TEST AT MDF W/BRITS BOX (FOR AMI-U or T) or IMTS BOX (FOR ANSI-U or T)

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

VERIFY MDF CROSS CONNECTS

RETERMINATE MDF CROSS CONNECTS

TEST AT POP/DEMARC W/BRITS BOX (AMI-U or T) or IMTS BOX (FOR ANSI-U or T)

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

VERIFY POP CROSS CONNECTS

RETERMINATE POP CROSS CONNECTS

TEST CABLE PAIR

TEST AT CUSTOMER HOUSEFRAME W/BRITS BOX (AMI-U or T) or IMTS BOX (FOR ANSI-U or T)

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

VERIFY CROSS CONNECTS

RETERMINATE CROSS CONNECTS

TEST CABLE PAIR

IF U-CARD, TEST AT NT1 LOCATION

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES

REPLACE NT1

TEST CABLE PAIR

LEVEL 2 ERROR TESTING


 LVL2

LVL2ERR

INDICATES THAT THE SWITCH HAS DETECTED PROBLEMS AT LAYER 2 OF THE TRANSMISSION. THE LAYER 2 PROTOCOL IS RESPONSIBLE FOR THE DATA LINK LAYER OF THE COMMUNICATION BETWEEN THE CPE AND THE SWITCH. THERE ARE TWO LAYER 2 MECHANISMS USED BY THE SWITCH TO DETECT LAYER 2 MAINTENANCE PROBLEMS ON THE BRI. ONE MAINTAINED IN THE PH AND THE OTHER IN THE SWITCHING MODULE PROCESSOR. BOTH, WHEN EXCEEDED, RESULT IN THE D-CHANNEL OR PACKET B-CHANNEL BEING PLACED ON THE LVL2ERRLIST.

LEVEL 2 TESTING

TEST AT THE CENTRAL OFFICE

IF CPE SUPPORTS LOOPBACK,

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

TST:DSL,DN=XXXXXXX,TERM=LC,DUR=300

TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF CPE DOES NOT SUPPORT LOOPBACK,

TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES

TST:DSL,DN=XXXXXXX,TERM=LC,DUR=300

TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF DSL SUPPORTED BY BRIE SYSTEM

TST:DSL,DN=XXXXXXX,TERM=CUX,DUR=300

- FAILURES

TST:DSL,DN=XXXXXXX,TERM=CUX-1,DUR=300

TEST AT MDF W/BRITS BOX

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES

VERIFY MDF CROSS CONNECTS

RETERMINATE MDF CROSS CONNECTS

TEST AT POP/DEMARC W/BRITS BOX

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES

VERIFY POP CROSS CONNECTS

RETERMINATE POP CROSS CONNECTS

TEST CABLE PAIR

TEST AT CUSTOMER HOUSEFRAME W/BRITS BOX

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES

VERIFY CROSS CONNECTS

RETERMINATE CROSS CONNECTS

TEST CABLE PAIR

TEST AT NT1 LOCATION

TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES

REPLACE NT1

TEST CABLE PAIR

LEVEL 3 ERROR TESTING**LVL3****LVL3ERR**

INDICATES THAT THE SWITCH HAS DETECTED AN EXCESSIVE NUMBER OF ABNORMAL Q.931 LAYER 3 EVENTS FROM THE CPE.

LEVEL 3 TESTING**BRI TROUBLE NOTIFICATION (BRITN)**

BRITN PROVIDES DSL Q.931 PROTOCOL ERROR RECORD (PER) INFORMATION IN ADDITION TO LEVEL 1 (ERRORED SECONDS COUNTS) AND LEVEL 2 (FRAMING ERROR PERCENTAGE).

PROTOCOL ERROR RECORDS CONTAIN:

- PORT THE ERROR OCCURRED ON
- PROTOCOL STATE
- Q.931 MESSAGE TYPE
- PROTOCOL ERROR CODE (PEC)
- TIMESTAMP OF WHEN THE PEC OCCURRED.

PROTOCOL ERROR RECORDS ARE ENTERED INTO THE PER TABLE WHENEVER A PROTOCOL VIOLATION OCCURS. THE PER TABLE CAN STORE UP TO 200 PERS PER SM/SM-2000 AND IS A CIRCULAR BUFFER ENTRY. THIS MEANS THAT THE NEWEST PERS WILL OVERWRITE THE OLDEST PERS IN THE TABLE. A MAXIMUM OF 15 PERS CAN BE REPORTED USING ALE FOR A DSL. SM/SM-2000 SOFTWARE CAN DETECT IF A DSL IS EXPERIENCING AN EXCESSIVE AMOUNT OF PROTOCOL ERRORS AND PREVENT THAT DSL FROM USING UP THE PER TABLE.

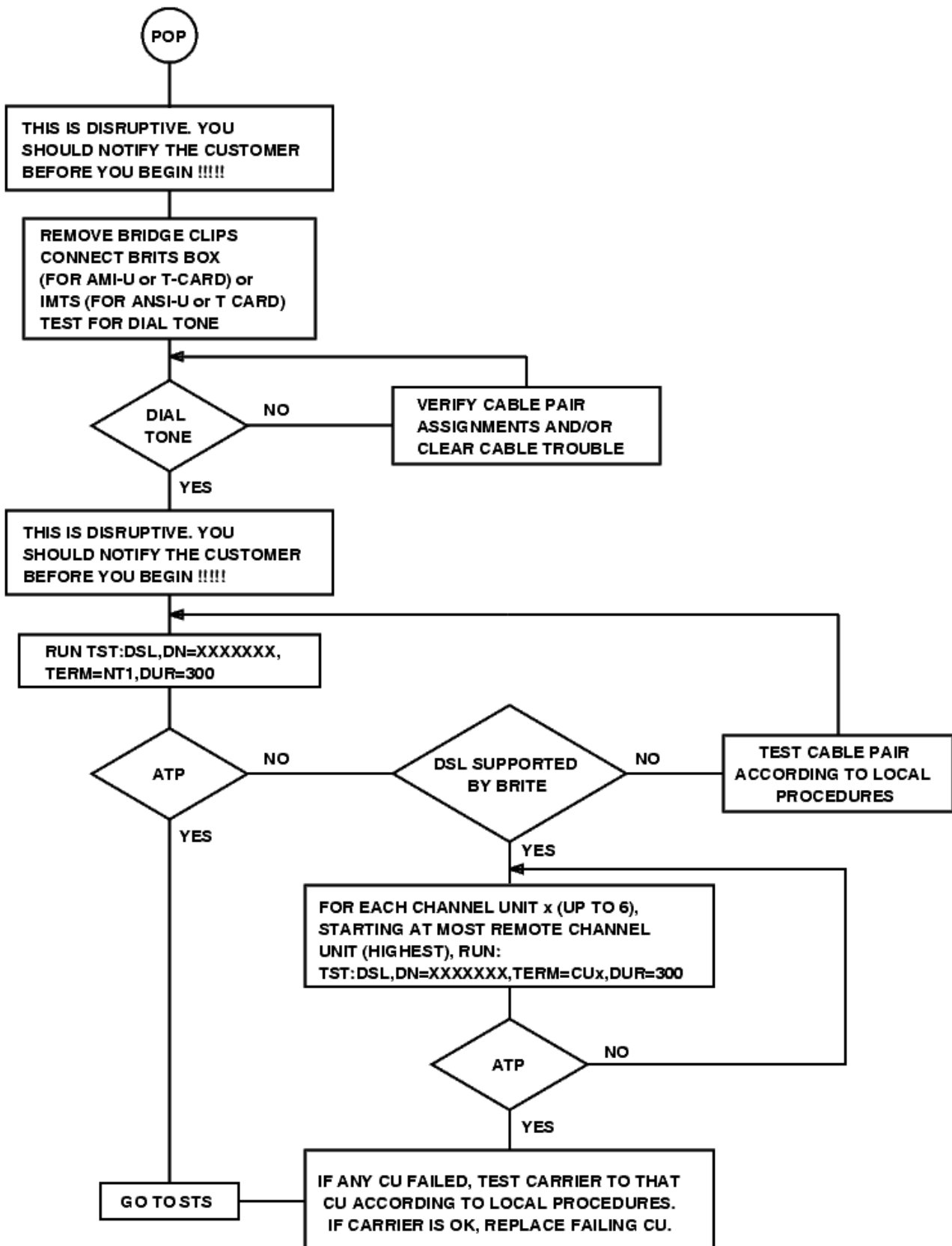
AUTOMATIC LINE EVALUATION (ALE)

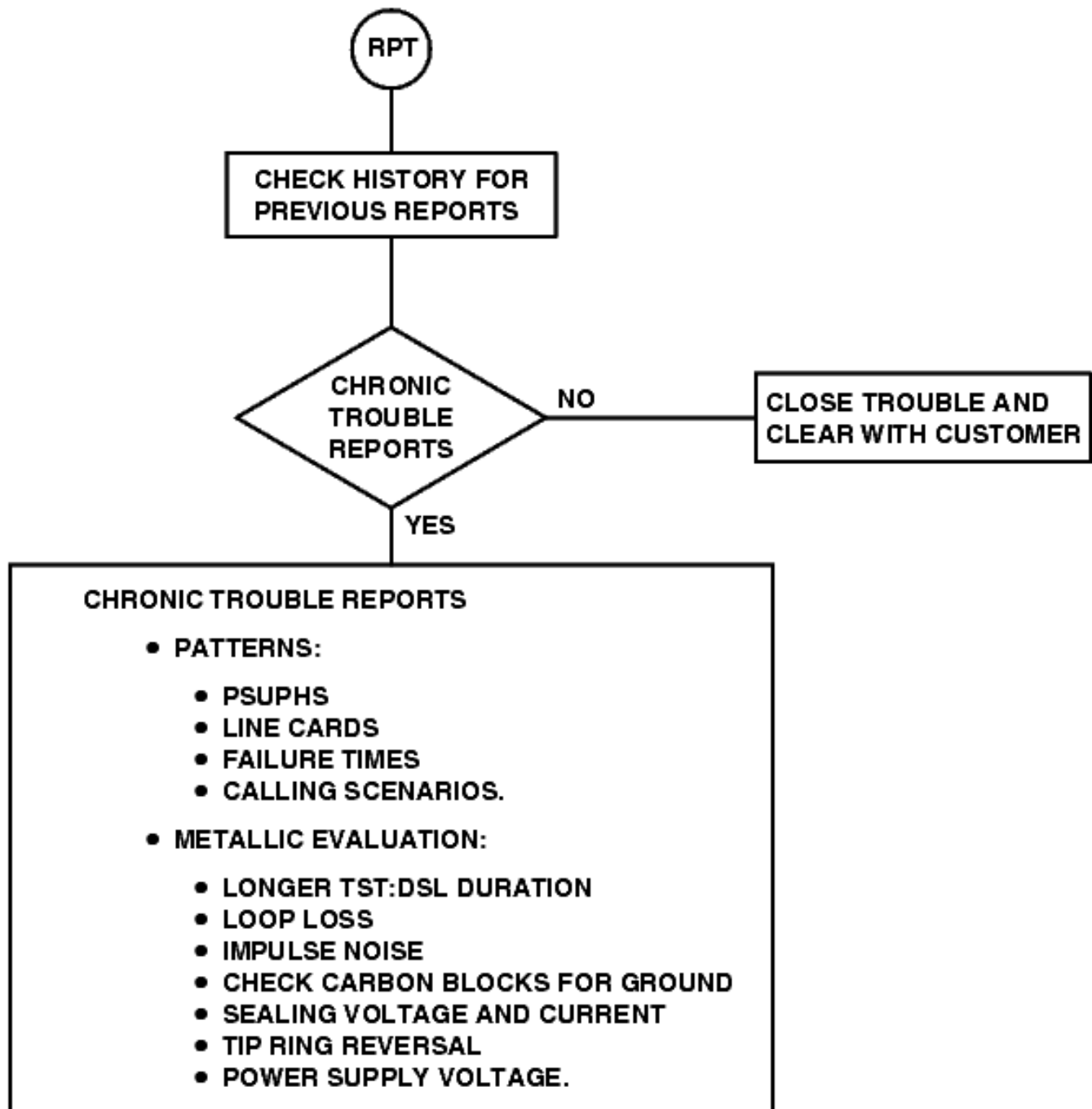
ALE IS USED TO PRINT ERROR INFORMATION ON DSLS AND IS ACTIVATED EITHER MANUALLY OR SCHEDULED AUTOMATICALLY. AUTOMATIC LINE INSULATION TESTING (ALIT) IS USED TO START ALE AT REGULAR INTERVALS (EVERY 24 HOURS) FOR ALL ISDN EQUIPPED LINES IN THE OFFICE.

ALE COLLECTS AND PRINTS THREE TYPES OF ERROR INFORMATION:

- LEVEL 1 ERRORED SECONDS COUNT - A COUNT OF THE 1-SECOND INTERVALS IN WHICH ONE OR MORE CYCLIC REDUNDANCY CHECK (CRC) ERRORS OCCURRED.
- LEVEL 2 FRAMING ERROR PERCENTAGE - THE PERCENTAGE OF FRAMES RECEIVED THAT HAD FRAMING ERRORS.
- PROTOCOL ERROR RECORDS - SHOWS INFORMATION ABOUT Q.931 PROTOCOL ERROR EVENTS.

TESTING AT THE POINT OF PRESENCE/DEMARC



REPORT TROUBLES AND CLOSE TICKETS

BIT ERROR RATE TESTING IN SEGMENTS


 BERT

TEST AT THE CENTRAL OFFICE
 IF CPE SUPPORTS LOOPBACK,
 TST:DSL,DN=XXXXXXX,TERM=CPE,DUR=300

- FAILURES
 - TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300
 - TST:DSL,DN=XXXXXXX,TERM=LC,DUR=300
 - TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF CPE DOES NOT SUPPORT LOOPBACK,
 TST:DSL,DN=XXXXXXX,TERM=NT1

- FAILURES
 - TST:DSL,DN=XXXXXXX,TERM=LC1,DUR=300
 - TST:DSL,DN=XXXXXXX,TERM=PH,DUR=300

IF DSL SUPPORTED BY BRITE SYSTEM
 TST:DSL,DN=XXXXXXX,TERM=CUx,DUR=300

- FAILURES
 - TST:DSL,DN=XXXXXXX,TERM=CUx-1,DUR=300

TEST AT MDF W/BRITS BOX
 TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES
 - VERIFY MDF CROSS CONNECTS
 - RETERMINATE MDF CROSS CONNECTS

TEST AT POP/DEMARCO W/BRITS BOX
 TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES
 - VERIFY POP CROSS CONNECTS
 - RETERMINATE POP CROSS CONNECTS
 - TEST CABLE PAIR

TEST AT CUSTOMER HOUSEFRAME W/BRITS BOX
 TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

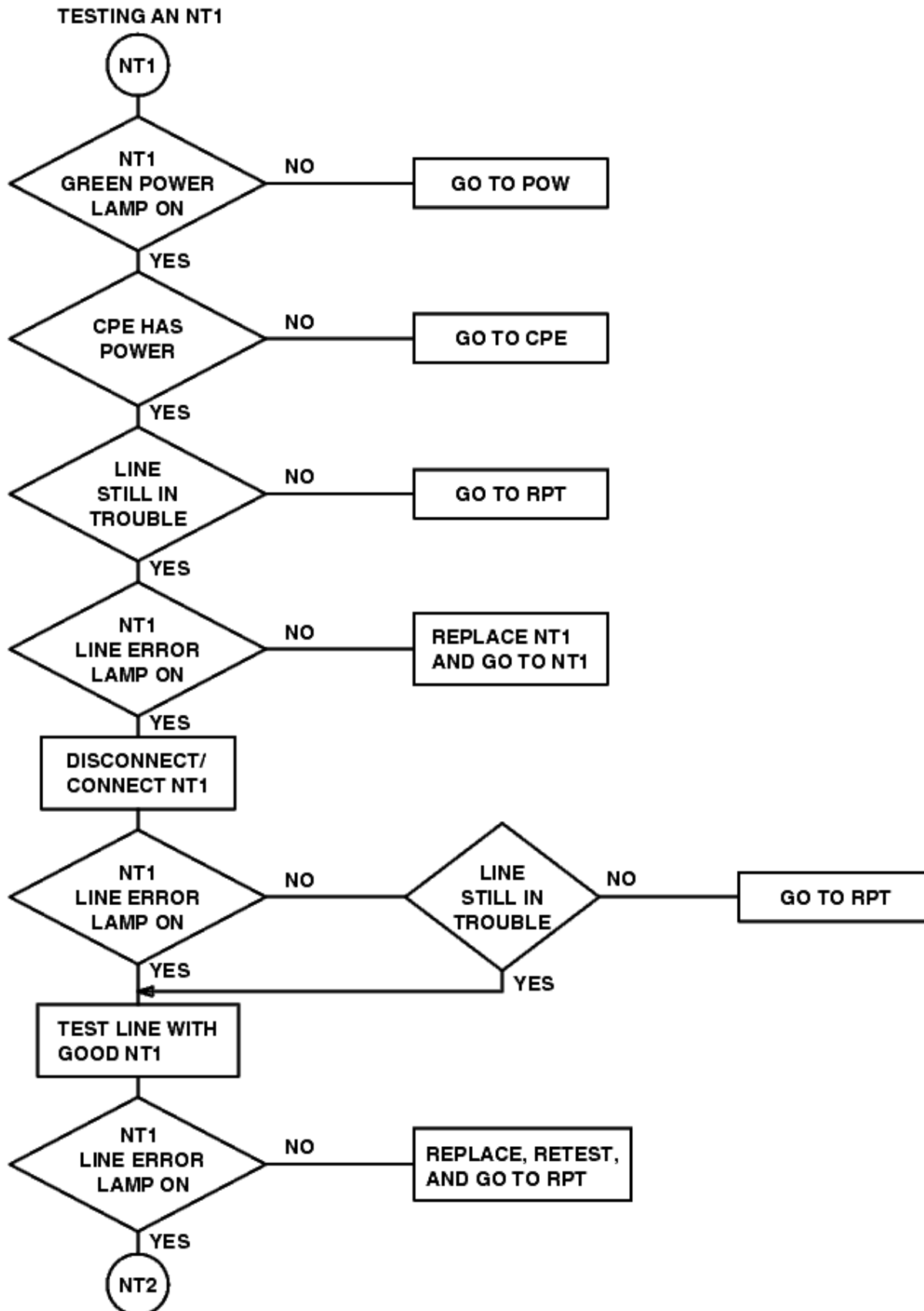
- FAILURES
 - VERIFY CROSS CONNECTS
 - RETERMINATE CROSS CONNECTS
 - TEST CABLE PAIR

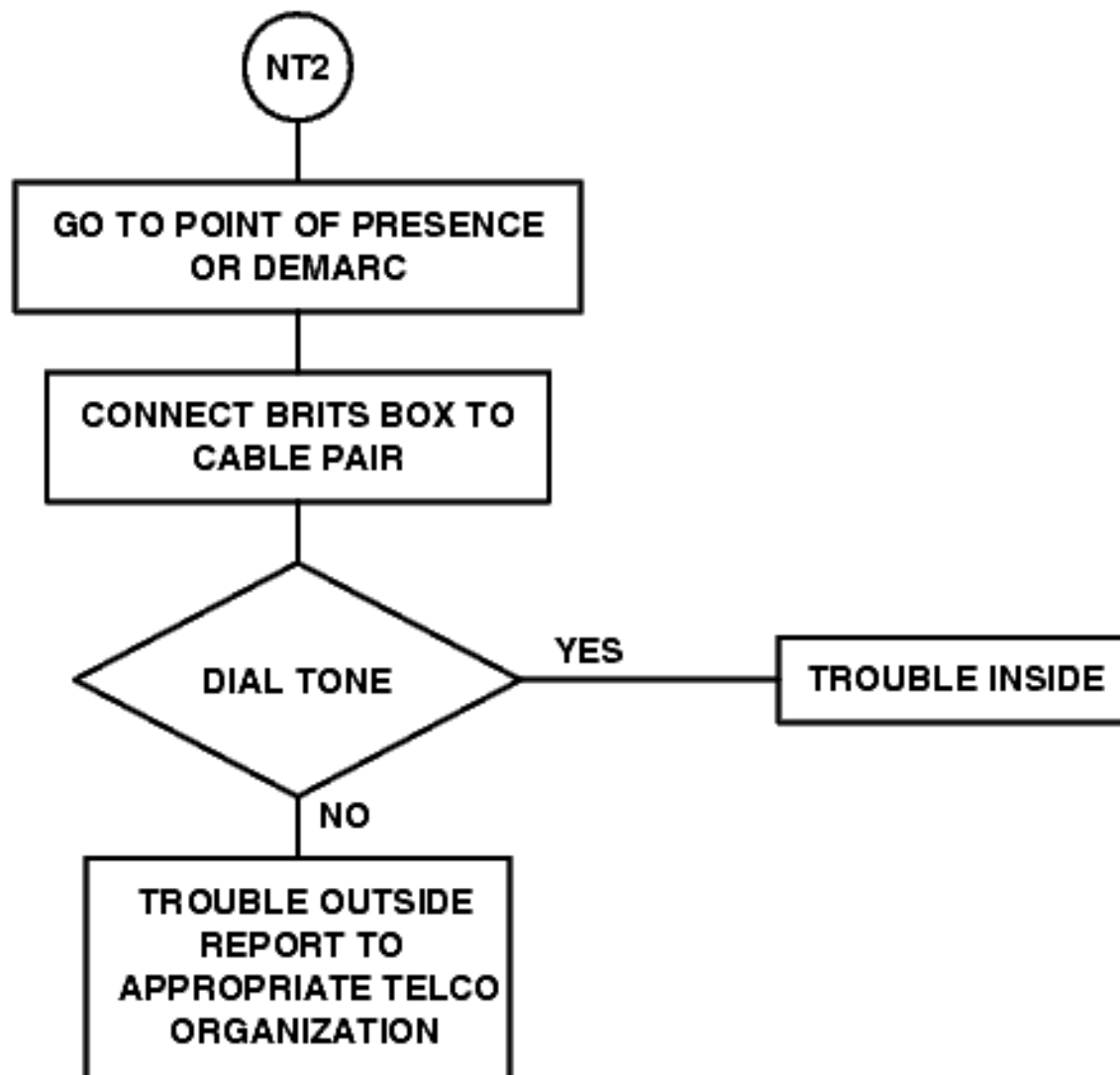
TEST AT NT1 LOCATION
 TST:DSL,DN=XXXXXXX,TERM=NT1,DUR=300

- FAILURES
 - REPLACE NT1
 - TEST CABLE PAIR

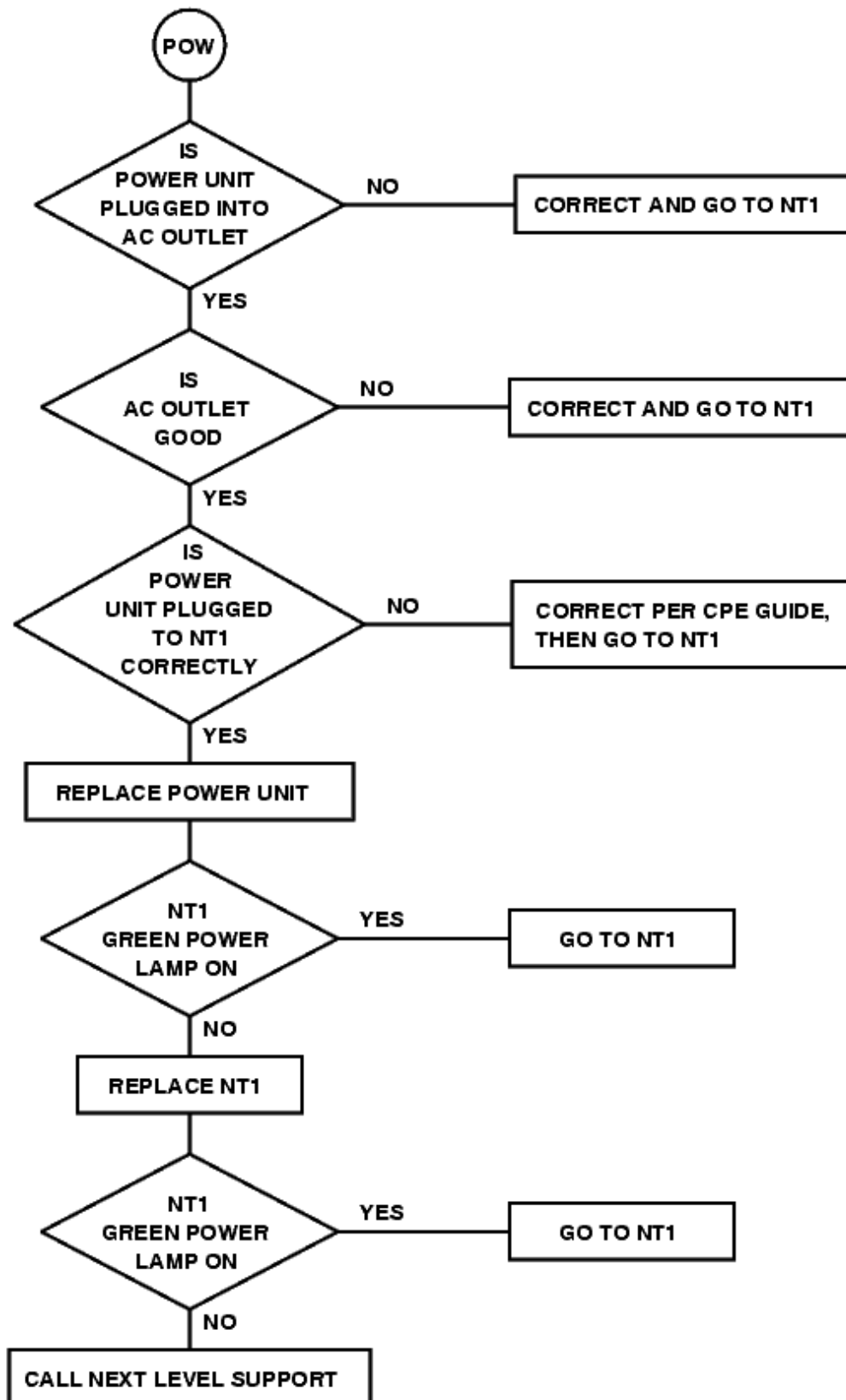
BERT FAILURES

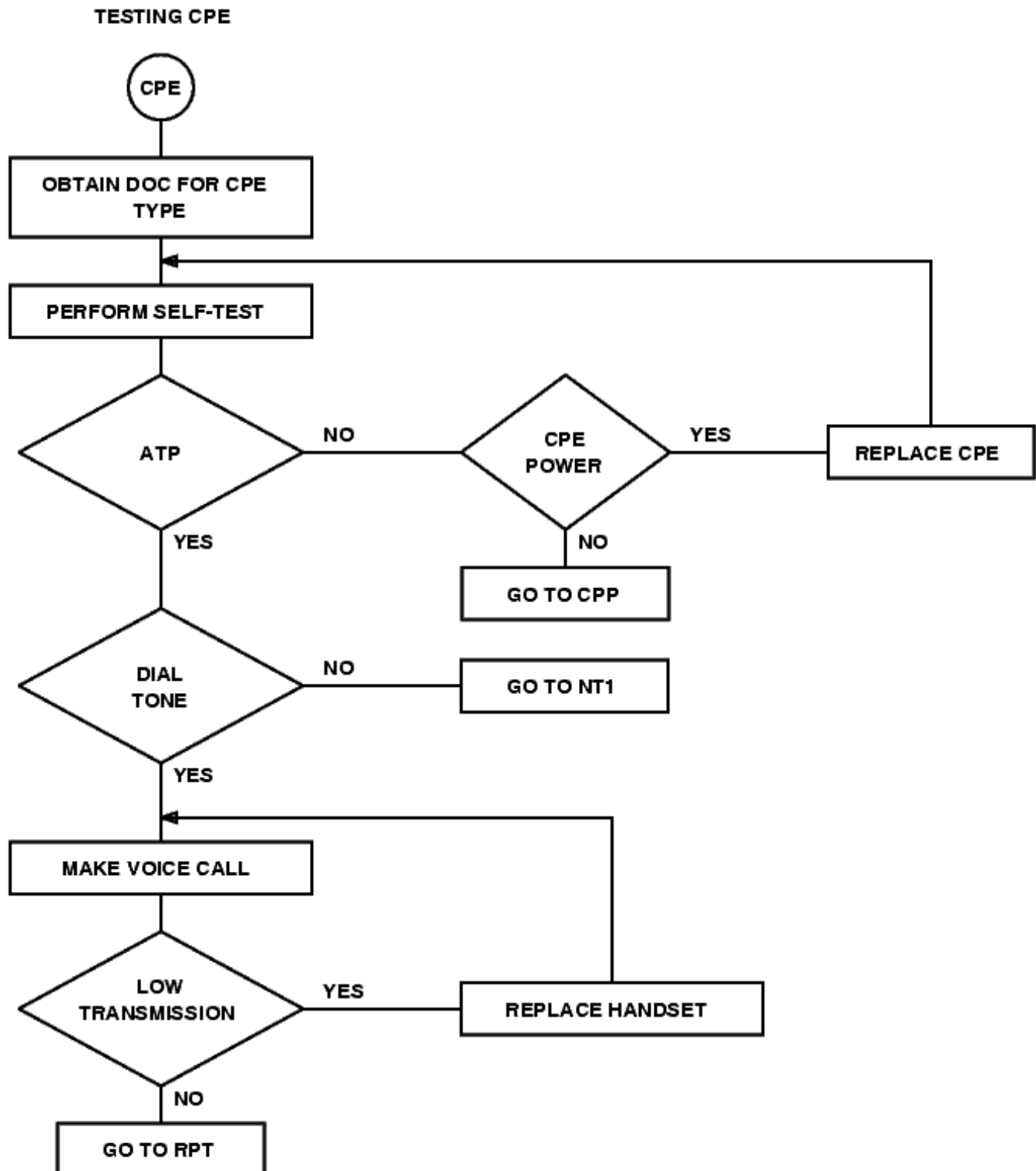
- METALLIC EVALUATION
 - LOOP LOSS
 - IMPULSE NOISE
 - CHECK CARBON BLOCKS FOR GROUND
 - SEALING VOLTAGE AND CURRENT
 - TIP RING REVERSAL
 - POWER SUPPLY VOLTAGE



TESTING AN NT1

POWER CHECK AND CONNECTION





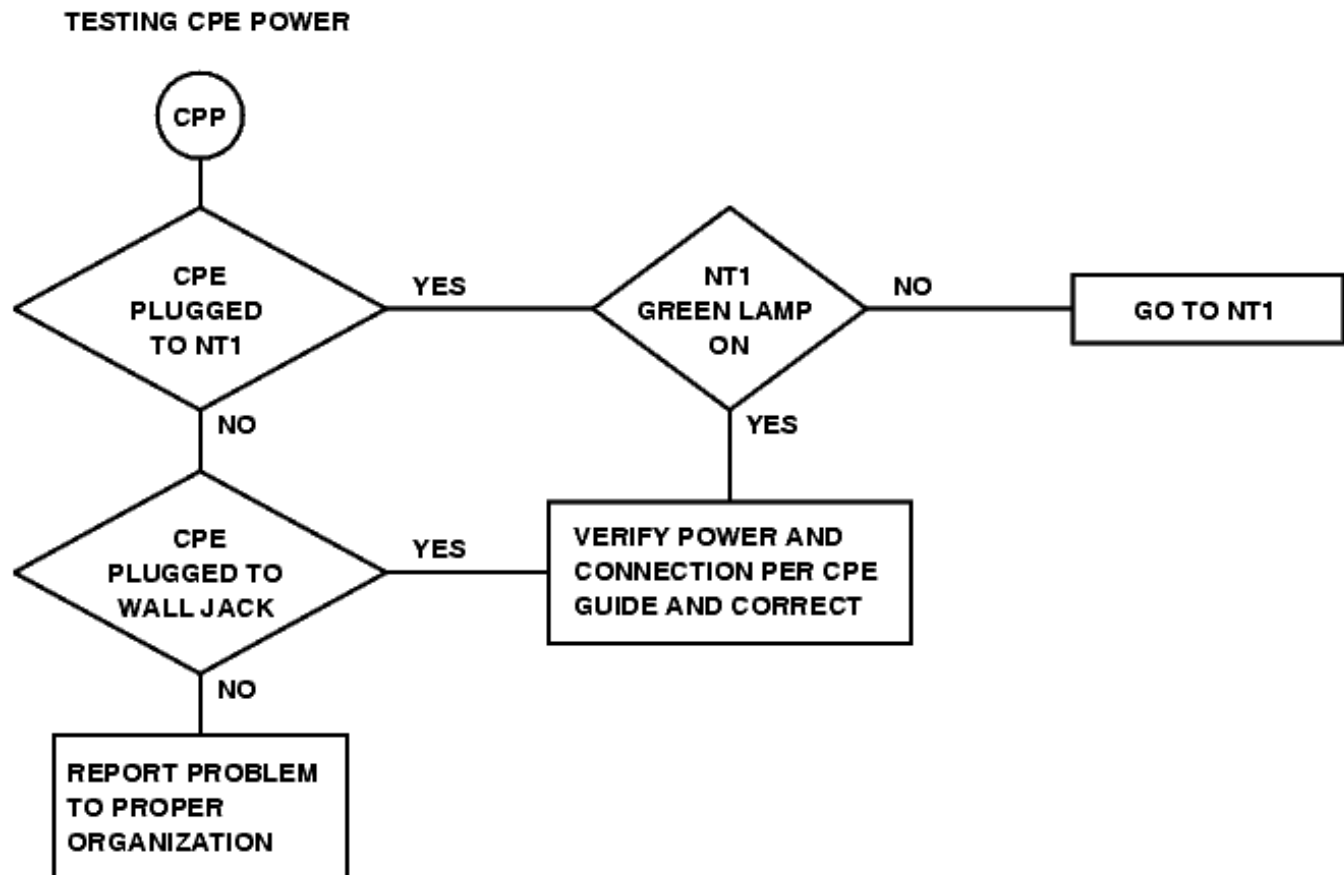


Figure 4-1 ISLU U-DSL BRI Troubleshooting Diagram ISLU U-DSL BRI troubleshooting diagram

5. ANALYSIS AND CLEARING PROCEDURES

GENERAL

This section contains procedures for the task of analyzing and clearing troubles.

Procedure 5.1: ANALYZE AND CLEAR NETWORK FAILURES

OVERVIEW

The sub-procedures in this section are used to replace hardware associated with the common network interface (CNI) ring. Additional information about CNI maintenance can be found in 235-190-120, *Common Channel Signaling Service Features*.

PROCEDURE

1. Select one of the following sub-procedures based on analysis of output messages on the receive-only printer (ROP), Master Control Center (MCC) displays, and other alarm indications:
 - (a) To replace a faulty power converter in the CNI ring node cabinet, use Procedure 12.1, Common Network Interface Power Pack Replacement.
 - (b) To replace other faulty CNI ring circuit packs (not power converters), use Procedure 12.2, Common Network Interface Ring Circuit Pack Replacement.
 - (c) To replace CNI ring fuses, use Procedure 12.3, Common Network Interface Ring Fuse Replacement.
 - (d) To replace the modem or circuit packs in the CNI digital frame access (DFA) cabinet, use Procedure 12.4, Common Network Interface Digital Frame Access Circuit Pack and Modem Replacement.
2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.2: ANALYZE AND CLEAR A PER-CALL TEST FAILURE

OVERVIEW

This procedure provides a method to clear a per-call test failure (PCTF) that occurred on a line during call setup.

Prior to setting up a call, various tests are performed on both the originating and terminating ends of the call. Failures encountered during the call setup tests can result in one of six different PCTFs being reported:

- (a) Low-line resistance (LLR) failure - Before ringing current is applied to the terminating end of a call, the line is tested for any condition which would cause a "ring trip" (false answer). An LLR PCTF indicates that a "ring trip" was detected.
- (b) Line-security scan (LSS) failure - Call originations from two-party lines require that party identification tests be performed to determine whether the ring party or the tip party is originating the call. This test, which checks for tip ground, is performed at two points in the call set-up sequence - once before the application of dial tone and again after the last digit is collected. If the test results differ, an LSS PCTF will be reported.
- (c) Power cross (PX) failure - Before a connection is established to a line (originating and terminating), a power cross test is performed on the line using the High Level Service Circuit (HLSC). This test is designed to detect any foreign voltages that would result in a current great enough to damage line circuitry (for example, a scan resistor). If a dangerous voltage is detected, a PX PCTF will be reported and the line will be placed on the power cross list with the battery and ground removed from the line.
- (d) Ringing continuity failure (RCF) - When ringing a line, a current sensor is used to measure the resulting ringing current. If this measurement is below a set threshold value, an RCF PCTF will be reported. The common cause of this type of failure is an unplugged phone or an open cable.
- (e) Restore and verify failure (RVF) - After the terminating end of a call disconnects, a stuck scanner on-hook test is performed on the line to verify that customer originations (off-hooks) can still be detected. This test uses the HLSC to simulate an off-hook condition at the line scanner and verifies that the off-hook is detected. If not, an RVF PCTF is reported.
- (f) Touch-tone fraud (TTF) failure - Call originations using touch-tone dialing results in a check of the calling line's service subscription to verify that touch-tone dialing is allowed. If a calling line using touch-tone dialing is not provisioned as such, a TTF PCTF is reported.

The **REPT:PCTF** output message and, the **REPT:PCTF-SUM** output message are used to report PCTF occurrences. The **REPT:PCTF** output message reports a single PCTF occurrence on a line in real time (at the time of the occurrence), while the **REPT:PCTF-SUM** message summarizes all PCTFs which have occurred and is output automatically on a periodic basis.

The **REPT:PCTF** output identifies a line experiencing a failure by directory number (DN), equipment number, and Multiline Hunt Group (MLHG) number (if applicable). The type of PCTF occurrence as well as any HLSC which may have been involved at the time of the failure are also indicated in the output. The **REPT:PCTF** messages are assigned the HM_RSB message class which by default is only directed to the Repair Service Bureau (RSB).

The **REPT:PCTF-SUM** output contains an entry for each line and HLSC which has experienced at least one PCTF since the previous automatically generated PCTF summary. Lines are identified by DN and equipment number and HLSCs by equipment number only. The PCTF occurrences for each line or HLSC are summarized by PCTF type and count (six columns to the right of the summary output indicate the number of times each of the PCTF types was reported on the given line or HLSC).

PROCEDURE

1. Use the **REPT:PCTF** or **REPT:PCTF-SUM** output message to identify the line experiencing the PCTF and the specific PCTF type.

NOTE: Look for a pattern to the failures listed [that is, look at the line identifiers and HLSCs (if present) for similarities between failures].

2. Is the PCTF which was reported a TTF PCTF?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.** There is no corrective maintenance required for a TTF PCTF. It only indicates that touch-tone dialing is being used on a line which is not service provisioned as such. Refer to local guidelines for handling TTF PCTFs

If **NO**, continue with Step 3

3. To determine if the trouble is an in-office or outside cable problem, perform line maintenance on the line identified in Step 1 as outlined in Procedure 7.1, Perform Line Maintenance.

4. Is the trouble an outside cable problem?

If **YES**, refer the problem to outside plant per local procedure.

If **NO**, continue with Step 5

5. Does the data obtained in Step 1 indicate that an LU HLSC was used?

If **YES**, continue with Step 6

If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6. Diagnose and clear the fault in the LU HLSC per Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS® Switch.

7. Is the HLSC per-call test failure cleared?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, seek next higher level of technical support.

Procedure 5.3: ANALYZE AND CLEAR NONDIAGNOSABLE SM/SM-2000 MEMORY ERRORS

OVERVIEW

This procedure contains information for clearing an intermittent memory fault in the Module Controller/Time Slot Interchange (MCTSI) in a switching module/switching module-2000 (SM/SM-2000).

Typically, the fault causes either "REPT SM HWLVL MP PARITY-ERROR", "CORRBITERR", or "MEMSYSTEM", interrupts when the affected side of the MCTSI is active (ACT) or an attempt to restore that side of the MCTSI is failing with an "REPT SM HASHSUM FAILURE" printout. However, the fault is so intermittently "soft" that it cannot be detected by the normal MCTSI diagnostics.

The SM/SM-2000 may have degenerated to a very undesirable state where the ACT side of the MCTSI is detecting memory errors, but it cannot be removed from service because the standby side is out of service (OOS) and cannot be restored due to the errors in the ACT side. Step 3 of the procedure addresses this special case.

PROCEDURE

1. Collect the associated "REPT SM HWLVL" interrupt or "REPT SM HASHSUM FAILURE" printouts.
2. Using the printouts, determine which side of the MCTSI and which memory pack (TN28, TN56, TN2012, TN1374, etc.) is most likely causing the problem. To identify an SM/SM-2000 Memory Board from an address, refer to Tables 5.3-1, 5.3-2, 5.3-3, and Figure 5.3-1. If additional assistance is required, refer to 235-600-750, *Output Message Manual*, for the "REPT SM HWLVL" and the "REPT SM HASHSUM" output messages.
3. Determine the status of the affected MCTSI side and its mate side and proceed as follows:
 - (a) If the affected side is OOS and the mate side is ACT, proceed to Step 4.
 - (b) If the affected side is standby (STBY) and the mate side is ACT, using the **REMOVE** poke (or **RMV** input message), remove the affected MCTSI side from service and proceed to Step 4.
 - (c) If the affected side is ACT and the mate side is STBY, using the **SWITCH** poke (or **SW** input message), switch the MCTSI, then remove the affected (now STBY) side and proceed to Step 4.
 - (d) If the affected side is ACT and the mate side is OOS, take the following action:
 - (1) Diagnose the mate side and verify it is all tests passed (ATP).
 - (2) Using the **INH** input message, temporarily inhibit hardware (HW) error checks in the ACT side.
NOTE: Inhibiting hardware checks may degrade SM/SM-2000 capacity.
 - (3) Using the **RST** input message with the unconditional (UCL) and STBY options, request an unconditional restore of the mate (OOS) side to STBY. Wait for the restore to complete.
 - (4) Using the **ALW** input message, remove the HW check inhibits previously activated.
 - (5) Using the **SWITCH** poke (or **SW** input message), switch the MCTSI.
 - (6) Using the **REMOVE** poke (or **RMV** input message), remove the STBY (affected) side from service and proceed to Step 4.

CAUTION: Updating the STBY MCTSI from an active MCTSI with errors could potentially corrupt the STBY MCTSI memory.

4. On the affected MCTSI, execute the MCTSI diagnostic demand Phase 7 [with the trouble locating procedure (TLP) option] several times. For the **DGN** input message format, refer to 235-600-700, *Input Message Manual*.
5. Perform Substep (a) or (b) as follows:
 - (a) If the Phase 7 result is ATP, replace the suspected faulty memory pack (as determined in Steps 1 & 2), repeat Step 4, and verify that Phase 7 of the MCTSI diagnostic runs consistently ATP.
 - (b) If the Phase 7 result is not ATP, using the SUSPECTED FAULTY EQUIPMENT printout, determine which pack is most likely causing the failure, replace this pack, and verify that Phase 7 of the MCTSI diagnostic now runs consistently ATP.
6. Once the previous steps have been completed successfully, using the **RESTORE** poke command or the **RST** input message, restore the MCTSI.
7. Verify that the MCTSI restored successfully (no hashsum failure after memory update).

NOTE: If after restoring the MCTSI, if the SM/SM-2000 errors continue, (and especially if the hashsum failure address is less than 0x24000 or 0x01000000), then, the following circuit pack could be the faulty pack:

PROCESSOR	CIRCUIT PACK CODE
SMP12/23	TN874B
SMP20	UN517
SB20CORE	KBN20, KBN21, or KBN22
CORE40	UN540
CORE60	UN560
CORE60MM	UN594 or UN588

If the MCTSI restores successfully, perform Step 8. If the MCTSI does not restore successfully, perform Step 9.

8. Hold the interrupt and diagnostic printouts along with the suspected faulty memory pack for a few days to verify that the memory errors have cleared. Once it is determined that the memory errors have been cleared, attach the interrupt and diagnostic printouts to the faulty memory pack and return the pack to the appropriate repair center.
9. Hold the interrupt and diagnostic printouts along with the suspected faulty memory pack and seek the next higher level of technical assistance to clear the problem.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 5.3-1 Memory Board Code to Size Conversion

BOARD CODE	BOARD SIZE VALUE
TN28	1
TN56	2
TN2012	4
TN1374	4
TN1376	8
TN1409	8
TN1419	16
TN1661	16
TN1685	32
TN1806	64

Table 5.3-2 Address Digit 6 Hexadecimal to Decimal Conversion

DIGIT 6	VALUE	DIGIT 6	VALUE	DIGIT 6	VALUE	DIGIT 6	VALUE
0	0	4	4	8	8	c	12
1	1	5	5	9	9	d	13
2	2	6	6	a	10	e	14
3	3	7	7	b	11	f	15

Table 5.3-3 Address Digit 7 Hexadecimal to Decimal Conversion

DIGIT 7	VALUE	DIGIT 7	VALUE	DIGIT 7	VALUE	DIGIT 7	VALUE
0	0	4	64	8	128	c	192
1	16	5	80	9	144	d	208
2	32	6	96	a	160	e	224
3	48	7	112	b	176	f	240

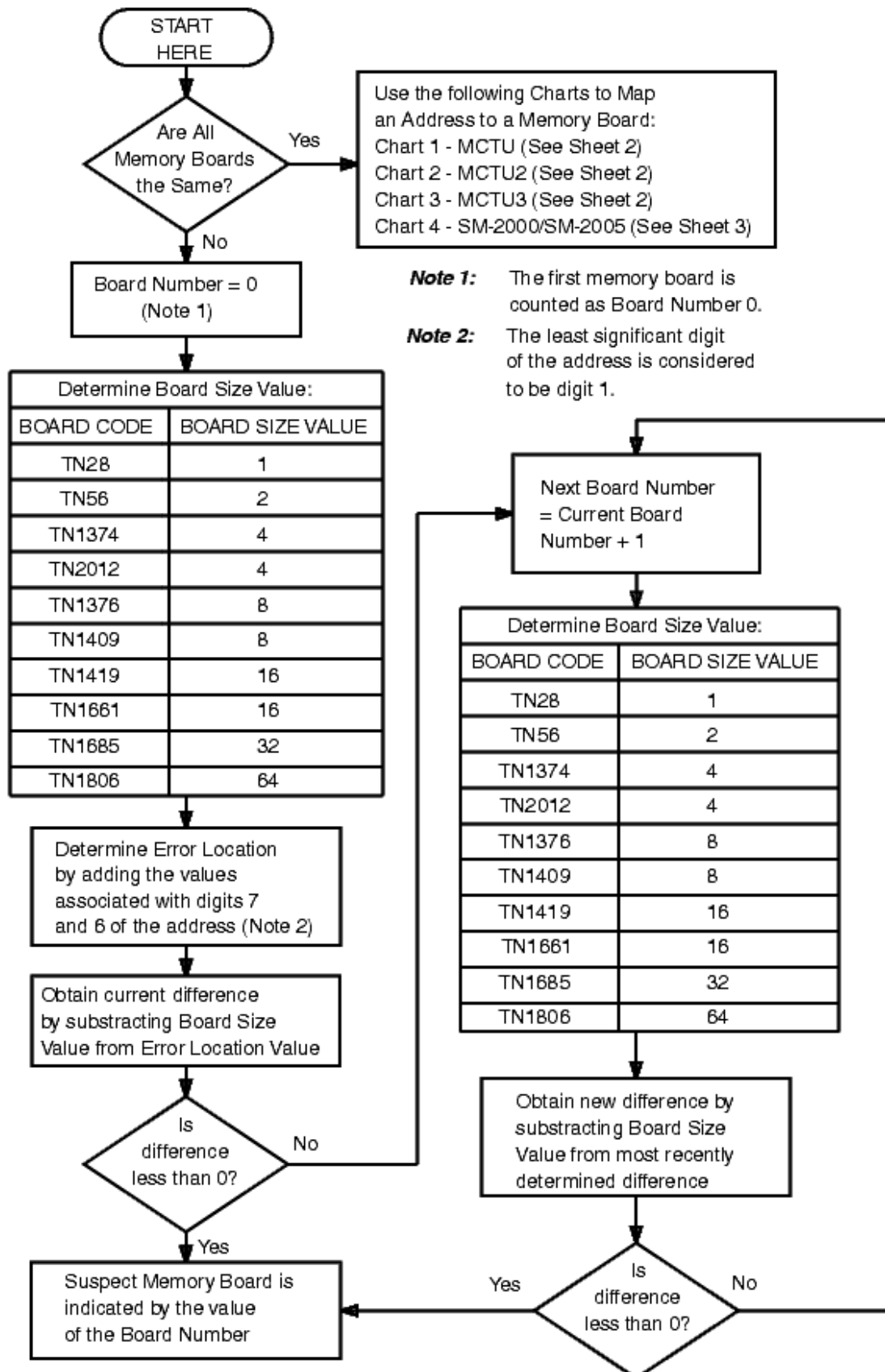


CHART 1 MCTU (SM) (USING TN56, TN2012, TN1409, OR TN1419)								
MEMORY BOARD SIZE*	MEMORY BOARD ADDRESS RANGE (LOWEST/HIGHEST)							
	SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	MEU-0	MEU-1	MEU-2
2 MB (TN56)	024000/ 1FFFFFF †	200000/ 3FFFFFF	400000/ 5FFFFFF	600000/ 7FFFFFF	800000/ 9FFFFFF	A00000/ BFFFFFF	C00000/ DFFFFFF	E00000/ FFFFFFF
4 MB (TN2012)	024000/ 3FFFFFF †	400000/ 7FFFFFF	800000/ BFFFFFF	C00000/ FFFFFFF	1000000/ 13FFFFFF	1400000/ 17FFFFFF	1800000/ 1BFFFFFF	1C00000/ 1FFFFFFF
8 MB (TN1409)	024000/ 7FFFFFF †	800000/ FFFFFFF	1000000/ 17FFFFFF	1800000/ 1FFFFFFF	-----	-----	-----	-----
16 MB (TN1419)	024000/ FFFFFFF †	1000000/ 1FFFFFFF	2000000/ 2FFFFFFF	3000000/ 3FFFFFFF	-----	-----	-----	-----
* Same board in all slots † Addresses below 0x24000 do not map to dynamic RAM.								

CHART 2 MCTU2 (SMP20) (USING TN1374, TN1376, OR TN1661)				
MEMORY BOARD SIZE*	MEMORY BOARD ADDRESS RANGE (LOWEST/HIGHEST)			
	SLOT 0	SLOT 1	SLOT 2	SLOT 3
4 MB (TN1374)	022000/ 3FFFFFF †	400000/ 7FFFFFF	800000/ BFFFFFF	C00000/ FFFFFFF
8 MB (TN1376)	022000/ 7FFFFFF †	800000/ FFFFFFF	1000000/ 17FFFFFF	1800000/ 1FFFFFFF
16 MB (TN1661)	022000/ FFFFFFF †	1000000/ 1FFFFFFF	2000000/ 2FFFFFFF	3000000/ 3FFFFFFF
* Same board in all slots † Addresses below 0x22000 do not map to dynamic RAM.				

CHART 3 MCTU3 (SM)	
MEMORY BOARD SIZE	MEMORY BOARD ADDRESS RANGE
32 MB (KBN17 or KBN20))	For the MCTU3 all memory is on core board, no memory slots are used, therefore no memory address ranges are required.
64 MB (KBN18 or KBN21)	
96 MB (KBN19 or KBN22)	

CHART 4
SM-2000/SM-2005 (SMPU4/SMPU5)

MEMORY BOARD SIZE	MEMORY BOARD ADDRESS RANGE (LOWEST/HIGHEST)				
	ON CORE	SLOT 0	SLOT 1	SLOT 2	SLOT 3
CORE40 (UN540)	NONE	-----	-----	-----	-----
32 MB (TN1685)	-----	01000000/ 02FFFFFF*	03000000/ 04FFFFFF	05000000/ 06FFFFFF	07000000/ 08FFFFFF
64 MB (TN1806)	-----	01000000/ 04FFFFFF*	05000000/ 08FFFFFF	09000000/ 0CFFFFFF	0D000000/ 10FFFFFF
CORE60 (UN560) or CORE60MM (UN594)	64 MB	-----	-----	-----	-----
32 MB (TN1685)	01000000/ 04FFFFFF*	05000000/ 06FFFFFF	07000000/ 08FFFFFF	09000000/ 0AFFFFFF	0B000000/ 0CFFFFFF
64 MB (TN1806)	01000000/ 04FFFFFF*	05000000/ 08FFFFFF	09000000/ 0CFFFFFF	0D000000/ 10FFFFFF	11000000/ 14FFFFFF
CORE60MM (UN588) ²	128 MB	-----	-----	-----	-----
32 MB (TN1685)	01000000/ 08FFFFFF	09000000/ 0AFFFFFF	0B000000/ 0CFFFFFF	-----	-----
64 MB (TN1806)	01000000/ 08FFFFFF	09000000/ 0CFFFFFF	0D000000/ 10FFFFFF	-----	-----
* Addresses below 0x01000000 do not map to dynamic RAM.					
² UN588 may be equipped on SM-2005 unit with 2 memory board slots.					

Figure 5.3-1 Identification of an SM/SM-2000 Memory Board from an Address

Procedure 5.4: CORRECT HASH ERRORS ON THE ACTIVE SIDE OF AN SM [5E9(1) AND EARLIER SOFTWARE RELEASES]

OVERVIEW

This procedure describes a mechanism for the craft to correct hash errors on the active side of a switching module (SM) without resorting to a pump of the SM.

NOTE: It is assumed that the hash error is NOT due to the hashsum value being incorrect. If it is found that the hash error IS due to an incorrect hashsum value, this procedure is **not** applicable and the craft should seek technical assistance. This procedure may be used to correct hash errors that occur during routine operations, but NOT to correct errors that are the result of an SM initialization.

Caution must be taken that the hash errors are NOT the result of manual craft activities such as:

- Repeated software update activities over the period of a few hours that could possibly circumvent the existing software mechanism which normally prevents hash errors from being reported during software update activity. The craft should verify that hash errors persist in the absence of such activities for a period of at least 3 hours.
- Deliberate memory overwrites using Generic Utilities that do NOT update the hashsums for the region of memory overwritten. Before restoring the memory to its original value, the craft should verify that the overwrite is no longer desired.

PROCEDURE

1. Determine if this procedure is applicable by referring to Substeps (a) and (b):
 - (a) Hash errors within the critical information, control Office Dependent Data (ODD), and ODD memory regions require technical assistance. These 3 address ranges are defined as follows:
 - (1) Critical Information - Glcrisa through Glcriea
 - (2) Control ODD - Glcoddsa through Glrcodea
 - (3) ODD - Addresses greater than or equal to Gloddsa

The address ranges of these memory regions may be found using the following Generic Utilities dump command for the appropriate values of "G" specified:

dump:ut:sm=A,gvar="G",l=4;

Where:

A =	module number of SM with hash error
G =	Glcrisa - critical information start address, or Glcriea - critical information end address, or Glcoddsa - control ODD start address, or Glrcodea - control ODD end address, or Gloddsa - ODD start address
l =	l not l or 1.

- (b) For hash errors **NOT** within these address ranges, proceed with Step 2. For hash errors within these address ranges **seek technical assistance. STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

2. Find another SM of the same configuration. Refer to Substeps (a) through (d):

- (a) Enter the Office Data Base Editor (ODBE) by entering the command **odbe** at the Maintenance Control Center (MCC) or the Recent Change/Verify (RC/V) terminal.
- (b) Once in ODBE, dump the contents of the Administrative Module (AM) relation SMCONF to a temporary file as follows:

Enter Processor Number (1-217): 193

Enter Relation Name: SMCONF

Enter Tuple Operation (I,R,U,D,W,BI,BR,BW): BR

Enter UNIX File Name: /updtmp/smconf.temp

Review Processing Completed.

X Tuples Written to File /updtmp/smconf.temp

Where: X = number of tuples in SMCONF written.

Enter Tuple Operation (I,R,U,D,W,BI,BR,BW): !

Enter Relation Name: !

Enter Processor Number (1-217): ^d

- (c) The format of the contents of the /updtmp/smconf.temp file is:

first column	=	SM number
second column	=	Configuration
third column	=	PH image
fourth column	=	ODD partition

A 5E6 example of the file format is as follows:

1	D_LOADED	PH128	1
2	D_STANDARD	PHNULL	1
48	D_BASIC	PHNULL	1

- (d) Examine the /updtmp/smconf.temp file to determine the configuration of the SM that is in hash error. Further examine the file to find another SM of the same configuration - to be referred to as SM NOHASHERR.

3. Tables 5.4-1 and 5.4-2 show a series of address ranges (start address - end address) that halve in size and double in number as one moves across the columns of the tables. The first column shows a single 2K byte address range; the second column shows two 1K byte ranges; the third column shows four 512 byte ranges; the fourth column shows eight 256 byte ranges; and the fifth column shows sixteen 128 byte ranges.

NOTE: The hash error report on the ROP specifies the start and end address of regions of memory containing hash errors. The smallest reported region is a 2K byte block of memory. Adjacent 2K byte blocks are reported as a single region. The 3 least significant digits of the start address are

either 000 or 800. The 3 least significant digits of the end address are either 7ff or fff.

For each 2K byte block reported as containing a hash error, locate and correct the error by overwriting the error to agree with the values contained in SM NOHASHERR memory. Use the start addresses of the progressively smaller address ranges to determine which 128 byte address range contains the hash error as follows:

- (a) Perform either Substep (1) or (2) as applicable:
 - (1) If hash error address range is xxxxy000 - xxxxy7ff, use Table 5.4-1 .
 - (2) If hash error address range is xxxxy800 - xxxxyfff, use Table 5.4-2 .
- (b) Determine in which 256 byte address range(s) the hash error is located:
 - (1) Enter the following command for the SM with the hash error and for SM NOHASHERR:

exc:ut:SM=A,call,func="SMhsh_blk",arg=2,parm=h'xxx-h'yyy

Where:

A = module number of SM with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 yyyy = lower 4 digits of start address

This function returns the address of a structure containing the 2K calculated and stored hash sums plus calculates the hash sums of each of the 256 byte sub-blocks.

- (2) Use Generic Utilities to dump the contents of the 32 byte memory segment identified in Substep 3(b) (1). Perform the dump on both the SM containing the hash errors and SM NOHASHERR using the following command:

dump:ut:SM=A,addr=h'xxxxxxxx,1=32;

Where:

A = module number of SM with hash error, or module number of SM NOHASHERR
 xxxxxxxx = RETVAL of function call in Substep 3(b) (1).

The output structure map follows:

**AAAAAAAA BBBB0000 CCCCCCCC DDDD0000 EEEEEFFF
 GGGGHHHH IIIIJJJ KKKLLLL**

AAAAAAAA	=	INPUT ADDRESS
BBBB	=	CALCULATED HASH FOR 2K
CCCCCCCC	=	ADDRESS WHERE HASH IS STORED
DDDD	=	STORED HASH FOR 2K
EEEE-LLLL	=	CALCULATED HASH OVER 8 256
		Byte Sub-Blocks

Compare the values returned from the SM with hash error(s) to the values returned from SM NOHASHERR for each 256 Byte Sub-Block (EEEE-LLLL). A hash error exists in the address range for which the 2 values are different. Make note of the address ranges containing hash errors and proceed to the next substep.

(c) Determine which 128 byte address range(s) within a 256 byte range contain errors:

- (1) For each 256 byte range found in Substep 3(b) to contain hash errors, use both 128 byte address ranges specified in the table selected in Substep 3(a), when entering the following command for the SM with the hash error and for SM NOHASHERR (total of 4 commands):

exc:ut:SM=A,call,func="SMbhash",arg=5,parm=h'xxxx-h'ySSS-h'080-h'0-h'0

Where:

A = module number of SM with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 y = most significant digit of the low word of the start address
 SSS = start address of the 128 byte address ranges from the table selected in Substep 3(a).

- (2) For each 128 byte address range, compare the value returned from the SM with a hash error(s) to the value returned from SM NOHASHERR. A hash error exists in the address range for which the 2 values are different. Make note of the address ranges containing hash errors and proceed to the next Substep.

NOTE: If no differences are found in a 2K byte region for which hash error was reported, the craft should assume the error is due to a corrupt hashsum value and seek technical assistance.

- (d) Use Generic Utilities to dump the contents of the 128 byte memory segment(s) identified in Substep 3(c) as containing a hash error. Perform the dump on both the SM containing hash errors and SM NOHASHERR using the following command:

dump:ut:sm=A,addr=h'xxxxySSS,l=128;

Where:

A = module number of SM with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 y = most significant digit of the low word of the start address
 SSS = start address of the 128 byte address range(s) found in Substep 3(c) to contain hash error(s).

Compare visually (or by whatever other means available) the contents of memory dumped from the SM with the hash error(s) to the contents of memory dumped from SM NOHASHERR. Wherever a difference is found, make note of the address and the value of the data from SM NOHASHERR for use in Step 4 as xxxxyZZZ and VV, respectively.

4. Use Generic Utilities to correct the difference(s) noted in Substep 3(d) using the following command:

load:ut:sm=A,addr=h'xxxxyZZZ,size=1,l=1,val=VV;

Where:

A = module number of SM with hash error
 xxxx = upper 4 digits of start address found in Substep 3(d)

y = most significant digit of the low word of the address found in Substep 3(d)
 ZZZ = least significant 3 digits of the address found in Substep 3(d)
 VV = value contained in SM NOHASHERR memory at address xxxxyZZZ.

5. After correcting all of the mismatches found in all of the 2K byte memory ranges that were reported for the SM in hash error, the hash error indication should be retired. The following command should be used to retire the hash error indication:

exc:ut:SM=A,call,func="SMmtacthash";

Where:

A = module number of SM with hash error.

If the hash error mode persists, Steps 3 through 5 of this procedure may be repeated to correct any previously reported hash errors that were missed or any new errors that just occurred. If the hash error mode persists after repeated attempts to correct the errors, the craft should seek technical assistance.

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

Table 5.4-1 Start-End Address of 2K Byte Range Beginning at h'xxxxy000

2048 BYTE RANGE	1024 BYTE RANGE	512 BYTE RANGE	256 BYTE RANGE	128 BYTE RANGE
000-7ff	000-3ff	000-1ff	000-0ff	000-07f
				080-0ff
			100-1ff	100-17f
				180-1ff
		200-3ff	200-2ff	200-27f
				280-2ff
			300-3ff	300-37f
				380-3ff
	400-7ff	400-5ff	400-4ff	400-47f
				480-4ff
			500-5ff	500-57f
				580-5ff
		600-7ff	600-6ff	600-67f
				680-6ff
			700-7ff	700-77f
				780-7ff

Table 5.4-2 Start-End Address of 2K Byte Range Beginning at h'xxxxy800

2048 BYTE RANGE	1024 BYTE RANGE	512 BYTE RANGE	256 BYTE RANGE	128 BYTE RANGE
800-fff	800-bff	800-9ff	800-8ff	800-87f
				880-8ff
			900-9ff	900-97f
				980-9ff
		a00-bff	a00-aff	a00-a7f
				a80-aff
			b00-bff	b00-b7f
				b80-bff
	c00-fff	c00-dff	c00-cff	c00-c7f
				c80-cff
			d00-dff	d00-d7f
				d80-dff
		e00-fff	e00-eff	e00-e7f
				e80-eff
			f00-fff	f00-f7f
				f80-fff

Procedure 5.5: CORRECT HASH ERRORS ON THE ACTIVE SIDE OF AN SM/SM-2000 [5E9(2) AND LATER SOFTWARE RELEASES]

OVERVIEW

This procedure describes a mechanism for the craft to correct hash errors on the active side of a switching module/switching module-2000 switching module-2000 (SM/SM-2000) without resorting to an initialization of the SM/SM-2000.

NOTE: It is assumed that the hash error is NOT due to the hashsum value being incorrect. If it is found that the hash error IS due to an incorrect hashsum value, this procedure is **not** applicable and the craft should seek technical assistance.

This procedure may be used to correct hash errors that occur during routine operations, but NOT to correct errors that are the result of an SM/SM-2000 initialization.

Caution must be taken that the hash errors are NOT the result of manual craft activities such as:

- Repeated software update activities over the period of a few hours that could possibly circumvent the existing software mechanism which normally prevents hash errors from being reported during software update activity. The craft should verify that hash errors persist in the absence of such activities for a period of at least 3 hours.
- Deliberate memory overwrites using Generic Utilities that do NOT update the hashsums for the region of memory overwritten. Before restoring the memory to its original value, the craft should verify that the overwrite is no longer desired.

PROCEDURE

1. Determine if this procedure is applicable by referring to Substeps (a), (b) and (c):

- (a) Determine the failing address range(s) as follows:

CAUTION: Inappropriate use of this command may interrupt or degrade service.

EXC:UT:SM=a,CALL,FUNC="SMmtacthash";

Where:

a = module number of SM/SM-2000 with has error.

- (b) Hash errors within the critical information, Control Office Dependent Data (Codd), Redundant Codd (RCodd), Redundant ODD (RODD), and Non-Redundant ODD (NRODD) memory regions require technical assistance. These five address ranges are defined as follows:

- (1) Critical Information - Glcrisa through Glcriea
- (2) Control ODD - Glcoddsa through Glcoddea
- (3) Redundant Control ODD - Glrcodsa through Glrcodea
- (4) Nonredundant ODD - Gloddsa through Gloddea

(5) Redundant ODD - Glroddsa through Glroddea

First, dump the Nonredundant ODD (NRODD) and Redundant ODD address ranges with the following:

DUMP:SMMAP,SM=a;

Where:

a = module number of SM/SM-2000 with hash error.

Save the printout for reference in Step 1(c).

The address ranges of these regions may be found using the following Generic Utilities dump command for the appropriate values of "g" specified:

DUMP:UT:SM=a,GVAR="g",L=4;

Where:

a = module number of SM/SM-2000 with hash error.
 g = Glcrisa - critical information start address, or
 Glcriea - critical information end address, or
 Glcoddsa - control ODD start address, or
 Glcoddea - control ODD end address, or
 Glrcodsa - redundant control ODD start address, or
 Glrcodea - redundant control ODD end address, or

For hash errors **NOT** within these address ranges, proceed with Substep 1(c). For hash errors within these address ranges **seek technical assistance. STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- (c) Hash errors within the peripheral images stored at the end of SM/SM-2000 memory can be corrected by repumping the peripheral images without disrupting call processing or tearing down calls. Determine the peripheral image with the hash error by dumping the address map for all peripherals on the SM/SM-2000 and comparing the start and end addresses for each peripheral image with the addresses that are failing hashsum checks. The address map can be dumped in Step 1(b).

When the peripheral image with hash errors has been determined, request a noninterfering pump for that image by executing the following command:

ST:NIPMP,UNIT=a,SM=b,UCL;

Where:

a = peripheral unit for the corresponding image.
 b = module number of SM/SM-2000 with hash error.

Consult the 235-600-700, *Input Message Manual*, to determine which images are pumped for each peripheral unit specified with the **ST:NIPMP** command.

NOTE: The pump could take up to several minutes depending on the size of the images pumped.

A completion message prints when the pump terminates. The unconditional option is required to repump an image that is already loaded.

If the has error was within the peripheral image, then repumping should have corrected the has error.
STOP. YOU HAVE COMPLETED THIS PROCEDURE.

(d) For hash errors **NOT** within the address ranges specified in (b) or (c), proceed with Step 2.

2. To find another SM/SM-2000 of the same configuration, type and enter:

OP:SYSSTAT,SM=1&&192,UCL;

The resulting printout will indicate in the leftmost column the configuration of each SM in the office. Current configurations are:

B	Basic
S	Standard
L	Loaded
K	SM-2000

3. Tables 5.5-1 and 5.5-2 show a series of address ranges (start address - end address) that halve in size and double in number as one moves across the columns of the tables. The first column shows a single 2K byte address range; the second column shows two 1K byte ranges; the third column shows four 512 byte ranges; the fourth column shows eight 256 byte ranges; and the fifth column shows sixteen 128 byte ranges.

NOTE: The hash error report on the ROP specifies the start and end address of regions of memory containing hash errors. The smallest reported region is a 2K byte block of memory. Adjacent 2K byte blocks are reported as a single region. The 3 least significant digits of the start address are either 000 or 800. The 3 least significant digits of the end address are either 7ff or fff.

For each 2K byte block reported as containing a hash error, locate and correct the error by overwriting the error to agree with the values contained in SM NOHASHERR memory. Use the start addresses of the progressively smaller address ranges to determine which 128 byte address range contains the hash error as follows:

(a) Perform either Substep (1) or (2) as applicable:

(1) If hash error address range is xxxxy000 - xxxxy7ff, use Table 5.5-1 .

(2) If hash error address range is xxxxy800 - xxxxyfff, use Table 5.5-2 .

(b) Determine in which 256 byte address range(s) the hash error is located:

(1) Enter the following command for the SM/SM-2000 with the hash error and for SM NOHASHERR:

EXC:UT:SM=a,CALL,FUNC="SMhsh_blk",ARG=2,PARM=h'xxxx-h'yyyy

Where:

a = module number of SM/SM-2000 with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 yyyy = lower 4 digits of start address

This function returns the address of a structure containing the 2K calculated and stored hash sums plus calculates the hash sums of each of the 256 byte sub-blocks.

- (2) Use Generic Utilities to dump the contents of the 32 byte memory segment identified in Substep 3(b) (1). Perform the dump on both the SM/SM-2000 containing the hash errors and SM NOHASHERR using the following command:

DUMP:UT:SM=a,ADDR=h'xxxxxxx,L=32;

Where:

a = module number of SM/SM-2000 with hash error, or module number of SM NOHASHERR
 xxxxxxxx = RETVAL of function call in Substep 3(b) (1).

The output structure map follows:

**AAAAAAAA BBBB0000 CCCCCCCC DDDD0000 EEEEEFFF
 GGGGHHHH IIIIJJJ KKKKLLLL**

AAAAAAAA	=	INPUT ADDRESS
BBBB	=	CALCULATED HASH FOR 2K
CCCCCCCC	=	ADDRESS WHERE HASH IS STORED
DDDD	=	STORED HASH FOR 2K
EEEE-LLLL	=	CALCULATED HASH OVER 8 256 Byte Sub-Blocks

Compare the values returned from the SM/SM-2000 with hash error(s) to the values returned from SM NOHASHERR for each 256 Byte Sub-Block (EEEE-LLLL). A hash error exists in the address range for which the 2 values are different. Make note of the address ranges containing hash errors and proceed to the next substep.

- (c) Determine which 128 byte address range(s) within a 256 byte range contain errors:

- (1) For each 256 byte range found in Substep 3(b) to contain hash errors, use both 128 byte address ranges specified in the table selected in Substep 3(a), when entering the following command for the SM/SM-2000 with the hash error and for SM NOHASHERR (total of 4 commands):

EXC:UT:SM=a,CALL,FUNC="SMbhash",ARG=5,PARM=h'xxxx-h'ySSS-h'080-h'0-h'0

Where:

a = module number of SM/SM-2000 with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 y = most significant digit of the low word of the start address
 SSS = start address of the 128 byte address ranges from the table selected in Substep 3(a).

- (2) For each 128 byte address range, compare the value returned from the SM/SM-2000 with a hash error(s) to the value returned from SM NOHASHERR. A hash error exists in the address range for which the 2 values are different. Make note of the address ranges containing hash errors and proceed to the next Substep.

NOTE: If no differences are found in a 2K byte region for which hash error was reported, the craft should assume the error is due to a corrupt hashsum value and seek technical assistance.

- (d) Use Generic Utilities to dump the contents of the 128 byte memory segment(s) identified in Substep 3(c) as containing a hash error. Perform the dump on both the SM/SM-2000 containing hash errors and SM NOHASHERR using the following command:

DUMP:UT:SM=a,ADDR=h'xxxxySSS,L=128;

Where:

a = module number of SM/SM-2000 with hash error, or module number of SM NOHASHERR
 xxxx = upper 4 digits of start address
 y = most significant digit of the low word of the start address
 SSS = start address of the 128 byte address range(s) found in Substep 3(c) to contain hash error(s).

Compare visually (or by whatever other means available) the contents of memory dumped from the SM/SM-2000 with the hash error(s) to the contents of memory dumped from SM NOHASHERR. Wherever a difference is found, make note of the address and the value of the data from SM NOHASHERR for use in Step 4 as xxxxyZZZ and VV, respectively.

4. Use Generic Utilities to correct the difference(s) noted in Substep 3(d) using the following command:

LOAD:UT:SM=a,ADDR=h'xxxxyZZZ,L=1,SIZE=1,VAL=VV;

Where:

a = module number of SM/SM-2000 with hash error
 xxxx = upper 4 digits of start address found in Substep 3(d)
 y = most significant digit of the low word of the address found in Substep 3(d)
 ZZZ = least significant 3 digits of the address found in Substep 3(d)
 VV = value contained in SM NOHASHERR memory at address xxxxyZZZ.

5. After correcting all of the mismatches found in all of the 2K byte memory ranges that were reported for the SM/SM-2000 in hash error, the hash error indication should be retired. The following command should be used to retire the hash error indication:

EXC:UT:SM=a,CALL,FUNC="SMmtacthash";

Where:

a = module number of SM/SM-2000 with hash error.

If the hash error mode persists, Steps 3 through 5 of this procedure may be repeated to correct any previously reported hash errors that were missed or any new errors that just occurred. If the hash error mode persists after repeated attempts to correct the errors, the craft should seek technical assistance.

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

Table 5.5-1 Start-End Address of 2K Byte Range Beginning at h'xxxxy000

2048 BYTE RANGE	1024 BYTE RANGE	512 BYTE RANGE	256 BYTE RANGE	128 BYTE RANGE
000-7ff	000-3ff	000-1ff	000-0ff	000-07f
				080-0ff
			100-1ff	100-17f
				180-1ff
		200-3ff	200-2ff	200-27f
				280-2ff
			300-3ff	300-37f

	400-7ff	400-5ff	400-4ff	380-3ff
				400-47f
			500-5ff	480-4ff
				500-57f
		600-7ff	580-5ff	
			600-6ff	600-67f
				680-6ff
			700-7ff	700-77f
	780-7ff			

Table 5.5-2 Start-End Address of 2K Byte Range Beginning at h'xxxxxy800

2048 BYTE RANGE	1024 BYTE RANGE	512 BYTE RANGE	256 BYTE RANGE	128 BYTE RANGE
800-fff	800-bff	800-9ff	800-8ff	800-87f
				880-8ff
		a00-bff	900-9ff	900-97f
				980-9ff
			a00-aff	a00-a7f
				a80-aff
			b00-bff	b00-b7f
				b80-bff
	c00-fff	c00-dff	c00-cff	c00-c7f
				c80-cff
		e00-fff	d00-dff	d00-d7f
				d80-dff
			e00-ef	e00-e7f
				e80-ef
			f00-fff	f00-f7f
				f80-fff

Procedure 5.6: ANALYZING CRC MISMATCHES (STORED/CALCULATED)

OVERVIEW

Procedure for Analyzing CRC Mismatches (Stored/Calculated)

The following input message:

```
S334-1441938 70-01-01 19:56:45 001399 MAINT J10.0 APP
VFY:FILE,FLIST="/no5text/bkup/CRCfile"; PF
```

Has generated the following output error message:

```
S334-1441938 70-01-01 19:58:54 001413 MAINT J10.0 APP
M VFY FILE VERIFICATION FAILURE ON FILE /no5text/prc/okp
STORED CRC VALUE = f2c2 afcc CALCULATED CRC VALUE = f2c2 afda
S334-1441938 70-01-01 19:58:54 001414 MAINT J10.0 APP
M VFY FILE COMPLETED
XXX FILES VERIFIED
1 ERRORS
```

PROCEDURE

1. Is there any software update which is in a "temporary" state via the poke "9104,sum" on the 1950 page:

```
S63E-458913 70-01-01 20:18:06 001639 MAINT J10.0 APP
upd:display,sum; PF
```

```
S63D-3145886 70-01-01 20:18:28 001640 UTIL J10.0 APP
UPD DISPLAY SUM
```

LAST OFFICIAL BWM: BWM92-0098 STATE: OFFICIAL

LAST CRAFT BWM: NONE

TEMPORARY BWM: NONE

ACTIVE CRAFT BWM: NONE

```
S63E-458913 70-01-01 20:18:29 001641 MAINT J10.0 APP
UPD DISPLAY COMPLETED
```

This states that there is no SU in any temporary (STATE would be "SOAK IN PROGRESS", not OFFICIAL. Or a TMP or CFT SU would show up as APPLY COMPLETED)

This is an example of a SU not in the OFFICIAL state:

```
S63D-262303 70-01-01 20:01:09 001442 UTIL J10.0 APP
UPD DISPLAY SUM
```

LAST OFFICIAL BWM: BWM92-0058 STATE: APPLY / SOAK IN-PROGRESS

LAST CRAFT BWM: CFT92-0026 STATE: OFFICIAL

TEMPORARY BWM: NONE

ACTIVE CRAFT BWM: NONE

2. If you received output which stated that some SU was in a temporary state, that SU should be examined for updates to the product which is failing the CRC check. If there is an update to that product in this SU, then the VFY:FILE command should be run again after that SU is either made OFFICIAL or backed out. If the SU does NOT contain updates to this product, then continue with the next steps.

3. If applicable, compare the disk version of the file with the working version in incore memory using the compare-disk-to-core command (/bin/cmpr -f in UNIX shell):

```
S2C4-3145874 70-01-01 20:03:03 001471 MAINT J10.0 APP
M  cmpr:disk,core,fn="/no5text/prc/okp"; PF
```

```
S2C4-3145874 70-01-01 20:03:29 001483 MAINT J10.0 APP
M  CMPR DISK CORE COMPLETED
```

```
S10B-131235 70-01-01 20:03:29 001484 MAINT J10.0 APP
M  DISK AND CORE ARE EQUAL FOR /no5text/prc/okp
```

If disk and core are NOT equal, then you must determine which one is correct and then correct the other one. Since you already have a CRC error, it is likely that disk is BAD and incore is good. In this case you must obtain a backup copy of the disk file and replace the (suspected) corrupted version. After replacement, some type of process initialization may be necessary to make disk and core equal again. Seek technical assistance to determine this.

4. If disk and core are equal, then it is suggested to run file system audits on the filesystem where the CRC mismatched file is located, as well as on the rest of the critical filesystems, to determine if the 5ESS[®] switch disk images are free of corruption.

```
S324-1769630 70-01-01 20:05:35 001522 MAINT J10.0 APP
M  aud:fslink=2,ins="/dev/no5text",ncg; PF
```

```
S325-327791 70-01-01 20:05:42 001524 AUDL J10.0 APP
M  AUD ENV=RTR FSLINK 2 /dev/no5text COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED
```

```
S324-262305 70-01-01 20:06:34 001538 MAINT J10.0 APP
M  aud:fsblk=2,ins="/dev/no5text",ncg; PF
```

```
S325-327791 70-01-01 20:06:40 001541 AUDL J10.0 APP
M  AUD ENV=RTR FSBLK 2 /dev/no5text COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED
```

Perhaps "ichk's" should also be run from UNIX shell:

```
# /etc/ichk -n /dev/no5text
```

```
/dev/no5text1    0 3601
(NO WRITE)
```

Phase 1 - Check Blocks

Phase 3 - Check Pathnames

Phase 4 - Check Connectivity

Phase 5 - Check Reference Counts

```
2498 files    118140 blocks    21373 free
```

5. Run audits on /dev/root, /dev/db, and /dev/etc to measure the disk integrity of the major filesystems of the

5ESS® switch.

S324-2359454 70-01-01 20:08:54 001569 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/root",ncg; PF

S325-327791 70-01-01 20:09:00 001570 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/root COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

S324-2556062 70-01-01 20:09:20 001571 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/etc",ncg; PF

S325-327791 70-01-01 20:09:20 001572 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/etc COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

S324-2687134 70-01-01 20:09:41 001575 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/db",ncg; PF

S325-327791 70-01-01 20:09:43 001576 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/db COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

6. Verify that the error is still present by entering the 'VFY:FILE' command again, if possible just on the one file which failed before:

S334-2752670 70-01-01 20:10:16 001577 MAINT J10.0 APP
M VFY:FILE,FN="/no5text/prc/okp g"; PF

S334-2752670 70-01-01 20:10:16 001578 MAINT J10.0 APP
M VFY FILE STARTED

S334-2752670 70-01-01 20:12:30 001589 MAINT J10.0 APP
M VFY FILE VERIFICATION FAILURE ON FILE /no5text/prc/okp
STORED CRC VALUE = f2c2 afcc CALCULATED CRC VALUE = f2c2 afda

S334-2752670 70-01-01 20:12:30 001590 MAINT J10.0 APP
M VFY FILE COMPLETED
1 FILES VERIFIED
1 ERRORS

7. If the error still persists, then some information may be needed to be gathered in order to assist technical support in determining what to do next. Suggestions might be to dump the PMLOG, and DKDRVLOG, to look for any recent errors/initializations which might lead us to suspect the disk version of the file being bad.

S214-2818206 70-01-01 20:14:38 001613 MAINT J10.0 APP
M op:log,lg=pmlog; PF

S214-2818206 70-01-01 20:14:38 001614 UTIL J10.0 APP
M OP LOG PMLOG STARTED SEGMENT 1

70-01-01 17:59

REPT PMSLOT

POSTMORTEM DUMP H'7

TIME OF POSTMORT: 70-01-01 17:54:08

INITIALIZATION MESSAGE

UNIX RTR LEVEL: 4 APPLICATION LEVEL: 1

REQUESTED INITIALIZATION PARAMETERS

SOURCE: PANIC CODE: 0

UNIX RTR LEVEL: 0 APPLICATION LEVEL: 0

PHASE OPTIONS: 0

UTILITY ID: 00000000

.
. .
. .
. .
. .

S214-2818206 70-01-01 20:14:38 001616 UTIL J10.0 APP
M OP LOG PMLOG COMPLETED SEGMENT 3

S214-2883742 70-01-01 20:15:07 001618 MAINT J10.0 APP
M op:log,lg=dkdrvlog; PF

S214-2883742 70-01-01 20:15:07 001619 UTIL J10.0 APP
M OP LOG DKDRVLOG COMPLETED SEGMENT 1

70-01-01 17:58
REPT DFC 0 AUTO PUMP STARTED

70-01-01 17:58
REPT DFC 0 AUTO PUMP COMPLETED

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58

REPT DKDRV INFO CODE H'265

70-01-01 17:58

REPT DFC 1 AUTO PUMP STARTED

70-01-01 17:58

REPT DFC 1 AUTO PUMP COMPLETED

At this point it must be decided whether the site has made enough checks to determine if the disk file is truly good or not. If the file is updated via file replacement when it is touched by an SU, then the sum and byte values for the file could be compared with the same file from another office at the identical SU level for another check of sanity. But this test is not valid for files (such as okp below) which are updated via function replacement.

If there is any doubt as to the sanity of the file or the rest of the 5ESS[®] switch at this point, seek technical assistance. Otherwise, if the site truly believes that the file is ok and that the CRC value is incorrect, it may recalculate and store a new CRC value via the gen option of the VFY:FILE command:

S334-3080350 70-01-01 20:15:51 001624 MAINT J10.0 APP
M VFY:FILE,FN="/no5text/prc/okp g",gen; PF

S334-3080350 70-01-01 20:15:51 001625 MAINT J10.0 APP
M VFY FILE STARTED

S334-3080350 70-01-01 20:18:06 001638 MAINT J10.0 APP
M VFY FILE COMPLETED

8. Running VFY:FILE again now yields no error.

S334-3211422 70-01-01 20:18:33 001642 MAINT J10.0 APP
M VFY:FILE,FN="/no5text/prc/okp g"; PF

S334-3211422 70-01-01 20:18:33 001643 MAINT J10.0 APP
M VFY FILE STARTED

S334-3211422 70-01-01 20:20:45 001652 MAINT J10.0 APP
M VFY FILE COMPLETED
1 FILES VERIFIED
0 ERRORS

9. The VFY:FILE error has now been corrected or gathered enough data so that a call for further technical assistance can be made.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 5.7: ANALYZE AND CLEAR NONDIAGNOSABLE CMP MEMORY ERRORS

OVERVIEW

The purpose of this procedure is to assist in clearing an intermittent Communication Module Processor (CMP) memory fault. The fault symptom is usually several interrupt reports (for example, REPT CMP HWLVL CORR-BIT ERROR) when the affected CMP is active (ACT) or an attempt to restore the CMP produces a REPT CMP HASHSUM FAILURE printout. However, the fault is so "soft" that it is not detected by the normal phases of the CMP diagnostic.

PROCEDURE

1. Collect the associated REPT CMP error/interrupt printouts.
2. On the affected CMP, execute the CMP diagnostic demand phase 11 (with TLP option) at least three times to determine if the fault can be detected by more exhaustive memory tests in this phase. Refer to 235-600-700, *Input Message Manual*, for the DGN input message format.
3. If the phase 11 result is consistently all tests passed (ATP), then proceed to Step 5. Else, continue with Step 4.
4. Using the SUSPECTED FAULTY EQUIPMENT LIST from the phase 11 failure, determine which pack is most likely causing the failure and proceed to Step 6.
5. Using the REPT CMP printouts collected in Step 1, determine which CMP board is most likely causing the problem as follows:
 - (a) The TN1369 (or TN1871) memory board is most likely faulty if the failing address (from the FAILING-ADDR=x part of the error/interrupt printout) is greater than or equal to 0x34000000 (hexadecimal) or if the printouts indicate one or more of the following errors:
 - MEM-BOARD-INIT-FAIL
 - EXT-BOARD-BUS-ERR
 - EXT-BOARD-ADDR-PARITY-ERR
 - EXT-BOARD-DATA-PARITY-ERR
 - EXT-BOARD-NON-CORR-MEM-ERR-ON-ACCESS.
 - (b) The TN1368 (or TN1800) core board is most likely faulty if the failing address is in one of the core board's memory ranges as follows:
 - 0x0b000000 - 0x0bffffff (DDRAM)
 - 0x0c000000 - 0x0c0fffff (DSRAM)
 - 0x18000000 - 0x180fffff (IP LSRAM)
 - 0x1c000000 - 0x1c0fffff (AP LSRAM).

6. Replace the suspect pack and verify that phase 11 of the CMP diagnostic now runs consistently ATP (at least three times). If the diagnosis is not consistently ATP, proceed to Step 9.
7. Using the **RESTORE** poke or the **RST:CMP** input message, request restoral of the affected CMP.
8. If the affected CMP restored successfully (including no hashsum failure after memory update), hold the suspect board (and printouts) for a few days, verify that the intermittent memory errors have been cleared, and attach the printouts to the board when it is returned to the repair center.
9. If the pack replacement has not cleared the intermittent memory errors, and if replacement of the other CMP pack has not yet been done, return to Step 6 and replace the pack not previously replaced.
10. If the problem has not been cleared at this point by replacing both the TN1368 and TN1369, retain the original packs and printouts and seek technical assistance.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.8: ANALYZE AND CLEAR TROUBLE CAUSING EXCESSIVE INTERRUPTS

OVERVIEW

This procedure is to be used as an aid to the craft in analyzing and clearing excessive interrupts.

PROCEDURE

1. Scan the interrupt reports and determine which hardware circuit (service group) is implicated. Refer to 235-600-750, *Output Message Manual*, for assistance.
2. At the Master Control Center (MCC), locate the display page showing the status of the implicated circuit and determine if it has already been removed from service and diagnosed.

If **YES**, continue with Step 3.

If **NO**, remove and diagnose the circuit using the **DIAGNOSE** poke command.
3. Determine if the diagnosis of the circuit yielded a "some test failed" (STF) response.

If **YES**, use Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] Switch, to clear the trouble.

If **NO**, continue with Step 4.
4. Repeat the diagnosis of the circuit at least three more times.
5. Determine if any diagnosis of the circuit yielded an STF response.

If **YES**, use Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] Switch, to clear the trouble.

If **NO**, continue with Step 6.
6. Using 235-600-750, *Output Message Manual*, and the interrupt report printouts, determine the type of error source for the interrupt.
7. If the circuit is the Control Unit (CU), Communication Module Processor (CMP), or Module Controller/Time Slot Interchange (MCTSI), determine if the error type is one of the memory error types covered in Procedure 5.3, Analyze and Clear Nondiagnosable SM/SM-2000 Memory Errors, Procedure 10.2, Analyze and Clear Nondiagnosable CU Memory Errors, or Procedure 5.7, Analyze and Clear Nondiagnosable CMP Memory Errors.

If **YES**, use the corresponding procedure to clear the trouble.

If **NO**, continue with Step 8.
8. Determine if the error type can be correlated to a specific circuit pack. Refer to 235-600-750, *Output Message Manual*, or seek technical assistance if necessary.

If **YES**, continue with Step 9.

If **NO**, seek technical assistance to work the problem further.

9. Using the diagnostic phase tables in Procedure 4 — Diagnostic Test Supporting Information, determine which specific diagnostic phase(s) has tests for the circuit pack identified and run that phase in repeat mode (use the **RPT** option with the **DGN** input message) at least 20 times.
10. Determine if there was any STF response to the diagnostic phase being run.

If **YES**, use Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS® Switch, to clear the trouble.

If **NO**, continue with Step 11.
11. Replace the suspected pack and restore the circuit to service (use the **RESTORE** poke command at the MCC).
12. Determine if the circuit continues to produce the same pattern of excessive interrupts as before.

If **YES**, remove the circuit from service, put the original pack back in the unit, and seek technical assistance.

If **NO**, continue with Step 13.
13. At this point the pack replacement has apparently cleared the trouble. If this is certain, make sure the YELLOW TAG attached to the returned pack notes the interrupt error type and that the diagnostic was "all tests passed" (ATP) (also put one of the interrupt printouts in the box with the returned pack).
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 5.9: ANALYZE AND CORRECT UPD:HSCHK AUDIT ERRORS

OVERVIEW

This feature was developed as a mechanism for the craft to correct hash-sum errors reported by the UPD:HSCHK program. The HSCHK program is an integrity check program that verifies the consistency of the disk and core images for hash-sum protected products. There are two major checks that are performed. The first check verifies the disk image by calculating the hash-sums over the entire image and comparing them with the associated hash-sum file. The second check compares the disk hash-sums with the core hash-sums. The HSCHK program can be invoked manually or can be scheduled via cron to run daily on all text products that have associated hash-sum files.

For errors involving mismatches between the files on disk, this procedure directs the craft to seek technical assistance for correction procedures as this type of error requires further analysis in order to determine the appropriate correction mechanism. For errors involving mismatches between the disk and core hash-sums, this procedure corrects the mismatch by either repumping the affected processor (for CMP or large SM/SM-2000 errors) or by using SM/SM-2000 utilities to overwrite the inconsistent text and hash-sum core images.

NOTE: Errors involving the CMP/SM/SM-2000 files on disk require correction of the files on the disk. Depending on the severity of the error the repair procedure may involve correction of the existing files using the **edobj** tool, replacement of all text files from backup tape, or replacement via tape of individual text files from another site that is at the same SU level. **Seek technical assistance** for analysis and correction of disk type errors.

PROCEDURE

1. Does the failing output message from UPD:HSCHK indicate an error (FOUND a DISK HASH SUM ERRORS output phrase) for the CMP/SM/SM-2000 images on disk?

CAUTION: Do not perform office backups to tape or scheduled SM/SM-2000 pumps until this trouble is resolved.

If **YES**, **Seek technical assistance**.

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

2. Does the failing output message from UPD:HSCHK indicate a system error (UPD HSCHK SYSERR ...) while executing the HSCHK program?

If **YES**, **Seek technical assistance** to resolve problem with the HSCHK program.

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

NOTE: At this point the type of failure is a problem with a mismatch between the CMP/SM/SM-2000 text files on disk and the CMP/SM/SM-2000 text in core (DISK TO CORE HASH SUM MISMATCH output phrase).

3. **NOTE:** The rest of this procedure corrects the core image of text so it matches the copy on disk. The core text image mismatches can be corrected with:

(1) Utility commands — This is the recommended method for limited mismatches of less than

128 bytes in an SM/SM-2000.

- (2) Repumps of the SM/SM-2000 text from disk — This is the recommended method for either SM/SM-2000 mismatches of more than 128 bytes or for mismatches in the CMP.

Does the failing output message from UPD:HSCHK indicate either a mismatch in the CMPs or an SM/SM-2000 mismatch that totals more than 128 bytes mismatching for the affected configuration and target combination?

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

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

4. Depending on the software release, use Figure 5.9-1 or 5.9-2 **and** the failing output message from HSCHK, to (1) determine the list of affected SM/SM-2000s (this is field "k") and (2) determine the number of words of mismatched data printed. This is indicated by the DISK fields ("i", up to 5 words) and CORE fields ("j", up to 5 words).

UPD HSCHK REPORT IN PROGRESS

TARGET - a
TEXT FILE - b
HASH SUM FILE - b

DISK TO CORE HASH SUM MISMATCH:

TEXT VADDR = d	HASH VADDR = d
TEXT PADDR = d	HASH PADDR = d
TEXT SMPADDR = d	HASH SMPADDR = d

CALCULATED HASH VALUES	STORED HASH VALUES
DISK = e	DISK = e
INCORE = e	INCORE = e

TEXT FILE SECTION - f
HASH FILE SECTION - f

TEXT MISMATCH ADDR RANGE: g - h

[NOTE: HASH SUMS MISMATCH ONLY - NO TEXT MISMATCH]

[DISK: i	i	i	i	i]
[CORE: j	j	j	j	j]

AFFECTED SM/CMP(S) :
k

[THERE WERE 1 ADDRESS RANGES WHERE MISMATCHES OCCURRED.]
[USE THE 'OUTFILE' OPTION FOR A COMPLETE LIST OF ERRORS]

UPD HSCHK COMPLETED WITH ERRORS

Figure 5.9-1 UPD HSCHK Disk to Core Mismatch Output Message - Software Releases 5E9(1) and 5E9(2)

UPD HSCHK REPORT IN PROGRESS

TARGET - a
 TEXT FILE - b
 HASH SUM FILE - b

DISK TO CORE HASH SUM MISMATCH:

TEXT VADDR = d	HASH VADDR = d
TEXT PADDR = d	HASH PADDR = d
TEXT SMPADDR = d	HASH SMPADDR = d

CALCULATED HASH VALUES	STORED HASH VALUES
DISK = e	DISK = e
INCORE = e	INCORE = e

TEXT FILE SECTION - f
 HASH FILE SECTION - f

TEXT MISMATCH ADDR RANGE: g - h

[NOTE: HASH SUMS MISMATCH ONLY - NO TEXT MISMATCH]

[DISK: i	i	i	i	i]
[CORE: j	j	j	j	j]

AFFECTED SM/CMP(S) :
 k

[THERE WERE 1 ADDRESS RANGES WHERE MISMATCHES OCCURRED.]
 [USE THE 'OUTFILE' OPTION FOR A COMPLETE LIST OF ERRORS]

UPD HSCHK COMPLETED WITH ERRORS

Figure 5.9-2 UPD HSCHK Disk to Core Mismatch Output Message - Software Releases 5E10 and later

5. Type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where:

a =	the SM/SM-2000 number selected from the affected SM/SM-2000 list.
b =	the physical address of the text mismatch as indicated by the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message.
c =	the disk contents for the physical address as specified in the first DISK field ("i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

6. If the DISK field contains two or more hex data words and the DISK data word specified is different than the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where:

- a = the SM/SM-2000 number.
- b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message plus h'4.
- c = the disk contents for the physical address as specified in the second word of the DISK field (second "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

7. If the DISK field contains three or more hex data words and the DISK data word specified is different than the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where:

- a = the SM/SM-2000 number.
- b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message plus h'8.
- c = the disk contents for the physical address as specified in the third word of the DISK field (third "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

8. If the DISK field contains four or more hex data words and the DISK data word specified is different than the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where:

- a = the SM/SM-2000 number.
- b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message plus h'C.
- c = the disk contents for the physical address as specified in the fourth word of the DISK field (fourth "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

9. If the DISK field contains five hex data words and the DISK data word specified is different than the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where:

- a = the SM/SM-2000 number.
- b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message plus h'10.

c = the disk contents for the physical address as specified in the fifth word of the DISK field (fifth "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

10. Type in message:

UPD:HSCHK,SM=a,CORE;

Where:

a = the SM/SM-2000 number.

Response: UPD HSCHK REPORT IN PROGRESS

DISK TO CORE HASH SUM MISMATCH:

TEXT MISMATCH ADDR RANGE: g - h

[NOTE: HASH SUMS MISMATCH ONLY - NO TEXT MISMATCH]

[DISK: i i i i i]

[CORE: j j j j j]

AFFECTED SM/CMP(S):

k

11. Was HASH SUMS MISMATCH ONLY - NO TEXT MISMATCH phrase printed in the UPD HSCHK output message?

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

If **NO**, more data to overwrite, repeat from **Step 4** with the new mismatch address and data.

12. **NOTE:** The core image of text has been overwritten to agree with the disk image. The STORED CORE HASH SUM value is now overwritten to agree with the STORED DISK HASH SUM value.

13. Type in message:

LOAD:UT,SM=a,ADDR=H'b,L=2,SIZE=2,VAL=H'c;

Where:

a = the SM/SM-2000 number.

b = the address given in the HASH FILE ADDRESS PHYSICAL field of the UPD HSCHK output message.

c = the hash value given in the STORED DISK HASH SUM field of the UPD HSCHK REPORT output message.

Response: LOAD UT SM a COMPLETED

14. Type in message:

UPD:HSCHK,SM=a,CORE;

Where:

a = the SM/SM-2000 number.
b = the affected TARGET.

Response: UPD HSCHK REPORT IN PROGRESS

DISK TO CORE HASH SUM MISMATCH:

TEXT MISMATCH ADDR RANGE: g - h

UPD HSCHK COMPLETED WITH ERRORS

OR

UPD HSCHK COMPLETED

15. **Note:** Step 13 and Step 14 updated the stored hash value for a single 2K byte block of text. If there was only one mismatch range then UPD HSCHK should complete without errors. If errors occur, Step 13 and Step 14 must be repeated to update other mismatch ranges in the same SM/SM-2000.

Did UPD HSCHK complete without errors?

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

If **NO**, repeat from Step 4 with the new TEXT MISMATCH ADDR RANGE value.

16. Have all affected SM/SM-2000s in the original failing HSCHK output message been corrected?

If **YES**, continue with Step 27.

If **NO**, repeat from Step 4 with the next affected SM/SM-2000 number.

17. **NOTE:** At this point it has been decided to correct the core mismatch by using a repump of the core image from disk.

Is the mismatch for the CMPs?

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

If **NO**, continue with Step 24

18. Repump the standby CMP. Enter Poke 923 on Page 1851, or type in message:

RST:CMP=a-0,STBY;

Where:

a = MSGS side number of Standby CMP.

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

19. Soft switch CMPs. Type in message:

SW:CMP=0-0;

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

20. Repump the other CMP. Enter Poke **923** on Page 1851, or type in message:

RST:CMP=b-0,STBY;

Where:

b = MSGS side number (0/1) of the other CMP (mate of "a").

Response: MATE STAT display becomes POSTINIT.

21. Type in message:

UPD:HSCHK,TARGET=CMP,CORE

Response: UPD HSCHK COMPLETED

22. Type in message:

UPD:HSCHK,TARGET=MSGH,CORE

Response: UPD HSCHK COMPLETVED

23. Does UPD HSCHK report any errors for Steps 21 or Step 22?

If **YES**, *Seek technical assistance.*

If **NO**, continue with Step 27.

24. **NOTE:** At this point, the core mismatch involves SM/SM-2000s or peripheral targets in an SM/SM-2000 configuration and it has been decided to clear the problem with a repump of the affected SM/SM-2000s. Refer to 235-105-250, *System Recovery Manual*, and use the off-line pump procedure to repump the affected SM/SM-2000 or SM/SM-2000s during a low traffic period.

25. After the affected SM/SM-2000s have been repumped, type in message:

UPD:HSCHK,SM=a,CORE;

Where:

a = the SM/SM-2000 number.

Response: UPD HSCHK COMPLETED

26. Does UPD HSCHK report any errors?

If **YES**, *Seek technical assistance.*

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

27. **Note:** At this point, the original problem has been corrected. A HSCHK with the ALL option is performed to update the HSCHK status on the Miscellaneous Status page (116).

Type in message:

UPD:HSCHK,ALL;

Response: UPD HSCHK COMPLETED

28. Does UPD HSCHK report any errors?

If YES, ***Seek technical assistance.***

If NO, **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

6. ALARM RESPONSE PROCEDURES

GENERAL

This section contains procedures for responding to alarms.

Procedure 6.1: RESPOND TO 5ESS® SWITCH ALARMS

OVERVIEW

The 5ESS® switch employs many software and hardware mechanisms to automatically detect faults. Some examples are self-checking circuitry, routine exercise (including diagnostics) of duplicated hardware units, dynamic data audits, software defensive checks (asserts), and end-to-end interprocessor connectivity checks. When a possible problem is detected, it is reported in an output message and an alarm is generated. The alarm level (critical, major, or minor) reflects the severity of the problem.

Faults can often be detected and corrected before they affect service. If system reliability and service objectives are to be maintained, prompt maintenance is required under all conditions. When an alarm is reported, this procedure should be used in order to locate and correct the fault.

A log should be kept of all maintenance problems encountered with the 5ESS® switch. This log should include the date, time, and nature of the fault(s), any associated Receive-Only Printer (ROP) messages and Master Control Center (MCC) video terminal display pages, and any corrective actions taken.

PROCEDURE

1. Use Procedure 6.2, Determine Location of a Fault in the AM, CM, or SM/SM-2000 Equipment, to locate the source of the trouble/alarm and perform an initial analysis of the problem.
2. Was any indication of the alarm source found (by using procedure 6.2)?

If **YES**, continue with Step 3.

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

3. Does the off-normal condition associated with the alarm still exist [for example, an out-of-service (OOS) hardware unit/circuit]?

If **YES**, continue with Step 4.

If **NO**, go to Step 9.

4. Based on initial analysis of the problem (using MCC displays, ROP output messages, and other trouble indications), select one of the following methods (if applicable) to aid in correcting the fault:

NOTE: If the alarm level is critical, corrective action should be taken *immediately*. If the alarm level is major or minor, schedule corrective action to be taken as soon as possible (within an hour or so for a major alarm). If multiple problems exist, use the alarm level associated with each problem to determine priority of action.

- (a) If an administrative module (AM) or switching module/switching module-2000 (SM/SM-2000) initialization is occurring, and the affected processor is not able to recover autonomously, refer to the 235-105-250, *System Recovery* manual to initiate the necessary manual recovery actions.
- (b) If an SM/SM-2000 has lost communication with the AM, or has lost all connectivity through the quad-link packet switch (QLPS) networks, and automatic attempts to restore communication are not successful, refer to the 235-105-250, *System Recovery* manual to initiate the necessary manual recovery actions.

- (c) If a fuse or power alarm was detected, fix the problem by using Procedure 6.4 , Respond to a Fuse Alarm (FA)/Power Alarm (PWR ALM) Failure.
 - (d) If a fault has left communication module (CM) units out-of-service (OOS), repair and restore the OOS CM hardware unit(s) by using Procedure 11.1 , Analyze Communication Module Problems.
 - (e) If a fault has left AM or SM/SM-2000 hardware OOS, and the faulty unit has failed diagnostics, repair and restore the OOS hardware using Procedure 3.1 , Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] Switch.
 - (f) If a line unit (LU) grid exercise test failed, resolve the problem by using Procedure 3.3 , Clear LU Grid Exercise Test Failure. For other line maintenance problems, refer to Procedure 7.1 , Perform Line Maintenance.
 - (g) For trunk maintenance problems (such as OOS trunks or **REPT MDII** output messages), refer to Procedure 8.1 , Perform Trunk Maintenance.
 - (h) If the alarm/fault is associated with the External Sanity Monitor (ESM), resolve the problem by using Procedure 6.6 , Respond To and Resolve an Alarm Associated With an External Sanity Monitor Fault.
 - (i) For problems related to the common network interface (CNI) ring, refer to Procedure 5.1 , Analyze and Clear Network Failures.
 - (j) For problems related to the Small Computer System Interface (SCSI) disks, refer to Procedure 10.6 , Troubleshoot Small Computer System Interface (SCSI) Disk Unit Package (DUP).
5. If none of the methods listed in the previous step are applicable, analyze the output message(s) associated with the alarm/fault, and perform any corrective actions recommended by the manual page(s) in the 235-600-750, *Output Message Manual*.
6. Was the problem resolved successfully?
- If **YES**, go to Step 7.
- If **NO**, go to Step 8.
7. If there are additional off-normal conditions, return to Step 4 in order to resolve them.
- NOTE:** If no off-normal conditions exist, only the SYS NORM status summary indicator should be backlighted.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
8. Collect all available data and **seek technical assistance**.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. The problem that caused the alarm may have been transient, or it may have been corrected by automatic recovery actions. If the problem continues to occur (and cause alarms) periodically, and the trouble still clears before corrective action is taken, refer to Procedure 5.8 Analyze and Clear Trouble Causing Excessive Interrupts.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
10. Since there is no indication of any alarm source, refer to Procedure 6.5 , Clear Stuck/False Alarm Condition,

to resolve a potential problem with invalid alarms.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 6.2: DETERMINE LOCATION OF A FAULT IN THE AM, CM, OR SM/SM-2000 EQUIPMENT

OVERVIEW

This procedure is used to determine the location of a problem that has caused a critical, major, or minor office alarm. The Master Control Center (MCC) display pages, output messages on the Receive-Only Printer (ROP), and other trouble indications are used in an effort to isolate the fault to a specific hardware unit/circuit or functional area. The faulty unit/circuit may be associated with the Administrative Module (AM), Communications Module (CM), or a Switching Module/Switching Module-2000 (SM/SM-2000).

The first step in determining the fault location is to use the status summary indicators on the MCC display to identify the affected area. Detailed display pages associated with each area are then used to obtain more specific information. Any off-normal condition (such as an out-of-service hardware unit) observed on the MCC display should be correlated with output messages on the ROP to aid in trouble-shooting. Once the source of the problem is located, other procedures can be invoked to take appropriate corrective actions.

If multiple faults are found to exist, the problem having the highest alarm level (also known as the "priority of action") should be addressed first. The alarm level associated with a specific problem is reported in the first field of the corresponding output message on the ROP as shown in Table 6.2-1.

Table 6.2-1 Priority of Action Codes for Alarmed Output Messages

OUTPUT MESSAGE INDICATION	ALARM LEVEL	IMPORTANCE OF MESSAGE
*C	Critical	Critical trouble. Immediate analysis is required.
**	Major	Major trouble. Immediate analysis is required.
*	Minor	Minor trouble. Eventual analysis is required.

For transient problems (and problems corrected by automatic recovery actions before the MCC display is accessed), it may not be possible to find the specific source of the alarm using only MCC displays. In these cases, the ROP should be checked for information about the problem that generated the alarm. If the problem occurs repeatedly, corrective action may be required.

PROCEDURE

1. Use Procedure 6.3 (Access Alarm Display Pages at MCC Video Terminal) to attempt to determine the location of faults and/or off-normal conditions that may have generated an alarm.
2. Analyze alarmed output messages on the ROP to obtain additional information about the problem. Other output messages that refer to the same unit or contain the same event number may also be relevant in trouble-shooting problems. All output messages are described in the 235-600-750, *Output Message Manual*. Note that the output message manual pages may recommend corrective actions.

NOTE: The first field of an alarmed output message contains the alarm level (see procedure overview) associated with the message. Use the alarm level in the output messages to prioritize corrective action — work on the most important problem first.

3. If the source of trouble still has not been identified, observe the light-emitting diode (LED) at the top of the front of each application hardware cabinet. This **red** LED will light when a cabinet fuse blows. If this has occurred, lift up the cabinet bezel to determine the specific cause of the fuse alarm.

4. If the source of trouble still has not been identified, observe the control/display (CD) circuit pack(s) (where equipped). If the "ALM" LED is lit, a power fault has been detected on the unit. If the "OOS" LED is lit, the unit is out-of-service. Additional information about C/D packs can be found in 235-105-110, *System Maintenance Requirements and Tools*.
5. Return to the calling procedure in order to initiate corrective actions.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 6.3: ACCESS ALARM DISPLAY PAGES AT MCC VIDEO TERMINAL

General

This procedure is used during analysis of an office alarm to determine the alarm state, access the appropriate Master Control Center (MCC) display pages, and interpret the indications being displayed. When the system detects a fault and reports an office alarm, the MCC display pages are the starting point for fault isolation to a specific equipment group or functional area.

This procedure utilizes the MCC display page hierarchy. It starts with a high-level indication (status summary indicators) of the fault location, and then traverses a series of increasingly detailed display pages until the specific trouble source is identified.

When the MCC video terminal is brought on-line from an off-line state, the identification line, the status summary indicators, the emergency action (EA) page, and the input command entry area are displayed. The status summary indicators are present on the second and third lines of all MCC displays, regardless of the page being displayed. These indicators (described in Table 6.3-1) report the overall system state and point to display pages containing additional information needed to analyze alarms. The key displays associated with analysis of alarms are identified in the following list:

- (a) Emergency Action (EA)
- (b) 100 - Page Index
- (c) 105/106 - Building/Power and Alarm Controls
- (d) 107 - Overload
- (e) 110 - System Inhibits
- (f) 111/112 - Administrative module (AM), AM Peripherals
- (g) 113 - Operation System Links
- (h) 114 - Equipped Switching Module (SM) Status Summary
- (i) 115 - Communication Module (CM) Summary
- (j) 116 - Miscellaneous
- (k) 118 - Common Network Interface (CNI) Ring Status
- (l) 119 - Miscellaneous Alarms
- (m) 1000 - SM Page Index
- (n) 1001 - CM Page Index
- (o) 1010 - SM Status (including Fan/Fuse Alarms)
- (p) 1400 - Remote Switching Module (RSM), Optically Remote Module (ORM), and Two-Mile Optically Remoted Module (TRM) Building/Power Alarms
- (q) 1420 - Remote Integrated Services Line Unit (RISLU) Building/Power Alarms

Examples of the display pages for each software release can be found in 235-105-110, *System Maintenance*

Requirements and Tools.

Indications of the MCC Video Terminal

The 5ESS[®] switch can be supplied with an MCC video terminal that has a black and white display or an optional 5-color (plus, black and white) display. The most commonly used states in the 5ESS[®] switch and their video characteristics are as listed in Table 6.3-2.

On black and white terminals, the general guidelines used in selecting the states are as follows:

- **White on black:** Normal conditions (for example, active or unequipped).
- **Black on white:** Off-normal conditions and acknowledged (reverse video) alarms [for example, out of service (OOS) or unavailable].
- **Flashing black on white:** Unacknowledged alarms and severe off-normal conditions [for example, critical and major alarms in the status summary area, a fire alarm, or isolated switching module (SM)].

For color terminals, the guidelines used are:

- **White on black:** Normal conditions (for summary or informational indicators).
- **Green background:** Used for active or predominantly active units.
- **Cyan background:** Off-normal unalarmed conditions (for summary indicators).
- **White background:** Minor acknowledged alarms, low severity off-normal conditions, and standby units.
- **Yellow background:** Major acknowledged alarms and medium severity off-normal conditions.
- **Red background:** Critical acknowledged alarms and high severity off-normal conditions.
- **Flashing:** Unacknowledged alarms and extremely severe off-normal conditions.

Page Correlation to Summary Status Indicators

There is a direct correlation between MCC display page numbers and the status summary indicators. If the status summary indicator in position XX has an associated display page, it will be page number 1XX. For example, the seventh status summary indicator (counting from left to right) is "CKT LIM" (circuit limit). The associated display page is "107 - CIRCUIT LIMIT". Some status summary indicators do not have an associated display page. The purpose for this arrangement is to provide a built-in trouble-locating shortcut. The status summary indicators are described in more detail in Table 6.3-1.

100 Page Index Commands

MCC display page "100 - PAGE INDEX" provides an index of the main display pages. These pages can be accessed from any other display page (except the EA page) by entering the page number as a command. Refer to the following tables for a list of all commands and titles shown on display page 100:

- Table 6.3-3 for the 5E8 software release,
- Table 6.3-4 for the 5E9(1) software release, and
- Table 6.3-5 for the 5E9(2) and later software releases.

NOTE: The per-switching module (SM) pages are not shown on the "100 - PAGE INDEX" display. The SM pages have their own index (1000 - SM PAGE INDEX). For 5E9(2) and later software releases, the communication module (CM) pages also have their own index (1001 - CM PAGE INDEX).

PROCEDURE

1. **CAUTION:** Service interruptions may occur when using the menu commands associated with the EMERGENCY ACTION PAGE. Several of these commands can interrupt service or prevent recovery when they are not used for their intended purposes. To avoid unnecessary service interruptions, use extreme care when entering commands on the EA page, and only use those commands that are necessary to troubleshoot office problems.

At the MCC, is the SYS EMER (system emergency) status summary indicator highlighted?

If **YES**, emergency action is necessary to recover the system. Continue with Step 2.

If **NO**, go to Step 5.

2. Is the EMERGENCY ACTION PAGE displayed on the MCC video terminal?

If **YES**, go to Step 4.

If **NO**, continue with Step 3.

3. Press the "EA DISP" function key to display the EMERGENCY ACTION PAGE.
4. Observe the indicators on the EA display (described in Table 6.3-6) and then use the appropriate procedure in the 235-105-250, *System Recovery* manual to determine and perform the necessary recovery actions.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

5. Is the EMERGENCY ACTION PAGE displayed at the MCC?

If **YES**, continue with Step 6.

If **NO**, go to Step 7.

6. Press the "NORM DISP" function key to leave the EMERGENCY ACTION PAGE.
7. Determine the severity of the problem by listening to the audible alarm or observing the alarm level indicators in the MCC status summary area. The indicator corresponding to the alarm level (CRITICAL, MAJOR, or MINOR) should be backlit. Identify *all* backlit status summary indicators.
8. When an alarm occurs, the related MCC status summary indicator will flash until the alarm is retired. Are any of the status summary indicators flashing?

If **YES**, use Table 6.3-1 to determine the MCC display page associated with *each* flashing status summary indicator, continue with Step 9.

If **NO**, go to Step 11.

9. Press the "ALM RLS" function key to retire any new alarms. This step will silence the audible alarm, clear the exit pilot lamps, clear the alarm level indicators in the status summary area, and stop the other status summary indicators from flashing.

10. Display each of the MCC page(s) identified in Step 8 by entering the page number(s) (one at a time) at the command prompt.

Observe each page to determine whether it indicates the location of any faults that may have generated alarms. Each MCC display page is described in detail in *System Maintenance Requirements and Tools* (235-105-110).

If a backlighted indicator on an MCC page indicates that additional information about an off-normal condition is located on another page, enter the command to display that other page. Continue to do this until all problems reflected on the MCC pages have been located and analyzed.

11. If a status summary indicator associated with a display page in Table 6.3-1 was backlighted but **not** flashing (prior to pressing "ALM RLS" in Step 9), the corresponding alarm had already been retired, but the problem may still exist.

If such problems exist and have not already been analyzed, repeat Step 10 starting with the appropriate MCC display pages identified in Table 6.3-1.

12. Did the MCC display pages indicate any possible source(s) of the alarm(s)?

If **YES**, continue with Step 13.

If **NO**, go to Step 14.

13. Return to the calling procedure to correlate information obtained from MCC display page analysis (such as alarm levels and off-normal conditions) with other available data.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

14. The problem that caused the alarm may have been transient, or may have been corrected by automatic recovery actions before the MCC was accessed. Return to the calling procedure to attempt to locate the fault by using other methods.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Table 6.3-1 MCC Status Summary Indicators

SYSTEM STATUS	INDICATIONS	ASSOCIATED
SUMMARY INDICATORS		DISPLAY PAGE
SYS EMER	This indicator is turned on when the peripheral controller recognizes system insanity or a problem with communication between the MCC and administrative module (AM).	EAI
CRITICAL	This indicator is turned on when a critical alarm condition is detected.	—
MAJOR	This indicator is turned on when a major alarm condition is detected.	—
MINOR	This indicator is turned on when a minor alarm condition is detected.	—
BLDG/PWR	This indicator is turned on when a building or power alarm is detected.	105/106
BLDG INH	This indicator is turned on when a building or power alarm is inhibited.	105/106
CKT LIM	This indicator is turned on when the trunk OOS limit (automatic maintenance limit) is exceeded or a primary rate interface (PRI) D-channel outage is detected.	107
SYS NORM	This indicator is normally on. It is turned off when an abnormal system condition is detected.	—

OVERLOAD	This indicator is turned on when a processor detects a real-time and/or resource overload and overload controls are activated.	109
SYS INH	This indicator is turned on when any system function is inhibited.	110
AM	This indicator is turned on when an AM abnormality is detected.	111/112
AM PERPH	This indicator is turned on when AM peripheral unit abnormality is detected.	111/112
OS LINKS	This indicator is turned on when an operational support system data link problem is detected.	113
SM	This indicator is turned on when a problem in the switching module is detected.	114
CM	This indicator is turned on when a problem in the communication module (CM) is detected.	115
MISC	This indicator is turned on to indicate a frame or cabinet fuse alarm and other miscellaneous alarms.	116

Table 6.3-2 MCC Video Display States

STATE	TEXT DISPLAYED	COLOR TERMINALS	B AND W TERMINALS
Active	ACT	steady black on green	steady white on black
Active Forced	ACTF	steady red on green	steady white on black
Critical Alarm	none	steady or flashing white on red	steady or flashing black on white
Major Alarm	none	steady or flashing red on yellow	steady or flashing black on white
Minor Alarm	none	steady or flashing red on white	steady or flashing black on white
Standby	STBY	steady black on white	steady white on black
Standby Deactivated	DACT	steady black on white	steady white on black
Standby Update	UPD	steady black on white	steady white on black
Unavailable	UNV	steady red on yellow	steady black on white
Unavailable Power	UNVP	steady red on yellow	steady black on white
Unavailable Transient	UNVT	steady blue on yellow	steady black on white
Unequipped	UNEQ	steady white on black	steady white on black
Initialization	INIT	steady black on yellow	steady white on black
Out-of-Service	OOS	steady white on red	steady black on white
Out-of-Service Family	OOSF	steady red on white	steady white on black
Out-of-Service Power	OOSP	steady white on red	steady black on white
Out-of-Service Transient	OOST	steady blue on white	steady white on black
Inhibit	INH	steady blue on yellow	steady black on white
Growth	GROW	steady black on cyan	steady white on black
Special Growth	SGRO	steady black on cyan	steady white on black
Trouble	none	steady white on red	steady black on white
Limited	LMTD	steady red on white	steady white on black
Test	TEST	steady blue on white	steady white on black
Degrade	DGR	steady	steady

Degrade Forced	DGRF	red on green steady	black on white steady
Normal (default)	none	red on green steady	white on black steady
Idle	IDLE	white on black steady	white on black steady
Deferred	DEFR	black on white steady	black on white steady
Customer Denied	CDNY	yellow on red steady	black on white steady
Camp On	CAMP	red on yellow ^a steady	white on black steady
		red on green	white on black
Notes:			
a. After camp-on time-out on ISLULGC and some LU COMC circuits.			

Table 6.3-3 Display Page 100 - Commands and Titles for Software Release 5E8

COMMAND	DISPLAY PAGE TITLE	COMMAND	DISPLAY PAGE TITLE
100	PAGE INDEX	160	TRUNK & LINE MAINT
105-106	BLDG/PWR & ALARM CNTLS	178	AUTO SPARE DISK
107	CIRCUIT LIMIT	179-180	DISK CONFIG
109	OVERLOAD	181-184	OFL SM STATUS
110	SYSTEM INHIBITS	190	C/D UPDATE
111-112	AM, AM PERIPHERALS	191	OS STATUS PAGE
113	OS LINKS	193	VFYTXT
114	EQUIPPED SM STATUS SUMMARY	194	SCREEN
115	CM SUMMARY	195	GENBACKUP
116	MISCELLANEOUS	196	ODD RCV
117	IOP AP DATA LINK	197	CUTOVER
118	CNI STATUS	198	SG RCV
119	MISC ALARMS	199	ECD RCV
120	MESSAGES	1000	SM PAGE INDEX
121	IOP 0 & 1	1209	ONTC 0 & 1
122	IOP 2 & 3	1210	MI/NC 0 & 1
123	DFSA DFC0-1 STATUS	1220	TMS 0 & 1 SUMMARY
124	GENERIC RETROFIT	1240	MSGs 0 SUMMARY
125	DFSA DFC2-3 STATUS	1250	MSGs 1 SUMMARY
126	DFSA DFC0-1 PERF	1260	CLNK SUMMARY
127	MTIB STATUS	1271	REX SUMMARY
128	DFSA DFC2-3 PERF	1850	CMP INH and RCVRY CNTL
129	DSN NM EXCEPTION	1940	EASY BWM INST
130	NM EXCEPTION	1950	PROG UPD MAINT
131	HARDWARE CALL TRACE	1960	INSTALL BWM
—	—	1999	STATE DEFINITIONS

Table 6.3-4 Display Page 100 - Commands and Titles for Software Release 5E9(1)

COMMAND	DISPLAY PAGE TITLE	COMMAND	DISPLAY PAGE TITLE
100	PAGE INDEX	178	AUTO SPARE DISK
105-106	BLDG/PWR & ALARM CNTLS	179-180	DISK CONFIG
107	CIRCUIT LIMIT	181-184	OFL SM STATUS
109	OVERLOAD	190	C/D UPDATE
110	SYSTEM INHIBITS	191	OS STATUS PAGE
111-112	AM, AM PERIPHERALS	193	VFYTXT
113	OS LINKS	194	SCREEN
114	EQUIPPED SM STATUS SUMMARY	195	GENBACKUP
115	CM SUMMARY	196	ODD RCV
116	MISCELLANEOUS	197	CUTOVER
117	IOP AP DATA LINK	198	SG RCV
118	CNI RING STATUS	199	ECD RCV
119	MISC ALARMS	1000	SM PAGE INDEX
120	MESSAGES	1209	ONTC 0 & 1
121	IOP 0 & 1	1210	MI/NC 0 & 1
122	IOP 2 & 3	1220	TMS 0 & 1 SUMMARY
123	DFC 0 & 1 STATUS	1240	MSGs 0 SUMMARY
124	GENERIC RETROFIT	1250	MSGs 1 SUMMARY
125	DFC 2 & 3 STATUS	1260	CLNK SUMMARY
126	DFC 0 & 1 PERF	1271	REX SUMMARY

127	MTIB STATUS	1850	CMP INH & RCVRY CNTL
128	DFC 2 & 3 PERF	1940	EASY BWM INST
129	DSN NM EXCEPTION	1941	BWM AUTOMATION
130	NM EXCEPTION	1950	PROG UPD MAINT
131	HARDWARE CALL TRACE	1960	INSTALL BWM
160	TRUNK and LINE MAINT	1999	STATE DEFINITIONS

Table 6.3-5 Display Page 100 - Commands and Titles for 5E9(2) and Later Software Releases

COMMAND	DISPLAY PAGE TITLE	COMMAND	DISPLAY PAGE TITLE
100	PAGE INDEX	130	NM EXCEPTION
105-106	BLDG/PWR & ALARM CNTLS	131	HARDWARE CALL TRACE
107	CIRCUIT LIMIT	160	TRUNK & LINE MAINT
109	OVERLOAD	178	AUTO SPARE DISK
110	SYSTEM INHIBITS	179-180	DISK CONFIG
111-112	AM, AM PERIPHERALS	181-184	OFL SM STATUS
113	OS LINKS	190	C/D UPDATE
114	EQUIPPED SM STATUS SUMMARY	191	OS STATUS PAGE
115	CM SUMMARY	193	VFYTXT
116	MISCELLANEOUS	194	SCREEN
117	IOP AP DATA LINK	195	GENBACKUP
118	CNI RING STATUS	196	ODD RCV
119	MISC ALARMS	197	CUTOVER
120	MESSAGES	198	SG RCV
121	IOP 0 & 1	199	ECD RCV
122	IOP 2 & 3	1000	SM PAGE INDEX
123	DFC 0 & 1 STATUS	1001	CM PAGE INDEX
124	GENERIC RETROFIT	1271	REX SUMMARY
125	DFC 2 & 3 STATUS	1940	EASY BWM INST
126	DFC 0 & 1 PERF	1941	BWM AUTOMATION
127	MTIB STATUS	1950	PROG UPD MAINT
128	DFC 2 & 3 PERF	1960	INSTALL BWM
129	DSN NM EXCEPTION	1999	STATE DEFINITIONS

Table 6.3-6 Emergency Action Indications and Qualifiers

EAI INDICATIONS	MEANING WHEN DISPLAYED IN REVERSE VIDEO
ASW	(1) PC is communicating with the EAI. (2) EAI reports all seem well (ASW).
ERR	(1) PC is communicating with the EAI. (2) EAI reports internal EAI problem.
OOS	(1) PC is not communicating with the EAI. (2) Displayed EAI status is unreliable.
CU INDICATIONS	MEANING WHEN DISPLAYED IN REVERSE VIDEO
ACT	CU Software is on-line (active).
FONL	Emergency action has forced hardware on-line.
FOFL	Emergency action has forced hardware off-line.
RUN	CU is running under software release control.
RCVRY	CU firmware has begun recovery.
SET	Associated function is set.
INH	Associated function is inhibited.
PRM DIGITS	MEANING OF THE DIGITS
rrrr rrrr rrrr rrrr	Indicates the processor recovery message (PRM).
ss ss	Indicates the emergency action status at the time the PRM was received.
nn	Indicates the low-priority PRM state at the time the PRM was received.
PRM TEXT DISPLAYED	MEANING WHEN IN PARTICULAR TEXT
rrrr rrrr rrrr rrrr ss ss nn (bold reverse video)	Trapped failure PRM.
rrrr rrrr rrrr rrrr ss ss nn (dynamic text)	Last PRM received from the EAI.

Procedure 6.4: RESPOND TO A FUSE ALARM (FA)/POWER ALARM (PWR ALM) FAILURE

OVERVIEW

Guidelines for analyzing, correcting, and restoring a unit/circuit after a power failure (power alarm or fuse alarm) are provided in this procedure. Users of this procedure should review the notes (Note 1 through Note 7) before performing and during execution of this procedure.

This procedure addresses the two most common causes of power failures that are identified as outlined in (a) and (b). The terminology "power converter" and "power unit" are synonymous.

- (a) A power converter/unit within a functional unit shuts down due to an internal fault within the power converter/unit.
- (b) A fault on a pack within a functional unit causes excessive current drain resulting in a power converter/unit shutdown or a fuse blowing.

CAUTION: The Global Power Distribution Frames (GPDFs) are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted, arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

NOTE 1: Other causes of power failures such as cables connected to wrong pins or damage to the backplane may require expert assistance. If this type problem exists and the trouble cannot be resolved, seek the next higher level of technical assistance.

NOTE 2: Regardless of the trouble cleared, special procedures should be used in restoring -48 V DC power at the power plant or at the Power Control Fuse Distribution (PCFD) or the Global Power Distribution Frame (GPDF). These procedures are required to avoid blowing good fuses and potentially damaging certain Line Unit (LU) packs.

NOTE 3: The phrase "unit having a power control pack" refers to a Control Unit (CU), Disk File Controller (DFC), Input/Output Processor (IOP), Message Switch Control Unit (MSCU), Message Switch Peripheral Unit (MSPU), Communication Module Processor Unit (CMPU), Office Network and Timing Complex (ONTC), Dual Link Interface/Remote Link Interface (DLI/RLI), Module Controller/Time Slot Interchange (MCTSI), or other unit (service group) having a "power control pack" such as the TN3B, TN5B, TN6B, SN412, SN516, TN1077, 495JA, or other pack having power switches (ON, OFF, RST) and lamps (OFF, OOS, ALM) on its faceplate. The lamps are light-emitting diodes (LED).

NOTE 4: When there is an instruction to "unseat," "reseat," or "replace" a power converter/unit pack or any other pack in a unit having a power control pack (Note 3), always first power down the unit (by pressing the OFF switch on its faceplate). After doing the unseat/reseat operation, check to see if the power problem has cleared by attempting to power up the unit (by pressing the ON switch and checking to see if the OFF and ALM lamps extinguish and remain extinguished).

NOTE 5: The condition "if power can be brought up" means the unit or service group can be powered up. For a unit having a power control pack (Note 3), this means the OFF and ALM lamps remain extinguished after momentary pressing the ON switch on the power control pack. For other service groups, this means the OFF lamp remains extinguished after momentary pressing the ST switch on the power converter/unit pack of the service group.

NOTE 6: The 5ESS® switch application hardware cabinets are equipped with either a J5D003AU-2, BJ-2, BT-1, FM-1 Fuse Filter Unit (FFU), or a J5D003FJ-1 Modular Fuse Filter Unit (MFFU). The cabinets are also equipped with a cabinet fuse alarm light-emitting diode (LED) on the front bezel (outside top) of the cabinet. The LED illuminates when a cabinet fuse blows. If the cabinet LED illuminates, lift up the bezel to determine the impact of the cabinet fuse alarm.

NOTE 7: The MFFU has a LED next to each fuse position on an MFFU fuse block. The LEDs on the MFFU fuse block can detect the loss of the incoming -48 volts from the PCFD, GPFD or when a fuse has cleared (opened) in the MFFU fuse position it is monitoring. When there is a cabinet fuse alarm, and there is more than one LED on a MFFU fuse block illuminated, there is a good chance that there is an upstream power problem (PCFD, GPFD or power plant). The FFU can not detect the loss of upstream power. If PCFD or GPFD power is lost to a cabinet equipped with an FFU, the cabinet fuse alarm LED does not illuminate. See Table 6.4-1 for MFFU fuse replacement information and Table 14.1-1 for FFU fuse replacement information.

PROCEDURE

1. Locate the cabinet and unit (or service group) having the FA or PWR ALM failure. This may be indicated by the FA or PWR ALM indicator located on top front of cabinet. If needed, refer to Procedure 6.2 , Access Alarm Display Pages at MCC Video Terminal, and Procedure 6.3 , Determine Location of a Fault in the AM, CM, switching module/switching module-2000 (SM/SM-2000), or CNI Equipment.
2. If the power failure is at the -48 V power plant, the PCFD, or the GPFD, refer to the POWER section in 235-105-250, *System Recovery*
3. If the problem is associated with an Lucent Technologies 3B20D Small Computer System Interface (SCSI) disk unit, perform Procedure 10.6 , Troubleshoot Small Computer System Interface (SCSI) Disk Unit Package (DUP), to clear the problem.
4. If the problem is associated with the Common Network Interface (CNI) Ring Node Cabinet, perform Procedure 12.1
5. Open the fuse panel cover above the unit. If there is a blown fuse (there should be one if an FA has been reported), proceed to Step 11.
6. If only one power converter/unit pack is shut down (its OFF LED is lighted), try replacing that pack, observing **Caution 1** and **Caution 2**:

CAUTION 1: If the unit is a Node within the CNI Ring Node Cabinet (RNC) and the pack being replaced is the 495FA power converter, then all packs powered by the 495FA should be temporarily unseated (to avoid current surge) before the 495FA is replaced.

CAUTION 2: Before pulling a power converter in an LU service group, always unseat the TN831(B) [or TN331(B)] and TN832(B) [or TN332(B)] packs in that order. If the replacement power converter powers up, then these packs can be resealed in the reverse order. There is no specific order to unseat the packs in a Model 3 LU.

If power can now be brought up (Note 5), proceed to Step 20.

7. If the unit has a power control pack (Note 3), try replacing that pack. If power can now be brought up, proceed to Step 20.
8. Observe the following **Caution** and unseat (observe power pack instructions in Note 4) all circuit packs other than the power converter/unit pack(s) in the service group. Verify that the power converter/unit pack(s) come

up.

CAUTION: When unseating packs in an operational LU service group, always unseat the TN831(B) [or TN331(B)] pack before unseating the TN832(B) [or TN332(B)] pack. There is no specific order to unseat the packs in a Model 3 LU.

9. While observing **Caution 4**, reseat (Note 4) the circuit packs (one at a time), watching to see which one causes the power converter/unit to shut down and replace that faulty pack with a spare.

CAUTION: When reseating packs in an operational LU service group, always reseat the TN832(B) [or TN332(B)] pack before reseating the TN831(B) [or TN331(B)] pack. There is no specific order to unseat the packs in a Model 3 LU.

10. If the problem has been cleared, proceed to Step 20. Otherwise, seek the next higher level of technical assistance.

11. If the blown fuse is one that supplies -48 V to an LU GRID, unseat the grid packs, observe the following **Caution** (for Model 1 LUs) before proceeding.

CAUTION: In a Model 1 LU (J5D004AB) grid, always unseat the two TN338 packs before unseating/removing the TN340 pack. There is no specific order to unseat the packs in a Model 3 LU.

12. If the blown fuse is one that supplies -48 V to a group of LU packs that includes the TN831(B) and TN832(B) packs [or TN331(B) and TN332(B) packs in Model 1 LU], observe the following **Caution**, unseat these packs.

CAUTION: Always unseat the TN831(B) [or TN331(B)] packs before unseating the associated TN832(B) [or TN332(B)] packs; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) packs. There is no specific order to unseat the packs in a Model 3 LU.

13. If the visible blown fuse is an indicating fuse for a covered load fuse [as in the Lucent Technologies 3B20D/3B21D Computer fuse panel in the Administrative Module (AM)], remove both fuses and let the words "the fuse" in Steps 14 through 18 refer to the load fuse. **Do not attempt to replace the indicator fuse until Step 19.**
14. Unseat all packs in the out-of-service (OOS) unit or service group including the power converter(s) in the unit that is powered by "the fuse."
15. Replace "the fuse" with one of the same type and rating.
16. If this replacement fuse blows, measure the voltage at the designated location with the blown fuse in to insure that the proper voltage is present. Other possible problems could be bent pins or damage to the backplane or cable connections (or misplaced cables) causing a possible short circuit (expert assistance may also be appropriate).
17. If this replacement fuse does not blow, reseat (one at a time) the power control pack (if there is one) and each power converter pulled previously (Step 14), watching to see if one causes "the fuse" to blow. If it does, try a replacement power control or converter pack (after replacing the blown fuse again).
18. Observe the following **Caution** and reinsert the pulled packs (one at a time), watching to see if reinsertion causes the fuse to blow. If it does, try a replacement/spare pack (after replacing the blown fuse again).

CAUTION: Always reseat the TN832(B) [or TN332(B)] before reseating the associated TN831(B) (or TN331(B)); and in Model 1 LU grids, always reseat the TN340(B) pack before reseating either TN338(B) pack. There is no specific order to unseat the packs in a Model 3 LU.

19. If an Lucent Technologies 3B20D/3B21D Computer Unit [CU, DFC, IOP, or Moving Head Disk (MHD)] problem causing a -48 V load fuse to blow has been cleared, the associated indicator fuse should be replaced.
20. Ensure that all packs are inserted, there are no blown fuses, and the unit is powered up (power converters ON). Request diagnosis and restoral of the unit using the appropriate **RESTORE** commands located on the appropriate display pages located at the Master Control Center (MCC) or the **RST** input messages. If the diagnosis and restore fails, use Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] Switch, to resolve the diagnostic failure.
21. If an LU GRID or GRIDBD has been restored, use the **RST LINE** input message to restore any line previously placed OOS due to the GRID/GRIDBD trouble.
22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 6.4-1 J5D003FJ-1 MFFU Fuse Replacement Information

PART NUMBER	UL[®] ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION ^b
WP-91768 L104	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747501 (S) 406663971 (B) Description: FUSE, MINIATURE, FAST-ACTING 0.50 amps, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-92458 L2	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406747519 (S) 406599308 (B) Description: FUSE, VERY FAST-ACTING 1.25 amps, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L107	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747527 (S) 406708545 (B) Description: FUSE, MINIATURE, FAST-ACTING 2.00 amps, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L108	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747535 (S) 406693895 (B) Description: FUSE, MINIATURE, FAST-ACTING 3.00 amps, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L110	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747543 (S) 406693887 (B) Description: FUSE, MINIATURE, FAST-ACTING 5.00 amps, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L112	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747550 (S) 406693903 (B) Description: FUSE, MINIATURE, FAST-ACTING 7.00 amps, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse,

		Inc.
WP-92458 L11	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406747568 (S) 406599324 (B) Description: FUSE, VERY FAST-ACTING 10.0 amps, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
WP-92458 L12	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406747576 (S) 406599332 (B) Description: FUSE, VERY FAST-ACTING 12.0 amps, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
WP-92458 L13	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406808469 (S) 406599357 (B) Description: FUSE, VERY FAST-ACTING 15.0 amps, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
WP-92458 L14	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406808477 (S) 406759050 (B) Description: FUSE, VERY FAST-ACTING 20.0 amps, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
Notes: a. Company name or trade name and catalog, series, type, model, or code designation. b. Comcodes are shown for single (S) and bulk (B).		

Procedure 6.5: CLEAR STUCK/FALSE ALARM CONDITION

OVERVIEW

This procedure is to be used when an alarm is present, but it has been determined to be invalid; that is, there is no trouble at the indicated source.

CAUTION: Be absolutely certain that there is no trouble source before concluding that the alarm is not valid.

PROCEDURE

1. Is an alarm condition indicated at the Maintenance Control Center (MCC)?
If **YES**, continue with Step 2
If **NO**, proceed to Step 6
2. Is it certain that the alarm is not valid?
If **YES**, continue with Step 3.
If **NO**, **STOP**. Use Procedure 6.2 , Access Alarm Display Pages at MCC Video Terminal, and Procedure 6.3 , Determine Location of Fault in AM, CM, or SM/SM-2000 Equipment, to localize the trouble source, or seek the next higher level of technical assistance.
3. Try the following corrective actions to clear the stuck alarm condition at the MCC:
 - (a) Replace the UN33B scan/distribute pack in the Input/Output (IOP) unit.
 - (b) Replace the TN867 pack in the Office Alarm Unit (OAU) in the Miscellaneous Cabinet.
 - (c) Check for stuck contact closure/sensor input to the OAU.
 - (d) Seek the next higher level of technical assistance.
4. After clearing the stuck alarm, verify proper operation of the alarm by using one of the "Test _____ Office Alarm" procedures as appropriate located in 235-105-210, *Routine Operations and Maintenance Procedures*.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
6. Does pressing the "ALM RLS" key on the MCC keyboard silence the alarm and turn off the alarm lamp at the exit pilot lamp array?
If **YES**, proceed to Step 8.
If **NO**, continue with Step 7.
7. Try the following corrective actions to clear the stuck/false audible or visual alarm indication:
 - (a) Replace the TN137 pack in the OAU in the Miscellaneous Cabinet (or the TN934 pack in the Remote Alarm Unit if the alarm is at the remote site).
 - (b) Replace the UN33B in the IOP unit.

- (c) Seek the next higher level of technical assistance.
- 8. After clearing the stuck alarm, verify proper operation of the alarm by using one of the "Test _____ Office Alarm" procedures as appropriate located in 235-105-210, *Routine Operations and Maintenance Procedures*.
- 9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.6: RESPOND TO AND RESOLVE AN ALARM ASSOCIATED WITH AN EXTERNAL SANITY MONITOR FAULT

OVERVIEW

This procedure provides guidelines for responding to an alarm resulting from an External Sanity Monitor (ESM) circuit failure. An ESM alarm can be enabled or inhibited at the Master Control Center (MCC) video terminal using display Page 116 in a 5ESS[®] switch office or page 1400 in a VCDX switch office. For a pictorial view of these display pages, refer to 235-105-110, *System Maintenance Requirements and Tools*.

PROCEDURE

1. At the MCC video terminal, access display Page 116 or Page 1400 per Procedure 6.2 , Access Alarm Display Pages at MCC Video Terminal.
2. If the trouble is associated with an ESM circuit, clear the trouble per Procedure 6.7 , Clear Trouble in External Sanity Monitor Unit.
3. If the trouble is associated with an ESM 1000-Hz tone, clear the trouble per Procedure 6.8 , Clear External Sanity Monitor 1000-Hz Tone Trouble.
4. If the trouble is associated with an ESM unit test (TST) lamp circuit, clear the trouble per Procedure 6.9 , Clear External Sanity Monitor Unit Test Lamp Circuit Trouble.
5. Once the ESM trouble has been cleared, diagnose the distribute point board by entering Substep (a) as follows:
 - (a) **DGN: DIST =a-b-c-d,RAW,TLP;**
6. If any diagnostic failure occurs, resolve per Procedure 3.1 , Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] switch.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.7: CLEAR TROUBLE IN EXTERNAL SANITY MONITOR UNIT

OVERVIEW

This procedure provides information to clear a trouble in the External Sanity Monitor (ESM) unit when reported by an alarm at the Master Control Center (MCC) video terminal or Receive-Only Printer (ROP).

The test (TST) switch and its associated circuitry are tested when the switch is operated.

PROCEDURE

1. At the ESM unit, momentarily press the "TST" key.

NOTE: There may be a time delay of less than a minute before response occurs.

2. Does a 1000-Hz tone sound?

If **YES**, continue with Step 3.

If **NO**, perform Procedure 6.8 , Clear External Sanity Monitor 1000-Hz Tone Trouble.

3. Is TST switch lamp lighted?

If **YES**, continue with Step 4.

If **NO**, perform Procedure 6.9 , Clear External Sanity Monitor Unit Test Lamp Circuit Trouble.

4. Do all audible alarm units sound?

If **YES**, continue with Step 5

If **NO**, clear the alarm trouble using SD-5D110.

5. At the MCC video terminal, press the "ALM RLS" key.

Response: At the MCC video terminal, **REPT ALM a b c** message is printed.

6. At the ESM unit, is the 1000-Hz tone silenced?

If **YES**, proceed to Step 10.

If **NO**, continue with Step 7.

7. Determine if the associated line is defective per Procedure 7.1 , Perform Line Maintenance.

8. Is the associated line defective?

If **YES**, clear the line trouble per Procedure 7.1 , Perform Line Maintenance.

If **NO**, continue with Step 9.

9. At the MCC video terminal, to diagnose the distribute point board, enter Substep (a) as follows:

(a) **DGN: DIST =a-b-c-d,TLP;**

Where:

- a = Switching Module/Switching Module-2000 (SM/SM-2000) (001-192)
- b = Metallic Service Unit (MSU) (0 or 1)
- c = Service Group (SG) (0 or 1)
- d = Distribute point board (0-31).

NOTE: To determine the correct distribute point board, see the RESETDP field on the Recent Change/Verify (RC/V) Class 8 (Office and Misc. Alarms), View 7 (Dial-tone Delay) screen.

10. Is all tests passed (ATP) printed in the response message?

If **YES**, restore the distribute point board using Substep (a) as follows, then continue with Step 14:

(a) **RST:DIST =a-b-c-d,UCL;**

NOTE: Variables a, b, c, and d are defined in Step 9.

If **NO**, perform Procedure 6.4 , Respond to a Fuse Alarm (FA)/Power Alarm (PWR ALM) Failure.

11. Are all audible alarms silenced?

If **YES**, continue with Step 13.

If **NO**, clear the alarm trouble using SD-5D110.

12. At the ESM unit, is the TST switch lamp off?

If **YES**, continue with Step 14.

If **NO**, clear the trouble using SD-5D110.

13. At the MCC video terminal, look at display **Page 116** in a 5ESS® switch office or **Page 1400** in a Very Compact Digital Exchange (VCDX) office to verify the state of the ESM alarms. Refer to 235-105-110, *System Maintenance Requirements and Tools*, for the applicable screen.

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

Procedure 6.8: CLEAR EXTERNAL SANITY MONITOR 1000-HZ TONE TROUBLE

OVERVIEW

This procedure provides information to clear a trouble in the 1000-Hz tone circuit of the External Sanity Monitor (ESM) unit.

PROCEDURE

1. Obtain one volt-ohm-meter (VOM) having test leads with probes which can be used to momentarily strap across two relay terminals.
2. At the ESM unit, replace the A802 circuit pack.
3. Does a 1000-Hz tone sound?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 4.

4. On the TO relay of the ESM unit, momentarily strap the test lead probe from terminals 10M to 10F (Figure 6.8-1).
5. Did the 1000-Hz tone sound during Step 4?

If **YES**, continue with Step 6.

If **NO**, proceed to Step 9.

NOTE: The TO relay contacts 10M to 10F did not make contact when the TO relay was operated.

6. Examine the defective TO relay for contacts displaced from the comb grooves, bent contacts, or foreign material (paper, dust, etc.) between contacts. Ensure that foreign materials do not cause obstruction to the relay armature movement.
7. Repair or replace the defective relay.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Troubleshoot the open-circuit path between the A802 circuit pack, terminal 21, and the TO relay, terminal 10M (Figure 6.8-2).
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

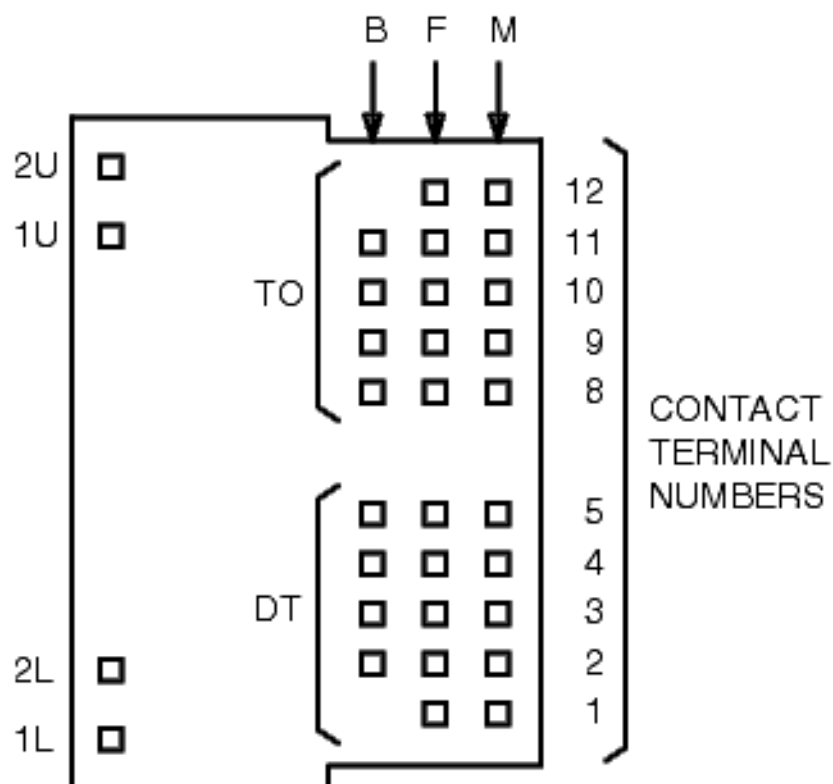


Figure 6.8-1 Rear View of AK30 Relay Containing DT and TO Relays

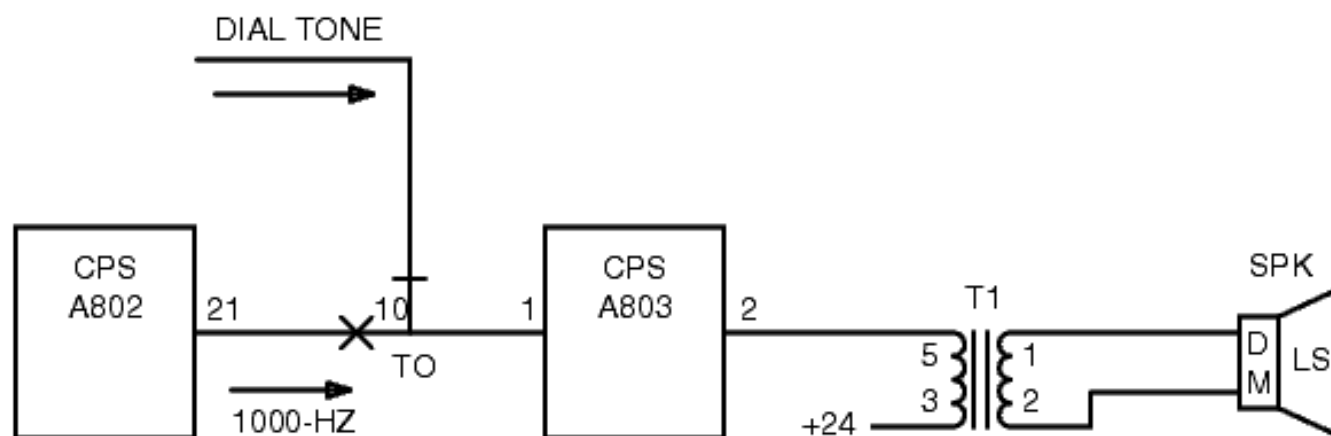


Figure 6.8-2 Simplified Circuit of SD1A277-01

Procedure 6.9: CLEAR EXTERNAL SANITY MONITOR UNIT TEST LAMP CIRCUIT TROUBLE

OVERVIEW

This procedure provides information to clear a trouble in the External Sanity Monitor (ESM) unit test (TST) lamp circuit.

PROCEDURE

1. On the ESM unit, replace the TST key lamp (K2 type).
2. Is the TST key lamp lighted?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 3.
3. Obtain a volt-ohm-milliammeter (VOM) KS-14510 or equivalent.
4. Set the VOM to measure +24 V DC.
5. On the back of the ESM unit TST key assembly, what is the DC voltage on terminal 6 with respect to frame ground (GND) (Figure 6.9-1)?

If **+24 V DC**, continue with Step 6.

If **0 V DC**, proceed to Step 9.
6. What is the DC voltage on terminal 5 with respect to frame ground?

If **+24 V DC**, continue with Step 7.

If **0 V DC**, proceed to Step 8.
7. Repair or replace the defective lamp socket.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Clear the open-circuit trouble between terminal 5 of the TST key assembly and frame ground (Figure 6.9-2).
10. What is the DC voltage on terminal 8 with respect to frame ground?

If **0 V DC**, continue with Step 11.

If **+24 V DC**, proceed to Step 12.
11. Clear the absence of +24 volts on terminal 8 of the TST key assembly and the +24V PT bus (Figure 6.9-2).
12. What is the DC voltage on terminal 9 with respect to frame ground?

If **+24 V DC**, continue with Step 13.

If **0 V DC**, proceed to Step 14.

13. Clear the open-circuit trouble between terminals 9 and 6. (Check for a possible open wire strap across these terminals.)
14. Use the A-313119 drawing to troubleshoot, if needed. The TST key (630A4) has contact trouble between terminals 8 and 9.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

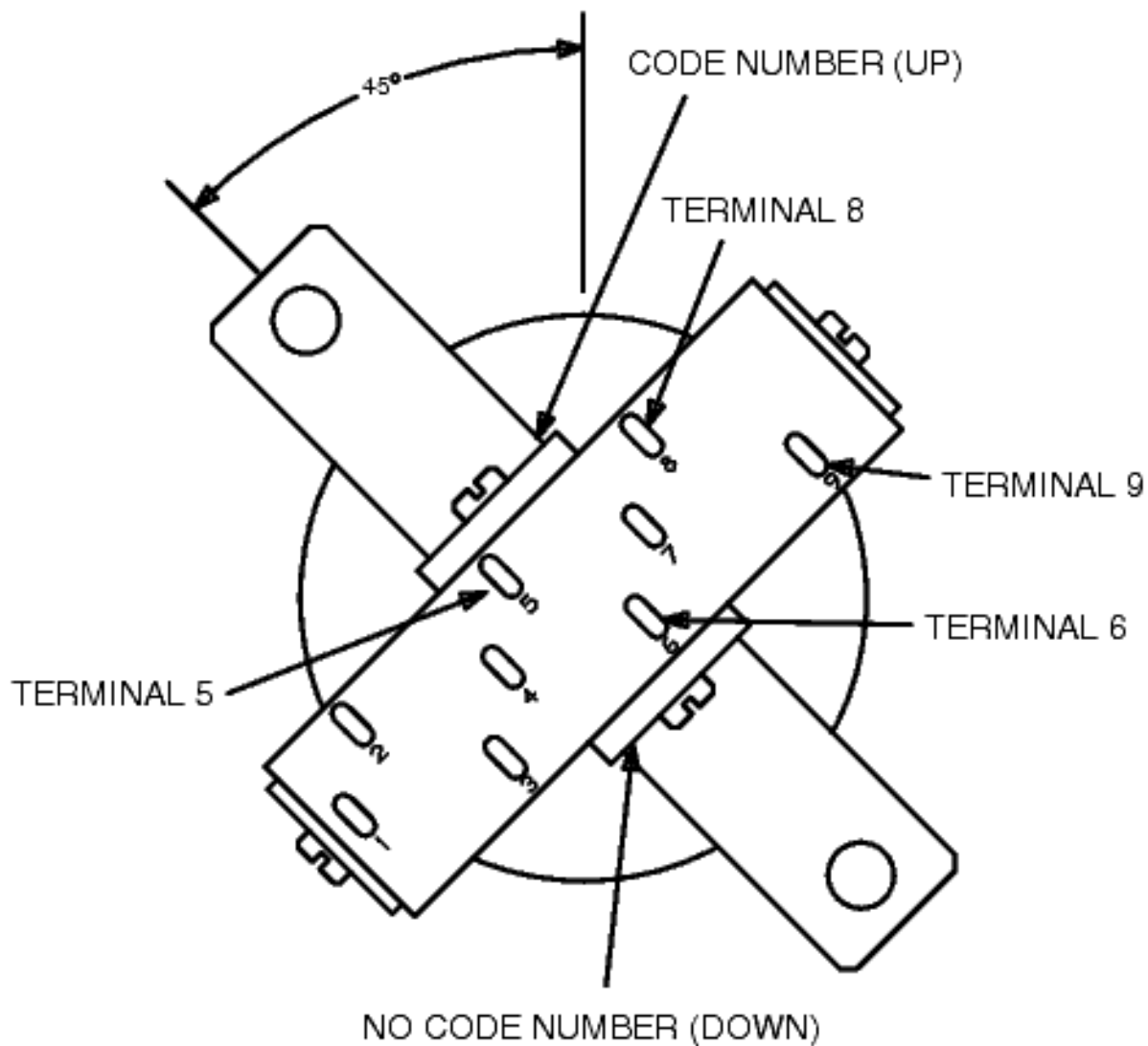


Figure 6.9-1 Rear View of 630A4 Test Key

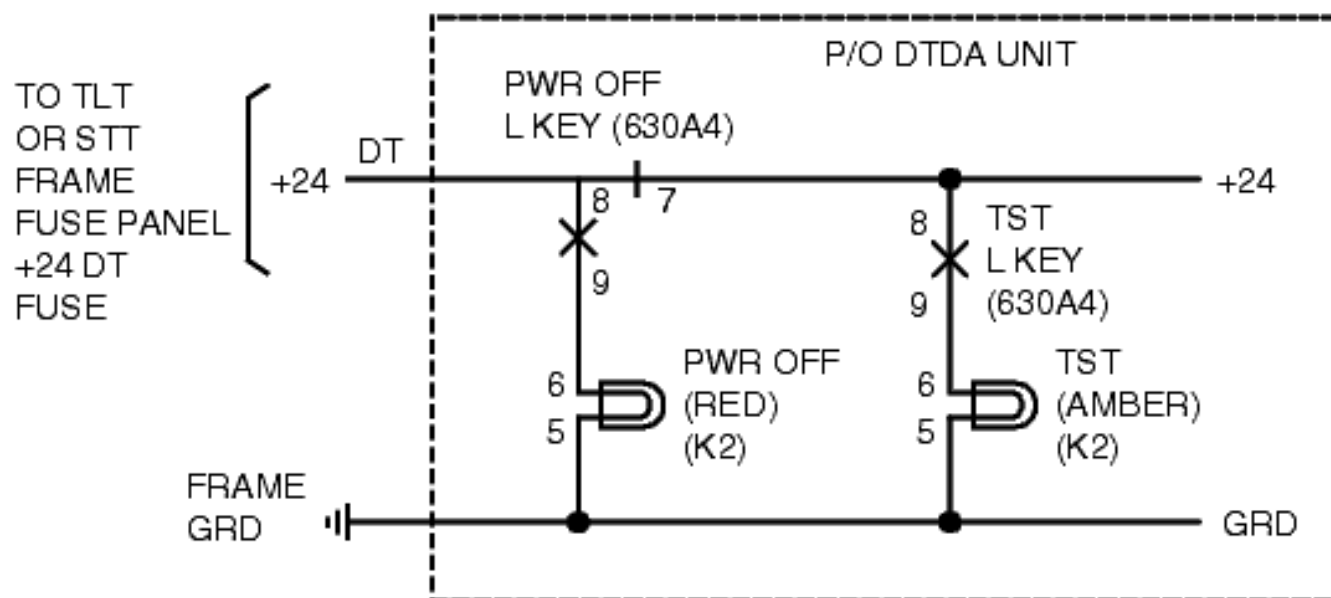


Figure 6.9-2 Simplified TST Lamp Circuit (SD1A277-01)

Procedure 6.10: RESPOND TO AND RESOLVE AN RC/V LOG WARNING ALARM

OVERVIEW

A Recent Change/Verify (RC/V) log warning alarm may occur as major alarm condition when the "Recent Change" area or the "Customer Originated Recent Change" (CORC) area reaches a specific percentage (%) level of capacity.

The craftsperson is alerted to an RC/V alarm condition both audibly and visually, plus a **REPT RCV** output message is printed on the Receive-Only Printer (ROP) located at the Master Control Center (MCC).

This procedure contains information for responding to and resolving an RC/V log warning alarm.

For details on input or output messages, refer to 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*.

PROCEDURE

1. If performing an RC/V activity (for a customer) or a subscribing customer is performing a CORC and an audible alarm is activated, check the MCC video terminal for a MAJOR alarm indication.
2. At the ROP, verify that a **REPT RCV** output message is printed. This message may be either one of three formats. (Refer to Step 7 or Step 8.)
3. At the MCC video terminal, silence the audible alarm condition by pressing the "ALM RLS" function key. The appropriate flashing indicator (MINOR or MAJOR) will clear.
4. Stop all on-site and remote site RC/V activity.
5. Enter the following:

```
OP:RCSTAT,{SM=a[&&b]|CMP=c[&&d]|AM|SM=a[&&b],CMP=c[&&d]|
SM=a[&&b],AM|CMP=c[&&d],AM|SM=a[&&b],CMP=c[&&d],AM};
```

Where:

- a = SM/SM-2000 number (001-192), or the lower limit of a range of SM/SM-2000s
- b = Upper limit of a range of SM/SM-2000s
- c = CMP number (194-205), or the lower limit of a range of CMPs
- d = Upper limit of a range of CMPs.

NOTE: If the input message is accepted, an **OP RCSTAT** output message is printed on the ROP.

6. Using the **REPT RCV** output message from Step 2 and the appropriate **OP RCSTAT** output message from Step 5, determine if a Backup Office Dependent Data (BKUP ODD) is required. Refer to Step 7 or Step 8.
7. If the **REPT RCV** output message format is **REPT RCV: RCLOG a PERCENT FULL**, this represents a major alarm condition and a BKUP ODD should be performed during normal off-hours for that specific office. The "a" in the format indicates the (%) level of capacity. For the appropriate BKUP ODD procedure, refer to 235-105-210, *Routine Operations and Maintenance Procedures*. Once this procedure is performed, proceed to Step 9.

8. If the **REPT RCV** output message format is **REPT RCV: RC DISABLED, LOG FULL** or **REPT RCV: CORC DISABLED, LOG FULL**, this represents a major alarm condition and BKUP ODD should be performed as early as real-time resources allow. For the BKUP ODD procedure, refer to 235-105-210, *Routine Operations and Maintenance Procedures*.
Once this procedure is performed, continue with Step 9.
9. Was the BKUP ODD procedure completed successfully?

If **YES**, a **BKUP ODD COMPLETED** output message is printed on the ROP at the MCC and normal RC/V activity can be resumed.

If **NO**, a minor alarm is generated and the next higher level of technical assistance should be requested.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 6.11: RESPOND TO AND RESOLVE A DAYLOG MESSAGE LOST ALARM

OVERVIEW

The daylog file is kept for the manufacturer to locate severe software faults. The contents of this log file consists of hexadecimal information. The size of the daylog file is such that in normal operation the log file will be able to contain all logged information for that day. When an entry is overwriting another entry which is less than 24 hours old, a minor alarm will be generated. Refer to 235-105-210, *Routine Operations and Maintenance*, for use of the daylog file.

This procedure contains information for responding to and resolving a daylog message lost alarm.

PROCEDURE

1. If a **REPT SOP a OUTPUT MESSAGES DISCARDED FOR DAYLOG** (where "a" is the number of output messages) is printed on the ROP located at the MCC, this indicates that a message is lost because of spooler queue overflow for the log file.
2. To prevent continued loss of messages, refer to 235-600-750 , *Output Message Manual*, for details concerning the **REPT SOP** message.
3. If a **REPT SOP DELETING OLDER HALF OF DAYLOG** message is printed on the ROP located at the MCC, this indicates that the "/log/DAYLOG1" file became full and was copied to the "/log/DAYLOG0" file. In order to save the data, the "/log/DAYLOG0" file should be backed up on tape.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7. LINE MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for performing maintenance to line units.

Procedure 7.1: PERFORM LINE MAINTENANCE

General

This procedure, plus the information provided in the currently supported *TLWS Job Aids*, 235-105-220JXX (where XX is the current supported software releases) provides guidelines for clearing line problems reported by the switch, customer complaints, manual line tests, repair service bureau trouble tickets, etc. The types of problems that may be encountered include a noisy line, no dial tone, clicking noises, line drops off, etc.

Line Per-Call Failure Reports

In addition, the **REPT PCTF** output message reports the type of per-call test failure as follows:

- (a) Low-Line Resistance (LLR) failure
- (b) Low-Security Scan (LSS) failure
- (c) Power Cross (PX) failure
- (d) Ringing Continuity Failure (RCF)
- (e) Restore and Verify Failure (RVF)
- (f) Touch-Tone Fraud (TTF) failure
- (g) High and Wet Ground (HW GRD) fault.

Automatic Line Insulation Test Reports

The Automatic Line Insulation Testing (ALIT) identifies the following types of line problems as follows:

- (a) Foreign Electromotive Force (FEMF)
- (b) Short Circuit and Ring to Ground (SRG)
- (c) Tip and Ring to Ground (TRG).

Automatic Line Evaluation

The Automatic Line Evaluation (ALE) feature provides continuous, nonservice-affecting monitoring of Digital Subscriber Line (DSL) performance. It does this by detecting and recording faults at the following:

- (a) Layer 1 (U-DSL only)
- (b) Layer 2
- (c) Layer 3 [Protocol Error Records (PERs)].

Master Control Center (MCC) Video Terminal Display Pages

Line maintenance makes use of the following Master Control Center (MCC) video display pages:

160 - TEST POSITION STATUS SUMMARY

160,X - TEST POSITION SUMMARY X - where X = 160,1, 160,2, 160,3, or 160,4 may be used to gain access to any of the following data:

- **161,X[,Y] - SELECT/DISPLAY TEST POSN X** where X = (1-32) and Y = (1-32)

Where:

TP = Test Position - One of several test positions; each having several display pages
TLWS LOCATION = Trunk and Line Work Station (TLWS) location where the MCC resides. The TLWS location is central office definable.
DEV = Displays the device location identification (ID) of the MCC.
ID = Logical identification of TLWS resources that may be specified using the Y option.
LINE/TRUNK DATA = Displays directory number (DN) being tested for lines and trunks.
TEST ACCESS = Displays the type of test connection (for example, metallic, transmission, or AC/DC jacks).
T&M = Displays the status of the talk and monitor (T&M) phone.

NOTE: The **160** page is not required but is provided to gain access to the **161,X** page. The **161,X** may be entered from other pages (for example, 1000) to gain access to a test position. It is still necessary to return to the **160,X** page to release the test position.

- **201,X - RELEASE TEST POSN X** where X = (1-32).

The MCC video display page 161,X - TEST POSITION X provides poke commands to seize and conduct tests on lines and trunks, and then displays the test results. The task selection screens provided for lines are as follows:

- **4000[,X]** - Allows display of TASK SELECTION— SEIZE LINE/TRUNK/INCOMING CALL screens where X = screen number.
 X = 4000,1 or 4000,2.
- **5000[,X]** - Allows display of TASK SELECTION— TRANSMISSION screens where X = screen number.
 X = 5000,1, 5000,2, or 5000,3
- **5200[,X]** - Allows display of TASK SELECTION— SUPERVISION screens where X = screen number.
 One 5200 screen applies.
- **5400[,X]** - Allows display of TASK SELECTION— AUTOMATIC screen where X = screen number.
 X = 5400,1, 5400,2, 5400,3, or 5400,4.
- **5600** - Allows display of TASK SELECTION—METALLIC MEASUREMENTS - via the Directly Connected Test Unit (DCTU), screens where the following applies:
 One 5600 screen applies for analog or digital lines and one 5600 screen applies for coin lines.
- **5700** - (Software Release 5E10 and later) - Allows display of TASK SELECTION—METALLIC MEASUREMENTS - via the Subscriber Line Instrument Measurement (SLIM), screens where the following applies:
 One 5700,1 screen applies for analog or digital lines, One 5700,1 screen applies for coin lines, and one 5700,2 screen applies for off-hook tests of lines.

- **5800** - Allows display of TASK SELECTION—JACKS screens where the following applies:
One 5800 screen applies for analog lines, coin lines, or digital lines.
 - **8000** - Displays the major test categories.
 - **9000[X]** - Allows display of MISCELLANEOUS TLWS COMMANDS screens where the following applies:
X = 9000,1 or 9000,2
One 9000 screen applies for analog lines, coin lines, or digital lines.
- NOTE:** Some of the commands that appear on the 9000 screen apply to both lines and trunks, and some of these commands also appear on more than one screen. When identical commands appear on more than one screen, they may be input from the applicable screen being viewed.
- **9200** - Allows display of TASK SELECTION - CPE TESTS screen where one 9200 page applies for digital subscriber lines.
 - **9201** - Allows display of TASK SELECTION - CPE USPID TESTS.

All available tests and poke commands may be entered from the task selection pages. The poke commands and their corresponding functions are identified and defined in 235-105-110, *System Maintenance Requirements and Tools* document. In addition, the currently supported *TLWS Job Aids*, 235-105-220JXX (where XX is the current supported software releases) are also available as a "quick access" reference for poke commands.

Error messages which may occur during the use of the poke commands are defined in 235-600-750, *Output Message Manual*, Appendix APP:TLWS.

PROCEDURE

1. **NOTE 1:** In the following subprocedures, poke commands are provided for MCC terminal use in testing at the TLWS facilities. At locations where an MCC terminal is not available, the user is required to utilize the appropriate input message provided in 235-600-700, *Input Message Manual*.

NOTE 2: Any of the following subprocedures may be performed in any order (as required), regardless of sequential order listed in this document.

To isolate a trouble condition associated with a line, select the appropriate subprocedure identified in Substeps (a) through (ac) as follows. Steps marked "A" apply to analog lines and steps marked "D" apply to digital lines.

- (a) Analyze and Resolve OOS Line List Entries—(A, D) Procedure 7.2 .
- (b) Analyze and Clear a Line Having a Subscribing Customer Complaint—(A, D) Procedure 7.3 .
- (c) Perform Metallic Tests on an On-Hook Line Using DCTU—(A, D) Procedure 7.4 .
- (d) Perform Distance-to-Open Measurement on an On-Hook Line Using DCTU—(A, D) Procedure 7.5 .
- (e) Analog Coin Phone Test to Perform Near-to-Far-End Check of Line State (via DCTU)—(A) Procedure 7.6 .
- (f) Analog Line Signaling Checks—(A) Procedure 7.8 .

- (g) Analog Line Status Check of Busy Line—(A) Procedure 7.9 .
- (h) Analog Ringer Count Check on an On-Hook Line Using the DCTU—(A) Procedure 7.7 .
- (i) Analog Station Ringer Touch-Tone Test for a Directory Number—(A) Procedure 7.10 .
- (j) Analog Station Ringer Touch-Tone Test for an MLHG—(A) Procedure 7.11 .
- (k) Digital Subscriber Line BRI Integrity Tests—(D) Procedure 7.12 .
- (l) Digital Subscriber Line Automatic Line Evaluation—(D) Procedure 7.13 .
- (m) Digital Subscriber Line Protocol Monitoring—(D) Procedure 7.14 .
- (n) Basic Rate Interface (BRI) Dial-Up Test Line—(D) Procedure 7.15 .
- (o) Calibrating TLWS Measurements—(A,D) Procedure 2.2 .
- (p) Network Termination (NT1)/Channel Unit (CU) Mismatch Test—(A, D) Procedure 7.18 .
- (q) Perform Tests on a Packet Switching Modem Pool Access Line—(A, D) Procedure 7.19 .
- (r) (R)ISLU Line Card Sparing—(A, D) Procedure 7.20 .
- (s) Basic Rate Interface (BRI) Access to the 108 Test Line—(D) Procedure 7.16 .
- (t) Analyze TLWS Response for Integrated Digital Carrier Unit (IDCU) Fiber to the Home (FTTH)—(D) Procedure 7.23 .
- (u) Embedded Operations Channel/Timeslot Management Channel (EOC/TMC) Protocol Monitoring—(D) Procedure 7.24 .
- (v) EOC/TMC Automatic Line Evaluation—(D) Procedure 7.25 .
- (w) EOC/TMC Duplex Failure Restoral—(D) Procedure 7.22 .
- (x) IDCU TR303 Remote Terminal Provisioning—(A, D) Procedure 7.26 .
- (y) Perform Scheduling of Subscriber Line Instrument Measurement (SLIM) Automatic Tests—(A, D) Procedure 7.27 .
- (z) Perform Metallic Tests on an On-Hook Line Using SLIM—(A, D) Procedure 7.28 .
- (aa) Perform Distance-to-Open Measurement on an On-Hook Line Using SLIM—(A, D) Procedure 7.29 .
- (ab) Analog Coin Phone Test to Perform Near-to-Far-End Check of Line State (via SLIM)—(A) Procedure 7.30 .
- (ac) Perform Off-Hook Tests Using SLIM—(A, D) Procedure 7.31 .

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

Procedure 7.2: ANALYZE AND RESOLVE OUT-OF-SERVICE LINE LIST ENTRIES

OVERVIEW

This procedure provides guidelines to analyze and resolve line trouble conditions that are reported by an **OP LIST LINES** output message.

PROCEDURE

1. **NOTE 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently supported *TLWS Job Aids*, 235-105-220JXX (where XX is the current supported software releases) be used to obtain the appropriate 4-digit poke command number.

NOTE 2: In this procedure, if reference is made to the use of an input or output message, it is advised that 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, be used to obtain the appropriate format(s) associated with the message.

At the Receive-Only Printer (ROP), obtain any **OP LIST LINES** output message(s).

2. For each out-of-service (OOS) line, identify the following that applies:
 - DN — either the line directory number
 - LEN — the line equipment number
 - SLEN — the subscriber loop carrier LEN
 - LCEN — the line card equipment number
 - ILEN — the integrated digital carrier unit (IDCU) line equipment number
 - INEN — the integrated digital loop carrier (IDLC) networking equipment number
3. From information contained in the **OP LIST LINES** output messages, determine the cause of the line status being OOS.
4. Refer to the OP:LIST Output Manual page and APP:PORT-STATUS appendix in 235-600-750, *Output Message Manual*, for appropriate recovery procedures.
5. Repeat Steps 3 and 4 for the remaining OOS lines on the OOS lines list.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.3: ANALYZE AND CLEAR A LINE HAVING A SUBSCRIBING CUSTOMER COMPLAINT

OVERVIEW

This procedure provides guidelines for troubleshooting lines having a trouble condition such as no dial tone, noise, crosstalk, restricted service, etc. These trouble conditions are normally reported by a subscribing customer report or, in some instances, may be reported via an output message on the receive-only printer (ROP).

NOTE 1: In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently supported *TLWS Job Aids*, 235-105-220JXX (where XX is the current supported software releases), be used to obtain the appropriate 4-digit poke command number.

NOTE 2: In this procedure, if a reference is made to the use of an input or output message, it is advised that 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, and job aids be used to obtain the appropriate format associated with the message.

PROCEDURE

1. Use the **OP:CONV** input message to verify the consistency of the data base and to obtain the line type.
 - (a) If an error is indicated, using an recent change/verify (RC/V) video terminal, go to the appropriate RC/V view(s) and verify the line attributes by comparing those indicated on the view against those indicated on the trouble ticket. If the attributes are not correct, resolve any conflicts using RC/V and notify the trouble ticket originator of any changes (for example, incorrect assignments).
 - (b) If the line has a line card equipment number (LCEN) and its type is **U** or **T** or an integrated digital carrier unit (IDCU) line equipment number (ILEN) and its type is **U**, the line is an integrated services digital network (ISDN) line. Proceed to Step 2.
 - (c) If the line has (1) LCEN with type **Z**, (2) ILEN not ISDN type **U**, (3) line equipment number (LEN), or (4) subscriber loop carrier line equipment number (SLEN), proceed to Step 3.
 - (d) If the line has an IDCU line equipment number (ILEN) and also an ISDN line, proceed to Step 2.
 - (e) If the line has an ILEN and is configured as an analog line, proceed to Step 3.
2. Use the **OP:CPE** input message to examine the status of the customer premises equipment (CPE) assigned to a digital subscriber line (DSL). If the status indicates an out-of-service (OOS) condition, follow the recovery procedures outlined on the **OP:CPE** *Output Message Manual* page.
3. Use the **OP:STATUS** input message to verify line status. If the line status is out-of-service (OOS), refer to the APP-PORT-STATUS *Output Message Manual* Appendix pages and attempt to restore the line. If the line status indicates an in-service condition, the **OP:STATUS** input message should provide additional information to troubleshoot the line.
4. If the line is an IDCU line [that is, it has an IDCU line equipment number (ILEN)], then use **EXC:RT,PROV** to refresh the provisioning data in the TR303 remote terminal. Refer to Procedure 7.26, IDCU TR303 Remote Provisioning.
5. If the line is an ISDN line, perform the following:
 - (a) Use the **EXC:ALE** input message on LEVEL1, LEVEL2, and PER together for use in further analysis.

Refer to Procedure 7.13 , Digital Subscriber Line Automatic Line Evaluation.

- (b) If the type of ISDN line is a T-DSL, then proceed with Substep (c). Otherwise, perform Procedure 7.4 , Perform Metallic Tests on an On-Hook Line Using DCTU.
 - (c) Perform Procedure 7.12 , Digital Subscriber Line BRI Integrity Tests.
 - (d) If the Protocol Error Record (PER) is repeated, begin an **EXC:PM** input message which will trigger on the repeating PER. Refer to Procedure 7.14 , Digital Subscriber Line Protocol Monitoring.
6. If the line is a non-ISDN type **U** ILEN and RC/V view 18.10 screen 4 of 6 titled "Remote Terminal Fiber to the Home Resistor Values" is populated, the line could be fiber to the home (FTTH). Perform the following steps:
- (a) At the trunk line work station (TLWS) video terminal, access a TLWS test position (16x) from the TLWS test position summary page (160).
 - (b) Seize the line using the appropriate poke command (4001,DN or 4008,ILEN).
 - (c) From the metallic measurement page (5600), use the poke command (5601) to determine if this line is a FTTH line.
 - (d) If the line is FTTH, proceed to Procedure 7.23 , Analyze TLWS Response for Integrated Digital Carrier Unit (IDCU) Fiber to the Home (FTTH).
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.4: PERFORM METALLIC TESTS ON AN ON-HOOK LINE USING DCTU

OVERVIEW

This procedure measures the values of voltage, resistance, and capacitance present on an analog or digital line [U-Interface (2-wire) digital subscriber line (U-DSL) only] by using the Directly Connected Test Unit (DCTU).

PROCEDURE

1. **NOTE 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently supported *TLWS Job Aids*, 235-105-220JXX (where XX is the current supported software releases), be used to obtain the appropriate 4-digit poke command number.

NOTE 2: Before beginning this procedure, perform Procedure 2.2, Calibrating TLWS Measurements, if the office has not been calibrated for Trunk and Line Work Station (TLWS) measurements. This can be determined by checking the RESIST field in the Recent Change/Verify (RC/V) office parameter view. If this field is **0**, then all measurements are relative to the DCTU instead of the Main Distributing Frame (MDF).

NOTE 3: With digital lines (U-DSL), the NT1 contains active circuitry that influences the capacitance values, which are used to determine the distance to open (DTO).

CAUTION: When the Digital Subscriber Line (DSL) is seized, the customer is denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position (**161,X**) from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command **4001,DN**.
3. From the metallic measurement page (5600), use the poke command (**5601**) to get a single measurement of the voltage, resistance, and capacitance.
4. The following tables indicate the results that should be achieved at the TLWS.
 - For an Analog Line on an AIU, see Table 7.4-1
 - For an Analog Line on a LU, see Table 7.4-2
 - For an Analog Line on a ISLU Z, see Table 7.4-3
 - For an Analog Line on a DCLU, see Table 7.4-4
 - For an Analog Line on an IDCUC, see Table 7.4-5 .
 - For an Analog Line on a DNU-S, see Table 7.4-6 .
 - For a Digital Line on an ISLU U-Card (AMI) NT1 or AMI BRITE CU AHG13, see Table 7.4-7
 - For a Digital Line on an ISLU/ISLU2 U-DSL (ANSI[®]) Lucent Technologies NT1, see Table 7.4-8
 - For a Digital Line on an ISLU U-DSL (ANSI) BRITE CU AHG18, see Table 7.4-9
 - For a Digital Line on an IDCUC U-DSL (ANSI) Lucent Technologies NT1, see Table 7.4-10 .

- For a Digital Line on an AIU U-DSL (ANSI) Lucent Technologies NT1, see Table 7.4-11
- For a Digital Line on a DNU-S U-DSL (ANSI) Lucent Technologies NT1, see Table 7.4-12

The voltage (AV=AC voltage and DV=DC voltage) should read "0" in all columns. The Resistance (Ko = Kilohms) should read "OPEN" (a resistance value of greater than 3500K is considered open) for all columns with the exception of the U-DSL, which differs because of its NT1 circuitry. The capacitance (in micro-Farads) can range from about 0.12 to 0.225 and should be balanced as explained in the tables.

The resistance and capacitance readings indicated in the tables are typical values for short loop lengths of less than one mile. Readings of 0 or OPEN are not loop length dependent. The tip-ground (TG) and ring-ground (RG) capacitance values should be balanced (same value). With analog lines, the ringer of the telephone influences the reading as follows:

- For a private line, the ringer is across the tip-ring (TR) pair; therefore, the TG and RG capacitance values are balanced.
- For a "tip" party, the ringer is connected across the tip and ground; therefore, the TG reading is greater than the RG reading.
- For a "ring" party, the ringer is connected across the ring and ground; therefore, the RG reading is greater than the TG.

The constants used in calculating resistance and distance-to-open (capacitance) are in Tables 7.4-13 and 7.4-14.

- Release the metallic measurement position by entering the poke command **5990**.
- Release the line by entering the appropriate poke command **4999**.
- Access the TLWS test position summary page (160) and release the TLWS test position (**201,X**).
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.4-1 Analog Line (AIU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.080	0.080	0.157

Table 7.4-2 Analog Line (LU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.042	0.042	0.021

Table 7.4-3 Analog Line (ISLU Z) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN

μ F	0.080	0.080	0.157

Table 7.4-4 Analog Line (DCLU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μ F	0.016	0.016	0.058

Table 7.4-5 Analog Line (IDCU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μ F	0.003	0.003	0.003

Table 7.4-6 Analog Line (DNU-S) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μ F	0.003	0.003	0.003

Table 7.4-7 Digital Line ISLU U-Card (AMI) NT1 or AMI BRITE CU AHG13 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	4-6
μ F	0.155	0.155	0.910

Table 7.4-8 Digital Line - ISLU/ISLU2 U-DSL (ANSI[®]) Lucent Technologies NT1 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	0.4
μ F	0.155	0.155	0.997

Table 7.4-9 Digital Line ISLU U-DSL (ANSI[®]) BRITE CU AHG18 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	160 ^a	OPEN	121 ^a
μ F	0.155	0.155	0.997

Notes:

- a. For the Digital Line ISLU U-DSL (ANSI) BRITE CU AHG18 values, some versions may have Ko values of TG=OPEN and TR in the range of 110 to 140.

Table 7.4-10 Digital Line IDCU U-DSL (ANSI[®]) Lucent Technologies NT1 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	1.9
μ F	0.025	0.025	0.940

Table 7.4-11 Digital Line AIU U-DSL (ANSI®) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	0.4
μ F	0.155	0.155	0.997

Table 7.4-12 Digital Line DNU-S U-DSL (ANSI®) Lucent Technologies NT1 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	1.968
μ F	0.020	0.021	0.964

Table 7.4-13 Resistance in Ohms/Mile (DCTU Tests)

CABLE GAUGE	TIP-RING VALUE
19	86.0
22	173.0
24	274.0
26	440.0

Table 7.4-14 Capacitance in UF/Mile (DCTU Tests)

CABLE GAUGE	TIP-RING VALUE
19	0.0845
22	0.0825
24	0.0815
26	0.0795

Procedure 7.5: PERFORM DISTANCE-TO-OPEN MEASUREMENT ON AN ON-HOOK LINE USING DCTU

OVERVIEW

This procedure measures the capacitance of an analog line or a U-type Digital Subscriber Line (U-DSL) and calculates the distance to open (DTO). This test should be used only when a line is suspected to be open. Any sort of complete connection (short, ground, etc.) will give invalid test results.

PROCEDURE

1. **NOTE 1:** Before beginning this procedure, perform Procedure 2.2 , Calibrating TLWS Measurements, if the office has not been calibrated for Trunk and Line Work Station (TLWS) measurements. This can be determined by checking the DISTOPEN field in the Recent Change/Verify (RC/V) office parameter view. If this field is "0", then all measurements will be relative to the Directly Connected Test Unit (DCTU) instead of the Main Distributing Frame (MDF).

NOTE 2: If the DTO is positive (and the office has been calibrated), the value indicates that the open is between the MDF and the subscriber. If the value is "0", the open is between the MDF and the office equipment (line appearance).

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position [**16X** for 5E7 and 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the appropriate poke command (**401,DN** or **4001,DN**).
3. From the metallic measurement page (560 or 5600), use the appropriate poke command (**565** or **5605**) to measure the capacitance of the tip-ring (TR) open line. The result will be given in terms of feet.

NOTE: Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (**950** or **9500**).

4. Release the metallic measurement position by entering the appropriate poke command (**590** or **5990**).
5. Release the line by entering the appropriate poke command (**499** or **4999**).
6. Access the TLWS test position summary page (160) and release the TLWS test position [**20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later].
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.6: ANALOG COIN PHONE TEST TO PERFORM NEAR-TO-FAR-END CHECK OF LINE STATE (VIA DCTU)

OVERVIEW

The Directly Connected Test Unit (DCTU) coin phone tests require interaction between two craftspersons—one at the Trunk and Line Work Station (TLWS) and the other at the coin phone being tested. After any of the tests (coin detect, coin collect, coin return, or home totalizer) are completed and the results are displayed, a printout of those results may be obtained by using the appropriate poke command.

When homing an electronic totalizer, the response will be "totalizer already homed" whether it had been previously homed or not. It is very important that the craftsperson at the TLWS verify that the totalizer has indeed been homed by using the appropriate poke command.

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position [**16X** for 5E7 and 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).
2. Refer to the **Caution** and seize the line using the appropriate poke command (**401,DN** or **4001,DN**).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (**560** or **5600**). When the applicable metallic measurement command is entered, the DCTU is automatically connected.
4. The craftsperson at the TLWS can ADD the talk and monitor (T&M) phone to the seized coin line by entering the appropriate poke command (**431** or **4301**).
5. Using the T&M phone, instruct the far-end craftsperson to hang up the phone and insert a predetermined amount of money (in various coin values).
6. To detect coin, enter the appropriate poke command (**568** or **5608**).
7. To return coin, enter the appropriate poke command (**570** or **5610**).
8. To home totalizer, enter the appropriate poke command (**567** or **5607**).
9. To ring coin phone line, enter the appropriate poke command (**522** or **5202**).
10. Ensure that all coins are returned.
11. Using the T&M phone, instruct far-end craftsperson to hang up phone and insert a predetermined amount of money (in various coin values).
12. To detect coin, enter the appropriate poke command (**568** or **5608**).
13. To collect coin, enter the appropriate poke command (**569** or **5609**).
14. To home totalizer, enter the appropriate poke command (**567** or **5607**).
15. To ring coin phone, enter the appropriate poke command (**522** or **5202**).

16. Ensure coin(s) is(are) collected.
17. Ensure totalizer homed.
18. If no further tests are to be performed on coin line, affect line release by entering the appropriate poke command (**499** or **4999**).
19. Access the TLWS test position summary page (160) and release the TLWS test position [**20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later].
20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.7: ANALOG RINGER COUNT CHECK ON AN ON-HOOK LINE USING THE DCTU

OVERVIEW

This procedure measures the ringing count of a line after first completing a metallic test to determine line resistance. The ringer count test is valid only if the tip-ring (TR), tip-ground (TG), and ring-ground (RG) resistance is greater than 150 Kilohms.

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position [**16X** for 5E7 and 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).
2. Refer to the **Caution** and seize the line using the appropriate poke command (**401,DN** or **4001,DN**).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (**560** or **5600**).
4. To perform a resistance test, enter the appropriate poke command (**563** or **5603**).
5. To perform a ringer count check, enter the appropriate poke command (**566** or **5606**).

NOTE: Results may be printed at Receive-Only Printer (ROP) by entering the appropriate poke command (**950** or **9500**).

6. If no further testing is to be performed on line, affect line release by entering the appropriate poke command (**499** or **4999**).
7. If all TLWS testing is complete, release the TLWS test position by entering poke command **20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.8: ANALOG LINE SIGNALING CHECKS

OVERVIEW

This procedure applies a ringing tone and a receiver off-hook (ROH) tone to a called line to verify signaling states. A far-end craftsperson is required at the called telephone and a Central Office (CO) craftsperson is required at the Trunk and Line Work Station (TLWS) position.

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position [**16X** for 5E7 and 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).
2. Refer to the **Caution** and seize the line using the appropriate poke command (**401,DN** or **4001,DN**).
3. To display the SUPERVISION commands, enter the appropriate poke command (**520** or **5200**).
4. At the TLWS CO end, the craftsperson ADDS the talk and monitor (T&M) phone, applies **RING** to the seized line, observes screen for an off-hook indication, applies the **ROH** tone, applies the **STOP TEST** command, and audibly verifies with far-end craftsperson that the ROH was heard.
5. If no further testing is to be performed on line, affect line release by entering the appropriate poke command (**499** or **4999**).
6. If all TLWS testing is completed, release the TLWS test position [**20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later].
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.9: ANALOG LINE STATUS CHECK OF BUSY LINE

OVERVIEW

This procedure is used to monitor a busy line by taking the talk and monitor (T&M) phone off-hook to listen for conversation or some type of suspected trouble.

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position [**16X** for 5E7 and 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).
2. Attempt to seize a busy line using the appropriate poke command (**401,DN** or **4001,DN**).
NOTE: Since a busy line cannot be seized, a **camp-on** situation will occur.
3. To display the MISC TLWS commands, enter the appropriate poke command (**900** or **9000**).
4. Enter the appropriate poke command (**530** or **4600**) to monitor the busy line. The T&M phone should ring.
5. Take T&M phone off-hook and listen for conversation or some other type of suspected trouble. If no suspected trouble exists, continue with the next step.
6. Drop the T&M phone by entering the appropriate poke command (**430** or **4300**).
7. If no further tests are to be performed, affect line release by entering the appropriate poke command (**499** or **4999**).
8. If all TLWS testing is complete, release the TLWS test position by entering poke command **20X** for 5E7 and 5E8 or **201,X** for 5E9(1) and later.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.10: ANALOG STATION RINGER TOUCH-TONE TEST FOR A DIRECTORY NUMBER

OVERVIEW

This procedure provides a test for off-hook and on-hook ground and ringing states Station Ringer Touch-Tone Test (SRTT) for a directory number (DN).

NOTE: Excessive background noise may lead to a failure indication.

PROCEDURE

1. At station under test, dial **xxx-yyyy**

Where:

xxx = A 3-digit SRTT test code.
yyyy = A 4-digit DN of line being tested.

Response: **Successful access:** Continuous dial tone should be heard indicating the SRTT test line is connected to the originating DN.

Unsuccessful access:

- Busy-tone indicates the dialed DN does not exist in the office records.
- Overflow tone indicates the hardware in the switch is busy or a successful connection cannot be made.

2. Is station being tested touch-tone or rotary dial?

If **touch-tone**, continue with Step 3.

If **rotary dial**, proceed to Step 4.

3. Referring to the following notes, dial the touch-tone digits per Table 7.10-1.

NOTE 1: Dial tone will be heard throughout the dialing sequence except in the case of the automatic dialer. If the phone is an automatic dialer, the dial tone will stop after the first digit is dialed.

NOTE 2: If the digits are not dialed or a flash is not received within 20 seconds after dial tone is started, a fail tone (one burst of high tone) is returned. Also, 20 seconds of interdigit time will be used in checking the time between digits. If timing between any two digits exceeds 20 seconds, reorder tone is returned.

Response: **Successful test:** Double burst of high tone (480 Hz 500 ms tone separated by 500 ms silent interval) is returned.

Unsuccessful test: Indicated by a single burst of high tone (480 Hz for 500 ms) after a digit that fails. The failure can be, as indicated, a digit dialed out of sequence or a digit that does not meet specifications. Repeat test if necessary.

4. Flash switchhook to start party identification test.

Response: *Individual line:* Steady high tone.

Multiparty tip party line: 60 IPM high tone.

Multiparty ring party line: Steady high tone.

NOTE: These tones are sent until the tester goes on-hook to request the on-hook ground and ringer tests or times out after 3 minutes.

5. Place receiver on-hook to start ringer tests.

Response: *Successful test:* Phone will ring.

Unsuccessful test: Phone does not ring.

6. Take receiver off-hook.

Response: *Successful test:* Steady high tone is heard.

Unsuccessful test: Tester hears 60 IPM high tone.

7. Tester can flash switchhook to repeat the ground and ringer tests or disconnect (on-hook for more than 1.5 seconds) to terminate testing.

NOTE: A maximum of three repetitions are allowed. If more than three attempts are made, the call is terminated.

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

Table 7.10-1 Touch-Tone Pad Dialing Sequences

TYPE OF STATION	DIGITS TO BE DIALED
10-button	1-2-3-4-5-6-7-8-9-0
12-button	4-1-2-3-4-5-6-7-8-9-*0#
12-button with auto dialer	2-1-2-3-4-5-6-7-8-9-*0#
16-button	5-1-2-3-A-4-5-6-B-7-8-9-C-*0#-D

Procedure 7.11: ANALOG STATION RINGER TOUCH-TONE TEST FOR AN MLHG

OVERVIEW

This procedure provides a test for off-hook and on-hook ground and ringing states Station Ringer Touch-Tone Test (SRTT) for a Multiline Hunt Group (MLHG).

NOTE: Excessive background noise may lead to a failure indication.

PROCEDURE

1. At the station under test, dial **xxx-yyy-zzzz**

Where:

xxx = a 3-digit SRTT test code.
yyy = a 4-digit MLHG base directory number.
zzz = a 4-digit terminal number of originating station. (If **zzz** is not dialed within 5 seconds of **yyy**, a connection will automatically be attempted on the first member of the MLHG.)

Response: **Successful access** - continuous dial tone heard indicating that the SRTT test line is connected to the originating directory number (DN).

Unsuccessful access:

- Busy-tone indicates the dialed DN does not exist in the office records.
- Overflow tone indicates the hardware in the switch is busy or a successful connection cannot be made.

2. Is station being tested touch-tone or rotary dial?

If **touch-tone**, continue with Step 3.

If **rotary dial**, proceed to Step 5.

3. Referring to the following notes, dial the touch-tone digits per Table 7.11-1.

NOTE: Dial tone will be heard throughout the dialing sequence except in the case of the automatic dialer. If the phone is an automatic dialer, the dial tone will stop after the first digit is dialed.

NOTE: If the digits are not dialed or a flash is not received within 20 seconds after dial tone is started, a fail tone (one burst of high tone) is returned. Also, 20 seconds of interdigit time will be used in checking the time between digits. If timing between any two digits exceeds 20 seconds, reorder tone is returned.

Response: **Successful test** - double burst of high tone (480 Hz 500 ms tone separated by 500 ms silent interval) is returned.

Unsuccessful test - indicated by a single burst of high tone (480 Hz for 500 ms) after a digit that fails. The failure can be, as indicated, a digit dialed out of sequence or a digit that does not meet specifications.

NOTE: Dial tone is received again regardless of success or failure of test. Repeat test if necessary.

4. Flash switchhook to start party identification test.

Response: *Individual line* - steady high tone.

Multiparty tip party line - 60 IPM high tone.

Multiparty ring party line - steady high tone.

NOTE: These tones are sent until the tester goes on-hook to request the on-hook ground and ringer tests or times out after 3 minutes.

5. Place receiver on-hook to start ringer tests.

Response: *Successful test* - phone will ring.

Unsuccessful test - phone will not ring.

6. Take receiver off-hook.

Response: *Successful test* - steady high tone is heard.

Unsuccessful test - tester will hear 60 IPM high tone.

7. Tester can flash switchhook to repeat the ringer tests or disconnect (on-hook for more than 1.5 seconds) to terminate testing.

NOTE: A maximum of three repetitions are allowed. If more than three attempts are made, the call is terminated.

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

Table 7.11-1 Touch-Tone Pad Dialing Sequences

TYPE OF STATION	DIGITS TO BE DIALED
10-button	1-2-3-4-5-6-7-8-9-0
12-button	4-1-2-3-4-5-6-7-8-9-*0#
12-button with auto dialer	2-1-2-3-4-5-6-7-8-9-*0#
16-button	5-1-2-3-A-4-5-6-B-7-8-9-C-*0#-D

Procedure 7.12: DIGITAL SUBSCRIBER LINE BRI INTEGRITY TESTS

OVERVIEW

To sectionalize the digital fault, a bit stream of data is transmitted from the 5ESS[®] switch and looped back at various points between the Customer Premises Equipment (CPE) and the switch. For circuit-switched channels, the Integrated Services Test Facility (ISTF), Global Digital Services Function (GDSF) and the ISTF functionality on the GDSF provides the digital bit stream and analysis of the return (Layer 1). For packet-switched channels, the Protocol Handler (PH) provides the transmitted data in packet form and the analysis of the return.

The basic concept is to loop back at the furthest point from the switch (namely the CPE) and then loop back closer and closer to the switch. The point at which no errors are detected defines the boundary of the fault, and it lies between that point and the last loopback point. For example, if the loopback detected errors at the CPE and at the Network Termination 1 (NT1) but not at the Line Termination (LT), then the fault must be between the loopback circuit on the Line Termination and the loopback circuit on the NT1.

This is a step-by-step procedure complete with recommendations of what might cause the fault and some resolutions for these faults.

For additional Basic Rate Interface (BRI) troubleshooting guidance and assistance, see Section 4, Figure 4-1, *ISLU U-DSL BRI Troubleshooting Diagram*.

NOTE 1: Before performing this procedure, perform Procedure 7.2, Analyze and Resolve OOS Line List Entries.

NOTE 2: This procedure should be performed as part of Procedure 7.3, Analyze and Clear a Line Having a Subscriber Customer Complaint.

NOTE 3: While performing this procedure, if reference is made to the use of an input or output message, then it is advised that 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, be used to obtain the appropriate format(s) associated with the message.

NOTE 4: The criteria for acceptable test results should be in accordance with local practices and recommendations. In general, the acceptable Bit Error Rate (BER) for a Digital Subscriber Line (DSL) channel intended for data applications should be 1×10^{-8} (0.00000001) or less, while for voice applications 1×10^{-6} (0.000001) or less is satisfactory. For packet channels, the **TST:DSL** command considers that if 98% of the transmitted packets can be received error-free, a PASSING result will occur. For circuit channels, the **TST:DSL** command uses a BER to produce a passing, degraded, or failing result. The BER used is a **TST:DSL** specifiable option (ABER).

NOTE 5: The **TST:DSL** command with the **SECT** and **V** option can perform a sequence of BER tests to each loopback termination automatically, and may be used in place of manually requesting individual tests. The command will start at the farthest available termination specified. If no termination is specified: (a) For U-DSL (AMI and ANSI[®]) interfaces, the default is the NT1; (b) For T interfaces the default is the LT. The **SECT** test will continue testing each termination approaching the 5ESS[®] switch until a PASSING result is obtained or all possible terminations have been exhausted. Also, the **TST:DSL** command will perform a mismatch test if run on an out-of-service (OOS) U-DSL, the U-interface is down at the line card, and a loopback of all channels has been requested at the NT1 or BRI transmission extension (BRITE) CUs. The **SEQ** option can be used to print the passing or failing test results for all terminations. See the **TST:DSL** input command in the 235-600-700, *Input Message Manual* for additional information on the **SECT** and **SEQ** options.

NOTE 6: Below are the automatic error counters used for Integrated Services Digital Network (ISDN) lines. Once a

counter reaches its minimum threshold, a timer begins. If the maximum threshold is reached before expiration of the timer, the terminal/interface is removed from service. If the threshold is not reached, the counters are reset. There are two counters for both the ISDN interface and the specific ISDN terminal. One exception exists in the software releases for national ISDN. Because no maintenance information message (MIM) exists for national ISDN type terminals, it is not possible to remove separate terminals. Therefore, the terminal counters are not applicable to this interface. For 5E9(1) and later software releases, the terminal counters are applicable to this interface.

For both the interface and terminal, a user counter and an error counter exist. The user counter is incremented whenever a direct end-user action causes an error to occur. An example of this is hitting a feature button that is unassigned. The terminal counter is incremented whenever a terminal causes an error and is not directly related with an end-user action.

Layer 3 Error Counters		
	Minimum Threshold	Maximum Threshold
Level 3 User Error Counter per Interface	60	80
Level 3 Error Counter per Interface	21	40
Level 3 User Error Counter per Terminal	20	30
Level 3 Error Counter per Terminal	7	15

CAUTION: When it is required that the DSL be seized, the customer will be denied use of the seized DSL or DSL channel(s). Seizing an individual CPE will not affect other customers on the DSL.

PROCEDURE

- At the TLWS video terminal, access a TLWS test position [**16x** for 5E8 software release or **161,x** for 5E9(1) and later software releases] from the TLWS test position summary page (160).
- Gain access to the CPE Summary Status page from a TLWS test position using the poke command **4001,<DN>,CPE** for 5E8 software release or **4001,<DN>,CPE|USPID** for 5E9(1) and later software releases.
 - Verify the SPID in the 5E8 software release or the USPID in 5E9(1) and later software releases for each CPE is correct by entering the following at the MCC: **OP:CPE,DN=<DN>**

Note the valid USPIDs and compare them to the USPIDs on the 9201 page [5E9(1) and later].
 - If the suspected faulty CPE is known, then select that directory number (DN).
 - If the suspected faulty CPE is not known, then test each CPE line which has a fully initializing protocol. If none exist, continue with Step 6.
- Perform an interactive digital loopback to the selected CPE by entering poke command **53xx,56000,ANY**, where **xx** is the CPE number shown on Page 9200, CPE Tests.

NOTE: The CPE loopback is not supported for standard CPEs. Refer to Procedure 7.16, BRI Access to the 108 Test Line.

- If after approximately 60 seconds (ELAP field) the test results are acceptable (see **Note 4** in Section 7.12), enter poke command **5999** to halt the test. The path from the switch to the CPE has been verified. If this test fails, go to Step 6.
- If there remains other testable CPE on the DSL that may be faulty, return to Step 3 and select the next available CPE. If all CPE test results are acceptable, continue with Step 12.
- Refer to the **Caution** and seize the DSL (unless already seized) by entering the poke command **4800**, which

will cause you to leave the 9200 page.

Access Line Transmission Page 5400,3 and run a loopback test to the NT1 with poke command **5411,NT1,20,56000,ALL,SECT,6,V**. See Note 5 for information on the **SECT** versus **SEQ** options.

NOTE: For an intermittent problem, a 1-hour noninvasive loopback is recommended (see the TST:DSL Input Message Manual page).

7. If the NT1 loopback test results are acceptable, the CPE is faulty or the CPE is of the wrong type, then the CPE and related wiring is suspected and should be repaired. Go to Step 15.

If the test results are not acceptable, or the DN is that of a T-DSL, then:

- (a) If not already there, access the Line Transmission Page (5000,3). Refer to the **Caution** and seize the DSL (unless already seized) by entering the poke command **4800**, then run a loopback test to the Line Termination with the poke command **5032,LC,56000,ALL** for 5E8 software release or **5032,LT,56000,ALL** for 5E9(1) and later software releases.
- (b) Proceed to Step 13 for any failing channel(s) connected to a PH (that is, it is a D-channel or other packet-switching channel).

8. After approximately 60 seconds (ELAP field), stop the test with poke command **5999**. If the test results are acceptable (see **Note 4** in Section 7.12), then the equipment beyond the Line Termination is faulty and must be repaired.

If the line is a T-DSL, the CPE or wiring from the Integrated Services Line Unit (ISLU) to the CPE is faulty and must be repaired. Go to Step 15.

If the line is a U-DSL, and the NT1 loopback test failed, then the fault could be a faulty or incorrect NT1, a disconnected or powered-down NT1, or a problem in the 2-wire loop from the Line Termination to the NT1. Go to Step 15.

9. If only packet tests failed, continue with Step 11. If all tests fail to this point, release the line by entering the appropriate poke command (**499** or **4999**) and diagnose the Line Card by entering the input message **DGN:ISLULC** or **DGN:ISLUCKT**. If the diagnostic fails, follow Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS® switch, or consider using Line Card sparing (see 235-105-210, *Routine Operations and Maintenance Procedures*). If the diagnostic passes, continue with Step 13.
10. If on-demand B-channel packet-switching (ODB) is supported by the DSL being tested, verify the PH channel assigned to the subscriber service by performing Substeps (a) and (b). Otherwise, continue with Step 16.
 - (a) Enter poke commands **9200**, **9201** or **4001,<DN>,CPE** to display the CPE currently active on the DSL.
 - (b) Perform a test of the PH channel by entering poke command **53xx,56000,B1** or **B2,PS**.
11. If after approximately 60 seconds the **53xx,PS** is passing, enter poke command **4999** to halt the test and release the line. The PH channel has been verified. Go to Step 15.
12. Soft switch the PH, and then diagnose the PH by entering the input message **DGN:PSUPH**.
13. If the PH passes all tests and the circuit-switched paths have been verified. Go to Step 15.
14. If a tested PH does not pass any of the described tests, replace the PH board and retest the DSL.
15. Access the TLWS test position summary page (160) and release the TLWS test position [**20x** for 5E8

software release or **201,x** for 5E9(1) and later software releases].

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

Procedure 7.13: DIGITAL SUBSCRIBER LINE AUTOMATIC LINE EVALUATION

OVERVIEW

The Automatic Line Evaluation (ALE) provides continuous, nonservice-affecting monitoring of Digital Subscriber Line (DSL) performance. It does this by detecting and recording faults at Layers 1 (U-DSL only), 2, and 3. These counts are displayed on the Receive-Only Printer (ROP) once every 24 hours and can be extracted and displayed by manual request via a message. The Protocol Error Records (PERs), which describe all protocol violations detected for a DSL, are temporarily stored in a circular buffer for retrieval by ALE. The PER of the last violation detected on a DSL that was found to be faulty and was automatically removed due to excessive Layer 3 protocol errors (LVL3ERR) is displayed along with the removal indication on the ROP. The ALE data is displayed automatically on a scheduled basis every 24 hours and manually via the **EXC:ALE** command (refer to 235-600-700, *Input Message Manual*, for use of this command).

PROCEDURE

1. At the Master Control Center (MCC), obtain the ALE output for a given DSL by entering **EXC:ALE,DN=xxxxxxx,level1,level2,per,print**.

NOTE: Instead of using the directory number (DN), one of the following commands can be used:

DSLGM=SM#-PH_GROUP#-PH_MEMBER#

or

LCEN=SM#-ISLU#-LG#-LC#

or

ILEN=SM#-IDCU#-RT#-LINE#

or

LCKEN=SM#-ISLU#-LU#-LBD#-LCKT#

Refer to 235-600-700, *Input Message Manual*, for a complete description of the command options.

2. If the level 1 output indicates that any of the counts have exceeded the count's associated threshold, perform Procedure 7.12, Digital Subscriber Line BRI Integrity Tests.

NOTE: The level 1 output, which automatically resets every 24 hours, indicates the number of errored seconds, severely errored seconds, and block errors (BE) detected by the line card (LC) or integrated digital carrier unit (IDCU) remote terminal (RT) line termination (channel unit). Counts for IDCU RT U-DSL line termination may not be completely reported due to the need to support multiple vendor's RT that may not be able to detect, collect, or report the counts requested. There is no way at this time to know which vendor's RT will support which count sets. Lucent Technologies IDCU RT U-DSL currently supports the same counts as an ISLU/ISLU2 *ANSI*[®] U-DSL. For details, refer to the **EXC:ALE-LVL1** output message in 235-600-750, *Output Message Manual*.

NOTE: If the subscribing customer has reported a noisy line or excessive data transmission errors, and the level 1 performance monitoring counts (**EXC:ALE-LVL1** output message) indicate little or no cyclic redundancy check (CRC) BE, this could indicate that the level 1 performance monitoring counters are not working. For U-DSLs (ANSI), use the corrupt CRC test (**TST:DSL, TEST=CRC,V** input message) to verify that the performance monitoring counters will count level 1 CRC BE. If the duration of the corrupt CRC test specified is long enough, it should be able to verify that the performance monitoring thresholds trigger a performance monitoring alert (**REPT:ALE-LEVEL1** output message). For Lucent Technologies U-DSLs on IDCU RTs, it is also possible to use the

corrupt CRC test (**TST:DSL,TEST=CRC-UP** and **TST:DSL,TEST=CRC-DWN** input messages) (refer to 235-600-700, *Input Message Manual* , for use of this command) to verify that the PM counters will count level 1 CRC BE in both upstream and downstream directions. For details, refer to the appropriate message manual and to Procedure 7.12 , Digital Subscriber Line BRI Integrity Tests.

3. If the level 2 output indicates a status of MINOR, MAJOR, CRITICAL, DEFECTIVE, or PROBLEM, perform Procedure 7.12 , Digital Subscriber Line BRI Integrity Tests.

NOTE: The level 2 output, which automatically resets every 24 hours, indicates a qualitative measure of level 2 performance. A status of NORMAL indicates all is well at level 2. A status of NO-INFO indicates that not enough packets were received to make an estimate of the level 2 quality. This usually occurs when there is no CPE plugged into the DSL. For details, refer to the

EXC:ALE-LVL2 output message in 235-600-750 , *Output Message Manual*.

4. The PERs indicate discreet protocol related events that the 5ESS[®] switch has detected indicating potential problems. They include the message type, call state, and Protocol Error Codes (refer to the **EXC:ALE-PER** output message and the **APP:ALE-PER** Appendix of 235-600-750, *Output Message Manual*) indicating the nature of the error. Also included is a time stamp, indicating when the error occurred. This should be correlated with any Customer Trouble Reports made on the DSL.

NOTE: Up to 15 PERs per DSL can be stored in the switching module/switching module-2000 (SM/SM-2000) and printed out by **EXC:ALE** . After 15 PERs have been logged on a given DSL, any additional PERs will overwrite the oldest ones in the buffer for that DSL.

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

Procedure 7.14: DIGITAL SUBSCRIBER LINE PROTOCOL MONITORING

General

The protocol monitoring (PM) feature allows monitoring of protocols over digital subscriber lines (DSL) and digital trunks. Protocols currently supported include link access protocol D-channel (LAPD), link access protocol - balanced (LAPB), Q.931, X.25, X.75, X.75, time slot management channel (TMC), and embedded operations channel convergence protocol (V.120).

A PM session consists of three parts:

- *Setup* is determining the correct parameters for the session's input command (refer to 235-600-700, *Input Message Manual*, 235-600-750, *Output Message Manual*, 235-600-755, *Protocol Error Record Descriptions*, for details).
- *Trigger* includes waiting for or stimulating an event that causes the PM session to end and the collected data to be output.
- *Analysis* is the studying of the output to determine what occurred. Analyzing the output requires detailed knowledge of the monitored protocol, or activation of the Protocol Translation Monitoring Special Feature.

Upon the execution of the **EXC:PM** input command, protocol events for the specified line are collected and stored in a buffer until the trigger event occurs. The trigger event, which is specified through the input command **TRIGVAL=c** or **PER[=d]**, causes termination of the data collection after all of the recording conditions have been met. The collected frames or messages are then output. By choosing to specify an offset input parameter (**OFF=a**), the craft can choose to manipulate whether the trigger will be the first event in the buffer, the last, or somewhere in between.

Even though all data for the specified channel is collected, stored, and displayed, the PM input parameters can be manipulated for user or channel triggering on multipoint lines, Protocol Error Record (PER) or message triggering, monitoring one protocol while triggering on another, and for the duration of a PM session.

Multipoint Lines - User or Channel Triggering

Since there can be up to eight users on a multipoint line, the craft can choose between user or channel triggering. Although the PM session collects data for all users on a multipoint line, the focus of the triggering can be narrowed to a single user of the channel by specifying the DN, PKTDN, or MLHG identifier in the input command. The other input identifiers (LCEN, LCKEN, ILEN, PORT, etc.) are assumed to be channel identifiers.

The Terminal Endpoint Identifier (TEI) of each output frame should be examined in order to determine which frames are for a given user. Before beginning the PM session, the user should execute the **OP:CPE** command on the given line to output a list of TEIs for that line.

PER or Message Triggering

Besides choosing user or line triggering, every PM session (multipoint or point-to-point) must specify a trigger. The two types of triggering (PER and Message) are as follows:

- *PER triggering* causes a PER to detail an error event associated with switch-detected protocol errors. A choice must be made between triggering on any PER or on a specified PER. For a complete list of PERs, refer to the 235-600-755 *Protocol Error Record Descriptions Document*.
- *Message triggering* (TRIGVAL) is used when a PM session is to be terminated with the occurrence of a particular frame, packet, or message traveling in a particular direction between the Customer Premises

Equipment (CPE) and the switch. For a complete list of messages, refer to the **EXC:PM** input message description in 235-600-700, *Input Message Manual*.

Monitoring and Triggering

Although the most common usage of PM is monitoring and triggering on the protocol specified (**PROT=z**), PM allows the user the option of monitoring one protocol but triggering on another by use of the TRIGLVL input parameter (**TRIGLVL=LEVELx**). Different level triggering can be requested by selecting a TRIGLVL value which differs from the level of the PROTOCOL chosen for monitoring. In this case, the specified TRIGVAL parameter must be of the same protocol level as TRIGLVL.

By using the duration parameter (**DUR=k**), the length of the PM session can be controlled. When the duration timer expires, the collection of data will cease and the outputting of data will begin.

The craft uses the Equipment Configuration Data (ECD) base to define the destination of the PM output. The ECD provides a list of possible destinations for each message class. The message class for PM messages is *SPM*. Through the *classdef* relation in the ECD, the craft can select the output's destination.

PROCEDURE

1. Collect the parameters to be used in the PM session. At the minimum, two parameters are required in order for the command to execute:

- (a) Line or user identification (**DN=xxxxxxx**, **LCEN=a-b-c-d**, **LCKEN=a-b-c-d-e**, etc.). If DN, PKTDN, or MLHG is used when identifying a multipoint line, then user triggering is selected.
- (b) PER (for triggering on receipt of a PER) or TRIGVAL (for triggering on a particular frame, packet, or message in a specified direction).

If no other parameters are specified, default values will be used. Refer to **EXC:PM** in 235-600-700, *Input Message Manual*, for a complete list of all input parameters and their default values.

2. At the Master Control Center (MCC), enter the **EXC:PM** command using the parameters gathered in Step 1. Some examples are as follows:

- (a) **EXC:PM,DSLGM=c-d-e,PROT=LAPD,PER;**

The command starts a PM session that monitors the LAPD protocol for DSLGM c-d-e. The session will trigger upon receipt of any PER for the LAPD protocol. The data will then be output.

- (b) **EXC:PM,LCEN=a-b-c-d,PROT=Q931,PER="PORT-OOS",OFF=20;**

This command starts a PM session that monitors the Q.931 protocol for LCEN a-b-c-d. This session will trigger upon receipt of a PORT-OOS (Port out-of-service) PER. Since the offset parameter is set to **20**, twenty frames will be collected after the triggering event. The data will be output after the final twenty frames are collected.

- (c) **EXC:PM,DN=xxxxxxx,PROT=LAPD,TRIGLVL=LEVEL3,TRIGVAL=INCCALL,PRINT;**

This command starts a PM session that monitors the LAPD protocol for DN xxxxxxx. The session will trigger and start printing segments on the Receive-Only Printer (ROP) when the switch receives a X.25 Incoming Call (INCCALL) packet. The PRINT parameter is necessary to have the output sent to the ROP only if the input command is initiated from a location other than the MCC or a Supplemental

Trunk and Line Work Station (STLWS). If the command comes from either of these locations, output automatically is sent to the ROP.

(d) **EXC:PM,eoc=a-b-c-d,prot=V120,triglvl=level7,perx,late**

The command starts a PM session that monitors the V.120 level3 protocol on the EOC channel. The session will terminate when an IDLC (level7) PER is detected. The xlate option results in an english translation of the PM output. The output of the PM session can take two forms.

By default a 5ESS[®] switch has the ability to provide a raw hex dump of the protocol exchange which was recorded by the PM session.

NOTE: This is from a file on the 3B in the /unixa/users/pmtran directory.

The hex output appears on the ROP in messages prefaced by "EXC PM DATA". An example is shown in Figure 7.14-1 .

Optionally, the raw hex data can be replaced with an English translation of the the protocol exchange by turning on Special Features and adding the "xlate" option on either the exc:pm or the stp:pm command line. The translated output is stored on the 3B under the directory /unixa/users/pmtran. The file name for the output of a PM session is atf.xxx where xxx represents the PM session number.

To obtain the base translation capability [pre-software release 5E9(1)] requires that Special Feature number 32 be activated. To obtain translation of National ISDN (NI-1), in addition to the base translation capability, Special Feature 151 must also be activated.

Figure 7.14-2 is an example of the translated capability when both Special Feature #32 and #151 are active.

To manually translate the raw hex dump, use the following references:

(a) **LAPD:**

- 235-900-341 — *National ISDN Basic Rate Interface Specification*
- 235-900-343 — *Custom ISDN Basic Rate Interface Specification*
- CCITT Recommendations Q.921 or I.441.

(b) **LAPB:**

- 235-900-341 — *National ISDN Basic Rate Interface Specification*
- 235-900-343 — *Custom ISDN Basic Rate Interface Specification*
- CCITT Recommendation X.25.

(c) **Q.931:**

- 235-900-341 — *National ISDN Basic Rate Interface Specification*
- 235-900-342 — *ISDN Primary Rate Interface Specification*
- 235-900-343 — *Custom ISDN Basic Rate Interface Specification*

- CCITT Recommendations Q.931 or I.451.

(d) **X.25:**

- CCITT Recommendation X.25.

(e) **X.75:**

- 235-900-317 — *5ESS[®] Switch Interface Specification to a Packet Switched Public Data Network (X.75).*

(f) **X.75':**

- 235-900-325 — *5ESS[®] Switch Interface Specification to a Public Packet Switch Network (X.75).*

3. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

```
M  EXC PM DATA SES=3 SEG=14 01/07 11:12:05 TEI=0
    80 BYTES OF FRAME NUMBER 14 FRAME LENGTH IS 80 DIR=XMT

    08016705 04038090 A2180189 34014070 08C13237 31353631 30952A34 80800103
    8B0C3730 382D3937 392D3033 34388001 05930E20 30312D30 37203131 3A313261
    6D800102 8C042049 6E498001 14800114
```

Figure 7.14-1 Example of EXC PM DATA in Hexadecimal Format

```
-----
Event 14 01/07 11:12:05
08 Q.931 Call Control Message
67 Call Reference Value          Orig          103
M 05 Message Type                SETUP
I 04 Bearer Capability            Length =    3
80 Coding Standard                CCITT
   Info Transfer Cap.            Speech
90 Transfer Mode                  Circuit
   Transfer Rate                  64 kbit/s
A2 Layer 1 Protocol                G.711 u-law
I 18 Channel Identification        Length =    1
89 Interface ID                    Implicitly Defined
   Interface Type                  Basic
   Preferred/Exclusive              Exclusive
   D Channel Indicator              Not D Channel
   Channel Selection                B1
I 34 Signal                        Length =    1
40 Value                          Alerting On - Pattern 0
I 70 Called Party Number           Length =    8
```

C1	Address Type	Subscriber Number
	Numbering Plan	ISDN/Telephony E.164/E.163
	Number	2715610
I 95	Shift	Locking Codeset 5
I 2A	Standard Display	Length = 52
80	Display Type	Normal
80	Display Tag	Blank
01	Display Element	Length = 1
03	Number of Blanks Appended	3
8B	Display Tag	Calling Address
0C	Display Element	Length = 12
	Value	708-979-0348
80	Display Tag	Blank
01	Display Element	Length = 1
05	Number of Blanks Appended	5
93	Display Tag	Date & Time of Day
0E	Display Element	Length = 14
	Value	01-07 11:12am
80	Display Tag	Blank
01	Display Element	Length = 1
02	Number of Blanks Appended	2
8C	Display Tag	Reason
04	Display Element	Length = 4
	Value	InI
80	Display Tag	Blank
01	Display Element	Length = 1
14	Number of Blanks Appended	20
80	Display Tag	Blank
01	Display Element	Length = 1
14	Number of Blanks Appended	20

Raw Hex Data

```

0801670504038090A21801893401407008C1323731
35363130952A34808001038B0C3730382D3937392D
30333438800105930E2030312D30372031313A3132
616D8001028C0420496E49800114800114

```

Figure 7.14-2 Example of EXC PM DATA in Translated Format

Procedure 7.15: BASIC RATE INTERFACE DIAL-UP TEST LINE (BRITL)

OVERVIEW

The steps in this procedure allow for an operational test of the Custom Digital Subscriber Line (DSL). The operational test is accomplished by generating a voice origination and conducting digital tests of the B-channels accessible from the Customer Premises Equipment (CPE) on the customer basic rate interface.

NOTE: The BRITL feature is only available to CPE equipment connected to pre-Standard DSLs or Custom ISDN interfaces. See Procedure 7.21, — Basic Rate Interface Verification (BRIV) to test CPE equipment connected to Standard DSLs.

The following operations are supported:

- Verify the line card equipment number (LCEN), the IDCU line equipment number (ILEN), or the ISLU2 line circuit equipment number (LCKEN).
- Verify the primary directory number (PDN).
- Verify the directory numbers (DN) associated with call appearances (CA).
- Verify the features assigned to feature buttons (FB).
- Run Bit Error Rate Tests on either B-channel (similar to the **TST:DSL** input command).

In order to use the Basic Rate Interface Test Line (BRITL), the test line access code must be defined in the office data base through one or more of the following ways:

- Individualized Dialing Plan (IDP) [Business and Residential Custom Services (BRCS) user only]
- Primary Digit Analysis (For 5E9(2) and earlier software releases, this is restricted to only BRCS users)
- Local Digit Analysis
- Regular Directory Number (7 digits).

Recent Change View 9.13 defines the digit string for BRITL in the IDP group. The following parameters should be used to insert the access code in View 9.13:

IDP GRP	Name of IDP Group (Key)
INC DIGIT	Access Code to be assigned (Key)
STATE	NORMAL
ACTION	BTLUSE (for non-billed BRITL) BBTLUSE (for billed BRITL)
FEATURE	/*

Recent Change View 9.2 defines the digit string for BRITL in the Primary Digit Interpreter Table (PDIT). The following parameters should be used to insert the access code in View 9.2:

PDIT	Primary Digit Interpreter Table (Key)
INC DIGIT	Access code to be assigned (Key)
CALL TYPE	FEATURE
TYPE CI CALL	NONCI
FEATURE	/*
ACTION	BTLUSE (for non-billed BRITL) BBTLUSE (for billed BRITL)
PREFIX	NONE

Recent Change View 9.3 defines the digit string for BRITL in the Local Digit Interpreter Table (LDIT). The following parameters should be used to insert the access code in View 9.3:

LDIT	Local Digit Interpreter Table (Key)
INCOMING DIGITS	Access code to be assigned (Key)
CALL TYPE	BRITL (for non-billed BRITL) BBRITL (for billed BRITL)
TYPE CI CALL	NONCI
NBR OF DIGITS	Number of digits to collect (length of access code).

Recent Change View 1.5 defines the directory number for BRITL. The following parameters should be used to insert the directory number in View 1.5:

TN	Telephone Number
PTY	I
MFRI	N
RAX	Same RAX used on 4.1
LCC	TST
RTI	0
TSTCODE	BRITL (for non-billed BRITL) BBRITL (for billed BRITL)
TRC	N

For additional information on Recent Change views, refer to the appropriate Recent Change/Verify (RC/V) manual. During a BRITL call, the following treatments may be heard:

- Continuous dial tone - waiting for a new command
- One burst of high tone - success
- Two bursts of low tone - failure
- Ringing - indicates a digital test is waiting for test equipment
- Busy - indicates a digital test has aborted
- Silence - indicates a test is running.

When a digital test completes, the success or failure treatment will be prefaced by a warning tone (long low tone) indicating that the test is complete and the results are forthcoming.

Multiple call appearances (MCA) subscribers have the ability to display the DN associated with the CA or display the assigned feature. This is accomplished by either pressing the CA button or the FB once dial tone is heard. During a test call, all CA and FB functions are turned off and cannot be used to start a new feature or call. The only way to originate a new call, terminate an incoming call, or activate a feature is to disconnect the test call by hitting the DROP button (going on-hook for all other subscribers), restoring the use of the CA and FB functions.

For PODS [Integrated Services Digital Network (ISDN) equivalent of plain old telephone service (POTS), also known as plain old circuit-switched ISDN call (POCSI)] subscribers, the PDN can be retrieved by dialing the proper code listed in Table 7.15-1.

NOTE 1: For Alternate Mark Inversion (AMI) - U-card users equipped with Basic Rate Interface Transmission Extension (BRITE) Channel Units (CU), B-channel digital loopback tests originating from BRITLs using any of the CUs as a termination are disallowed. Attempts to run the digital loopback test on

any of the CUs will receive failure treatment. However, full digital loopback (2B + D) can still be performed through the **TST:DSL** command interface from the central office (CO).

NOTE 2: Depending on the CPE, the display for CA verification may be truncated. Some possible display identifiers are as follows:

Pri DN	Primary Directory Number
Sec DN	Secondary Directory Number
MLHG	Multiline Hunt Group
SH	Shared Directory Number/Multiline Hunt Group.

NOTE 3: The CPE loopback is supported by Feature Package 2.0 and later. This excludes any CPE that does not support voice.

PROCEDURE

1. At the station under test, dial the BRITL access code (DN assigned through RC/V). Continuous dial tone should be heard and a message should be seen on the station set's display indicating successful origination.
2. Enter: (1) the appropriate code to display the LCEN, or ILEN, or LCKEN, or (2) the appropriate code to display the PDN.
3. Set the digital test parameters by dialing one or more of the set parameter codes listed in Table 7.15-1.

NOTE: If the default parameters are acceptable, this step may be omitted.

4. Run a digital test on channel B1 using the default test parameters by entering the appropriate code from Table 7.15-1.
5. Run a digital test on channel B2 using the default test parameters by entering the appropriate code from Table 7.15-1.
6. If either of the digital tests fail, repeat the test using different loopback terminations (NT1, Line Termination). This should help to isolate the problem.
7. For MCA subscribers, press multiple CA or FB buttons to display the DN or feature assigned to the buttons.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.15-1 BRI Dial Up Test Line Keypad Codes

KEYPAD STRING ^a	ACTION
*11x#	Run BER Test on Channel x With Current Parameters
*120#	Display Current Test Termination
*12x#	Set Test Termination
*130#	Display Current Test Duration
*13x#	Set Test Duration
*140#	Display Current Test Data Rate
*14x#	Set Test Data Rate
*2#	Send Alerting Signal to the CPE
*3#	Print LCEN or ILEN or LCKEN on CPE Display
*4#	Print Primary DN/MLHG on CPE Display
*0#	Repeat Previous Message (Display/Tone)
Notes:	
a. The valid values for x are defined in Table 7.15-2.	

Table 7.15-2 BRI Dial Up Test Line Parameters

COMMAND PREFIX			

x	*11x	*12x	*13x	*14x
1	B1	CPE ^a	20 sec ^a	64k Clear
2	B2	NT1	2 min	64k Restricted
3	-	Line Termination	20 min	56k Clear ^a
41	-	BRITE CU1	-	-
42	-	BRITE CU2	-	-
43	-	BRITE CU3	-	-
44	-	BRITE CU4	-	-
45	-	BRITE CU5	-	-
46	-	BRITE CU6	-	-

Notes:

a. Default parameters.

Procedure 7.16: BASIC RATE INTERFACE (BRI) ACCESS TO THE 108 TEST LINE

OVERVIEW

The BRI Access to the 108 Test Line (108TL) feature is an optional Bellcore national ISDN feature that provides ISDN BRI 7-digit dialable circuit switched access (voice or data) to a 108-Type Test Line. The 108-Type Test Line provides a capability over the 2-wire or 4-wire Customer Premises Equipment (CPE) interface that accepts binary signals (bits) and loops back received octets (8 bits) from a digital circuit. This provides a noninverting loopback test line capable of looping back a signal up to 64 kbps. The primary use of this feature is to measure the integrity of digital data transmitted between the CPE and the 5ESS[®] switch.

Unlike the Basic Rate Interface Test Line (BRITL), which currently supports the custom BRI interface, the 108TL currently supports the standard BRI interface. Table 7.16-1 shows the differences between BRITL and 108TL.

The operating company craft can be dispatched to correct loop problems during installation/provisioning of the BRI or to a customer complaint.

Test Equipment must include a TR-816 compliant portable test set with a Bit Error Rate (BER) capability.

The craft in the central office will have the choice of assigning a 7-digit DN for the 108TL on either of two Recent Change Line Assignment Views, namely view 1.5 or 1.6. The craft will use the same technique as used currently to assign the noninverting loopback for trunk access to the 108TL (Procedure 8.15). For trunk access to the 108TL, the route index is used to identify the ISTF, GDSF or the ISTF functionality on the GDSF (future plans for trunk testing include the TSI for non-inverting loopback) as the source of the loopback. For BRI access, the TSI is used as the source of the loopback. Hence, the route index is ignored. If desired, the craft may assign the same 7-digit number to access the 108TL from a BRI or a trunk (Figure 7.16-1).

5ESS SWITCH			
RECENT CHANGE 1.5			
PBX-DID LINE (LINE ASSIGNMENT)			
*1. TN	9591080	(any DN, 958XXXX or 959XXXX is a Bellcore TR-TSY-0000-275 recommendation)	
24. RAX	XX	(Same RAX used on 4.1)	SPEC TRN _____
25. LCC	TST		COMP LOSS ____.
38. RTI	_____		
HRI	_____		SCD SCRNING _
55. TSTCODE	NINV		
57. RMK	108 TEST LINE		
58. TRC	N		

Figure 7.16-1 Recent Change View 1.5

For additional information on recent change views, refer to the appropriate recent change/verify (RC/V) manual.

PROCEDURE

1. Temporarily disconnect the end-user's CPE equipment and replace it with the appropriate test set.
2. At the station under test, dial the 108TL access code (DN assigned through RC/V) from the test set.

3. If a digital loopback is available, a Call Proceeding message is sent back to the CPE. If the TSI loopback termination is made, the 5ESS[®] switch sends back to the CPE a Q.931 **CONN**ect message and starts a 20-minute timer.
4. The craft at the CPE may start testing in any manner that is felt appropriate. Possible tests may be as follows:
 - The transmitting of a pseudo-random test bit pattern over the B-channel path for certain performance measurements (for example, errored seconds, bit errors, etc.)
 - The transmitting of a digital signal in order to perform a quick continuity check of the BRI path between the CPE and the serving 5ESS[®] switch.

Specific testing procedures for the use of the 108TL will be determined by the operating company or CPE users.

5. The 5ESS[®] switch will terminate the TSI loopback when a **DIS**connect message is received from the CPE or when the 20-minute timer expires. The normal call disconnect sequence is then followed.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.16-1 Differences Between BRITL and 108TL

ITEM	BRITL	108TL
Technologies Supported	Custom BRIs: U-Interface (AMI & 2B1Q) and T-Interface.	Standard BRIs: U-Interface (2B1Q) and T-Interface.
Bearer Capabilities Supported	Originations from CSV.	Originations from CSV and CSD.
64 kbps or 56 kbps Access	64 kbps access may not be available to RISLUs and potentially not available if the path to the ISTF, GDSF or the ISTF functionality on the GDSF is on an RSM "umbilical". GDSF is allowed on RSMs for ISTF functionality only. 56 kbps is always available.	64 kbps access may not be available to RISLUs. 56 kbps is always available.
User Test Options	Under CPE key pad control: Used by switch to determine (1) the termination to be looped back (CPE, NT, CU, or LC), (2) test duration, and (3) channel (B1 or B2) to test. Note: If the channel to be tested is NOT the one from which the BRITL call originated, then the channel is tested regardless of the services (CSV, CSD, and Packet) on that channel.	Switch does not accept test options from user. Switch provides: (1) the loopback termination at the TSI, (2) a loopback on the B-channel originating the test request, and (3) a loopback for up to 20 minutes. Note: Channels that support only packet services cannot be tested.
Test Pattern	Sourced from switch.	Sourced from CPE. Typically, the CPE is temporarily replaced with a Portable Test Set (PTS). Refer to Bellcore TR-TSY-000816.
CPE Display	Switch updates CPE display with test results.	Switch does not generate any CPE display. Test results under PTS control. Refer to TR-TSY-000816.
Default Service	Access to BRITL is allowed.	Cannot be assigned to a standard BRI.
Feature Interactions	Handled as an originating call while entering BRITL test options. Handled as a maintenance call while testing the loop.	Handled as a normal call until the 7D 108TL access DN is dialed. From that point on the call is handled as a TM maintenance call.
AMA Records	Billed AMA records are optional.	No AMA records are created.

Procedure 7.17: BASIC RATE INTERFACE VERIFICATION (BRIV)

OVERVIEW

The steps in this procedure allow for an operational test of the Standard Digital Subscriber Line (DSL). The operational test is accomplished by generating a circuit switched voice (CSV) origination and circuit switched data (CSD) tests of the B-channels accessible from the Customer Premises Equipment (CPE) on the standard basic rate interface.

NOTE: The BRIV feature is only available to CPE equipment connected to Standard DSLs. See Procedure 7.15, — Basic Rate Interface Dial-Up Test Line (BRITL) to test CPE equipment connected to pre-Standard DSLs or Custom ISDN interfaces.

The following operations are supported:

- Verify the office equipment number (OE).

In order to use the Basic Rate Interface Verification (BRIV), the test line access code must be defined in the office data base through one or more of the following ways:

- Individualized Dialing Plan (IDP) [Business and Residential Custom Services (BRCS) user only]
- Primary Digit Analysis.
- Local Digit Analysis
- Regular Directory Number (7 digits).

Recent Change View 9.13 defines the digit string for BRIV in the IDP group. The following parameters should be used to insert the access code in View 9.13:

IDP GRP	Name of IDP Group (Key)
INC DIGIT	Access Code to be assigned (Key)
STATE	NORMAL
ACTION	BTLUSE
FEATURE	/*

Recent Change View 9.2 defines the digit string for BRIV in the Primary Digit Interpreter Table (PDIT). The following parameters should be used to insert the access code in View 9.2:

PDIT	Primary Digit Interpreter Table (Key)
INC DIGIT	Access code to be assigned (Key)
CALL TYPE	FEATURE
TYPE CI CALL	NONCI
FEATURE	/*
ACTION	BTLUSE
PREFIX	NONE

Recent Change View 9.3 defines the digit string for BRIV in the Local Digit Interpreter Table (LDIT). The following parameters should be used to insert the access code in View 9.3:

LDIT	Local Digit Interpreter Table (Key)
INCOMING DIGITS	Access code to be assigned (Key)
CALL TYPE	BRITL
TYPE CI CALL	NONCI
NBR OF DIGITS	Number of digits to collect (length of access code).

Recent Change View 1.5 defines the directory number for BRIV. The following parameters should be used to insert the directory number in View 1.5:

TN	Telephone Number
PTY	I
MFRI	N
RAX	Same RAX used on 4.1
LCC	TST
RTI	0
TSTCODE	BRITL
TRC	N

For additional information on Recent Change views, refer to the appropriate Recent Change/Verify (RC/V) manual.

During a BRIV call, the following treatments may be observed:

- Audible Ringing for 2 seconds, CSV only.
- Message "Connected" is displayed on CPE for 1 second.
- OE identification value is displayed on CPE.

PROCEDURE

1. At the station under test, dial the BRIV access code (DN assigned through RC/V).
2. Enter the appropriate code to display the LCEN or ILEN or LCKEN and the PDN.

During a BRIV call, the following treatments may be observed:

- Audible Ringing for 2 seconds, CSV only.
- Message "Connected" is displayed on CPE for 1 second.
- OE identification value is displayed on CPE.
- OE is displayed for 60 seconds.

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

Procedure 7.18: NETWORK TERMINATION/CHANNEL UNIT MISMATCH TEST

OVERVIEW

This procedure describes the manual Network Termination (NT1)/Channel Unit (CU) Mismatch Test. This test performs Integrated Services Line Unit (ISLU) NT1, or first Basic Rate Interface Transmission Extension (BRITE) CU mismatch detection for U-Interface Digital Subscriber Lines (U-DSLs).

NOTE: Mismatch testing is not supported on integrated digital carrier unit (IDCU) digital subscriber lines (DSLs).

Two types of U-DSL technologies exist:

- Alternate Mark Inversion (AMI) U-DSL
- ANS[®]/U-DSL.

The KCB10 U-Card is used to provide the U-DSL AMI service. The KCB17 ISLU U-Card or MPU2 ISLU2 U-Line Circuit is used to provide the U-DSL ANSI service. A mismatch exists if the Line Card (LC) installed does not match the type of service assigned to the customer at LC provisioning time, or the NT1 or first BRITE CU that is connected to the U-Card/U-Line Circuit does not match the type of service.

The Mismatch Test will also detect tip and ring wiring reversals that may be present on an AMI U-DSL line since tip and ring reversals do not permit loop sealing current to flow on AMI U-Cards/U-Line Circuit that are connected to AMI NT1s.

On an hourly basis, the automatic Mismatch Test runs on all U-Cards/U-Line Circuits that have a D-Channel port status indicating that Integrated Services Digital Network (ISDN) layer 1 is not established at the 2-wire U-Interface. Layer 1 may not be established because of a mismatch condition. When the automatic Mismatch Test detects a mismatch, then the D-Channel port status supplementary information is updated to MSMTCH to indicate the mismatch condition, and a summary report is printed on the Receive-Only Printer (ROP) for all U-DSLs that are found with a mismatch condition.

There are several Global Parameters that provide craft control of the automatic Mismatch Test and its report. Switching module/switching module-2000 (SM/SM-2000) global parameters are changed using the **INH:MISMATCH** and **ALW:MISMATCH** input commands. Office global parameters for the automatic Mismatch Test are changed using the Recent Change/Verify (RC/V) Global Parameters view 8.1.

CAUTION: When it is required that the DSL be seized, the customer will be denied use of the seized DSL or DSL channel(s).

PROCEDURE

1. At the Master Control Center (MCC), invoke the on-demand NT1/CU Mismatch Test by performing any of the following:
 - (a) Enter the **TST:DSL** input message with the **MSMTCH** option. Output will be printed on the ROP and will indicate if a mismatch was detected and the type of LC and NT1/CU found.
 - (b) At the TLWS video terminal, access a TLWS test position [**16X** for 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160). Refer to the **Caution** and seize the line using poke command **4001,DN**. At the TLWS supervision page (5200), execute command **5212**. Output will be displayed at the TLWS screen and will indicate if a mismatch was detected and the type of mismatch

detected, either LC mismatch or NT1/CU mismatch. To release the line, enter poke command **4999**. Release the TLWS test position [**20X** for 5E8 or **201,X** for 5E9(1) and later] from the TLWS test position summary page (160).

- (c) At the TLWS video terminal, access a TLWS test position [**16X** for 5E8 or **161,X** for 5E9(1) and later] from the TLWS test position summary page (160).
- (d) Refer to the **Caution** and seize the line using poke command **4001,DN**. At the TLWS automatic testing page (5400), execute command **5414**. Output will be displayed on the ROP and will indicate the type of mismatch detected. Release the TLWS test position from the 160 page by entering poke command **20X** for 5E8 or **201,X** for 5E9(1) and later.

NOTE: The on-demand NT1/CU Mismatch Test may also be invoked by using Phase 4 of the U-Card/U-Line Circuits diagnostic.

2. If either an LC or an NT1/CU mismatch condition was detected, the D-Channel port status supplementary information updates to MSMTCH to indicate this condition. The port status for a line may be reported by using the **OP:STATUS** input command, or the **OP:LIST,LINES** input command. To correct a mismatch, proceed as follows:
 - (a) If the Mismatch Test indicates an NT1/CU mismatch, it is recommended to perform metallic loop tests on the U-DSL to distinguish metallic loop faults from NT1/CU mismatch conditions. (Metallic loop tests are accessed through the Metallic testing page 5600 of the TLWS.)
 - (b) To confirm the results of the NT1/CU Mismatch Test, especially when an NT1/CU mismatch has been detected, the craftsperson should ascertain the type of NT1 or first BRITE CU connected to the U-DSL. The NT1 or first BRITE CU should match the type of service (either AMI or ANSI) that was assigned to the customer at LC provisioning time. The results of the Mismatch Test show the type of service (either AMI or ANSI) that is assigned to the U-DSL.
 - (c) If the Mismatch Test indicates an U-Card mismatch:
 - (1) Remove the mismatched LC from service using the **RMV:ISLULC** input command [the incorrect LC may already be out of service (OOS) due to switch fault recovery actions].
 - (2) Replace the incorrect LC with the correct type of U-Card.
 - (3) Diagnose the correct LC and restore it to service using the **RST:ISLULC** input command.
 - (d) If the Mismatch Test indicates an U-Line Circuit mismatch:
 - (1) Remove the mismatched U-Line Circuit from service using the **RMV:ISLULB** input command [the incorrect U-Line Circuit may already be out of service (OOS) due to switch fault recovery actions].
 - (2) Replace the incorrect U-Line Circuit with the correct type of U-Line Circuit.
 - (3) Diagnose the correct U-Line Circuit and restore it to service using the **RST:ISLULB** input command.

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

Procedure 7.19: PERFORM TESTS ON A PACKET SWITCHING MODEM POOL ACCESS LINE

OVERVIEW

This procedure uses test features provided in the 5ESS[®] switch to test a Modem Pool Access Line. A Modem Pool Access Line consists of a Basic Rate Interface (BRI) digital line and an analog line. Manual execution of these tests should only be required when a problem with the line has been reported. This procedure would then be used to confirm that there is a problem and to do further testing for fault sectionalization.

This procedure is oriented toward the use of the Master Control Center (MCC) or other terminals using the **TST:MP...** input messages and associated output messages. For details associated with formats and parameters, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

PROCEDURE

1. Identify the Modem Pool Multiline Hunt Group (MLHG) number by entering the **OP:CONV,DN=a** input message, where **a** is the directory number (DN) of an analog member of the modem pool group.

NOTE 1: The Modem Pool MLHG number may also be found by entering the **OP:CONV,LCEN=b** input message, where **b** is the equipment number of a Digital Subscriber Line (DSL) member of the modem pool or an analog member's equipment number for an analog member residing on a Z-card. The **OP:CONV,LEN=c** input message may also be used, where **c** is the equipment number of an analog member's equipment number for an analog member not residing on a Z-card.

NOTE 2: If the DN entered is the packet Modem Pool MLHG DN (a DN that a packet user would dial to gain access to the Modem Pool MLHG for the first stage of its two-stage dialing procedures), or a modem access DN (a DN that an analog user would dial to gain access to a modem pool and make a call request to a particular packet service), "MP access DN" will be returned and the MLHG will not be identified. Refer to the office records, [forms 5109 and 5111, which are associated with RC/V view 1.6 (5E7 and later software releases)]. Modem pool MLHG information can be retrieved with the analog member's DN or equipment number previously mentioned. The MLHG information may also be found by using a DSL member's equipment number on office records 5900, 5900A, and 5901, which are associated with RC/V view 23.2.

2. If the input message is accepted [usually as evidenced by a printout follows (PF) at the end of the input message], an output message will be printed on the Receive-Only Printer (ROP), giving the MLHG information in the format **MLHG=b-c**, where **b** is the MLHG number, and **c** is the MLHG member.
3. Determine if the equipment is out of service (OOS) by entering the command **OP:STATUS,MLHG=b-c**. This will give the status of the analog as well as the digital member of the modem pool. The status of the entire modem pool (digital and analog members) can be seen by entering the command **OP:LIST,MLHG=a**, where **a** is the modem pool MLHG number.
4. If the digital line or analog line is OOS, determine the reason and perform Procedure 3.1, Clear Diagnostic Failure in Hardware (Units/Circuits) of 5ESS[®] switch, if necessary.

NOTE: This test will still work if the analog line is OOS MTCE DSBLD.

5. Request a modem pool test by entering **TST:MP,MPM=b-c**. At least three of the modem pool members (digital and its analog counterpart) should be in service when this test is done. Repeat this step several times.

NOTE: This test relies heavily on customer-owned equipment. Settings of Integrated Services Digital Network (ISDN) terminal adapters and analog modems are critical to the success of this test.

6. If testing is passing consistently, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.** Otherwise, continue with the next step.
7. If testing is failing (perhaps intermittently), or the test cannot isolate the faulty MPM, perform Substeps (a) through (e) as follows:
 - (a) The results of a failed modem pool test will include two members (c,d) of the MLHG. Run the test again using one of these members and a different member (e) which is known to be good as follows:
 - (1) Remove member *d* by entering **RMV:LINE,MLHG=b-d**.
 - (2) Enter **TST:MP,MPM=b-c,MPMB=b-e**. Repeat several times.

NOTE: It is a good idea to have an additional in-service member available (possibly member *f*). For example, in the case of testing member *c* against member *e*, if there are errors found, the **TST:MP** command will look for another in-service member to test with. Member *d* could not be used with this command since it is OOS, and OOS members cannot be tested unless they are used explicitly in the command mentioned here.
 - (b) If this test is passing consistently, member *d* is the suspected faulty equipment.
 - (c) If this test is failing (perhaps intermittently), or the test cannot isolate the faulty MPM, run the test again as follows:
 - (1) Remove member *c* by entering **RMV:LINE,MLHG=b-c**.
 - (2) Enter **TST:MP,MPM=b-d,MPMB=b-e**. Repeat several times.

NOTE: It is a good idea to have an additional in-service member available (possibly member *f*). For example, in the case of testing member *d* against member *e*, if there are errors found, the **TST:MP** command will look for another in-service member to test with. Member *c* could not be used with this command since it is OOS, and OOS members cannot be tested unless they are used explicitly in the command mentioned here.
 - (d) If this test is passing consistently, member *c* is the suspected faulty equipment.
 - (e) If the fault still cannot be isolated, the problem is most likely associated with the settings of the analog modem or the terminal adapter.
8. When the problem has been cleared, check to see that the digital and analog lines have been restored to service.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.20: (R)ISLU LINE CARD SPARING

OVERVIEW

NOTE: This procedure is intended for the Remote Integrated Services Line Unit (R)ISLU only, it is **not** intended for an ISLU2. See Procedure 7.21, — ISLU2 Line Circuit Sparing Operations for ISLU2 line card sparing.

Procedure 7.20 is used to restore service to a subscriber line assigned on a (R)ISLU that is in an unmanned office or peripheral site. Because LC sparing uses call processing resources and maintenance resources, the LC that is OOS or in a degraded state should be replaced as soon as possible. Therefore, use this LC sparing procedure as a temporary fix only.

In the event a Line Card (LC) goes out of service (OOS), the craft may either repair/replace the LC or defer this action to a later time through LC sparing. This is especially convenient for a (R)ISLU. The steps in this procedure describe the method to be used for assigning an (R)ISLU spare LC in the STANDBY state to temporarily replace an OOS LC. The method to remove a spare LC and place it back into the STANDBY state is also described. It is assumed that either a spare U-type or Z-type LC will be assigned to replace an OOS LC of the same type.

A maximum of two LCs (Z-type, U-type, or a combination) can be actively spared in an (R)ISLU. Sparing is not intended to be activated indefinitely since it requires resources that are also used by call processing and maintenance activities.

In an (R)ISLU, there are two Metallic Access Network (MAN) buses (0 and 1). Each LC has two line group (LG) bus access inputs to the MANs. Each MAN spare bus half is connected to every other Line Group Controller (LGC) half-group where LCs 0-15 are considered the lower half and 16-31 the upper half. The LC position 15 can only be connected to MAN spare bus 0 and LC position 31 to MAN spare bus 1. Spare Z-type LCs may be assigned to either slots 15 or 31 in any equipped LGCs. However, due to internal LC hardware limitations for MAN access, spare U-type LCs may only be equipped in slot 15. Therefore, sparing operations for U-type LCs are limited to bus 0.

Since sparing requires relay operations by the LC to be spared, some faults may occur that will prevent sparing from being successfully completed. Once sparing has been activated, the faulty LC cannot be physically removed from the LGC without affecting customer service. In order to replace a faulty LC, it must first be unspared by using the sparing deactivation procedure.

The faulty LCs to be spared must not be within the same four-line half groups that share a common test bus segment in order to prevent denying access to other LCs in these groups from the test bus. Since U-type LCs can only be spared on MAN bus 0, only one active spare LC will be allowed in each line group 0-7 and 8-15 providing that the faulty and selected designated spare LCs are within the same MAN half and do not require a path that spans MANs. If a U-type LC is spared between lower and upper MAN halves, only one LC can be spared.

PROCEDURE

1. Proceed using one of the following:
 - (a) If activating a spare LC, continue with Step 2.
 - (b) If deactivating a previously spared LC, go to Step 26.
2. To display the Master Control Center (MCC) page for the Line Group (LG) equipped with the spare LC, type and enter:

1720,Y,Z,X

Where:

Y = (R)ISLU number
Z = LG number (where spare is located)
X = switching module (SM) number (where (R)ISLU is located).

Response: (R)ISLU line group page is displayed.

3. Verify spare LC equipage on 1720 Page.

If sparing Z-type LC:

ISLUC 15 or 31 with TYPE = ZSP

If sparing a U-type LC:

ISLULC 15 with TYPE = AULC

4. At the MCC, diagnose the spare LC to be activated by entering:

51XX

or

DGN:ISLULC=a-b-c-d,raw,tlp

Where:

a = SM
b = ISLU number
c = LGC number
d = spare LC number
XX = LC number.

NOTE: An all tests passed (ATP) condition must be achieved before continuing with the next step. If the sparing option plug is not properly installed, diagnostics will fail.

5. If the spare LC ATPs, restore unconditionally by entering:

31XX,UCL

or

RST:ISLULC=a-b-c-d,UCL

Where:

a = SM
b = ISLU number
c = LGC number
d = spare LC number
XX = LC number.

Response: RST: ISLULC a-b-c-d COMPLETED.

6. Is the LC on MCC Page 1720 OOS?

If **YES**, continue with Step 7.

If **NO**, enter **21XX** then continue with Step 7.

Where:

XX = LC to be spared.

NOTE: LC must be OOS to be spared.

7. Depending on the type of terminal being used, perform either (a) or (b) as follows:

(a) If using the MCC, go to Step 10.

(b) If using a Recent Change/Verify (RC/V) terminal (the recommended method), continue with Step 8.

8. At the RC/V terminal, enter :

RCV:MENU:APPRC,PRINT,VERBOSE;

Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.

9. Go to Step 15.

10. At the MCC, ensure that the terminal is in COMMAND mode.

11. If the RCV PARAMETER INFO page is not already displayed, enter poke command **196**.

Response: RCV PARAMETER INFO page is displayed with cursor at PRINT OPTION.

12. At the MCC, enter command **y**.

Response: Cursor at DETAIL OPTION.

13. At the MCC, enter command **n**.

Response: Cursor at SUMMARY OPTION.

14. At the MCC, enter command **y**.

Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.

15. Enter command **4.23**.

Response: Enter data base operation:

I=Insert, R=Review, D=delete:.

16. Enter **i**.

Response: RECENT CHANGE LINE CARD SPARING page displayed with cursor at FLTY OE attribute as follows:

ATTRIBUTE

*1. FLTY OE _

4. SPR OE _

(* key attribute)
Response: Enter Insert, Change, or Print:

17. Enter the appropriate value for the key attribute FLTY OE, (originating equipment number to which the spare LC will be assigned and spare originating equipment number if desired) using format **[C][I] aaabccdd** .

Where:

C = character representation for a Z-type LC
 I = character representation for a U-type LC
 aaa = SM
 b = ISLU number
 cc = LGC number
 dd = LC slot number.

NOTE: If not specifying a spare originating equipment number, enter 2 carriage returns.

18. Enter i.

Response: Inserting . . . Form Inserted
 RECENT CHANGE 4.23 page displayed
 Cursor at FLTY OE attribute.

19. Repeat Steps 17 and 18 for any other spare LC in this (R)ISLU which needs to be spared.

20. Exit the RECENT CHANGE LINE CARD SPARING VIEW by entering <.

Response: LINES MISCELLANEOUS VIEWS 4.0 page is displayed.

21. Exit the Recent Change session by entering q.

Response: RCV MENU APPRC COMPLETED
 or
 RCV - 196 COMPLETED.

22. Verify the MCC page display for the spare LC by entering **1720,Y,Z,X**.

Where:

Y = (R)ISLU number
 Z = LGC number
 X = SM number.

Response: (R)ISLU LGC page is displayed.

23. Verify from the MCC page displayed that the now activated spare LC displays a state of DSPR and that the spared LC indicates a state of SPR. The box on the lower right-hand side of the MCC page display will have a display indicating "LC xx spr" to "LC xx", where "xx" is the appropriate LC slot numbers.

NOTE: Depending upon the LGC location of the spare LC and the LGC location of the LC to be spared, two LGC pages may have to be displayed.

24. At the MCC, back up the Office Dependent Data (ODD) by entering **BKUP:ODD**.

Response: BKUP ODD COMPLETED.

NOTE: Data base backup will take several minutes to complete.

25. **STOP. YOU HAVE COMPLETED THE ACTIVATION PORTION OF THIS PROCEDURE.**

26. Verify the MCC page display for the (R)ISLU spare LC to be deactivated by entering **1720,Y,Z,X**.

Where:

Y =	(R)ISLU number
Z =	LGC number (where spare is located)
X =	SM number.

Response: (R)ISLU line group page is displayed.

27. Determine from the MCC page displayed that the spare LC to be deactivated is properly displayed.

NOTE: If the spare LC to be deactivated is a Z-type, it may be in LC slot 15 or 31. If the spare LC to be deactivated is a U-type, it can only be in LC slot 15.

28. Depending on the type of terminal being used, perform either (a) or (b) as follows:

(a) If using the MCC, go to Step 31.

(b) If using an RC/V terminal (the recommended method), continue with Step 29.

29. At the RC/V terminal, enter:

RCV:MENU:DATA,APPRC,PRINT,SUMMARY;

Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.

30. Go to Step 36.

31. At the MCC, ensure that the terminal is in COMMAND mode.

32. If the RCV PARAMETER INFO page is not already displayed, enter poke command **196**.

Response: RCV PARAMETER INFO page is displayed with cursor at PRINT OPTION.

33. At the MCC, enter command **y**.

Response: Cursor at DETAIL OPTION.

34. At the MCC, enter command **n**.

Response: Cursor at SUMMARY OPTION.

35. At the MCC, enter command **y**.

Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.

36. Enter command **4.23**.

Response: Enter data base operation:
I=Insert, R=Review, D=delete:.

37. Enter **d**.

Response: RECENT CHANGE LINE CARD SPARING page displayed with cursor at FLTY OE attribute as follows:

ATTRIBUTE
*1. FLTY OE _

(* key attribute)
Response: Enter Delete, Validate, or Print:

38. Enter the appropriate value for the key attribute FLTY OE, (port number to which the spare LC is to be assigned) using format **[C][I] aaabccdd**.

Where:

C =	character representation for a Z-type LC
I =	character representation for a U-type LC
aaa =	SM number
b =	ISLU number
cc =	LGC number
dd =	LC slot number.

Response: The remainder of the form will be filled in.

39. Enter **d**.

Response: Deleting . . . Form Deleted
RECENT CHANGE 4.23 page displayed
Cursor at FLTY OE attribute.

40. Repeat Steps 38 and 39 for any other spare LC in this (R)ISLU which needs to be unspared.

41. Exit the RECENT CHANGE LINE CARD SPARING VIEW by entering **<**.

Response: LINES MISCELLANEOUS VIEWS 4.0 page is displayed.

42. Exit the Recent Change session by entering **q**.

Response: RCV MENU APPRC COMPLETED
or
RCV - 196 COMPLETED.

43. Verify the MCC LGC page display for the spare LC and for the faulty LC which has been spared by entering **1720,Y,Z,X**.

Where:

Y = (R)ISLU number
 Z = LGC number
 X = SM number

Response: (R)ISLU LGC page is displayed.

44. Verify from the MCC page displayed that the now deactivated spare LC displays a state of STBY and that the faulty spared LC is in the OOS state (this will be true if both LCs were in the ACT state prior to the delete). If the faulty LC was in the OOS state prior to the delete, then both the LCs will indicate the OOS state after the delete.
45. Remove the OOS LC which had been spared from the drawer and replace it with a good LC.
46. At the MCC, back up the ODD by entering **BKUP:ODD**.

Response: BKUP ODD COMPLETED.

NOTE: Data base backup will take several minutes to complete.

47. At the MCC, diagnose the replaced LC by entering :

51XX

or

DGN:ISLULC=a-b-c-d,raw,tlp

Where:

a = SM number
 b = ISLU number
 c = LGC number
 d = LC number
 XX = LC number.

NOTE: An ATP condition must be achieved before continuing with the next step.

48. At the MCC, activate the replaced LC to service by entering:

31XX,UCL

or

RST:ISLULC=a-b-c-d,UCL

Where:

a = SM number
 b = (R)ISLU number
 c = LGC number
 d = LC number
 XX = LC number.

Response: RST: ISLULC a-b-c-d COMPLETED.

NOTE: An ATP condition must be achieved before continuing with the next step.

49. Verify that the customer assigned to the replaced LC has service.
50. **STOP. YOU HAVE COMPLETED THE DEACTIVATION PORTION OF THIS PROCEDURE.**

Procedure 7.21: INTEGRATED SERVICES LINE UNIT MODEL 2 (ISLU2) LINE CIRCUIT SPARING OPERATIONS

ISLU2 Definition

The ISLU2 LCKEN is defined as follows: LCKEN=SM-LU-LG-LBD-LCKT

Where:

SM =	Switching module number
LU =	Line unit number
LG =	Line group number
LBD =	Line board number
LCKT =	Line circuit number

Prerequisite Conditions

- (1) The faulty LCKT must be OOS; otherwise, the sparing facility cannot be used.
- (2) The faulty LCKEN must have a port assignment.
- (3) Up to 4 spare LCKTs are populated and up to 4 spare connections are active simultaneously.
- (4) Only 1 faulty circuit is spared within a given LG.
- (5) The faulty circuit is only spared by a LCKT within the same ISLU2.
- (6) For U-circuits, possible sparing positions are as follows:

LG 0-LBD 0-LCKT 0
LG 7-LBD 3-LCKT 0
LG 8-LBD 0-LCKT 0
LG 15-LBD 3-LCKT 0

PROCEDURE

1. If sparing actions are required because of a subscriber complaint, to find the LCKEN, type and enter the following:

OP:CONV,DN=a;

Where:

a = DN of subscriber

NOTE: The system can find a faulty LCKT by REX. When REX finds the faulty pack, it is placed in a degraded state and prints the LCKEN. The LCKEN is used later in this procedure.

2. At the MCC terminal, for the SM involved, type and enter **1730,Y,Z** menu command.

Where:

Y = ISLU2 number
Z = LG number (obtained from LCKEN).

3. Check if the faulty LCKT is OOS. If not, to remove the faulty LCKT from service, type and enter **22X,Y** menu command.

Where:

X = LBD number
Y = LCKT number

NOTE: Camp-on occurs if the customer is using the line. Try again when the line is idle.

Procedure 7.21.1: Activate Spare Line Circuit

PROCEDURE

1. Select view **4.23** in the insert mode.
2. At the parameters **FAULTY OE** and **SPARE OE** enter the appropriate values.

Reference: Recent Change Manual

3. To insert the data, type and enter **i**

Response: **inserting. . . FORM INSERTED** is displayed

4. Return to the class menu.
5. Verify the subscriber is in service, type and enter:

OP:STATUS,DN=a;

Where:

a = DN of subscriber

Procedure 7.21.2: Operation with Spare Connections active

NOTE: The following should be noted when sparing connections are active.

PROCEDURE

1. Requests to diagnose or conditionally remove the spared faulty circuit, line board, LG, the designated spare circuit, or the MAN packs supporting the spare connection is denied.
2. Requests to unconditionally remove any of the circuits will succeed, and the spare path is automatically taken down. Once this happens, the faulty spare circuit cannot be restored again until the sparing data is removed by the RC/V terminal.
3. When a spare connection is active, diagnostics are inhibited on the entire line board associated with the faulty circuit (including other circuits that are not faulty).
4. To print a report of all active spare connections in an SM, type and enter:

OP:CFGSTAT,SM=a,SPARE;

Where:

a = SM number

Procedure 7.21.3: Deactivate Spare Connection

PROCEDURE

1. Start up the RC/V menu mode.
2. Select the view **4.23** in the delete mode.
3. At the parameter **FAULTY OE** enter **LCKEN**.
4. To deactivate the sparing connection between the faulty and spare LCKTs, type and enter **d**

Response: deleting. . . FORM DELETED is displayed.

5. Return to the class menu.
6. **CAUTION:** Service interruption occurs to other users of the same line board being replaced. Therefore, perform a conditional removal of the line board before replacement.

To replace and restore to service the line board where the faulty circuit was, follow the hardware installation procedures in the Hardware Change Manual.

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

Procedure 7.22: EOC/TMC DUPLEX FAILURE RESTORAL

OVERVIEW

The following is a procedure to restore the Embedded Operations Channel/Time slot Management Channel (EOC/TMC) Derived Data Links (DDL) after they have duplex failed.

PROCEDURE

1. To determine the state of the EOCs or TMCs, type in at the Master Control Center (MCC) the following command:

OP:CFGSTAT,SM=x,OOS

Refer to 235-600-700, *Input Message Manual*, for a description of the **OP:CFGSTAT** command.

2. From the output of the **OP:CFGSTAT** command, determine which EOC/TMC to work on.

3. Is the circuit out of service/removed (OOS/RMVD)?

If **YES**, type in the following command at the MCC:

RST:EOC=a-b-c-d.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, and the 235-600-750, *Output Message Manual*, for the **RST:EOC** command.

NOTE: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

4. Is the circuit out of service/trouble analysis (OOS/TBLA)?

If **YES**, type in the following command at the MCC:

RST:EOC=a-b-c-d.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, and the 235-600-750, *Output Message Manual*, for the **RST:EOC** command.

NOTE: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

5. Is the circuit out of service/family of equipment (OOS/FE)?

If **YES**, continue.

6. To determine the Protocol Handler (PH) associated with the EOC/TMC, type in at the MCC the following command:

OP:CONV,EOC=a-b-c-d

Refer to the 235-600-700, *Input Message Manual*, for the **OP:CONV** command.

7. Display the Remote Terminal (RT) MCC page associated with the EOC/TMC. At the MCC, type and enter the following poke command:

For 5E9(1) and earlier

188xy

For 5E9(2) and later

1880,X,Y

Where:

x = integrated digital carrier unit (IDCU)
y = the RT number.

8. At the MCC, type in the following command:

OP:CFGSTAT,SM=x,OOS.

Perform this command for the switching module/switching module-2000 (SM/SM-2000) associated with the EOC/TMC that is OOS.

9. Is the PH OOS/RMVD (removed)?

If **YES**, type in the following command at the MCC:

RST:PSUPH=a-b-c-d.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:PSUPH** command.

10. Is the PH OOS/FE (Family of Equipment)?

If **YES**, type in the following command at the MCC:

RST:PSUCOM=a-b-c.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:PSUCOM** command.

11. Is the Integrated Digital Carrier Unit (IDCU) digital signal level one (DS1) facility (FAC) circuit (IFAC) OOS/RMVD (removed)?

If **YES**, type in the following command at the MCC:

RST:IFAC=a-b-c.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:IFAC** command.

NOTE: Due to potential EMI emissions, all DS1 facilities connected to an IDCU are required to be properly terminated. The 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.

12. Is the Electrical Line Interface (ELI) OOS/RMVD (removed)?

If **YES**, type in the following command at the MCC:

RST:IDCUELI=a-b-c.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:IDCUELI** command.

13. Is the ELI OOS/FE (Family of Equipment)?

If **YES**, type in the following command at the MCC:

RST:IDCU=a-b-c.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:IDCU** command.

14. Is the circuit OOS/FAF (Facility Failure)?

If **YES**, type in the following command at the MCC:

RST:IFAC=a-b-c.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, for the **RST:IFAC** command.

15. Is the circuit OOS/LVL2ERR (Level 2 Protocol Error)?

If **YES**, type in the following command at the MCC:

RST:EOC=a-b-c-d.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, and the 235-600-750, *Output Message Manual*, for the **RST:EOC** command.

NOTE 1: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

NOTE 2: The switch will attempt to automatically restore the EOC/TMCs in this state once every 3 minutes.

16. Is the circuit OOS/LVL3ERR (Level 3 Protocol Error)?

If **YES**, type in the following command at the MCC:

RST:EOC=a-b-c-d.

If **NO**, go to the next step.

Refer to the 235-600-700, *Input Message Manual*, and the 235-600-750, *Output Message Manual*, for the

RST:EOC command.

NOTE 1: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

NOTE 2: The switch will attempt to automatically restore the EOC/TMCs in this state once every 3 minutes.

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

Procedure 7.23: ANALYZE TLWS RESPONSE FOR INTEGRATED DIGITAL CARRIER UNIT FIBER TO THE HOME (FTTH)

OVERVIEW

The only way to identify that an IDCU line is FTTH is to run the TLWS input command 5601. This command will determine if the line is FTTH and will display the condition of the fiber. If the line is not FTTH, then 5601 input command will display the voltage, resistance, and capacitance results as it normally does. The 5601 results for FTTH will show the condition of the fiber from the remote terminal (RT) to the DT and the metallic drop from the DT to the customer's telephone.

NOTE: The TLWS input commands 5602, 5603, 5604, 5605, 5606, and 5611 do not give meaningful results for a FTTH line. The condition of the fiber beyond the channel unit (CU) in the RT is determined and an equivalent 3 terminal representation is set up in the RT CU. The TLWS 5601 input command is the only TLWS input command which correctly interprets the measured values and provides the information on the status of the FTTH line to the craft.

There is no way to determine if a line is FTTH unless you installed it or have seized the line from the TLWS and executed an input command 5601. There is no data kept in the 5ESS[®] switch to indicate what is past the RT. It is assumed that the following sequence has been executed.

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position [**16x** for 5E7 and 5E8 or **161,x** for 5E9(1) and later] from the TLWS test position summary page (160).
2. Seize the line using the appropriate poke command (4001,DN or 4008,ILEN).
3. From the metallic measurement page (5600), use the poke command (5601) to get the condition of the FTTH line.
4. Refer to the following list of response messages to determine the condition of the FTTH line:
 - **RT_DT FIBER GOOD, PHASE 1.0 DT**
The fiber is good and no drop test will be performed because the Phase 1.0 DT has no ability to perform a metallic drop test from the DT to the customer's telephone.
 - **RT_DT FIBER GOOD & NO DTM**
The fiber is good and the drop test module (DTM) is either not present in the phase 1.5 DT CU (ASJ2) or it is not functioning. This response indicates the use of phase 1.5 RT CUs (that is, AUA404/405) or Phase 2.0 RT CU (that is, AUA406).
 - **RT-DT FIBER GOOD & DROP TEST OK**
The fiber is good and the drop test passed. No errors are detected.
 - **RT-DT FIBER GOOD & NO RINGER**
The fiber is good and there is no ringer connected to the metallic past the DT.
 - **RT-DT FIBER IS GOOD & DROP FAILS (FEMF)**
The fiber is good and the drop test from the DT to the customer's telephone is failing because a possibly hazardous voltage has been detected on the line.
 - **RT-DT FIBER GOOD & RECEIVER OFF HOOK**

The fiber is good and the receiver is off hook on the customer's line.

- **RT-DT FIBER GOOD & HAZARDOUS DT VOLTAGE**

The fiber is good and a hazardous voltage has been detected at the DT. This message is only valid for phase 2.0 FTTH.

- **RT-DT FIBER GOOD, PHASE 1.0 RT**

The fiber is good and the RT contains a phase 1.0 RT channel unit (that is, AUA400/401). The phase 1.0 RT CU can not report the results of a drop test from the DT to the customer's telephone, even if the test is performed.

- **RT-DT FIBER OUT OF FRAME**

The fiber is bad. There is a problem between the RT and the DT.

When testing has been completed, continue with the following steps:

5. Release the metallic measurement position by entering the poke command (5990).
6. Release the line by entering the poke command (4999).
7. Access the TLWS test position summary page (160) and release the TLWS test position [20x for 5E7 and 5E8 or 201,x for 5E9(1) and later].
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.24: EOC/TMC PROTOCOL MONITORING

OVERVIEW

Protocol Monitoring (PM) allows the monitoring of protocols over Derived Data Links (DDL). Protocols currently supported for the Timeslot Management Channel (TMC) and Embedded Operations Channel (EOC) include Link Access Protocol D-Channel (LAPD), TMC, and V.120. This feature is similar to protocol monitoring for Digital Subscriber Lines (DSL) except a DDL is monitored instead of a single DSL (see Procedure 7.14, Digital Subscriber Line Protocol Monitoring).

A PM session consists of three major parts:

- Setup is determining the correct parameters for the session's input command (refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, for details).
- Trigger includes waiting for the event that causes a PM session to end and the collected data to be output to the read-only printer (ROP).
- Analysis is the studying of the output to determine what occurred over the link. Analyzing the output requires detailed knowledge of the monitored protocol.

Upon the execution of the **EXC:PM** input command, protocol events for the specified line are collected and stored until the trigger event occurs. The trigger event, which is specified through the input of TRIGVAL=c or PER=[d] on the command line, causes the PM session to stop collecting data after the trigger conditions have been met. By choosing to specify an offset input parameter of OFF=a, the craft can choose to manipulate whether the trigger will be the first event in the buffer, the last event, or somewhere in between.

Protocol Error Records (PER) or Message Triggering

The two types of protocol monitoring triggers are as follows:

- A PER trigger will cause a PER to detail an error event associated with switch-detected protocol errors. A choice must be made between triggering on any PER for a specific PER. For a complete list of PERs, refer to the ALE-PER Appendix section of 235-600-700, *Input Message Manual*.
- Message triggering (TRIGVAL=c) is used to terminate a PM session with the occurrence of a particular frame, packet, segment, or message traveling in a particular direction between the 5ESS[®] switch and the Customer Premises Equipment (CPE). For a complete list of messages, refer to the **EXC:PM** input message description in 235-600-700, *Input Message Manual*.

Monitoring and Triggering

Although the most common usage of PM is monitoring and triggering on a specific protocol (PROT=z), PM allows the user the option of monitoring one protocol but triggering on another by the use of **TRIGLVL=x** in the input command. Different level trigger can be requested by selecting a TRIGLVL value which differs from the level of the protocol being monitored. In this case, the specified TRIGVAL parameter must be of the same protocol level at TRIGLVL. Possible protocol/TRIGLVLS are as follows:

Protocol	Protocol Level	TRIGLVL
LAPD	Level 2	Level 3
TMC	Level 3	Level 2
V.120	Level 3	Level 7

By using the duration parameter (DUR=a), the length of a PM session can be controlled. Upon the expiration of the

duration parameter, the PM session will stop collecting data and begin to output the data on the ROP.

PROCEDURE

1. Determine the parameters to be used in the PM session input. At the minimum, two parameters are required as follows:
 - (a) Line identification (**EOC=a-b-c-d** or **TMC=a-b-c-d**)
 - (b) PER (for triggering on a PER) or TRIGVAL (for trigger on a frame, packet, segment, or message).

If no other parameters are specified, default values will be used. Refer to **EXC:PM** in 235-600-700, *Input Message Manual*, for a complete list of all input and default values.

2. At the Master Control Center (MCC), enter the **EXC:PM** command using the parameters collected in Step 1.
3. The output of a PM session is a hexadecimal dump of the frames collected. It can be analyzed by comparing the data against the appropriate protocol specification. See Procedure 7.14 , Digital Subscriber Line Protocol Monitoring, for a list of references.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.25: EOC/TMC AUTOMATIC LINE EVALUATION

OVERVIEW

Automatic Line Evaluation (ALE) provides nonservice affecting monitoring of Timeslot Management Channels (TMC) and Embedded Operations Channels (EOC). It does this by detecting and recording faults at Layers 2 and 3. These counts are displayed on the Receive-Only Printer (ROP) once every 24 hours or can be extracted and displayed by a manual request via the **EXC:ALE** input command (refer to 235-600-700, *Input Message Manual*, for use of this command). This procedure is similar to ALE for digital subscriber lines (DSL) except instead of monitoring a single line, an entire derived data link (DDL) is monitored (refer to Section 7.13 for DSL ALE). The Protocol Error Records (PER), which describe all protocol violations detected on a DDL, are temporarily stored in a circular buffer for retrieval by ALE. If a DDL is determined to be faulty due to excessive PERs detected, the DDL will automatically switch to its standby side.

PROCEDURE

1. At the Master Control Center (MCC) obtain the ALE output for a given DDL by entering the following command: **EXC:ALE,EOC=a-b-c-d,level2,per,print**

NOTE 1: Instead of using EOC, the command can also be executed by entering the following command:

TMC=SM#-IDCU#-RT#-PRIMARY_ID#. Refer to 235-600-700, *Input Message Manual*, for a complete description of the command options.

NOTE 2: The ALE-Level 1 is not supported for EOC/TMC DDLs.

2. The Level 2 output, which automatically resets every 24 hours, indicates a qualitative measure of Level 2 performance. A status of **NORMAL** indicates all is well at Level 2. A status of **NO-INFO** indicates that not enough packets were received to make an estimate of the Level 2 quality. For more details, refer to the **EXC:ALE-LVL2** output message in 235-600-750, *Output Message Manual*.
3. PERs indicate that the 5ESS[®] switch has detected potential Level 3 problems. Refer to the **EXC:ALE-PER** output message and the APP:ALE-PER Appendix of 235-600-750, *Output Message Manual*, for more details.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.26: IDCU TR303 REMOTE TERMINAL DATA MISMATCH CLEARING PROCEDURE

OVERVIEW

This procedure describes how to use the EXC:RT,PROV input message to clear any potential mismatches between the 5ESS® switch database and the provisioned data in the TR303 Remote Terminal. Refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, for details on how to use the input messages described below.

PROCEDURE

1. At the Master Control Center (MCC) enter the **OP:RT,PROV,LRT=sm-idcu-rt** input message to determine if provisioning failure reporting is enabled. If so continue with the next step. Otherwise, enable provisioning reporting for the RT in question by using the **ALW:RT,PROV,REPT,LRT=sm-idcu-rt** input message.
2. At the MCC enter **EXC:RT,PROV,TYPE=LINE,ILEN=sm-idcu-rt-line** to refresh the provisioned data for that line.
3. If the output message indicates **COMPLETED - NO TASKS PENDING** then the refresh operation was successful. Otherwise, consult the *Output Message Manual* to determine the meaning of the given result.
4. If the output message indicates a failure, examine the ROP for any occurrences of **REPT,RT,PROV** messages indicating a provisioning failure. This output message can be used to further identify the nature of the failure if it is present. Refer to the *Output Message Manual* for the interpretation of the **REPT:RT,PROV** output message.
5. If provisioning failure reporting was previously disabled, then disable it now by using the **INH:RT,PROV,REPT,LRT=sm-idcu-rt** input message.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.27: PERFORM SCHEDULING OF SUBSCRIBER LINE INSTRUMENT MEASUREMENT (SLIM) AUTOMATIC TESTS (5E10 AND LATER)

OVERVIEW

This procedure is used to define automatic test schedules on a large number of lines. This is done by using the recent change (RC) View 14.13, View 14.14, View 14.15, View 14.16, and View 14.17. Lists of line equipment numbers (LENs) should be defined to run tests on. Different tests are to be collected in a test set. For every test in a test set, a threshold is to be defined in a threshold list. The threshold is a set of values that are compared against the test results. The equipment number list, test set, and threshold list are linked together in a test job. Several test jobs are linked with a time schedule.

The tests in a test set are divided into three groups: voltage, resistance, and capacitance. A test job will test a single group of lines. Up to six test jobs may be included in a test session. A maximum of 30 failed lines are reported from a test job plus up to 30 unavailable lines. The maximum duration of a test session is 23 hours 59 minutes. After testing all required lines if any schedule time is left, SLIM (subscriber loop instrument measurement) will retest the lines that were faulty or unavailable. A line is called unavailable (for SLIM equipment) when it is conversation busy. A test session can run once, daily, weekly, or monthly. This allows some lines to be tested more frequently than others.

When tests sessions are defined, the status of the different sessions may be checked using the 162 SLIM TESTSESSION STATUS TP page. The valid status values are: SUSPENDED, DONE, IN PROGRESS, SCHEDULED, and DEFINED.

PROCEDURE

1. **NOTE:** For all the lines to be tested, SLIM must be allowed (PSLIM=N).

Are the PSLIM parameters already set to N for the required subscriber lines?

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

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

2. At the MCC terminal, to access the office dependent data (ODD) RC views, type and enter **196** menu command.

Response: **CLASS_MENU**

Input **CLASS, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM, or N** -> _____

3. Are subscriber line characteristic updates required for SLIM tests?

If **YES**, continue with Step 4.

If **NO**, go to Step 13.

4. To update View 1.6, type and enter **1.6u** menu command.

Response: View 1.6 is displayed. The cursor is positioned at the TN field.

5. Type and enter data for the following field:

TN ____ (Telephone number)

Response: The remaining fields are populated.
Enter Update, Change, Validate, or Print:

6. To start the change mode, type and enter **c**

Response: Change field:

7. Type and enter the PSLIM field number.

8. Type and enter **n**

Response: Change field:

9. Type and enter **<**

Response: Enter Update, Change, Validate, or Print:

10. To update the data, type and enter **u**

Response: updating . . . FORM UPDATED flashes in the upper-right corner of the screen. The cursor returns to the TN field.

11. At this point, to update other subscriber lines repeat Steps 5 through 10.

12. Return to the class menu.

13. **NOTE:** Views 14.13 through 14.17 are used to set up the SLIM routine mode tests. View 14.13 is used to link several LENS into one list identified by a equipment number list. This view is considered optional because LENS also can be specified in the overall test job (View 14.16).

To insert View 14.13, type and enter **14.13i** menu command.

Response: View 14.13 is displayed. The cursor is positioned at the OE LIST ID field.

14. Type and enter data for the following fields:

OE LIST ID	_____	(equipment number list 1-8)
ENTRY NUMBER	_____	(entry number 1-60)
START OE	- _____	(start/first office equipment number)

NOTE: The entry number is used to separate the equipment number within a list. For fields requiring no entry, type and enter an apostrophe (') to blank the field. Once all the fields are completed, the following response appears:

Response: Enter Insert, Change, Validate, or Print:

15. To insert the data, type and enter **i**

Response: inserting . . . FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the OE LIST ID field.

16. At this point, the technician is already in the insert mode. To insert the other OE LIST ID, repeat Steps 14 and 15.

17. Return to the class menu.

18. **NOTE:** View 14.14 is used to select insulation resistance and capacitance tests that are run along

with the compulsory foreign voltage test. Type and enter **y** or **n** for insulation resistance and capacitance tests. All the tests with **y** are executed.

To insert View 14.15, type and enter **14.15i** menu command.

Response: View 14.15 is displayed. The cursor is positioned at the TEST SET ID field.

19. Type and enter data for the following field:

TEST SET ID	(test set identifier 1-8)

NOTE: For fields requiring no entry, type and enter an apostrophe (') to blank the field. Once all the fields are completed, the following response appears:

Response: Enter Insert, Change, Validate, or Print:

20. To insert the data, type and enter **i**

Response: inserting . . . FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the TEST SET ID field.

21. At this point, the technician is already in the insert mode. To insert the other TEST SET ID, repeat Steps 19 and 20.

22. Return to the class menu.

23. **NOTE:** View 14.15 is used to set up the SLIM threshold list identifier. The higher values of insulation resistance are compared against the test results. The upper and lower values of the voltage tests and capacitance test are compared against the test results. The line passes if the test results are between those values. The off-hook tests shown on View 14.15 (Screen 3 of 3) are not used in the routine mode.

To insert View 14.15, type and enter **14.15i** menu command.

Response: View 14.15 (Screen 1 of 4) is displayed. The cursor is positioned at the THRESHOLD LIST ID field.

24. Type and enter data for the following field:

THRESHOLD LIST ID	(threshold list identifier 0-8)

NOTE: For fields requiring no entry, type and enter an apostrophe (') to blank the field. Once all the fields are completed, the following response appears:

Response: Enter Insert, Change, Validate, or Print:

25. To insert the data, type and enter **i**

Response: inserting . . . FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the THRESHOLD LIST ID field.

26. At this point, the technician is already in the insert mode. To insert the other THRESHOLD LIST ID, repeat Steps 24 and 25.

27. Return to the class menu.

28. **NOTE:** View 14.16 is used to set up the SLIM job identifier. The job identifier is the way View

14.13, View 14.14, and View 14.15 are linked together.

To insert View 14.16, type and enter **14.16i** menu command.

Response: View 14.16 is displayed. The cursor is positioned at the JOB ID field.

29. Type and enter data for the following fields:

TEST JOB ID	—	(job identifier 1-240)
TEST SET ID	—	(test set identifier 1-8)
THRESHOLD LIST ID	—	(threshold list identifier 0-8)

NOTE: If a LEN for testing has one simple upper and lower limit, it may be entered in View 14.16 under the JOB ID field instead of View 14.13 under the OE LIST ID field. For fields requiring no entry, type and enter an apostrophe (') to blank the field. Once all the fields are completed, the following response appears:

Response: Enter Insert, Change, Validate, or Print:

30. To insert the data, type and enter **i**

Response: inserting . . . FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the JOB ID field.

31. At this point, the technician is already in the insert mode. To insert the other JOB ID, repeat Steps 29 and 30.

32. Return to the class menu.

33. **NOTE:** View 14.17 is used to set up the SLIM test session identifier. A maximum of six jobs are collected to be executed at one time. With the periodicity parameter, the cycle frequency is specified. At the start time, the test session executes automatically. When the start time is defined within 1 minute of the actual time, the session starts immediately. If the stop time is a lower value than the start time, it is considered to be the next day.

To insert View 14.17, type and enter **14.17i** menu command.

Response: View 14.17 is displayed. The cursor is positioned at the TEST SESSION ID field.

34. Type and enter data for the following fields:

TEST SESSION ID	—	(session identifier 1-40)
TEST JOB1	—	(test job 1-240)

NOTE: For fields requiring no entry, type and enter an apostrophe (') to blank the field. Once all the fields are completed, the following response appears:

Response: Enter Insert, Change, Validate, or Print:

35. To insert the data, type and enter **i**

Response: inserting . . . FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the TEST SESSION ID field.

36. At this point, the technician is already in the insert mode. To insert the other TEST SESSION ID, repeat Step 34 and Step 35.

37. Exit the RC/V.

38. Is an overview of the SLIM test session status, or a printout of the results of the last run test session required?

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

If **NO**, go to Step 44.

39. To obtain the test session status, type and enter **162** menu command.

Response: The 162 - SLIM TESTSESSION STATUS TP page is displayed.

NOTE: The status of the test sessions is displayed in a table. The status is SUSP, DONE, IP, SCHD, or DEF.

40. Is a printout of the status of a specific test session required?

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

If **NO**, go to Step 42.

41. To print the status of a specified test session, type and enter **941,xx** menu command.

Where:

xx = Test session identifier number.

42. Are result reports of the last executed test session required?

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

If **NO**, go to Step 44.

43. To print out all the unavailable and the failed lines found in the last test session, a dump from the 3B computer is required. The files that should be dumped are as follows:

- (a) For latest test session:

"/slim/TMslx.new"

- (b) For previous test session:

"/slim/TMslx.old"

Where:

x = Test session identifier number.

44. **NOTE:** Routine mode only uses the ONHIGH thresholds for insulation tests. Only result values above this threshold pass the test.

When the test sessions are not manually aborted or terminated due to an error, the results of the session is automatically printed on the ROP (receive-only printer).

Response: **SLIM ROUTINE TESTSESSION RESULTS FILE: TMsla.new**

TESTSESSION ID :a
 STARTED AT :yy:mm:dd: hh:mm
 TESTJOB IDs :b,,,c
 TESTJOB 1 ID b
 STARTED AT :hh:mm
 STOPPED AT :hh:mm
 DURATION :hh:mm
 TESTJOB DEFINITION :
 ENTYPE IS L
 LEN LIST RANGE : d to e

TEST SET ID:f	THRESHOLD LIST ID:g	
TEST NO./DESCRIPTION	LOW	HIGH
1 AC Tip to ground	0.000 volts	5.000 volts
2 AC Ring to ground	0.000 volts	5.000 volts
.	.	.
.	.	.
10 Tip to Ring	0.010uF	3.000uF
.	.	.
13 AB common to battery	0.010uF	3.000uF
RESULTS :		
TOTAL LINES TESTED FOR THIS JOB =h		
TOTAL UNAVAILABLE LINES FOR THIS JOB = i		

UNAV. LINE REASON	UNAV. LINE REASON	UNAV. LINE REASON
j . . k o	j . . k o	j . . k o
TOTAL FAILED LINES FOR THIS JOB = l		
FAILED LINE TEST		
m . . n p		
TESTSESSION ID : a		
STOPPED AT :yy:mm:dd hh:mm		
DURATION :hh:mm		
TESTSESSION STATUS = DONE		

Where:

a = Test session identifier.
 b = First test job identifier.
 c = Last test job identifier.
 d = First LEN of LEN list range.
 e = Last LEN of LEN list range.
 f = Test set identifier.
 g = Threshold list identifier.
 h = Total lines tested for job number.
 i = Total amount of unavailable lines.
 j = First unavailable line (LEN).
 k = Last unavailable line.
 o = Reason for unavailable line:
 BY = busy
 CT = congestion
 ER = general errors, used when software cannot decide what caused unavailability
 MS = error within MSU, unusually resource failure, often caused by hardware OOS
 PT = port problems, no metallic connection to port, PPM failure, unable to activate port
 TM = other errors outside of MSU, possibly resource failure in LU or ISLU.

l = Total amount of failed lines.
m = First failed line (LEN).
n = Last failed line.
p = Test number for failed line.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 7.28: PERFORM METALLIC TESTS ON AN ON-HOOK LINE USING SLIM (5E10 AND LATER)

OVERVIEW

This procedure measures the values of voltage, resistance, and capacitance present on an analog or digital line [U-type digital subscriber line (U-DSL) only] by using the Subscriber Loop Instrument Measurement (SLIM).

PROCEDURE

1. **NOTE 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently supported TLWS Job Aids, 235-105-220JXX (where XX is the current supported software releases), be used to obtain the appropriate 4-digit poke command number.

NOTE 2: With digital lines (U-DSL), the NT1 contains active circuitry that influences the capacitance values, which are used to determine the distance to open (DTO).

CAUTION: When the Digital Subscriber Line (DSL) is seized, the customer is denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001,DN).
3. From the metallic measurement page (5700), use the poke command (5701) to get a single measurement of the voltage, resistance, and capacitance.
4. The following tables indicate the results that should be achieved at the TLWS.
 - For an Analog Line on an AIU, see Table 7.28-1
 - For an Analog Line on a LU, see Table 7.28-2
 - For an Analog Line on a ISLU Z, see Table 7.28-3
 - For an Analog Line on a DCLU, see Table 7.28-4
 - For an Analog Line on an IDCU, see Table 7.28-5
 - For a Digital Line on an ISLU AMI-U NT1 or AMI BRITE CU AHG13, see Table 7.28-6
 - For a Digital Line on an ISLU/ISLU2 U-DSL (ANSI[®]) Lucent Technologies NT1, see Table 7.28-7
 - For a Digital Line on an ISLU U-DSL (ANSI) BRITE CU AHG18, see Table 7.28-8
 - For a Digital Line on an IDCU U-DSL (ANSI) Lucent Technologies NT1, see Table 7.28-9.
 - For a Digital Line on an AIU U-DSL (ANSI) Lucent Technologies NT1, see Table 7.28-10

The voltage (AV=AC voltage and DV=DC voltage) should read "0" in all columns.

NOTE: There is the possibility of a trace voltage reading for analog line units.

The Resistance (Ko = Kilohms) should read "OPEN" (a resistance value of greater than 3500K is considered open) for all columns with the exception of the U-DSL, which differs because of its NT1 circuitry. The capacitance (in micro-Farads) can range from about 0.12 to 0.225 and should be balanced as explained in the tables.

The resistance and capacitance readings indicated in the tables are typical values for short loop lengths of less than one mile. Readings of 0 or OPEN are not loop length dependent. The tip-ground (TG) and ring-ground (RG) capacitance values should be balanced (same value). With analog lines, the ringer of the telephone influences the reading as follows:

- (a) For a private line, the ringer is across the tip-ring (TR) pair; therefore, the TG and RG capacitance values are balanced.
- (b) For a "tip" party, the ringer is connected across the tip and ground; therefore, the TG reading is greater than the RG reading.
- (c) For a "ring" party, the ringer is connected across the ring and ground; therefore, the RG reading is greater than the TG.

The constants used in calculating resistance and distance-to-open (capacitance) are shown in Tables 7.28-11 and 7.28-12.

5. Release the metallic measurement position by entering the poke command (5990).
6. Release the line by entering the poke command (4999).
7. Access the TLWS test position summary page (160) and release the TLWS test position [201,X].
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.28-1 Analog Line (AIU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	7	7	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	0.010

Table 7.28-2 Analog Line (LU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	7	7	0
Ko	OPEN	OPEN	OPEN
μF	0.013	0.013	0.022

Table 7.28-3 Analog Line (ISLU Z) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	0.010

Table 7.28-4 Analog Line (DCLU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR

AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	0.009

Table 7.28-5 Analog Line (IDCU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	0.009

Table 7.28-6 Digital Line (ISLU AMI-U NT1 or AMI BRITE CU AHG13) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	1150	OPEN	144
μF	0.030	0.030	0.995

Table 7.28-7 Digital Line - ISLU/ISLU2 U-DSL (ANSI®) Lucent Technologies NT1 Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

Table 7.28-8 Digital Line ISLU U-DSL (ANSI®) BRITE CU AHG18 Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

Table 7.28-9 Digital Line IDCU U-DSL (ANSI®) Lucent Technologies NT1 Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	1.010

Table 7.28-10 Digital Line AIU U-DSL (ANSI®) Lucent Technologies NT1 Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	TR
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

Table 7.28-11 Resistance in Ohms/Mile (SLIM Tests)

CABLE GAUGE	TIP-RING VALUE
19	86.0

22	173.0
24	274.0
26	440.0

Table 7.28-12 Capacitance in μ F/Mile (SLIM Tests)

CABLE GAUGE	TIP-RING VALUE
19	0.0845
22	0.0825
24	0.0815
26	0.0795

Procedure 7.29: PERFORM DISTANCE-TO-OPEN MEASUREMENT ON AN ON-HOOK LINE USING SLIM (5E10 AND LATER)

OVERVIEW

This procedure measures the capacitance of an analog line or a U-type Digital Subscriber Line (U-DSL) and calculates the distance to open (DTO). This test should be used only when a line is suspected to be open. Any sort of complete connection (short, ground, etc.) will give invalid test results.

PROCEDURE

1. **NOTE:** If the DTO is positive (and the office has been calibrated), the value indicates that the open is between the Main Distributing Frame (MDF) and the subscriber. If the value is "0", the open is between the MDF and the office equipment (line appearance).

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001,DN).
3. From the metallic measurement page (5700), use the appropriate poke command (5705) to measure the distance-to-open of the tip-ring (TR) open line. The result will be given in terms of feet.

NOTE: Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (9500).

4. Release the metallic measurement position by entering the appropriate poke command (5990).
5. Release the line by entering the appropriate poke command (4999).
6. Access the TLWS test position summary page (160) and release the TLWS test position [201,X].
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.30: ANALOG COIN PHONE TEST TO PERFORM NEAR-TO-FAR-END CHECK OF LINE STATE (VIA SLIM) (5E10 AND LATER)

OVERVIEW

The Subscriber Loop Instrument Measurement (SLIM) coin phone tests require interaction between two craftspersons—one at the Trunk and Line Work Station (TLWS) and the other at the coin phone being tested. After any of the tests (coin detect, coin collect, coin return, or home totalizer) are completed and the results are displayed, a printout of those results may be obtained by using the appropriate poke command.

When homing an electronic totalizer, the response will be "totalizer already homed" whether it had been previously homed or not. It is very important that the craftsperson at the TLWS verify that the totalizer has indeed been homed by using the appropriate poke command.

PROCEDURE

1. **CAUTION:** When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the appropriate poke command (4001,DN).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (5700).
4. The craftsperson at the TLWS can ADD the talk and monitor (T&M) phone to the seized coin line by entering the appropriate poke command (4301).
5. To apply ringing to the coin phone line, enter the appropriate poke command (5202). When an off-hook indication is observed, continue with the next step.
6. Using the T&M phone, instruct the far-end craftsperson to hang up the phone and insert a predetermined amount of money (in various coin values).
7. To detect coin, enter the appropriate poke command (5708).
8. To return coin, enter the appropriate poke command (5710).
9. To home totalizer, enter the appropriate poke command (5707).
10. To ring coin phone line, enter the appropriate poke command (5202).
11. Ensure that all coins are returned.
12. Using the T&M phone, instruct far-end craftsperson to hang up phone and insert a predetermined amount of money (in various coin values).
13. To detect coin, enter the appropriate poke command (5708).
14. To collect coin, enter the appropriate poke command (5709).
15. To home totalizer, enter the appropriate poke command (5707).

16. To ring coin phone, enter the appropriate poke command (**5202**).
17. Ensure coin(s) is(are) collected.
18. Ensure totalizer homed.
19. If no further tests are to be performed on coin line, affect line release by entering the appropriate poke command (**4999**).
20. Access the TLWS test position summary page (160) and release the TLWS test position [**201,X**].
21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 7.31: PERFORM SUBSCRIBER LINE INSTRUMENT MEASUREMENT (SLIM) OFF-HOOK TESTS (5E10 AND LATER)

OVERVIEW

The off-hook tests are used to test the subscribers telephone set. These procedures [which are accessed by the master control center (MCC) pages], are used to confirm problems detected by the operator mode. Page 5700,2 is used for the off-hook tests.

These procedures are performed by technicians and only the MCC pages are used; it is recommended that these procedures be performed at the MCC terminal.

PROCEDURE

1. **NOTE 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently supported TLWS Job Aids, 235-105-220J9, J10, or J11, be used to obtain the appropriate 4-digit poke command number.

NOTE 2: Before beginning this procedure, perform Procedure 2.2, Calibrating TLWS Measurements, if the office has not been calibrated for Trunk and Line Work Station (TLWS) measurements. This can be determined by checking the DISTOPEN field in the Recent Change/Verify (RC/V) office parameter view. If this field is "0", then all measurements will be relative to the Subscriber Loop Instrument Measurement (SLIM) instead of the Main Distributing Frame (MDF).

NOTE 3: With digital lines (U-DSL), the NT1 contains active circuitry that will influence the capacitance values, which are used to determine the distance to open (DTO).

CAUTION: When it is required that the Digital Subscriber Line (DSL) be seized, the customer will be denied use of the seized DSL or DSL channel(s).

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001,DN).
3. To select all the off-hook operator mode tests, type and enter 5700,2 menu command.

NOTE: Pokes on the 5700,2 page, automatically add the T&M phone to make conversation possible between the operator and the subscriber. Conversation is required for the operator to give instructions to the subscriber (for example, depressing the telephone keys in a certain sequence).

Page 5700,2 also shows whether the subscriber's phone is on hook or off hook.

4. **NOTE:** The status of the selection is displayed in a blue line. A yellow line displays why the selection failed. Also during each test, conversation is temporarily inhibited.
5. From the metallic measurement page (5700), use the poke command (5716) to provide a ringing current to test bell. This test does not return a result.
6. When the subscriber phone rings, take it off-hook.
7. Instruct the subscriber, after they hear dial tone, to dial a digit (2-9 or 0).

NOTE: On a touch-tone phone the subscriber must depress and hold a key for 0.4 seconds.

8. From the metallic measurement page (5700), use the poke command (**5712** for rotary dial subscribers or **5714** for touch-tone subscribers), to test the quality of the telephone sets.

Response: Digits being dialed show up on 5700,2 page.

9. Repeat steps 7 and 8 as desired.
10. From the metallic measurement page (5700), use the poke command (**5715**) to measure loop resistance. See Table 7.28-11 for acceptable values.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8. TRUNK MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for performing maintenance to trunk units.

Procedure 8.1: PERFORM TRUNK MAINTENANCE

OVERVIEW

This procedure, plus the information provided in the currently supported TLWS Job Aids, 235-105-220XX (where XX is the current supported releases), provides guidelines for clearing trunk problems reported by the switch, by customer complaints, by manual trunk tests, by repair service bureau trouble tickets, etc.

Trunk maintenance makes use of the following Master Control Center (MCC) video terminal display pages:

160 - TEST POSITION STATUS SUMMARY

160,X - TEST POSITION SUMMARY X - where X = 160,1, 160,2, 160,3, or 160,4 may be used to gain access to any of the following data:

- **161,X[Y] - SELECT/DISPLAY TEST POSN X** where X = (1-32) and Y = (1-32)

Where:

TP = One of several test positions; each having several display pages.
TLWS LOCATION = Trunk and Line Work Station (TLWS) location where MCC resides. The TLWS location is central office definable.
DEV = Displays the device location identification (ID) of the MCC.
ID = Logical identification of TLWS resources that may be specified by using the Y option.
LINE/TRUNK DATA = Displays trunk group (TG) and TG member number being tested for trunks.
TEST ACCESS = Displays the type of test connection (for example, metallic, transmission, or AC/DC jacks).
T&M = Displays the status of the talk and monitor (T&M) phone.

NOTE: The **160** page is not required but is provided to gain access to the **161,X** page. The **161,X** may be entered from other pages (for example, 1000) to gain access to a test position. It is still necessary to return to the **160,X** page to release the test position.

- **201,X - RELEASE TEST POSN X** where X = (1-32).

The MCC video display page 161,X - TEST POSITION X provides poke commands to seize and conduct tests on trunks and then displays the test results. The task selection display screens for trunks are as follows:

- **4000[,X]** - Allows display of TASK SELECTION— SEIZE LINE/TRUNK/INCOMING CALL screens where X = screen number.
 X = 4000,1 or 4000,2.
- **5000[,X]** - Allows display of TASK SELECTION— TRANSMISSION screens where X = screen number.
 X = 5000,1 or 5000,2.
- **5200[,X]** - Allows display of TASK SELECTION— SUPERVISION screens where the following applies:
 Three 5200[,X] screens apply for analog or digital trunks, and X = 5200,1, 5200,2, or 5200,3.
- **5400[,X]** - Allows display of TASK SELECTION— AUTOMATIC screens where X = screen number.

X = 5400,1 or 5400,2 for analog or digital trunks.

- **5600** - Allows display of TASK SELECTION—METALLIC MEASUREMENTS - via the Directly Connected Test Unit (DCTU) screens where the following applies:

One 5600 screen applies for analog or digital trunks.

- **5700** - (Software Release 5E10 and later) - Allows display of TASK SELECTION—METALLIC MEASUREMENTS - via the Subscriber Line Instrument Measurement (SLIM), screens where the following applies:

One 5700 screen applies for analog or digital trunks.

- **5800** - Allows display of TASK SELECTION—JACK screens where the following applies:

One 5800 screen applies for analog or digital trunks.

- **8000** - Displays the major test categories.

- **9000[X]** - Allows display of MISCELLANEOUS TLWS COMMANDS screens where the following applies:

X = 9000,1 or 9000,2

One 9000 screen applies for analog or digital trunks.

NOTE: Some of the commands that appear on the 9000 screen apply to both lines and trunks and some of these commands can appear on more than one screen. If a miscellaneous command appears on more than one screen, it may be entered from the viewed screen where it appears.

All available tests and poke commands may be entered from the task selection pages. The poke commands and their corresponding functions are identified and described in 235-105-110, *System Maintenance Requirements and Tools* document. In addition, the currently supported *TLWS Job Aids*, 235-105-220J9, J10, or J11, are also available as a "quick access" reference for poke commands.

Error messages which may occur during the use of the poke commands are defined in 235-600-750, *Output Message Manual*, Appendix APP:TLWS.

PROCEDURE

1. **NOTE 1:** In the following subprocedures, poke commands are provided for MCC terminal use in testing at the TLWS facilities. At locations where an MCC terminal is not available, the user must utilize the appropriate input message provided in 235-600-700, *Input Message Manual*.

NOTE 2: Any of the following subprocedures may be performed in any order (as required), regardless of sequential order listed in this document.

To isolate a trouble condition associated with trunks, select the appropriate subprocedures as follows in Substeps (a) through (q):

- (a) Analyze and Resolve OOS Trunk List Entries—Procedure 8.2
- (b) Test Incoming Trunk Using 101 Test Line—Procedure 8.3
- (c) Verify Trunk Equipment Number of Analog, ILEN, and SLEN Trunks—Procedure 8.4

- (d) Verify Trunk Group and Trunk Group Member Number—Procedure 8.5
- (e) Verify Digital Equipment Number of a Digital Trunk—Procedure 8.6
- (f) Check/Adjust AC Jack Amplifiers in Test Access Unit—Procedure 8.3
- (g) Exchange Tone With Distant Office Using Portable Test Equipment—Procedure 8.7
- (h) Measure/Record Noise Between Offices—Procedure 8.8
- (i) Measure/Record Trunk Transmission Loss—Procedure 8.9
- (j) Monitor Busy Trunk—Procedure 8.10
- (k) Perform Metallic Measurements of an Analog Trunk Using DCTU—Procedure 8.11
- (l) Perform Metallic Measurements of an Analog Trunk Using DC Jacks—Procedure 8.12
- (m) Perform Operational Test for an In-Service Trunk—Procedure 8.13
- (n) Remote Protocol Monitoring and Access to ISDN—Procedure 8.14
- (o) Implement 108-Type Test Line Capabilities of ISTF/GSDF—Procedure 8.15
- (p) Far-End Loop (FELP) —Procedure 8.16
- (q) Perform Metallic Measurements of an Analog Trunk Using SLIM—Procedure 8.17

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

Procedure 8.2: ANALYZE AND RESOLVE OOS TRUNK LIST ENTRIES

OVERVIEW

Contained within this procedure are guidelines to analyze and resolve trunk trouble conditions that are reported by the **OP LIST TRUNK** out-of-service (OOS) output message(s). Software release dependencies exist for unique office applications, therefore, 235-600-750, *Output Message Manual*, must be referenced for message parameter meanings. In addition, office records must be referred to for specific equipment allocations or assignments.

PROCEDURE

1. At the Receive-Only Printer (ROP), obtain any **OP LIST TRUNK** output message(s).
2. Identify the appropriate Trunk Group Member Number (TKGMN), Trunk Equipment Number (TEN), Integrated Line Equipment number (ILEN), Digital Equipment Number (DEN), DNU-S Networking Equipment Number (NEN) or *SLC*[®] Line Equipment Number (SLEN) assignments printed in the output message(s).
3. Determine the primary status of the trunk including the:
 - Basic state
 - Qualifier
 - Operational restrictions
 - Supplementary information
 - Mode.
4. From information contained in the **OP LIST - TRUNK** output message(s), determine the cause of the trunk status being OOS.
5. What is the trunk OOS cause as reported? Refer to Substeps (a) through (e) as follows:
 - (a) If **FE**, investigate possible trouble in analog trunk unit per Procedure 8.3 , Clear Diagnostic Failure in Hardware (Units/Circuits) of *5ESS*[®] switch.
 - (b) If **HW**, resolve the problem per local procedure.
 - (c) If **DSBLD**, investigate possible software/hardware problems using Procedure 8.3 , Clear Diagnostic Failure in Hardware (Units/Circuits) of *5ESS*[®] switch.
 - (d) If **PX**, check the trunk using any of the trunk tests outlined in Procedure 8.1 , Perform Trunk Maintenance.
 - (e) If **RAP**, **FAF**, or **LKDO**, investigate the cause reported by the **OP LIST LINE PORT STATUS** field. [Possible error in Recent Change/Verify (RC/V) entries.]
6. Do the test results indicate acceptable operational requirements?

If **YES**, diagnose the analog trunk unit.

If **NO**, reassign the TEN per local procedure by using RC/V.

7. Resolve bad reports using Procedure 8.1 , Perform Trunk Maintenance. Save all bad reports for future analysis of error pattern.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 8.3: TEST INCOMING TRUNK USING 101 TEST LINE

OVERVIEW

A 101 test line call can be initiated from a line or from a far-end office by dialing the digits that access the 101 test line within the requesting office.

Upon receipt of the 101 test line call, the talk and monitor (T&M) phone will ring, assuming it is not busy in another conversation or is not off-hook. It can be answered and a normal conversation conducted. (If the T&M phone is hung up, the connection will be dropped.) The incoming call can be assigned to any test position available at the Trunk Line Work Station (TLWS) associated with the T&M phone that rings. To assign the call, a test position must be active.

The 101 test line number **IS NOT** the same as the plain old telephone service (POTS) number assigned to the T&M phone. The 101 test number can be obtained from the far-end craftsperson using the RLrt_specri relation in the Office Dependent Data (ODD). For toll trunks, use the PRrt_tmtsc relation.

PROCEDURE

1. Answer the 101 test call at the TLWS with the associated T&M phone.
2. At the TLWS, access a test position by entering poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
 X = test position number (1-32) for 5E9(1) and later.

3. To seize an incoming trunk associated with the 101 test line call, enter the appropriate poke command (**420** or **4200**).

NOTE: Once the call is assigned to a test position, it cannot be transferred to another.

4. To display **TRANSMISSION** commands, enter the appropriate poke command (**500,X** or **5000,X**).

Where:

X = screen number

5. Once the appropriate task selection screen is displayed, enter the poke command corresponding to tone you wish to send or measure.

NOTE: Other frequencies may be sent or measured by simply entering another (corresponding) poke command. It is not necessary to physically stop sending or measuring the current frequency.

6. If no further testing is to be performed on trunk, release the trunk by entering the appropriate poke command (**499** or **4999**).
7. If all TLWS testing is completed, release the test position by entering poke command **20X** (for 5E7 and 5E8) or **201,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8

X = test position number (1-32) for 5E9(1) and later.

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

Procedure 8.4: VERIFY TRUNK EQUIPMENT NUMBER OF ANALOG, ILEN, AND SLEN TRUNKS

OVERVIEW

This procedure describes a method to verify the Trunk Equipment Number (TEN), Subscriber Loop Carrier Line Equipment Number (SLEN), or integrated digital carrier unit (IDCU) line equipment number (ILEN) of an analog trunk. In this document, in the input message and output response, some of the options are identified with an asterisk (*) instead of a subscript number. In 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, a subscript number is utilized. Refer to these manuals for specific details.

The SLEN portion is applicable only in 5E7 and later software releases and the ILEN portion is applicable only in 5E8 and later software releases.

NOTE: Since SLENs and ILENs are not physically located in the office, no physical location information is given.

PROCEDURE

1. Enter the following input message:

OP: CONV,a;

Where:

a = TEN=j-f*-g*-h*-i* **OR**
 a = SLEN=j-d*-e*-n* **OR**
 a = ILEN=j-k*-m*-o*

j = switching module/switching module-2000 (SM/SM-2000) number (1-192)

d* = digital carrier line unit (DCLU) number (0-7)

e* = remote terminal (RT) number (1-6)

f* = trunk unit (TU) number (0-7)

g* = service group (SG) number (0 or 1)

h* = channel board number (0-7)

i* = circuit number (0-3)

k* = IDCU number (0-7)

m* = remote terminal (RT) number (1-31)

n* = remote terminal (RT) line number (1-96)

o* = remote terminal (RT) line number (1-2048)

Response: See the **OP CONV** output message in the 235-600-750, *Output Message Manual*.

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

Procedure 8.5: VERIFY TRUNK GROUP AND TRUNK GROUP MEMBER NUMBER

OVERVIEW

This procedure describes a method to verify the Trunk Group Member Number (TKGMN). For simplicity purposes, in the input message and output response, some of the options are identified with an asterisk (*) instead of a subscript number. In 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, a subscript number is utilized. Refer to these manuals for specific details.

The subscriber loop carrier line equipment number (SLEN) portion is applicable to the 5E7 and later software releases and the integrated digital carrier unit (IDCU) line equipment number (ILEN) is applicable to the 5E8 and later software releases.

NOTE: Since SLENs and ILENs are not physically located in the office, no physical location information is given.

PROCEDURE

1. Enter the following input message:

OP: CONV,a;

Where:

a = TKGMN=k*-l*

k* = trunk group number

l* = trunk member number.

Response: See the **OP CONV** output message in the 235-600-750, *Output Message Manual*.

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

Procedure 8.6: VERIFY DIGITAL EQUIPMENT NUMBER/NETWORKING EQUIPMENT NUMBER OF A DIGITAL TRUNK

OVERVIEW

This procedure provides a method to verify the Digital Equipment Number (DEN) or Networking Equipment Number (NEN) of a digital trunk. Refer to the 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, for specific details.

PROCEDURE

1. Enter the appropriate input message:

- For the **DEN**:

OP:CONV,a[,];

Where:

a =	DEN = b-c-d-e
b =	Switching module/switching module-2000 (SM/SM-2000) number
c =	Digital unit number
d =	Digital facility interface (DFI) number
e =	Channel number (If this is a DFI-2, channels 1-24 are associated with facility T1 A and channels 25-48 are associated with facility T1 B. Otherwise, there is only one facility).

- For the **NEN** residing on the Digital Network Unit Synchronous Optical Network (DNU-S):

OP:CONV,a[,];

Where:

a =	NEN = b-c-d-e-f-g-h-i-j
b =	Switching module-2000 (SM-2000) number
c =	DNU-S number
d =	Data group (DG) number
e =	SONET termination equipment (STE) number [5E13(1) and later]
f =	Synchronous transport signal (STS) number
g =	Virtual tributary 1.5 (VT1.5) number [5E9(2) to 5E12(1)]
h =	Virtual tributary group (VTG) number [5E13(1) and later]
i =	Virtual tributary member (VTM) number [5E13(1) and later]
j =	Digital signal level 0 (DS0) number.

Response: See the **OP CONV** output message in the 235-600-750, *Output Message Manual*.

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

Procedure 8.7: EXCHANGE TONE WITH DISTANT OFFICE USING PORTABLE TEST EQUIPMENT

OVERVIEW

This procedure provides a method to exchange a tone with a distant office using the portable test equipment.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
 X = test position number (1-32) for [5E9(1) and later].

2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).

Where:

X = **GRP, MEM**

3. To display the TLWS jack commands, enter the appropriate poke command (**580** or **5800**).
4. To connect AC1 JACK to the trunk phone, enter the appropriate poke command (**581** or **5801**).
5. Connect the HP3551 transmission test set (or equivalent) to the SEND and RECEIVE jacks of AC1 JACK.
6. Set the HP3551A test set (or equivalent) to SEND.
7. Set the transmission test set terminating impedance to 600 ohms.
8. Using the HP3551 test set (or equivalent), send a 1004-Hz tone at 0 dBm.
9. Ensure that the far-end craft has completed their measurement(s).
10. Turn off the tone at the HP3551A test set (or equivalent).
11. Have the far-end craft send a 1004 Hz signal at 0 dBm.
12. Set the HP3551A test set (or equivalent) to RECEIVE.
13. Turn the volume control CLOCKWISE to satisfactorily receive the tone level.
14. Read and record the measurement from the distant office.
15. If no further testing is to be performed on the trunk, release it by entering the appropriate poke command (**499** or **4999**).
16. If all TLWS testing is completed, release the test position by entering poke command **20X** (for 5E7 and 5E8) or **201,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
X = test position number (1-32) for [5E9(1) and later].

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

Procedure 8.8: MEASURE/RECORD NOISE BETWEEN OFFICES

OVERVIEW

This procedure provides a method to measure noise levels between offices using the poke commands on the Trunk and Line Work Station (TLWS) display Page 160.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
 X = test position number (1-32) for [5E9(1) and later].

2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).

Where:

X = **GRP, MEM**

3. To identify and outpulse the directory number (DN) of a 100 or 101 test line at the far-end office, enter the appropriate poke command (**441,X** or **4401,X**).

Where:

X = Outpulsed Directory Number (OPDN) of 100 or 101 test line at the far-end office.

4. To display the TRANSMISSION commands, enter the appropriate poke command (**500,X** or **5000,X**).

Where:

X = screen number.

5. If using a 100 test line, wait for the 1004-Hz tone to stop.
6. To measure (far-to-near) noise, enter the appropriate poke command (**512** or **5102**).
7. Check the circuit layout card of the trunk for limits.
8. If the results are not within local specifications for this type of trunk, repair the trunk using local procedures before proceeding.
9. If no further tests are to be performed on the trunk, release it by entering the appropriate poke command (**499** or **4999**).
10. If all TLWS testing is completed, release the test position by entering poke command **20X** (for 5E7 and 5E8) or **201,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
 X = test position number (1-32) for [5E9(1) and later].

11. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 8.9: MEASURE/RECORD TRUNK TRANSMISSION LOSS

OVERVIEW

This procedure provides a method to measure the trunk transmission loss by using the poke commands shown on the Trunk and Line Work Station (TLWS) display pages. Refer to Figure 8.9-1

PROCEDURE

1. At the master control center (MCC) or TLWS, to select the TEST POSITION STATUS SUMMARY page, type and enter:

160

Response: The 160- TEST POSITION STATUS SUMMARY page is displayed.

2. At the MCC page 160, to access a test position, type and enter the poke command:

161,X

Where:

X = Test position number (1-32).

3. If the trunk is not currently seized, to seize it, type and enter the poke command:

4102,X

Where:

X = **GRP, MEM.**

4. To identify and output the directory number (DN) of a 100 or 101 test line at the far\hyend office, type and enter the poke command:

4401,X

Where:

X = Outputted Directory Number (OPDN) of the 100 or 101 test line at the far-end office.

5. To display the TRANSMISSION commands, type and enter the poke command:

5000,X

Where:

X = screen number.

6. Enter the poke command corresponding to the tone you wish to measure or send.

NOTE: Other frequencies may be measured by simply entering another (corresponding) command. It is

not necessary to physically stop measuring the current frequency.

7. To print results at the Receive-Only Printer (ROP), enter the poke command:

9500

8. If results are not within local specifications for this type of trunk, repair the trunk using local procedures before proceeding.

NOTE: Table 8.9-1 shows the loss inserted for each toll class and trunk type.

9. If no further testing is to be performed on the trunk, to release it, type and enter the poke command:

4999

10. If TLWS testing is complete, to return to the 160 - TEST POSITION SUMMARY STATUS page, type and enter:

160

11. If all TLWS testing is completed, to release the test position type and enter the poke command:

201,X

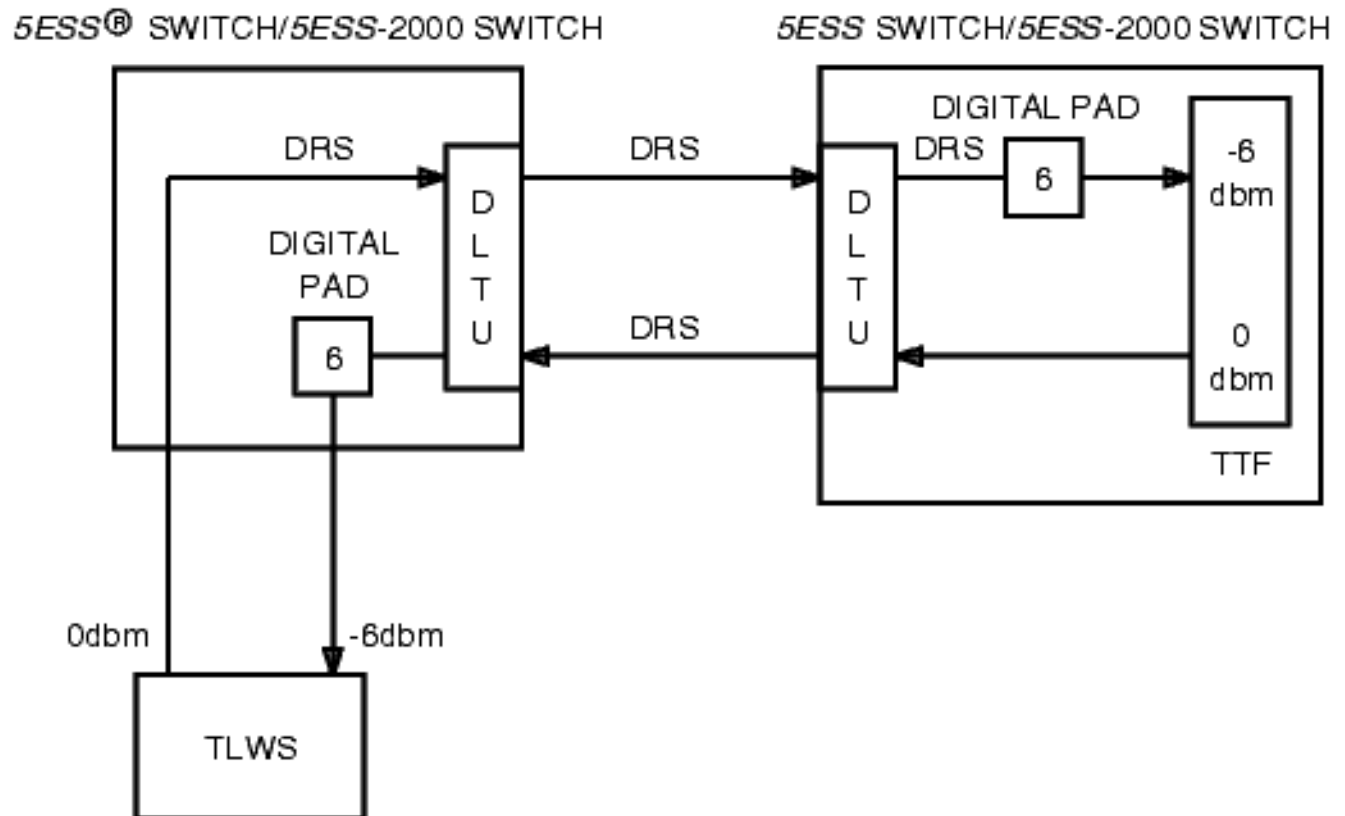
Where:

X = Test position number (1-32).

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

Table 8.9-1 Expected Measured Loss for Digital Trunks Between the Switch and Digital Offices

TRUNK	FROM 5ESS TM SWITCH	TO 5ESS TM SWITCH	EXPECTED MEASURED LOSS (db)
Interend-Office 200 Miles or Less	End-Office	End-Office	3 ^a
Interend-Office Greater Than 200 Miles	End-Office	End-Office	6
Tandem Connecting	End-Office	Tandem	6
Tandem Connecting	Tandem	End-Office	6
Intertandem	Tandem	Tandem	6
Notes:			
a. This may be 3 or 6 db. Refer to local network design.			



tpa 852382/01

Figure 8.9-1 Measuring Trunk Transmission Loss From the TLWS

Procedure 8.10: MONITOR TRUNK

OVERVIEW

The following procedures provide a method to monitor an idle or busy trunk by using the poke commands on the trunk and line work station (TLWS) display pages.

PROCEDURE

1. Is the monitored trunk idle?

If **YES**, go to 8.10.1

If **NO**, go to 8.10.2

8.10.1 Monitor Idle Trunk

1. At the master control center (MCC), to select the TEST POSITION STATUS SUMMARY page, type and enter.

160

Response: The 160 — TEST POSITION STATUS SUMMARY page is displayed.

2. At MCC page 160, to select an idle test position, type and enter:

161,X

Where:

X = Test position (TP) number (1-32).

Response: The 161 — TEST POSITION page is displayed.

3. At TLWS page 4000,2, to seize a trunk, use the appropriate displayed poke command.

NOTE: The appropriate poke command depends on available trunk information via office records (for example, trunk group number, trunk group member number, switching module number, trunk unit number, etc.)

4. At TLWS page 5000,2, to connect the talk and monitor (T&M) phone in the desired mode (talk or monitor), type and enter:

4302 — talk mode

or

4303 — monitor mode

5. When the T&M phone rings, take off-hook.
6. To outpulse test line number, type and enter:

4401,X

Where:

X = Digits for outpulse test number.

7. When test line answers, monitor the trunk for noise and tone/voice quality.
8. If a problem exists, perform corrective procedures.
9. If no further testing is to be performed on this trunk, to release the trunk, type and enter:

4999

10. If TLWS testing is complete, to return to the 160 — TEST POSITION SUMMARY STATUS page, type and enter:

160

11. To release the TP, type and enter:

201,X

Where:

X = Test position (TP) number (1-32).

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

8.10.2 Monitor Busy Trunk

1. If the TLWS page is not displayed, at MCC page 160, to select a seized trunk test position, type and enter:

161,X

Where:

X = Test position (TP) number (1-32).

Response: The 161 — TEST POSITION page is displayed.

2. At TLWS page 5000,2, to connect the talk and monitor (T&M) phone in the desired mode (talk or monitor), type and enter:

4302 — talk mode

or

4303 — monitor mode

3. When T&M phone rings, take off-hook and monitor the trunk for noise and tone/voice quality.
4. If a problem exists, perform corrective procedures.
5. If no further testing is to be performed on this trunk, to release the trunk, type and enter:

4999

6. If TLWS testing is complete, to return to the 160 — TEST POSITION SUMMARY STATUS page, type and enter:

160

7. To release the TP, type and enter:

201,X

Where:

X = Test position (TP) number (1-32).

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

Procedure 8.11: PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING DCTU

OVERVIEW

This procedure provides a method to perform a metallic measurements of an analog trunk using the Directly Connected Test Unit (DCTU).

NOTE: Only the tip and ring of loop supervision and 2-wire ear and mouth (E&M) trunks can be accessed with the DCTU. The DCTU cannot access 4-wire trunks.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
X = test position number (1-32) for 5E9(1) and later.

2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).

Where:

X = **GRP, MEM**

3. To display the METALLIC measurements, enter the appropriate poke command (**560** or **5600**).
4. Enter the poke command corresponding to the metallic measurement you wish to perform.

NOTE: Most metallic measurements will be updated every few seconds (**561** and **5601** pokes do not update).

5. Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (**950** or **9500**).
6. Other measurements may be made by simply entering another (corresponding) poke command.
7. If no further testing is to be performed on the trunk, release it by entering the appropriate poke command (**499** or **4999**).
8. If all TLWS testing is completed, release the test position by entering poke command **20X** (for 5E7 and 5E8) or **201,X** for 5E9(1) and later (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
X = test position number (1-32) for 5E9(1) and later.

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

Procedure 8.12: PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING DC JACKS

OVERVIEW

This procedure provides a method to perform a measurement of an analog 2-wire trunk using DC jacks via the poke commands on the Trunk and Line Work Station (TLWS) display Page 160.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **16X** for 5E8 or **161,X** for 5E9(1) and later (display Page 160).

Where:

X = test position number (1-8) for 5E8
X = test position number (1-32) for [5E9(1) and later].

2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).

Where:

X = **GRP, MEM.**

3. To select the DC1 or DC2 JACK, enter the appropriate poke commands (**583** or **5803** and **584** or **5804**).
4. To perform voltage or resistance measurements, connect the multimeter (or equivalent) to the DC1 or DC2 JACK.
5. If no further testing is to be performed on the trunk, release it by entering the appropriate poke command (**499** or **4999**).
6. If all TLWS testing is completed, release the test position by entering poke command **20X** (for 5E8) or **201,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E8
X = test position number (1-32) for 5E9(1) and later.

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

Procedure 8.13: PERFORM OPERATIONAL TEST FOR AN IN-SERVICE TRUNK

OVERVIEW

This procedure provides a method to clear a trouble report applicable to an incoming or outgoing in-service trunk. To perform this procedure, a craftsman should know how to interpret any of the stimuli identified in (a) through (i) as follows:

- (a) Customer trouble report
- (b) Repair Service Bureau (RSB) trouble report
- (c) Centralized Automatic Reporting on Trunks (CAROT) trouble report
- (d) Carrier Group Alarm (CGA) **REPT CGA** output message
- (e) Far-end office trouble report
- (f) Engineering and Administrative Data Acquisition System (EADAS) trouble report
- (g) Network Administration Center (NAC) trouble report
- (h) Network Management (NM) trouble report
- (i) Trunk Maintenance Package (TRUMP) at the Switching Control Center (SCC) trouble report.

PROCEDURE

1. Analyze the trouble report or alarm to determine the type of trunk. Refer to Substeps (a) and (b) as follows:
 - (a) If "outgoing" or "2-way," go to Step 2.
 - (b) If "incoming," go to Step 38.
2. Obtain the office trunk information (signaling supervision) per the office records.
3. At the Master Control Center (MCC), access an idle Trunk Line Work Station (TLWS) by entering poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later] (display Page 160).

Where:

X = test position number (1-8) for 5E7 and 5E8
 X = test position number (1-32) for [5E9(1) and later].

4. Seize the trunk that was identified in the trouble report by entering the appropriate poke command (**412,X** or **4102,X**).

Where:

X = **GRP, MEM**

5. Is the message in the test area indicating trunk **SEIZED**? Refer to Note as follows:

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

If **NO**, continue with Step 6.

NOTE: When the trunk is busy, the system camps on and waits for control as indicated per the output message **CAMPED ON**. If the control of the trunk is not obtained within 5 minutes, the message **CAMP ON DROPPED** is printed. When the trunk becomes available for testing, the message displayed will change from **CAMPED ON** to **SEIZED**.

6. Wait and monitor the message displayed in the test area. Has the message changed to **SEIZED**?

If **YES**, continue with Step 7.

If **NO**, wait and try again per Step 4.

7. Review the trouble reports (for example, CAROT report). Are any transmission problems identified?

If **YES**, go to Step 27.

If **NO**, continue with Step 8.

8. To run diagnostics on the trunk circuit, enter the appropriate poke command (**548** or **5408**), or the appropriate diagnostic input message (**DGN:TEN**, **DGN:DFI** or **DGN:TMUX** and **DGN:SFI**).

9. From the diagnostic response, perform Substep (a) or (b) as follows:

(a) If an ear and mouth (E&M) type circuit is identified, continue with Step 10.

(b) If circuit other than E&M type identified, go to Step 13.

10. Is the E&M signaling channel board option (type 2 or 3) set to agree with the software definition concerning the E&M signaling for the office?

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

If **NO**, continue with Step 11.

NOTE: When the software definition for E&M signaling is set to type 2, the option plug on the channel board must be positioned at type 2. When the software is set to type 3, the option plug on the channel board must be positioned at type 3. ***If the option plug position and the software definition do not match, the diagnostic test will fail.***

11. Change the option plug on the front of the channel board to match the software definition for E&M signaling.

12. Repeat Step 8 and refer to Substeps (a) and (b) as follows:

(a) If all tests passed (ATP), go to Step 15.

(b) If some tests failed (STF), seek next higher level of technical assistance.

13. Change the circuit board (for example, a digital or loop supervision analog circuit).

14. At the TLWS, reseat the trunk using the appropriate poke command (**480** or **4800**), then repeat Step 12.

15. Restore the trunk (unconditionally) by entering the input message as follows:

(a) **RST:TRK, TKGMN=a-b,UCL;**

Where:

a = trunk group.
b = member number.

Response: RST TRK output message.

16. Perform a wink or operational test on the trunk via a poke command or a **TST:TRK** input message. Refer to Substeps (a) through (d) as follows:

- (a) If performing a wink test, at the TLWS, enter the appropriate poke command (**520** or **5200,X**) followed by the corresponding poke command (**525** or **5202**).

Where:

X = screen number.

- (b) If the operational test is applicable to a 2-way automatic transmission test, enter the input message as follows:

(1) **TST: TRK,TKGMN=a-b,TYPE=105;**

- (c) If the operational test is applicable for a synchronous test, enter the input message as follows:

(1) **TST: TRK,TKGMN=a-b,TYPE=SYNC;**

- (d) If the operational test is applicable for a balance (100 type) test, enter the input message as follows:

(1) **TST: TRK,TKGMN=a-b,TYPE=100;**

Where:

a = trunk group number.
b = trunk member number.

Response: TST TRK output message.

17. Did the trunk pass the wink or operational test?

If **YES**, continue with Step 18.

If **NO**, go to Step 20.

18. Restore the trunk to service via a poke command or a **RST:TRK** input message per Substeps (a) or (b) as follows:

- (a) If via a poke command, at the TLWS, enter the appropriate poke command (**300[,UCL]** or **3000[,UCL]**).

- (b) If via an input message, enter as follows:

(1) **RST: TRK,TKGMN=a-b [,UCL];**

19. Release the TLWS position and TLWS by performing Substeps (a) and (b) as follows:

- (a) Enter poke command **16X** (for 5E7 and 5E8) or **161,X** [for 5E9(1) and later].
- (b) Enter poke command **20X** (for 5E7 and 5E8) or **201,X** [for 5E9(1) and later].

Where:

X = position number.

20. Check the distribution frame connections and software options associated with the faulty trunk by entering poke command **196** [Recent Change/Verify (RC/V) menu mode]. Refer to Substeps (a) and (b) as follows:

- (a) Enter a **5.5r** (for review mode) to access the RC/V menu View 5.5.
- (b) Enter the trunk group and member number. System responds with a list of options assigned that can be checked.

21. Are the distribution frame connections and options correct?

If **YES**, continue with Step 22.

If **NO**, go to Step 23.

22. Refer trouble to far-end office.

23. Fix the identified broken jumpers or correct options.

24. Retest the trunk per the wink/operational test outlined in Step 16.

25. Did trunk pass the wink/operational retest?

If **YES**, go to Step 30.

If **NO**, continue with Step 26.

26. Seek the next higher level of technical support.

27. What is the type of test to be performed?

If **AUTOMATIC**, go to Step 34.

If **MANUAL**, continue with Step 28.

28. Perform trunk transmission loss test per Procedure 8.9 , Measure/Record Trunk Transmission Loss.

29. Is the transmission loss within the tolerance limits?

If **YES**, continue with Step 30.

If **NO**, go to Step 32.

30. Restore the trunk to service via a poke command or a **RST:TRK** input message by repeating Step 18.

31. Release the TLWS position by repeating Step 19.

32. Check and clear noise with distant office per Procedure 8.8 , Measure/Record Noise Between Offices.

33. Retest the trunk transmission loss per Step 28.
34. Perform a 105TL (105 Test Line) test on the trunk via a poke command or an input message per Substeps (a) or (b) as follows:
- (a) If via a poke command, at the TLWS, enter the appropriate poke command (**546,105** or **5406,105**).
 - (b) If via an input message, enter as follows:
 - (1) **TST: TRK,TKGMN =a-b,TYPE=105;**

Where:

a = trunk group.
b = member number.

Response: TST TRK output message.

35. Are noise/level responses within correct tolerance limits?
- If **YES**, go to Step 30.
- If **NO**, continue with Step 36.
36. Notify the distant office of the level/noise problem(s) and clear per Procedure 8.8 , Measure/Record Noise Between Offices.
37. Retest the trunk per the 105TL test by repeating Step 34.
38. Obtain the office trunk information per the office records.
39. Has this problem been referred from a distant office?
- If **YES**, continue with Step 40.
- If **NO**, go to Step 48.
40. What is the trunk type?
- If **analog**, go to Step 44.
- If **digital**, continue with Step 41.
41. Does the out-of-service (OOS) list indicate a pattern of failures associated with:
- (a) The same Digital Facility Interface (DFI) board?
 - If **YES**, continue with Step 42.
 - If **NO**, go to Step 43.
 - (b) The Digital Networking Unit — Synchronous Optical Network (DNU-S) hardware circuits?
 - If **YES**, go to Step 44.
 - If **NO**, go to Step 43.

42. Remove all circuits associated with the DFI board from service and replace the faulty DFI board with a new board per local procedure.
43. Reassign the digital circuit per local procedures.
44. Perform diagnostics using the following input messages:

- (a) For the trunk equipment number (TEN):

DGN: TEN = a-b-c-d-e;

Where:

a =	switching module/switching module-2000 (SM/SM-2000)
b =	TEN unit number
c =	service group number
d =	TEN board number
e =	TEN circuit number.

- (b) For the DNU-S digital trunks, refer to the following note and run diagnostics on the transmission multiplexer (TMUX) and the synchronous transport signal electrical interface (STSX-1) facility interface (SFI):

NOTE: For 5E13 and later, the TMUX corresponds to the value of the STE-1 in the NEN. The For 5E12 and earlier, the TMUX number matches the STS number (value of 1 only) in the networking equipment number (NEN) of the DNU-S digital trunk.

DGN: TMUX = a-b-c-d;

Where:

a =	SM-2000
b =	DNU-S number
c =	data group number
d =	TMUX number.

and

DGN: SFI = a-b-c-d;

Where:

a =	SM-2000
b =	DNU-S number
c =	data group number
d =	SFI number.

Reference: **DGN TEN** output message.

DGN TMUX output message.

DGN SFI output message.

45. Does the TEN/TMUX/SFI diagnostic indicate ATP?

If **YES**, go to Step 49.

If **NO**, continue with Step 46.

46. Observing the following note, replace the faulty circuit board.

NOTE: When the software definition for E&M signaling is set to type 2, the option plug on the channel board must be positioned at type 2. When the software is set to type 3, the option plug on the channel board must be positioned at type 3. ***If the option plug position and the software definitions do not match, the diagnostic test will fail.***

47. Retest the TEN/TMUX/SFI by repeating Step 44.

48. How is trouble indicated?

If an OOS message is displayed on an MCC display page, go to Step 40.

If a Machine Detected Interoffice Irregularities (MDII) report is displayed on the Receive-Only Printer (ROP), continue with Step 49.

49. Access an idle TLWS test position by entering poke command **16X** (display Page 160).

Where:

X = test position number (1-8) or (1-32).

50. Seize the trunk listed on the MDII report by performing Substeps (a) and (b) as follows:

(a) Enter the appropriate poke command (**400,2** or **4000,2**).

(b) Enter the appropriate poke command (**412,X** or **4102,X**).

Where:

X = trunk group and member number.

51. Is the message in the test area indicating trunk **SEIZED**?

If **YES**, go to Step 53.

If **NO**, continue with Step 52.

NOTE: When the trunk is busy, the system camps on and waits for control as indicated per the message **CAMPED ON**. If the control of the trunk is not obtained within 5 minutes, the message **CAMP ON DROPPED** is printed. When the trunk becomes available for testing, the message displayed will change from **CAMPED ON** to **SEIZED**.

52. Wait and monitor the message displayed in the test area. Has the message changed to **SEIZED**?

If **YES**, continue with Step 53.

If **NO**, wait and try again to seize the trunk per Step 50.

53. Based on the MDII report, verify the trunk signaling and/or transmission measurements with the distant office. Observe Note 6 and refer to Substeps (a) and (b) as follows:

NOTE: If the distant office test line numbers are not in the automatic trunk test table, obtain them from the distant office.

- (a) Enter the appropriate poke command (**500,X** or **5000,X**).

Where:

X = screen number.

Response: Task selection display Page **500,X** or **5000,X** is displayed.

- (b) Once the appropriate display page is displayed, select and enter the appropriate poke command(s).

54. Did the trunk pass the appropriate TLWS test(s) selected?

If **YES**, go to Step 56.

If **NO**, continue with Step 55.

55. Refer the trouble to the outside cable group per local procedure.

56. Restore the trunk to service by repeating Step 18.

57. Release the TLWS position by repeating Step 19.

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

Procedure 8.14: REMOTE PROTOCOL MONITORING AND ACCESS TO ISDN

OVERVIEW

The Remote Digital Test Access (RDTA) allows the craft located at a Customer Service Center (CSC) the ability to set up an RDTA connection on a customer's Integrated Services Digital Network (ISDN) facility for troubleshooting a problem that the customer is experiencing. This feature is also used to test a newly provisioned ISDN facility prior to giving it to the customer.

The CSC is the work center where the protocol analysis functions are performed. The 5ESS® switch that terminates to the CSC is called the ACCESS SWITCH. A Primary Rate Interface (PRI) or pseudo Basic Rate Interface (BRI) serves as the interface between the CSC and the ACCESS SWITCH. Several originating switches can connect to a common ACCESS SWITCH via a 64-kbps T1 CCS7/User Side PRI (or equivalent) trunks. An RDTA connection is made by making a circuit-switched data call between the originating 5ESS® switch and the ACCESS SWITCH. Thus, the network through which the RDTA connection is made should support a 64-kbps circuit-switched data call. Two trunk members are required for each monitored channel, one for receive and one for transmit.

The RDTA refers to several types of connections in the originating 5ESS® switch that may be set up on an ISDN channel. The connections are supported on PRI, Common Channel Signaling (CCS), and all packet switching trunk interfaces (for example, IP, X.75, X.75', and XAT). The three main types of RDTA connections are as follows:

- **Noninterruptive Monitor:** This function allows the CSC craft the ability to non-intrusively access the ISDN interfaces at the 5ESS® switch and view the exchanges taking place. Refer to Figure 8.14-1.

For wide-band calls (Fractional DS1/ISDN), this capability supported as follows:

- Monitoring of a single B-channel of a wide-band call
- Monitoring the D-channel of a wide-band call
- Monitoring of a single data channel of a wide-band call transversing ISDN user part (ISUP) facilities.

NOTE: Monitoring of a DS0 call on a wideband ISUP or PRI trunk group is transparent to RPA.

- **Interactive Split Access:** In this application, the CSC protocol analysis equipment interacts with the ISDN interface in one of the following ways:
 - *Interactive Duplex Split:* This connection allows the craft at the CSC to break the original path and place the protocol analysis equipment between the customer premises equipment (CPE) and the originating 5ESS® switch. Refer to Figure 8.14-2.
 - *Interactive Protocol Handler (PH) Simplex Split:* This connection is similar to the duplex split except the data is exchanged between the PH and the CSC, and not between the CPE and the CSC. Refer to Figure 8.14-3.
 - *Interactive Port Under Test (PUT) Simplex Split:* This connection is similar to the duplex split except the data is exchanged between the CPE and the CSC, and not between the CSC and the PH. Refer to Figure 8.14-4.

NOTE: Interactive splits (duplex, PH, PUT) continue to be allowed on PRI D-channels even though they may

now be part of a PRI group supporting a wideband trunk group(s) or signalling for a wideband call. Interactive splits are NOT allowed on a PRI B-channel or a ISUP trunk member which is part of a wideband call. Interactive splits (duplex and PUT) continue to be supported for DS0 calls on wideband capable PRI and ISUP trunk groups.

- **Direct Test Access Connection (DTAC):** A DTAC sets up a path from an idle port to the CSC. This type of connection allows the craft to have the same ability as the Interactive PUT Simplex Split without the requirement of having an existing path to the PUT. Refer to Figure 8.14-4 .

NOTE: A single or multiple DTAC session(s) is/are allowed on member(s) of wideband PRI and ISUP trunk groups.

This procedure is invoked by the **EXC:RDTA** input message. For details associated with formats and parameters, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual* .

PROCEDURE

1. Using the Recent Change/Verify (RC/V) views at the ACCESS SWITCH, verify that the output facility is provisioned correctly. Similarly, verify that all the routing data at the originating 5ESS[®] switch and at the access switch is set up correctly for 64-kbps circuit-switched data calls.
2. Connect the protocol analyzer(s) to the output facility at the CSC and set them to the correct data rate (56-kbps, 64-kbps restricted or clear) and protocol (LAPB/LAPD, Q.931/X.25, etc.).
3. Identify the following parameters for the **EXC:RDTA** input message:
 - (a) ISDN trunk interface and BRI interface to be tested
 - (b) type of RDTA connection (monitor or duplex split, etc.)
 - (c) output facility directory numbers where RDTA output is required.
4. Enter the **EXC:RDTA** command at the originating switch.

NOTE: The data exchange output from the 5ESS[®] switch should be remoted to the protocol analyzers at the CSC.

5. Use the **OP:RDTA** input message to verify that the RDTA session is active.
6. Use the **VFY:RDTA** input message connection to verify the RDTA path.
7. If the RDTA session is to stay active for more than 24 hours, use the **UPD:RDTA** input message to update the 24 hour timer to keep the RDTA connection active for another 24 hours.
8. When the RDTA session is to be stopped, use the **STP:RDTA** input message. This will stop the data exchange from being sent to the protocol analyzers at the CSC.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

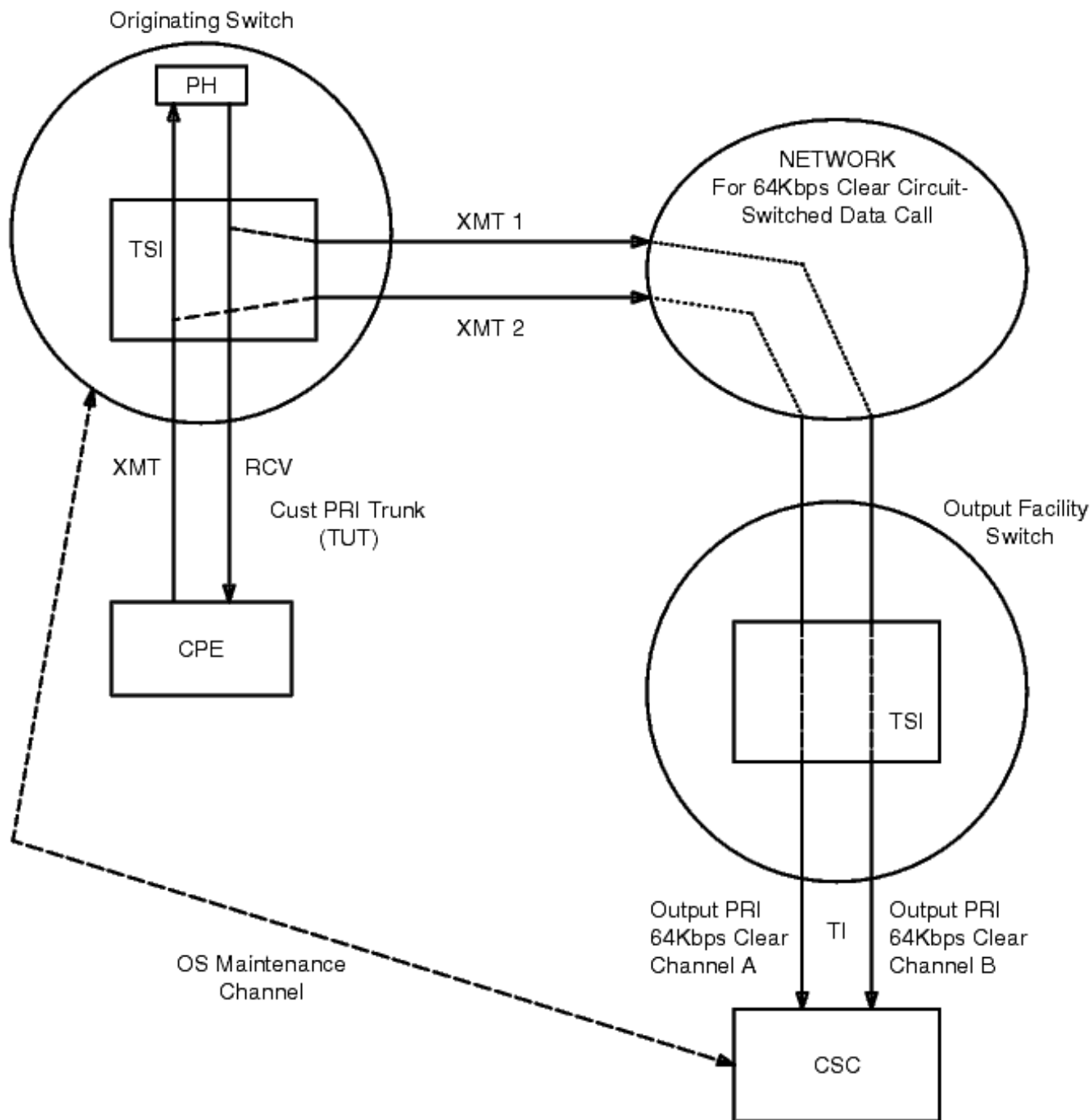


Figure 8.14-1 RDTA Noninterruptive Monitor

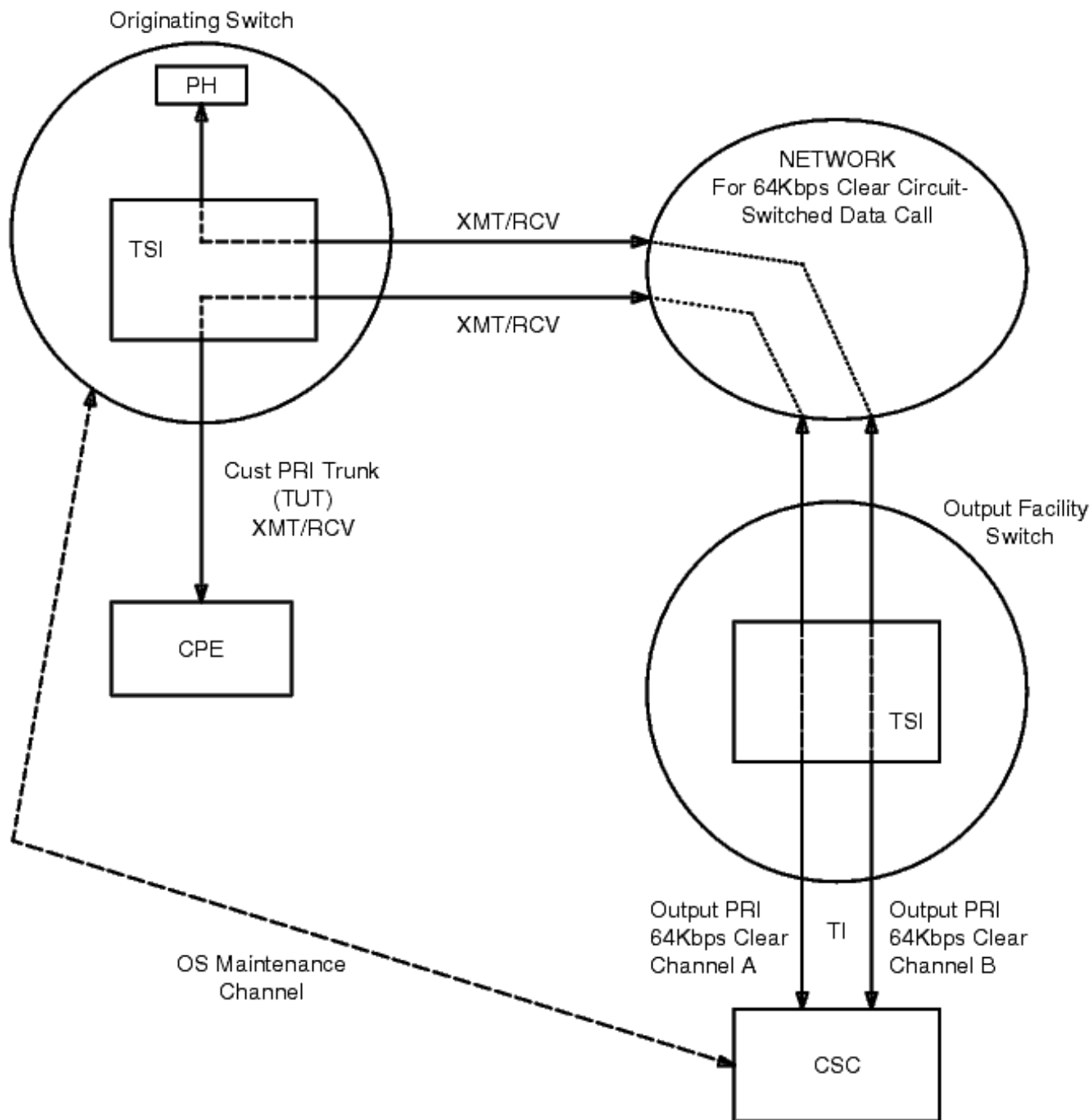


Figure 8.14-2 RDTA Interactive Duplex Split

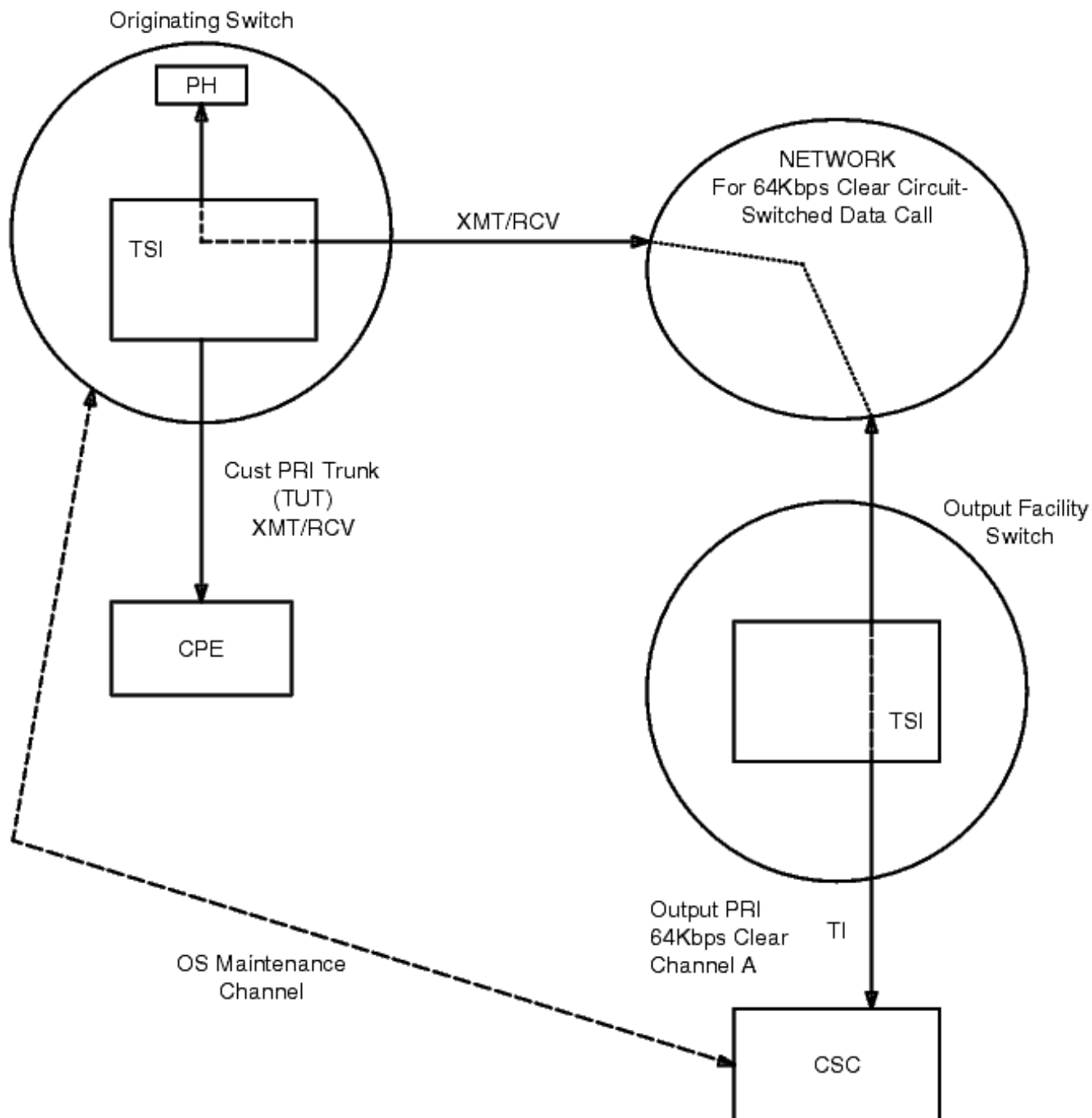


Figure 8.14-3 RDTA Interactive PH Simplex Split

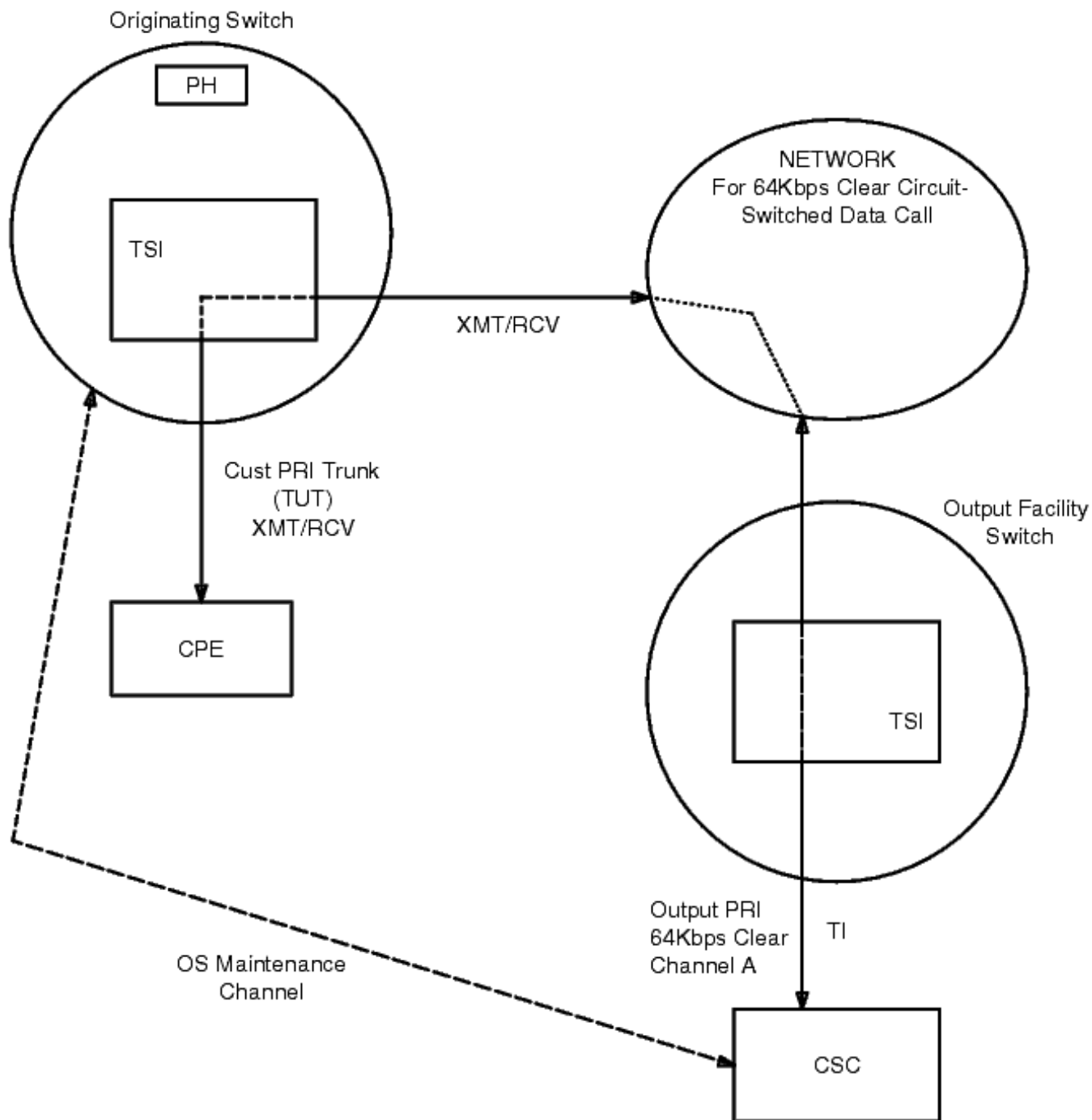


Figure 8.14-4 RDTA Interactive PUT Simplex Split and DTAC

Procedure 8.15: IMPLEMENT 108-TYPE TEST LINE CAPABILITIES OF ISTF/GDSF

OVERVIEW

The 5ESS[®] switch can provide a digital-circuit loopback and transmit capability to test digital trunks, and this procedure describes its implementation.

The ISTF Loopback Function

The digital service unit-2 (DSU2) integrated services test function (ISTF) and the ISTF functionality on the Global Digital Services Function (GDSF) provides a 5ESS[®] switch peripheral unit for integrated services digital network (ISDN) that supports transmission testing of interoffice digital trunks and basic rate interfaces through the use of a pseudo-random number (PRN) bit pattern. The ISTF is physically located on the DSU2 shelf in "loaded" switching modules and in "basic" switching module/switching module-2000s (SM/SM-2000). Each DSU2 shelf can have up to four ISTF units. Two types of services are provided by the ISTF:

- Transmit pseudo-random number bit pattern
- Digital loopback of the bits received.

The transmit service consists of a *send* side and a *receive* side. The send side generates an 11-bit shift register PRN which has been recommended by the CCITT for digital testing. It expects a far-end device to loopback the bits so the receive side can tell if any bits were altered during transmission. Each ISTF can perform up to three simultaneous transmit services.

The loopback service also consists of a receive side and a send side. It takes the bits from the input channel and places them on the output channel. The service provides two options: *inverting* and *noninverting*. The *noninverting* option copies the bits from the input channel directly to the output channel. The *inverting* option changes the polarity of each bit. For example, an input bit that is a "1" is placed on the output channel as a "0". Each ISTF unit can perform up to 31 simultaneous loopback services.

The noninverting 5ESS[®] switch loopback test line for ISDN trunking meets the functional requirements announced in the ANSI[®] standard T1.206-1988 (Digital Exchanges and PBXs - Digital Circuit Loopback Test Line). The ANSI standard designates the test line as a 108-type test line.

The 5ESS[®] switch 108-type test line deviates in one minor detail from the ANSI standard in that time-out is currently fixed at 1 hour (in the event the caller fails to disconnect), whereas the ANSI specification calls for a time-out period that can be set by the operating company.

108-Type Test Line Access

Currently, only 7-digit access is provided. The North American Numbering Plan recommends "959" as the NXX for end-office testing. Bellcore TR-476 recommends 959-1080 as the directory number.

PROCEDURE

1. For ISTF loopback function feature implementation, go to Step 2.
For ISTF transmit function feature implementation, go to Step 9.
For verifying feature implementation, go to Step 14.

2. ISTF Loopback Feature Implementation.

The recent changes required to implement the *inverting* and *noninverting* loop-back function of this feature are described in the following steps.

3. Use recent change view 5.1 (TRUNK GROUP) to define the trunk-group characteristics. The significant attributes and their respective values are as follows:

- TGN = The loopback trunk group
- TRK DIR = LTP
- HUNT TYPE = FIFO
- TRK CLASS = LTPISTFL
- RMK = ISTF LOOP
- INPLS = NOSIGNAL
- OUTPLS = NOSIGNAL
- VPA TYPE = NOVPA
- CCS7 TYPE = RBOC.

4. Use recent change view 5.5 (TRUNK MEMBER) to define the trunk-member characteristics. The significant attributes and their respective values are as follows:

- TGN = The loopback trunk group
- MEMB NBR = 0
- QTY = 1
- EN = P XXXXXXXX (where X is the logical port).

5. Define the fixed route on recent change view 10.1 (FIXED ROUTE). The significant attributes and their respective values are as follows:

- TRMT = ISTFLB
- RTI = Route Index of the loopback function.

6. Use recent change view 10.2 (ROUTE INDEX) to define the route index that points to the trunk group with the ISTFLB function. The significant attributes and their respective values are as follows:

- RTI = RTI value from RC/V 10.1
- TGN = The loopback Trunk Group
- SIG PRO = TRAD.

7. Use recent change view 1.5 (PBX-DID LINE) to insert the telephone number that will be associated with the

noninverting option. The significant attributes and their respective values are as follows:

- LCC = TST
- RTI = RTI value from RC/V 10.1
- TSTCODE = NINV.

8. Use recent change view 1.5 (PBX-DID LINE) to insert the telephone number that will be associated with the *inverting* option. The significant attributes and their respective values are as follows:

- LCC = TST
- RTI = RTI value from RC/V 10.1
- TSTCODE = INV.

This concludes the *ISTF LOOPBACK FUNCTION FEATURE IMPLEMENTATION* portion of this procedure.

9. ISTF Transmit Function Feature Implementation.

The recent changes required to implement the transmit function of this feature are described in the following steps.

10. Use recent change view 5.1 (TRUNK GROUP) to define the trunk group characteristics. The significant attributes and their respective values are as follows:

- TGN = The transmit trunk group
- TRK DIR = LTP
- HUNT TYPE = FIFO
- TRK CLASS = LTPISTFX
- RMK = ISTF XMTR
- INPLS = NOSIGNAL
- OUTPLS = NOSIGNAL
- VPA TYPE = NOVPA
- CCS7 TYPE = RBOC.

11. Use recent change view 5.5 (TRUNK MEMBER) to define the trunk member characteristics. The significant attributes and their respective values are as follows:

- TGN = The transmit trunk group
- MEMB NBR = 0
- QTY = 1
- EN = P XXXXXXXX (where X is the logical port).

12. Define the fixed route on recent change view 10.1 (FIXED ROUTE). The significant attributes and their respective values are as follows:
 - TRMT = ISTFXMIT
 - RTI = Route Index of the transmit function.
13. Use recent change view 10.2 (ROUTE INDEX) to define the route index that points to the trunk group with the transmit function. The significant attributes and their respective values are as follows:
 - RTI = The RTI value from RC/V 10.1
 - TGN = The transmit Trunk Group
 - SIG PRO = TRAD.

This concludes the *ISTF TRANSMIT FUNCTION FEATURE IMPLEMENTATION* portion of this procedure.

14. Verifying Feature Implementation

If verifying *loopback* operation, go to Step 15.

If verifying *transmit* operation, go to Step 24.

15. Verifying Loopback Operation.

There are two ways to verify the operation of the ISTF loopback feature. One way is to place an interoffice call to the 108-type test line which has the inverting option; the squelch of the data stream should be clearly audible. A second method is through the use of a trunk and line work station (TLWS) test position at a far-end office.

16. At TLWS, Access Page 160 and seize a TLWS test position.
17. At TLWS, access Page 4000,2 (SEIZE TRUNK/INCOMING CALL).
18. To seize a trunk, at TLWS, enter the following poke:

CMD: **4102,X,Y**

Where:

X = GRP (Outgoing trunk group to office with 108-type test-line)
Y = MEM (Trunk group member).

19. At TLWS, access Page 5000,1 (TRANSMISSION).
20. To specify the digits to outpulse, enter the following poke:

CMD: **4401,X**

Where:

X = Directory number of inverting test line.

21. At TLWS, access Page 5000,2 (TRANSMISSION) for 5E8 software release and Page 5000,3

(TRANSMISSION) for 5E9(1) and later software releases.

NOTE: Be sure to seize a digital trunk prior to accessing this page.

22. To specify digital trunk loopback testing, enter the following poke:

CMD: **5033,X,Y**

Where:

X = LBKINV (Termination type
Y = BLKSZ (Data block size, 1-64000).

23. The system displays the status of the test session in the lower right-hand corner of the page. The display should resemble the following:

ELAPSED = Elapsed Time

BLKSZ = Data block size (1 through 64000)

BER = 0.0 E - 0 (see Note)

ERBLK = 0.0 E 0 (see Note).

NOTE: **00R NO SYNCH** implies a failure to connect with the 108-type test line, or a connection to the wrong port of the 108-type test line (that is, you outputted the *noninverting* test number but then requested the *inverting* test).

24. Verifying Transmit Operation

To verify the operation of the transmit function, repeat Steps 16 through 23 at a TLWS in the central office where the 108-type test line is being installed.

NOTE: MCC Page 1110,x, ISTF displays a dynamic count of the number of ISTF services and channels currently available and in use.

Currently, digital loopback testing for CCS7 trunks may be invoked *only* from a TLWS. The system currently treats a digital loopback test invoked with the TST:TRK command as an invalid test request. This restriction will be lifted in the near future.

Procedure 8.16: FAR-END LOOP (FELP) PROCEDURE

OVERVIEW

TR303 FELP Configuration by TTY Message

There are two options available for using far-end loop process (FELP) on a TR303 facility. One with and one without the protection. When a protection line is available, the looped-back DS1 automatically switches to the protection line to preserve customer service. Without the protection line, the facility to be looped-back must be out-of-service (OOS) either manually or automatically, to ensure no live traffic is using the facility.

TR303 FELP Operation Protection Line Switch (PLS) Option

In preparation for a far-end loopback on a facility, the craft can optionally inhibit protection switch release of the facility and inhibit the facility fault count measurements.

Optional FELP TR303 Protection Line Switch Release Inhibit

In TR303, a DS1 on protection and looped-back can be bumped off protection should the active primary DS1 [the DS1 carrying the active time slot management channel (TMC)] need to use the protection line (both due to "soft" or "hard" faults). This could cause calls to be lost on the protected and looped-back facility. To disable the active primary DS1s ability to interrupt the protected looped-back DS1, the protection switch release inhibit can be used.

PROCEDURE

1. On the MCC, enter the following command:

INH:RT,FAC=a-b,RELEASE;

Where yy is the SID and b is the facility number (1-28).

**Response: M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
FAC b SWITCH RELEASE INHIBIT**

Where:

c = SM/SM-2000 (1-192).
d = IDCU (0-7)
e = DS1 Facility (0-39)

-and-

M INH RT FAC=a-b RELEASE COMPLETED

Procedure 8.16.1: Optional FELP TR303 Facility Alert (IFAC) Inhibit (not required for FELP without PLS)

PROCEDURE

1. During a TR303 FELP to UN-FELP transition, the DS1s exhibit a tendency to take facility errors. These errors appear as ROP messages such as the following:

M REPT FAC ALERT IFAC=c-d-e NE 15MIN P IFAC=c-d-e ERR3

CI EE THR SES THR UAS THR FLS THR SS THR

xx xx xx xx xx xx xx xx xx xx

-and-

A minor alarm on MCC page 1880,x,y [where: x=IDCU number (0-7) and y=RT number) and 187x (where: x=IDCU number) is given.

2. The counting of these errors can be inhibited during a FELP with the following input command:

INH:FAC,IFAC=c-d-e;

Response: M INH FAC IFAC=c-d-e COMPLETED

Procedure 8.16.2: Set Far-End Loop Execution with Protection Line Switch Option

PROCEDURE

1. The far-end loop configuration can be requested by a TTY message. Configuration of a DS1 facility to a FELP is also a pending request for a protection line switch. To request the set of a FELP on a DS1 facility, the following message is used:

SET:RT,FAC=a-b,FELP;

Response:

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
  FAC b SWITCH RELEASE INHIBITED (optional)
  FAC b FAR END LOOP REQUESTED
```

2. The system will respond immediately to these requests with one of the following messages:

```
M SET RT FAC=a-b FELP IN PROGRESS
```

3. Before FELP can be completed, the facility must not be carrying live traffic. The system will attempt to do this automatically by switching the facility to the protection line. When the facility has been successfully placed on protection, the following message will be printed:

```
M RMV IFAC=c-d-e COMPLETED PROTECTION SWITCH OK
```

Response:

```
FAC b FAR END LOOP REQUESTED
FAC b LINE ON PROTECT ALARM ON
FAC b SWITCH RELEASE INHIBITED (optional)
```

This message will indicate which facilities the far-end loop requests are pending on. When the RT responds, the FELP requests the following message to be printed:

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END EVENT
  FAC b LINE ON PROTECT ALARM ON
  FAC b FAR END LOOP
  FAC b SWITCH RELEASE INHIBITED (optional)
```

Also the facilities on MCC pages **187x** and **1880,x,y** will indicate FELP if the facility is both far-end looped and protected. If the facility is not on protect, the FELP status must be determined from the automatic ROP output messages or as a response to a manual **OP:RT,SID=yy;** input command.

Procedure 8.16.3: TR303 FELP Operation Without Protection Line Switch Option

PROCEDURE

1. Before requesting the FELP, the facility to be looped must be in the OOS condition. Facilities with the EOC and TMC will not be removed. To perform the operation, enter the following input command:

RMV:IFAC=c-d-e;

Response:

M RMV IFAC=c-d-e COMPLETED

2. If the previous command cannot be performed due to nailups or ISDN lines on the facility, a removal of the facility can be performed unconditionally. To perform the operation, enter the following input command:

CAUTION: This is possibly a service affecting command.

RMV:IFAC=c-d-e,UCL;

Response: M RMV IFAC=c-d-e COMPLETED

3. The far-end loop can be requested by a TTY message. To request a set of a FELP on a DS1 facility, the following message is used:

SET:RT,FAC=a-b,FELP

4. The system responds immediately to these requests with one of the following messages:

M SET RT FAC=a-b FELP IN PROGRESS

When the RT responds, the FELP requests that the following message be printed:

**M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
FAC b FAR END LOOP**

Also the facilities on MCC pages **187x** and **1880,x,y** will indicate FELP if the facility is both far-end looped. The FELP status must be determined from the automatic ROP output messages or as a response to a manual **OP:RT,SID=yy;** input command.

Procedure 8.16.4: Clear Far-End Loop with Protection Line Switch Option

PROCEDURE

1. The far-end loop can be cleared using an input command. The command will trigger a message to be sent to the RT to request that the far-end loop be removed from the selected facility. To clear the FELP condition, enter the message:

CLR:RT,FAC=a-b,FELP;

Response:

CLR RT FAC=a-b FELP IN PROGRESS

-and-

REPT RT SID=yy LRT=c-d-e MINOR NEAR END

FAC b LINE ON PROTECT ALARM ON

-or optional-

FAC b SWITCH RELEASE INHIBITED

If switch release is INHIBITED, the DS1 will not be taken off protection.

When the facility has been successfully taken off the FELP condition, the following message will be printed:

M REPT RT SID=yy LRT=c-d-e MINOR NEAR END

FAC b SWITCH RELEASE INHIBITED

Procedure 8.16.5: Clear FELP without Protection Line Switch Option

OVERVIEW

If the optional protection switch release inhibit or the facility alert counts were inhibited, they should also be cleared.

PROCEDURE

1. To release a FELP on a DS1 facility, enter the message:

CLR:RT,FAC=a-b,FELP

Response:

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT  
  
FAC b LINE ON PROTECT ALARM ON
```

```
M REPT RT SID=yy LRT=c-d-e MINOR FAR END  
  
FAC b LINE ON PROTECT ALARM ON
```

```
M CLR RT FAC=a-b FELP IN PROGRESS
```

```
RST IFAC=c-d-e COMPLETED
```

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT  
  
FAC b LINE ON PROTECT ALARM OFF
```

2. When the RT responds to the clearing of the FELP, the following message be printed:

NOTE: This is because the IFAC is still OOS.

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
```

3. To restore the IFAC number, use the following command:

RST:IFAC=c-d-e

Response: M RST IFAC=c-d-e COMPLETED

4. The RT responds to the IFAC restoral with the following:

M REPT RT SID=yy LRT=c-d-e ALL OKAY

Procedure 8.16.6: Release Optional FELP Release Inhibit (After The FELP Is Cleared)**OVERVIEW**

If the optional protection switch release inhibit or the facility alert counts were inhibited, they should also be cleared.

PROCEDURE

1. To clear the optional protection switch release inhibit, use the following input message:

ALW:RT,FAC=a-b,RELEASE;

Response:

* REPT RT SID=yy LRT=c-d-e MINOR FAR END

FAC b LINE ON PROTECT ALARM ON

M ALW RT FAC=a-b RELEASE COMPLETED

RST IFAC=c-d-e COMPLETED PROTECTION UN-SWITCH OK

* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT

FAC b LINE ON PROTECT ALARM OFF

2. To clear the optional alert count inhibit, use the following input message:
ALW:FAC,IFAC=c-d-e;

Response: M ALW FAC IFAC=c-d-e COMPLETED

3. The RT responds as follow:

M REPT RT SID=yy LRT=c-d-e ALL OKAY

Procedure 8.16.7: Optional FELP TR303 Facility Alert (IFAC) Allowed (After The FELP is Cleared)

OVERVIEW

If the optional FELP TR303 facility alert is allowed, then perform the following:

PROCEDURE

1. To allow IFAC error counting use the following input command.

ALW:FAC,IFAC=c-d-e

Response: M ALW FAC IFAC=c-d-e COMPLETED

Procedure 8.17: PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING SLIM

OVERVIEW

This procedure provides a method to perform a metallic measurements of an analog trunk using the Subscriber Loop Instrument Measurement (SLIM).

NOTE: Only the tip and ring of loop supervision and 2-wire ear and mouth (E&M) trunks can be accessed with the SLIM. The SLIM cannot access 4-wire trunks.

PROCEDURE

1. At the TLWS, access a test position by entering the poke command **161,X** (TLWS test position summary display Page 160).

Where:

X = test position number (1-32).

2. If the trunk is not currently seized, seize it by entering the poke command **4102,X**.

Where:

X = **GRP, MEM**

3. To display the METALLIC measurements, enter the poke command **5600**.
4. Enter the poke command corresponding to the metallic measurement you wish to perform.

NOTE: Most metallic measurements will be updated every few seconds (**5701** pokes do not update).

5. Results may be printed at the Receive-Only Printer (ROP) by entering the poke command **9500**.
6. Other measurements may be made by simply entering another (corresponding) poke command.
7. If no further testing is to be performed on the trunk, release it by entering the poke command **4999**.
8. If all TLWS testing is completed, release the test position by entering the poke command **201,X** (TLWS test position summary display Page 160).

Where:

X = test position number (1-32).

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

9. FAN MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for performing maintenance to fan equipment.

Procedure 9.1: PERFORM FAN MAINTENANCE

OVERVIEW

This section describes procedures for replacement of the switching module/switching module-2000 (SM/SM-2000), the communication module (CM) bay fans, the integrated services line unit (ISLU) drawer fan, and the SM/SM-2000 and CM bay fan alarm boards. Complete 5ESS® switch replacement fan ordering information is provided in Table 9.1-1.

Six main types of fan assemblies are used in the SM/SM-2000 bays. They are as follows:

- (1) **J5D003BE-X(1-2):** A 3-fan assembly found in general use throughout the 5ESS™ switch bay configurations. It is mounted in the bottom of a bay, and access to the filter is from the front of the bay. (See Figure 9.2-1.) The replacement fan for these fan units can be ordered as comcode number 845622042 and thermostatically controlled replacement fans for these fan units can be ordered as comcode number 846937506.
- (2) **J5D003BN-X(1-2):** A 6-fan assembly provided to accommodate the addition of Packet Switch Units (PSU) and the Module Controller and Time Slot Interchanger Unit Model 2 (MCTU2). It is mounted in the bottom shelf position of a bay, and access to the filter is from the front of the bay. (See Figure 9.2-2.) The replacement fan for the J5D003BN-1 fan unit can be ordered as comcode number 846166015 and the thermostatically controlled replacement fan can be ordered as comcode number 846943256. The replacement fan for the J5D003BN-2 fan unit can be ordered as comcode number 846365641 and the thermostatically controlled replacement fan can be ordered as comcode number 846968691.
- (3) **J5D004AH-1:** A 3-fan assembly mounted in each ISLU drawer to cool the contents of the drawer. It is provided to supplement the 6-fan assembly in the bay. Access to the filter is from the rear of the drawer unit. There are two versions of this assembly:
 - Pre-June 1989 version requires access from underneath the drawer to replace a fan. (See Figure 9.3-1.)
 - Post-June 1989 version provides access from the top of the drawer to replace a fan. (See Figure 9.3-2.)

The replacement fan for the J5D004AK-1 fan unit can be ordered as comcode number 405189416.

- (4) **J5D003BW-1:** A 6-fan assembly that mounts in the top shelf position of an SM/SM-2000 bay containing PSUs. It is an exhaust fan unit required to supplement the standard by fan assemblies when more than 3 PSUs are mounted in the bay. There is no filter with this fan assembly. (See Figure 9.2-3.) The replacement fan for the J5D003BW-1 fan unit can be ordered as comcode number 846365641.
- (5) **J5D003FH-X(1-2):** A 6-fan, bidirectional fan assembly provided for 3B21D, SM-2000, and ISLU2 that is mounted in the middle of a bay. The replacement fan for the J5D003FH-1 fan unit can be ordered as comcode number 846968691 and the replacement fan for the J5D003FH-2 fan unit can be ordered as comcode number 406611186.
- (6) **J5D003FT-1:** A 3-fan assembly designed to be used as a standalone or with an additional J5D003FT-1 assembly to create a 6-fan assembly. Designed as a platform fan unit, this unit may be used in CM3, AIU, XAIU, and QADSL. The replacement fan for the J5D003FT-1 fan unit can be ordered as comcode number 406611186.

Fans run continuously as long as they are fused. Fuses located in the fuse/filter panel may be removed to power down fan assemblies, except for the ISLU drawer fans. Details for fusing and alarming assignments are shown on the office ED-5D651-15.

Fan malfunctions are indicated by a message printout at the Master Control Center (MCC) and a MAJOR audible alarm. Also, light-emitting diodes (LED) light on the fan unit as seen from the rear of the bay and at the top of the bay as seen from the front. In addition, each ISLU drawer has an alarm circuit pack (256A) mounted on the rear of the ISLU fan unit. An LED on this circuit pack will also light to identify a defective fan.

Be aware that unplugging a fan's connector wires will **not** result in an alarm condition. Fan alarm circuits require a connection to the alarm module to provide alarms. Separate test capabilities are provided for the fan alarm modules. Fan alarm circuits are normally open and will close only as a result of a fan malfunction.

It is not necessary to power down a fan unit in order to replace a filter except in the ISLU drawers.

CAUTION: DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. The RESET button or the RESET/TEST switch or the TEST button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

Detailed procedures for filter replacement are found in 235-105-210, *Routine Operations and Maintenance Procedures*.

PROCEDURE

1. Depending on the type of fan to be replaced, select and perform one of the following procedures:
 - (a) For fan assemblies J5D003BE-X(1-2), J5D003BN-X(1-2), J5D003BW-1, J5D003FH-X(1-2), and J5D003FT-1, perform Procedure 9.2, Replacement of SM/SM-2000 and CM Bay Fans.
 - (b) For fan assembly J5D004AK-1, perform Procedure 9.3, Replacement of ISLU LGC Fans.
2. If a Fan Unit Alarm Board has malfunctioned, perform Procedure 9.4, Remove and Replace SM/SM-2000 Bay Fan Unit Alarm Board.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 9.1-1 5ESS® Switch Replacement Fan Ordering Information

UNIT ^a	REPLACEMENT LIST NUMBER	SCHEMATIC	DESCRIPTION	REPLACEMENT FAN COMCODE ^a	KS-SPEC	COMMENT
J5D003BE-1	L101	SD5D019-01	3 Fan Unit Model 1	845622042	KS22501 L3A	5 Wires
J5D003BE-1	L103	SD5D019-01	3 Fan Unit Model 1	846937506	KS23912 L1A	Thermo Version
J5D003BE-1	L100	SD5D019-01	3 Fan Unit Model 1	845620228	KS22501 L3	3 Wires
J5D003BE-1	L102	SD5D019-01	3 Fan Unit Model 1	846969301	KS23912 L1	Thermo Version
J5D003BE-2	L100	SD5D019-02	3 Fan Unit Model 2	845622042	KS22501 L3A	5 Wires
J5D003BE-2	L101	SD5D019-02	3 Fan Unit Model 2	846937506	KS23912 L1A	Thermo Version
J5D003BN-1	L100	SD5D081-01	6 Fan Unit Model 1	846166015	KS22501 L3	3 Wires

J5D003BN-1	L101	SD5D081-01	6 Fan Unit Model 1	846943256	KS23912 L1	Thermo Version
J5D003BN-2	L100	SD5D081-02	6 Fan Unit Model 2	846365641	KS22501 L3A	5 Wires
J5D003BN-2	L101	SD5D081-02	6 Fan Unit Model 2	846968691	KS23912 L1A	Thermo Version
J5D003BW-1	L100	SD5D162-01	Exhaust 6 Fan Unit	846365641	KS22501 L3A	
J5D003FH-1	L100	SD5D168-01	Bi-Directional 6 Fan Unit	846968691	KS23912 L1A	Thermo Version
J5D003FH-1	L101	SD5D168-01	Bi-Directional 6 Fan Unit	846967883	KS23912 L5	Nonlatching
J5D003FH-2	L100	SD5D168-02	6 Fan Bi-Dir Model 2	406611186	KS23912 L2	
J5D003FT-1	L100	SD5D168-02	3 or 6 fan platform unit	406611186	KS23912L2	
J5D004AH-1	L100		ISLU Drawer Fan Unit	405189416	KS23398 L2	
ED4C386-30	G100		3B20 Fan Unit	846422111	KS22501 L3A	
J3T027AB-1			SCSI Disks b	405995923	—	

Notes:

- a. Use the replacement fan comcode or J-code replacement list number to order replacement fans for 5ESS switch fan units. This number denotes the fan assembled with the proper connectors. If the replacement fan comcode number for different units is the same, then the fan assembly with connector is identical. All replacement fans can be the thermo version (adjusts fan speed with temperature) and can be mixed with full speed fans in the same fan unit.
- b. Replacement of SCSI disk drive fans in the field is not recommended. The whole SCSI disk unit should be replaced and repaired remotely at an approved service center.

Procedure 9.2: REPLACEMENT OF SM/SM-2000 AND CM BAY FANS

OVERVIEW

This procedure describes a method for replacement of switching module/switching module-2000 (SM/SM-2000) and communication module (CM) bay fans. The procedure is the same for all SM/SM-2000 and CM bay fan units. The following fan units are covered:

- J5D003BE-X(1-2) (Figure 9.2-1)
- J5D003BN-XC(1-2) (Figure 9.2-2)
- J5D003BW-1 (Figure 9.2-3).

CAUTION 1: Manually unplugging a fan unit will not result in an alarm condition. Fan alarm circuits require a connection to the alarm module to provide alarms. Therefore, when replacing a fan, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.

CAUTION 2: Do not remove fuses to simulate fan alarms. The RESET button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

PROCEDURE

1. Determine the location of the unit with the defective fan.
2. At the fuse/filter panel, remove the fuse associated with the defective fan.

CAUTION: On newer fan units, the defective fan will begin to spin backwards from the pressure of the other operating fans.

3. Unplug the connector that connects the fan to the wiring harness.
4. This is used for the J5D003BE-1 and early version of the J5D003BE-2 fan units that have three screws holding the alarm board; otherwise, go to Step 5. Remove the bottom two screws holding the alarm board. You may have to remove connectors J5 and J6 which are in line with the center screw. Loosen the top screw so the alarm board may be moved out of the way when removing the fan in a later step.
5. Do not remove the fingerguard separately. Remove the defective fan by unscrewing the two screws that hold it in place and removing the screws, fingerguard and fan together as one assembly. Set the assembly on the floor and wait until the fan stops spinning.
6. Mount the fingerguard and screws to the replacement fan. Mount the assembly to the fan unit using the locator holes and mounting screws.
7. This is used for the J5D003BE-1 and early version of the J5D003BE-2 fan units only; otherwise, go to Step 8. Move the board back and replace the two screws. Tighten top screw and replace the two connectors, if removed.
8. Reconnect the fan connector to the wiring harness. Ensure that the connector is properly seated and there is no evidence of breaks in the wires. Refer to the **Caution 1** in the Overview.
9. At the fuse/filter panel, replace the fuse associated with the defective fan.

10. Press the fan reset button and ensure that the fans are running by physically looking at them and observing that no fan alarm LEDs are lighted.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

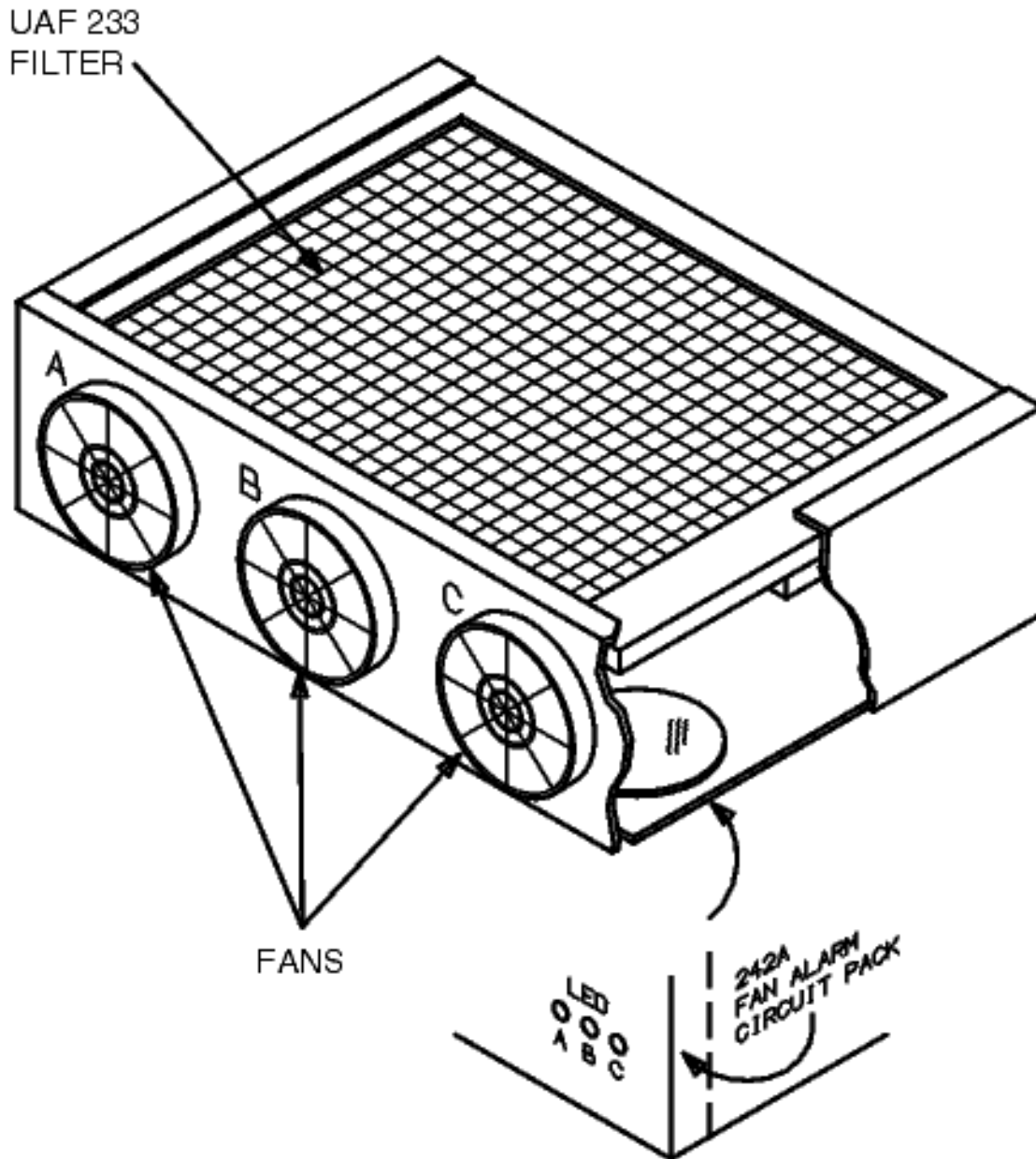


Figure 9.2-1 Fan Type J5D003BE-X(1-2)

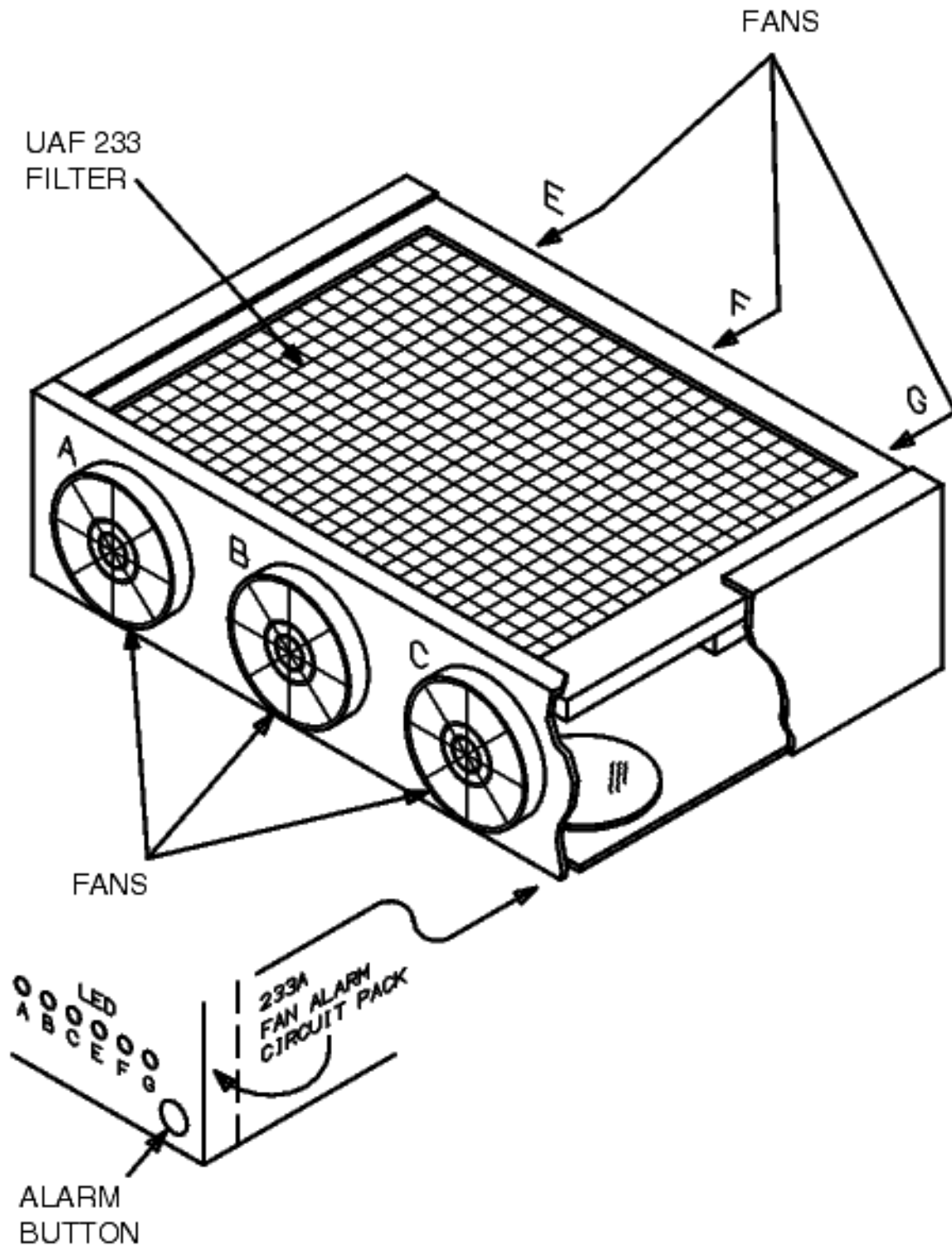


Figure 9.2-2 Fan Type J5D003BN-XC(1-2)

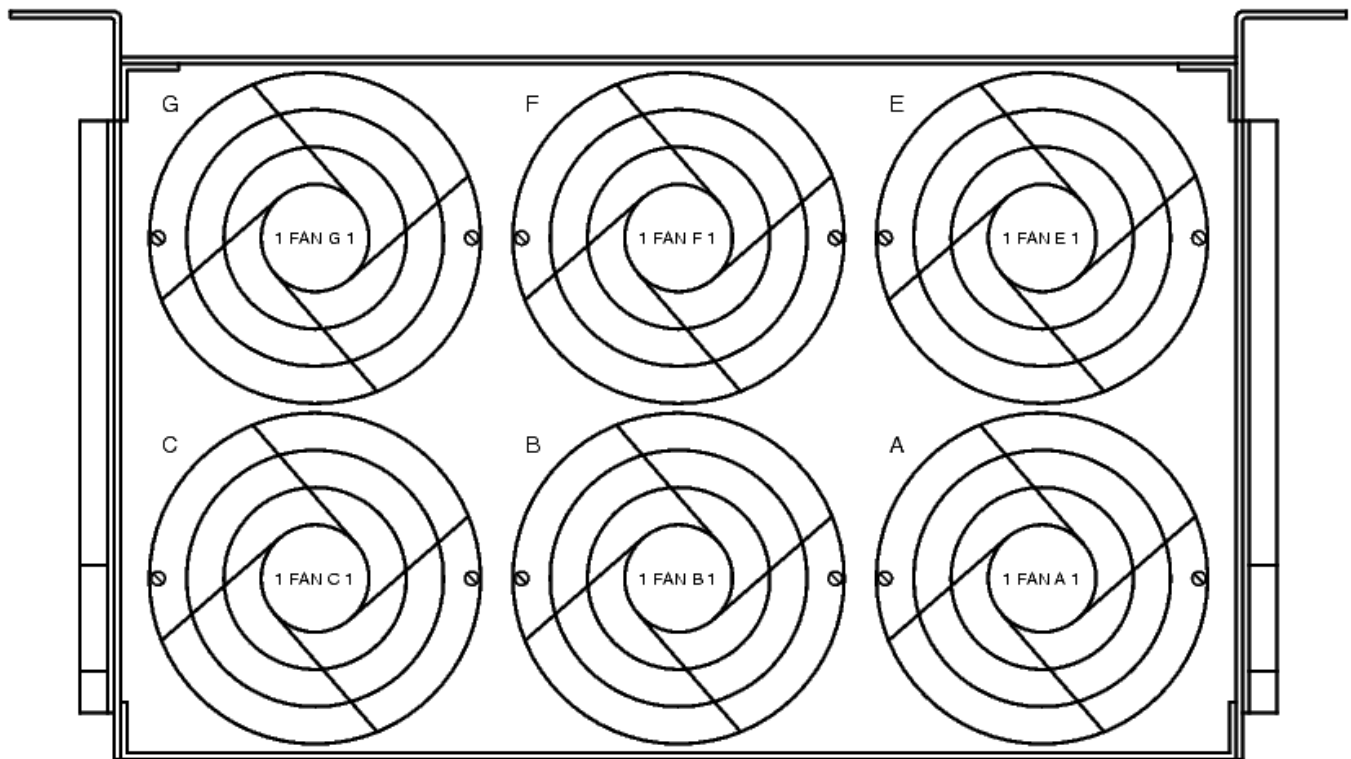


Figure 9.2-3 Fan Type J5D003BW-1 (Top View)

Procedure 9.3: REPLACEMENT OF ISLU LGC FANS

OVERVIEW

Each Integrated Services Line Unit (ISLU) Line Group Controller (LGC) has a 3-fan assembly (J5D004AK-1) which is used to cool the contents of the ISLU drawer. These fans are in addition to the fan units located in the bottom of the cabinets. When a fan fails, a major alarm will sound and a message will be printed on the Receive-Only Printer (ROP).

Mounted on the back side of the fan assembly is the Fan Alarm circuit board (256A). There are three light-emitting diodes (LED) on this board which are related to each fan. The top LED is associated with fan "C," the middle, fan "B," and the bottom, fan "A." When the LED is lighted, it indicates that the associated fan is not operating and requires maintenance.

There are two versions of the fan assembly. The earlier version was manufactured prior to June 1989 and is illustrated in Figure 9.3-1. The later version is illustrated in Figure 9.3-2.

CAUTION 1: Manually powering down a fan unit will not result in an alarm condition. Fan alarm circuits are normally open and will close only as a result of a fan malfunction. Therefore, when replacing a fan, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.

CAUTION 2: Fans in ISLU LGC drawers share fuses with line groups in the drawers. DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. Do not remove fuses to simulate fan alarms. The RESET button or the RESET/TEST switch on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

PROCEDURE

1. Go to the back of the appropriate cabinet and locate the fan unit with the bad fan. An LED will be lighted for the bad fan (A, B, or C).
2. Disconnect the top cable assembly that is connected to the 256A Fan Alarm circuit board.
3. Remove the UAF235 air filter.

NOTE: If the air filter needs replacement, it may be replaced at this time. Do not under any circumstances clean the filter and reuse it. Refer to the air filter replacement procedures which are located in 235-105-210, *Routine Operations and Maintenance Procedures*.

4. Unlock the fan unit by pulling out on the push/pull locking mechanism located in the upper left quadrant of the rear of the unit.
5. Remove the fan unit.
6. Replace the defective fan by removing the four mounting screws and disconnecting the connector to the wiring harness. Refer to either Figure 9.3-1 or Figure 9.3-2, whichever is applicable.
7. Ensure that the connector to the wiring harness is properly seated and there is no evidence of breaks in the wires. Refer to the **Warning** in the Overview.
8. Reinsert the fan unit into the bottom of the ISLU LGC drawer.
9. Lock the fan unit into place by pushing in on the push/pull locking mechanism.

10. Reinstall the UAF235 air filter.
11. Reconnect the upper connector on the 256A Fan Alarm circuit board.
12. Ensure that the fans are running by going around to the front of the cabinet, pulling out the ISLU drawer, and looking at the fans from the bottom of the drawer.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

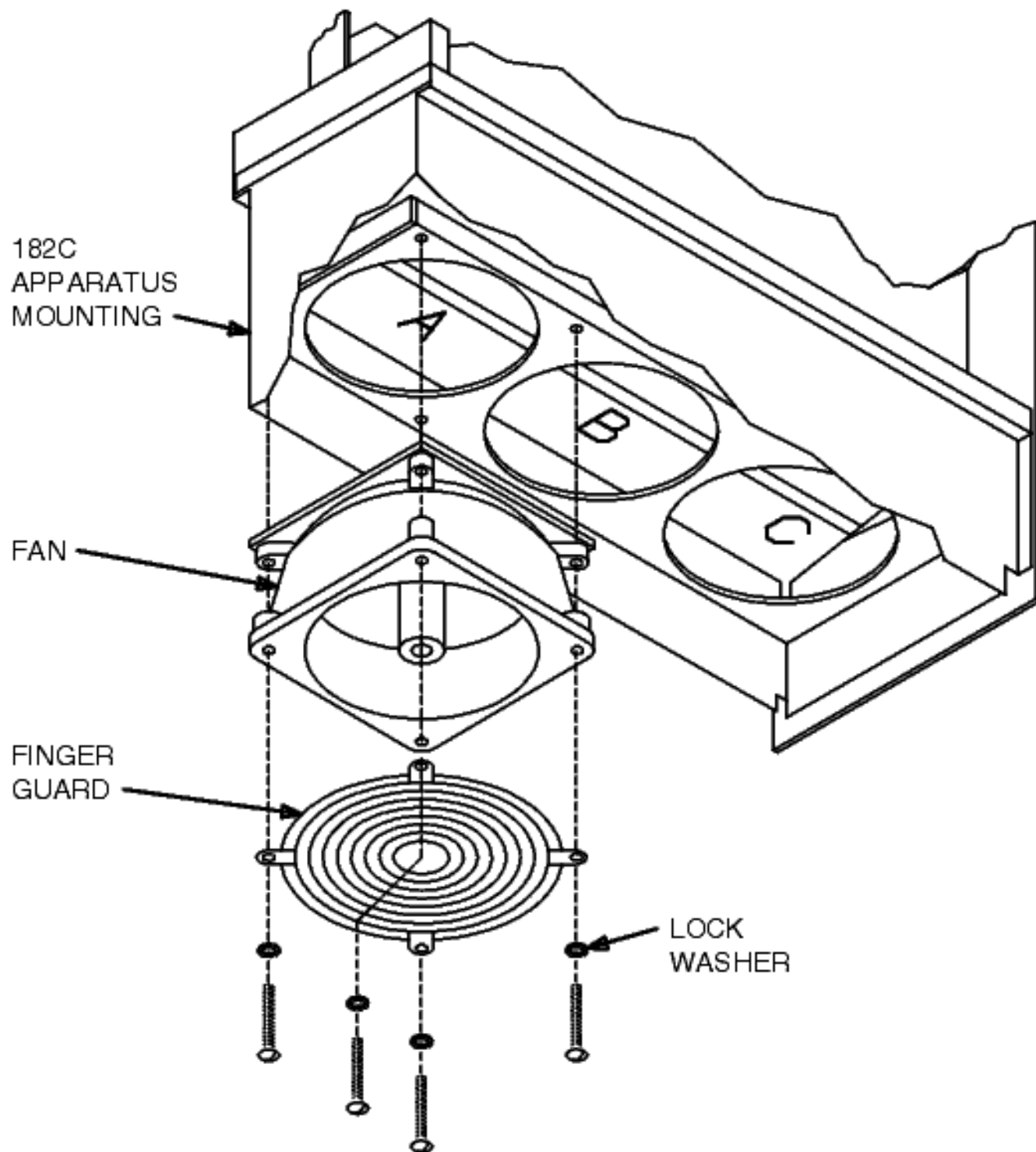


Figure 9.3-1 J5D004AK-1 Fan (Pre-June 1989)

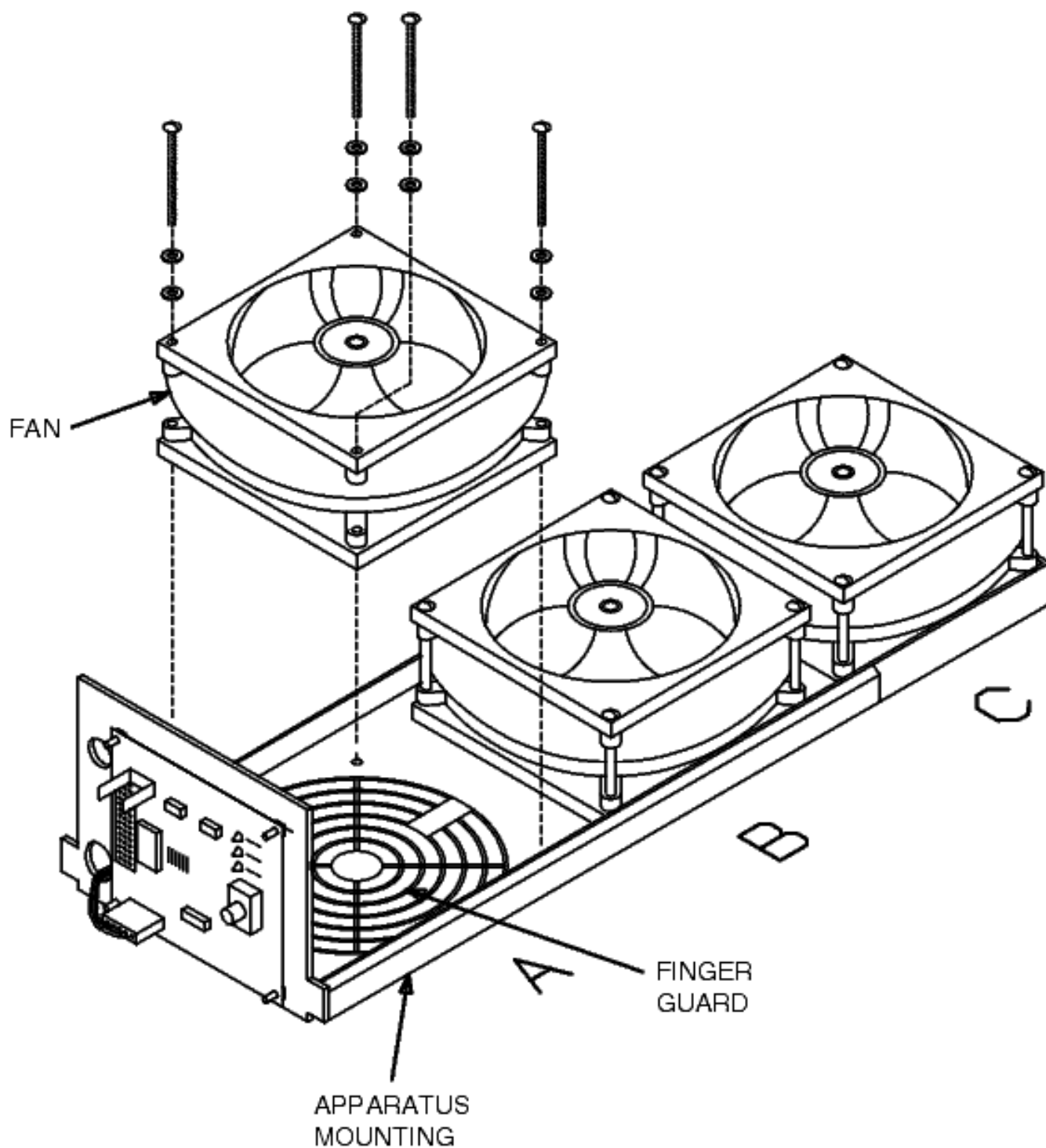


Figure 9.3-2 J5D004AK-1 Fan (Post-June 1989)

Procedure 9.4: REPLACE 256A FAN ALARM CIRCUIT PACK

OVERVIEW

This procedure describes how to replace a 256A fan alarm circuit pack in an Integrated Services Line Unit (ISLU) drawer. The 256A circuit pack is mounted on the back side of the 3-fan assembly (J5D004AK-1). Before performing the 256A circuit replacement procedure, read the following cautions.

CAUTION 1: Manually powering down a fan unit will not result in an alarm condition. Fan alarm circuits are normally open and will close only as a result of a fan malfunction. Therefore, when replacing the 256A circuit pack, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.

CAUTION 2: Fans in ISLU LGC drawers share fuses with line groups in the drawers. DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. Do not remove fuses to simulate fan alarms. The RESET button or the RESET/TEST switch on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

PROCEDURE

1. Go to the back of the appropriate cabinet and locate the fan unit with the bad 256A circuit pack. Refer to Figure 9.4-1
2. Disconnect the upper cable assembly that is connected to the 256A fan alarm circuit board.
3. Disconnect the lower cable assembly that is connected to the 256A fan alarm circuit board.
4. Remove the 4 screws that hold the circuit pack in place, and then remove the circuit pack.
5. Install the new 256A circuit pack and reinstall the screws removed in Step 4.
6. Reconnect the lower cable assembly and the upper cable assembly.
7. Ensure that the connector to the wiring harness is properly seated and there is no evidence of breaks in the wires. Refer to the **Caution** in the Overview.
8. At the front of the cabinet, pull out the ISLU drawer and ensure that the fans are running.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

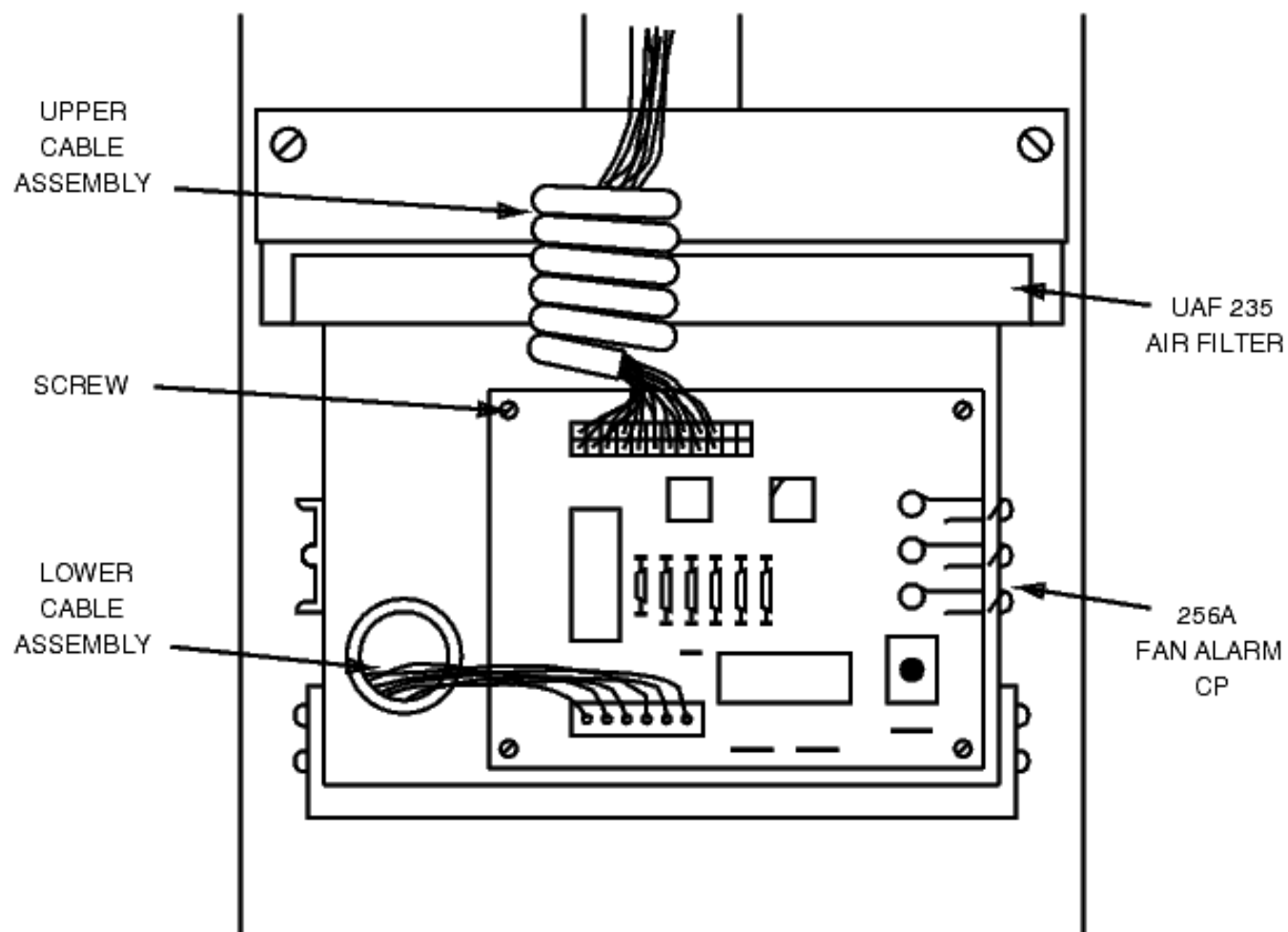


Figure 9.4-1 256A Alarm Circuit Pack for ISLU Fans

Procedure 9.5: REMOVE AND REPLACE SM/SM-2000 BAY FAN UNIT ALARM BOARD

OVERVIEW

This procedure describes how to replace a switching module/switching module-2000 (SM/SM-2000) bay fan alarm unit. Both the 3-Fan Unit Alarm Board (CM242A) and the 6-Fan Unit Alarm Board (CM233A) are included.

CAUTION: Do not remove fuses to simulate fan alarms. The RESET button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

PROCEDURE

1. Determine which type of Fan Unit Alarm Board is to be replaced and proceed with either Substep (a) or (b):
 - (a) If replacing the 3-Fan Unit Alarm Board (CM242A), proceed with Step 2.
 - (b) If replacing the 6-Fan Unit Alarm Board (CM233A, KS23884L3, or KS23884L3A), go to Step 8.
2. Remove the fuse marked "Fan Alarm Board."
3. On the CM242A board, disconnect (as required) cables from connectors J0 - J9.

NOTE: If you have the old version of the CM242A board (that is, wire wrap connected), obtain conversion kit ED5D670-30 and convert the alarm board and cables to a connectorized alarm board.
4. Remove and replace the CM242A board.
5. Refer to Figure 9.5-1 and reinstall cables to connectors J0 - J9 as appropriate.
6. Reinstall the fuse previously removed in Step 2.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
8. Remove the fuses marked "Fan A" and "Fan C."
9. On the CM233A, KS23884L3, or KS23884L3A board, disconnect (as required) cables from connectors J1 - J8.
10. Remove and replace the alarm board.
11. Referring to Figure 9.5-2, observe the following **Caution** and replace cables J1 - J8 as appropriate.

CAUTION: Connectors J1 - J8 are not in numerical sequence on this board.
12. Reinstall the fuses removed in Step 8.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

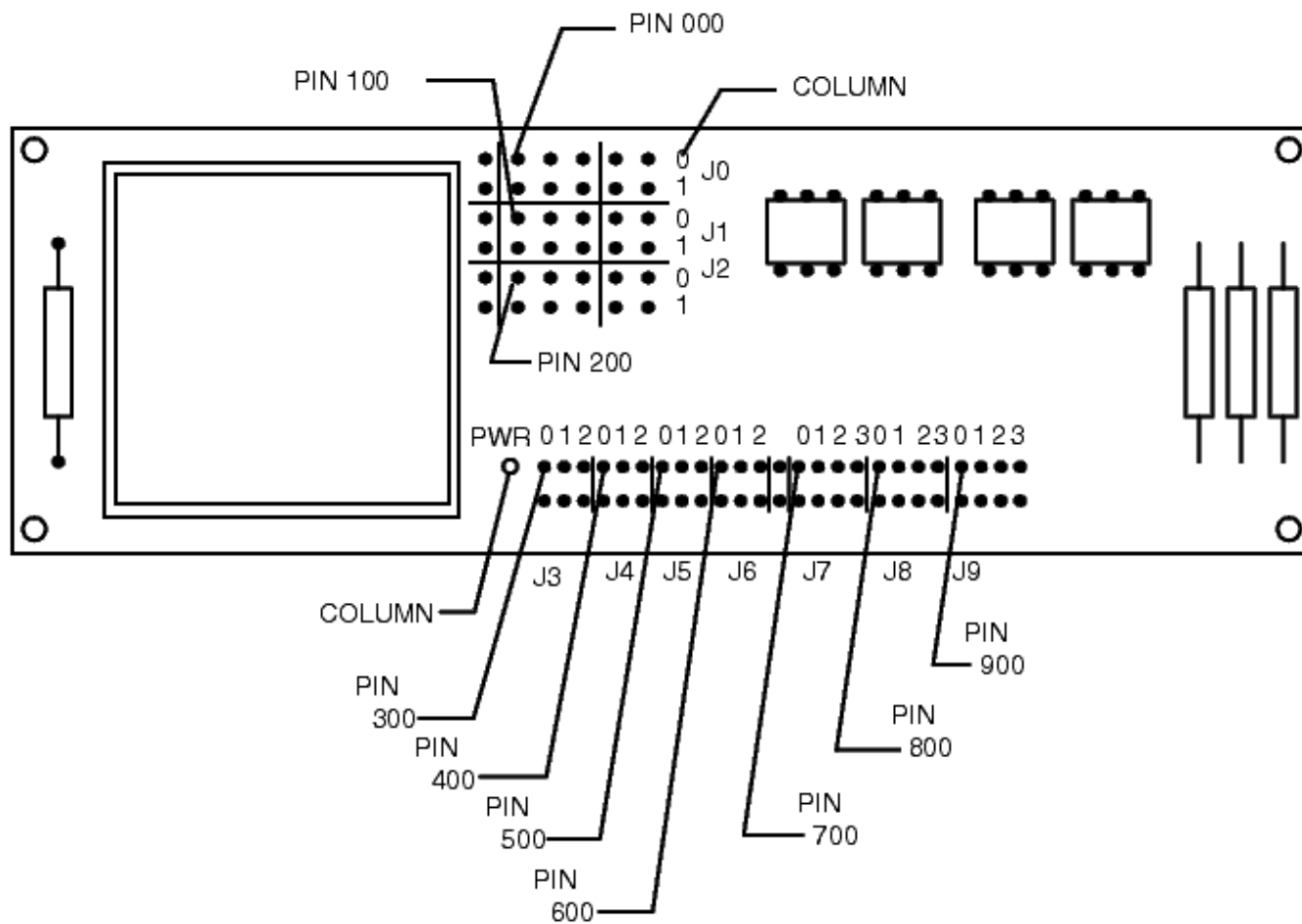


Figure 9.5-1 Terminal Numbering for a 242A Circuit Board

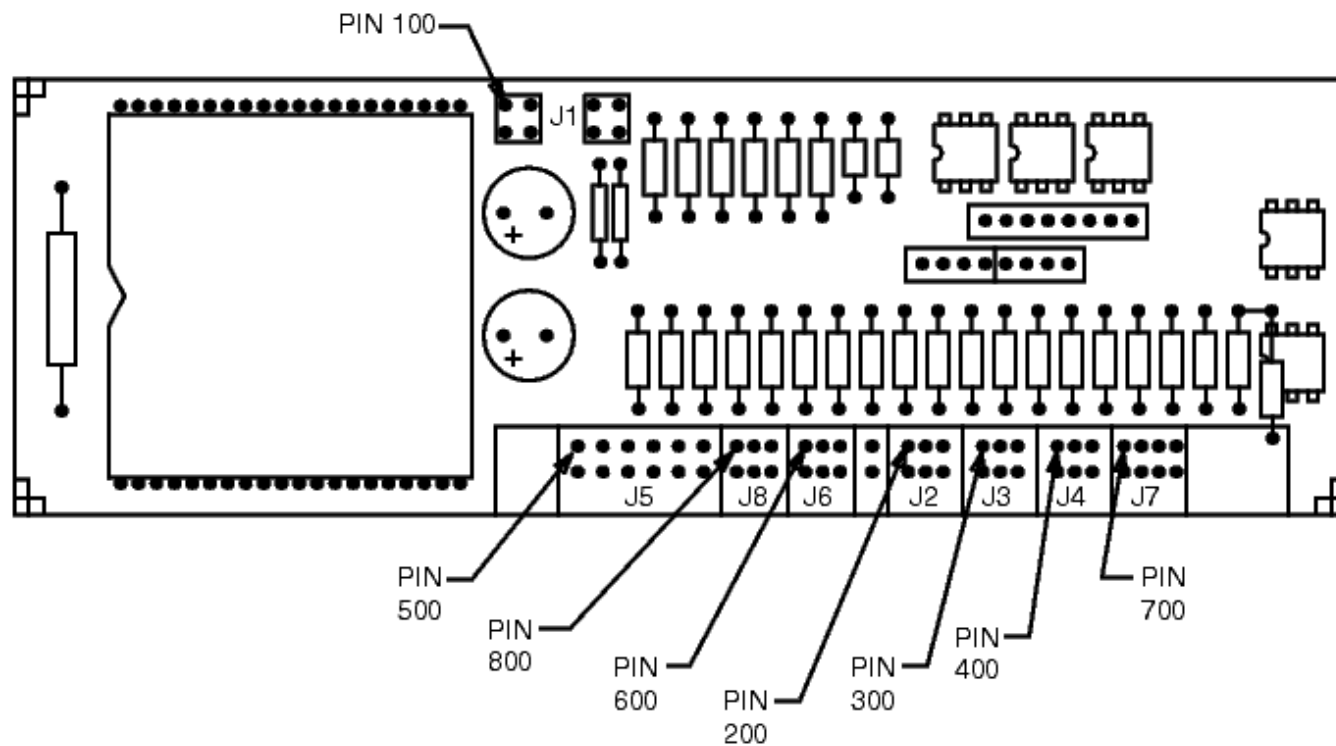


Figure 9.5-2 Terminal Numbering for a 233A Circuit Board

10. ADMINISTRATIVE MODULE MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for maintenance of Administrative Module (3B20D and/or 3B21D) equipment.

Procedure 10.1: RESPOND TO AND RESTORE A LOCKED-UP VIDEO TERMINAL

OVERVIEW

This procedure provides a method to restore a video terminal that does not respond to keystrokes. To perform this procedure, a trained craftsperson needs a good understanding of terminal configurations at the 5ESS[®] switch and the remote Switching Control Center (SCC). Also, the applicable craftsperson should know how to use the Master Control Center (MCC) video terminal to locate the display page(s) that can be helpful in restoring the locked-up video terminal.

PROCEDURE

1. Identify the Teletypewriter (TTY) member number of the locked-up terminal. As used in this procedure, the TTY member number and the video terminal number are synonymous. The video terminal number is probably indicated at the top of the status indicator on the MCC or the Supplementary Trunk and Line Work Station (STLWS).
2. Locate another operational video terminal that is assigned to the same 5ESS[®] switch as the locked-up video terminal.
3. At the operational video terminal, enter the command as follows to restore the faulty video terminal to service.

NOTE: At least one Input/Output Processor (IOP) and one Teletypewriter Controller (TTYC) must be in service before the TTY can be restored.

RST: TTY=a[,UCL];

Where:

a = TTY member number (0-255).

Response: A **PF** entry (on the same line as the input message), followed by a **RST TTY** output message.

4. Does the **RST TTY** output message and video terminal that is being restored indicate restoration? For successful restoration, the **RST TTY** output message should contain the TTY member number (0-255), followed by the word **COMPLETED**. The restored video terminal should display a **CFTSHL TERMINAL IN SERVICE** output message. If these two conditions do not exist, continue with Steps 5 and 6.
5. Identify the TTYC that is assigned to the locked-up terminal and identify other terminals that are using this TTYC. Refer to 235-600-301 for details concerning TTY Terminal Specifications in base Equipment Configuration Data (ECD).
6. Observing the following **Caution**, at the operational video terminal, enter the command as follows to restore the TTYC assigned to the locked-up terminal.

CAUTION: Notify personnel that the other terminals using the same TTYC will be out of service (OOS) when the TTYC is being restored. Do not use these terminals until the locked-up terminal and the TTYC have been restored to service.

NOTE: The **UCL** option only works if one of the TTYs assigned to the TTYC is OOS.

enter **RST: TTYC= a [,UCL];**

Where:

a = TTYC member number (0-255).

Response: A **PF** entry (on the same line as the input message), followed by a **RST TTYC** output message. Successful restoration is indicated when the **RST TTYC** output message contains the TTYC member number (0-255), followed by the word **COMPLETED**. The restored video terminal should display a **CFTSHL TERMINAL IN SERVICE** output message. If these two conditions do not exist, observe the following **Caution** and the following note and proceed to Step 7.

CAUTION: All human interaction with the 5ESS[®] switch is lost during a craft initialization. Input messages and poke commands cannot be entered during a craft initialization. A craft initialization takes approximately 10 to 15 minutes to complete.

NOTE: Step 7 is performed **ONLY** when the **RST** input messages (**RST:TTY** and **RST:TTYC**) fail to restore the locked-up terminal. To perform Step 7, the video terminal at the MCC must be operational.

7. Refer to 235-105-250, *System Recovery Manual*, for craft init procedures.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 10.2: ANALYZE AND CLEAR NONDIAGNOSABLE CU MEMORY ERRORS

OVERVIEW

This procedure contains information for clearing an intermittent memory fault in the Control Unit - Main Store Controller (CU MASC) of the Administrative Module (AM). Typically, the intermittent memory fault causes "REPT CU ERROR INTERRUPT" reports when the affected Control Unit (CU) side is active (ACT) or that side of the CU cannot be restored due to the memory errors. However, the fault is so intermittently "soft" that it cannot be detected by the normal CU MASC diagnostics.

PROCEDURE

1. Collect the associated "REPT CU ERROR INTERRUPT" printouts. On the affected MASC (0 or 1), input the **OP:MEMERRS** message to obtain a printout of selected "MEMLOG" entries for specific dates. For the input message format, refer to 235-600-700, *Input Message Manual*.
2. Determine which Main Store Controller (MASC) (0 or 1), which memory pack (TN28, TN56, etc.), and which memory slot (0, 1, 2, etc.) in the CU is most likely causing the problem. A guide for doing this is in 235-600-750, *Output Message Manual*, "REPT CU" output message page. If necessary, refer to the following subprocedures:
 - Analyze REPT:CU MEMLOG File Entries—Procedure 10.3
 - Analyze REPT:CU Error Interrupt Handler Log File (ERLOG) Entries— Procedure 10.4
 - Analyze Postmortem Dump—Procedure 10.5 .
3. On the affected MASC (0 or 1), execute the special CU MASC diagnostic demand phases 33, 34, 36, 40, 41, 93, and 95 (with TLP option) several times to determine the consistency of the failure. For the diagnostic (DGN) input message format, refer to 235-600-700, *Input Message Manual*. Additional information about these demand diagnostic phases can be found in Section 4 — Diagnostic Test Supporting Information.
4. Perform Substeps (a) or (b) as follows:
 - (a) If the diagnostic's result is all tests passed (ATP), replace the suspected faulty memory pack (as determined in Step 2), repeat Step 3, and verify that the diagnostics demand phases (listed in Step 3) completes ATP.
 - (b) If the diagnostic result is not ATP, using the SUSPECTED FAULTY EQUIPMENT LIST generated in Step 3, replace the suspected faulty memory pack, and verify that the failing diagnostic phase (if any) now runs consistently ATP.
5. Once the previous Steps have been completed successfully, using the **RST** poke command or the **RST:CU [0,1]** input message, restore the applicable MASC (0 or 1).
6. Verify that the applicable MASC restored successfully (no hashsum failure after memory update). If the applicable MASC restores successfully, perform Substep (a) and then proceed to Step 7. If the applicable MASC does not restore successfully, perform Substep (b) and then proceed to Step 7.
 - (a) Hold the interrupt and diagnostic printouts along with the suspected faulty memory pack for a few days to verify that the memory errors have cleared. Once it is determined that the memory errors have been cleared, attach the interrupt and diagnostic printouts to the faulty memory pack and return

pack to the appropriate repair center.

- (b) Hold the interrupt and diagnostic printouts along with the suspected faulty memory pack and seek the next higher level of technical assistance to clear the problem.

7. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 10.3: ANALYZE REPT:CU MEMLOG FILE ENTRIES

OVERVIEW

The MEMLOG file contains the **REPT:CU** supplementary data particular to memory failures. This procedure analyzes memory failure data to determine the faulty pack.

NOTE: Use of the **OP:MEMERRS** command can also be very helpful. Refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*, for details.

PROCEDURE

1. Extract the supplemental data for the error from the log file by executing the **OP:LOG** command on the MEMLOG log file with the KW parameter. Pass the sequence number indicated in the **REPT:CU** output message as the argument to the KW parameter. For detailed information regarding use of this command, refer to 235-600-700, *Input Message Manual*.
2. Check the first line of the log file entry to determine the type of memory problem. The error message will be one of the following:
 - (a) REPT NONCORRECTABLE PARITY ERROR ON MEMORY REFERENCE *d* (X'8)
 - (b) REPT MEMORY PARITY FAILURE *d* (X'14)
 - (c) REPT OTHER STORE REFRESH PARITY ERROR *d* (X'D)
 - (d) REPT OTHER STORE READ PARITY ERROR *d* (X'E)
 - (e) REPT OTHER STORE HARDWARE ERROR *d* (X'C)
 - (f) REPT MY STORE C DURING DMA *d* (X'21).

NOTE: The *d* in each of the error messages is the sequence number indicated in the **REPT:CU** output message. The numbers in parentheses at the end of each message represent the error interrupt type numbers (in hexadecimal) from the **REPT:CU** message. These do not print out in the log file entry. They appear only in the **REPT:CU** message and are shown here for reference purposes only.

3. Interpret the error message(s) as follows: A NONCORRECTABLE PARITY ERROR indicates that a location in memory has encountered a double-bit error. This error type is the most likely to damage running programs. Error messages (a), (b), (c), and (d) of Step 2 indicate a memory array if there is correlation between the errors, for example, the same failing location. If errors (a) through (d) occur in several memory arrays or if the error is type (e), the main store controller is the likely cause. Isolated, uncorrelated events usually do not require action, but records should be kept of the occurrences.
4. Examine the register information. Many error reports have physical addresses supplied. If supplied, you may refer directly to Table 10.3-1, 10.3-2, 10.3-3, or 10.3-4 instead of continuing with this procedure. Although the trapped address register and the main store controller error registers (ER) are printed for both controllers, **examine only the information for the faulty unit**. To determine the unit on which the error occurred, check the FAULTY UNIT designation in the MEMLOG file entry.
5. Convert the trapped address register to get the faulty address and identify the faulty memory array slot as follows:

- (a) For systems that have *at most* 16 Mbytes of main memory, continue with Step 6.
 - (b) For systems that have the extended main memory (EMM) feature, go to Step 9.
 - (c) For systems that have the very large main memory (VLMM) feature, go to Step 12.
6. For systems that have 16 Mbytes or less of main memory, a conversion of the trapped address register is necessary because the address bits in this register do not yield a contiguous address. The bit layout is as follows:

0100 0000 0111 1111 1111 1111 1100

The bit layout shows one bit (second leftmost bit) separated by 0s from the lower twenty-three bits. The conversion process is performed to shift the second leftmost bit seven positions to the right so that the twenty-four bits of the address are contiguous. Proceed as follows to convert the trapped address register:

- (a) Observe the leftmost digit of the trapped address register. If this digit is 0, 1, 2, 3, 8, 9, A, or B, the address range is LOW. This means that the high-order address bit is not asserted. Otherwise, the address range is HIGH, high-order address bit asserted.
- (b) Replace the leftmost two digits of the trapped address register with zeros.
- (c) Look at the third leftmost digit of the trapped address register. If this digit is 7 or less, then it should not be changed. Otherwise, it should be converted as follows:

Present Value	New Value
8	0
9	1
A	2
B	3
C	4
D	5
E	6
F	7

The reason for this conversion is that the third leftmost digit has only three bits of value. The most significant bit of this nibble is not part of the address; hence, it is discarded.

7. Use Table 10.3-1, 10.3-2, 10.3-3, or 10.3-4, depending upon the type of memory array (TN14, TN28, TN56, or TN2012), to locate the faulty memory array slot. Refer to the following examples:

Trapped Address	Range	Faulty Address
Register		
183FFFCC	LOW	3FFFCC
583FFFCC	HIGH	3FFFCC
19C14568	LOW	414568
D9C14568	HIGH	414568

- **TN14 Memory Arrays:** Use Table 10.3-1 to locate the faulty memory array slot for TN14 memory arrays. A fully equipped main memory will require the use of two memory controllers (0 and 1). The LOW and HIGH address ranges mean MASC0 (controller 0) and MASC1 (controller 1), respectively. Each controller in this case will support only address ranges of 000000 through 7FFFFC. The combined capacity of both controllers is 16 Mbytes (8 Mbytes each). Some examples for TN14 memory arrays are as follows:

Range	Faulty Address	Slot	Controller	Table Used
LOW	3FFFCC	7	0	10.3-1
HIGH	3FFFCC	7	1	10.3-1
LOW	414568	8	0	10.3-1
HIGH	414568	8	1	10.3-1

- **TN28 and TN56 Memory Arrays:** There is only one memory controller capable of addressing the full 16 Mbyte address range for TN28 and TN56 arrays. In this case, the HIGH/LOW address range designation no longer means MASC0 and MASC1. It should be incorporated into a full 24-bit address. This is done by adding 800000 to the converted address if the address range was found to be HIGH. After this addition, use Table 10.3-2 or 10.3-3 to locate the faulty memory array slot for TN28 or TN56 memory arrays, respectively. Some examples for TN28 memory arrays are as follows:

Range	Faulty Address	Slot	Table Used
LOW	3FFFCC	3	10.3-2
HIGH	BFFFCC	11	10.3-2
LOW	414568	4	10.3-2
HIGH	C14568	12	10.3-2

Some examples for TN56 memory arrays are as follows:

Range	Faulty Address	Slot	Table Used
LOW	3FFFCC	1	10.3-3
LOW	414568	2	10.3-3
HIGH	C14568	6	10.3-3

- **TN2012 Memory Arrays:** The memory controller 1 (MASC1) is not associated with these arrays. The trapped address range with these arrays can range from 0x0 to 0x1FFFFFFC for a 32 Mbyte system in Release 1 and from 0x0 to 0x3FFFFFFC for a 64 Mbyte system in Release 6. Any system equipped with more than 32 Mbytes of memory must have TN2012 arrays (4 Mbytes/array) installed. If the system is running on Release 1, go to Step 9. If the system is running on Release 6, go to Step 12.

- Go to Step 14.
- For systems that are equipped with more than 16 Mbytes of memory (Release 1 only), a conversion of the trapped address register is necessary because the address bits in this register do not yield a contiguous address. The bit layout is as follows:

1100 0000 0111 1111 1111 1111 1100

The bit layout shows two bits (leftmost two bits) separated by 0s from the lower twenty-three bits. The conversion process is performed to shift the leftmost two bits seven positions to the right so that the twenty-five bits of the address are contiguous. Proceed as follows to convert the trapped address register:

- Observe the third leftmost digit of the trapped address register. If the value of this digit is 7 or less, then it should not be changed. Otherwise, it should be converted as follows:

Present Value	New Value
8	0
9	1
A	2
B	3
C	4
D	5
E	6
F	7

The purpose of this conversion is to eliminate the high-order bit of the third leftmost nibble, since this bit is not part of the address.

- Observe the leftmost digit of the trapped address register. The two most significant bits of this nibble are the two most significant bits of the address. These bits must be extracted and concatenated with the low three significant bits of the third leftmost significant digit of the trapped address register.

Extract the three bits of address from the leftmost nibble of the trapped address register using the following:

Leftmost Nibble	Converted Value
0	0
1	0
2	0
3	0
4	8
5	8
6	8
7	8
8	10
9	10
A	10
B	10
C	18
D	18
E	18
F	18

- (c) Continuing the address conversion, perform a simple hexadecimal addition of the results of the two previous substeps. As a check, ensure that the result of substep 9(a) is a value between 0 and 7 and the result of substep 9(b) is 0, 8, 10, or 18. After the addition, the resulting value has a range of 0 through 1F hexadecimal.
- (d) Incorporate the result of the addition into the trapped address. To do this, the three most significant nibbles of the trapped address register are set to 0 and the addition result becomes the most significant five bits of the trapped address. The resulting trapped address can now be used to determine the memory array slot that contains the failing location.
10. For systems equipped with TN56 boards and no more than 16 Mbytes of memory, use Table 10.3-3 to determine the slot number. For systems equipped with the TN2012 boards, use Table 10.3-4 to determine the slot number. Refer to the following examples:
- A system equipped with more than 16 Mbytes of main memory cannot use memory arrays smaller than the TN56 (2 Mbytes each). Only one memory controller is required for the entire maximum memory size of 32 Mbytes. For this reason, the only conversion table that is used is Table 10.3-3. The last addressable word of such a configuration is 0X1FFFFFC.

Faulty Address	Converted Address	Slot (Decimal)	Table Used
3F312345	0312344	1	10.3-3
4F312345	0B12344	5	10.3-3
4F812345	0812344	4	10.3-3
8F312345	1312344	9	10.3-3
9F312345	1312344	9	10.3-3
DF312345	1B12344	13	10.3-3
FF012345	1812344	12	10.3-3

- This is the same example as previous except that TN2012 arrays (4 Mbytes each) are assumed. For the TN2012 arrays, use Table 10.3-4 to determine the slot number of the faulty array. The last addressable word of such a configuration is 0X1FFFFFC.

Faulty Address	Converted Address	Slot (Decimal)	Table Used
3F312345	0312344	0	10.3-4
4F312345	0B12344	2	10.3-4
4F812345	0812344	2	10.3-4
8F312345	1312344	4	10.3-4
9F312345	1312344	4	10.3-4
DF312345	1B12344	6	10.3-4
FF012345	1812344	6	10.3-4

11. Go to Step 14.
12. Convert the trapped address register and the memory error register 2 (MER2) to a trapped address. Use Table 10.3-4 to determine the faulty memory array slot. For Release 6, both registers must be used to determine the trapped address. Proceed as follows:
 - (a) The trapped address bits 2 through 22 are in the trapped address register bits 2 through 22. The trapped address bit 23 is located in the trapped address register bit 30. The trapped address bit 24 is located in the trapped address register bit 31. The trapped address bit 25 is located in the MER2 bit 23. Concatenating these bits in the proper order yields the trapped address which must be used with Table 10.3-4 to determine the faulty array slot number. The last two bits of the trapped address are always zero since the trapped address is a *word* address.
 - (b) The bit layout of the trapped address bits in the registers, where the address bits are indicated by an **x** and the nonaddress bits are indicated by zeroes, is as follows:

	3 2	2	2	1	1			
Bit #:	1 8	4	0	6	2	8	4	0
TAR:	xx00	0000	0xxx	xxxx	xxxx	xxxx	xxxx	xx00
MER2:	0000	0000	x000	0000	0000	0000	0000	0000

- (c) The trapped address must be formed (converted) by concatenating the noncontiguous address bits as follows:

	3 2	2	2	1	1			
Bit #:	1 8	4	0	6	2	8	4	0
TA:	0000	00xx	xxxx	xxxx	xxxx	xxxx	xxxx	xx00

13. The trapped address conversion is completed when the trapped address register bits 30 and 31, and the MER2 bit 23 are correctly concatenated with the trapped address register bits 2 through 22. Use Table 10.3-4 to determine the faulty slot number for the TN2012 array. Some examples of the trapped address conversion are as follows:

TAR Value	MER2 Value	Converted Address	Slot (Decimal)	Table Used
3F312345	1289abcd	2312344	8	10.3-4
3F312345	1249abcd	0312344	0	10.3-4
4F312345	1200abcd	0B12344	10	10.3-4
4F312345	1259abcd	0B12344	2	10.3-4
DF512345	12A9abcd	3D12344	15	10.3-4
DF512345	1279abcd	1D12344	7	10.3-4
9F812345	12B9abcd	3012344	12	10.3-4
9FF12345	12C9abcd	3712344	13	10.3-4

14. At this point, the location of the memory array shown in the MEMLOG file has been identified. A single occurrence of a fault does not imply that a particular memory array is faulty. Diagnostics should be run on the main memory to verify that a hard failure (always fails) exists before a memory array is replaced. If a hard failure exists, the memory array should be replaced. Even though an error report message indicates a fault, if memory diagnostics do not reveal a problem, the memory array should not be immediately replaced. A better approach is to swap the array with another under the same controller (noting the array positions). If the same array fails in its new position, it should then be replaced. If the failures continue in the same position as before the swap, the problem is most likely with the controller. In this case, consider swapping or replacing the suspect controller.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 10.3-1 Address Conversion Table (TN14 Memory Array)

CONVERTED ADDRESS	RANGE	FAULTY SLOT	CONTROLLER
000000 - 07FFFC	LOW	0	0
080000 - 0FFFFC	LOW	1	0

100000 - 17FFFC	LOW	2	0
180000 - 1FFFFC	LOW	3	0
200000 - 27FFFC	LOW	4	0
280000 - 2FFFFC	LOW	5	0
300000 - 37FFFC	LOW	6	0
380000 - 3FFFFC	LOW	7	0
400000 - 47FFFC	LOW	8	0
480000 - 4FFFFC	LOW	9	0
500000 - 57FFFC	LOW	10	0
580000 - 5FFFFC	LOW	11	0
600000 - 67FFFC	LOW	12	0
680000 - 6FFFFC	LOW	13	0
700000 - 77FFFC	LOW	14	0
780000 - 7FFFFC	LOW	15	0
000000 - 07FFFC	HIGH	0	1
080000 - 0FFFFC	HIGH	1	1
100000 - 17FFFC	HIGH	2	1
180000 - 1FFFFC	HIGH	3	1
200000 - 27FFFC	HIGH	4	1
280000 - 2FFFFC	HIGH	5	1
300000 - 37FFFC	HIGH	6	1
380000 - 3FFFFC	HIGH	7	1
400000 - 47FFFC	HIGH	8	1
480000 - 4FFFFC	HIGH	9	1
500000 - 57FFFC	HIGH	10	1
580000 - 5FFFFC	HIGH	11	1
600000 - 67FFFC	HIGH	12	1
680000 - 6FFFFC	HIGH	13	1
700000 - 77FFFC	HIGH	14	1
780000 - 7FFFFC	HIGH	15	1

Table 10.3-2 Address Conversion Table (TN28 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 0FFFFC	0
100000 - 1FFFFC	1
200000 - 2FFFFC	2
300000 - 3FFFFC	3
400000 - 4FFFFC	4
500000 - 5FFFFC	5
600000 - 6FFFFC	6
700000 - 7FFFFC	7
800000 - 8FFFFC	8
900000 - 9FFFFC	9
A00000 - AFFFFC	10
B00000 - BFFFFC	11
C00000 - CFFFFC	12
D00000 - DFFFFC	13
E00000 - EFFFFC	14
F00000 - FFFFFC	15

Table 10.3-3 Address Conversion Table (TN56 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 1FFFFC	0
200000 - 3FFFFC	1
400000 - 5FFFFC	2
600000 - 7FFFFC	3
800000 - 9FFFFC	4
A00000 - BFFFFC	5
C00000 - DFFFFC	6
E00000 - FFFFFC	7
1000000 - 11FFFFC	8
1200000 - 13FFFFC	9
1400000 - 15FFFFC	10
1600000 - 17FFFFC	11
1800000 - 19FFFFC	12
1A00000 - 1BFFFFC	13
1C00000 - 1DFFFFC	14
1E00000 - 1FFFFFC	15

Table 10.3-4 Address Conversion Table (TN2012 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 3FFFFC	0
400000 - 7FFFFC	1
800000 - BFFFFC	2
C00000 - FFFFFC	3
1000000 - 13FFFFC	4
1400000 - 17FFFFC	5
1800000 - 1BFFFFC	6
1C00000 - 1FFFFFC	7
2000000 - 23FFFFC	8
2400000 - 27FFFFC	9
2800000 - 2BFFFFC	10
2C00000 - 2FFFFFC	11
3000000 - 33FFFFC	12
3400000 - 37FFFFC	13
3800000 - 3BFFFFC	14
3C00000 - 3FFFFFC	15

Procedure 10.4: ANALYZE REPT:CU ERROR INTERRUPT HANDLER LOG FILE (ERLOG) ENTRIES

OVERVIEW

The Error Interrupt Handler (EIH) log file (ERLOG) contains a history of all error interrupts handled by the EIH that are not associated with the main memory. Among the errors handled are input/output (I/O) errors, direct memory access (DMA) errors, other Control Unit (CU) hardware errors, and software errors.

The Interrupt Source (IS) register contains three bits of information. This information is summarized as follows:

IS BIT	FAULT CLASSIFICATION
0	On-line hardware
1	Off-line hardware
2	On-line software.

Depending on which of these bits is asserted, the EIH will gain control of the computer at a predetermined error handling routine. The locations of the error handling routines are placed in the interrupt vector table on a system initialization or on completion of a CU restore (bit 1 only).

In most instances when an error occurs, a message is printed on the Receive-Only Printer (ROP) providing details about the error. In addition, this message is written to a log file (ERLOG). Having a log file of messages serves two purposes:

- (1) If the message is lost and never printed on the ROP, it will be preserved in the log file.
- (2) Having a file containing the error messages allows one to access more than one message at a time.

For specific details relating to input and output messages, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

PROCEDURE

1. At the Master Control Center (MCC) video terminal, extract the supplemental data for the error from the log file by entering the following:

(a) **OP:LOG:ERLOG,KW=d;**

Where:

d = identification flag shown in the **REPT:CU** output message.

NOTE: The messages in ERLOG are not of a set format. Different errors require different information to be printed. Hardware errors produce messages where the contents of various hardware registers are provided. Software errors on the other hand provide the saved state of the process involved in the error. There are different approaches to using each type of message to determine the source of the problem. The following steps apply to all types of EIH reported errors including those in MEMLOG.

2. Classify the error as either a hardware or software error. To accomplish this, look at the **REPT:CU** message. Refer to 235-600-750, *Output Message Manual*, for details.
3. Obtain a brief description of the error from Table 10.4-1. Included in the table is the classification of the

error (hardware, software, or main memory). Also listed are actions to take when a particular error occurs.

NOTE: In many cases, the resolution of a problem requires analysis of several log files, PRMs, and other system output; the error entry by itself may not be enough. To effectively analyze a problem, the system output (ROP) should be collected for a period of time after the system has recovered. The intent here is to preserve system error message sequence and continuity. This is sometimes vital to the resolution of a problem.

NOTE: Interrupt type numbers in Table 10.4-1 are in hexadecimal and are those numbers that appear in the **REPT:CU** output message.

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

Table 10.4-1 Error Interrupt Handler Faults

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 8	A my store error C	On-line hardware	A non-correctable parity error has occurred on the currently running CU.	If the processors switched as a result of the error, run diagnostics on the processor encountering the fault.
X' B	Invalid maintenance channel order	Off-line hardware	Maintenance channel is faulty or maintenance channel protocol has been violated.	If the error occurs repeatedly, run diagnostics on the off-line processor. If no problem is found, run diagnostics on the on-line processor.
X' C	Restore hardware error	Off-line hardware	The memory controller of the off-line processor encountered a store error A condition.	This error indicates a problem with the controller hardware, not the memory. The implicated controller should be diagnosed and replaced if found to be faulty.
X' D	Other store correctable memory failure	Off-line hardware	A correctable parity error (other store D) occurred in the mate processor. This type of error can only occur if the mate processor is in the standby state.	Run diagnostics if the mate processor is removed from a standby state.
X' E	Other store noncorrectable memory failure	Off-line hardware	A noncorrectable memory error (other store C) occurred in the mate processor. This type of error can only occur if the mate processor is in the standby state.	Run diagnostics if the mate processor is removed from a standby state.
X' F	Other store time-out error	Off-line hardware	The memory controller of the mate processor did not respond to an access.	Check the update cables on both processors and run diagnostics on the off-line processor.
X' 10	I/O channel error	On-line hardware	The faulty unit encountered a fatal error condition. The channel status and channel address are provided.	Examine the channel status register layout to determine the error type and the appropriate action to be taken.
X' 11	3/6 main channel I/O response error	On-line hardware	More than one channel responded to an I/O address.	Run diagnostics on the processor encountering the fault.
X' 12	3/6 main channel sequencing error	On-line hardware	More than one I/O pulse point was active in the command to the channel.	Run diagnostics on the processor encountering the fault.
X' 13	Parity divert error	On-line hardware	A named unit returned a word with bad parity when the	Run diagnostics.

			instruction expected good parity.	
X' 14	On-line correctable memory failure	On-line hardware	A correctable memory failure occurred in the on-line processor (my store D).	If the processor encountering the fault is removed, run diagnostics on it.
X' 15	Protection violation	Software	A program tried to execute from a segment that did not have execute permission or tried to write into a segment that did not have write permission.	Forward the software log entry information to your technical assistance organization.
X' 16	Virtual address out-of-range (VORA)	Software	A program attempted to access memory with virtual address values exceeding 64 megabytes.	Forward the software log entry information to your technical assistance organization.
X' 17	Out-of-range memory reference	Software	A program tried to access unequipped memory.	Forward the software log entry information to your technical assistance organization.
X' 18	Out-of-range memory reference (other store)	Software	The off-line main memory considered the address to be out of range while the on-line memory did not. This usually indicates a problem with the off-line main memory.	Check and replace the fuses in the off-line memory (if necessary). Run diagnostics on off-line memory.
X' 19	Privileged instruction violation	Software	The program tried to execute one of the special instructions without a corresponding privilege bit set in the PSW.	Forward the software log entry information to your technical assistance organization.
X' 1A	Bad alignment on memory reference	Software	The program executed an instruction and used the wrong type of address (for example, the execution of full-word instruction with a half-word address.)	Forward the software log entry information to your technical assistance organization.
X' 1B	Illegal operand	Software	One of the operands specified in an instruction is invalid for the particular opcode.	Forward the software log entry information to your technical assistance organization.
X' 1C	Illegal instruction	Software	The data in the instruction buffer did not correspond to a valid instruction.	Forward the software log entry information to your technical assistance organization.
X' 1D	Illegal stack switch	Software	The program attempted to switch to a private stack or attempted to switch to the kernel stack when it was already running on the kernel stack.	Forward the software log entry information to your technical assistance organization.
X' 1E	Spurious intercept	Software	The EIH was entered and did not find an error set.	If possible, the processors should be switched so that the faulty CU can be diagnosed. In any case, forward the results of the diagnostic and ERROR log to the responsible engineer through the technical assistance organization.
X' 20	My store A during DMA	On-line hardware	The DMA controller (DMAC) encountered a fatal main memory problem during a DMA transfer.	Run diagnostics on the unit indicated in the MEMLOG entry.

X' 21	My store B during DMA	On-line hardware	The DMAC used an out-of-range address.	Run diagnostics on the unit indicated in the MEMLOG entry.
X' 22	DMA detected non-correctable parity failure	On-line hardware	Noncorrectable memory error (my store C) occurred in the on-line processor during DMA.	If the processors switched as a result of the error, run diagnostics on the processor encountering the fault.
X' 25	Bad parity on DIO bus	On-line hardware	The DMAC received bad parity from the named CHANNEL ADDRESS device on data destined for the main memory during a DMA transfer.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 26	Bad parity on DMA read	On-line hardware	The DMAC detected bad parity on its internal bus. This can be caused by a DMAC failure or a request from a device that has not had its DMAC RAM block initialized.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 27	DMA RAM parity failure	On-line hardware	The DMAC detected bad parity over the RAM address register. This only occurs on the 3B20D Model 1 computer.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 29	DIO ready failure	On-line hardware	The named channel did not return a READY signal to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2A	DIO-ASW failure	On-line hardware	The named channel did not return all-seems-well to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2B	DIO acknowledge failure	On-line hardware	Either more than one or no channel responded to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2C	CCIO data parity failure	On-line hardware	The command received by the DMAC on a PIO operation had bad parity.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2D	CCIO-command error	On-line hardware	A second programmed I/O order was sent to the DMAC before the first one was completed.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2E	DMA-ROM parity failure	On-line hardware	Bad parity was detected in the DMAC read-only memory. This can be caused by other fatal errors occurring in the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2F	DMA-address error	On-line hardware	During the virtual to physical address translation, the DMAC found that the requested I/O access was not permitted to physical memory; or during the data transfer, the data would have been written beyond the end of a segment.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 30	DMA-channel request error	On-line hardware	A device on a DMA channel requested service but the DMAC RAM block for the device did not have its valid bit set, or a channel on the	Run diagnostics on the unit indicated in the ERLOG entry.

			DMAC requested service but no device on that channel had a request pending.	
X' 32	Spurious interrupt	On-line hardware	EIH was dispatched to handle an error, but no error bit in the error registers was set.	Run diagnostics on the CU in which the error occurred and forward the ERLOG and ROP output to the responsible engineer.

Procedure 10.5: ANALYZE POSTMORTEM DUMP

OVERVIEW

After a system initialization, a postmortem dump output message is generated. This message contains critical register and system data which was collected at the time the system reset occurred. The data provided in each entry consists of most of the critical hardware registers from both Control Units (CU) and Central Processing Units (CPU) and some nonhardware type information dealing with the past and present configuration of the system.

There are two types of postmortem dumps: manual and automatic. In either case, the output is the same. Automatic postmortem dumps are labeled either POSTMORTEM DUMP or MAINTENANCE INTERRUPT. Each type is placed in the log file PMLOG. In the case of a **REPT CU MAINTENANCE INTERRUPT d** message, the sequence number **d** can be used in the **OP:LOG** command to extract the entry from PMLOG. For the postmortem case, the sequence number is embedded in the **DD PRM** message issued during processor initialization. Refer to 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, as applicable.

PROCEDURE

1. At the Maintenance Control Center (MCC) terminal, generate a printout of the dump by entering the following:

- (a) **OP:PMLOG:LG;**

NOTE: Use keyword (KW) or TIME and DATE ranges to select entries.

2. Analyze the INITIALIZATION MESSAGE section of the dump to determine the source of the initialization. Refer to Substeps (a) through (c) as follows:

- (a) If the SOURCE designation is shown as "m," no further analysis is necessary. However, Step 3 may be performed if desired. Otherwise, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

- (b) If the SOURCE designation is shown as "s," go to Step 4.

- (c) If the SOURCE designation is shown as "h," go to Step 7.

NOTE: The INITIALIZATION MESSAGE also indicates which CU was on-line, the faulty CU, the UNIX[®]RTR operating system initialization level, and the application initialization level. Follow local practices for using this information.

3. Analyze the Emergency Action Interface (EAI) buffer (eaipar). The buffer describes the EAI input parameter buffer for inputting manual requests to UNIX RTR operating system software from the craft interface terminal. The single bit defined for the parameters under EAI BUFFER can be found in the system header file <fltrcv/phymem.h>. All parameters are from the previous manual initialization except the APPL PAR and the EAINEW BIT in the CONFIGURATION field. The APPL PAR is from the current manual request. The EAINEW BIT is set by the boot programs on the current manual request and is reset by the Application Integrity Monitor (AIM) when it has reacted to the manual initialization or at the end of the initialization interval by the Error Interrupt Handler (EIH).

NOTE: If this step was performed in conjunction with a SOURCE designation of "m," **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4. Analyze the REQUESTED INITIALIZATION PARAMETERS section of the dump and forward the information to your technical assistance organization. This section repeats the source, UNIX RTR operating system

initialization level, and application initialization level information presented in the initialization message. In addition, a panic code, the phase options, and the utility identification (ID) are given. The single bit defined for PHASE OPTIONS is in the system header file <ltrcv/rparm.h>. Use the information obtained to determine the process that invoked the phase operating system trap (OST) and the problem that it encountered as follows:

- (a) Locate the utility ID value in Table 10.5-1. The process name is in parentheses below the ID value.
 - (b) For the appropriate utility ID, locate the panic code in Table 10.5-1. The problem is identified in the column to the right of the panic code.
5. Check for acceptable values. The BOOT DEVICE fields indicate the previous and current active boot devices. Acceptable values for these fields are as follows:
 - 0 (boot device 0)
 - 1 (boot device 1)
 - b (both boot devices).
 6. If the source of the fault was software (see Step 1), forward the information in the postmortem dump to your technical assistance organization. If the source was ``m," disregard the GENERAL REGISTERS information.
 7. Analyze the FAULTY CU REGISTERS section of the dump. Although the saved state information is mainly of interest if the source is "h," the system status register (SSR) and error register (ER) may also be of interest on software-requested initializations. Refer to local practices for using the saved state information. See Table 10.5-2 for the saved state information registers.
 8. If an error is not obvious, each timer register may be checked for a sanity time-out. The timer registers are normal counters (active 1) and are periodically reset. The registers are printed for each side relative to the current configuration; therefore, the off-line timer may be checked for a stop-and-switch (SAS) error. The sanity time-out bits are bits 6 and 7 in the timer register. Bit 6 going active produces an SAS error, while bit 7 going active causes a maintenance reset function (MRF) on that side. If the processor is not active (SSR bit 16 = 0), then bit 6 going active does not cause an SAS error.
 9. If the ER in the microcode save state registers section indicates that a MYSERA or a my store time-out occurred (bit 6 = 0 or bit 7 = 0, respectively), the MAIN STORE REGISTERS provide additional information about the error. Follow local practices for using this information. See Table 10.5-3 for the definitions of the main store register acronyms.
 10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 10.5-1 Postmortem Dump Process/Problem Identification

UTILITY ID	PANIC CODE	DESCRIPTION
00000000 Kernel Boot (KBOOT)	1	Kboot cannot create a system process.
	2	Bad kernel process dispatcher control table (DCT) pointer.
	3	Bad kernel process, process control block (PCB) segment.
	4	Bad segment case.
	5	Bad supervisor process DCT pointer.
	6	Bad supervisor process PCB segment.
	7	Cannot send message to process manager.
	8	Cannot send message to file manager.
	9	Cannot send "pcreate" message.
	A	Bad boot segment ID.

	B	Bad kernel message segment ID.
	C	Bad kernel DCT segment ID.
	D	Bad kernel interrupt stack segment ID.
	E	Bad port table segment ID.
	F	Bad process ID.
	10	Cannot create protected application segment (PAS).
	11	Cannot fill in segment table entry.
	12	PAS is too large.
	13	Cannot create a PUB LIB work segment.
	14	Boot process segment list full.
	15	Boot process segment list overlay.
	16	Invalid root directory block.
	17	No boot shared library.
	18	Invalid boot shared library inode.
	19	Cannot allocate boot shared library segment.
	1A	Disk read time-out.
	1B	DMA system generation (SYSGEN) failure.
	1C	Disk read failure.
	1D	Cannot apply segment name.
	1E	Boot time data base is missing.
	1F	Could not allocate a whole descriptor block segment.
	20	Not enough swappable memory.
	21	Could not allocate a PAS segment for a boot process because there are no PAS segments.
	22	Kernel process control block (KPCB) of a boot process does not have enough entries to accommodate either PAS or equipment configuration data base (ECD) segments.
00000001 Memory Manager (MMGR)	6E	Function to make space on disk failed.
	6F	Invalid return code from function to load segments.
	70	Failed reclaiming swap space.
	71	Unable to retry failed I/O.
	72	Message drained out of sequence.
	74	Ran out of entries describing free swap space on the swap device (HDBs).
	75	Unexpected fault.
00000002 Capability Manager (CMGR)	7F	Swap space damaged.
	80	Capability manager unexpected fault.
00000003 Utility Manager (UMGR)	50	Utility manager unexpected fault.
00000004 File Manager (FMGR)	1	No buffer segment.
	2	Could not read root superblock.
	4	Could not read root inode.
	5	Cannot allocate initialization message to SIM.
	6	Could not connect to ECD.
	7	Stack switch failure.
	8	Bad mount table.
	9	Illegal block device.
	C	Mount point not found in mount table.
	D	Bad inode disk address.
	10	Too many nontask faults.
	11	Too many task faults.
	12	Too many kfault faults.
00000009 (SCHEDULER)	37	I/O error loading essential/no-term process.
	38	SCHEDULER unexpected fault.
	3A	SCHEDULER received a second software fault within monitored interval.
0000000A (Kernel)	1	Excess number of illegal interrupts.

	2	Bad segment descriptor entry pointer.
	3	Faulting kernel.
	4	Unexpected interrupt.
	5	Unattached process during interrupt.
	6	Dispatching to a nonkernel process.
	7	Bad segment descriptor entry pointer.
	8	Faulting kernel.
	9	Null DCT pointer.
	10	Invalid branch to zero.
	11	Nonidentifiable kernel fault.
	12	Special process fault.
	13	Fault while handling supervisor OST.
	14	Fault while handling channel OST.
	15	Fault while handling kernel process OST.
	16	Fault in kernel audit.
	1D	Null DCT pointer.
00000025 (KDAPDRVR)	40	KDAP driver special process unexpected fault.
0000008C Little Boot (LBOOT)	1	Bus Interface Controller (BIC) for the boot Disk File Controller (DFC) initialization failed.
	4	Peripheral Interface Controller (PIC) for the boot DFC initialization failed.
	5	Failed to find the big boot file entry in the disk volume table of contents (VTOC).
	7	Failed to initialize the DMAC RAM.
	A	Failed to find an entry in the disk VTOC.
	B	Disk job timed out.
	10	Disk job failed.
	20	Page table initialization routine called with an invalid parameter.
	21	Channel error during I/O SYSGEN command to disk.
	22	Disk job failed.
	2	Enabled hardware checks with an error source present.
	8	A UNIX RTR operating system LEVEL 3 phase will be called because the up-to-date off-line memory is not accessible after a CU stop-and-switch (SAS).
0000008D Processor Init (PINIT)	9	Memory copy failed after a SAS.
	1	Failed to initialize the BIC for the boot DFC.
	2	Failed to initialize the PIC for the boot DFC.
0000008E Big Boot (BBOOT)	3	Failed to initialize the PIC for the boot DFC.
	4	Failed to find the disk VTOC entry for the file being loaded.
	5	Failed to find the boot file or a boot time data base (BTDB).
	6	Failed to find the boot file or a BTDB.
	7	Memory copy failed after an SAS.
	9	Boot file data on disk is no good.
	A	Failed to access BTPARM record from incore ECD.
	10	Boot ECD on disk is no good.
	20	Page table initialization routine called with an invalid parameter.
	21	Channel error during a programmed I/O SYSGEN command to disk.
	22	Disk job failed.
	31	ECD: MASC 0 UCB not found for one or both CUs.
	32	ECD: MASC 0 UCB has unknown memory array type for one or both CUs.
	33	ECD: MASC 1 UCB has unknown memory array type for one or both CUs.
	53	Boot image format invalid for release.
	63	Disk job timed out.
000000C0 IOP Driver (IODRV)	1	Encountered a fault while handling a fault.
	2	Excessive software faults.
	3	Excessive unrecoverable errors while processing a fault.
	4	Excessive unrecoverable errors while processing a fault where IOPs were affected but not implicated.
	A	User requested via the EAI page on MCRT a UNIX RTR operating system LEVEL 0 application level 0 initialization.
000000C1 Disk Driver (DKDRV)	1	CONFIG failed a "rptrerr" call - deljob.c.
	2	CONFIG failed a "rptrerr" call - jobrsp.c.
	3	Message buffer allocation failed - kevent.c.
	4	Disk driver software fault detected - kfault.c.
	5	CONFIG failed a "rptrerr" call - kfault.c.
	6	Limp mode initialization failed - jobrsp.c.
	7	Limp mode initialization failed - deljob.c.
	8	Limp mode initialization failed - kfault.c.
	9	CONFIG failed a "rptrerr" call - kfault.c.

	A	Limp mode initialization failed - kfault.c.
	B	Limp mode enable interrupt failed - kfault.c.
	C	CONFIG failed a ``rpterr'' call - kfault.c.
	D	Limp mode initialization failed - kfault.c.
	E	Nested faults have been detected - kfault.c.
	F	Fault rate is excessive - kfault.c.
00000083 Error Interrupt Handler (PCPEIH)	2	EIH failed to attach to the ECD.
	10	Channel error.
	4D	Boot disk (MHD) or SCSI bus (SBUS) off-line or unavailable.
	51	ECD audit failure.
	55	Hard switch called with CU forced off-line.
	7E	ECD audit found errors in UCB of device type DMA, DSCH, or SCH.
	C4	Fault FLT CMA remove request.
	C5	Fault FLT CMB remove request.
	C6	Fault FLT CMC remove request.
	C7	Fault FLT CMD remove request.
	C8	Fault FLT CMAN manual remove request.
	C9	Fault FLT UCLRMV unconditional remove.
	E1	ECD access failure.
	E2	Zero transfer vector encountered.
	E4	ECD audit found errors in UCB data for which EIH is responsible.
	E5	A hard switch was called due to a reconfiguration request from CONFIG.
	E6	A hard switch was called due to a disk limp mode request from CONFIG.
00000085 Processor Audit (PCPAUD)	1	Executing the fault entry too many times. A phase will be called to protect a kernel stack overflow.
	2	Executing the event entry too many times. A phase will be called to protect a kernel stack overflow.
00000187 System Integrity Monitor (SIM)	1	Initialization failure.
	4	Audit recovery.
	9	Message buffer overload.
	B	Critical message buffer overload.
	C	Unrecognized faults.
	C8	Application sanity failure.
00000026 Kernel Level Disk LLA Process (KLLA)	1	Too many kfault faults.
	2	Too many task faults.
	3	Too many nontask faults.
	4	Stack switch failure.

Table 10.5-2 Postmortem Dump Faulty CU Registers

REGISTER	DESCRIPTION
CDR	CCIO bus data register (channel data register).
ER	Error register.
HSR	Hardware status register.
IB	Instruction buffer. Contains the first half-word of the current instruction at the time of the MRF.
IM	Interrupt mask register. This register is active low (that is, a 0 indicates that the function is asserted). Therefore, any bit that is 0 allows the corresponding interrupt in the source register IS.
IS	Interrupt source register.
PA	Program address at time of initialization. For software requested initializations, this is the address of the PHASE OST and not the address where the problem was detected.
PPR	Pulse point register.
PSW	Processor status word. The processor modes are as follows: (1) 00 - Kernel mode (2) 01 - Kernel process (3) 10 - Supervisor process/user process (Release 1 only) (4) 11 - User process.

	The processor mode (bits 30 and 31), in conjunction with the execution level (bits 24 - 27), can often be used to determine which process was active at the time of the initialization.
SAR	Store address register. This register is only meaningful if a main store problem is suspected.
SCR	Store control register. This register is meaningful only if a main store problem is suspected.
SDR	Store data register. This register is significant only if a main memory problem is suspected.
SIR	Store instruction register. Contains the remainder of the current instruction or the next instruction.
SSR	System status register. Information to check includes whether or not cache was enabled (bit 13), hardware checks were blocked (bit 23), interrupts were blocked (bit 18), or sanity timer was inhibited (bit 11).
TMR	Timer register. Bits 6 and 7 indicate on- and off-line sanity timer time-out. If the source is "h" and no other errors are present, the timer probably indicates a sanity time-out.
UER	Microinterrupt error register.
UER1	Microinterrupt error register 1.

Table 10.5-3 Main Store (Memory) Register Acronyms

ACRONYM	DESCRIPTION
ER01	Main store controller 0, error register 1
ER02	Main store controller 0, error register 2
ER11	Main store controller 1, error register 1
ER12	Main store controller 1, error register 2
TAR0	Trapped address register 0
TAR1	Trapped address register 1

Procedure 10.6: TROUBLESHOOT SMALL COMPUTER SYSTEM INTERFACE (SCSI) DISK UNIT PACKAGE (DUP)

OVERVIEW

The following procedure contains information for troubleshooting a Small Computer System Interface (SCSI) Disk Unit Package (DUP).

PROCEDURE

1. Is the OFF lamp lighted?
If **YES**, proceed with Step 2.
If **NO**, go to Step 16.
2. Is the ALM lamp lighted?
If **YES**, proceed with Step 3.
If **NO**, go to Step 9.
3. Press the ``OFF" and ``MOR" switches simultaneously.
4. Does the ALM lamp stay lighted?
If **YES**, proceed with Step 5.
If **NO**, go to Step 40.
5. Remove the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
6. Replace the Power Switch (CGG1) using Procedure 10.8 , Replace Small Computer System Interface (SCSI) Disk Unit Package (DUP) Subunits.
7. Reinstall the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Operate the "ACO/T" switch.
10. Does the ALM lamp light?
If **YES**, proceed with Step 11.
If **NO**, go to Step 5.
11. Release the "ACO/T" switch.
12. Press the "ON" switch.
13. Does the OFF lamp stay lighted?

If **YES**, go to Step 5.

If **NO**, proceed with Step 14.

14. Diagnose the Moving Head Disk (MHD) as follows:

(a) Ensure that the standby MHD has been verified.

(b) Enter the **DGN:MHD=x:RAW,DEX**; input message, where x = MHD number.

(c) If not all tests passed (ATP), clear the diagnostic fault per local policy.

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

16. Is the ALM lamp lighted?

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

If **NO**, go to Step 23.

17. Is the out-of-service (OOS) lamp lighted?

If **YES**, proceed with Step 18.

If **NO**, go to Step 19.

18. Press the "OFF" switch and go to Step 20.

19. Press the "OFF" and "MOR" switches simultaneously.

20. Does the OFF lamp light?

If **YES**, proceed with Step 21.

If **NO**, go to Step 5.

21. Press the "ON" switch.

22. Does the OFF lamp stay lighted?

If **YES**, go to Step 5.

If **NO**, go to Step 14.

23. Operate the "ACO/T" switch.

24. Do all lamps light?

If **YES**, go to Step 36.

If **NO**, continue with Step 25.

25. Are all lamps off?

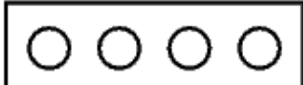
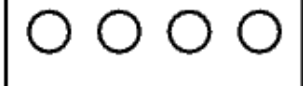
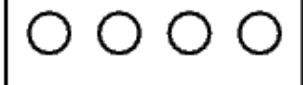
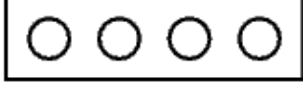
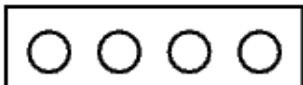
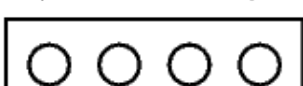
If **YES**, continue with Step 26.

If **NO**, go to Step 5.

26. At the Power Distribution Unit (PDU), check for a blown fuse for this DUP location. Refer to Figure 10.6-1 for fuse locations.
27. Is the -48 V fuse blown?
If **YES**, continue with Step 28.
If **NO**, go to Step 34.
28. Remove the blown indicator fuse and the load fuse.
29. At the rear of the DUP, remove the ED-3T053-15, G1-G16 cable and check for a short circuit between the -48 V and the -48 RTN pins on the cable plug.
30. Was a short circuit found?
If **YES**, continue with Step 31.
If **NO**, go to Step 40.
31. Replace the faulty power cable between the PDU and the DUP.
32. Insert good fuses in the PDU.
33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
34. At the rear of the DUP, remove the ED-3T053-15, G1-G16 cable and measure -48 V DC on the plug between the -48 V and -48 RTN pins.
35. Was -48 V DC present?
If **YES**, go to Step 40.
If **NO**, go to Step 31.
36. Remove the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
37. Replace the Disk Module using Procedure 10.8 , Replace Small Computer System Interface (SCSI) Disk Unit Package (DUP) Subunits.
38. Reinstall the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
39. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
40. Has the Power Supply (CGG1), Power Switch (CGG2), Fan and Fan Cable, and Disk Module been replaced during this maintenance session?
If **YES**, continue with Step 41.
If **NO**, go to Step 44.
41. Remove the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
42. Install a new DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI)

Disk Unit Package (DUP).

43. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
44. Remove the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
45. Replace the following items not previously replaced in this DUP one at a time and in the order listed [Refer to Procedure 10.8 , Replace Small Computer System Interface (SCSI) Disk Unit Package (DUP) Subunits.]:
 - (a) Power Supply (CGG1)
 - (b) Power Switch (CGG2)
 - (c) Fan and Fan Cable
 - (d) Disk Module.
46. Reinstall the DUP using Procedure 10.7 , Remove and/or Install Small Computer System Interface (SCSI) Disk Unit Package (DUP).
47. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

NEW SHIP OR GROWTH		NEW SHIP OR CONVERSION		NEW SHIP OR CONVERSION		NEW SHIP OR GROWTH	
LOAD/ LOCATION	LOAD/ LOCATION	LABEL		LABEL	LOAD/ LOCATION	LOAD/ LOCATION	
(LEFT FUSE BLOCK)							
MHD 16/ 006-045	MHD 0/ 006-045	Disk 6-045 74B/70F 3A/.25A (F4/F4A)		Disk 15-045 70F/74B .25A/3A (F8A/F8)	MHD 8/ 015-045	MHD 24/ 015-045	
MHD 18/ 024-045	MHD 2/ 024-045	Disk 24-045 74B/70F 3A/.25A (F3/F3A)		Disk 32-045 70F/74B .25A/3A (F7A/F7)	MHD 10/ 032-045	MHD 26/ 032-045	
MHD 20/ 011-045	MHD 4/ 011-045	Disk 11-045 74B/70F 3A/.25A (F2/F2A)		Disk 19-045 70F/74B .25A/3A (F6A/F6)	MHD 14/ 019-045	MHD 28/ 019-045	
MHD 22/ 028-045	MHD 6/ 028-045	Disk 28-045 74B/70F 3A/.25A (F1/F1A)		Disk 36-045 70F/74B .25A/3A (F5A/F5)	MHD 12/ 036-045	MHD 30/ 036-045	
(CENTER FUSE BLOCK)							
DFC 2/ 062-016	DFC 0/ 056-016*	DFC 0/2 Pwr Supp 74D/70F 10A/.25A (F12/F12A)*		Fan 1 - A & B 70F/74C .25A/5A (F16A/F16)*	FAN 1/ 047-128*	FAN 1/ 053-128	
DFC 2/ 062-024	DFC 0/ 056-024*	DFC 0/2 Pwr Switch 70C/72A 3A/Dum (F11/F11A)*		Fan Ctl 1 72A/70C Dum/3A (F15A/F15)*	FAN 1/ 047-104*	FAN 1/ 053-104	
FAN 0/ 053-016	FAN 0/ 047-016*	Fan Ctl 0 70C/72A 3A/Dum (F10/F10A)*		DFC 1/3 Pwr Switch 72A/70C Dum/3A (F14A/F14)*	DFC 1/ 056-104*	DFC 3/ 062-112	
FAN 0/ 053-038	FAN 0/ 047-038*	Fan 0 - A & B 74C/70F 5A/.25A (F9/F9A)*		DFC 1/3 Pwr Supp 70F/74D .25A/5A (F13A/F13)*	DFC 1/ 056-112*	DFC 3/ 062-104	
(RIGHT FUSE BLOCK)							
MHD 31/ 036-134	MHD 13/ 036-134	Disk 36-134 74B/70F 3A/.25A (F20/F20A)		Disk 28-134 70F/74B .25A/3A (F24A/F24)	MHD 7/ 028-134	MHD 23/ 028-134	
MHD 29/ 019-134	MHD 15/ 019-134	Disk 19-134 74B/70F 3A/.25A (F19/F19A)		Disk 11-134 70F/74B .25A/3A (F23A/F23)	MHD 5/ 011-134	MHD 21/ 011-134	
MHD 27/ 032-134	MHD 11/ 032-134	Disk 32-134 74B/70F 3A/.25A (F18/F18A)		Disk 24-134 70F/74B .25A/3A (F22A/F22)	MHD 3/ 024-134	MHD 19/ 024-134	
MHD 25/ 015-134	MHD 9/ 015-134	Disk 15-134 74B/70F 3A/.25A (F17/F17A)		Disk 6-134 70F/74B .25A/3A (F21A/F21)	MHD 1/ 006-134	MHD 17/ 006-134	

* Used in optional growth or conversion cabinet configuration

Figure 10.6-1 SCSI Disk Cabinet Fuse Assignments

Procedure 10.7: REMOVE AND/OR INSTALL SMALL COMPUTER SYSTEM INTERFACE (SCSI) DISK UNIT PACKAGE (DUP)

OVERVIEW

The following procedure contains information for removing and/or replacing a Small Computer System Interface (SCSI) Disk Unit Package (DUP).

CAUTION 1: Wear a properly grounded wrist strap throughout this procedure.

CAUTION 2: When replacing a DUP, disk access problems may result if an incorrect ID SELECTOR microswitch setting is inserted.

PROCEDURE

1. Proceed as follows:
 - (a) To REMOVE the SCSI DUP, proceed with Step 2.
 - (b) To INSTALL the SCSI DUP, go to Step 14.
2. Observing **Caution 2**, at the front of the DUP, record and save the setting of the DUP "ID SELECTOR" microswitch.
3. Refer to Table 10.7-1 and determine the SCSI bus number for the location of the DUP being removed.

Table 10.7-1 DUP Bus Assignments

NEW SYSTEM CABINET		GROWTH SYSTEM CABINET		CONVERSION CABINET	
TAPE DRIVE KS-23113		DFC 2	DFC 3	DFC 0	DFC 1
		COOLING UNIT		COOLING UNIT	
Upper left 4 DUPs on SCSI Bus 2 DFC 0	Upper right 4 DUPs on SCSI Bus 3 DFC 1	Upper left 4 DUPs on SCSI Bus 6 DFC 2	Upper right 4 DUPs on SCSI Bus 7 DFC 3	Upper left 4 DUPs on SCSI Bus 2 DFC 0	Upper right 4 DUPs on SCSI Bus 3 DFC 1
Lower left 4 DUPs on SCSI Bus 0 DFC 0	Lower right 4 DUPs on SCSI Bus 1 DFC 1	Lower left 4 DUPs on SCSI Bus 4 DFC 2	Lower right 4 DUPs on SCSI Bus 5 DFC 3	Lower left 4 DUPs on SCSI Bus 0 DFC 0	Lower right 4 DUPs on SCSI Bus 1 DFC 1

4. At the terminal, enter the **RMV:SBUS=a** input message (where a = SCSI bus number) and wait for the **RMV COMPLETE** output message.

NOTE: All DUPs on that bus will be removed from service.

5. At the front of the DUP, press the "OFF" switch. Allow 60 seconds for the disk to spin down.
6. At the Power Distribution Unit (PDU) at the top of the cabinet, remove the indicator fuse and then the load fuse for this DUP. Refer to Figure 10.6-1 for fuse locations.
7. Referring to Figure 10.7-1, at the rear of the DUP, remove all cables from the following connectors:
 - SCSI Bus
 - 48 V DC

- SCAN/SD.

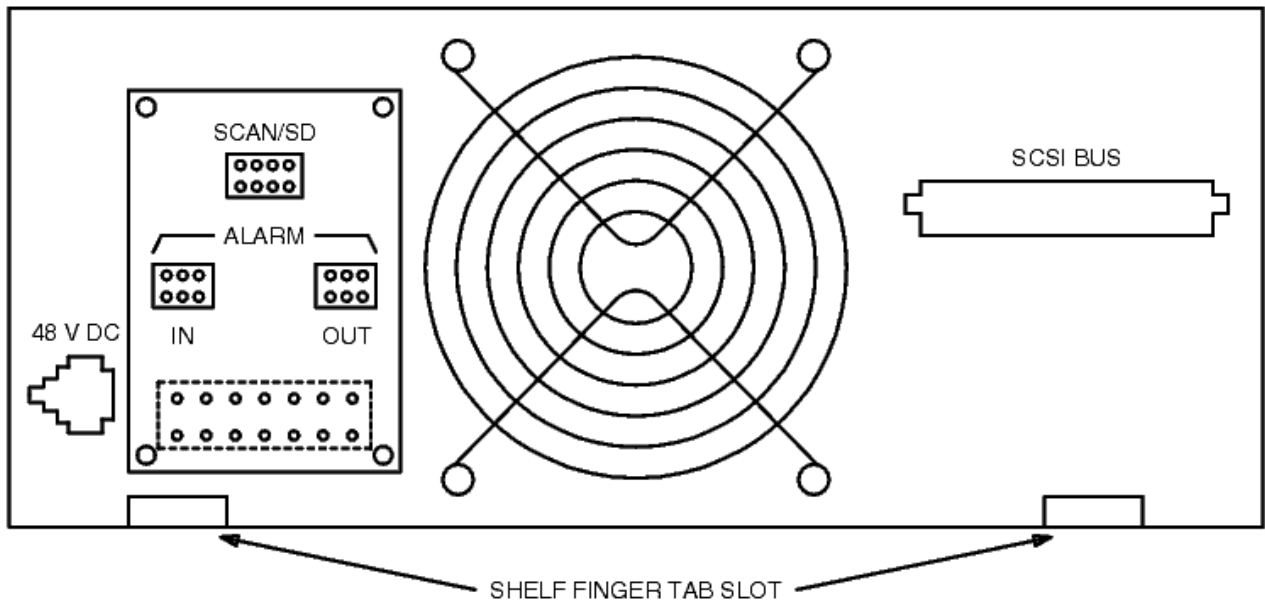


Figure 10.7-1 Disk Unit Package - Rear View

- Referring to Figure 10.7-2 , at the front of the DUP, remove three screws that hold the retaining bracket to the shelf.
- Remove the retaining bracket from the finger slots in both DUPs on this shelf.
- From the rear of the cabinet, slide the DUP forward to clear the finger tabs from the shelf at the rear of the DUP.
- At the front of the cabinet, remove the DUP from the shelf.
- Section 10.8 contains the procedure to change the disk module in the DUP and if the disk module in the DUP unit just removed from the SCSI disk cabinet needs to be replaced.
- STOP. YOU HAVE COMPLETED THE REMOVAL PORTION OF THIS PROCEDURE.**

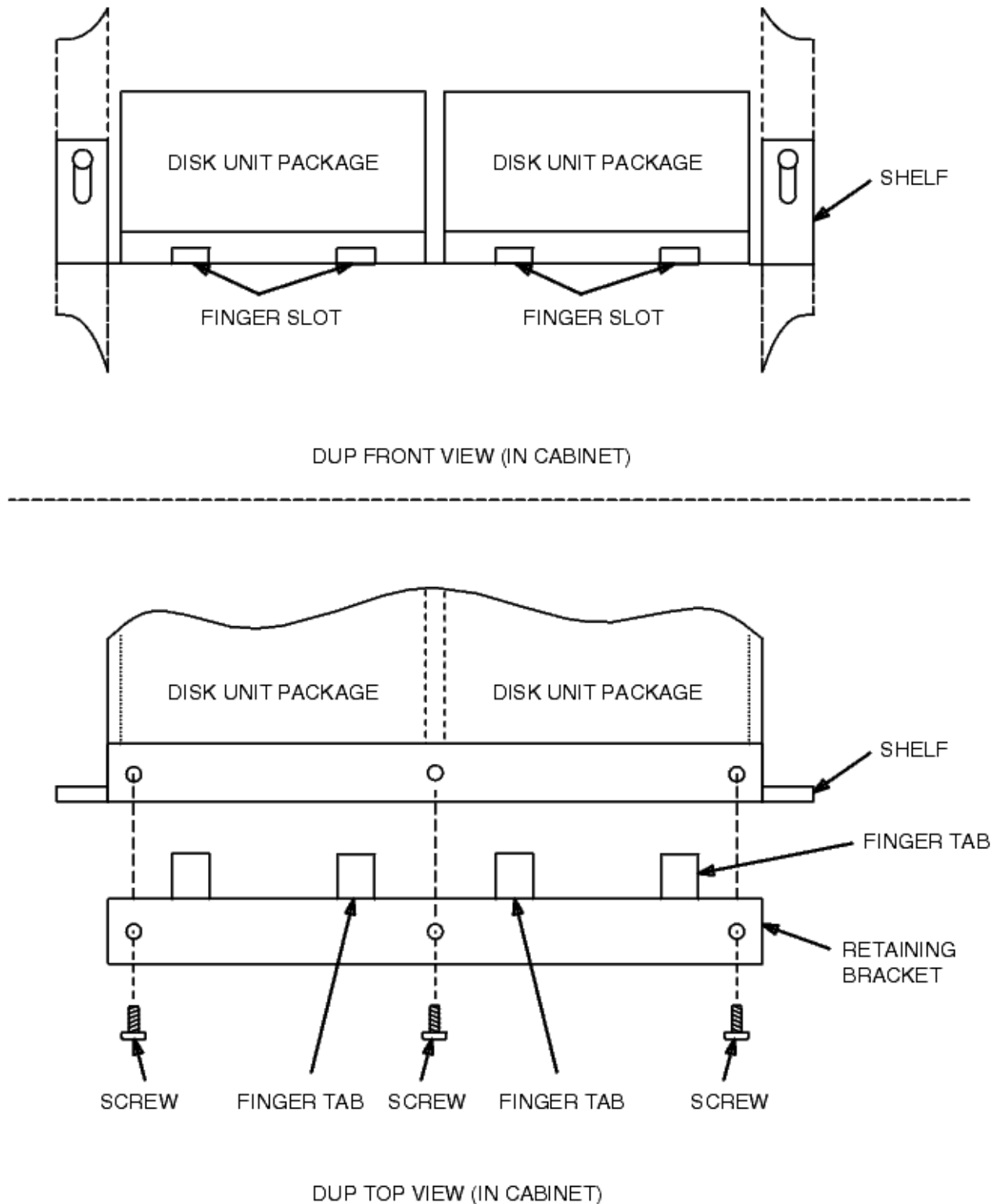


Figure 10.7-2 Disk Unit Package Shelf Arrangement

14. At SCSI disk cabinet, place the DUP on the shelf and slide to the rear to engage the shelf tabs.
15. Referring to Figure 10.7-2, at the front of the cabinet, engage the retaining bracket tabs in both DUPs and

install three screws.

16. Referring to Figure 10.7-1 , at the rear of the DUP, install all cables to connectors as follows:
 - SCAN/SD
 - 48 V DC
 - SCSI Bus.
17. On the DUP front panel, set the "RST/ROS" switch to the ``ROS" position.
18. At the PDU, insert the load fuse and then the indicator fuse. Refer to Figure 10.6-1 for fuse locations.
19. Observing **Caution 2**, set the Moving Head Disk (MHD) ``ID SELECTOR" microswitch to the same number recorded for the DUP removed from this location. If that number is unknown or in doubt, see Table 10.7-2 .
20. At the DUP, press the "ON" switch and wait 60 seconds for the disk to spin up to speed.
21. Referring to Table 10.7-2 , find the bus number for the DUP being replaced. Restore the SCSI bus to service by entering the **RST:SBUS=a,CONT** input command, where a = SCSI bus number.
22. Type and enter the following to determine the capacity of the new disk drive: **OP:MHD=x:INFO** where x is the MHD number.

Response: The output of this message includes "Equipage Size." The values under **DRIVE & UCB** must match.
23. Do the values obtained in Step 22 match?

If **YES**, then go to Step 28.

If **NO**, then go to the next step.
24. Type and enter the following to remove the controlling SBUS from service: **RMV:SBUS=x** where x = the SBUS restored in Step 21.
25. Type and enter the following to update the Equipment Configuration Data base (ECD) for the new **MHD**: **EXC:ENVIR:UPROC,FN="/no5text/bkup/chgmhdec",ARGS=x-y** where x = MHD number and y = the capacity of x (332, 600 or 1000).
26. Repeat Step 23 to ensure that the values under **DRIVE and UCB** are identical.
27. Referring to Table 10.7-2 , find the bus number for the DUP being replaced. Restore the SCSI bus to service by entering the **RST:SBUS=a,CONT** input command, where a = SCSI bus number.
28. Type and enter the following input command for all MHDs (except the installing MHD): **RST:MHD=a** where a = MHD equipped under SBUS restored in the previous step. Wait for **RST COMPLETED** message.
29. Enter the input command **INIT:MHD=x:VFY** where x = the installing MHD, and wait for **INIT MHD x COMPLETED** output message.
30. Restore the installing MHD to service by setting the "ROS/RST" switch to the "RST" position at the SCSI unit's power switch.

31. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Table 10.7-2 MHD Bus and ID SELECTOR Assignments

NEW SCSI SYSTEM OR CONVERSION SYSTEM				GROWTH SCSI SYSTEM			
DFC	SCSI BUS	MHD ^a	ID SELECTOR	DFC	SCSI BUS	MHD ^a	ID SELECTOR
0	0	0	0	2	4	16	0
0	0	4	1	2	4	20	1
0	0	8	2	2	4	24	2
0	0	14	3	2	4	28	3
0	2	2	0	2	6	18	0
0	2	6	1	2	6	22	1
0	2	10	2	2	6	26	2
0	2	12	3	2	6	30	3
1	1	1	0	3	5	17	0
1	1	5	1	3	5	21	1
1	1	9	2	3	5	25	2
1	1	15	3	3	5	29	3
1	3	3	0	3	7	19	0
1	3	7	1	3	7	23	1
1	3	11	2	3	7	27	2
1	3	13	3	3	7	31	3
Notes:							
a. Application dependent.							

Procedure 10.8: REPLACE SMALL COMPUTER SYSTEM INTERFACE (SCSI) DISK UNIT PACKAGE (DUP) SUBUNITS

OVERVIEW

This procedure contains information for replacing Small Computer System Interface (SCSI) Disk Unit Package (DUP) Subunits.

CAUTION 1: Wear a properly grounded wrist strap throughout this procedure as electrostatic discharge may damage the disk module.

CAUTION 2: Touching exposed circuit elements may damage circuits.

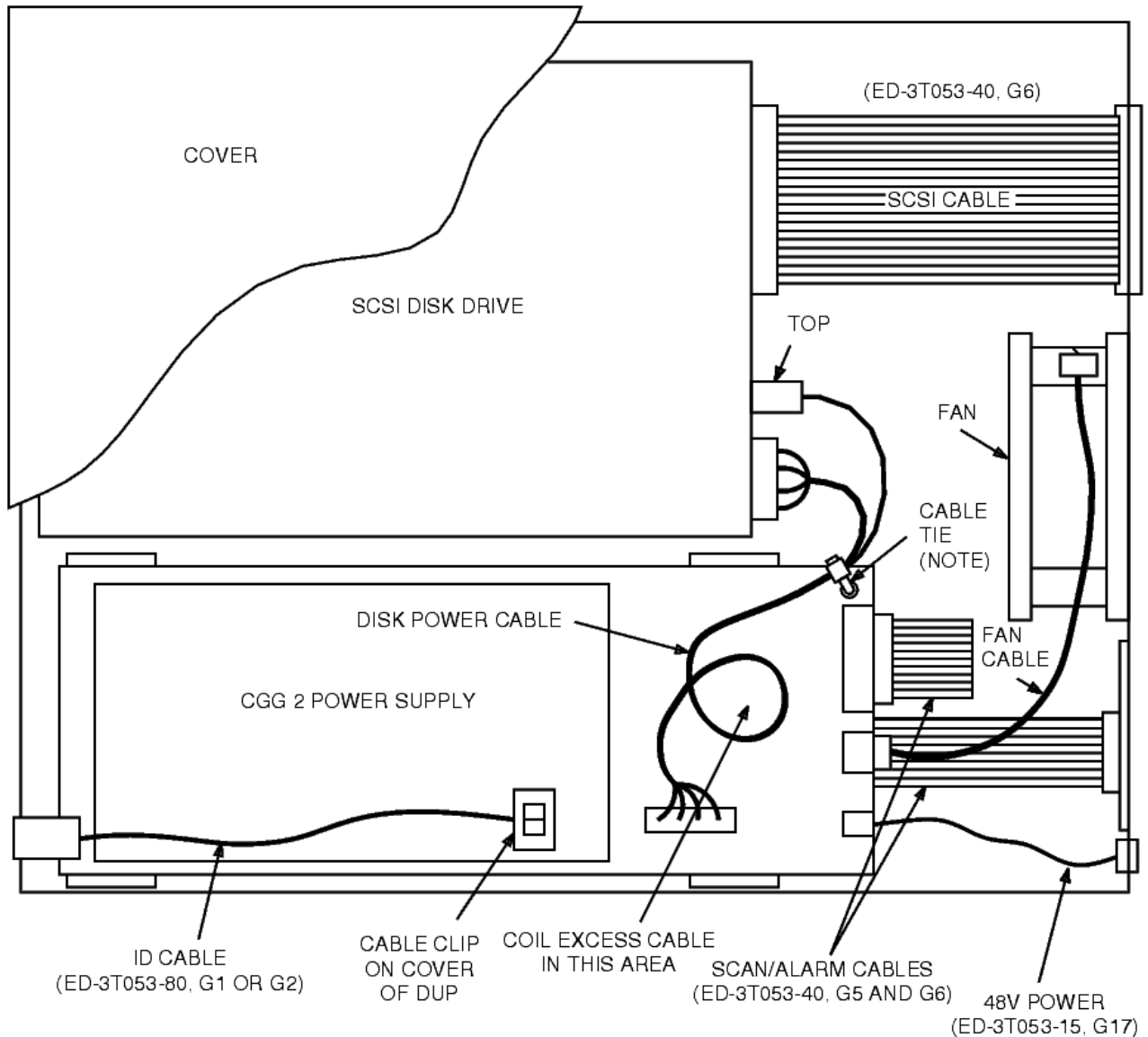
PROCEDURE

1. Remove two screws from each side and one screw from the top (rear center) of DUP.
2. Slide cover assembly forward to clear switches and gently lift from DUP chassis. There is a cable tie restraining the ID cable to the CGG2 power supply board when a 5 1/4-inch SCSI disk is present. This cable tie restrains the ID cable and power cable from being damaged when removing the cover and keeps them away from the fan (See Figure 10.8-1). If the cover is to be completely removed from the DUP, the cable tie must be cut. When a 3 1/2-inch SCSI disk is present, the ID selector cable may be unplugged from the mounted disk module assembly (See Figure 10.8-2).
3. To replace:
 - (a) Disk module, continue with Step 4.
 - (b) Power Supply (CGG2), go to Step 11.
 - (c) Power Switch (CGG1), go to Step 16.
 - (d) Fan, go to Step 27.
4. To replace the disk module, disconnect the cabling as follows from the rear of the disk module:
 - SCSI bus cable ED-3T053-40, G6
 - Disk power cable from DC power
 - ID selector switch cable ED-3T053-80, G1 or G2.

The following figures are provided as a guide to aid in disconnecting the cable:

- Figure 10.8-3 , KS23483,L13 Disk Drive Cable Connection - Rear View
- Figure 10.8-4 , KS23483,L21 Disk Drive Cable Connection - Rear View
- Figure 10.8-5 , KS23841,L15 Disk Drive Cable Connection - Rear View
- Figure 10.8-6 , KS23841,L17 Disk Drive Cable Connection - Rear View
- Figure 10.8-7 , KS23908,L20 Disk Drive Cable Connection - Front and Rear View

- Figure 10.8-8 , KS23908,L21 Disk Drive Cable and Jumper Connections - Front and Rear View
- Figure 10.8-9 , KS23908,L30 Disk Drive Cable and Jumper Connections - Front and Rear View.



NOTE: Disk Power Cable and ID Cable must be restrained using a cable tie through a hole on CGG 2 Power Supply board to keep cables away from the front of the fan and avoid cable damage to the ID Cable when removing the cover. Internal cable connections may vary depending on the SCSI disk drive.

Figure 10.8-1 Top View of DUP (Showing Internal Cabling)

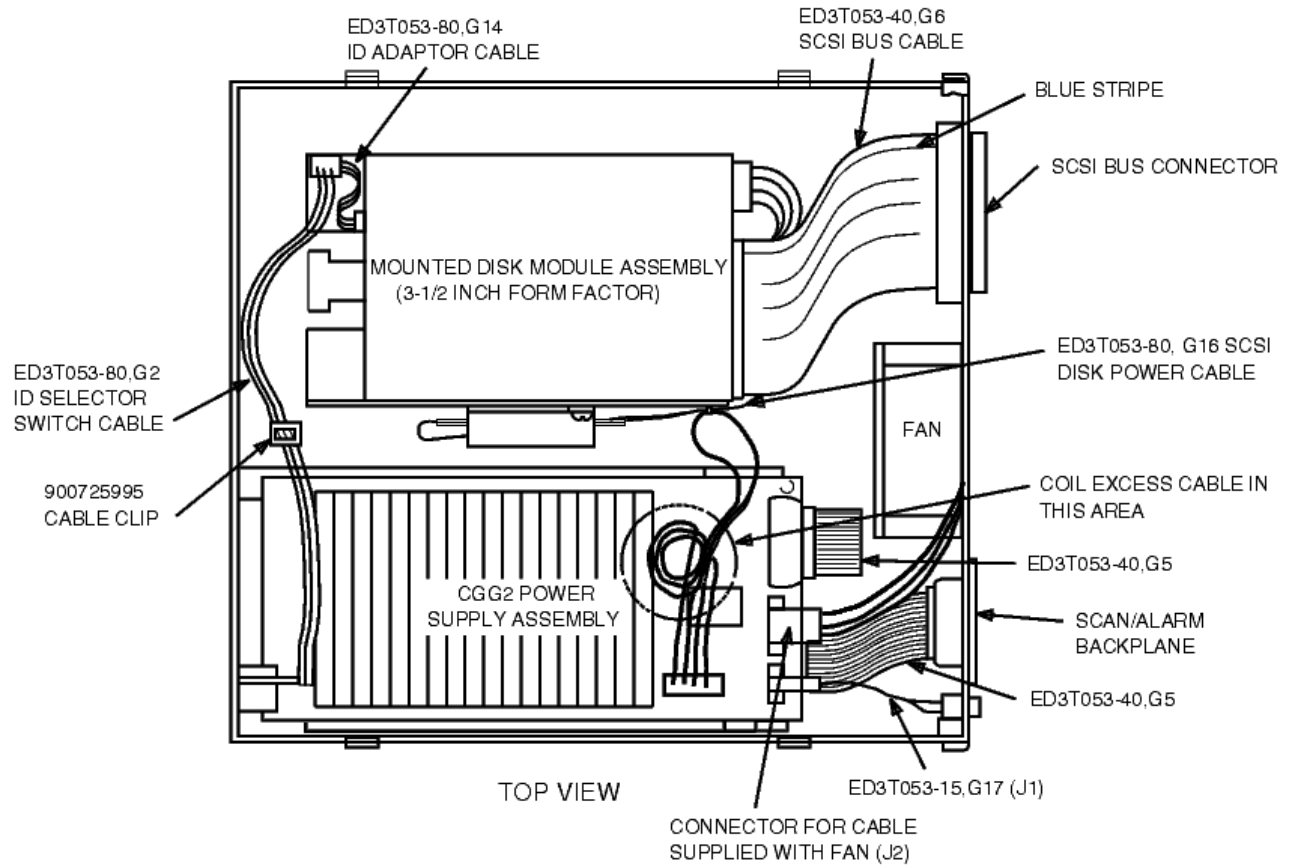
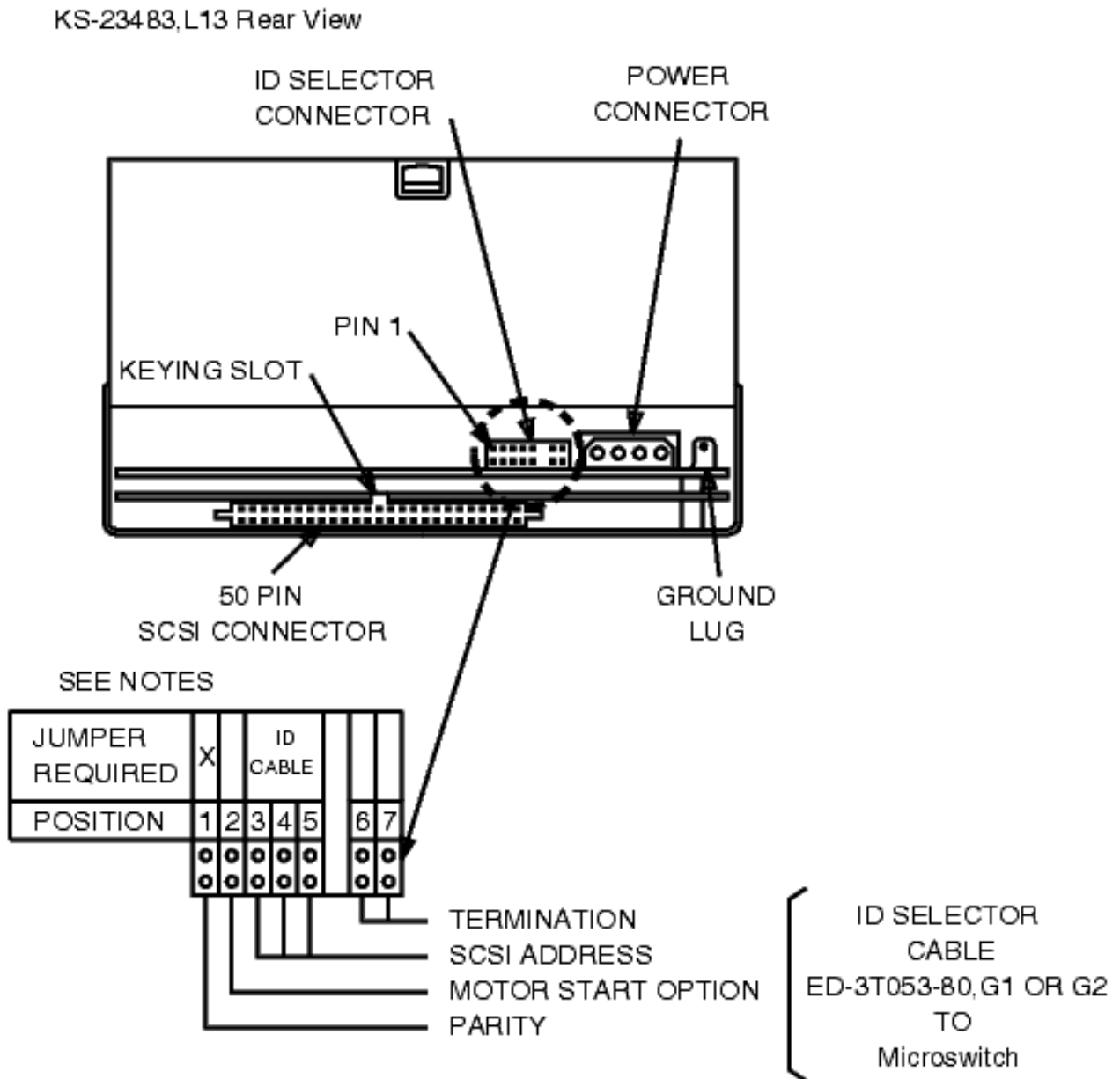


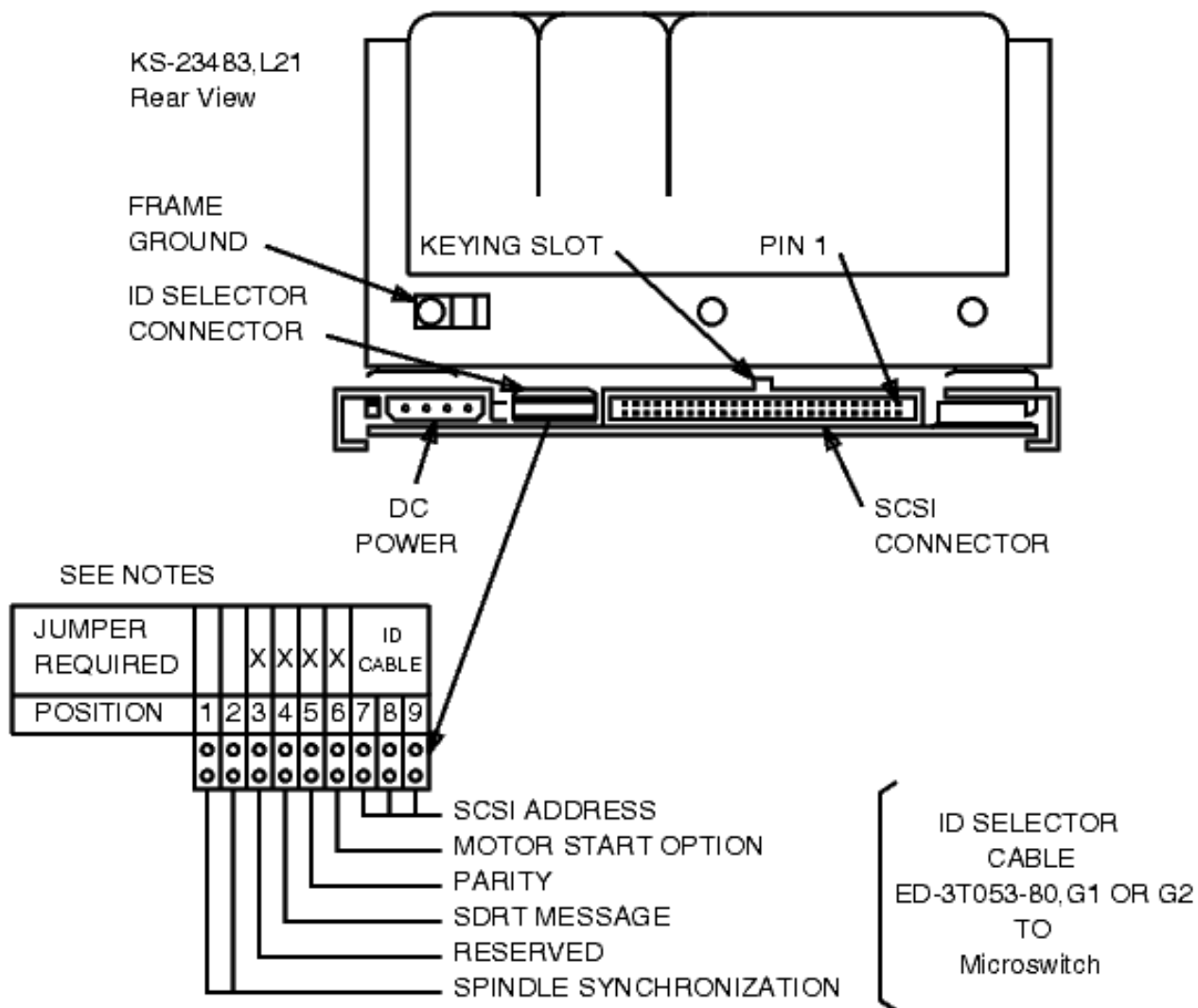
Figure 10.8-2 Top View of DUP Equipped with a 3 1/2-inch SCSI Disk (KS-23908,L20) Showing Internal Cabling



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

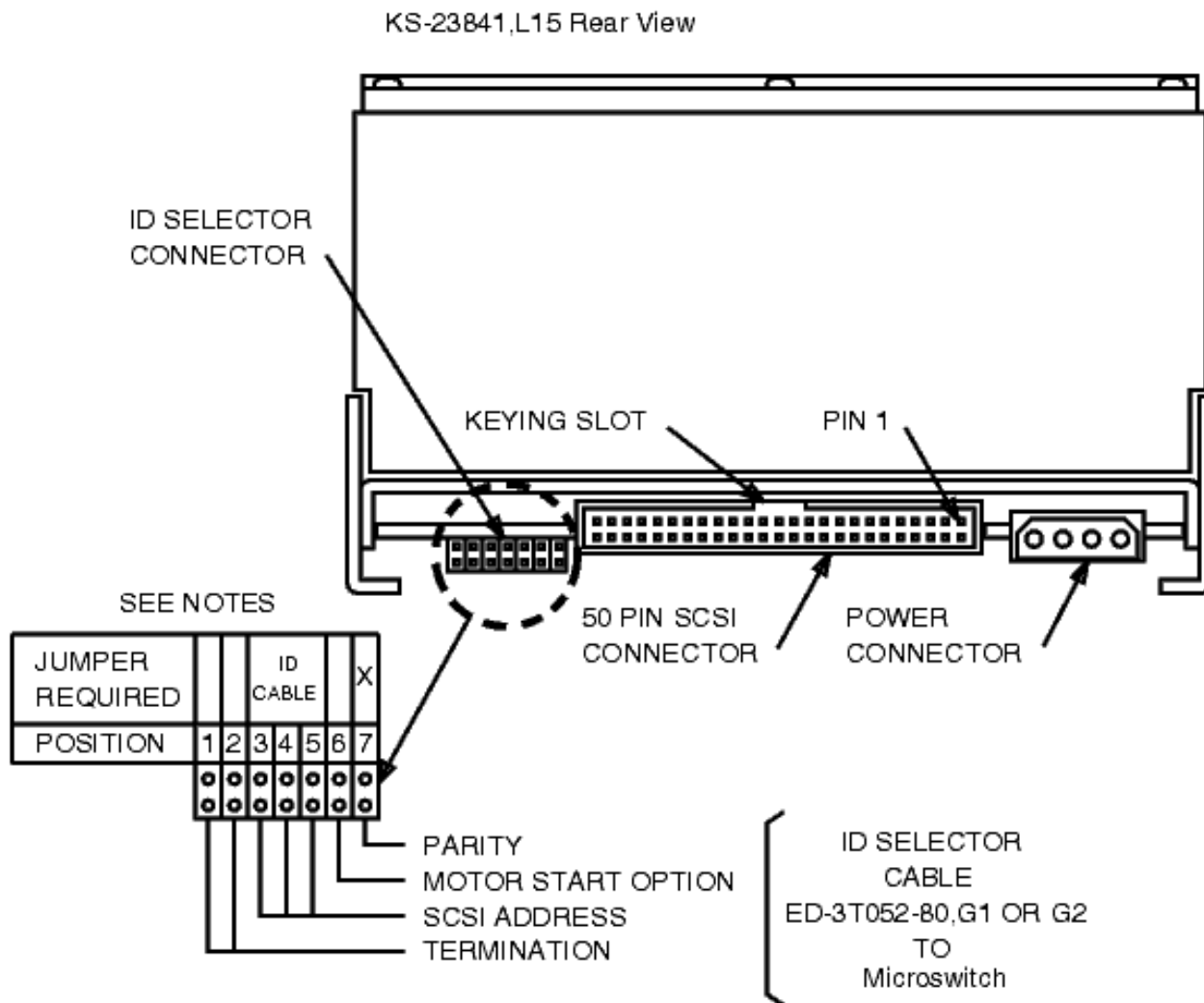
Figure 10.8-3 KS23483,L13 Disk Drive Cable Connection - Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

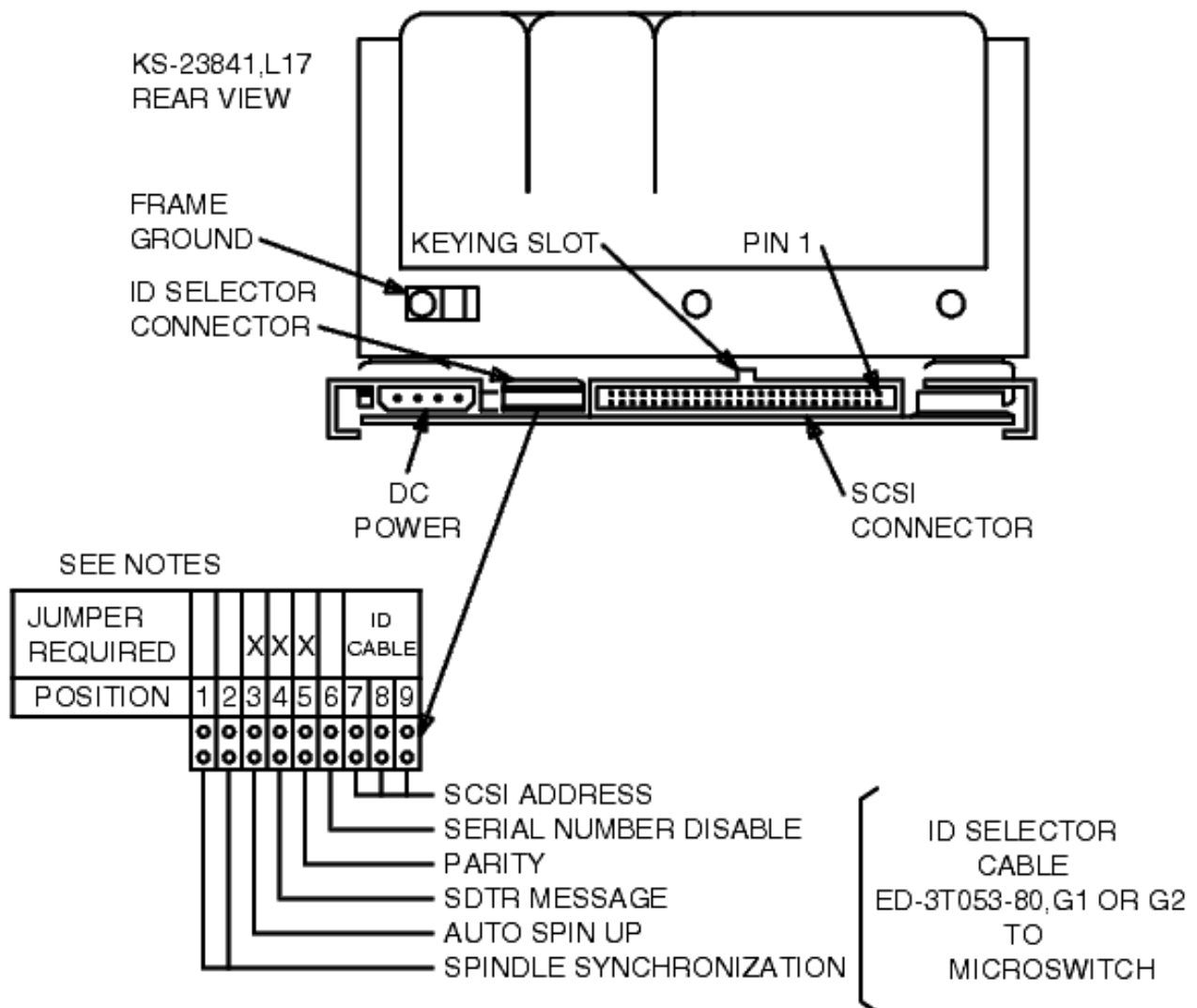
Figure 10.8-4 KS23483, L21 Disk Drive Cable Connection - Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

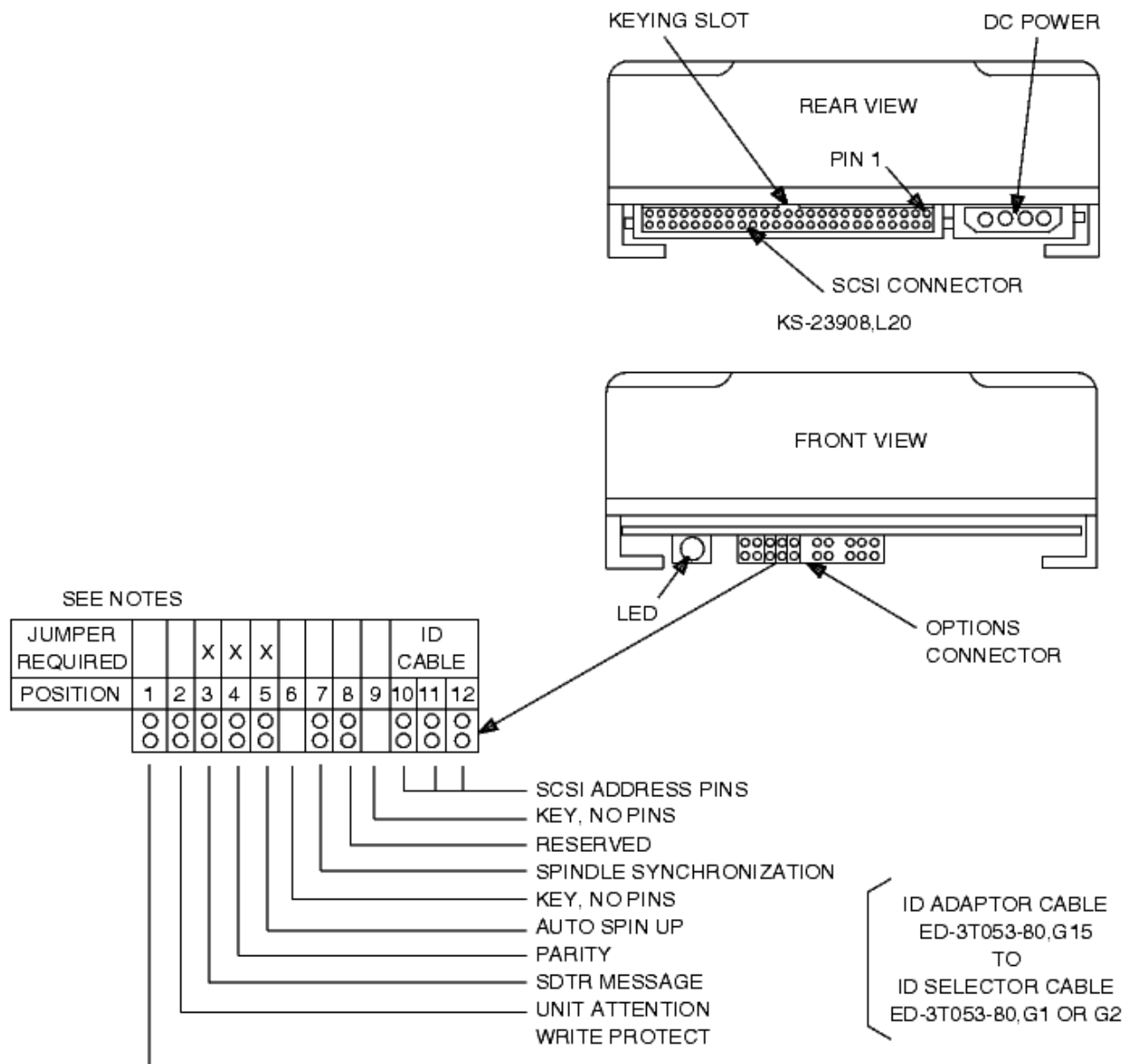
Figure 10.8-5 KS23841,L15 Disk Drive Cable Connection - Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

Figure 10.8-6 KS23841,L17 Disk Drive Cable Connection - Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID Adaptor cable in the indicated position.
Observe proper orientation of the cable plug.

Figure 10.8-7 KS23908,L20 Disk Drive Cable Connection - Front and Rear View

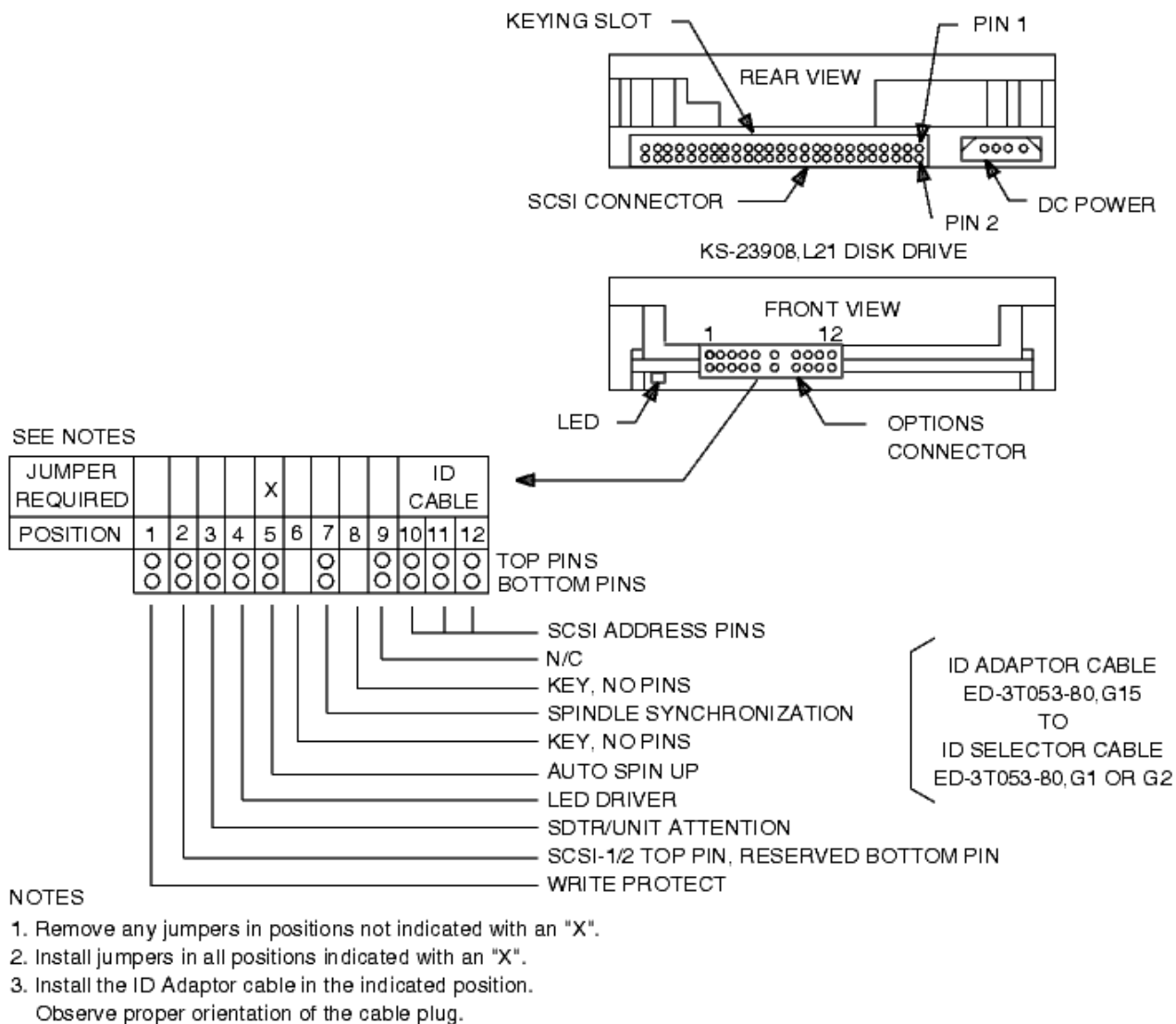
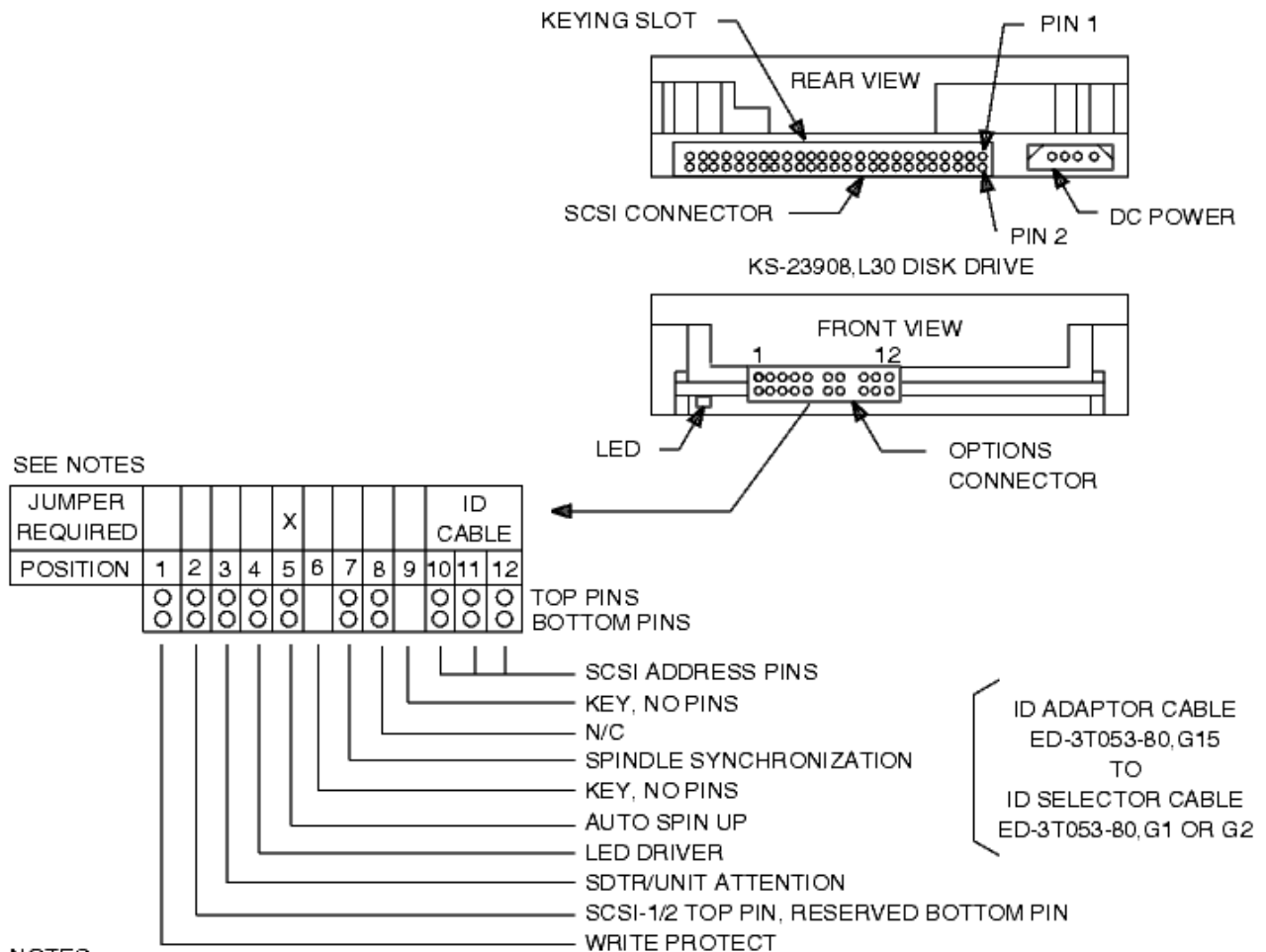


Figure 10.8-8 KS23908,L21 Disk Drive Cable and Jumper Connections - Front and Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID Adaptor cable in the indicated position.
Observe proper orientation of the cable plug.

Figure 10.8-9 KS23908,L30 Disk Drive Cable and Jumper Connections - Front and Rear View

5. Referring to Figure 10.8-10, from underneath the DUP chassis, release the locking tab and push the disk module mounting assembly back (to the rear of the DUP) to disengage the mounting tabs. Remove the Disk Module with the mounting assembly.
6. Making sure that the disk module does not drop, remove two screws from each side of the mounting assembly, then remove the 5 1/4-inch disk module.

NOTE: When replacing a 3 1/2-inch disk module, do not remove disk from the disk module mounting assembly. Entire mounted disk assembly will be replaced.

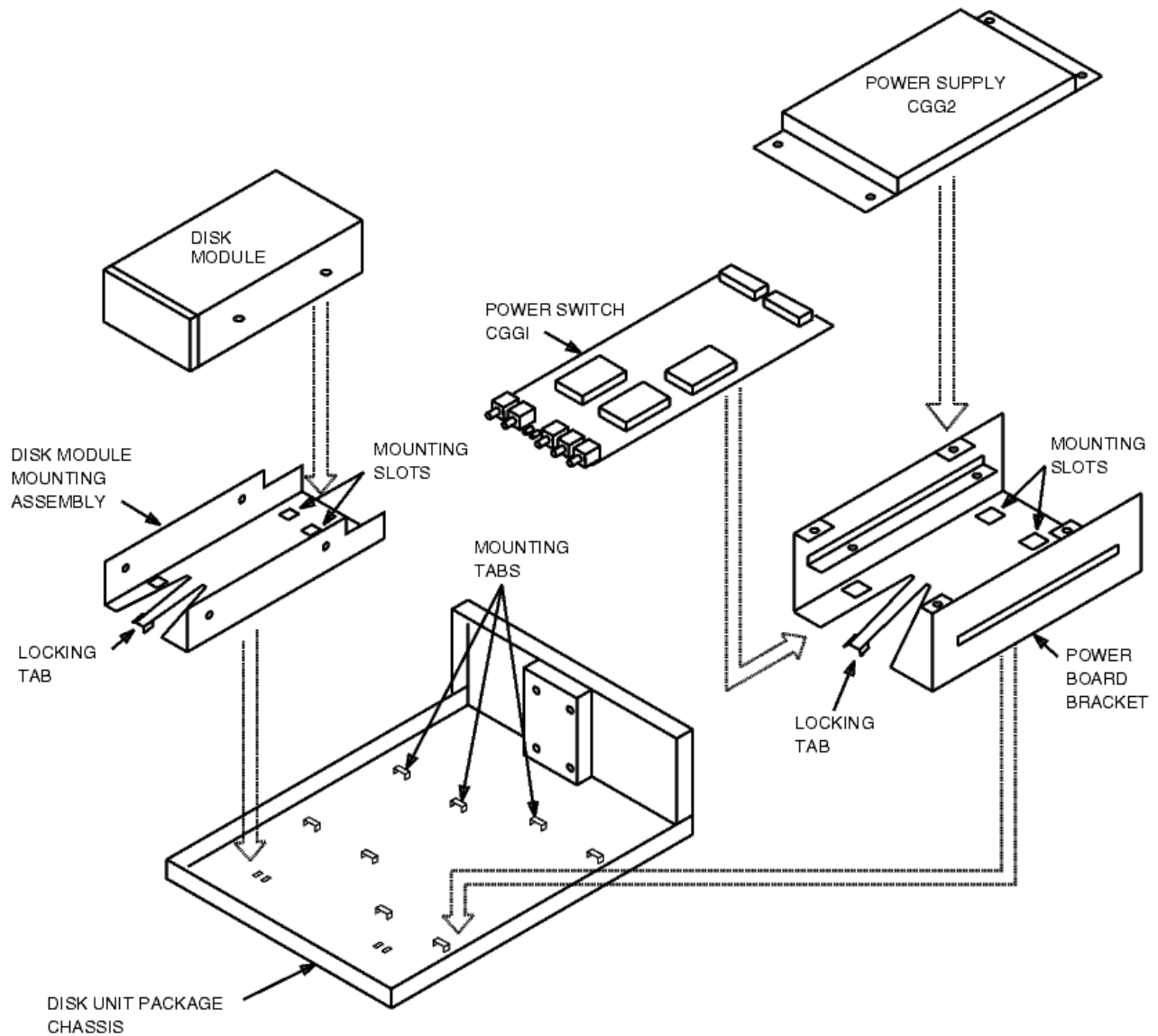


Figure 10.8-10 Disk Unit Package - Exploded View

7. Install the new 5 1/4-inch disk module into the disk module mounting assembly and replace the two screws on each side. For a 3 1/2-inch disk module, replace the entire mounted disk module assembly.
8. Slide the disk module mounting assembly onto the DUP chassis so the tabs are engaged. Ensure that the locking tab is also engaged.
9. Connect the cabling as follows at the rear of the disk module:
 - SCSI bus cable ED-3T053-40, G6
 - Disk power cable to DC power.

The following figures are provided as a guide to aid in connecting the cable:

- Figure 10.8-3 , KS23483,L13 Disk Drive Cable Connection - Rear View

- Figure 10.8-4 , KS23483,L21 Disk Drive Cable Connection - Rear View
 - Figure 10.8-5 , KS23841,L15 Disk Drive Cable Connection - Rear View
 - Figure 10.8-6 , KS23841,L17 Disk Drive Cable Connection - Rear View
 - Figure 10.8-7 , KS23908,L20 Disk Drive Cable Connection - Front and Rear View
 - Figure 10.8-8 , KS23908,L21 Disk Drive Cable and Jumper Connections - Front and Rear View
 - Figure 10.8-9 , KS23908,L30 Disk Drive Cable and Jumper Connections - Front and Rear View.
10. Go to Step 31 and install the DUP cover.
 11. To replace the Power Supply (CGG2), remove the following cables from connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 12. Referring to Figure 10.8-10 , remove the four screws holding the Power Supply (CGG2) to the power board bracket.
 13. Place the new Power Supply on the power board bracket and replace the four screws.
 14. Install the following cables to the connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 15. Go to Step 31 and install DUP cover.
 16. To replace the Power Switch (CGG1), at the Power Supply, remove the following cables from connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 17. At the Power Switch, remove the scan/alarm cable ED-3T053-40, G5 and G6 from the Power Switch connector.

18. Referring to Figure 10.8-10 , from underneath the DUP chassis, release the locking tab and push the power board bracket back (to the rear of the DUP) to disengage the mounting tabs. Remove the power board bracket from the DUP chassis.
19. Remove the four screws holding the Power Supply (CGG2) to the power board bracket and remove the Power Supply.
20. Remove the four screws holding the Power Switch (CGG1) to the power board bracket and slide the Power Switch out of the bracket.
21. Slide the replacement Power Switch (CGG1) into the power board bracket and secure with four screws.
22. Mount the Power Supply (CGG2) on the power board bracket and secure with four screws.
23. Slide the power board bracket with both units mounted onto the chassis to engage the mounting tabs. Ensure that the locking tab is also engaged.
24. At the Power Switch, install the scan/alarm cable ED-3T053-40, G5 and G6 to the Power Switch connector.
25. At the Power Supply (CGG2), install the following cables to the connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
26. Go to Step 31 and install the DUP cover.
27. To replace the fan, at the Power Supply (CGG2), remove the fan power cable at J2.
28. At the rear of the DUP chassis, remove the four screws and finger guard. Remove the fan from inside the chassis.
29. Install the new fan and replace the finger guard with four screws.
30. Install the fan power cable to J2 on the Power Supply (CGG2).
31. To install the DUP cover, hold the cover over the chassis and connect the ID SELECTOR cable to the disk module. When a 5 1/4-inch SCSI disk module is present, the ID cable must be restrained to the CGG2 power supply board using a small cable tie, keeping the cable away from the fan. (See Figures 10.8-1 and 10.8-2 .) Route the fan cable away from the chassis screw tab and fan to avoid pinching. Place the cover over the DUP chassis.

The following figures are provided as a guide to aid in connecting the ID SELECTOR cable:

- Figure 10.8-3 , KS23483,L13 Disk Drive Cable Connection - Rear View
- Figure 10.8-4 , KS23483,L21 Disk Drive Cable Connection - Rear View
- Figure 10.8-5 , KS23841,L15 Disk Drive Cable Connection - Rear View
- Figure 10.8-6 , KS23841,L17 Disk Drive Cable Connection - Rear View

- Figure 10.8-7 , KS23908,L20 Disk Drive Cable Connection - Front and Rear View
 - Figure 10.8-8 , KS23908,L21 Disk Drive Cable and Jumper Connections - Front and Rear View
 - Figure 10.8-9 , KS23908,L30 Disk Drive Cable and Jumper Connections - Front and Rear View.
32. Replace the two screws on each side and one screw from top (rear center) of the DUP.
33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 10.9: ANALYZE AND CLEAR ADMINISTRATIVE SERVICES MODULE (ASM) PROBLEMS

OVERVIEW

The following procedures guide the user through steps to get an off-normal Administrative Services Module (ASM) back to a normal state. The procedures may be as simple as inputting a poke command from MCC (master control center) page **124** — **DCI/ASM STATUS PAGE**, or as detailed as to do a detailed analysis of reports that can lead to a software boot of the ASM or clearing ASM hardware problems.

This section is intended to follow the Alert, Analysis, Repair, and Follow-up (AARF) methodology. Maintenance personnel are guided to MCC Page 124 to maintain the ASM. For more information on MCC Page 124, refer to the 235-105-110, *System Maintenance Requirements and Tools Manual*. As with other MCC pages, the normal state is green for the icons on the 124 page and red for Out-Of-Service (OOS). But, note that the color of the icons may momentarily change to some color other than red or green to indicate software transitions. For example, light-blue (GROW) indicates the ASM growth procedure is still in progress, and yellow, Unavailable (UNAV) may occur during diagnostics. If these states persist, then a software failure has occurred, and customer support must be contacted.

NOTE: It's possible that the Dual Serial Channel Computer Interconnect (DCI) status is Active (ACT), but the ASM status is UNAV. This occurs when the ASM platform is manually shut down. This condition is corrected by executing **dsup** on the ASM.

PROCEDURE

NOTE: This procedure assumes that the MCC page 124 is available. If the 124 page is not available, use the **INIT:AM,ASM,FPI** command (for 5E12 use the **INIT:ULARP** command) to restore the 124 page. If the 124 page will not restore, call customer technical support.

1. At the Trunk Line Work Station (TLWS), to select the DCI/ASM STATUS PAGE, type and enter:

124

2. To analyze a fault with the ASM, proceed to Procedure 10.9.1 .

Procedure 10.9.1: ANALYZE FAULT WITH ASM

PROCEDURE

- NOTE:** If the **TTY-24** icon is in an off-normal condition with any other combination of off-normal conditions with the **DCI-0** and **ASM-0** icons, the TTY-24 link must be restored first. Follow Procedure 10.9.4 to restore the TTY link, then the procedures to correct the other off-normal conditions.

At the Master Control Center (MCC) Page 124, is the **TTY-24** icon in an off-normal condition?

If **YES**, go to Procedure 10.9.4 .

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

- At MCC Page 124, is the **DCI-0** icon and the **ASM-0** icon in an off-normal condition?

If **YES**, go to Procedure 10.9.2 .

If **NO**, continue with Step 3.

- At MCC Page 124, is the **ASM-0** icon in a **DGR** state?

If **YES**,

IF THE SECOND LINE OF TEXT READS:	THEN:
RMT SERV DOWN	go to Procedure 10.9.3 Step 25.
VIRT TRM DOWN	obtain a shell prompt on the TLWS (RCV:MENU:SH) and go to Procedure 10.9.3 Step 35.
DISK0 MAINT	go to Procedure 10.9.6 .
DISK1 MAINT	if the ASM Configuration Tape Backup procedure (235-105-210, Procedure 6.38) is active, this message indicates a temporary state; therefore, no corrective action is required — go to Step 5. However, if the tape backup procedure is not active, go to Procedure 10.9.7 .
DISK0 Resync	go to Step 5. (This is a temporary state and no action is required.)
DISK1 Resync	go to Step 5. (This is a temporary state and no action is required.)
FAN FAULT	refer to local practice to replace workstation.
X FAILED	seek technical assistance.
Where: X = Process name.	
SW MISMATCH	seek technical assistance.
Sudb Corrupt	seek technical assistance.

If **NO**, continue with Step 4.

- At MCC Page 124, is the **ASM-0** icon the only icon in an off-normal condition?

If **YES**, go to Procedure 10.9.3 .

If **NO**, continue with Step 5.

- STOP. YOU HAVE COMPLETED THE ANALYSIS SECTION OF THIS PROCEDURE.**

Procedure 10.9.2: CLEAR DCI FAULT CONDITION**PROCEDURE**

1. At the TLWS, on MCC Page 124, to restore the DCI to the Active (ACT) state, type and enter:

300

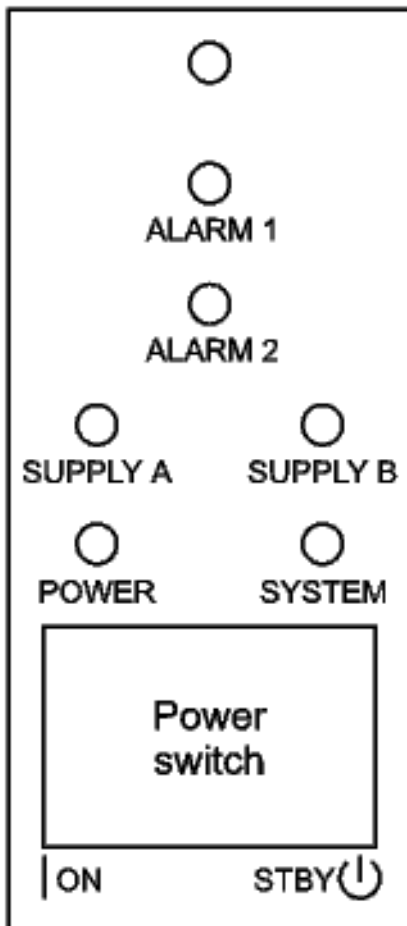
2. Did the DCI and ASM icon change to the ACT state?

NOTE: The DCI and ASM icons may take up to 30 seconds to change to the active state.

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 3.

3. Verify the ASM has power (**POWER**, **SUPPLY A**, and **SUPPLY B** LEDs should be green). Refer to Figure 10.9.2-1 ..



fpnetra1120

Figure 10.9.2-1 ASM Power Switch and Indicators

4. Verify the DCI cable is securely in place.
5. Was there an ASM power problem, or a DCI cable problem?

If **YES**, go to Step 6.

If **NO**, go to Step 7.

6. Restore power to the ASM or correct the DCI cable problem and return to Step 1.
7. **NOTE:** To enter the full screen mode to view multiple lines of text, type and enter **120**.

At the TLWS, toggle to the message mode.

8. At the TLWS, to obtain a UNIX prompt, type and enter:

RCV:MENU:SH

9. Type and enter:

dsmcon

10. Press the ENTER key.
11. Is **ok** the displayed prompt?
12. At the **ok** prompt, type and enter:

boot

NOTE: Once the boot command is entered, the ASM should start to recover. If dsmcon returns a **console login** and the DCI and ASM icons return to an ACT state, then the ASM has recovered successfully. The boot command takes several minutes to complete. If a **lost carrier** indication is received during the boot process, type and enter **dsmcon** and wait for the boot to complete.

13. Did the **boot** command return a **console login** prompt?
14. Are the DCI and ASM icons on MCC Page 124 in the ACT state?

If **YES**, go to Step 14.

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

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

If **NO**, go to Procedure 10.9.5 .

15. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

16. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

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

Procedure 10.9.3: CLEAR ASM SOFTWARE PROBLEMS

PROCEDURE

1. **NOTE:** To enter the full screen mode to view multiple lines of text, type and enter **120**.

At the TLWS, toggle to the message mode.

2. To obtain a status report on the programs running on the ASM, type and enter:

EXC:ENVIR:UPROC,FN="/no5text/dsm/dsstat"

3. Does the **dsstat** response contain the **CModcmsend**, and **CModcmrecv** processes with an **UP** status? For example:

```
Link:UP   Messaging:UP   Remote AM Access:UP
Virtual TTY:UP
```

Appl	Process	Tag	PID	Status	A/I	Restart	HB	Wait
asm	CModcmsend	1	10107	UP	ALLOW	RESTART	HB	NOWAIT
asm	CModcmrecv	1	10108	UP	ALLOW	RESTART	NOHB	NOWAIT

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

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

4. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

5. Type and enter:

dsmcon

6. Press the ENTER key.

7. To login as root, type and enter:

root

8. Enter your root password.

Response: host-name#

9. To obtain a status report on the contents of the ASM processes, type and enter:

dsstat

10. Does the **dsstat** response contain the **CModcmsend**, and **CModcmrecv** processes with an **UP** status? For example:

```
Link:UP   Messaging:UP   Remote AM Access:UP
Virtual TTY:UP
```

Appl	Process	Tag	PID	Status	A/I	Restart	HB	Wait
asm	CModcmsend	1	10107	UP	ALLOW	RESTART	HB	NOWAIT

asm	CModcmrecv	1	10108	UP	ALLOW	RESTART	NOHB	NOWAIT

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

If **NO**, go to Step 11.

11. To collect data on the ASM and to dump this ASM data to ROP, type and enter:

who - r | dsrop -

ipcs - a | dsrop -

ps - af | dsrop -

12. To reset the ASM software, type and enter:

dsdown

Response: #

dsup

Response: #

13. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

14. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

15. At the Trunk Line Work Station (TLWS), to select the DCI/ASM STATUS PAGE, type and enter:

124

16. Did the ASM icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 49.

17. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

18. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

19. To save the state data for the processes DSamp, dcidip, and CMdc to the ROP, type and enter:

OP:STATUS:PROCESS,ALL

20. To stop and restart the 3B messaging software, type and enter:

For 5E12: **INIT:ULARP**

For 5E13 and later: **INIT:AM,ASM,FPI**

21. At the Trunk Line Work Station (TLWS), to select the DCI/ASM STATUS PAGE, type and enter:

124

22. Did the ASM icon change to the ACT state?

NOTE: After entering **INIT:ULARP** or **INIT:AM,ASM,FPI**, wait 1 to 2 minutes for the icons to change on MCC page 124.

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 23.

23. To obtain a status report on the programs running on the ASM, type and enter:

EXC:ENVIR:UPROC,FN="/no5text/dsm/dsstat"

24. Does the **dsstat** response contain the **CModcmsend**, and **CModcmrecv** processes with an **UP** status? For example:

```
Link:UP   Messaging:UP   Remote AM Access:UP
Virtual TTY:UP
```

Appl	Process	Tag	PID	Status	A/I	Restart	HB	Wait
asm	CModcmsend	1	10107	UP	ALLOW	RESTART	HB	NOWAIT
asm	CModcmrecv	1	10108	UP	ALLOW	RESTART	NOHB	NOWAIT

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

If **NO**, go to Step 49.

25. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

Response: #

26. At the # prompt, to verify the ASM file transfer software is operating correctly on the 3B side, type and enter:

/no5text/dsm/dsftfr asm:/etc/passwd 3b:/dev/null

27. Is the response the # prompt with no error message?

If **YES**, go to Step 35.

If **NO**, go to Step 28.

28. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

29. To save the state data for the processes DSamp, dcidip, and dseaks to the ROP, type and enter:

OP:STATUS:PROCESS,ALL

30. To stop and restart the 3B file transfer software, type and enter:

For 5E12: **INIT:ULARP**

For 5E13 and later: **INIT:AM,ASM,FPI**

31. Did the ASM icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 32.

32. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

Response: #

33. At the # prompt, to verify the ASM file transfer software is operating correctly on the 3B side, type and enter:

/no5text/dsm/bin/dsftfr asm:/etc/passwd 3b:/dev/null

34. Is the response the # prompt with no error message?

If **YES**, go to Step 35.

If **NO**, go to Step 49.

35. Type and enter:

dsmcon

36. Press the ENTER key.

37. To login as root, type and enter:

root

38. Enter your root password.

Response: host-name#

39. To verify the ASM virtual terminal software is operating correctly, type and enter:

dsremexec -e date

NOTE: This command takes about 1 minute to execute.

40. Is the response the **host-name#** prompt with the date?

If **YES**, go to Step 54.

If **NO**, go to Step 41.

41. To collect data on the ASM and to dump this ASM data to ROP, type and enter:

who - r | dsrop -

ipcs - a | dsrop -

ps - af | dsrop -

42. To bounce the ASM platform, type and enter:

dsdown

dsup

43. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

44. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

45. Did the ASM icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 46.

46. To save the state data for the processes DSamp, dcidip, and dsvtty to the ROP, type and enter:

OP:STATUS:PROCESS,ALL

47. To stop and restart the 3B messaging software, type and enter:

For 5E12: **INIT:ULARP**

For 5E13 and later: **INIT:AM,ASM,FPI**

48. Did the ASM icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 49.

49. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

50. Type and enter:

dsmcon

51. Press the ENTER key.

52. To login as root, type and enter:

root

53. Enter your root password.

Response: **host-name#**

54. At the **host-name#** prompt, type and enter:

dsboot

NOTE: Once the boot command is entered, the ASM should start to recover. If dsmcon returns a **console login** and the DCI and ASM icons return to an ACT state, then the ASM has recovered successfully.

55. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

56. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

57. Did the ASM icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

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

NOTE: Collect the ROP data and contact customer technical support. The ROP data is useful information for diagnosing ASM problems in more detail.

Procedure 10.9.4: CLEAR ASM CONSOLE PROBLEMS**PROCEDURE**

1. At the TLWS, on MCC Page 124, to restore the TTY-24 to the Active (ACT) state, type and enter:

310

2. Did the TTY-24 icon change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Step 3.

3. Verify the ASM has power (**POWER**, **SUPPLY A**, and **SUPPLY B** LEDs should be green). Refer to Figure 10.9.2-1 .
4. Verify the TTY cable is securely in place.
5. Was there an ASM power problem, or a TTY cable problem?

If **YES**, go to Step 6.

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

6. Restore power to the ASM or correct the TTY cable problem and return to Step 1.

Procedure 10.9.5: CLEAR ASM HARDWARE PROBLEMS

PROCEDURE

1. Has the ASM power and the DCI cable been checked?

If **YES**, go to Step 6.

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

2. Verify the ASM has power (**POWER**, **SUPPLY A**, and **SUPPLY B** LEDs should be green). Refer to Figure 10.9.2-1 .
3. Verify the DCI cable is securely in place.
4. At the TLWS, on MCC Page 124, to restore the DCI and ASM to the Active (ACT) state, type and enter:

300

5. Did the DCI and ASM icons change to the ACT state?

If **YES**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, go to Step 6.

6. Toggle to the message mode.
7. To switch Administrative Module (AM) Control Units (CU), type and enter:

SW:CU

8. Toggle to the command mode.
9. At the TLWS, on MCC Page 124, to restore the DCI and ASM to the Active (ACT) state, type and enter:

300

10. Did the DCI and ASM icons change to the ACT state?

If **YES**, the ASM is operating correctly. Go to Step 11.

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

11. Refer to Procedure 10.2 to clear AM CU memory problems. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
12. Call customer technical support and refer to local practices to replace the ASM box.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 10.9.6: RECOVER FROM AN ASM DISK 0 FAILURE

PROCEDURE

CAUTION: Follow proper ESD grounding procedures when handling components. Wear an antistatic wrist strap and store ESD-sensitive components in antistatic containers.

1. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

2. Type and enter:

dsmcon

3. Press the ENTER key.

4. To login as root, type and enter:

root

5. Enter your root password.

Response: host-name#

6. At the **host-name#** prompt, to power down the ASM, type and enter:

poweroff

7. Verify the power LED is off. Refer to Figure 10.9.2-1 ..
8. Remove the input power connectors. Refer to Figure 10.9.6-1 ..

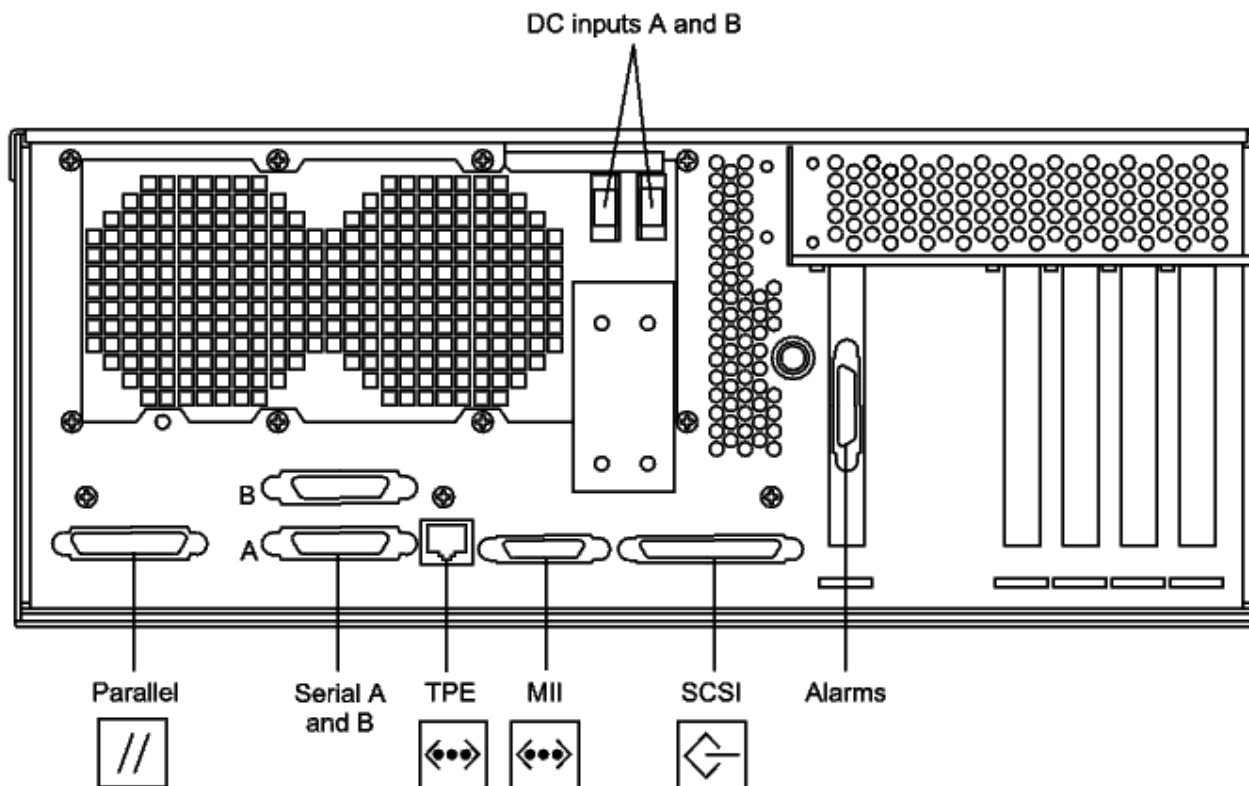


Figure 10.9.6-1 ASM Rear View

9. Open the front access cover. Refer to Figure 10.9.6-2 ..

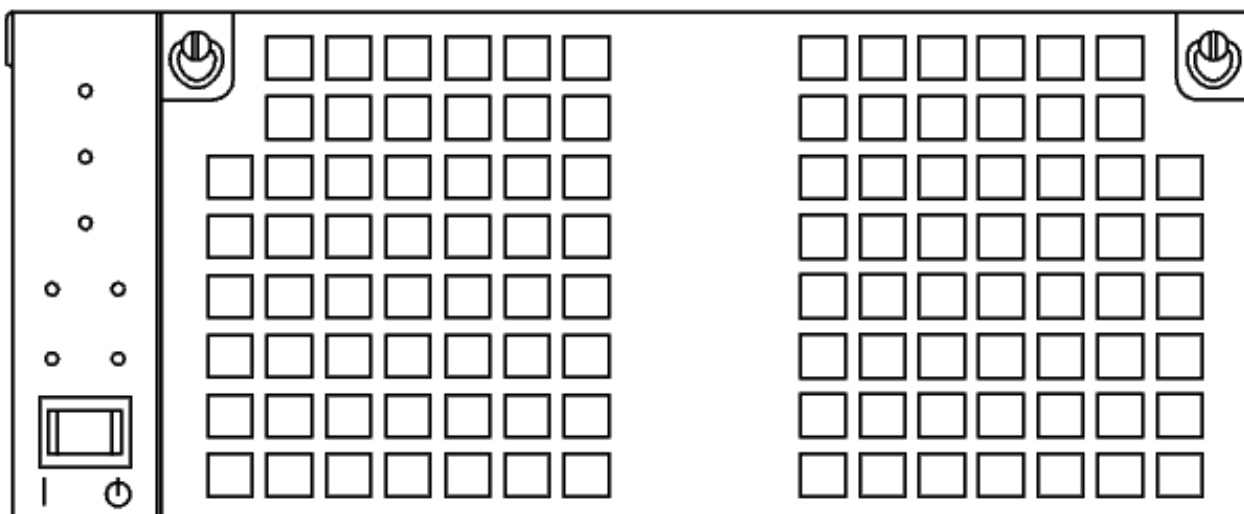


Figure 10.9.6-2 ASM Front View

10. To remove the front ESD screen, remove the two No. 1 Phillips head retaining screws holding the ESD screen. Refer to Figure 10.9.6-3 ..

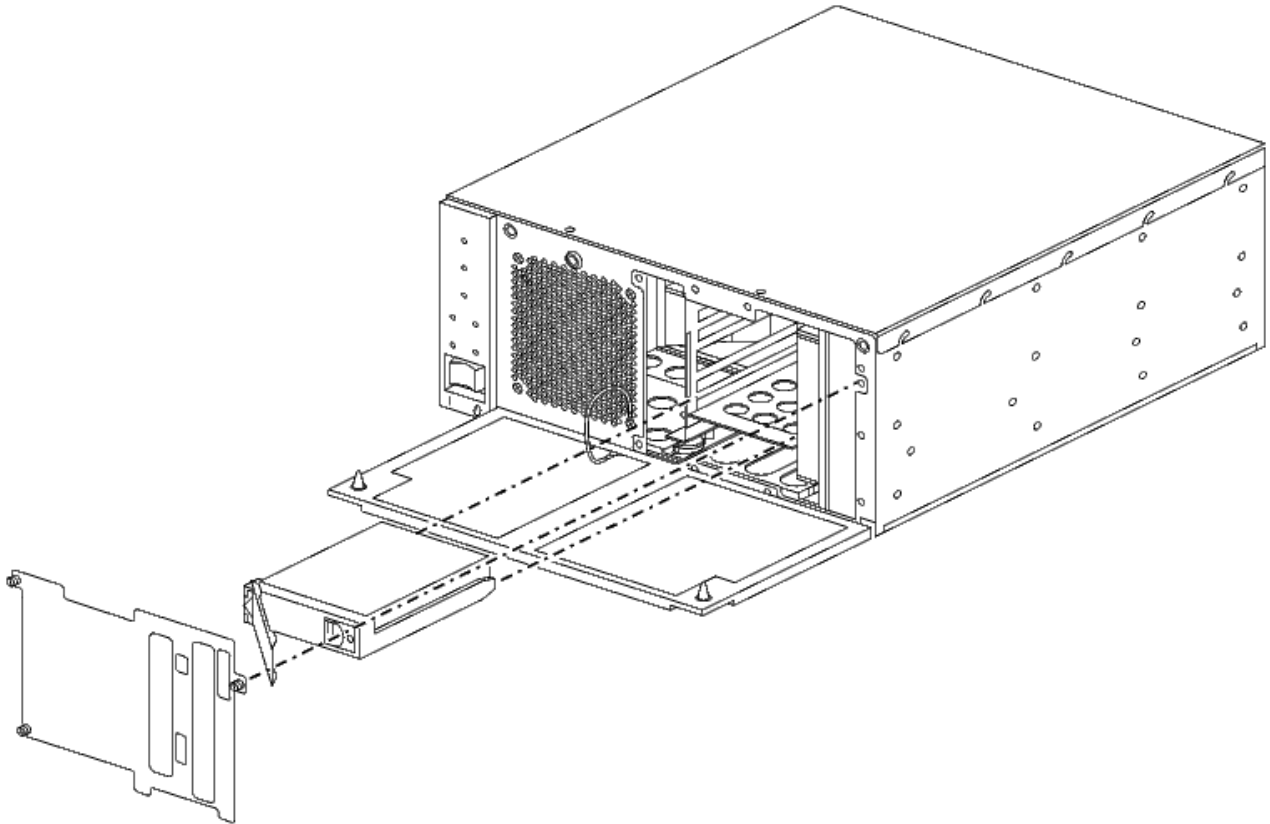


Figure 10.9.6-3 ASM Hard Disk Drives

11. Push the Disk 0 latch to the right and extend the drive handle to disconnect the drive from the system.

NOTE: Disk 0 is the bottom disk drive.

12. Remove the drive from the drive bay with the drive handle.

NOTE: The hard disk drive rear connector is disconnected when the drive is ejected.

13. Holding the new drive by the drive handle, insert the new drive into the Disk 0 drive bay.

14. Push the front of the drive to connect the drive securely to the SCSI bus.

15. Close the drive handle and latch to lock the drive into the system.

16. Replace the front ESD screen and two No. 1 Phillips head retaining screws.

17. Reconnect the input power connectors on the rear of the ASM workstation.

18. To power up the ASM, set the ON/STBY system switch to the on position.

19. To recover Disk 0, type and enter:

dsdisk0recov

NOTE: Disk recovery may take up to 2 hours to complete.

20. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

21. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

22. At the Trunk Line Work Station (TLWS), to select the DCI/ASM STATUS PAGE, type and enter:

124

23. Did the ASM icon change to the ACT state?

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

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

24. Replace the ASM front access cover. Refer to Figure 10.9.6-2 .
25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 10.9.7: RECOVER FROM AN ASM DISK 1 FAILURE

PROCEDURE

CAUTION: Follow proper ESD grounding procedures when handling components. Wear an antistatic wrist strap and store ESD-sensitive components in antistatic containers.

1. At the TLWS, to obtain a shell prompt, type and enter:

RCV:MENU:SH

2. Type and enter:

dsmcon

3. Press the ENTER key.

4. To login as root, type and enter:

root

5. Enter your root password.

Response: host-name#

6. At the **host-name#** prompt, to power down the ASM, type and enter:

poweroff

7. Verify the power LED is off. Refer to Figure 10.9.2-1 .

8. Remove the input power connectors. Refer to Figure 10.9.6-1 .

9. Open the front access cover. Refer to Figure 10.9.6-2 .

10. To remove the front ESD screen, remove the two No. 1 Phillips head retaining screws holding the ESD screen. Refer to Figure 10.9.6-3 .

11. Push the Disk 1 latch to the right and extend the drive handle to disconnect the drive from the system.

NOTE: Disk 1 is the top disk drive.

12. Remove the drive from the drive bay with the drive handle.

NOTE: The hard disk drive rear connector is disconnected when the drive is ejected.

13. Holding the new drive by the drive handle, insert the new drive into the Disk 1 drive bay.

14. Push the front of the drive to connect the drive securely to the SCSI bus.

15. Close the drive handle to lock the drive into the system.

16. Replace the front ESD screen and two No. 1 Phillips head retaining screws.

17. Reconnect the input power connectors on the rear of the ASM workstation.

18. To power up the ASM, set the ON/STBY system switch to the on position.

19. To recover Disk 1, type and enter:

dsdisk1recov

NOTE: Disk recovery may take up to 2 hours to complete.

20. To exit dsmcon and return to the UNIX shell mode, type and enter an exit and a tilde and period as follows:

exit

~.

21. To exit UNIX shell and return to the Man-Machine Language (MML) mode, type and enter:

exit

22. At the Trunk Line Work Station (TLWS), to select the DCI/ASM STATUS PAGE, type and enter:

124

23. Did the ASM icon change to the ACT state?

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

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

24. Replace the ASM front access cover. Refer to Figure 10.9.6-2 .

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

Procedure 10.10: REPLACE DIGITAL AUDIO TAPE (DAT) DRIVE

OVERVIEW

This procedure provides a method to replace a Digital Audio Tape (DAT) drive. The DAT unit (UN376) should be replaced if the unit has been identified as a defective unit during a diagnostic test (Procedure 3.1).

The DAT is a circuit-pack tape drive that is connected to a Small Computer System Interface (SCSI) bus. The SCSI bus must be removed from service before removing or inserting the UN376 circuit pack. At the Master Control Center (MCC), to identify the SCSI bus of the defective Magnetic Tape (MT) drive, type and enter:

OP:MT=a:INFO;

Where:

a = Tape drive number (for example, 0).

The terminal display lists the KS-number and product revision number in the PRODUCT IDENTIFICATION field.

CAUTION: While writing to tape, if the tape drive is removed from service or powered down, the tape operation is considered a failure.

PROCEDURE

1. To remove the tape drive from service, type and enter:

RMV:MT=a;

Where:

a = Tape drive number (for example, 0).

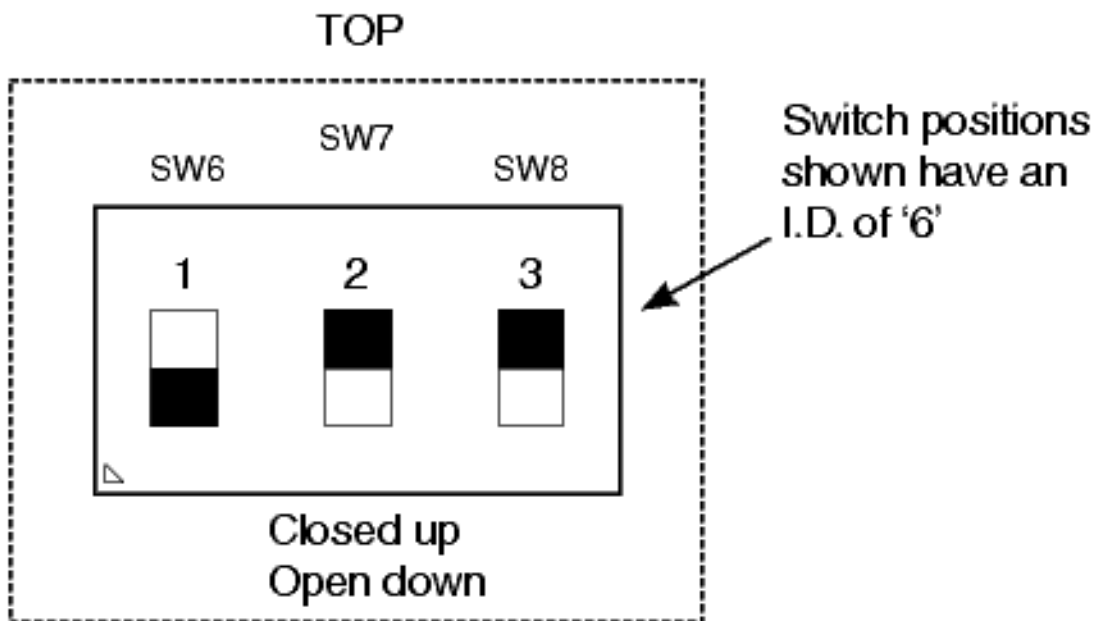
2. To remove from service the tape drive SCSI bus (SBUS), type and enter:

RMV:SBUS=a;

Where:

a = SBUS number (for example, 0).

3. Remove the DAT drive by pulling out the latch on the faulty UN376 circuit pack.
4. Set the device ID toggle switch of the replacement UN376 circuit pack to **6**. Refer to Figure 10.10-1 .



100053-1

Figure 10.10-1 DAT Drive Switch Positions

5. Insert the replacement UN376 circuit pack into the empty slot created in Step 3 and seat the pack in the backplane.
6. To restore to service the tape SBUS, type and enter:

RST:SBUS=a;

Where:

a = SBUS number (for example, 0).

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

11. COMMUNICATION MODULE MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for maintenance of communication Module equipment. Included in the Quad Link Packet Switch (QLPS).

Procedure 11.1: ANALYZE COMMUNICATION MODULE PROBLEMS

Overview

The procedure in this section provides a guide to analyze noncritical off-normal conditions in the communication module (CM). When such faults occur in the CM, maintenance software attempts to automatically recover from the failure or re-configure CM hardware to minimize the impact on system operation. If the problem cannot be corrected, units may be left OOS or in some other off-normal condition, requiring craft intervention (hence, this procedure exists to analyze these problems). Under some circumstances, craftspersons may have removed a unit or inhibited interrupts, when the system was operating under different conditions, and now it may be appropriate to return those units to full service (again, this procedure identifies these cases).

For critical problems, such as escalations to rolling AM/CM initializations (usually due to a duplex failure of critical CM hardware), or in cases where one/more SMs/SM-2000s become totally isolated from the AM, or lose all connectivity to the QLPS networks or QGPs (the SM/SM-2000 has a status of ISOLATED, COMM LOST, STNDALONE, INIT ISOL, QLPS ISOL, QLNK LOST or CLNK LOST displayed on the MCC, or critically alarmed **REPT SM ISOL** output messages is printed on the ROP), craft should refer to 235-105-250, *System Recovery*.

PROCEDURE

1. This procedure is a "roadmap" for the craft to analyze CM problems identified via various sources/techniques. The following three strategies are used to analyze the CM problems.
 - (1) Analysis via REPT TRBL Messages
 - (2) Analysis using MCC Indicators
 - (3) Analysis using OFF-NORMAL Status.

Section 11.1.4 — Clear Communication Module Problems is then used to clear all problems in specific units in the CM.

In all cases, the craft is referred to step-by-step procedures to clear specific problems.

For each of the described strategies to identify problems, a suggested sequence of resolution/repair is implied, based upon the importance of units to system operation or parent/child relationships of the hardware. If another order of repair is used, the individual procedure may still be successful, or specific instructions are provided to make necessary diversions (such as parent hardware must be recovered, before the child can be made operational).

11.1.1 ANALYSIS VIA REPT TRBL MESSAGES

OVERVIEW

The first strategy is concerned with CM unit errors/faults, that are detected by fault recovery. If an error/fault is addressed by fault recovery, a **REPT TRBL** output message is produced. If the message is **not alarmed**, recovery is ongoing and immediate repair is not necessary (failure of that recovery results in another REPT TRBL message, which is alarmed). Within the REPT TRBL messages, **unit types/error classes** should be identifiable by specific phrases. The following list (Steps 1 through 17) point to appropriate problem clearing procedures, based upon unit type/class. If multiple REPT TRBL messages implicate different unit types/classes, follow the implied order of the following list (Steps 1 through 17) to resolve the problems.

NOTE 1: The alarm level (critical, major, or minor) of individual messages may be just cause to alter this preferred sequence of repair.

NOTE 2: Since REPT TRBL messages only indicate a problem has occurred some time in the past, and these problems are being addressed by fault recovery, it is possible that the faulty unit(s) may have been recovered automatically. Thus it is possible to enter repair procedures, only to find all units of the type/class implicated are now returned to service.

This strategy is based upon detected faults/errors, it does not consider any manually removed/forced units, which may be very important to restoring full service, when taking into account the effects of new faults introduced. Although this strategy is perfectly valid approach to the repair of CM hardware, it is suggested that one of the two remaining strategies be used as a backup (to ensure all manually removed/inhibited units are identified, and to guard against the loss of REPT TRBL messages).

1. Order **unit types/classes**, derived from the **REPT TRBL** messages, to line up with the list in Section 11.1.4 , — Clear Communication Module Problems, and continue with the next step.

NOTE: New items may be added to the list, if REPT TRBL output messages are produced while repairing other units, or the process may be started over at any time.

2. If a **MSCU** is identified, go to Procedure 11.2 .
Otherwise continue to the next step.
3. If a **FPC** is identified, go to Procedure 11.2 .
Otherwise continue to the next step.
4. If an **ONTCCOM MI/NC/TMS** is identified, and an **error type** in the REPT TRBL message is **ONTC CRITICAL**, go to Procedure 11.3 .
Otherwise continue to the next step.
5. If a **CMP** is identified, go to Procedure 11.2 .
Otherwise continue to the next step.
6. If a **QGP** is identified, go to Procedure 11.8 .
Otherwise continue to the next step.
7. If a **MMP** is identified, go to Procedure 11.2 .
Otherwise continue to the next step.
8. If a **QLPS** is identified, go to Procedure 11.9 .
Otherwise continue to the next step.
9. If a **NCREF, XC, OSCXC, or NCOSC** is identified (a phrase **NC REFERENCE CONFIGURE** or **NC OSCILLATOR RECOVERY** appears in the REPT TRBL message), go to Procedure 11.4 .
Otherwise continue to the next step.
10. If an **ONTCCOM TMS** is identified, and an **ONTC NON-CRITICAL** error class is present, perform the following further checks:

If on the **115** MCC page, any of the **1221-1228** or **1231-1238** indicators are backlit (indicating faulty **TMSLNKs**), go to Procedure 11.5 .

If on the **1380** or **1381** MCC page, any **QTMSLNKs** are OOS, go to Procedure 11.11 .

Otherwise continue to the next step.

11. **NOTE:** If an NLI is identified, diagnose the NLI before proceeding. Segment 30 of phase 2 indicates a host TRCU3 failure, and segment 20 of phase 2 indicates a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,

If an **NLI** is identified, go to Procedure 11.6 .

Otherwise continue to the next step.

12. **NOTE:** If a DLI is identified, diagnose the DLI before proceeding. Segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,

If a **DLI** is identified, go to Procedure 11.5 .

Otherwise continue to the next step.

13. If a **QGL** or **QGPQPIPE** is identified, go to Procedure 11.10 .

Otherwise continue to the next step.

14. If a **MHQPIPE** is identified, go to Procedure 11.12 .

Otherwise continue to the next step.

15. If a **QLNK** or **ISMQLNK** is identified, go to Procedure 11.13 .

Otherwise continue to the next step.

16. If a **CLNK** is identified, go to Procedure 11.7 .

Otherwise continue to the next step.

17. If a **PPC** is identified, go to Procedure 11.2 .

Otherwise return to Step 1, if **new** REPT TRBL messages have occurred, or exit this procedure.

NOTE: If the phrase **QGP DUPLEX FAIL** or **QGP QUADRUPLIX FAIL** is present in a **critically** alarmed REPT TRBL output message, repair MSCUs first, followed by QGPs (Steps 2 and 6), before attempting to repair other units. Similarly, identification of the phrase **QLPS QUAD FAILED** should result of the repair of MSCUs, FPCs, ONTCCOMs, and QLPSs first, in that order (Steps 2, 3, 4 and 8).

If a **MMP** is identified in a **critically** alarmed REPT TRBL output message, this indicates all MMPs serving the same group of SMs are OOS/UNAV. Through such a loss is only critical, if the group of MMPs serves at least one SM (not SM/EXM-2000), it deserves higher priority attention; repair MSCUs first, followed by MMPs associated with isolated SMs (Steps 2 and 7), before attempting to repair other units.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

11.1.2 ANALYSIS USING MCC INDICATORS

OVERVIEW

A second strategy is to use the MCC to track CM problems. First go to the **115 - COMMUNICATION MODULE SUMMARY** page, and look for off-normal (backlit) indicators; it should be noted that indicators are off-normal due to manually removed/forced units or when hardware checks are manually inhibited, as well as those units removed by fault recovery (based upon a current view of the entire CM complex). Indicators are **not** backlit, if a unit is OOS due to parent hardware problems ("family-of-equipment" outage); therefore, this technique filters out any extraneous actions.

For any backlit indicators found, examine the following list (Steps 1 through 11) and look for matches. For every match found, bring up the designated MCC page, and if the indicated supplementary conditions are met, perform the referenced procedures.

1. If a **1240** or **1250** indicator is backlit, repair **MSCUs** via Procedure 11.2 .
Otherwise continue to the next step.
2. If a **1241** or **1251** indicator is backlit, perform the following tests:
If **both 1241 and 1251** indicators are backlit, go to each MCC page and note QGP status. If **all QGPs** are OOS/UNAV, repair **at least one QGP** via Procedure 11.8 .
If on the identified MCC page, a **FPC** is OOS or UNAV or has interrupts inhibited, repair via Procedure 11.2 .
Otherwise continue to the next step.
3. If a **1209** indicator is backlit, perform the following tests:
If an **ONTCCOM** is OOS or UNAV or has interrupts inhibited, repair via Procedure 11.3 .
If **all QLPSs** are OOS, repair **at least one QLPS** via Procedure 11.9 .
Otherwise continue to the next step.
4. If a **1241** or **1251** indicator is backlit, perform the following tests:
If on the identified MCC page, a **CMP** is OOS or UNAV or has interrupts inhibited, repair via Procedure 11.2 .
If on the identified MCC page, a **QGP** is OOS or UNAV or has interrupts inhibited, repair via Procedure 11.8 .
Otherwise continue to the next step.
5. If a **1242-1243** or **1252-1253** indicator is backlit, repair **MMPs** via Procedure 11.2 .
Otherwise continue to the next step.
6. If a **1209** indicator is backlit, **and** a **QLPS** is OOS, repair **QLPSs** via Procedure 11.9 .
Otherwise continue to the next step.
7. If a **1210** indicator is backlit, repair **NC XCs, NCREFs, OSCXCs** or **NCOSCs** via Procedure 11.4 .

Otherwise continue to the next step.

8. **NOTE:** If an NLI is identified, diagnose the NLI before proceeding. Segment 30 of phase 2 indicates a host TRCU3 failure, and segment 20 of phase 2 indicates a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 .
- If a DLI is identified, diagnose the DLI before proceeding. Segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,

If a **1221-1228** or **1231-1238** indicator is backlit, repair **TMSLNKs** (or their parent **DLIs** or **NLIs**) via Procedure 11.5 .

Otherwise continue to the next step.

9. If a **1380** or **1381** indicator is backlit, perform the following tests:

If on the identified MCC page, a **QTMSLNK** is OOS, go to Procedure 11.11 .

If on the identified MCC page, a **QGL** is OOS or the **QGPQPIPE OOS** indicator is backlit, go to Procedure 11.10 .

If on the identified MCC page, the **QPIPE/QLNK OFFNORMAL** indicator is backlit **and** an execution of the **OP:QNETSTAT,NOFE** command indicates a **MHQPIPE** is OOS, go to Procedure 11.12 .

If on the identified MCC page, the **QPIPE/QLNK OFFNORMAL** indicator is backlit **and** an execution of the **OP:QNETSTAT,NOFE** command indicates a **QLNK** or **ISMQLNK** is OOS, go to Procedure 11.13 .

Otherwise continue to the next step.

10. If a **1260** indicator is backlit, repair **CLNKs** via Procedure 11.7 .

Otherwise continue to the next step.

11. If a **1241** or **1251** indicator is backlit, **and** a **PPC** is OOS or UNAV or has interrupts inhibited, repair via Procedure 11.2 .

Otherwise return to Step 1, if the 115 MCC page still has off-normal indicators, or exit this procedure otherwise.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

11.1.3 ANALYSIS USING OFF-NORMAL STATUS

OVERVIEW

The third (and final) strategy to analyze CM problems is via off-normal reports associated with CM entities, noting these reports may be requested manually, and are produced automatically on an hourly basis. The manually requested input messages are:

- **OP:CFGSTAT,CM,OOS,UNAV,NOGRO,NOFE** produces a listing of all OOS or UNAV hardware units and CLNKs, which are **not** OOS due to parent hardware outages or CM hardware growth occurring in the office
- **OP:OFFNORM,CM** indicates all in-service CM hardware that have hardware checks **inhibited** (either

automatically or manually)

- **OP:QNETSTAT,NOFE** produces a listing of all OOS QGP QPIPEs, MH QPIPEs, QLNKs and ISMQLNKs, which **cannot** be attributed to parent hardware failures

Once a list of valid off-normal CM units is produced, examine the following list (Steps 1 through 17) and look for matches.

1. Order **unit types** to line up with the following list, and continue with the next step.
NOTE: The status requests used to start this analysis process (see Procedure 11.1.3) may be reexecuted at any time, this process can then be restarted.
2. If an off-normal **MSCU** is identified, go to Procedure 11.2 .
 Otherwise continue to the next step.
3. If an off-normal **FPC** is identified, go to Procedure 11.2 .
 Otherwise continue to the next step.
4. If an off-normal **ONTCCOM** is identified, go to Procedure 11.3 .
 Otherwise continue to the next step.
5. If an off-normal **CMP** is identified, go to Procedure 11.2 .
 Otherwise continue to the next step.
6. If an off-normal **QGP** is identified, go to Procedure 11.8 .
 Otherwise continue to the next step.
7. If an off-normal **MMP** is identified, go to Procedure 11.2 .
 Otherwise continue to the next step.
8. If an off-normal **QLPS** is identified, go to Procedure 11.9 .
 Otherwise continue to the next step.
9. If an off-normal **NC XC, NCREF, OSCXC, or NCOSC** is identified, go to Procedure 11.4 .
 Otherwise continue to the next step.
10. **NOTE:** If a DLI is identified, diagnose the DLI before proceeding. Segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,
 If an off-normal **TMSLNK**, or **DLI** is identified, go to Procedure 11.5 .
 Otherwise continue to the next step.
11. **NOTE:** If an NLI is identified, diagnose the NLI before proceeding. Segment 30 of phase 2

indicates a host TRCU3 failure, and segment 20 of phase 2 indicates a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15. Otherwise,

If an off-normal **NLI** is identified, go to Procedure 11.6.

Otherwise continue to the next step.

12. If an off-normal **QTMSLNK** is identified, go to Procedure 11.11.

Otherwise continue to the next step.

13. If an off-normal **QGL** or **QGPQPIPE** is identified, go to Procedure 11.10.

Otherwise continue to the next step.

14. If an off-normal **MHQPIPE** is identified, go to Procedure 11.12.

Otherwise continue to the next step.

15. If an off-normal **QLNK** or **ISMQLNK** is identified, go to Procedure 11.13.

Otherwise continue to the next step.

16. If an off-normal **CLNK** is identified, go to Procedure 11.7.

Otherwise continue to the next step.

17. If an off-normal **PPC** is identified, go to Procedure 11.2.

Otherwise re-execute the cited status requests, and, if any off-normal units are found, return to Step 1; if none are found, exit this procedure.

NOTE: If **all QGPs** or their parent **MSCUs** appear in the list in any combination (duplex/quadruplex failed QGPs), repair off-normal MSCUs first, followed by QGPs (Steps 2 and 6), before attempting to repair other units. Similarly, if **all QLPSs** or their parent **ONTCCOMs** appear on the list in any combination (quadruplex failed QLPSs), repair the OOS/UNAV MSCUs, FPCs, ONTCCOMs, and QLPSs first (Steps 2, 3, 4, and 8), in that order.

If one/more **MMPs** have an **OOS-AUTO-DFRIP** state, this indicates all MMPs serving the same SM are OOS/UNAV. Although this may not be a critical situation for SM/EXM-2000s, it should be handled with elevated priority. In this case, repair off-normal MSCUs first, followed by QGPs with OOS-AUTO-DFRIP states (Steps 2 and 7), before attempting to repair other units.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

11.1.4 CLEAR COMMUNICATION MODULE PROBLEMS

OVERVIEW

The following list of procedures is provided to clear all problems in the communication module (CM), **except** those units associated directly with the quad-link packet switch (QLPS) network (for QLPS problems see Procedure 11.1.5). Specifically, the following units are covered:

1. To clear problems in the message switch control unit (**MSCU**), see Procedure 11.2.

2. To clear problems in the foundation peripheral controller (**FPC**), see Procedure 11.2 .
3. To clear problems in the communication module processor (**CMP**), see Procedure 11.2 .
4. To clear problems in the module message processor (**MMP**), see Procedure 11.2 .
5. To clear problems in the pump peripheral controller (**PPC**), see Procedure 11.2 .
6. To clear problems in the office network and timing complex common (**ONTCCOM**), see Procedure 11.3 .
7. To clear problems in the network clock cross-couple (**NC XC**) or network clock reference (**NCREF**), see Procedure 11.4 .
8. To clear problems in the network clock oscillator (**NCOSC**) or oscillator cross-couple (**OSCXC**), see Procedure 11.4 .
9. To clear problems in the time-multiplex switch link (**TMSLNK**), see Procedure 11.5 .
10. **NOTE:** If a DLI is identified, diagnose the DLI before proceeding. Segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,

To clear problems in the dual link interface (**DLI**), see Procedure 11.5 .

11. **NOTE:** If an NLI is identified, diagnose the NLI before proceeding. Segment 30 of phase 2 indicates a host TRCU3 failure, and segment 20 of phase 2 indicates a remote TRCU3 failure. If either of these segments are indicated during a diagnostic, go to Procedure 11.15 . Otherwise,

To clear problems in the network link interface (**NLI**), see Procedure 11.6 .

12. To clear problems in the communication link (**CLNK**), see Procedure 11.7 .

NOTE: If the procedures to restore CM hardware units to an operational, normal state fail, it is possible to re-initialize the entire CM without re-initializing the AM. This feature is termed a **CM-only initialization**. **CM-only initialization** is available only in 5E12 and later software releases as a secured feature. This feature can be invoked **only** by an input message at the MCC or STLWS. The command syntax is as follows:

- (1) To perform a full initialization and optionally force the MSGS or ONTC to side 0 or 1, type and enter:

INIT:CM,FI,[ONTC=0|1],[MSGs=0|1]

- (2) To perform a selective initialization that preserves the active stable inter-SM calls, type and enter:

INIT:CM,SI

Note: No side forces are possible with this command.

Warning: *Inappropriate use of this command can result in unanticipated switch downtime and degraded service. Refer to 235-600-700 , Input Message Manual, and the 235-105-250 , System Recovery Manual, for more information about CM-only initialization.*

11.1.5 CLEAR QUAD LINK PACKET SWITCH NETWORK PROBLEMS

OVERVIEW

This list of procedures is provided to clear all problems in quad-link packet switch (QLPS) network (for other CM equipment units, see Procedure 11.1.4). Specifically, the following units are covered:

- To clear problems in the quad-link packet switch gateway processor (**QGP**), see Procedure 11.8 .
- To clear problems in the quad-link packet switch (**QLPS**), see Procedure 11.9 .
- To clear problems in the quad-link packet switch gateway link (**QGP**), see Procedure 11.10 .
- To clear problems in the QGP QLPS pipe (**QGPQPIPE**), see Procedure 11.10 .
- To clear problems in the QLPS time-multiplex switch link (**QTMSLNK**), see Procedure 11.11 .
- To clear problems in the message handler QLPS pipe (**MHQPIPE**), see Procedure 11.12 .
- To clear problems in the QLPS communication link (**QLNK**) or the inter-SM QLPS communication link (**ISMLNK**), see Procedure 11.13 .

BACKGROUND INFORMATION

The quad-link packet switch (QLPS) network is an optional overlay network that provides a high bandwidth, low latency transport mechanism for operating system for distributed switching (OSDS) messages. Message transport is provided between a switching module-2000 (SM-2000) and another SM-2000 or an SM-2000 and an existing switching module (SM) and the administrative module (AM), communication module processor (CMP), foundation peripheral controller (FPC), and direct link node (DLN).

The QLPS message transport between the message handler [MH (SM-2000)] and the QLPS gateway processor (QGP) endpoints requires the availability of QLPS logical links through the QLPS networks. In addition, the QLPS networks provide QLPS communication links (QLNKs), interswitching module QLPS communication links (ISMLNKs), and QLPS pipes (QPIPEs). This section describes each of these entities and their relationships.

If QGPs are equipped, there are 8 equipped QLNKs between the AM and each SM-2000, 4 QLNKs per network, 2 active and 2 standby. Each QLNK represents a different physical communication path between the AM and an SM-2000. Note that all messages to the AM/CMP/FPC/DLN must go through the QGPs to access the MSCU via the QLPS network.

The QLPS network provides four logical links for routing messages between the AM and an SM-2000. Under normal (fault free) conditions each logical link is assigned to a separate active QLNK.

When messages are sent between processors, the messages are distributed across the logical links for both networks to provide automatic load balancing between active QLPS network paths.

The QLPS network provides one logical link for routing messages between the CMP and an SM-2000. Under normal (fault free) conditions, this logical link is assigned to an active QLNK on the MSGS side with the ACT CMP.

The QLPS network provides one logical link for routing messages between the FPC and an SM-2000. Under normal (fault free) conditions, this logical link is assigned to an active QLNK on the MSGS side with the ACT FPC.

The QLPS network provides two logical link for routing messages between the DLN and an SM-2000. Under normal

(fault free) conditions, each logical link is assigned to an active QLNK on each MSGS side.

Between each pair of QLPS equipped SM-2000s, there are two equipped ISMQLNKs one per network. Each ISMQLNK represents a different physical communication path between the SM-2000s. The QLPS networks also provide two logical links between every pair of SM-2000s. These logical links are dynamically assigned to active ISMQLNKs by way of routing tables. Messages between SM-2000s are distributed across the logical links for both QLPS networks to once again provide automatic load balancing. If, due to fault conditions, the ISMQLNKs become unavailable communication between the two SM-2000s can use two QLNKs to communicate.

In order to establish communication with another endpoint on a QLPS network, an MH or QGP must first establish connectivity with the active QLPS for that network. The QPIPE is a logical entity representing the ability of a QLPS endpoint to establish connectivity with the active QLPS for a network. The QPIPE between a QGP and a QLPS is called a QGP QPIPE and is supported by the QGL hardware. The QPIPE between an SM-2000 and a QLPS is called an MH QPIPE and is supported by the QTMSLNK/TMSLNK/NLI/MH hardware. Before two endpoints can establish communication between them, the endpoints must both have an active QPIPE on the same network. If an endpoint does not have an active QPIPE on a network, the endpoint cannot establish communication to any other endpoint on that network. Therefore, the QPIPE is a logical parent of both the QLNK and ISMQLNK. The relationships between the QLNKs and QPIPEs for QLPS Network 0 for a dual QGP exchange configuration are shown in Figure 11.1.5-1. The relationships between ISMQLNKs and QPIPEs for Network 0 are shown in Figure 11.1.5-2.

When an SM-2000 experiences loss of connectivity with a QLPS network due to an MH QPIPE, QLNK or ISMQLNK troubles, an appropriate SM-2000 status phrase (Table 11.1.5-1) is shown on the SM status pages displayed on the master control center (MCC) terminal. The status phrase may be displayed if the QPIPE/QLNK/ISMQLNK problems are associated with out-of-service (OOS) hardware or the hardware may be in service.

Table 11.1.5-1 SM-2000 Status Phrases for MH QPIPES, QLNKS, and ISMQLNKS

STATUS PHRASE	COLOR OF PHRASE/BOX	DESCRIPTION
QLPS ISOL	Red/White	SM-2000 lost MH QPIPES to the active QLPS for both networks.
QPIPE OOS	Black/Cyan	SM-2000 lost MH QPIPE to the active QLPS for one network.
QLNK LOST	Black/Cyan	SM-2000 lost all QLNKS (if QGPs are equipped) or ISMQLNKs (if QGPs are not equipped).
QLNK OFFN	Black/Cyan	SM-2000 lost some but not all QLNKS or ISMQLNKS for one or both networks.

Off-normal summary indicators are displayed on the 1380/1381 - QLPS NETWORK 0/1 STATUS pages. These indicators may be displayed if the QPIPE/QLNK/ISMQLNK problems are associated with OOS hardware or the hardware may be in service. Loss of connectivity due to a QGP QPIPE is displayed on 1380/1381 pages. The QGP QPIPE status of QPIPE OOS is only displayed when a QPIPE problem is associated with in-service QGL hardware. The QPIPE OOS indicator is not displayed when the parent QGL hardware is OOS, since a QPIPE loss of connectivity would be expected in this case.

The QLPS networks provide autonomous recovery capability for all QGP QPIPES, MH QPIPES, QLNKS, and ISMQLNKs as long as the hardware associated with these units is in service.

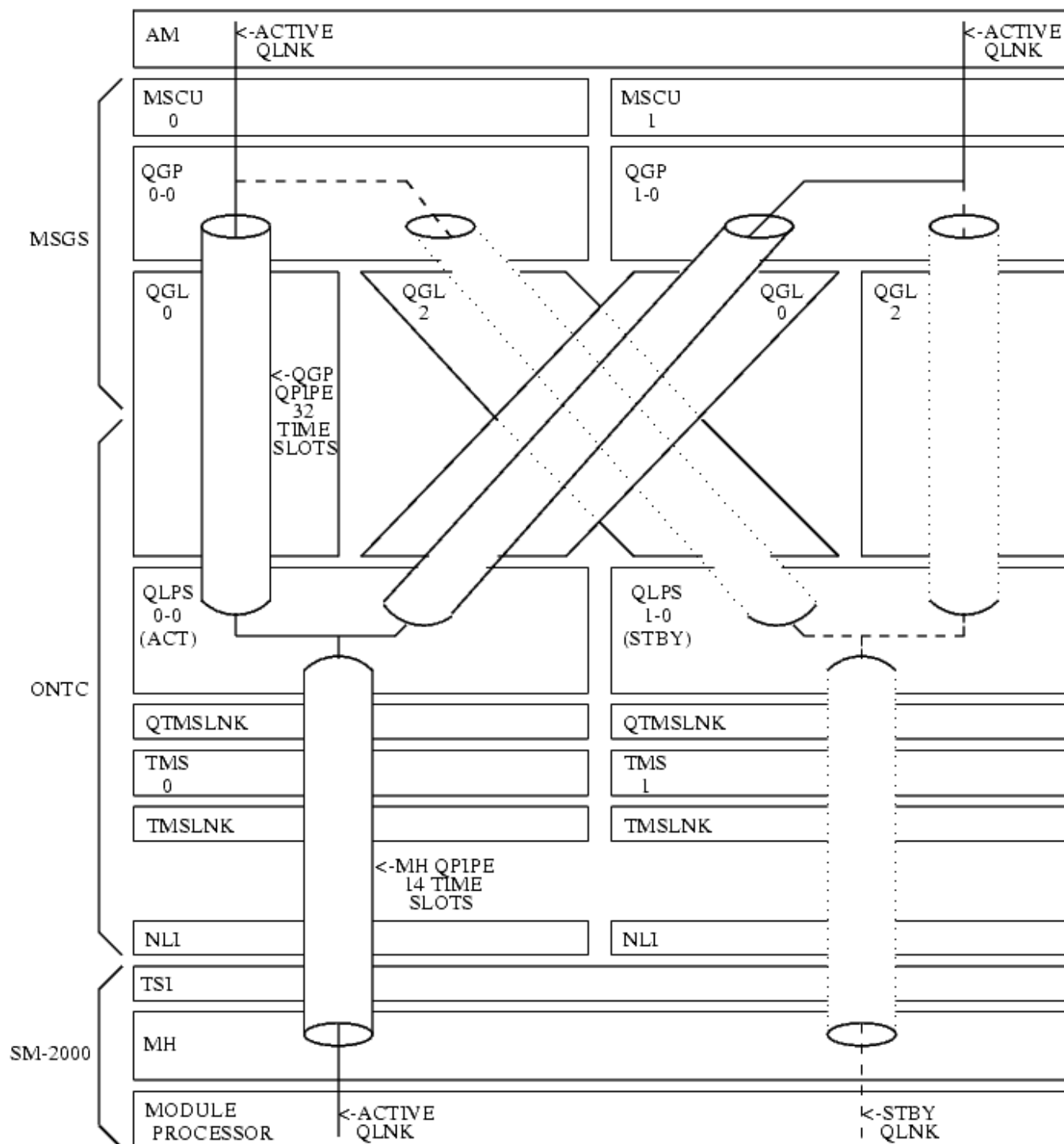


Figure 11.1.5-1 QLNK and QPIPE Relationships for QLPS Network 0 (2 QGP Configuration)

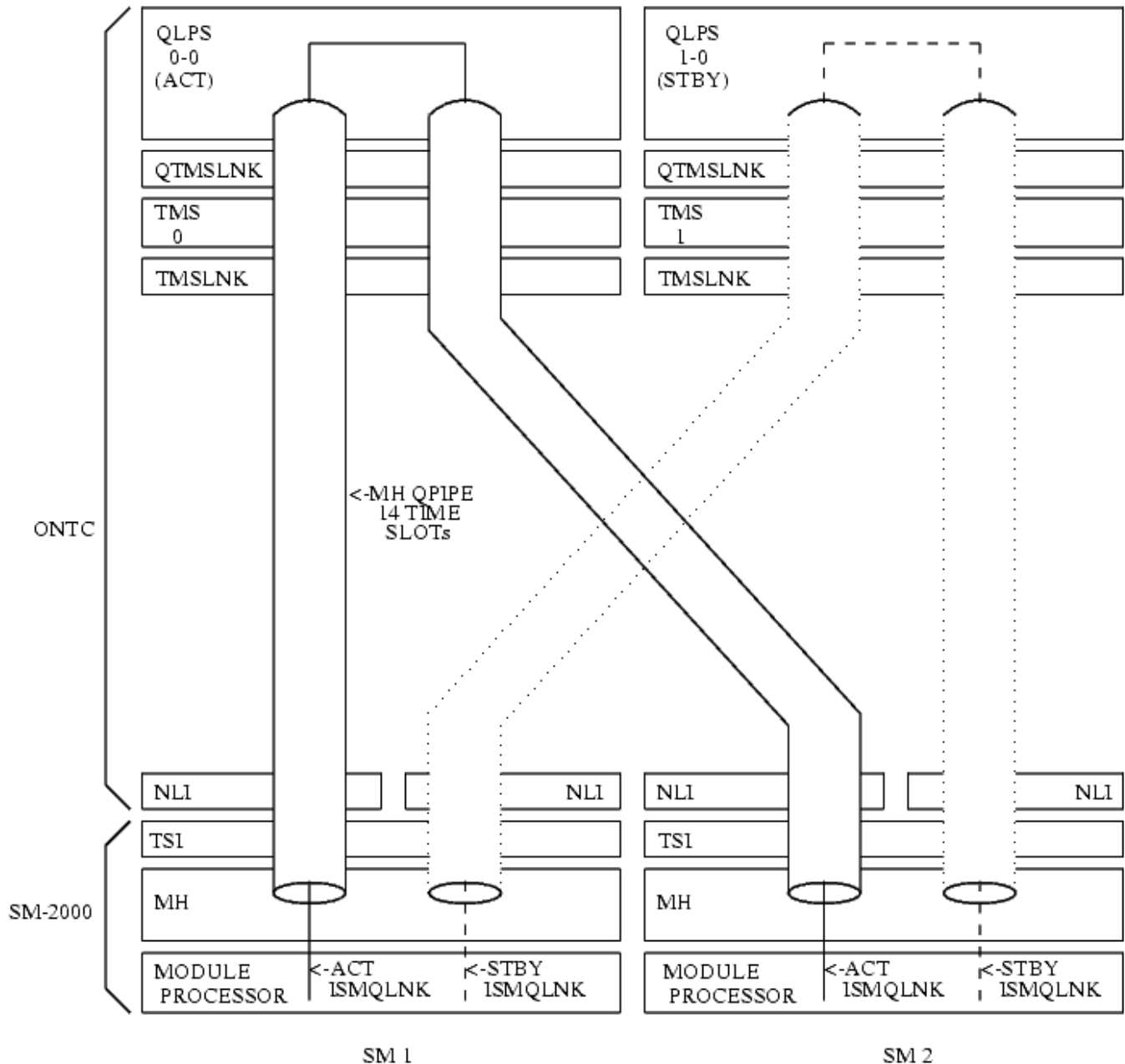


Figure 11.1.5-2 ISMQLNKs and QPIPE Relationships for QLPS Network 0 (QGP Independent)

1. If the parent hardware is OOS, perform the procedures to diagnose and restore the units.
2. If the **QLNK(s)/MH QPIPE OOS** indicator, the SM-2000 status phrase indicators for QPIPE/QLNKs, or the **QPIPE OOS** indicator for QGP QPIPEs is being continuously displayed as previously described, the QGP QPIPEs, MH QPIPEs, QLNKs, or ISMQLNKs are not being successfully restored by way of autonomous recovery. In this case, the OP:QNETSTAT output report should be requested from the 1380 - QLPS NETWORK 0 STATUS page or the 1381 - QLPS NETWORK 1 STATUS page by way of the **940** and **941** menu commands.

NOTE: This report indicates the state of the MH QPIPEs, QGP QPIPEs, QLNKs, and ISMQLNKs for the

associated QLPS network.

Procedure 11.2: CLEAR MESSAGE SWITCH PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in the message switch (MSGS), except the quad-link gateway processor (QGP). Specifically, the following units are covered:

- (a) Message switch control unit (MSCU)
- (b) Foundation peripheral controller (FPC)
- (c) Pump peripheral controller (PPC)
- (d) Communication module processor (CMP)
- (e) Module message processor (MMP).

PROCEDURE

1. Based upon the unit to be repaired, perform the following actions:
 - If **MSCU 0** is to be repaired, bring up MCC page **1240**, continue with the next step
 - If **MSCU 1** is to be repaired, bring up MCC page **1250**, continue with the next step
 - If a **FPC, PPC** or **CMP** is to be repaired, go to Step 18.
 - If a **MMP** is to be repaired, go to Step 52. Otherwise, return to Procedure 11.1 to evaluate other CM units.
2. Is the MSCU in an out-of-service (OOS) or unavailable (UNAV) state?
 - If **YES**, go to Step 6.
 - If **NO**, continue with the next step.
3. Are hardware checks inhibited on the MSCU ?
 - If **YES**, continue with the next step.
 - If **NO**, return to Procedure 11.1 to evaluate other CM units.
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: Hardware checks for the MSCU 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, then return to Procedure 11.1 to reevaluate the 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**, continue with Step 7.

If the state is **OOS-AUTO-RMV**, go to Step 14.

If the state is **OOS-MAN-DGN**, go to Step 10.

If the state is **OOS-AUTO-DGN**, go to Step 10.

If the state is **OOS-MAN-EX**, go to Step 10.

If the state is **OOS-MAN-REX**, go to Step 10.

If the state is **OOS-AUTO-REX**, go to Step 10.

If the state is **OOS-MAN-TEMP**, go to Step 15.

If the state is **OOS-MAN-FLT**, go to Step 9.

If the state is **OOS-AUTO-FLT**, go to Step 9.

If the state is **OOS-AUTO-TBLA**, go to Step 11.

If the state is **OOS-AUTO-PWRALM**, go to Step 12.

If the state is **UNAV-MAN-PWROFF**, go to Step 13.

If the state is **UNAV-FRCD-RMV**, go to Step 18.

If the state is **UNAV-FRCD-PWROFF**, go to Step 13.

If the state is **UNAV-FRCD-DGN**, go to Step 10.

If the state is **UNAV-FRCD-EX**, go to Step 10.

If the state is **UNAV-FRCD-TEMP**, go to Step 15.

If the state is **UNAV-FRCD-FLT**, go to Step 16.

If the state is **UNAV-FRCD-PWRALM**, go to Step 12.

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**, return to Step 1.

If **NO**, return to Step 6.

9. The MSCU is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit.

NOTE: If Procedure 3.1 is successful in repairing the MSCU, then restart this Procedure 11.2. If Procedure 3.1 is **not** successful in repairing the MSCU, then go to Procedure 11.1 to evaluate other CM units.

10. 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.
11. The MSCU is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedures.
12. The MSCU has lost power autonomously. Refer to power repair guidelines in Procedure 6.1 . Once the problem is resolved, return to Step 2.
13. The MSCU has been manually powered off. Power up the MSCU at the corresponding control and display pack, and then return to Step 6.
14. 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, return to Step 7.

If the MSCU is in queue, wait for diagnostics to complete, return to Step 1.

15. The MSCU is being utilized as a "helper unit" to execute diagnostics tests for other hardware. When the diagnostic testing is complete, the state of the MSCU changes. Once the diagnostic completes, return to Step 2.
16. The forced unavailable MSCU is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When the repair is complete, return to Step 1.
17. The MSCU has been forced unavailable. To clear the force, use the clear force **poke 402** or the **"clr:fr,mscu"** command, and then return to Step 6.
18. To repair a **FPC, PPC** or **CMP**, if MCC Page **1241** or **1251** is not already displayed, perform the following actions before continuing to the next step.

If a **FPC, PPC** or **CMP** on **MSG 0** is to be repaired, go to MCC page **1241**.

If a **FPC, PPC** or **CMP** on **MSG 1** is to be repaired, go to MCC page **1251**.

19. Decide on the unit type to be repaired, specifically:
 - If a **FPC** or **PPC** is to be repaired, go to Step 36
 - If a **CMP** is to be repaired, continue with the next step.
20. Is the CMP in an OOS, UNAV or INIT state?
 - If **YES**, go to Step 26.
 - If **NO**, continue with the next step.
21. Is the mate CMP in a failed recent change backup state?
 - If **YES**, go to Procedure 11.14 .
 - If **NO**, continue with the next step.
22. Are CMP hardware checks inhibited?

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

If **NO**, return to Procedure 11.1 to reevaluate status of other CM units.

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: CMP hardware checks are inhibited automatically only after an automatic AM/CMP 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 to Step 21.

If the decision is made to leave hardware checks inhibited, then return to Procedure 11.1 to reevaluate the 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**, continue with Step 26.

If the state is **OOS-DACT-RMV**, continue with Step 26.

If the state is **OOS-AUTO-RMV**, go to Step 34.

If the state is **OOS-MAN-DGN**, go to Step 30.

If the state is **OOS-AUTO-DGN**, go to Step 30.

If the state is **OOS-MAN-EX**, go to Step 30.

If the state is **OOS-MAN-REX**, go to Step 30.

If the state is **OOS-AUTO-REX**, go to Step 30.

If the state is **OOS-MAN-FLT**, go to Step 28.

If the state is **OOS-AUTO-FLT**, go to Step 28.

If the state is **OOS-AUTO-PWRALM**, go to Step 32.

If the state is **OOS-AUTO-TBLA**, go to Step 31.

If the state is **OOS-MAN-FE**, go to Step 35.

If the state is **OOS-AUTO-FE**, go to Step 35.

If the state is **UNAV-MAN-PWROFF**, go to Step 33.

If the state is **INIT-NUL-NULL**, see Note.

If the state is **INIT-DACT-NUL**, see Note.

NOTE: The INIT-NUL-NULL and INIT-DACT-NUL states are transient, used while the CMP is being initialized. Allow the recovery to complete, and return to Step 20.

26. Restore the CMP that was removed using MCC **poke 3yy** or the "**rst:cmp=x-yy**" command (where x =

MSG side and yy = CMP number).

27. Did the CMP restore successfully ?

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

If **NO**, go to Step 25.

28. The CMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 . to repair the unit, and then continue with the next step.

29. Did Procedure 3.1 result in the successful restoral of the CMP?

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

If **NO**, return to Procedure 11.1 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 procedures.

32. The CMP has lost power autonomously. Refer to power repair guidelines in Procedure 6.1 . 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, return to Step 26.

If the CMP is in the queue, return to Step 21, after diagnostics complete.

35. The CMP is in the OOS family of equipment (OOSF) state, which indicates the parent MSCU is OOS or UNAV. Return to Procedure 11.1 to evaluate the parent MSCU.

36. Is the FPC (or PPC) in an OOS or UNAV state?

If **YES**, go to Step 40.

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

37. Are FPC (or PPC) hardware checks inhibited?

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

If **NO**, return to Procedure 11.1 to evaluate other CM units.

38. Use MCC **poke 94x**, (or **95x**, or the "**op:cfgstat,fpc=x**" (or "**op:cfgstat,ppc=x**") command (where x = MSG side) to determine if hardware checks were manually or automatically inhibited.

NOTE: FPC and 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, use **poke 74x** (or **75x**), or the **"alw:hdwchk,fpc=x"** (or **"alw:hdwchk,ppc=x"**) command (where x = MSGS side), and then return to Step 36.

If the decision is made to leave hardware checks inhibited, then return to Procedure 11.1 to reevaluate the 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**, continue with Step 41.

If the state is **OOS-AUTO-RMV**, go to Step 49.

If the state is **OOS-MAN-DGN**, go to Step 45.

If the state is **OOS-AUTO-DGN**, go to Step 45.

If the state is **OOS-MAN-EX**, go to Step 45.

If the state is **OOS-MAN-REX**, go to Step 45.

If the state is **OOS-AUTO-REX**, go to Step 45.

If the state is **OOS-MAN-TEMP**, go to Step 51.

If the state is **OOS-AUTO-TEMP**, go to Step 51.

If the state is **OOS-MAN-FLT**, go to Step 43.

If the state is **OOS-AUTO-FLT**, go to Step 43.

If the state is **OOS-AUTO-PWRALM**, go to Step 47.

If the state is **OOS-AUTO-TBLA**, go to Step 46.

If the state is **OOS-MAN-FE**, go to Step 50.

If the state is **OOS-AUTO-FE**, go to Step 50.

If the state is **UNAV-MAN-PWROFF**, go to Step 48.

41. Restore the FPC (or PPC), that was removed, by using MCC **poke 34x** (or **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**, go to Step 37.

If **NO**, go to Step 40.

43. The FPC or PPC is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.

44. Did Procedure 3.1 result in the successful restoral of the FPC or PPC?

If **YES**, return to Step 37.

If **NO**, return to Procedure 11.1 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 procedures.
47. The combined FPC/PPC community has lost power autonomously. Refer to power repair guidelines in Procedure 6.1. 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, return to Step 36.

50. The FPC or PPC is in the OOS family of equipment (OOSF) state, which indicates the parent MSCU is OOS or UNAV. Return to Procedure 11.1 to evaluate the parent MSCU.
51. The FPC or PPC is being utilized as a "helper unit" to execute diagnostics tests for other hardware. When the diagnostic testing is complete, the state of the FPC/PPC changes. Once the diagnostic completes, return to Step 36.
52. To repair a **MMP**, if MCC page **1242**, **1243**, **1252** or **1253** is **not** already displayed, determine the MMP community of interest/MCC page from the following algorithm before continuing to the next step.

For **MMP 0-X (where X = 0 to 23)**, go to **MCC page 1242**.

For **MMP 0-X (where X = 24 to 47)**, go to **MCC page 1243**.

For **MMP 1-X (where X = 0 to 23)**, go to **MCC page 1252**.

For **MMP 1-X (where X = 24 to 47)**, go to **MCC page 1253**.

53. Are there any MMPs in an OOS or UNAV state?

If **YES**, go to Step 57.

If **NO**, continue with Step 54.

54. Are any MMP hardware checks inhibited?

If **YES**, continue with Step 55.

If **NO**, return to Procedure 11.1 to reevaluate CM hardware status.

55. 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: MMP hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated, or during duplex/quadruplex fail recovery.

56. 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 53.

If the decision is made to leave hardware checks inhibited, then return to Procedure 11.1 to reevaluate the status of other CM units.

57. 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**, continue with Step 58.

If the state is **OOS-AUTO-RMV**, go to Step 66.

If the state is **OOS-MAN-DGN**, go to Step 62.

If the state is **OOS-AUTO-DGN**, go to Step 62.

If the state is **OOS-MAN-EX**, go to Step 62.

If the state is **OOS-MAN-REX**, go to Step 62.

If the state is **OOS-AUTO-REX**, go to Step 62.

If the state is **OOS-MAN-FLT**, go to Step 60.

If the state is **OOS-AUTO-FLT**, go to Step 60.

If the state is **OOS-AUTO-PWRALM**, go to Step 64.

If the state is **OOS-AUTO-TBLA**, go to Step 63.

If the state is **OOS-UNEQ-NULL**, go to Step 67.

If the state is **OOS-GROW-XXX**, go to Step 68.

If the state is **OOS-MAN-FE**, go to Step 69.

If the state is **OOS-AUTO-FE**, go to Step 69.

If the state is **OOS-MAN-TEMP**, go to Step 70.

If the state is **OOS-AUTO-TEMP**, go to Step 70.

If the state is **OOS-MAN-MIP**, go to Step 71.

If the state is **OOS-AUTO-MIP**, go to Step 71.

If the state is **OOS-AUTO-DFRIP**, see Note and go to Step 58.

If the state is **UNAV-MAN-PWROFF**, go to Step 65.

NOTE: The OOS-AUTO-DFRIP state only occurs when a group of MMPs serving the same SM cannot be restored (periodic restoral attempts occur, but usually 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).

58. 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).
59. Did the MMP restore successfully?
If **YES**, go to Step 54.
If **NO**, go to Step 57.
60. The MMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.
61. Did Procedure 3.1 result in the successful restoral of the MMP?
If **YES**, return to Step 54.
If **NO**, return to Procedure 11.1 to evaluate other CM units.
62. 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 53.
63. The MMP is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedures.
64. The MMP community has lost power autonomously. Refer to power repair guidelines in Procedure 6.1 . Once the problem is resolved, return to Step 53.
65. 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 53.
66. 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, return to Step 58.
If the MMP is on the queue, wait for the diagnostics to complete, then return to Step 53.
67. The MMP is unequipped. No further action can be performed. Return to Step 52, and analyze **another** MMP.
68. The MMP is in a growth state. Refer to the MMP growth procedures (applicable 555A Installation Handbook), then return to Step 53, and analyze **another** MMP.
69. The MMP is in the OOS family of equipment (OOSF) state, which indicates the parent MSCU is OOS or UNAV. Return to Procedure 11.1 to evaluate the parent MSCU.
70. The MMP is being utilized as a "helper unit" to execute diagnostics tests for other hardware. When the diagnostic testing is complete, the state of the MMP changes. Once the diagnostic completes, return to Step 53.
71. 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.
72. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.3: CLEAR OFFICE NETWORK AND TIMING COMPLEX COMMON PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear critical problems in the office network and timing control common (ONTCCOM).

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**, go to Step 7.

If **NO**, continue with Step 3.
3. Are hardware checks inhibited on an ONTC?

If **YES**, go to Step 5.

If **NO**, continue with Step 4.
4. Are any QLPSs in an OOS state?

If **YES**, go to Procedure 11.9 .

If **NO**, return to Procedure 11.1 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: 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, then return to Procedure 11.1 to reevaluate the 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**, continue with Step 8.

If the state is **OOS-AUTO-RMV**, go to Step 10.

If the state is **OOS-AUTO-DGN**, go to Step 13.

If the state is **OOS-MAN-DGN**, go to Step 13.

If the state is **OOS-MAN-EX**, go to Step 13.

If the state is **OOS-AUTO-REX**, go to Step 13.

If the state is **OOS-MAN-REX**, go to Step 13.

If the state is **OOS-MAN-TEMP**, go to Step 19.

If the state is **OOS-AUTO-TEMP**, go to Step 19.

If the state is **OOS-AUTO-FLT**, go to Step 11.

If the state is **OOS-MAN-FLT**, go to Step 11.

If the state is **OOS-AUTO-PWRALM**, go to Step 15.

If the state is **OOS-AUTO-TBLA**, go to Step 14.

If the state is **OOS-AUTO-DFRIP**, see the following **Note**.

If the state is **UNAV-MAN-PWROFF**, go to Step 16.

If the state is **UNAV-FRCD-RMV**, go to Step 17.

If the state is **UNAV-FRCD-DGN**, go to Step 13.

If the state is **UNAV-FRCD-EX**, go to Step 13.

If the state is **UNAV-FRCD-FLT**, go to Step 18.

If the state is **UNAV-FRCD-PWROFF**, go to Step 16.

If the state is **UNAV-FRCD-PWRALM**, go to Step 15.

NOTE: The OOS-AUTO-DFRIP state only occurs when both ONTCCOM 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**, return to Step 3.

If **NO**, return to Step 7.

NOTE: If a FPC is OOS/UNAV, it cannot be used as a "helper unit" for the ONTCCOM diagnostic. Return to Procedure 11.2 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, return to Step 2.

11. The ONTCCOM is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the

unit.

NOTE: If the ONTCCOM is restored, then restart this procedure at Step 3. If the ONTCCOM is not restored, then go to Procedure 11.1 to evaluate other CM units.

12. 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.
13. The ONTCCOM is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
14. The ONTCCOM or one of its shelf units has lost power autonomously (probably a "blown fuse"). Refer to power repair guidelines in Procedure 6.1. Once the problem is resolved, return to Step 2.
15. The ONTCCOM or one of its shelf units has been manually powered down (powered off). Power up the ONTCCOM/shelf unit at the corresponding control and display pack, and then return to Step 2.
16. 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.
17. The forced unavailable ONTCCOM is faulty. Find the most recent printed TLP list on the ROP, and use Procedure 3.1 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When the repair is complete, return to Step 2.
18. The ONTCCOM is being utilized as a "helper unit" to execute diagnostics tests for other hardware. When the diagnostic testing is complete, the ONTCCOM state will change. Once the diagnostic completes, return to Step 2.
19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.4: CLEAR NETWORK CLOCK PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear non-critical problems in the network clock (NC). Specifically, the following units are covered:

- (1) network clock cross-couples (NC XC)
- (2) network clock references (NC REF)
- (3) oscillator cross-couples (OSCXC)
- (4) network clock oscillator (NCOSC)

PROCEDURE

1. Go to the **1210** MCC page, and continue to the next step.
2. Is a NC cross couple (XC) in an OOS state?

If **YES**, continue with Step 3.

If **NO**, 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 the **91x poke** or the "**op:cfgstat,ncref,nc=x**" (where x = NC XC number).

If the state is **OOS-MAN-RMV**, continue with Step 4

If the state is **OOS-AUTO-FE**, go to Step 6.

If the state is **OOS-MAN-FE**, go to Step 6.

If the state is **OOS-AUTO-FLT**, go to Step 7.
4. The NC XC has been manually removed and can be restored by using the **31x poke**, or the "**rst:ncref,xc=x**" command (where x = NC XC number).
5. Did the NC XC restore successfully?

If **YES**, go to Step 10.

If **NO**, 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 11.3 to repair the parent ONTCCOM.
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 3.1 to repair the unit, and then continue to the next step.
8. Did Procedure 3.1 result in the successful restoral of the ONTCCOM?

If **YES**, continue with Step 9.

If **NO**, return to Procedure 11.1 to evaluate other CM units.

9. Did the NC XC restore successfully?

If **YES**, continue with Step 10.

If **NO**, **seek technical assistance** according to local procedure.

10. Choose one of the branches below, dependent upon the vintage of the NC in the office (NC1 or NC2).
(NC1 Only) Is the "T1" box backlit?

If **YES**, continue with Step 11.

If **NO**, return Procedure 11.1 and evaluate other CM units.

(NC2 Only) Is the "SEE PAGE 1211" box backlit?

If **YES**, bring up MCC page **1211**, go to Step 19.

If **NO**, return to Procedure 11.1 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**, continue with Step 14.
- If **NO**, go to Step 16.
14. (NC1 Only) The T1 carrier reference (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**, return to Procedure 11.1 to reevaluate CM hardware status.
- If **NO**, continue with Step 16.
16. (NC1 Only) The T1 carrier reference (NCREF) interface is nonfunctional, which could be due to a latent fault in the NC. Diagnose that NC via a **52x poke**, 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**, continue with Step 18.
- If **NO**, gather TLP data, go to Procedure 3.1 to repair the NC. Upon completion of repairs, return to Procedure 11.1 to reevaluate status of all CM units.
18. (NC1 Only) Restore the ONTCCOM unconditionally, by using the **30x,ucl poke** 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 a NC reference backlit?

If **YES**, continue with Step 20.

If **NO**, 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 a NC reference, which is OOS, by using the **32x poke**, or the "**rst:ncref,refx**" command (where refx = the OOS NC reference number).

22. (NC2 Only) Did the NC reference restore successfully?

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

If **NO**, **seek technical assistance** according to local procedure.

23. (NC2 Only) Is an NC oscillator cross-couple (OSCXC) in an OOS state?

If **YES**, continue with Step 24.

If **NO**, return to Procedure 11.1 to reevaluate CM hardware status.

24. (NC2 Only) Attempt to restore the NC OSCXC, which is OOS, by using the **34x poke**, or the "**rst:oscxc=x**" command (where x = number of the OOS OSCXC).

25. (NC2 Only) Did the OSCXC restore successfully?

If **YES**, go to Step 23.

If **NO**, continue with Step 26.

26. (NC2 Only) Is a NC oscillator (NCOSC) in an OOS or UNAV state?

If **YES**, continue with Step 27.

If **NO**, return to Procedure 11.1 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), continue with Step 28.

If the NCOSC is in any other OOS state, 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 11.1 to reevaluate the status of other CM units.

29. (NC2 Only) Attempt to restore the NCOSC by using the **33x poke**, or the "**rst:ncosc=x**" command (where x = ONTC side).

30. (NC2 Only) Did the NCOSC restore successfully?

If **YES**, return to Procedure 11.1 to reevaluate other CM units.

If **NO**, **seek technical assistance** according to local procedure.

Procedure 11.5: CLEAR DUAL LINK INTERFACE PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in a SM dual link interface (DLI), and its associated time multiplexed switch links (TMSLNKs).

PROCEDURE

1. If a specific **DLI** is to be repaired, go to MCC page **1200,x** (DLI summary, where x = SM number), and then go to Step 8.

Otherwise, go to MCC Page **115**, note the MCC page number inside the TMSLNK box that is off-normal (backlit), enter the number for that box, and continue to the next step.

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**, continue with Step 4

If **NLI**, go to Procedure 11.6 to evaluate **this SM-2000**.

4. Is the SM summary box, associated with a pair of TMSLNKs, backlit (indicating the parent DLI is OOS)?

If **YES**, go to Step 8.

If **NO**, 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**, go to Step 1.

If **NO**, 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 number) to determine the equipment status.

If the parent ONTCCOM is OOS/UNAV, return to Procedure 11.3 to repair the parent ONTCCOM.

If the parent ONTCCOM is ACT/DGR, continue with Step 8.

8. Is the associated DLI OOS?

If **YES**, continue with Step 9.

If **NO**, 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 **OOS-MAN-RMV**, continue with Step 10.

If **OOS-AUTO-RMV**, go to Step 12.

If **OOS-AUTO-DGN**, go to Step 15.

If **OOS-MAN-DGN**, go to Step 15.

If **OOS-MAN-EX**, go to Step 15.

If **OOS-AUTO-REX**, go to Step 15.

If **OOS-MAN-REX**, go to Step 15.

If **OOS-AUTO-FLT**, go to Step 13.

If **OOS-MAN-FLT**, go to Step 13.

If **OOS-AUTO-PWRALM**, go to Step 17.

If **OOS-AUTO-TBLA**, go to Step 16.

If **OOS-MAN-FE**, go to Step 19.

If **OOS-AUTO-FE**, go to Step 19.

If **UNAV-MAN-PWROFF**, 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**, return to Procedure 11.1 to evaluate other CM units.

If **NO**, go to Step 9.

12. The DLI was 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 DLI is not on the queue, return to Step 10.

If the DLI is on the queue, wait for diagnostics to complete, return to Step 8.

13. The DLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.

14. Did Procedure 3.1 result in the successful restoral of the DLI?
If **YES**, return to Step 1.
If **NO**, return to Procedure 11.1 to evaluate 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 (probably a "blown fuse"). Refer to power repair guidelines in Procedure 6.1 . Once the problem is resolved, return to Step 1.
18. The DLI has been manually powered down (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 11.3 to repair the parent ONTCCOM.
20. Diagnose/restore the DLI with the OOS TMSLNK by using Procedure 3.1 , and then continue to the next step.
21. Did Procedure 3.1 result in the successful restoral of the DLI?
If **YES**, go to Step 22.
If **NO**, return to Procedure 11.1 to evaluate other CM units.
22. Did the child TMSLNK restore successfully ?
If **YES**, continue with Step 23
If **NO**, **seek technical assistance** according to local procedure.
23. Are any TMSLNK boxes still indicating an off-normal condition?
If **YES**, return to Step 1.
If **NO**, return to Procedure 11.1 to evaluate other CM units.
24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.6: CLEAR NETWORK LINK INTERFACE PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in a SM-2000 network link interface (NLI), and its associated time multiplexed switch links (TMSLNKs).

PROCEDURE

1. If a specific **NLI** is to be repaired, go to MCC page **1200,x** (NLI summary, where x = SM number), and then go to Step 8.

Otherwise, go to MCC Page **1151**, note the MCC page number inside the TMSLNK box that is off-normal (backlit), enter the number for that box, and continue to the next step.

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**, continue to Step 4.

If **DLI**, go to Procedure 11.5 to evaluate **this SM**.

4. Is the SM summary box, associated with a pair of TMSLNKs for SM-2000s or a single TMSLNK for EXM-2000s, backlit (indicating the parent NLI is OOS)?

If **YES**, go to Step 8.

If **NO**, 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**, go to Step 1.

If **NO**, 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-2000 number) to determine the equipment status.

If the parent ONTCCOM is OOS/UNAV, return to Procedure 11.3 to repair that ONTCCOM.

If the parent ONTCCOM is ACT/DGR, continue with Step 8.

8. Is the associated NLI OOS?

If **YES**, continue with Step 9.

If **NO**, 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**, continue with Step 10.

If the state is **OOS-AUTO-RMV**, go to Step 12.

If the state is **OOS-AUTO-DGN**, go to Step 15.

If the state is **OOS-MAN-DGN**, go to Step 15.

If the state is **OOS-MAN-EX**, go to Step 15.

If the state is **OOS-AUTO-REX**, go to Step 15.

If the state is **OOS-MAN-REX**, go to Step 15.

If the state is **OOS-AUTO-FLT**, go to Step 13.

If the state is **OOS-MAN-FLT**, go to Step 13.

If the state is **OOS-AUTO-TBLA**, go to Step 16

If the state is **OOS-MAN-FE**, go to Step 17.

If the state is **OOS-AUTO-FE**, 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**, return to Procedure 11.1 to reevaluate other CM units.

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

If the NLI is on the queue, wait for the diagnostics to complete, return to Step 8.

13. The NLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.

14. Did Procedure 3.1 result in the successful restoral of the NLI?

If **YES**, return to Step 1.

If **NO**, return to Procedure 11.1 to evaluate 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 11.3 to repair that parent ONTCCOM.
18. Diagnose/restore the NLI with the OOS TMSLNK by using Procedure 3.1, and then continue to the next step.
19. Did Procedure 3.1 result in the successful restoral of the NLI?

If **YES**, go to Step 20.

If **NO**, return to Procedure 11.1 to evaluate other CM units.

20. Did the child TMSLNK restore successfully ?

If **YES**, continue with Step 21.

If **NO**, **seek technical assistance** according to local procedure.

21. Are any TMSLNK boxes still indicating an off-normal condition?

If **YES**, return to Step 1.

If **NO**, return to Procedure 11.1 to evaluate other CM units.

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

Procedure 11.7: CLEAR COMMUNICATION LINK PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in a communication links (CLNKs).

PROCEDURE

1. If CLNKs on a **specific** SM/SM-2000 are to be recovered, enter **poke 1900,x** (where x = SM/SM-2000 number), and go to Step 3.

Otherwise go to the CLNK MAP display page, by entering **poke 1260**, and continue to the next step.

2. 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).
3. 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).

NOTE: If there are any other CM units out of service, repair those OOS units before attempting to restore CLNKs.

4. Did the CLNK restore successfully?

If **YES**, return Procedure 11.1, to evaluate other CM units.

If **NO**, **seek technical assistance** according to local procedure.

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

Procedure 11.8: CLEAR QUAD LINK GATEWAY PROCESSOR PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in a quad link gateway processor (QGP).

PROCEDURE

1. If QGPs on **MSGS 0** are to be repaired, go to MCC page **1241**; for **MSGS 1** QGPs, go to MCC page **1251**. Are any QGPs on the displayed page in an OOS or UNAV state?

If **YES**, go to Step 5.

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

2. Are there any QGPs with hardware checks inhibited?

If **YES**, continue with Step 3.

If **NO**, return to the **calling Procedure 11.1** to reevaluate status of other CM units.

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: 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 the **calling Procedure 11.1** 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**, continue with Step 6.

If the state is **OOS-AUTO-RMV**, go to Step 14.

If the state is **OOS-MAN-DGN**, go to Step 10.

If the state is **OOS-AUTO-DGN**, go to Step 10.

If the state is **OOS-MAN-EX**, go to Step 10.

If the state is **OOS-MAN-REX**, go to Step 10.

If the state is **OOS-AUTO-REX**, go to Step 10.

If the state is **OOS-MAN-FLT**, go to Step 8.

If the state is **OOS-AUTO-FLT**, go to Step 8.

If the state is **OOS-AUTO-DFRIP**, see Note and go to Step 6.

If the state is **OOS-AUTO-PWRALM**, go to Step 12.

If the state is **OOS-AUTO-TBLA**, go to Step 11.

If the state is **OOS-UNEQ-NULL**, go to Step 15.

If the state is **OOS-GROW-XXX**, go to Step 16.

If the state is **OOS-MAN-FE**, go to Step 17.

If the state is **OOS-AUTO-FE**, go to Step 17.

If the state is **OOS-MAN-MIP**, go to Step 18.

If the state is **OOS-AUTO-MIP**, go to Step 18.

If the state is **UNAV-MAN-PWROFF**, go to Step 13.

NOTE: The OOS-AUTO-DFRIP state only occurs when no QGPs can be restored (periodic restoral attempts will 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, and a stable OOS-MAN-FLT state, suitable for further analysis).

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**, go to Step 1.
 - If **NO**, go to Step 5.
8. The QGP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.
9. Did Procedure 3.1 result in the successful restoral of the QGP?
 - If **YES**, return to Step 1
 - If **NO**, return to the **calling Procedure 11.1 to evaluate other CM units.**
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 Procedure 6.1 . 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, return to Step 6

If the QGP is on the queue, wait for the diagnostics to complete, 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), 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. Go to Procedure 11.2 to repair the parent MSCU.
18. The QGP is being pumped/restarted (maintenance in progress), which should only take several seconds to complete. After a short wait, return to Step 1.
19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.9: CLEAR QUAD LINK PACKET SWITCH PROBLEMS

OVERVIEW

This section provides procedures to analyze/clear problems in a quad link packet switch (QLPS).

PROCEDURE

1. Go to the **1209** MCC page, and continue to the next step
2. Is either QLPS in an OOS state?

If **YES**, continue with Step 3.

If **NO**, return to Procedure 11.1 to evaluate other CM units.
3. 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 4.

If the state is **OOS-AUTO-RMV**, go to Step 9.

If the state is **OOS-MAN-DGN**, go to Step 7.

If the state is **OOS-AUTO-DGN**, go to Step 7.

If the state is **OOS-MAN-EX**, go to Step 7.

If the state is **OOS-MAN-REX**, go to Step 7.

If the state is **OOS-AUTO-REX**, go to Step 7.

If the state is **OOS-AUTO-FLT**, go to Step 5.

If the state is **OOS-MAN-FLT**, go to Step 5.

If the state is **OOS-AUTO-TBLA**, go to Step 8.

If the state is **OOS-AUTO-FE**, go to Step 10.

If the state is **OOS-MAN-FE**, go to Step 10.

If the state is **OOS-UNEQ-NULL**, go to Step 11.

If the state is **OOS-GROW-XXX**, go to Step 11.
4. 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 2 when the restoral is complete.

NOTE: If the parent ONTCCOM is OOS or UNAV, do **not** attempt the QLPS restoral. Instead, return to Procedure 11.3 to resolve ONTCCOM problems first.

When executing this step, it would be preferable to restore **conditionally** (leave off the **ucl** option on the poke/command cited). 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.

5. The QLPS is faulty. Find the most recent printed TLP list on the ROP, use Procedure 3.1 to repair the unit, and then continue to the next step.
6. Did Procedure 3.1 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 2.

If **NO**, return Procedure 11.1 to evaluate other CM units.

7. 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 2.
8. The QLPS is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
9. 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, return to Step 2.

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 11.1 to evaluate them; otherwise, go to Step 4.

10. The QLPS's parent ONTCCOM is in an OOS or UNAV state. Refer to Procedure 11.3 to repair the parent ONTCCOM.
11. 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 11.1 to evaluate other CM units.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.10: CORRECT QGL AND QGP QPIPE PROBLEMS

OVERVIEW

This procedure is only used in offices where QGPs are equipped in the QLPS network. A QGL physically connects a QGP to a QLPS. Each equipped QGL is associated with a logical QGP 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 from the QGP. A QGP QPIPE to a standby QLPS is assumed to be capable of supporting message transport if all parent hardware is in service (the loopback test is not performed), unless the QGP QPIPE was removed from service due to errors that occurred while the parent QLPS was active (before a QLPS switch).

This procedure will attempt to fix all QGL/QGP QPIPE problems and may be entered for any of the following reasons:

- An automatic (or manual) OP QNETSTAT off-normal report shows QGP QPIPE(s) OOS.
- An automatic (or manual) OP CFGSTAT CM off-normal report shows QGL(s) OOS.
- A REPT TRBL QGL or REPT TRBL QGPQPIPE message appears on the ROP
- MCC page 115/1380/1381 is off-normal due to OOS QGLs or QGP QPIPEs.

The identification parameters for a QGP QPIPE in messages, identify the supporting hardware for the QGP QPIPE as follows: QGP QPIPE = a-b-c-d.

The identification parameters for a QGL in messages, identify the supporting hardware for the QGL as follows: QGL = a-b-e.

- a = MSGS side (0 - 1)
- b = QGP number (0 or 1)
- c = QLPS network (0 or 1)
- d = Office network and timing complex (ONTC) side (0 or 1).
- e = QGL number (0 - 3)

The QGL number is the decimal equivalent of the ONTC side and QLPS network number when treated as a binary number. That is, QGL X-X-0 connects to ONTC side 0, QLPS network 0 (0 0->0) and QGL X-X-3 connects to ONTC side 1 QLPS network 1 (1 1->3).

The following hardware must be in service before starting this procedure (Repair any OOS units if necessary):

- All MSCUs
- All QGPs
- All ONTCCOMs
- All QLPSs
- All QTMSLNKs

Hardware checks should be allowed on all QGPs and ONTCs.

NOTE: While QGP and/or ONTC hardware checks are inhibited, faults that would normally cause a QGP/QGL/ONTCCOM/QLPS/QTMSLNK to be removed from service may be masked. Such faults, if they exist, may affect the ability of in service hardware to support message traffic. If hardware checks were manually inhibited in an effort to keep hardware in service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the actual cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks, before executing this procedure.

Wait a short while (1 minute) after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, type and enter **1380** menu command.

Response: The 1380 - QLPS NETWORK 0 STATUS page is displayed.

2. Are any QGLs OOS family of equipment (**OOSF**)?

If **YES**, then restore the parent (MSCU/QGP/ONTCCOM/QLPS/QTMSLNK) hardware using Procedure 11.1. Then continue with this procedure if the QGL remains OOS (not due to family of equipment).

If **NO**, then go to Step 3.

3. Are there any OOS QGLs connected to the ACTIVE QLPS?

If **YES**, continue with Step 4.

If **NO**, go to Step 6.

4. To restore the OOS QGL, type and enter **33abe** menu command.

Where:

a =	MSGs side
b =	QGP number
e =	QGL number

5. Has an attempt been made to restore all OOS QGLs connected to the ACTIVE QLPS?

If **YES**, continue with Step 6.

If **NO**, repeat from Step 4 for other OOS QGL.

6. Are there any OOS QGLs connected to the STBY QLPS?

If **YES**, continue with Step 7

If **NO**, continue with Step 11.

7. To conditionally switch the QLPS units in the network, type and enter **42c** menu command.

Where:

c = QLPS network number.

NOTE: The QLPS switch may be denied if overall connectivity for all endpoints is adversely impacted.

8. Did the QLPSs in the network switch?

If **YES** repeat Steps 3 through 5 for each OOS QGL connected to the new ACT QLPS, continue with Step 11.

If **NO**, go to Step 9.

9. Are QGP or ONTC hardware checks inhibited?

If **YES**, continue with Step 10.

If **NO** repeat Steps 2 through 5 for the OOS QGLs connected to the STBY QLPS, continue with Step 11.

10. Can Hardware checks be allowed?

If **YES**, allow hardware checks, repeat Steps 2 through 5 for the OOS QGLs connected to the STBY QLPS.

If **NO**, continue with Step 11.

11. Are any **QPIPE OOS** indicators on?

If **YES**, continue with Step 12.

If **NO**, continue with Step 16.

12. For each OOS QGP QPIPE on an ACT QGL, type and enter **33abe** menu command to restore the parent QGL.

Where:

a = MSGS side
b = QGP number
e = QGL number

13. Are there any OOS QGP QPIPEs on a STBY QGL?

If **YES**, continue with Step 14.

If **NO**, continue with Step 16.

14. To conditionally switch the QLPS units in the network, type and enter **42c** menu command.

Where:

c = QLPS network number.

NOTE: The QLPS switch may be denied if overall connectivity for all endpoints is adversely impacted.

15. Did the QLPSs in the network switch?

If **YES**, repeat Step 12 for each OOS QGP QPIPE connected to the new active QLPS. Then continue with

Step 16.

If **NO**, then go to Step 16.

16. Are any QGLs or QGP QPIPEs **OOS** for this network?

If **YES**, continue with Step 17.

If **NO**, continue with Step 22.

17. Are any OOS QGL(s) or QGP QPIPE(s) associated with the STBY QLPS?

If **YES**, continue with Step 18.

If **NO**, continue with Step 19.

18. To conditionally restore the STBY QLPS, type and enter **32dc** menu command.

Where:

d = ONTC side
c = QLPS network of QLPS to be restored.

NOTE: The QLPS conditional restore may be denied if overall connectivity for all endpoints is adversely impacted. The conditional restore may also be denied due to unavailable helper units (FPC/ONTCCOM).

If the QLPS diagnostic yields STF results then repair the QLPS according to Procedure 11.9 before continuing this procedure.

19. Are there any OOS QGL(s) or QGP QPIPE(s) associated with the other (originally active) QLPS in the network?

If **YES**, repeat Step 18 for the other QLPS in the network, continue with Step 20.

If **NO**, continue with Step 20.

20. Are there any OOS QGL(s) or QGP QPIPE(s)?

If **YES**, continue with Step 21.

If **NO**, continue with Step 22.

21. To conditionally restore all QGPs that have OOS QGL(s) or OOS QGP QPIPE(s) associated with the QGP, type and enter **37ab** menu command.

Where:

a = MSGS side
b = QGP number

NOTE: The QGP conditional restore may be denied if overall connectivity for all endpoints is adversely impacted.

If the QGP diagnostic yields STF results then repair the QGP according to Procedure 11.8 before continuing this procedure.

22. Has this procedure been attempted for both QLPS networks?

If **YES**, continue with Step 23.

If **NO**, repeat Steps 2 through 21 for the other QLPS network (MCC page 1381), continue with Step 23.

23. Were any of the attempts to switch or conditionally restore units denied?

If **YES**, continue with Step 24.

If **NO**, continue with Step 25.

24. To request the status of the QLPS networks, type and enter input command:

OP:QNETSTAT,OOS

25. Are any MH QPIPEs, in either network, **OOS**?

If **YES**, attempt repair of all MH QPIPEs using Procedure 11.12 . Then re-start this procedure.

If **NO**, then continue with Step 25.

26. Are any QGL(s) or QGP QPIPE(s) OOS for either QLPS Network?

If **YES**, collect all available data and contact next level of technical support

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.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE**, Return to Procedure 11.1 .

Procedure 11.11: CORRECT QTMSLNK PROBLEMS

OVERVIEW

A QTMSLNK physically connects a QLPS to the TMS. Each QLPS has 4 QTMSLNKs and these QTMSLNKs support both the QGLs and the MH QPIPEs.

This procedure will attempt to fix all QTMSLNK problems and may be entered for any of the following reasons:

- An automatic (or manual) OP CFGSTAT CM off-normal report shows QTMSLNK(s) OOS.
- A REPT TRBL QTMSLNK message appears on the ROP
- MCC page 115/1380/1381 is off-normal due to OOS QTMSLNKs.

The identification parameters for a QTMSLNK in messages, identifies the supporting hardware for the QTMSLNK as follows: QTMSLNK = a-b-c.

- a = Office network and timing complex (ONTC) side (0 or 1).
- b = QLPS network (0 or 1)
- c = QTMSLNK number (0 - 3)

The following hardware must be in service before starting this procedure (Repair any OOS units if necessary):

- All ONTCCOMs
- All QLPSs

Hardware checks should be allowed on all ONTCs.

NOTE: While ONTC hardware checks are inhibited, faults that would normally cause a ONTCCOM/QLPS/QTMSLNK/TMSLNK/NLI to be removed from service may be masked. Such faults, if they exist, may affect the ability of in service hardware to support message traffic. If hardware checks were manually inhibited in an effort to keep hardware in service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the actual cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks, before executing this procedure.

Wait a short while (1 minute) after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, type and enter **1380** menu command.

Response: The 1380 - QLPS NETWORK 0 STATUS page is displayed.

2. Are any QTMSLNKs OOS family of equipment (**OOSF**)?

If **YES**, restore the parent (ONTCCOM/QLPS) hardware using Procedure 11.1 . Then continue with this procedure if the QTMSLNK remains OOS (not due to family of equipment).

If **NO**, then go to Step 3.

3. Are there any OOS QTMSLNKs connected to the ACTIVE QLPS?

If **YES**, continue with Step 4.

If **NO**, go to Step 6.

4. To restore the OOS QTMSLNK on the ACT QLPS, type and enter **31abc** menu command.

Where:

a =	ONTC side
b =	QLPS network
c =	QTMSLNK number

5. Has an attempt been made to restore all OOS QTMSLNKs connected to the ACTIVE QLPS?

If **YES**, continue with Step 6.

If **NO**, repeat Step 4 for all other OOS QTMSLNKs to the ACT QLPS.

6. Are there any OOS QTMSLNKs to the STBY QLPS?

If **YES**, continue with Step 7

If **NO**, continue with Step 11.

7. To conditionally switch the QLPS units in the network, type and enter **42b** menu command.

Where:

b =	QLPS network number.

NOTE: The QLPS switch may be denied if overall connectivity for all endpoints is adversely impacted.

8. Did the QLPSs in the network switch?

If **YES**, repeat Steps 3 through 5 for each OOS QTMSLNK for the new ACT QLPS. Then continue with Step 11.

If **NO**, then go to Step 9.

9. Are ONTC hardware checks inhibited?

If **YES**, then continue with Step 10.

If **NO**, repeat Steps 3 through 5 for the OOS QTMSLNKs to the STBY QLPS. Then continue with Step 11.

10. Can Hardware checks be allowed?

If **YES**, allow hardware checks, repeat Steps 2 through 5 for the OOS QTMSLNKs to the STBY QLPS.

NOTE: QTMSLNKs may be restored with hardware checks inhibited, however, QGL/QGPQPIPE/MHQPIPE errors may be reported if QTMSLNK hardware is bad.

If **NO**, continue with Step 11.

11. Conditionally restore all QLPSs that have OOS QTMSLNK(s) associated with the QLPS, type and enter **32ab** menu command (Starting with the STBY QLPS).

Where:

a = ONTC side
b = QLPS network

NOTE: The QLPS conditional restore may be denied if overall connectivity for all endpoints is adversely impacted. The unconditional restore may also be denied due to unavailable helper units (FPC/ONTCCOM).

If the QLPS diagnostic yields STFs results then repair the QLPS according to Procedure 11.9 before continuing this procedure.

12. Has this procedure been attempted for both QLPS networks?

If **YES**, continue with Step 13.

If **NO**, repeat from Step 2 for the other QLPS network (MCC page 1381), continue with Step 13.

13. Were any of the attempts to switch or conditionally restore units denied?

If **YES**, continue with Step 15.

If **NO**, continue with Step 14.

14. Are any QTMSLNK(s) **OOS** for either QLPS Network?

If **YES**, collect all available data and contact next level of technical support

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.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE**

15. To request the status of the QLPS networks, type and enter input command:
OP:QNETSTAT,OOS

16. Are any QGP QPIPEs or MH QPIPEs, in either network, **OOS** (including family of equipment)?

If **YES**, attempt repair of all QGP QPIPEs using Procedure 11.10 . Attempt to repair all MH QPIPEs using Procedure 11.12 . Then re-start this procedure.

If **NO**, then continue with Step 14.

Procedure 11.12: CORRECT MH QPIPE PROBLEMS

OVERVIEW

A MH QPIPE is a path between a SM-2000's MH(0) and a specific QLPS unit, when the SM-2000 is in the QLPS network. Physically, it passes from the MH to one of the SM-2000's primary NLIs, over a TMSLNK in to the TMS, and then through a QTMSLNK to the QLPS. From the SM-2000 perspective, a 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. A MH QPIPE to a standby QLPS is assumed to be capable of supporting message transport if all parent hardware is in service (the loopback test is not performed), unless that MH QPIPE was removed from service due to errors that occurred while the parent QLPS was active (before a QLPS switch).

This procedure will attempt to fix all MH QPIPE problems for a single SM-2000 and may be entered for any of the following reasons:

- An automatic (or manual) OP QNETSTAT off-normal report shows MH QPIPE(s) OOS.
- An automatic (or manual) OP SYSSTAT off-normal report shows a SM-2000 with a status phrase of QPIPE_OOS (or any other MCC page where the SM status phrase is displayed).
- A REPT TRBL MHQPIPE message appears on the ROP
- MCC page 115/1380/1381 is off-normal due to OOS MH QPIPEs on a active QLPS.

NOTE: The off-normal indicator is for OOS QLNNs/ISMQLNNs/QPIPEs. In order to determine that the off-normal indication is due to MH QPIPEs, the OP:QNETSTAT; command must be used. The indicator is not lit for OOS MH QPIPEs to STBY QLPSs (as this is not service impacting) and this case must be determined using OP:QNETSTAT.

The identification parameter for a MH QPIPE in messages, identify the supporting hardware for the MH QPIPE as follows: MH QPIPE = a-b-c-d

- a = SM-2000 number
- b = Active MCTSI side
- c = QLPS network
- d = ONTC side.

The following hardware must be in service before starting this procedure (Repair any OOS units if necessary):

- All ONTCCOMs
- All QLPSs
- All QTMSLNKs
- All Primary NLIs (for that SM-2000)
- All TMSLNKs on primary NLIs (for that SM-2000)

Hardware checks should be allowed on all ONTCs.

NOTE: While ONTC hardware checks are inhibited, faults that would normally cause a ONTCCOM/QLPS/QTMSLNK/NLI/TMSLNK to be removed from service may be masked. Such faults, if they exist, may affect the ability of in service hardware to support message traffic. If hardware checks were manually inhibited in an effort to keep hardware in service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the actual cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks, before executing this procedure.

Wait a short while (1 minute) after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, to request the SM-2000 off-normal status, type and enter input command:

OP:SYSSTAT,SM=a;

Where:

a = SM-2000 number.

Response: At the receive-only printer (ROP), the SM-2000 status report is printed.

2. In the OP SYSSTAT output message, are any of the SM-2000 off-normal condition status phrases **QLPS_ISOL** or **QLNK_LOST**?

If **YES**, execute the procedure to establish QLPS communication with a SM-2000 in the 235-105-250, *System Recovery* manual.

If **NO**, continue with Step 3.

3. To request the maintenance status of the MH QPIPEs for the SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

4. Is the state of any MH QPIPE for either network listed as OOS family of equipment (**OOS FE**)?

If **YES**, restore the parent (QLPS/QTMSLNK/NLI/TMSLNK) hardware of any MH QPIPE that is OOS family of equipment using Procedure 11.1 .

Then continue with this procedure if any MH QPIPE remains OOS (not due to family of equipment).

If **NO**, then continue with Step 5.

5. Is the maintenance state of any MH QPIPE for either network listed as **OOS NEARFLT** or **OOS NEARLBK**?

If **YES**, continue with Step 6.

If **NO**, go to Step 15.

6. Type and enter **1190,a** menu command.

Where:

a = SM-2000 number.

Response: The 1190 - SM a - MCTSI page is displayed.

7. Is either MCTSI side OOS or Forced unavailable?

If **YES**, continue with Step 8.

If **NO**, go to Step 11.

8. Restore the OOS MCTSI. After clearing any force (unless there is a good reason to retain the force), and powering unit up (if necessary), type and enter **30X** menu command.

Where:

X = MCTSI number

Response: Wait for the OOS MCTSI to be conditionally restored to ACTIVE.

NOTE: If conditional restore fails, execute the procedure to repair the MCTSI.

9. Request the status of the MH QPIPEs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

10. Is the state of any MH QPIPE for either network still listed as **OOS NEARFLT** or **OOS NEARLBK**?

If **YES**, continue with Step 11.

If **NO**, continue with Step 15.

11. Does this SM-2000 have duplex MCTSI (ACT/STBY)?

If **YES**, continue with Step 12.

If **NO**, repair OOS MCTSI before continuing with Step 13.

12. To switch the MCTSI sides, type and enter **403** menu command.

Response: The STBY MCTSI side becomes the ACT side.

13. To request the status of the MH QPIPEs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

14. Is the state of any MH QPIPE for either network still listed as **OOS NEARFLT** or **OOS NEARLBK**?

If **YES**, collect all available data and contact next level of technical support

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.

If **NO**, continue with Step 15. It may be desirable to conditionally restore the currently STBY MCTSI to look for latent faults.

15. Is the state of any MH QPIPE for either network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, choose a QLPS network to work on that has an OOS MH QPIPE, continue with Step 16.

NOTE: Steps 15 through 32 should be repeated for both QLPS networks.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

16. Type and enter **1209** menu command.

Response: The MCC 1209 - ONTC (0 or 1) STATUS page is displayed.

17. Request the status of the MH QPIPEs for the SM-2000 on this network, type and enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where:

a = SM-2000 number.
c = QLPS network number.

18. Is either MHPIPE to the SM-2000 on this QLPS network **OOS FARFLT** or **OOS FARLBK** ?

If **YES**, continue with Step 19.

If **NO**, continue with Step 21.

19. To switch ACT and STBY QLPS units, type and enter **42c** menu command.

Where:

c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

NOTE: The QLPS switch may be denied if overall connectivity from all end points are adversely impacted. The switch may also be denied if the QLPSs are not ACT/STBY, if this is the case restore the OOS QLPS and repeat this step. If switch is denied due to other reason continue with Step 23.

20. Request the status of the MH QPIPEs for the SM-2000 on this network, type and enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where:

a = SM-2000 number.
c = QLPS network number.

21. Is either MH QPIPE to the SM-2000 on this QLPS network **OOS FAR**

If **YES**, continue with Step 22.

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

22. To switch ACT and STBY QLPS units, type and enter **42c** menu command.

Where:

c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

NOTE: The QLPS switch may be denied if overall connectivity from all end points are adversely impacted.

23. Request the status of the MH QPIPEs for the SM-2000 on this network, type and enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where:

a = SM-2000 number.

c = QLPS network number.

24. Are there any **OOS-FAR, OOS-FARLBK, or OOS-FARFLT** MH QPIPEs?

If **YES**, continue with Step 25.

If **NO**, go to Step 15 for the other QLPS network.

25. To conditionally restore each QLPS in the network that has an OOS MH QPIPE associated with it, type and enter **32dc** menu command.

Where:

d = ONTC side

c = QLPS network

Response: The QLPS will be conditionally restored. If the restore fails, execute Procedure 11.9 to repair the QLPS. Otherwise the QLPS will be placed in the ACT or STBY status.

NOTE: The QLPS condition restore may be denied if overall connectivity from all end points are adversely impacted.

26. To switch ACT and STBY QLPS units, type and enter **42c** menu command.

Where:

c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

NOTE: The QLPS switch may be denied if overall connectivity from all end points are adversely impacted.

27. To request the status of the MH QPIPEs for the SM-2000 on this network, type and enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where:

a = SM-2000 number.
c = QLPS network number.

28. Is the state of any MH QPIPE for this network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, continue with Step 29.

If **NO**, repeat from Step 15 for the other QLPS network.

29. Type and enter **1201,1,a** menu command.

Where:

a = SM-2000 number

Response: The MCC 1201 - SM a - DLI/NLI/TMSLNK SET 1 page is displayed.

30. Use **OP:QNETSTAT, MHQPIPE=a-b-c-d;** to obtain the parent NLI of the OOS MH QPIPE.

Where:

a = SM-2000 number
b = Active MCTSI side
c = QLPS network
d = ONTC side.

Then conditionally restore the parent NLI of the OOS MH QPIPE on that ONTC for the SM-2000 in sequence, type and enter **3dXX** menu command.

Where:

d = ONTC side.
XX = NLI number (00 or 01).

Response: The NLIs are conditionally restored. If any NLI fails to restore, repair it using Procedure 11.6

NOTE: The NLI conditional restores may be denied for service impacting reasons.

31. To request the status of the MH QPIPEs for the SM-2000 on this network, type and enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where:

a = SM-2000 number.
c = QLPS network number.

32. Is the state of any MH QPIPE for this network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, collect all available data and contact the next level of technical support. This procedure may be concurrently executed on the remaining OOS MH QPIPEs while seeking support.

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.

If **NO**, continue with Step 15 for the other QLPS network, Return to calling procedure after executing procedure for both QLPS networks.

Procedure 11.13: CLEARING QLNK OR ISMQLNK TROUBLES

OVERVIEW

A QLPS communication path between the AM and a 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 a SM-2000. In a fault-free environment, there will be four active QLNKs (which pass through an active QLPS, two active QLNKs per network) and four standby QLNKs. When faults occur or parent hardware is removed from service, a SM-2000 may have fewer than four active QLNKs. Message traffic is distributed across the active QLNKs by dynamically mapping QLPS "logical links" over the set of active "physical" QLNKs. The number of "logical links" used varies depending on the processor that the message is going to. Communication between the AM and a SM-2000 use four logical links. Communication between a SM-2000 and the CMP or FPC uses one logical link. Communication between a SM-2000 and another SM (non-SM-2000 or SM-2000 not in QLPS network) or DLN uses two logical links.

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 OOS, the messages are routed over QLNKs (if available) or CLNKs (if QLNKs are not available).

If all supporting hardware of a QLNK or ISMQLNK is in service, and the parent (QGP/MH) QPIPEs are active, the QGP and/or SM-2000 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.

This procedure will attempt to fix all QLNK/ISMQLNK problems for a single SM-2000, and may be entered for any of the following reasons:

- An automatic (or manual) OP QNETSTAT off-normal report shows QLNKs or ISMQLNKs in the OOS or INIT states.
- A REPT TRBL QLNK or REPT TRBL ISMQLNK message appears on the ROP.
- MCC page 115/1380/1381 is off-normal due to OOS QLNK(s)/ISMQLNK(s) through the active QLPS.

NOTE: The off-normal indicator is for QLNKs/ISMQLNKs/MHQPIPEs. In order to determine that the off-normal indication is due to QLNKs or ISMQLNKs, the **OP:QNETSTAT;** command must be used. The indicator is not lit for OOS QLNKs/ISMQLNKs to STBY QLPSs (as this is not service impacting) and this case must be determined using **OP:QNETSTAT**.

- An automatic (or manual) OP SYSSTAT lists a SM-2000 with a status phrase of QLNK OFFN (or MCC pages where SM status phrases are displayed).

The identification parameters for a QLNK messages, identify the supporting hardware for the QLNK=a-b-c-d-e-f as follows:

The identification parameters for an ISMQLNK messages, identify the supporting hardware for the ISMQLNK=a-b-c-d-g-h as follows:

- a = SM-2000 number

- b = ACTIVE MCTSI side
- c = QLPS network
- d = ONTC side
- e = QGP number
- f = MSGS side
- g = Far-end SM-2000 number
- h = Far-end SM-2000's ACTIVE MCTSI side.

The following parents must be in service before starting this procedure (Repair any OOS QPIPEs if necessary):

- All QGP QPIPEs for relevant SM-2000
- All MH QPIPEs for relevant SM-2000

Hardware checks should be allowed on all QGPs and ONTCs.

Wait a short while (1 minute) after each recovery attempt to allow the system to stabilize.

PROCEDURE

1. To request the SM-2000 off-normal status, type and enter input command:

OP:SYSSTAT,SM=a;

Where:

a = SM-2000 number.

Response: The SM-2000 off-normal status report is printed at the ROP.

2. Are any of the SM-2000 status phrases **QLNK LOST** or **QLPS ISOL**?

If **YES**, go to the 235-105-250, *System Recovery* manual and execute the procedure to restore QLPS communication to a SM-2000.

If **NO**, go to Step 3.

3. Are any of the SM-2000 status phrases **QLNK OFFN**?

If **YES**, continue with Step 4.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

4. To request the status of the QLNKs and ISMQLNKs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

5. Are any QLNKs or ISMQLNKs OOS family of equipment (**OOS FE**)?

If **YES**, repair the QGP QPIPEs(for QLNK) and MH QPIPEs (for QLNK and ISMQLNK) that are related to this QLNK or ISMQLNK.

NOTE: Use **OP:QNETSTAT,[ISMQLNK/QLNK]** to determine the parent hardware to restore. Then follow Procedure 11.1 to do the repair.

If **NO**, continue with Step 6.

6. Wait 2 minutes to allow for autonomous recovery.
7. To request the status of the QLNKs and ISMQLNKs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

8. Are any QLNKs or ISMQLNKs **OOS**?

If **YES**, continue with Step 9.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

9. At the MCC terminal, to display the QLPS network associated with the OOS QLNK(s) or OOS ISMQLNK(s), type and enter **138c** menu command.

Where:

c = The QLPS network (0 or 1) associated with OOS QLNK(s) or ISMQLNK(s).

Response: The 138c - QLPS NETWORK 0 STATUS page or the NETWORK 1 STATUS page is displayed.

10. Type and enter **42c** menu command to switch the ACT and STBY QLPS units.

Where:

c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

NOTE: The QLPS switch may be denied if overall connectivity for all end points are adversely impacted. The switch will also be denied if the QLPSs in this network are not ACT/STBY. If this is the case then restore/repair the OOS QLPS and repeat this Step.

11. To request the status of the QLNKs and ISMQLNKs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

12. Is the state of the ISMQLNK(s) for either network listed as **OOS** or **INIT**?

If **YES**, continue with Step 13.

If **NO**, continue with Step 14.

13. Is the ISMQLNK **OOS** or **INIT** due to the other SM-2000?

Use **OP:SYSSTAT,ALL** to determine if the destination SM-2000(g) has one of the following status phrases:

- **INITIALIZING,**
- **ISOLATED,**
- **COMM LOST,**
- **QLPS ISOL,**
- **MAN ISOL,**
- **QMAN ISOL,** or
- **MH DGRD.**

If **YES**, the ISMQLNK is OOS due to problems on the other SM-2000. These problems must be cleared before the ISMQLNK can be brought back in service.

If **NO**, continue with Step 18.

14. Is the state of the QLNK(s) for either network listed as **OOS** or **INIT**?

If **YES**, continue with Step 15.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

15. To conditionally restore the parent QGP for the OOS QLNK, type and enter **37fe** menu command.

Where:

f = MSGS side of QGP
e = QGP number

Response: The parent QGP will be conditionally restored. If the restore fails, execute Procedure 11.8 to repair the QGP. Otherwise the QGP will be placed in the ACT status.

NOTE: The conditional restore may be denied if overall connectivity for all end points are adversely impacted.

16. To request the status of the QLNKs/ISMQLNKs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

17. Is the state of the QLNKs/ISMQLNKs for either network listed as **OOS L2**?

If **YES**, continue with Step 18.

If **NO**, continue with Step 19

18. Wait 15 minutes to allow for deferred autonomous recovery to occur.

19. To request the status of the QLNKs/ISMQLNKs for this SM-2000, type and enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where:

a = SM-2000 number.

20. Is the state of any QLNKs/ISMQLNKs for either network listed as **OOS** or **INIT**?

If **YES**, collect all available data and contact next level of technical support

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.

If **NO**, **STOP, YOU HAVE COMPLETED THIS PROCEDURE**, return to the calling procedure.

Procedure 11.14: RECOVER FROM RC_BACKOUT CONDITION ON MATE CMP

OVERVIEW

This procedure contains steps for recovery from a RC-BACKOUT condition on the mate CMP.

If a backout of recent change has occurred, the following message is printed on the ROP:

```
OP SYSSTAT SUMMARY                                LAST RECORD  
  
CMP 1-0 M: BACKOUT-RC BKUP_FAIL
```

PROCEDURE

1. Use the **REMOVE** poke command or the **RMV** input message, to remove the mate CMP from service.
2. Perform a backup of the ODD (office dependent data) for the CMP with the following command:
BKUP:ODD:CMP=0
3. After ODD backup completes, use the **RESTORE** poke command or the **RST** input message to return the CMP to service.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 11.15: CLEAR TRCU3 PROBLEMS

Overview

The Transmission Rate Converter Unit - Model 3 (TRCU3) provides the same capability as the Transmission Rate Converter Unit - Model 2 (TRCU2) to remote an Extended Switching Module - 2000 (EXM-2000) or an Optically Remoted Module (ORM). In addition, the TRCU3 converts the Network Control and Timing (NCT) / Network Control and Timing - Model 2 (NCT2) signals into Synchronous Optical Network (SONET) Synchronous Transport Signal Level - 1 (STS-1) signals. These electrical STS-1 signals are multiplexed into Optical Carrier Level 3 Signal (OC-3) or Optical Carrier Level 12 Signal (OC-12) for transmission to the remote or host office. Figure 11.15-1 show the TRCU3 shelf layout.

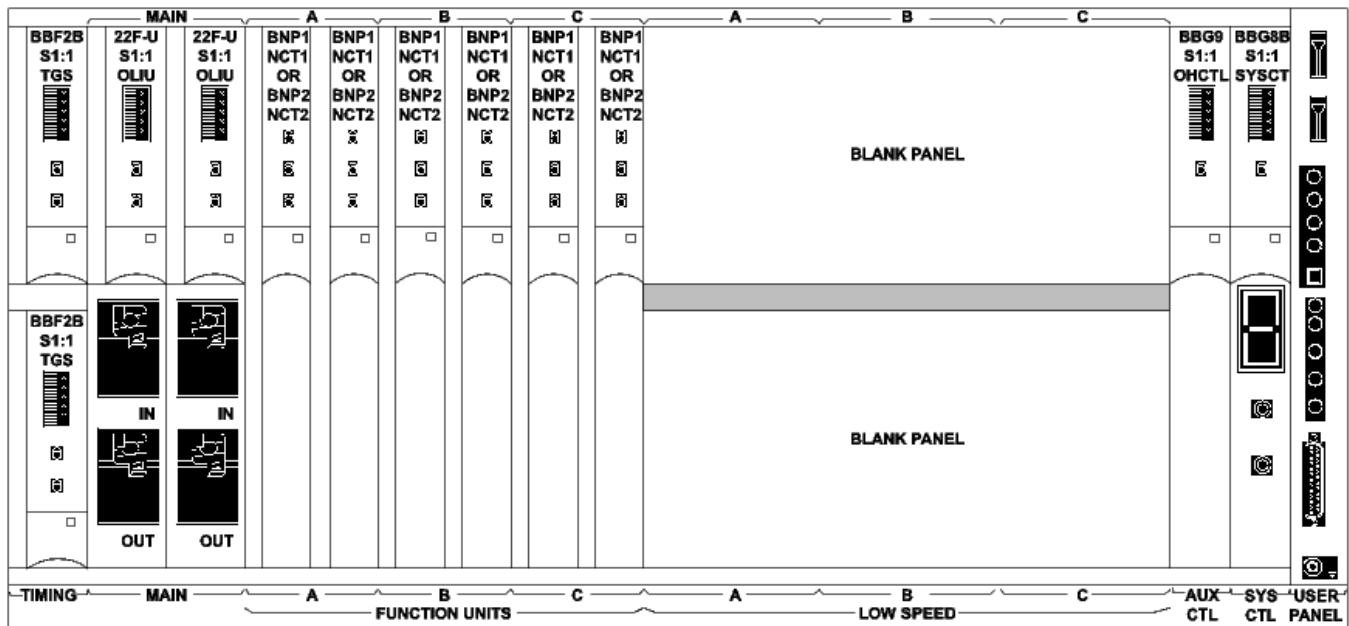


Figure 11.15-1 TRCU3 Shelf

Table 11.15-1 contains a listing of the corrective maintenance procedures for the TRCU3 shelf. All of the procedures listed, except for the Network Control and Timing Interface Unit (NCTIU) repair procedure 11.15.1, the Network Link Interface (NLI)/Dual Link Interface (DLI) fault procedure 11.15.2, and the fuse alarm module (**CM-2601A**) replacement procedures 11.16, are contained in the DDM-2000 OC-3 Multiplexer Release 13.0 *User/Service Manual (TARP)*, 363-206-285. The procedures that were not shown in the table are contained in this section. It is possible that the NCTIU fault is caused by something else on the shelf. If the NCTIU repair and fault sequences fail to clear the fault, a DDM procedure could be used.

NOTE: Before replacing any BNP/BNP2 circuit pack, the 5ESS[®] circuit to the circuit pack needs to be Out-Of-Service (OOS). The **OOS** light on the BNP/BNP2 circuit pack is lighted when the 5ESS[®] circuit is OOS. The **OOS** light is controlled by messages sent from the 5ESS[®] on the NCT/NCT2 link. If both sides of the 5ESS[®] circuit are OOS, the lamp may not be lighted because the message to light the circuit cannot reach the TRCU3 shelf.

Table 11.15-1 TRCU3 Corrective Maintenance Procedures Table

Title	Procedure Number
Clear Critical (CR) Alarm	TAP-101
Clear Major (MJ) Alarm	TAP-102
Clear Multiple Failure	TAP-103
Clear Power Minor (PMN) Alarm	TAP-104

Clear Trouble Report	TAP-105
Isolate and Clear Failure	TAP-106
Clear Obscure Failure Condition	TAP-108
Clear Abnormal (ABN) Indication	TAP-109
Clear Flashing FAULT LED Indication	TAP-110
Clear Minor (MN) Alarm	TAP-112
Clear Obscure Minor (MN) Alarm	TAP-113
Clear LED Test Trouble	TAP-115
Clear NE ACTY Alarm Only	TAP-117
Clear OLIU or Fiber Trouble Path Protected Ring	TAP-119
Clear STS/VT AIS Alarm Conditions	TAP-120
Clear Brownout Condition Flashing L in FE ID Display	TAP-121
Connect Optical Loop	DLP-505
Perform LED Test	DLP-509
Set Circuit Pack Options	DLP-513
Perform Optical Fiber Connections and Verification of Optical Facility	DLP-514
Perform End-to-End OC-3 Optical Line Test	DLP-515
Check Local Office Alarms	DLP-516
Test Protection Switching Function	DLP-519
Connect CIT and Establish Session	DLP-521
Establish Remote Login	DLP-522
Replace Circuit Pack	DLP-523
Condition and Connect Modems to Establish Communication from Remote CIT Location	DLP-526
Clean Optical Fibers, Connectors, and Lightguide Buildouts (LBOs)	DLP-527
Perform OC-3s (STS-3s) Transmission Test	DLP-544
DDM-2000 Receiver Sensitivity Test	DLP-547
Replace DDM-2000 OC-3 Shelf User Panel Out of Service	DLP-551
Remove -48 V DC User Panel Fuse	DLP-555
Provision STS-1 Path Trace	DLP-563

PROCEDURE

1. Use the procedures listed in Table 11.15-1 and those contained in this section to clear problems that may occur with the TRCU3 unit.

11.15.1 NCTIU REPAIR PROCEDURE (RED *FAULT LED* LIGHTED)

OVERVIEW

This section contains repair procedures for the NCTIU. Use the following steps for NCTIU repair.

1. Is **FAULT** LED on suspect BNP function group pack lighted?
If **YES**, go to Step 9.
If **NO**, go to Step 2.
2. Does the identified BNP pack correspond to the BNP pack indicated in the alarm message?
If **YES**, go to Step 4.
If **NO**, go to Step 3.
3. Locate the BNP pack identified in the alarm message and repeat from Step 1.
4. Perform an LED test by pressing the Alarm Cutoff (ACO) button on the User Panel on the TRCU3 shelf.
5. Did all LEDs (**OOS**, **FAULT**, and **ACTIVE**) on suspect BNP pack light momentarily?

NOTE: This pack may still not be the pack that was reported.

If **YES**, go to Step 6.

If **NO**, go to Step 14.

6. At the CIT, type and enter the following command:

rtrv-alm-all

For example:

In progress ...

```

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1
M rtrv-alm: COMPLD
/* Active Alarms and Status Report
=====
Alarm      Source   Date   Time   SRV   Description
Level      Address  Detected
=====
Critical fn-a-1  04-23 11:41:25 SA   NCT2 CP failed
-----
Minor      fn-a-2  04-22 23:45:30 nsa NCT2 CP failed
Minor      fn-b-1  04-22 22:00:43 nsa NCT CP failed
*/
;

```

NOTE: The Source Address field contains the function pair with the faulty NCTIU.

7. Was the alarm properly routed by the Operation System (OS).

If **YES**, go to Step 14.

If **NO**, go to Step 8.

8. Request the OS to refer the problem to the proper location. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9. Release the latch on the suspect BNP pack, but do **NOT** disengage the pack from the backplane connector (refer to the following Note).

NOTE: Releasing the latch of the suspect BNP without disengaging the circuit pack will make the TRCU3 shelf think that the pack has been pulled, but traffic will not be affected.

10. Wait 30 seconds.
11. Push the latch back in.
12. Wait 30 seconds.
13. Does **FAULT** lamp go out?

If **YES**, go to Step **50**.

If **NO**, go to Step **14**.

14. Is BNP **OOS** lamp lighted?

If **YES**, go to Step **23**.

If **NO**, go to Step **15**.

15. Connect a Craft Interface Terminal (CIT) to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the FAULT. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0 *User/Service Manual (TARP)*, 363-206-285. Refer to the following note.

NOTE: The CIT session is used to determine the faulty NLI/DLI function pair.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

16. At the CIT, type and enter the following command:

rtrv-alm-all

For example:

In progress ...

```

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1
M rtrv-alm: COMPLD
/* Active Alarms and Status Report
=====
Alarm      Source   Date   Time   SRV   Description
Level      Address  Detected
=====
Critical fn-a-1 04-23 11:41:25 SA  NCT2 CP failed
-----
Minor      fn-a-2 04-22 23:45:30 nsa NCT2 CP failed
Minor      fn-b-1 04-22 22:00:43 nsa NCT CP failed
*/
;

```

NOTE: The Source Address field contains the function pair with the faulty NCTIU.

17. At the CIT, type and enter the following command:

rtrv-nct:fn-x

Where:

x = Function pair with the faulty NCTIU.

For example:

In progress...

```
REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1
M rtrv-nct: fn-b COMPLD
/* NCT Provisioning Report
```

```
=====
Line      CTS      CTS      TCTS      Mode
Address   Enabled
=====
fn-a      yes      18      249      remote
=====
```

18. Observe and record the Transmission Control Time Slot (TCTS) number.

NOTE: The TCTS number is 249 in the previous example response.

19. At the Master Control Center (MCC) [or Trunk and Line WorkStation (TLWS)] terminal, type and enter the following command:

OP:TRCU:TCTS=x

Where:

x = TCTS number.

NOTE: The output of this command is either one or two messages. (TCTS numbers are even or odd so there may be more than one match.) The output will contain the 5ESS[®] switch circuits (NLI/DLI) using the TCTS plus the Office Dependent Data (ODD) information of the TRCUPATH and TRCU remark (TRCURMK). The remark may also be used to help locate the TRCU3 in question.

You can use the AISLE, BAY, and VERTPOS to help locate the TRCU. Side 0 fiber is attached to **fn-x-1** BNP circuit packs, and side 1 fiber is attached to **fn-x-2** circuit packs.

20. At the MCC (or TLWS), remove the NLI/DLI circuit from service by typing and entering the following command:

If	Type and enter:
DLI	RMV:DLI=a-b Where: a = SM number b = ONTC side
NLI	RMV:NLI=a-b-c Where: a = SM number b = NLI number c = ONTC side

For example:

S570-75 98-04-22 15:50:16 002469 ONTC N42 ic4.0-eaiu

M OP TRCU

TRCP=192-1

CTS=18

TCTS=249

NLI=192-1-0 NLI=192-1-1

HOST REMARK:

REMOTE REMARK:

	HOST TRCU	REMOTE TRCU
TYPE	TRCU3	TRCU3
NUM	4	7
CKT	1	1
CLI	H' 0	H' 0
AISe	0004	0004
BAY	0	0
VERTPOS	0	15

NOTE: The DLI removes the even and the odd circuit on the specified side, resulting in two circuit packs Out-of-Service (OOS) LEDs being lighted. You may also use the remove pokes on the 1201 page.

Requirement: The OOS LED on the BNP circuit pack lights. This will ensure that the proper circuit has been removed.

21. Was NLI/DLI circuit successfully removed from service?

If **YES**, go to Step 23.

If **NO**, go to Step 22.

22. 5ESS® switch action required (refer to the following note).

NOTE: If the remove fails, a failure reason is given with the output report. This gives a clue as to what 5ESS® switch action needs to occur. It could be that other circuits are OOS, Communication Links (CLNKs) need more time to remap, or numerous other reasons.

23. Remove the suspect BNP circuit pack and insert a new one.

24. Is **FAULT** LED on replacement BNP pack lighted?

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

If **NO**, go to Step 50.

25. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number

	c = ONTC side number

26. What occurs?

If **ATP**, go to Step **31**.

If Conditional All Tests Passed (**CATP**), go to Step **27**.

If Some Tests Failed (**STF**), go to the NLI fault procedure (11.15.2).

27. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (see Note)?

If **YES**, go to Step **28**.

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

NOTE: There should be diagnostic (DGN) messages indicating what resources of the 5ESS[®] switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

28. Can the unavailable resources be recovered?

If **YES**, go to Step **29**.

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

29. Recover the unavailable resources or wait until unavailable resources have been recovered.

30. Repeat from Step **25**.

31. Is **FAULT** LED on BNP pack lighted?

If **YES**, go to Step **32** (refer to the following note).

If **NO**, go to Step **50**.

NOTE: The **FAULT** may be in the mate circuit pack.

32. At the MCC or (TLWS), restore the OOS circuit unconditionally by typing and entering the following command:

If	Type and enter:
DLI	RST:DLI=a-b,UCL Where: a = SM number b = ONTC side
NLI	RST:NLI=a-b-c,UCL Where: a = SM number b = NLI number c = ONTC side

33. Did the unit stay in service?

If **YES**, go to Step 34.

If **NO**, perform normal NLI/DLI fault procedures. Refer to Procedure 11.5 or 11.6 .

34. At the MCC (or TLWS), remove the NLI/DLI on the mate side from service by typing and entering the following command:

If	Type and enter:
DLI	RMV:DLI=a-b Where: a = SM number b = ONTC side
NLI	RMV:NLI=a-b-c Where: a = SM number b = NLI number c = ONTC side

35. Was NLI/DLI circuit successfully removed from service?

If **YES**, go to Step 37.

If **NO**, go to Step 36.

36. 5ESS[®] switch action required (refer to the following note).

NOTE: If the remove fails, a failure reason is given with the output report. This gives a clue as to what 5ESS[®] switch action needs to occur. It could be that other circuits are OOS, Communication Links (CLNKs) need more time to remap, or numerous other reasons.

37. Is **FAULT** LED on BNP pack lighted?

If **YES**, go to Step 38.

If **NO**, go to Step 39.

38. **Seek technical assistance** (refer to the following note).

NOTE: Problem may be in backplane.

39. Is **OOS** LED on BNP pack lighted?

If **YES**, go to Step 40.

If **NO**, refer to the following note.

NOTE: Before replacing any BNP/BNP2 circuit pack, the 5ESS[®] circuit to the circuit pack needs to be Out-Of-Service (OOS). The **OOS** light on the BNP/BNP2 circuit pack is lighted when the 5ESS[®] circuit is OOS. The **OOS** light is controlled by messages sent from the 5ESS[®] on the NCT/NCT2 link. If both sides of the 5ESS[®] circuit are OOS, the lamp may not be lighted because the message to light the circuit cannot reach the TRCU3 shelf. Also, there is a possibility of a bad circuit pack. Refer to Procedure 11.15.2 .

40. Remove the suspect mate BNP circuit pack and insert a new one.
41. Did **FAULT** LED extinguish on BNP/BNP2 circuit pack just replaced?

If **YES**, go to Step **42**.

If **NO**, new circuit pack is faulty. Try another pack . If the problem persists, **seek technical assistance**.

42. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

43. What occurs?

If **ATP**, go to Step **48**.

If **CATP**, go to Step **44**.

If **STF**, go to the NLI FAULT procedure (11.15.2).

44. Are there resources that were unavailable to run the diagnostic phase(s) that were skipped (refer to the following note)?

If **YES**, go to Step **45**.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS® switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

45. Can the unavailable resources be recovered?

If **YES**, go to Step **46**.

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

46. Recover the unavailable resources or wait until unavailable resources have been recovered.

47. Repeat from Step **42**.

48. Is **FAULT** LED on original BNP pack lighted?

If **YES**, go to Step **49**.

If **NO**, go to Step **50**.

49. **Seek technical assistance.** The problem is in the backplane.

50. At the MCC (or TLWS), perform diagnostics on both link interface circuits as follows:

If	"Then"
MCC Page Display Mode	Use MCC 1201 page
Message Function Mode - DLI	Type and enter: DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
Message Function Mode - NLI	Type and enter: DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

51. What occurs?

If **ATP** for both circuits, go to Step **56**.

If **CATP** for either or both circuits, go to Step **52**.

If **STF** for either or both circuits, go to the NLI/DLI FAULT procedure (11.15.2).

52. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (see Note)?

If **YES**, go to Step **53**.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS[®] switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

53. Can the unavailable resources be recovered?

If **YES**, go to Step **54**.

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

54. Recover the unavailable resources or wait until unavailable resources have been recovered.

55. Repeat from Step **50**.

56. Have diagnostics been performed with each NCTIU active?

If **YES**, go to Step **59**.

If **NO**, go to Step **57**.

57. At the CIT connected to the TRCU3 shelf, switch NCTIUs by typing and entering:

switch-fn:fn-x:pri>manual;

Where:

x = Function pair to be switched.

58. Repeat from Step **50** for active mate NCTIU.
59. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.15.2 NLI/DLI FAULT PROCEDURE

OVERVIEW

The following procedure assumes that there are no other *5ESS*® switch faults which would cause NLI/DLI circuits to be OOS. This includes Time Multiplexed Switch Links (TMSLNKs), NLI/DLIs, Module Controller and Time Slot Interchangers (MCTSI) as well as connect fibers. Section 11.5 provides procedures to analyze/clear problems in an SM Dual Link Interface (DLI) and its associated TMSLNKs. Section 11.6 provides procedures to analyze/clear problems in an SM-2000 NLI and its associated TMSLNKs. Do not **seek technical assistance** until all circuits making up the NLI/DLI have been eliminated.

If the **FAULT** lamp is lighted on the suspect BNP pack, execute the NCTIU repair procedure 11.15.1 .

1. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

2. What occurs?

If **ATP**, go to Step **55**.

If **CATP**, go to Step **3**.

If **STF**, go to Step **7** (refer to the following note).

NOTE: Phase 2 of an NLI diagnostic and phases 9 and 11 of a DLI diagnostic test the TRCU3 shelf.

3. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (refer to the following note)?

If **YES**, go to Step 4.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS® switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

4. Can the unavailable resources be recovered?

If **YES**, go to Step 5.

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

5. Recover the unavailable resources or wait until unavailable resources have been recovered.
6. Repeat from Step 1.
7. Determine if the problem is in the host or a remote TRCU3 location. Refer to the following note.

NOTE: For NLI diagnostics, segment 30 of phase 2 indicates a host TRCU3 failure, while segment 20 of phase 2 indicates a remote TRCU3 failure. Segment 40 of the NLI diagnostic is the SM to TMS loop test. If segments 20 and 30 pass and this one fails, then the fibers may be hooked up incorrectly. It may possibly also be a TMS or transceiver failure.

For DLI diagnostics, segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. Segments 5 and 10 of phase 11 of the DLI diagnostic is the SM to TMS loop test. If the host and remote segments of the DLI diagnostic pass and these segments fail, then the fibers may be hooked up incorrectly. It may possibly also be a TMS or transceiver failure.

In addition, the TLP diagnostic executes the trouble location procedure at the conclusion of the diagnostic. This procedure generates a list of suspected faulty circuit packs which can also be used to determine whether the problem is in the host or remote location.

8. Is there a CIT session established at the TRCU3 shelf?

If **YES**, go to Step 10.

If **NO**, go to Step 9.

9. Connect a CIT and establish a session using the procedure from below that corresponds to the location of the **FAULT**. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0 *User/Service Manual (TARP)*, 363-206-285.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

10. At the CIT, type and enter the following command:

rtrv-nct:fn-x

Where:

x = Function pair with the faulty NCTIU.

For example:

In progress...

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1

M rtrv-nct: fn-b COMPLD

/* NCT Provisioning Report

Line Address	CTS Enabled	CTS	TCTS	Mode
fn-a	yes	19	249	remote

11. Observe and record the TCTS number.

NOTE: The TCTS number would be 249 in the previous example.

12. At the MCC (or TLWS), type and enter the following command:

OP:TRCU:TRCP=a-PATH

Where:

a = SM number.

PATH = the path shown in the TRCP box on the MCC 1201 page.

Comment: This would be best performed from the 1201 MCC page with the 5ESS[®] switch circuit, which has been removed by fault recovery. Once there, do **95xx** where xx is the TRCU path shown on the page. This output will give the correct TCTS which should be provisioned.

13. Was NCT provisioning correct for both host and remote TRCU3s?

If **YES**, go to Step **21**.

If **NO**, go to Step **14**.

14. At the CIT, correct NCT provisioning by typing and entering the following command:

set-nct:fn-x;

Where:

x = Function pair with the faulty NCT provisioning.

15. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number

	b = NLI number c = ONTC side number

16. What occurs?

If **ATP**, go to Step **55**.

If **CATP**, go to Step **17**.

If **STF**, go to Step **21**.

17. Are there resources that were unavailable to run the diagnostic phase(s) that were skipped (refer to the following note)?

If **YES**, go to Step **18**.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS[®] switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

18. Can the unavailable resources be recovered?

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

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

19. Recover the unavailable resources or wait until unavailable resources have been recovered.

20. Repeat from Step **15**.

21. Replace the BNP board.

22. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

23. What occurs?

If **ATP**, go to Step **55**.

If **CATP**, go to Step **24**.

If **STF**, go to Step **28** (refer to the following note).

NOTE: The mate NCTIU is possibly at fault.

24. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (refer to the following note)?

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

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

NOTE: There should be DGN messages indicating what resources of the 5ESS[®] switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

25. Can the unavailable resources be recovered?

If **YES**, go to Step 26.

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

26. Recover the unavailable resources or wait until unavailable resources have been recovered.

27. Repeat from Step 22.

28. At the MCC (or TLWS), type and enter the following command to force the NCTIU mate inactive (refer to the following note):

SET:FRC,TRCU3=a-b-c,d

Where:

a =	SM number
b =	NLI or DLI number
c =	Active ONTC side
d =	HOST for host TRCU3 problems or REMOTE for remote TRCU3 problems.

NOTE: DLI 0 is for the EVEN circuit and DLI 1 is for the ODD circuit. This command will make the mate NCTIU faulty.

29. Does **FAULT** LED on mate NCTIU light?

If **YES**, go to Step 37.

If **NO**, go to Step 30.

30. Has Office Network Timing Complex Common (ONTCCOM) sides been removed and restored?

If **YES**, go to Step 36.

If **NO**, go to Step 31.

31. At the MCC (or TLWS), type and enter the following command to remove ONTCCOM side 0:

RMV:ONTCCOM=0

32. Was ONTCCOM side 0 successfully removed?

If **YES**, go to Step 34.

If **NO**, go to Step **33**.

33. 5ESS® switch action required (refer to the following note).

NOTE: If the remove fails, a failure reason is given with the output report. This gives a clue what 5ESS® switch action needs to occur. It could be that other circuits are OOS, CLNKs need more time to remap, or numerous other reasons.

34. At the MCC (or TLWS), type and enter the following command to restore ONTCCOM side 0:

RST:ONTCCOM=0,ucl

35. Have both ONTCCOM sides been removed and restored?

If **YES**, repeat from Step **28**.

If **NO**, repeat from Step **31** for the remaining ONTCCOM side (1).

36. **Seek technical assistance.**

37. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

38. What occurs?

If **ATP**, go to Step **44**.

If **CATP**, go to Step **39**.

If **STF**, go to Step **43**.

39. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (refer to the following note)?

If **YES**, go to Step **40**.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS® switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

40. Can the unavailable resources be recovered?

If **YES**, go to Step 41.

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

41. Recover the unavailable resources or wait until unavailable resources have been recovered.
42. Repeat from Step 37.
43. See comment. At the MCC (or TLWS), restore the DLI/NLI unconditionally by typing and entering the following command:

If	Type and enter:
DLI	RST:DLI=a-b,UCL Where: a = SM number b = ONTC side
NLI	RST:NLI=a-b-c,UCL Where: a = SM number b = NLI number c = ONTC side

NOTE: Either other parts of the NLI/DLI is faulty (refer to NLI/DLI maintenance), new BNP circuit pack is bad, or the problem is in the TRCU3 backplane. If the problem is in the backplane, **seek technical assistance**.

44. At the MCC (or TLWS), remove the mate NLI/DLI circuit from service by typing and entering the following command:

If	Type and enter:
DLI	RMV:DLI=a-b Where: a = SM number b = ONTC mate side
NLI	RMV:NLI=a-b-c Where: a = SM number b = NLI number c = ONTC mate side

NOTE: The DLI removes the even and the odd circuit on the specified side, resulting in two circuit packs OOS LEDs being lighted. You may also use the remove pokes on the 1201 page.

45. Remove the suspect mate BNP circuit pack and insert a new one.
46. At the MCC (or TLWS), type and enter the following command to clear NCTIU fault:

CLR:FRC,TRCU3=a-b-c,d

Where:

a = SM number
 b = NLI or DLI number
 c = Active ONTC side
 d = HOST for host TRCU3 problems or REMOTE for remote TRCU3 problems.

NOTE: DLI 0 is for the EVEN circuit and DLI 1 is for the ODD circuit. This command should restore the mate NCTIU side.

47. Did NCTIU **FAULT** lamp go out?

If **YES**, go to Step 48.

If **NO**, go to the NCTIU repair procedure (11.15.1). Refer to the following note.

NOTE: The new pack is possibly faulty.

48. Diagnose the NLI or DLI by typing and entering the following command:

If	"Type and enter:"
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

49. What occurs?

If **ATP**, go to Step 55.

If **CATP**, go to Step 50.

If **STF**, go to Step 54.

50. Are there resources that were unavailable to run the diagnostic phase(s) that was(were) skipped (refer to the following note)?

If **YES**, go to Step 51.

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

NOTE: There should be DGN messages indicating what resources of the 5ESS[®] switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.

51. Can the unavailable resources be recovered?

If **YES**, go to Step 52.

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

52. Recover the unavailable resources or wait until unavailable resources have been recovered.
53. Repeat from Step 48.
54. **Seek technical assistance.** The 5ESS® switch NLI/DLI repair is required.

NOTE: Either other parts of the NLI is faulty (refer to NLI maintenance), new BNP circuit pack is bad, or the problem is in the TRCU3 backplane. If the problem is in the backplane, **seek technical assistance**

55. At the MCC (or TLWS), perform diagnostics on both link interface circuits as follows:

If	"Then"
MCC Page Display Mode	Use MCC 1201 page
Message Function Mode - DLI	Type and enter: DGN:DLI=a-b,TLP,RAW; Where: a = SM number b = ONTC side that the DLI is on
Message Function Mode - NLI	Type and enter: DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number b = NLI number c = ONTC side number

56. What occurs?
 - If **ATP** for both circuits, go to Step 61.
 - If **CATP** for either/or both circuits, go to Step 57.
 - If **STF** for either/or both circuits, go to the NLI/DLI fault procedure (11.15.2).
57. Are there resources that were unavailable to run the diagnostic phase(s) that was (were) skipped (refer to the following note)?
 - If **YES**, go to Step 58.
 - If **NO**, **seek technical assistance.**

NOTE: There should be DGN messages indicating what resources of the 5ESS® switch are unavailable to run the phase which was skipped. Those resources must be recovered first before continuing.
58. Can the unavailable resources be recovered?
 - If **YES**, go to Step 59.
 - If **NO**, **seek technical assistance.**
59. Recover the unavailable resources or wait until unavailable resources have been recovered.
60. Repeat from Step 55.

61. Have diagnostics been performed with each NCTIU active?

If **YES**, go to Step **64**.

If **NO**, go to Step **62**.

62. At the CIT connected to the TRCU3 shelf, switch NCTIUs by typing and entering the following:

switch-fn:fn-x:pri>manual;

Where:

x = Function pair to be switched.

63. Repeat from Step **55** for active mate NCTIU.

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

Procedure 11.16: TRCU3 FUSE ALARM MODULE (CM-2601A) REPLACEMENT PROCEDURES

OVERVIEW

These procedures should be used to replacing and installing a TRCU3 fuse alarm module (CM-2601A). The CM-2601A circuit board is disposable. It should **not** be returned to the factory for repair. For ordering purposes, the reference number is J5D003EF-1, List 6.

This procedure is divided into the following four sections: Removing a CM-2601A circuit board (11.16.1), Installing a CM-2601A circuit board (11.16.2), Removing two CM-2601A circuit board (11.16.3), and Installing two CM-2601A circuit board (11.16.4).

CLEAR MINOR, MAJOR ALARM, and FE ACTY

Identify if minor or major alarm is caused by CM-2601A circuit board. refer to the following note.

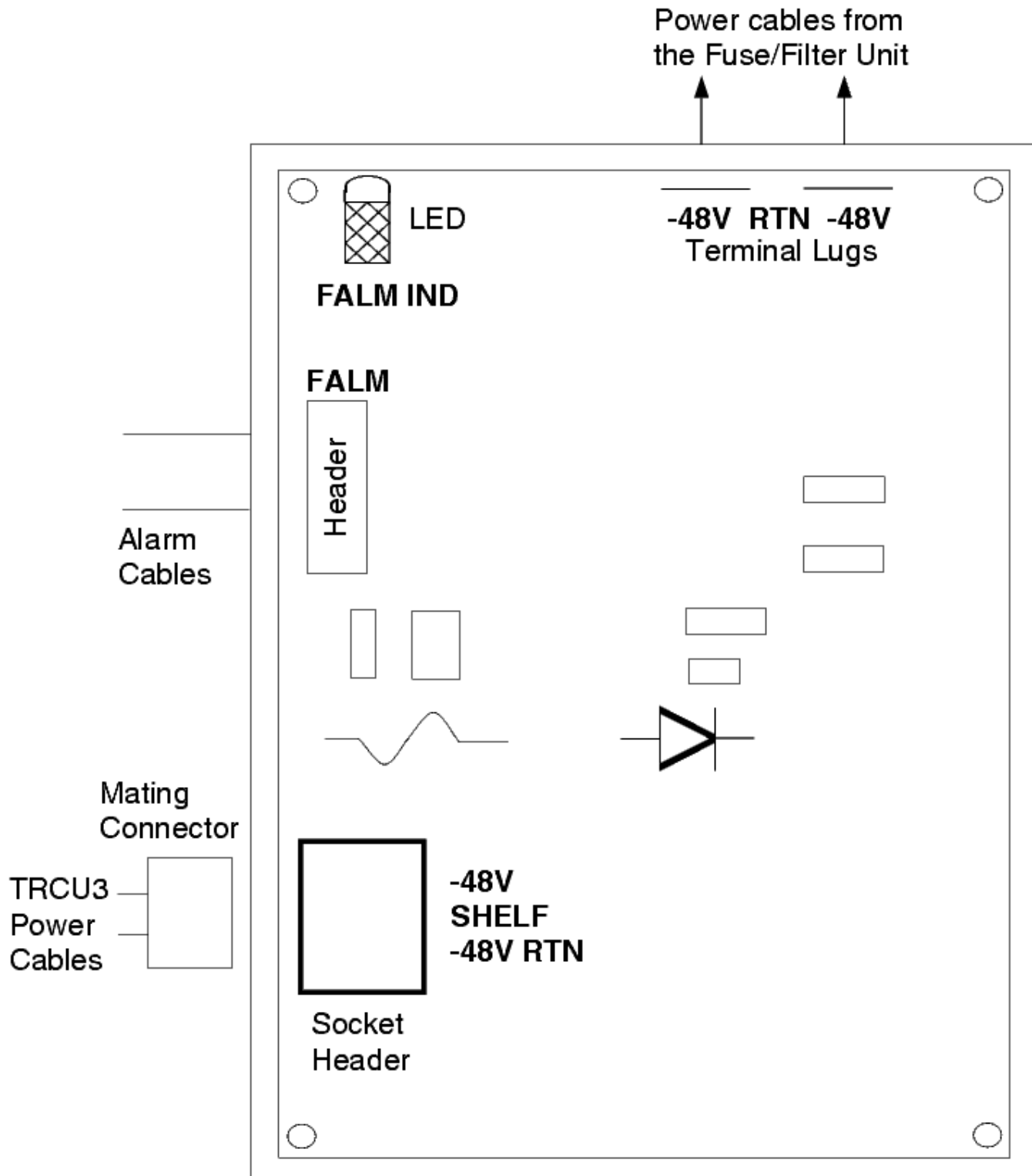
NOTE: Alarm failures could be caused by duplex failure in the NCT links. FE ACTY alarm will be reported by other nodes on the ring or from the host/remote TRCU3 unit.

Visually inspect the two CM-2601A circuit board at the rear of the TRCU3 shelf.

If one of the LEDs on CM-2601A circuit board is lighted proceed to and execute sections 11.16.1 and 11.16.2 .

If the LED on both CM-2601A circuit boards are lighted proceed to and execute sections 11.16.3 and 11.16.4 .

Refer to Figure 11.16-1 .



Note: Bold words on the above diagram are the labels printed on the CM-2601A circuit board.

Figure 11.16-1 Top View of the CM-2601A Circuit Board

PROCEDURE

11.16.1 REMOVING A CM-2601A CIRCUIT BOARD

NOTE: Use a standard Flathead screwdriver to perform the following steps when removing a CM-2601A circuit board.

1. Connect a CIT to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the fault. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0 *User/Service Manual (TARP)*, 363-206-285.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

2. At the TRCU3 CIT, verify which CM-2601A fuse is blown by typing and entering the following command:

rtrv-alm-all

Response:

If		Then
Alarm Level	Source Address	-48 V Power/Fuse Bus
MINOR	env-8	A
or MINOR	env-3	B

Response: The **MN** and **NE ACTY** LEDs will turn on at the User Panel of a host TRCU3 shelf. If the alarm is from a remote TRCU3 shelf location, the **FE ACTY** LED will turn on.

3. Visually inspect the CM-2601A circuit board at the rear of the TRCU3 shelf.
4. Is the LED on the CM-2601A board lighted?
If **YES**, go to Step 6.
If **NO**, go to Step 5.
5. **Seek technical assistance.**
6. Mark the faulty circuit board on the backplane of the TRCU3 unit.
7. At the front of the TRCU3 unit, locate the -48 V power fuse associated with the faulty CM-2601A board.
8. Disengage the -48 V power fuse (FA or FB) associated with the faulty CM-2601A board (Figure 11.16-1).
Carefully remember the fuse location.
9. At the User Panel on the TRCU3 shelf, visually check that the power LED for the faulty CM-2601A circuit board is off (Power FA or FB LED).
10. At the TRCU3 CIT, verify that the -48 V power fuse failed by typing and entering the following command:

rtrv-alm-all

Response:

Source Address	Description

env-8	-48 V Power/Fuse FA for the TRCU3 failed
env-3	-48 V Power/Fuse FB for the TRCU3 failed

NOTE: It is now safe to remove the cables and the CM-2601A from TRCU3 unit.

11. Refer to the following **Danger**. At the rear of the TRCU3 shelf, unplug the power cables from the terminal lugs located at the top of the CM-2601A board.

DANGER: -48 V is present on the adjacent CM-2601A circuit board and in the backplane.

12. Unplug the power cables from the socket header located at the bottom left corner of the CM-2601A board.

NOTE: The socket connector is locked in place with the mating connector. To unlock the socket connector, press both sides and pull.

13. Unplug alarm cables from FALM header located at the top left side of the CM-2601A board. Notice the orientation of the FALM connector to the FALM header.
14. Carefully remember the position of the CM-2601A board. The LED should always be positioned to the top left corner of the unit.
15. Using a Flathead screwdriver, unscrew the four mounting screws located at each corner of the CM-2601A board. Screws should be saved for the new CM-2601A board. Refer to the following note.

NOTE: The CM-2601A board has been properly removed. The new CM-2601A board can now be installed.

16. **STOP. YOU HAVE COMPLETED THE REMOVING PROCEDURE FOR A CM-2601A CIRCUIT BOARD.**

11.16.2 INSTALLING A CM-2601A CIRCUIT BOARD

NOTE: Use the following steps when installing a CM-2601A circuit board.

1. Plug the alarm cables into the FALM header located at the top left side of the CM-2601A board.
2. Plug the TRCU3 power cables mating connector to the -48 V/SHELF/-48 V RTN header, which is located at the bottom left corner of the CM-2601A board.

NOTE: The mating connectors and the socket header is keyed to be plugged in only one way.

3. Plug the power cables from the Fuse/Filter Unit to the CM-2601A board -48 V RTN -48 V terminal lugs of the CM-2601A board.
4. Install the -48 V power fuse for the new CM-2601A circuit board.
5. Are both **PWR ON** LEDs (**A** and **B**) lighted?

If **YES**, go to Step 8.

If **NO**, go to Step 6.

6. Is replacement fuse good?

If **YES**, **seek technical assistance**.

If **NO**, go to Step 7.

7. Replace fuse and repeat from Step 5.

8. At the TRCU3 CIT, verify that all alarms have been cleared by typing and entering the following command:

rtrv-alm-all

Response: There are no active alarms or status conditions.

9. **STOP. YOU HAVE COMPLETED THE INSTALLATION PROCEDURE FOR A CM-2601A CIRCUIT BOARD.**

11.16.3 REMOVING TWO CM-2601A CIRCUIT BOARDS

NOTE: Use a standard Flathead screwdriver to perform the following steps when removing a CM-2601A circuit board.

1. Connect a CIT to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the fault. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0 *User/Service Manual (TARP)*, 363-206-285.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

2. Visually inspect the CM-2601A circuit board at the rear of the TRCU3 shelf.

3. Is the LED on the CM-2601A board lighted?

If **YES**, go to Step 5.

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

4. **Seek technical assistance.**

5. At the front of the TRCU3 unit, locate the -48 V power fuse associated with the faulty CM-2601A board.

6. Disengage the -48 V power fuse (FA or FB) associated with the faulty CM-2601A board (see Figure 11.16-1). **Carefully remember the fuse location.**

7. At the User Panel on the TRCU3 shelf, visually check that the power LED for the faulty CM-2601A circuit board is off (Power FA or FB LEDs).

NOTE: Refer to Steps 8 through 12 for removing the faulty CM-2601A board from side A.

8. Refer to the following **Danger**. At the rear of the TRCU3 shelf, unplug the power cables from the terminal lugs located at the top of the CM-2601A board.

DANGER: -48 V is present on the adjacent CM-2601A circuit board and in the backplane.

9. Unplug the power cables from the socket header located at the bottom left corner of the CM-2601A board.

NOTE: The socket connector is locked in place with the mating connector. To unlock the socket connector, press both sides and pull.

10. Unplug alarm cables from FALM header located at the top left side of the CM-2601A board. Notice the orientation of the FALM connector to the FALM header.

11. Carefully remember the position of the CM-2601A board. The LED should always be positioned to the top left corner of the unit.

12. Using a Flathead screwdriver, unscrew the four mounting screws located at each corner of the CM-2601A board. Screws should be saved for the new CM-2601A board.

NOTE: Refer to Step 13 for removing the faulty CM-2601A board from side B.

13. Repeat Step 8 through 12 for the CM-2601A board side B. Refer to the following note.

NOTE: The CM-2601A boards has been properly removed. The new CM-2601A boards can now be installed.

14. **STOP. YOU HAVE COMPLETED THE REMOVING PROCEDURE FOR TWO CM-2601A CIRCUIT BOARDS.**

11.16.4 INSTALLING TWO CM-2601A CIRCUIT BOARDS

NOTE: Use the following steps when installing two CM-2601A circuit boards. Refer to Steps 1 through 3 for installing the CM-2601A circuit board for side A

1. Plug the alarm cables into the FALM header located at the top left side of the CM-2601A board.
2. Plug the TRCU3 power cables mating connector to the -48 V/SHELF/-48 V RTN header, that is located at the bottom left corner of the CM-2601A board.

NOTE: The mating connectors and the socket header is keyed to be plugged in only one way.

3. Plug the power cables from the Fuse/Filter Unit to the CM-2601A board -48 V RTN -48 V terminal lugs of the CM-2601A board.

NOTE: Refer to Step 4 for installing the CM-2601A circuit board for side B.

4. Repeat steps 1 through 3 for CM-2601A circuit board side B.
5. Install the -48 V power fuse for the new CM-2601A circuit board.
6. Are both **PWR ON** LEDs (**A** and **B**) lighted?

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

If **NO**, go to Step 7.

7. Is replacement fuse good?

If **YES**, **seek technical assistance**.

If **NO**, go to Step 8.

8. Replace fuse and repeat from Step 6.
9. At the TRCU3 CIT, verify that all alarms have been cleared by typing and entering the following command:

rtrv-alm-all

Response: There are no active alarms or status conditions.

10. **STOP. YOU HAVE COMPLETED THE INSTALLATION PROCEDURE FOR TWO CM-2601A CIRCUIT BOARDS.**

12. CIRCUIT PACK MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for proper maintenance and/or replacement of circuit packs.

Procedure 12.1: COMMON NETWORK INTERFACE (CNI) POWER PACK REPLACEMENT

OVERVIEW

The Common Network Interface (CNI) ring node cabinet uses two 495FA power converters per shelf. These converters supply power to the node(s) on their half of the shelf only. Therefore, each node in the CNI cabinet is powered by its own converter, except for LN-5, which gets its power from both shelf converters.

A 495F power converter can fail for four main reasons:

- (1) The power pack itself is faulty.
- (2) A frame fuse in the ring cabinet has blown, powering down the converter.
- (3) A bus fuse in the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) has blown, which causes multiple converters to go out of service (OOS).
- (4) A circuit pack supplied by the power converter has its power shorted to ground.

It is rare for more than one node to drop out when a power converter fails. Any additional nodes going OOS will be restored by Automatic Ring Recovery (ARR) software. Only the node(s) associated with the faulty power converter should fail to be restored to service.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, for details.

PROCEDURE

1. Allow the ARR software to restore all nodes possible. Use the **OP:DMQ** command to view ARR's restore requests.

NOTE: The ARR software will also attempt to restore the node(s) associated with the faulty power converter. However, ARR will not attempt to restore the same node after three previous attempts have failed.
2. At the Master Control Center (MCC), view Page 118 to verify that the PWR ALM indicator is backlighted red.
 - (a) If the indicator is not backlighted, then the problem is more likely to be a circuit pack in the node. Refer to Procedure 12.2, Common Network Interface (CNI) Ring Circuit Pack Replacement, to recover the node.
 - (b) If the indicator is backlighted, continue with Step 3.
3. Attempt to clear the PWR ALM by using command **ALW:ALM,CNI,PWR**.
 - (a) If the alarm clears, go to Step 21 for restoring the nodes to service.
 - (b) If the indicator is still backlighted, continue with Step 4.
4. To prevent the ARR software from attempting to recover nodes while the power converter is being replaced, inhibit it by using command **INH:DMQ,SRC=ARR**.
5. At the MCC, view Page 118 (5E8 software release and earlier) or Page 1520 (5E9 software release and

later) and determine if any of the nodes in the ring are isolated (ISO).

- (a) If at least one node is isolated, go to Step 12.
- (b) If no nodes are isolated, continue with Step 6.

NOTE: The PWR ALM indicator is driven by a relay in the 495FA power converter. Any converter closing its relay will set off the alarm. This relay can falsely trigger an alarm if the CNI frame was not properly powered when first installed. In this case, the ALM light on the front of the power converter will not be lighted because the converter is still supplying the +5 V DC to the node(s). Therefore, this converter must be replaced to prevent future false alarms.

6. At the back of the CNI ring cabinet, pull the alarm scan lead (labeled CVPAA or CVPAB) off each converter until the alarm clears. Refer to MCC Page 118.
7. Replace the last scan lead removed and verify that the PWR ALM indicator backlights again.
8. Identify the node which receives power from that converter.
 - (a) If the converter is on the three node shelf (LN-6, LN-5, LN-4), LN-5 will have to be removed (if equipped) along with the other node identified.
 - (b) If the converter is not powering a node, then it can be replaced without affecting the ring.
9. If the node(s) identified are CCS6 or CCS7 and are active (ACT), then remove their signaling links with the command **CHG:SLK=xx-y,MOOS**, where **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.
10. If the node(s) identified are ACT, then remove them from service using one of the following:
 - (a) For link nodes (LN) and direct link nodes (DLN), use command **RMV:LNxx=y**.
 - (b) For a Ring Peripheral Controller Node (RPCN), use command **RMV:RPCNxx=0**.

In both commands, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.
11. Using one of the identified nodes, configure the ring to isolate them from the ACT ring segment using one of the following:
 - (a) For LNs and DLNs, use command **CFR:RING,LNxx=y,EXCLUDE**.
 - (b) For an RPCN, use command **CFR:RING,RPCNxx=0,EXCLUDE**.

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.
12. Verify on the Receive-Only Printer (ROP) that the node(s) that were not restored have POWER as a possible problem listed on the Trouble Locating Procedure (TLP) listing.
 - (a) If POWER is not on the list, the node has a bad circuit pack. Refer to Procedure 12.2, Common Network Interface (CNI) Ring Circuit Pack Replacement.
 - (b) If POWER is on the TLP list, continue with Step 13.
13. At the ring node cabinet, verify that the node(s) which are OOS have an associated power converter with its ALM light on. If the light is not on, then the fuse will have to be replaced along with the power converter (Step 15).

14. Unseat ALL circuit packs from node(s) affected by the faulty power converter.
15. Remove the faulty converter from the frame. If the converter's fuse was blown (Step 13), replace it first, then install the new power converter.
16. At the front of the newly installed converter, using a voltmeter, verify that the converter is supplying +5 V DC.
17. At the MCC, refer to Page 118 and verify that the PWR ALM has cleared.

NOTE: If this was not the only power converter which needs replacing, then the alarm will still exist until all power converters are operational.

18. Reseat all packs powered by the replaced converter.

NOTE: Watch the power converter ALM light as each pack is replaced. If after a circuit pack is installed the power converter re-alarms, then that circuit pack may be shorting the converter. The converter may need to be replaced again (if it was damaged) as well as the circuit pack in the node.

19. Diagnose the OOS node(s) running all phases with one of the following:

- (a) For LNs and DLNs, use command **DGN:LNxx=y,RAW,TLP**.
- (b) For an RPCN, use command **DGN:RPCNxx=0,RAW,TLP**.

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

20. If any node circuit pack failed diagnostics in Step 19, replace it and repeat the step.

21. Restore all nodes unconditionally using one of the following:

- (a) For LNs and DLNs, use command **RST:LNxx=y,UCL**.
- (b) For an RPCN, use command **RST:RPCNxx=0,UCL**.

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

22. If the node(s) restored are CCS6 or CCS7 and their signaling links are in the manual OOS (MOOS) state, then restore the links using command **CHG:SLK=xx-y,IS**, where **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

NOTE: Each link will drop into the OOS state for up to 3 minutes until the link can synchronize with the far-end.

23. All ring nodes should now be restored and the ring should have no isolated nodes. At this point, allow the ARR software to execute for future node problems using command **ALW:DMQ,SRC=ARR**.
24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 12.2: COMMON NETWORK INTERFACE (CNI) RING CIRCUIT PACK REPLACEMENT

OVERVIEW

This procedure is used for the replacement of Common Network Interface (CNI) circuit packs. It is not used for the replacement of power converters that are used in the same frame. For power converter replacement, refer to Procedure 12.1, Common Network Interface (CNI) Power Pack Replacement.

Each node in the CNI ring uses a combination of circuit packs to allow it to function. Many circuit packs are common among the nodes, but certain packs (LI, RI0, RI1, and IFB) are not interchangeable.

Currently, four versions of the Link Interface (LI) pack exist. These versions are for both the CCS6 and CCS7 signaling, and are in encrypted and non-encrypted formats. It is critical that the microcode on the replacement pack is checked against the original.

The Ring Interface (RI) packs (RI0 and RI1) are not backward compatible. Only replace the faulty pack with one having the same or greater pack code. For example, a UN123C can replace a UN123A, but the opposite is not true.

There are two types of Interframe Buffer (IFB) packs for the CNI ring. The TN915 packs are used for the Ring Peripheral Controller Node (RPCN) and highest Link Node (LN) in each group. In contrast, the TN918 buffer pack is only used in offices equipped with Direct Link Nodes (DLN) and is placed in both LN-1 and the DLN. The TN915 and TN918 packs are not interchangeable.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, for details.

NOTE: This procedure assumes that only one node in the ring has dropped from service. For multiple node outages, repeat the procedure for each out-of-service (OOS) node.

PROCEDURE

1. Allow the Automatic Ring Recovery (ARR) software to restore the faulty node if possible. Use the **OP:DMQ** command to view ARR's restore requests.

NOTE: The ARR software will not attempt to restore the same node after a maximum of three attempts have failed.

2. At the Master Control Center (MCC), view Page 118 to verify that the PWR ALM indicator is NOT backlighted red. If the indicator is backlighted, then the problem is more likely to be a power converter. Refer to Procedure 12.1, Common Network Interface (CNI) Power Pack Replacement, to recover the node.
3. To prevent the ARR software from attempting to recover nodes while circuit packs are being replaced, inhibit it by using command **INH:DMQ,SRC=ARR**.
4. At the MCC, view Page 118 (5E8 software release and earlier) or Page 1520 (5E9 software release and later) to determine if the OOS node in the ring is isolated (ISO).
 - (a) If the OOS node is not ISO, continue with Step 5.
 - (b) If the OOS node is ISO, go to Step 6.

5. Configure the ring to isolate the OOS node from the active (ACT) ring segment using one of the following:
 - (a) For LNs and DLNs, use command **CFR:RING,LNxx=y,EXCLUDE** .
 - (b) For an RPCN, use command **CFR:RING,RPCNxx=0,EXCLUDE** .

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

6. Look at the Receive-Only Printer (ROP) Trouble Locating Procedure (TLP) to see what pack(s) have been identified as faulty.

NOTE: In the following steps, only replace one pack at a time.

7. Remove the faulty pack from the frame and install an appropriate replacement.

NOTE: Before pulling the circuit pack, make sure that packs having either the Ring Quarantine (RQ) or No Token (NT) lights are illuminated. If the lights are not on, go back to Step 5 and remove the node from the ACT ring segment.

CAUTION: Since most circuit packs require considerable force to insert or remove, extreme caution must be exercised. Carefully inspect the circuit pack edge connector and the backplane connector for bent or missing pins.

8. Diagnose the OOS node running all phases using one of the following:

- (a) For LNs and DLNs, use command **DGN:LNxx=y,RAW,TLP** .
- (b) For an RPCN, use command **DGN:RPCNxx=0,RAW,TLP** .

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

9. If the diagnostics again fail listing the pack just replaced, the original pack is good and can be used again. Look at the TLP listing again and choose the next circuit pack down on the list and return to Step 6.

10. Restore the node unconditionally using one of the following:

- (a) For LNs and DLNs, use command **RST:LNxx=y,UCL**.
- (b) For an RPCN, use command **RST:RPCNxx=0,UCL**.

In both cases, **xx** is ring group 00 or 32 and **y** is any node member number 1 through 6.

11. All nodes in the ring should now be ACT. If other nodes in the ring are OOS, go back to Step 4 and restore these nodes.
12. At this point, allow the ARR software to execute for future node problems by using command **ALW:DMQ,SRC=ARR**.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 12.3: COMMON NETWORK INTERFACE (CNI) RING FUSE REPLACEMENT

PROCEDURE

1. To prevent the Automatic Ring Recovery (ARR) software from attempting to recover the node while the power converter fuse is being replaced, inhibit it by using command **INH:DMQ,SRC=ARR**. In addition, if affected the node is not out-of-service (OOS), then, put the node in a manual out-of-service (MOOS) state by using the command **CHG:SLK=xx-y,MOOS**.
2. Completely unseat all the circuit packs including the 495FA power converter associated with the node requiring the fuse replacement in the CNI Ring Node Cabinet (RN 00/32).

NOTE: If the converter is on the three node shelf (LN-6, LN-5, LN-4), the circuit packs associated with LN-5 will also have to be unseated.

CAUTION: Since most circuit packs require considerable force to insert or remove, extreme caution must be exercised. Carefully inspect the circuit pack edge connector and the backplane connector for bent or missing pins.

3. Remove the fuse from the fuse block. Insert the replacement fuse. For fuse replacements associated with the top row of the fuse block (M--), use the 70G (0.5-amp) monitor fuse. For fuse replacements associated with the second to top row of the fuse block (000, 001, 031, 110, 111, 220, 221, 230, 231, 201, 340, 341, 050, or 051), use the 74D (10-amp) buffer fuse.

Use the following illustrations to correlate the affected node from the MCC 118 Page to the associated fuse in the RNC.

Power Buses for Cabinet with Only 2 Link Nodes		Power Buses for Cabinet with More than 2 Link Nodes	
5		5	LN32-6 LN32-4 M50/050 M51/051
4		4	DLN32-2 LN32-3 M40/340 M41/341
3	RPCN32-0 LN32-1 M30/230 M31/031	3	RPCN32-0 LN32-1 M30/230 M31/231
2		2	LN00-6 LN00-4 M20/220 M21/221
1		1	DLN00-2 LN00-3 M10/110 M11/111
0	RPCN00-0 LN00-1 M00/000 M01/201	0	RPCN00-0 LN00-1 M00/000 M01/001

4. Reinsert the 495FA power converter. At the front of the power converter, using a voltmeter, verify that the converter is supplying +5 V DC.
5. At the MCC, refer to Page 118 and verify that the FUSE ALM and PWR ALM has cleared.

NOTE: If this was not the only power converter fuse which needs replacing, then the alarm will still exist until all power converters are operational.

6. Reseat the remaining circuit packs in the node.

NOTE: Watch the power converter ALM light as each pack is replaced. If after a circuit pack is installed the power converter re-alarms, then that circuit pack may be shorting the converter. The converter may need to be replaced (if it was damaged) as well as the circuit pack in the node.

7. Diagnose the OOS node running all phases with one of the following:

- (a) For LNs and DLNs, use command **DGN:LNxx=y,RAW,TLP** .
- (b) For an RPCN, use command **DGN:RPCNxx=0,RAW,TLP** .

In both cases, xx is ring group 00 or 32 and y is any node member number 1 through 6.

- 8. If any node circuit pack failed diagnostics in Step 7, reseal and/or replace it and repeat Step 7.
- 9. Restore the node unconditionally only after diagnostics have ATPed in Step 7, using one of the following:
 - (a) For LNs and DLNs, use command **RST:LNxx=y,UCL**.
 - (b) For an RPCN, use command **RST:RPCNxx=0,UCL**.

In both cases, xx is ring group 00 or 32 and y is any node member number 1 through 6.

- 10. If the node restored is CCS6 or CCS7 and its signaling link is in the manual OOS (MOOS) state, then restore the link using command **CHG:SLK=xx-y,IS**, where xx is ring group 00 or 32 and y is any node member number 1 through 6.

NOTE: Each link will drop into the OOS state for up to 3 minutes until the link can synchronize with the far end.

- 11. All ring nodes should now be restored and the ring should have no isolated nodes. At this point, allow the ARR software to execute for future node problems using command **ALW:DMQ,SRC=ARR**.
- 12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 12.4: COMMON NETWORK INTERFACE (CNI) DIGITAL FRAME ACCESS (DFA) CIRCUIT PACK AND MODEM REPLACEMENT

OVERVIEW

This procedure is used to replace the TF10B, TF9, or 2556A Modem in the CNI DFA cabinet when diagnostic phase 48 fails on the transmission side of the Link Interface.

The DFA cabinet converts the RS449 protocol to V.35 via the TF9 circuit pack. This signal is then fed into the Digital Service Unit (DSU) or modem. The modem then sends out a 56K DDS signal to the transmission facilities. The TF10B circuit pack powers both the TF9 and modem. When there is a problem with the connection from the Link Interface (LI) to the modem, diagnostic phase 48 will fail.

Diagnostic phase 48 does a loop-around test using the modems built-in self-loop feature. It sends a prearranged signal to the modem and expects to receive the signal back on the incoming side. This test continues for about 30 seconds.

If the node is failing any other diagnostic phase other than 48, use the CNI Ring Circuit Pack Replacement Procedure 12.2. If the Signaling Link is not staying up, but the node passes diagnostics **seek technical assistance**.

While performing this procedure, if reference is made to a specific input or output message, refer to the 235-600-700, *Input Message Manual*, or 235-600-750, *Output Message Manual*, for details.

NOTE: This procedure assumes that only one node has failed diagnostics. For multiple node outages, repeat the procedure for each failing node.

PROCEDURE

1. Allow Automatic Ring Recovery (ARR) software to restore faulty node if possible. Use the OP:DMQ command to view ARR's restore requests.

NOTE: ARR will not attempt to restore the same node after a maximum of three attempts have failed.

2. At the Master Control Center (MCC), view Page 118 to see if the PWR ALM indicator is backlighted red, if red continue with the next step; if not red, then continue with Step 6.
3. Find the blown fuse in the DFA cabinet and locate the TF10B circuit pack that it feeds. Unseat the TF10B.
4. Replace the blown fuse with the same type fuse.
5. Reseat the TF10B previously unseated.
6. Restore the node to service using command RST:LNxx=y,RAW,TLP
7. If phase 48 fails, then continue with the next step, if the test does not fail go to Step 17.
8. At this point it is unknown which hardware is the cause of the failure, the TF9 or Modem. Historically speaking, the TF9 has a higher failure rate than the Modem.
9. Locate the TF9 associated with failing node and replace it.
10. Restore the node to service using command RST:LNxx=y,RAW,TLP

11. If phase 48 fails, then continue with the next step, if the test does not fail go to Step 17.
12. Locate the Modem associated with failing node. Remove the DDS, V.35 and power connectors. Be very careful when removing the power connector, it is attached using a plastic clip. The clip must be pulled back before the connector can be removed.
13. Remove the old modem and lay it next to the replacement. Set the replacement Dual In-line Package (DIP) switch and jumpers identically to the old modem settings. There is a total of 12 switches per DSU; 1 DIP switch and 11 strap plug/jumpers (3 near the back of the DSU, 7 on the side and 1 on the front).
14. Install replacement modem and connect DDS, V.35, and power.
15. Restore the node to service using command RST:LNxx=y,RAW,TLP
16. If phase 48 fails, then **seek technical assistance**.
17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 12.5: PERFORM SEQUENTIAL REMOVAL AND INSERTION OF LU CIRCUIT PACKS

OVERVIEW

This procedure provides the proper sequence(s) for removal (or unseating) and insertion (or reseating) of Line Unit (LU) circuit packs. Unseating of all grid and Gated Diode Crosspoints Access (GDXACC) packs is required before -48 V DC is restored if the LU is not equipped for line unit auto power recovery (LUARP). Unseating and reseating in the proper sequence(s) is(are) required to avoid potential damage to certain packs that can occur when other packs are missing or not powered up. For this reason, the following **Cautions** should be observed. Also, for personal safety, observe the following **DANGER**.

CAUTION 1: Do not remove any -48 V DC fuse at the LU cabinet or at the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) or in any other way interrupt the -48 V DC power to the LU packs as a troubleshooting technique.

CAUTION 2: Removal of an entire LU from service should only be done when necessary (rarely). Once power is lost, the system may remove working lines, marking them "OOS, MAN." These lines must be restored via Step 9 to complete this procedure and minimize the interruption of service on those lines connected to the LU.

DANGER: Hazardous voltages are present on LU packs (even shortly after they are removed from the cabinet). Do not touch exposed components or wiring paths on the pack. When removing or inserting a pack, use the latch and hold the pack at its edges without touching components or paths.

PROCEDURE

1. For removal or unseating of LU packs:

(a) If for LU Model 1 (J5D004AB):

- (1) For the entire LU, perform Steps 3 through 5.
- (2) For a TN340(B) grid pack only, remove the grid from service with the appropriate **RMV** input message and unseat the two TN338(B)s (first) and then the TN340(B) pack.
- (3) For a TN332(B) pack only, remove the GDXACC circuit in the service group (SG) from service with the appropriate **RMV** input messages and unseat the TN331(B) (first) and then the TN332(B) pack.
- (4) **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**

(b) If for LU Model 2 (J5D004AC), LU Model 3 (J5D004AD):

- (1) For the entire LU, perform Steps 3 through 5.
- (2) For a TN832(B) pack only, remove the GDXACC circuit in the SG from service with the appropriate **RMV** input messages and unseat the TN831(B) (first) and then the TN832(B) pack.
- (3) For both the TN842B and TN843 packs, remove the Line Unit Common Control (LUCOMC) circuit in the SG from service with the appropriate **RMV** input messages and unseat the TN843 (first) and then the TN842B pack.

NOTE: Some interrupts may occur when unseating the TN843 pack. Allow the system time to recover by itself before unseating the TN842B pack.

(4) **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**

2. For insertion or reseating of LU packs:

(a) If for LU Model 1 (J5D004AB):

- (1) For the entire LU, perform Steps 6 through 8.
- (2) For a TN340(B) grid pack only, insert and latch the TN340(B) pack and (last) the TN338(B) packs (one at a time). Unconditionally restore the grid with the appropriate **RST** input messages.
- (3) For a TN332(B) pack only, insert and latch the TN332(B) pack and (last) the TN331(B) pack. Restore the packs with the appropriate **RST** input messages.
- (4) **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

(b) If for LU Model 2 (J5D004AC), LU Model 3 (J5D004AD):

- (1) For the entire LU, perform Steps 6 through 8.
- (2) For a TN832(B) pack only, insert and latch the TN832(B) pack and (last) the TN831(B) pack. Unconditionally restore the packs with the appropriate **RST** input messages.
- (3) For both the TN842B and TN843 packs, insert and latch the TN842B pack and (last) the TN843 pack. Unconditionally restore the packs with the appropriate **RST** input messages.
- (4) **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3. Before removing/unseating any LU packs, verify that the LU's equipment groups [Service Group (SG) 0 and SG 1] and GRIDs (0-7/9) are out of service (OOS). Use of the appropriate **RMV** input messages with the unconditional (UCL) option may be required to remove the entire LU from service.

4. Depending on which model of LU (1, 2, or 3) is involved, use the appropriate pack removal/unseat procedure per Substeps (a) and (b) as follows:

(a) Circuit Pack Removal Sequence for LU Model 1 (J5D004AB):

- (1) For each equipped GRID (GRID 0 - GRID 7), unseat the two TN338(B)s (first) and then the TN340(B) pack.
- (2) For each equipment group (SG 0 and SG 1), unseat the TN331(B) (first) and then the TN332(B).

(b) Circuit Pack Removal Sequence for LU Model 2 (J5D004AC), LU Model 3 (J5D004AD):

- (1) For each equipped GRID (GRID 0 - GRID 7/9), unseat the two GRID packs [TN838s, TN1048s, TN1058(B,C)s].

- (2) For each equipment group (SG 0 and SG 1), unseat the TN831(B) (first) and the TN832(B) (last).

5. **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**

6. Before inserting or reseating the packs in the LU, verify that no fuses are blown for the -48 V DC power to the LU (either at the LU cabinet, the PCFD, or the GPFD).

NOTE: In Step 7, when inserting the packs (one at a time), be alert to a fuse blowing at the LU cabinet, the PCFD or the GPFD. The blowing of the fuse may be due to a faulty pack being inserted or some other trouble causing excessive current load that should be cleared before proceeding with the pack insertion procedure.

7. Depending on which model of LU (1, 2, or 3) is involved, use the appropriate pack inserting/reseating procedure per Substeps (a) and (b) as follows (be alert for the blowing of a fuse):

(a) Circuit Pack Insertion Sequence for LU Model 1 (J5D004AB):

- (1) Insert and latch (one at a time, in order specified) the TN343, TN335(B,C)s, TN333s, TN336(B), TN332(B), and (last) the TN331(B).
- (2) For each equipped GRID (GRID 0 - GRID 7), insert and latch (one at a time) the TN340(B) pack and (last) the two TN338(B)s.

(b) Circuit Pack Insertion Sequence for LU Model 2 (J5D004AC), LU Model 3 (J5D004AD):

- (1) Insert and latch (one at a time, in the order specified) the UN322(B) (LU Model 3) or TN843 and TN842(B) (LU Model 2), TN335(C,E)s, TN844s, TN832(B), and (last) the TN831(B).
- (2) For each equipped GRID (GRID 0 - GRID 7/9), insert and latch (one at a time) the GRID packs [TN838s, TN1048s, TN1058(B,C)s].

8. Unconditionally restore both SGs and all GRIDs of the LU to service, using the appropriate **RESTORE** commands at the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
9. List the OOS lines by entering input message **OP:LIST,LINES,FULL:OOS**. Use the **RST:LINE** input message to restore the OOS lines. Sample test for dial tone.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 12.6: DETERMINE SWITCH/STRAP SETTINGS FOR TRCU CIRCUIT PACKS

OVERVIEW

When replacing the 16-type Optical Link Interface (OLI) or AKM3 circuit packs, the attenuation switches (or straps) on the replacement pack must be set according to the "NOTE" on the plastic cover panel in front of the Transmission Rate Converter Unit (TRCU). If the settings have not been marked or if the validity of the markings are in question, the procedure that follows can be used as a quick method of determining proper settings.

PROCEDURE

1. If the TRCU is equipped with an AKM3, go to Step 2.
If the TRCU is equipped with a 16-type OLI, go to Step 3.
2. For a TRCU equipped with an AKM3:

The settings of the option straps on the AKM3 (Figure 12.6-1) are based on the length of cable from the TRCU to the DSX-3 in Table 12.6-1.

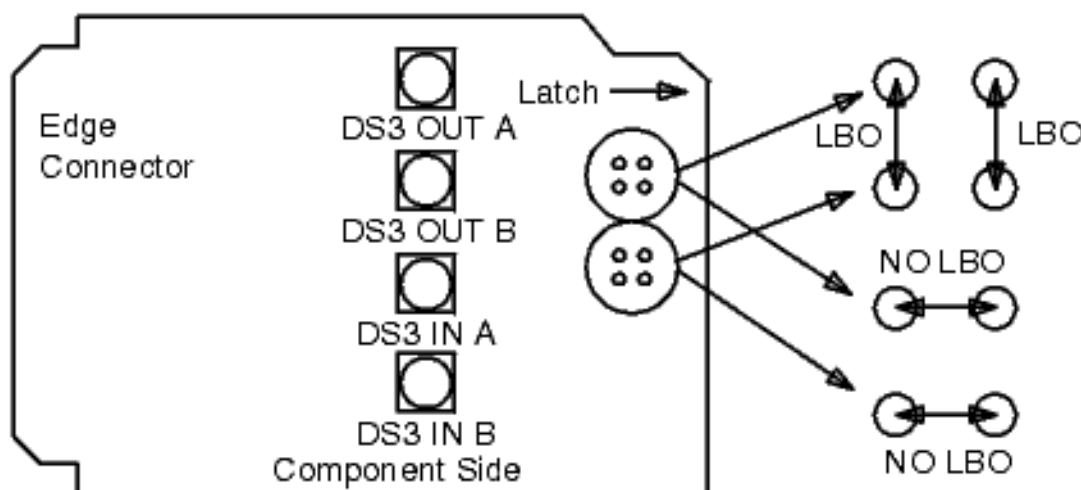


Figure 12.6-1 Line Build-Out (LBO) Option Straps

Table 12.6-1 Line Build-Out Selections

CABLE LENGTH (FEET)	PLUG SETTING
0 to 225	LBO
>225 to 400	No LBO

3. For a TRCU equipped with a 16-type OLI:

Obtain an Optical Loss Test Set (OLTS), such as a Lucent Technologies Local Area Network (LAN) Optical Loss Set 938A1. The OLTS must be capable of measuring 35 dB at a wavelength of 1300 nanometers (nm) on single or multimode optic fiber.

NOTE: Care should be taken to make sure that the connector adapters between the test set's optical ports and the optical fibers are correctly chosen.

4. For each OLI pack, locate the associated optical fibers and measure the end-to-end transmission loss as

follows:

- (a) Measure the host site first and then the remote site when doing the following:
 - (1) Connect the test set adapter to the yellow cable connector (output).
 - (2) Read and record the output measurement.
 - (3) Disconnect the test set adapter from the yellow cable connector and reconnect to the grey cable connector (input).
 - (4) Read and record the input measurement.
 - (5) Disconnect the test set adapter from the grey cable connector.
- (b) Calculate the fiber path transmission loss by subtracting the input reading from its associated output reading.
- (c) If the loss is within the limits specified in Table 12.6-2, set the transmitter switch properly (Figure 12.6-2) and record the switch setting on the plastic cover panel of the TRCU housing. Table 12.6-2 lists the switch points for the combinations of transmitters and receivers.
- (d) If the loss is outside the limits specified in Table 12.6-2, check the connector adapters to ensure that they are the correct adapters and are properly connected. Repeat previous measurements if required.

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

Table 12.6-2 Transmitter Switch Facility Loss

TRANSMITTER	RECEIVER	LW	HI
16E or 16F	16E	0 to 9 dB	9 to 17.5 dB
16E or 16F	16F or 16G	0 to 11 dB	11 to 22 dB
16G	16E	7 to 15 dB	15 to 23.5 dB
16G	16F or 16G	7 to 16 dB	16 to 28 dB

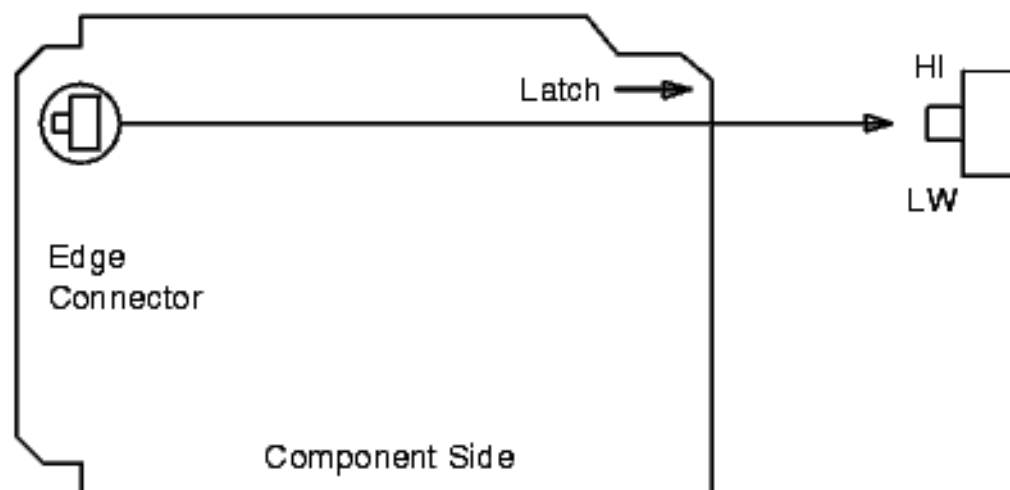


Figure 12.6-2 Optical Line Interface Unit (OLIU) Option Switches

Procedure 12.7: REPLACE SCANNER AND SIGNAL DISTRIBUTOR (SCSD) UN33B CIRCUIT PACK

OVERVIEW

This procedure is to be used when replacing the UN33B circuit pack.

PROCEDURE

1. If input/output processor (IOP) is not already removed from service, at terminal, type:

RMV:IOP=a;

Where:

a = member number of IOP.

2. On **TN6** at location 29-162, depress **OFF** switch.

3. Remove **UN33B** circuit pack from IOP.

4. **NOTE:** If older versions of circuit packs will not insert into the new cost-reduced apparatus housing due to double card guide tabs (center and side), remove the side card guide tabs.

Does replacement **UN33B** have two card guide tabs on the top and bottom of the connector (Figure 12.7-1) that will not allow it to be inserted into the apparatus housing?

If **YES**, continue to Step 5.

If **NO**, do Step 6.

5. Remove the **SIDE** card guide tabs (both top and bottom) by following the instructions provided with Figure 12.7-1, using a small fine cut mill file or equivalent.

CAUTION: Do not allow filings to enter the connector.

6. Install **UN33B** replacement circuit pack.

7. On **TN6** at location 29-162, depress **ON** switch.

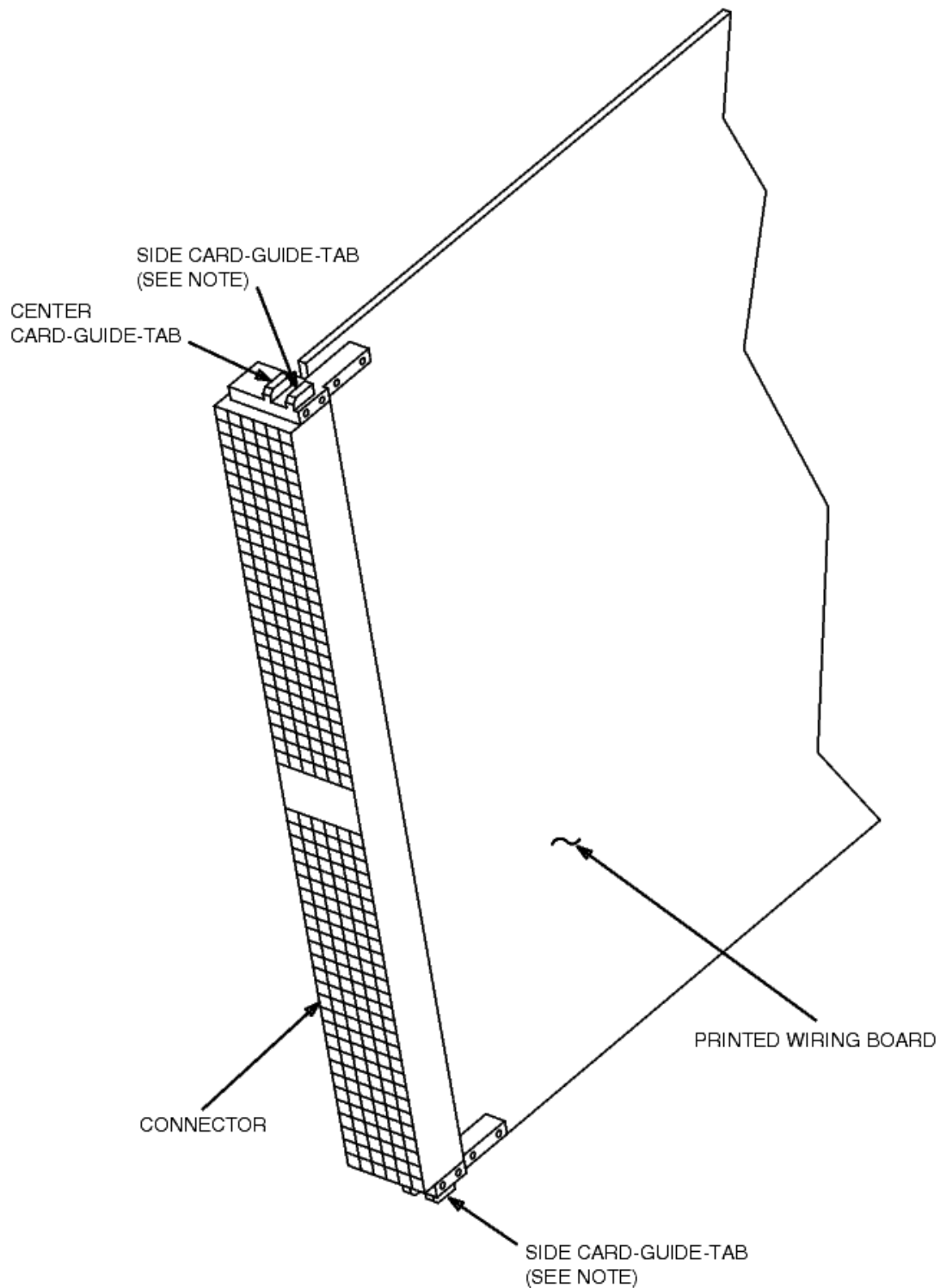
8. Type:

RST:IOP=a;

Where:

a = member number of IOP.

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



NOTE: Remove the side card guide tabs (both top and bottom) on older versions of circuit packs before inserting into a new apparatus housing equipped with the reduced-cost card guides. The side card guide tabs may be removed by filing the tabs flush with the top of the connector.

tpa 816255/01

Figure 12.7-1 Replacement of the UN33B Circuit Pack

Procedure 12.8: AUTOMATIC CIRCUIT PACK RETURN TAG TOOL

OVERVIEW

The automatic circuit pack return tag (RTAG) tool allows maintenance personnel to display and print recent diagnostic and fabric test faults, as well as generate (in an interactive fashion) circuit pack return tags to be used in returning faulty circuit packs to the Lucent Technologies factory for repair. The following procedure shows the basic menu of the tool.

PROCEDURE

1. The return tag tool can be invoked by any of the following three methods:
 - (a) At the *UNIX*[®] system terminal, type in ***/usr/bin/rtag*** at the prompt.
 - (b) At the trunk line work station (TLWS) terminal, type in ***RCV:MENU:RTAG;*** at the prompt.
 - (c) At the master control center (MCC) terminal, poke Page **194**; then select **RTAG**. The users can also invoke the RTAG tool by entering ***RCV:MENU:SCREEN;*** and selecting **RTAG**. On the MCC screen, the following interface menu is first printed:

```
Depress PF3 key twice to reconnect to the SCREEN process if
the Command Message Key (PF3) has been used during this procedure.
```

```
What is the desired command?
```

```
o) ODBE
a) ACCED
u) UNIX SHELL
c) CNIDBOC
r) RTAG
Q) TO QUIT
```

```
Please enter o,a,u,c,r, or Q:
```

```
character mappings
```

```
\;, \1, \s, \8, \-, \a, \/, \\  
;, !, $, &, -, @, ?, \
```

2. After the RTAG tool is invoked, the following interface header is printed:

```
WELCOME TO THE AUTOMATED CIRCUIT PACK RETURN TAG TOOL
PLEASE FOLLOW THE MENU DRIVEN PROMPTS
```


At any prompt, the following special characters can be entered:

- ! : To go back to the previous menu.
- h : To show the help command.
- q : To quit.

Then, the following menu is displayed:

Please select one of the following commands:

- (1) Select diagnostic failure(s) by circuit identifier
- (2) Select diagnostic failure(s) by circuit identifier and number
- (3) Select diagnostic failure(s) by date
- (4) Select diagnostic failure(s) by number of last fault(s)
- (5) Select diagnostic failure(s) by all faults
- (6) Generate a circuit pack return tag for update
- (7) Empty the fault data base and/or change password
- (8) Help
- (9) Quit

(a) For selection 1, the following display is shown:

Please enter the circuit identifier
(e.g., MCTSI, MASC, or h for help, or q to quit):

Go to Step 3.

(b) For selection 2, the following display is shown:

Please enter the circuit identifier and number
(e.g., MCTSI=15-1, CU=0 MASC=2, or h for help, or q to quit):

Go to Step 3.

(c) For selection 3, the following display is shown:

Please enter the date
(e.g., mm-dd-yy, or h for help, or q to quit):

Go to Step 3.

(d) For selection 4, the following display is shown:

Please enter the number of last faults to review
(Valid number is 1 - n, or h for help, or q to quit):

Where:

n = Number of existing fault entries in the circular data base.

Go to Step 3.

- (e) For selection 5, the menu in Step 3 is displayed.

Go to Step 3.

- (f) For selection 6, the five questions in Step 4b are asked, then an update tag is printed on the receive only printer (ROP). The menu is redisplayed.
- (g) For selection 7, if there is no password (initially), the following will be displayed.

NOTE: This initial condition indicates when the software release is first retrofitted or the data base file is removed by "rm" command from a UNIX system terminal.

```
There is no password.
Please enter a password
(NOTE: The length of the password cannot exceed 6 characters)
```

```
Enter the password again:
```

Otherwise, the following will be displayed:

```
Please enter the password
```

If the password does not match, the access of this command to empty the data base is denied, and the main menu is redisplayed. If the password matches, then the following will be displayed:

```
Do you want to flush the fault database?
Please enter y for yes, or n for no, or q to quit
default is no
```

If the answer is "y", the fault data base is flushed. And then, the following will be displayed:

```
Do you want to change the password?
Please enter y for yes, or n for no, or q to quit:
```

If the answer is "y", the following will be displayed:

```
Please enter the new password:
Enter the new password again:
```

and go back to main menu.

- (h) For selection 8, a HELP message is displayed. The menu is redisplayed.

- (i) For selection **9**, quit the RTAG user interface.

3. The following menu is displayed:

Please select one of the following commands:

- (1) Print the summary of the fault entries on ROP
- (2) Display the summary of the fault entries
- (3) Help
- (4) Quit

- (a) For selection **1**, the summary of the fault entries that satisfy the selection is first dumped into a temporary file. Then the file is "cat"ed out onto the ROP. The menu is redisplayed.

- (b) For selection **2**, the fault entries are displayed as follows:

The following shows the fault entries that satisfy the selected key (YYY):

- (1) M 04-10-91 12:50 PSUPH=8-0-1-7 STF PH 1 SEG 2 TEST 19 MM H'fa72
- (2) A 03-12-91 01:05 MCTSI=10-0 STF PH 4 SEG 1050 TEST 1 MM H'2
- (3) R 02-01-91 17:56 CU=0 MASC=2 STF PH 13 TEST 3 MM H'2a

.

.

.

- (10) M 10-15-90 03:45 MCTSI=10-0 STF PH 4 SEG 1050 TEST 1 MM H'2

To display a tag, enter the fault number.

To page down the fault list, hit the <ENTER> key.

To page up the fault list, enter u.

To print the current screen to the ROP, enter p.

To quit, enter q:

Go to Step 4.

- (c) For selection **3**, a HELP message is displayed. The menu is redisplayed.

- (d) For selection **4**, quit the RTAG user interface.

4. The selected tag is displayed as follows:

```
OFFICE BASE: T9997-d7
SOFTWARE RELEASE: 5e9(1)
REASON FOR RETURN: DEFECT
EQUIPMENT STATUS:
24 HOUR INDICATOR:
SOURCE OF DIAGNOSTIC REQUEST: AUTOMATIC
DATE/TIME FAILED: 03-12-91 01:05
MCTSI=10-0 PH 4 SEG 1050
```

```
TEST      MM
1          H'2
CIRCUIT PACK CODE:
SERIES:
SERIAL NUMBER:
```

NOTE: The previous step shows an unedited tag. Then, the next prompt is as follows:

Please enter the number that corresponds to your selection:

- (1) Print the tag
- (2) Edit the tag
- (3) Select another fault
- (4) Quit

- (a) For selection 1, the OP TAG REPORT output message is printed on ROP. This will take the dialogue flow back to Step 3.
- (b) For selection 2, the following questions are displayed:

```
QUESTION 1:
Equipment status (default XXX)?
(1) INSTALLING
(2) PRE-CUT
(3) IN SERVICE
(4) Help
(5) Quit
Please enter the selected number, or <ENTER> for no change:
```

```
QUESTION 2:
24 hour indicator (default XXX)?
(1) YES
(2) NO
(3) Help
(4) Quit
Please enter the selected number, or <ENTER> for no change:
```

```
QUESTION 3:
Circuit Pack Code (default XXX)
Please enter new circuit pack code,
or <ENTER> for no change, h for help, or q to quit:
```

```
QUESTION 4:
Series (default XXX)
Please enter new series,
or <ENTER> for no change, or h for help, or q to quit:
```

```
QUESTION 5:
Serial number (default XXX)
Please enter new serial number,
or <ENTER> for no change, or h for help, or q to quit:
```

Where: **XXX** shows the respective current default data.

After getting all the answers to the five questions, redisplay what the user has entered. Then the following will be displayed:

```
Do you want to save these changes?  
Please enter y for yes, or n for no, or q to quit:
```

This will take the dialogue flow back to Step 4.

- (c) For selection **3**, this will take the dialogue flow back to Step 3.
- (d) For selection **4**, quit the RTAG user interface.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 12.9: REPLACEMENT OF ASU/ASU2 CIRCUIT MODULE

OVERVIEW

This procedure will provide the instructions to safely replace each circuit module that can be used in the alarm status unit/alarm status unit 2 (ASU/ASU2) which is located at the top of a 6-foot 5ESS® switch frame on those products that require the alarm feature. Basically each ASU unit can have a stand-alone monitor (SAM), an alarm status circuit (ASC), or both. Since there are only two ASC types, the procedure for the replacement of these circuits will be described first.

PROCEDURE

1. To replace an ASC circuit, continue with Step 2. To replace a SAM circuit, go to Step 13.
2. Enter Page 1160 on the master control center (MCC).
3. Enter a Poke **300** command to diagnose the ASC circuit (note failure if any).
4. Enter a Poke **200** command to remove the ASC from service.
5. On the switching module/switching module-2000 (SM/SM-2000) ASU unit, raise the ASU panel by rotating the unit up to access the cabling and circuits.

CAUTION: Care must be taken at this time NOT to accidentally press any panel buttons and ALWAYS USE THE ELECTROSTATIC DISCHARGE (ESD) GROUND STRAP.

6. Check the position of the cable connectors by referencing the ASU/ASU2 (Figure 12.9-1) panel layout diagram which is located in the SAM replacement section (Step 13) of this procedure.
7. Remove the -48 volt plug (J5/J6 or J3) from the ASC noting the position before removing.
8. Remove the I/O connectors (J1/J2, J3/J4 or J1, J2) noting their positions before removing.
9. Remove and replace the circuit module.

NOTE: These circuit modules are not interchangeable between the ASU and the ASU2.

10. Reconnect the I/O connectors.
11. Reconnect the -48 volt plug.
12. Enter a Poke **300** command to diagnose the ASC circuit (make sure no new failures have occurred or the initial failure has cleared).
13. In the case of the SAM circuits, there are four types. Two used on the ASU and two used on the ASU2. Figure 12.9-1 illustrates the two types of units and panel layouts. The following steps are used for each SAM removal.
14. On the SM/SM-2000 ASU unit, raise the ASU panel by rotating the unit up to access the cabling and circuits.

CAUTION: Care must be taken at this time to NOT accidentally press any panel buttons and ALWAYS USE THE ESD GROUND STRAP.

NOTE: When dealing with the SAM, be sure not to press the **CIK** buttons because they will initialize the SM/SM-2000.

15. From a duplex SM/SM-2000, verify that Side 0 is standby. If not, enter a Poke **403** command from the 1190 page of the MCC.
16. Remove Side 0 from service by entering a Poke **201** command.
17. Power down Side 0.
18. Remove the Berg Connector on the backplane at EQL (Table 12.9-1).
19. Power up Side 0.
20. Restore Side 0 by entering a Poke **300** command.
21. Remove Side 1 from service by entering a Poke **201** command.
22. Power down Side 1.
23. Remove the Berg Connector on the backplane at EQL (Table 12.9-1).
24. Power up Side 1.
25. Restore Side 1 by entering a Poke **301** command.
26. Remove the power connector from the SAM circuit module.
27. Remove the signal connector from the SAM circuit module.
28. Replace the circuit module by removing the old module and installing the new module.
29. Install the signal connector to the SAM circuit module.
30. Install the power connector to the SAM circuit module.
31. Switch sides so that Side 1 is active. (Enter a Poke **403** if necessary to make Side 1 active.)
32. Remove Side 0 from service by entering a Poke **201** command.
33. Power down Side 0.
34. Install the Berg Connector on the backplane at EQL (Table 12.9-1).
35. Power up Side 0.
36. Restore Side 0 by entering a Poke **300** command.
37. Remove Side 1 from service by entering a Poke **201** command.
38. Power down Side 1.
39. Install the Berg Connector on the backplane at EQL (Table 12.9-1).
40. Power up Side 1.

41. Restore Side 1 by entering a Poke **301** command.
42. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

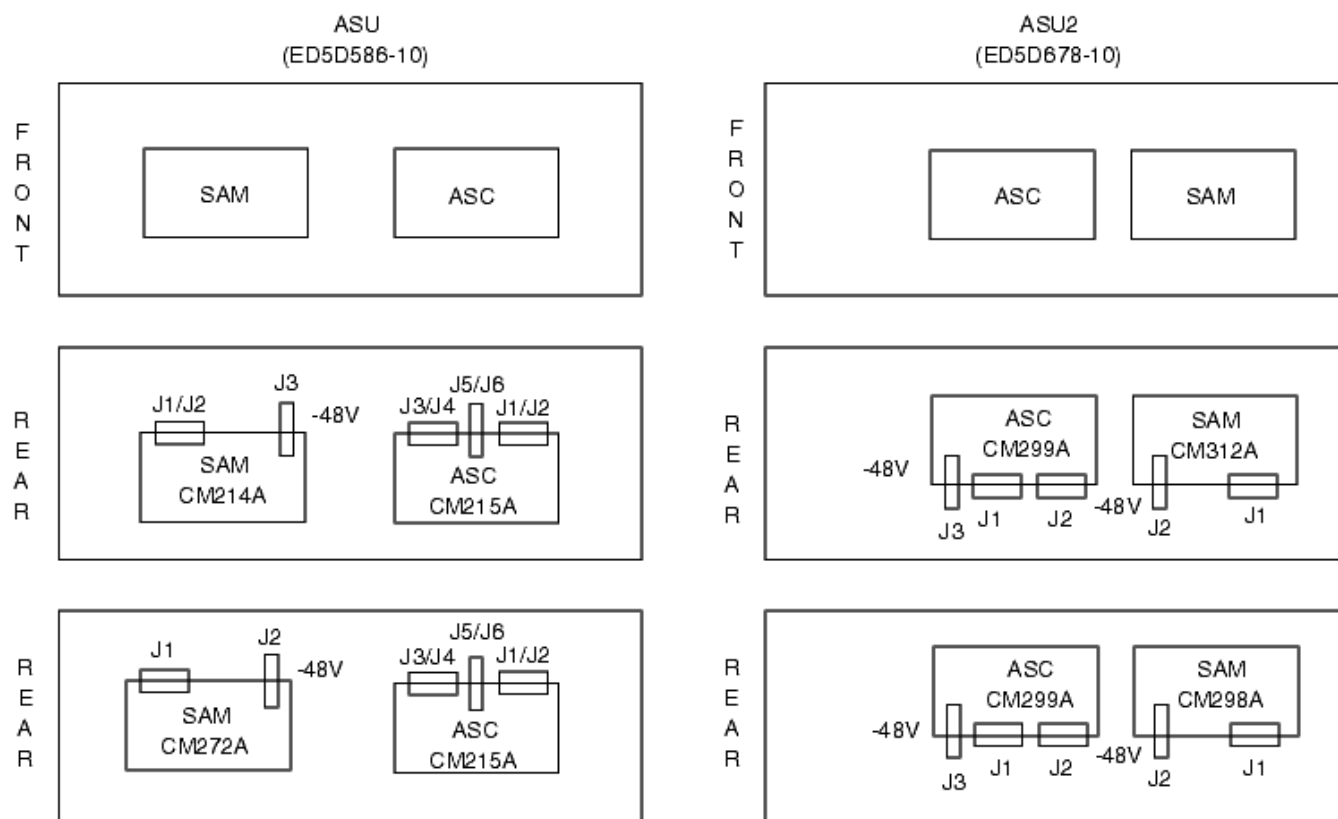


Figure 12.9-1 ASU/ASU2 Panel Layout Diagram

Table 12.9-1 Berg Connector Location

UNIT	ASU		EQL (EQUIPMENT LOCATION)	ASU2	
	CM214	CM272A		CM312A	CM298A
MCTU J5D003EC (SMP1,12,23)	X		128-088-032(0) 128-088-045(1)	X	
IMPU J5D003AY (SMP1,12,23)	X		128-088-032(0) 128-088-045(1)	X	
MCTU2 J5D003LA (SMP20)		X	119-033-021(0) 128-033-021(1)		X
MCTU3 J5D003LB			004-119-019(0) 004-119-019(1)	X	X

13. MISCELLANEOUS EQUIPMENT MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for the maintenance of miscellaneous equipment.

NOTE: It is intended that this section is to be used to have only equipment that does not have a specific function/location. As the 5ESS[®] switch grows and changes and/or improvements are made, the procedures in this section will be moved to other sections.

Procedure 13.1: OPTICAL DATA TRANSCEIVER REPLACEMENT

OVERVIEW

This procedure should be used when replacing Lightwave Data Transceiver (LDT), Network Link Interface (NLI), Peripheral Link Interface (PLI), Network Link Interface-1 (NLI1), CM2 Optical Transceiver (COT), and Optical Transceiver Digital Networking Unit - SONET (COTD) paddleboards in all optically connected units. This section also identifies the different vintages of optical transceiver hardware. There are several vintages of optical transceivers, more recently referred to as LDT. For the SM-2000, five new paddleboards were introduced : NLI, PLI, NLI1, COT and COTD.

The support of optics into the 5ESS[®] switch is as follows:

- **50 Micron Biconic Threaded Optical Connector:**
 - 982CF/CG, 982WY/TA (SM/CM1), 982FH, 982TH (CM2)
- **62.5 Micron ST-Type Bayonet Twist Lock Optical Connector:**
 - 982TR/TS (SM/CM1), 982TT (CM2)
 - 982TRA/TSA-3 (SM/CM1), 982TT (CM2)
 - 982TRA/TSA-4 or 982TRAA-5/TSAA-5 (SM/CM1), 982TT-7 (CM2)
 - 982TRC/TSC (SM/CM1/CM2C), 982TTC (CM2)
 - COTD - 982TN (DNU-S)
 - NLI - BKD1 (SM2K)
 - COT - BKF1 (CM2)
 - PLI - BKD2 (SM2K)
 - NLI1 - BKD7 (SM2K) with CM2C unit.

Tables 13.1.5-1 and 13.1.5-2 give a detail description of where the various optics are used in the 5ESS[®] switch. The following is a list of figures that describe the various optics with information showing their appropriate units:

- Figure 13.1.5-1 , Lightwave Data Transceivers
- Figure 13.1.5-2 , TSIU4 Wiring Side Label Stamping Instructions
- Figure 13.1.5-3 , TSIU4-2 Wiring Side Label Stamping Instructions
- Figure 13.1.5-4 , SM-2000 Data Transceivers
- Figure 13.1.5-5 , COT - CM2 Optical Transceiver
- Figure 13.1.5-6 , Optical Transceivers - DNU-S.

There are two basic types of LDT connectors, Biconic and ST type. The physical differences are as follows:

(1) Biconic Optical Connector:

- 50-micron fiber with biconic type connectors as the interface to the optical devices.
- Two separate paddle boards: one for transmit, one for receive.
(Except for the 982TH and 982FH - one combined paddleboard)
- Power sources include -48 and +5 volts except for the 982TH and 982FH which uses -48, -5, and -2 volts.

(2) "ST" Bayonet Optical Connector:

- LDT Paddle Boards:
 - 62.5-micron fiber with ST-type series fiber connectors as the interface to the optical devices.
 - One paddle board contains both transmit and receive circuits.
 - Power source -48 volts is not used, but is in the pin field that the boards plug into.
 - Power sources include +5 volts except for the 982TT/TTC which uses -5, and -2 volts.
- NLI/PLI/NLI1/COT/COTD Paddle Boards:
 - 62.5-micron fiber with ST-type series fiber connectors as the interface to the optical devices.
 - One paddle board which contains both transmit and receive circuits.
 - A power converter that requires a power source of -48 volts. A COT uses a power source of -5 and -2 volts. A COTD uses a power source of +5 volts. The COT and COTD do not have power converters.

PROCEDURE

1. Use the following list of sub-procedures to replace optical data transceiver equipment:
 - (a) CM1/CM2/CM2C Procedure
 - (b) SM Procedure
 - (c) TN877 DLI/RLI Procedure
 - (d) TN1077 or TN1077B/C/D/E/F DLI/RLI Procedure
 - (e) Cleaning Optical Fiber Procedure.

13.1.1 CM1/CM2/CM2C OPTICAL DATA TRANSCEIVER REPLACEMENT PROCEDURE

1. Remove from service the Office Network Timing Complex (ONTC) associated with the Optical Data Transceiver to be replaced. At the MCC, type and enter:

RMV:ONTC=a

Where:

a = ONTC side

2. Verify that the ONTC is in the out of service (OOS) state using Master Control Center (MCC) page 1209.

CAUTION: -48 volts are present on some pins in the TMS backplane near the Optical Data Transceiver connections. When replacing paddleboards, make certain the transceiver is not damaged by improper contact with the -48 volt supply.

3. Note the exact location of the Optical Data Transceiver paddleboard to be replaced and, (with fiber cable still connected) unplug the paddleboard.
4. **NOTE:** Prior to performing this step, make certain you note the exact location and order of removal for the fiber cables connected to the Optical Data Transceiver paddleboard. You will need this information to properly replace the new paddleboard

CAUTION: Do not kink the fiber cables. This will damage the cables and cause faulty operation.

Note the location of each fiber cable and disconnect the fiber cables from the paddleboard.

- With Biconic Optical Connectors - 982CF/CG, 982WY/TA or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
 - For other paddleboards, release the ST-type connector locking mechanism from the paddleboard optical device.
5. Clean Optical Fiber - See Section 13.1.5 for instructions about Cleaning Optical fiber.
 6. **CAUTION:** Make certain the paddleboard is to be installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins, or if it installed upside down.
- Carefully insert the replacement paddleboard at the correct location in the frame.
7. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
 8. Restore the OOS ONTC. At the MCC, type and enter:

RST:ONTC=a

Where:

a = ONTC side

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

13.1.2 SWITCHING MODULE OPTICAL DATA TRANSCEIVER REPLACEMENT PROCEDURE

1. Remove from service, one of the following interfaces associated with the Optical Data Transceiver to be replaced.

- Dual Link Interface (DLI)
- Remote Link Interface (RLI)
- Network Link Interface (NLI)
- Network Link Interface 1 (NLI1)
- Peripheral Link Interface (PLI).

At the MCC, type and enter:

RMV:?LI=a-b-c

Where:

? =	D for DLI
? =	N for NLI/NLI1
? =	P for PLI
? =	R for RLI

Where:

a =	SM number
b =	?LI number
c =	ONTC side

2. Verify that the ?LI is in the OOS state using MCC page 1190.
3. The replacement procedure to be followed depends upon the version of the circuit pack or paddleboard.
 - For a Data Link Interface (DLI)/ Remote Link Interface (RLI) with circuit pack TN877, refer to Section 13.1.3 for the Lightwave Data Transceiver (LTD) paddleboard replacement procedures.
 - For a DLI/RLI with circuit pack TN1077B/C/D/E/F, refer to Section 13.1.4 for the LTD paddleboard replacement.
 - For a DLI/RLI with NLI/NLI1/PLI paddleboards, continue with Step 4 for the LTD paddleboard replacement.
4. The status of the paddleboard lamps should be as follows:
 - For the NLI paddleboard, the OOS lamp should be lighted.
 - For the NLI1 paddleboard, the OOS lamp should be lighted.
 - For the PLI paddleboard, the OOS lamp should be lighted.

CAUTION: -48 volts are present on some pins in the TMS backplane near the Optical Data Transceiver connections. When replacing paddleboards, make certain the transceiver is not damaged by contact with the -48 volt supply.

5. Note the exact location of the Optical Transceiver Paddleboard to be replaced and, (with fiber cable still

connected) unplug the paddleboard.

6. **NOTE:** Make certain you note the exact location and removal order for the fiber cables connected to the Optical Transceiver Paddleboard. You will need this information to properly replace the new paddleboard.

CAUTION: Do not kink the fiber cables. This will damage the cables and cause faulty operation.

Note the location of each fiber cable, and disconnect the fiber cables from the paddleboard.

7. Clean Optical Fiber - See Section 13.1.5 for instructions about Cleaning Optical fiber.

8. **CAUTION:** Make certain the paddleboard is to be installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins, or if it installed upside down.

Carefully insert the replacement paddleboard at the correct location in the frame.

9. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.

10. Restore the OOS NLI/NLI1/PLI associated with the paddleboard replacement. At the MCC, type and enter:

RST:?LI=a-b-c

Where:

? = N for NLI/PLI1
 ? = P for PLI

Where:

a = SM number
 b = ?LI number
 c = ONTC side

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

13.1.3 TN877 DLI/RLI OPTICAL DATA TRANSCEIVER REPLACEMENT PROCEDURE

OVERVIEW

NOTE: For DLI/RLI version TN877, this procedure includes additional steps that are required to ensure safe operation and installation of equipment.

1. Remove from service the Dual Link Interface (DLI) or Remote Link Interface (RLI) associated with the Optical Data Transceiver to be replaced. At the MCC, type and enter:

RMV:?LI=a-b-c

Where:

? = D for DLI
 ? = R for RLI

Where:

a =	SM number
b =	?LI number
c =	ONTC side

2. Verify that the ?LI is in the OOS state using MCC page 1190.
3. Verify that the OOS light is on for the DLI/RLI that has been taken OOS.
4. Power down the OOS DLI/RLI by depressing the OFF button on the DLI/RLI power unit circuit pack.
5. Unseat the DLI/RLI circuit pack. It is not necessary to remove the circuit pack completely from the unit.
6. Remove the power fuse from the Fuse Filter Unit (FFU) or the Modular Fuse Filter Unit (MFFU) for the associated DLI/RLI.

CAUTION: -48 volts are present on some pins in the TMS backplane near the Optical Data Transceiver connections. When replacing paddleboards, make certain the transceiver is not damaged by contact with the -48 volt supply.

7. Note the exact location of the Optical Transceiver Paddleboard to be replaced and, (with fiber cable still connected) unplug the paddleboard.
8. **NOTE:** Make certain you note the exact location and removal order for the fiber cables connected to the Optical Transceiver Paddleboard. You will need this information to properly replace the new paddleboard .

CAUTION: Do not kink the fiber cables. This will damage the cables and cause faulty operation.

Note the location of each fiber cable and disconnect the fiber cables from the paddleboard.

- With Biconic Optical Connectors - 982CF/CG, 982WY/TA or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
- For other paddleboards, release the ST-type connector locking mechanism from the paddleboard optical device.

9. Clean Optical Fiber - See Section 13.1.5 for instructions about Cleaning Optical fiber.
10. **CAUTION:** Make certain the paddleboard is to be installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins, or if it installed upside down.

Carefully insert the replacement paddleboard at the correct location in the frame.

11. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
12. Replace the power fuse for FFU or MFFU.
13. Re-seat the DLI/RLI circuit pack in its original slot.
14. Apply power to the associated DLI/RLI by depressing the ON button on the associated power unit circuit pack.

15. Restore the OOS DLI/RLI associated with the paddleboard replacement. At the MCC, type and enter:

RST:?LI=a-b-c

Where:

? = D for DLI
? = R for RLI

Where:

a = SM number
b = ?LI number
c = ONTC side

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

13.1.4 TN1077 or TN1077B/C/D/E/F DLI/RLI OPTICAL DATA TRANSCEIVER REPLACEMENT PROCEDURE

OVERVIEW

NOTE: For DLI/RLI version TN1077, or TN1077B/C/D/E/F, this procedure includes additional steps that are required to ensure safe operation and installation of equipment.

1. Remove from service the Dual Link Interface (DLI) or Remote Link Interface (RLI) associated with the Optical Data Transceiver to be replaced. At the MCC, type and enter:

RMV:?LI=a-b-c

Where:

? = D for DLI
? = R for RLI

Where:

a = SM number
b = ?LI number
c = ONTC side

2. Verify that the DLI/RLI is in the OOS state using MCC page 1190.
3. Verify that the OOS light is on for the DLI/RLI that has been taken OOS.
4. Power down the OOS DLI/RLI by depressing the OFF button on the DLI/RLI power unit circuit pack.
5. Unseat the DLI/RLI circuit pack. It is not necessary to remove the circuit pack completely from the unit.

CAUTION: -48 volts are present on some pins in the TMS backplane near the Optical Data Transceiver connections. When replacing paddleboards, make certain the transceiver is not damaged by contact with the -48 volt supply.

6. Note the exact location of the Optical Transceiver Paddleboard to be replaced and, (with fiber cable still connected) unplug the paddleboard to be replaced.
7. **NOTE:** Make certain you note the exact location and removal order for the fiber cables connected to the Optical Transceiver Paddleboard. You will need this information to properly replace the new paddleboard .

CAUTION: Do not kink the fiber cables. This will damage the cables and cause faulty operation.

Note the location of each fiber cable and disconnect the fiber cables from the paddleboard.

- With Biconic Optical Connectors - 982CF/CG, 982WY/TA or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
- For other paddleboards, release the ST-type connector locking mechanism from the paddleboard optical device.

8. Clean Optical Fiber - See Section 13.1.5 for instructions about Cleaning Optical fiber.
9. **CAUTION:** Make certain the paddleboard is to be installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins, or if it installed upside down.

Carefully insert the replacement paddleboard at the correct location in the frame.
10. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
11. Re-seat the DLI/RLI circuit pack in its original slot.
12. Apply power to the associated DLI/RLI by depressing the ON button on the associated power unit circuit pack.
13. Restore the OOS DLI/RLI associated with the paddleboard replacement. At the MCC, type and enter:

RST: ?LI=a-b-c

Where:

? = D for DLI
? = R for RLI

Where:

a = SM number
b = ?LI number
c = ONTC side

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

13.1.5 CLEANING OPTICAL FIBER PROCEDURE

OVERVIEW

Replacing LDTs involves cleaning the optical fiber. The connector tip and the housing around the glass fiber must be thoroughly cleaned. Cleaning the fiber is implemented to ensure that signal performance will not be affected.

Unclean fiber heads can lead to degradation in overall system operation. Below are the materials required and procedures to follow when cleaning optical fiber.

Cleaning Materials

- Canned Air, when cleaning any optical parts always hold canned 3 inches away. Air Can is optional. Optical parts can be left to dry for 30 seconds before placing it back into circuit.
 - Cotton Tipped Swabs.
 - Wipes Moistened with (Isopropyl alcohol).
1. Clean optical tip with a wipe moistened with alcohol and blow dry with canned air.
 2. Clean the end and sides of the connector ferrule with wipe moistened with alcohol and blow dry with canned air.
 3. For Biconic Type Only - Clean the coupling/buildout by placing a wipe moistened with alcohol over a cotton tipped swab and rotate while placing inside the coupling. Then blow dry with canned air.
 4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 13.1.5-1 Lightwave Data Transceivers (LDT) Vintages and Locations With Biconic Threaded Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE	SIDE 0 LOCATIO N (POSITION and PIN)	SIDE 1 LOCATIO N (POSITIO N and PIN)
CM1 MSGS	MICU	J5D006AA-1	TN834	982CG 982CF	126-113 126-100	126-113 126-100
CM1 MSGS	MICU2	J5D006ED-1	TN834	982CF 982CF	120-113 120-100	120-113 120-100
CM1 TMS	TMCU	J5D001AA-1	TN252	982CG 982CF	086-100 086-113	086-100 086-113
CM1 TMS	TMSU	J5D001AB-1	TN243	982CG 982CG 982CF 982CF 982TA ^b 982W ^b	XXX-145 XXX-100 XXX-113 XXX-132 XXX-132 XXX-100	XXX-145 XXX-100 XXX-113 XXX-132 XXX-132 XXX-100
CM2 TMS	TMSU2 TMSU3	J5D020AD-1 J5D020AG-1	TN883 TN888	982FH(1A) 982TH ^b 982FH(1A) 982FH(1A) 982TH ^b 982TH ^b	088-145 088-132 XXX-145 XXX-113 XXX-132 XXX-100	088-145 088-132 XXX-145 XXX-113 XXX-132 XXX-100
MISC	TRCU- 1	J5D003ED-1	TN1344	982CG 982CG 982CG 982CF 982CF 982CF	026-145 042-145 066-145 082-145 026-132 042-132 066-132	154-145 170-145 114-145 130-145 154-132 170-132 114-132

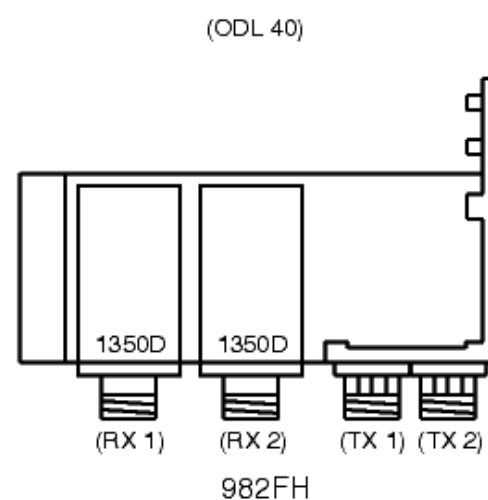
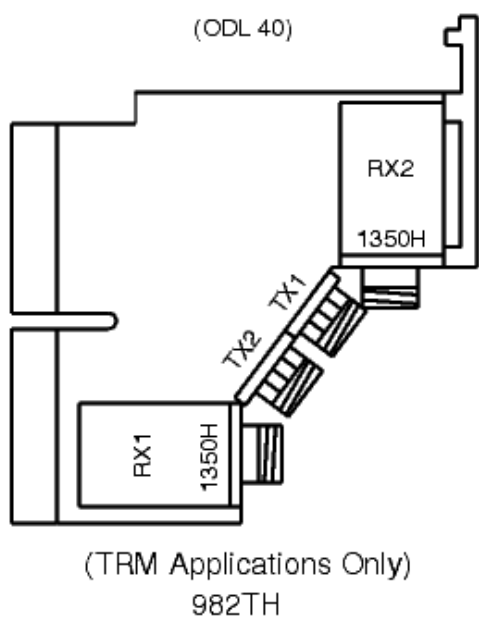
				982CF	082-132	130-132
MISC	TRCU-2	J5D003ED-2	TN1345	982CG	022-145	138-145
				982CG	030-145	146-145
				982CG	038-145	154-145
				982CG	046-145	162-145
				982CF	022-132	138-132
				982CF	030-132	146-132
				982CF	038-132	154-132
				982CF	046-132	162-132
SM/RSM	TSIU	J5D003AB-1	TN834	982CG	032-113	132-113
				982CG	056-113	156-113
				982CF	032-100	132-100
				982CF	056-100	156-100
				982TA b	032-100	132-100
				982TA b	056-100	156-100
SM/RSM	MCTU	J5D003EC-1	TN1077	982CG	084-345	098-345
				982CG	084-300	098-300
				982CF	084-332	098-332
				982CF	084-313	098-313
				982TA b	084-332	098-332
				982WY b	084-300	098-300
SM/RSM	MCTU	J5D003EC-1	TN1077 B,C,D,E, F	982CG	084-345	098-345
				982CG	084-300	098-300
				982CF	084-332	098-332
				982CF	084-313	098-313
				982TA b	084-332	098-332
				982WY b	084-300	098-300
SM/RSM	MCTU2	J5D003LA-1	TN1077 B,C,D,E, F	982CG	156-345	156-345
				982CG	156-300	156-300
				982CF	156-332	156-332
				982CF	156-313	156-313
				982TA b	156-332	156-332
				982WY b	156-300	156-300
SM/RSM	MCTU3	J5D003LB-1	TN1077 E,F	982TSC	084-332	176-332
				982TRC	084-300	176-300
RSM	FIU2	J5D003AP-2	TN834	982CG	046-113	136-113
				982CG	076-113	166-113
				982CF	046-100	136-100
				982CF	076-100	166-100
RSM	FIU3	J5D003AP-3	TN1510	982CG	036-345	126-345
				982CG	036-300	126-300
				982CF	036-332	126-332
				982CF	036-313	126-313
Notes:						
a. Circuit Pack Code that interfaces directly with the LDT.						
b. Used for Transmissionless Remote Module (TRM) Applications.						

Table 13.1.5-2 Lightwave Data Transceivers (LDT) Vintages and Locations With Bayonet 'ST' Type Twist Lock Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK a	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
CM1 MSGS	MICU	J5D006AA-1	TN834	982TRAA-5 982TRC	126-100	126-100
CM1 MSGS	MICU2	J5D006ED-1	TN834	982TRAA-5 982TRC	120-100	120-100

CM1 TMS	TMCU	J5D001AA-1	TN252	982TSAA-5 982TSC	086-100	086-100
CM1 TMS	TMSU	J5D001AB-1	TN243	982TRAA-5 982TRC 982TSAA-5 982TSC	XXX-132 XXX-100	XXX-132 XXX-100
CM2 TMS	TMSU2 TMSU3	J5D020AD-1 J5D020AG-1	TN883 TN888 TN1681	982TT,TTC 982TT,TTC 982TT,TTC BKF1-COT	088-132 XXX-132 XXX-100 XXX-100	088-132 XXX-132 XXX-100 XXX-100
CM2C	CMU	J5D020AJ-1	TN1830	982TSC 982TRC 982TSC 982TRC	160-300 160-332 168-300 168-332	160-300 160-332 168-300 168-332
MISC	TRCU-1	J5D003ED-1	TN1344	982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC	022-132 030-132 038-132 046-132	138-132 146-132 154-132 162-132
MISC	TRCU-2	J5D003ED-2	TN1345	982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC	026-132 042-132 066-132 082-132	154-132 170-132 114-132 130-132
SM/RSM	TSIU	J5D003AB-1	TN834	982TRAA-5 982TRC 982TRAA-5 982TRC	032-100 056-100	132-100 156-100
SM/RSM	TSIU	J5D003AT-1	TN877	982TRAA-5 982TRC 982TSAA-5 982TSC	084-332 084-300	100-332 100-300
SM/RSM	MCTU	J5D003EC-1	TN1077	982TRAA-5 982TRC 982TSAA-5 982TSC	084-332 084-300	098-332 098-300
SM/RSM	MCTU	J5D003EC-1	TN1077B, C,D,E,F	982TR,TRA, TRAA-5,TRC 982TS,TSA, TSAA,TSC	084-332 084-300	098-332 098-300
SM/RSM	MCTU2	J5D003LA-1	TN1077B, C,D,E,F	982TR,TRA, TRAA-5,TRC 982TS,TSA TSAA-5,TSC	156-332 156-300	156-332 156-300
SM/RSM	MCTU3	J5D003LB-1	TN1077 E,F	982TSC 982TRC	084-332 084-300	176-332 176-300
RSM	FIU2	J5D003AP-2	TN834	982TRAA-5 982TRC 982TRAA-5 982TRC	046-100 076-100	136-100 176-100
RSM	FIU3	J5D003AP-3	TN1510	982TR,TRA, TRAA-5,TRC 982TS,TSA, TSAA-5,TSC	036-332 036-300	126-332 126-300
SM2K	TSIU4	J5D003NB-1	KLU1- TSIS	BKD1- NLI BKD2- PLI BKD7- NLI1	PORT 02-39 PORT 04-39 PORT 02-03	PORT 02-39 PORT 04-39 PORT 02-03
SM2K	TSIU4-2	J5D003NB-2	KLU1- TSIS	BKD1- NLI	PORT 02-39	PORT 02-39

				BKD2- PLI BKD7- NLI1	PORT 04-39 PORT 02-03	PORT 04-39 PORT 02-03
SM2K	DNU-S	J5D003FR-1	KLU3- CD	982TN- COTD 982TN- COTD 982TN- COTD 982TN- COTD 982TN- COTD	XXX- X00X XXX- X00T ^b XXX- X32T XXX- X00B ^b XXX- X32B	XXX- X00X XXX- X00T ^b XXX- X32T XXX- X00B ^b XXX- X32B
Notes: a. Circuit Pack Code that interfaces directly with the LDT. b. 00T/00B = Top Shelf of Unit or Bottom Shelf of Unit.						

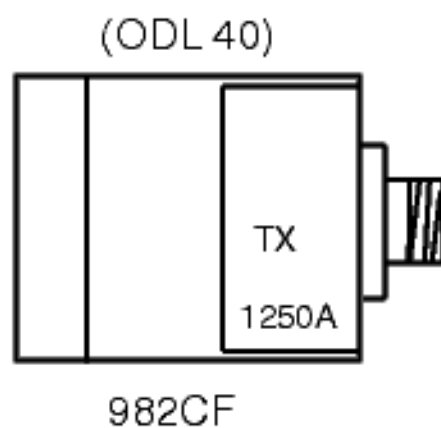
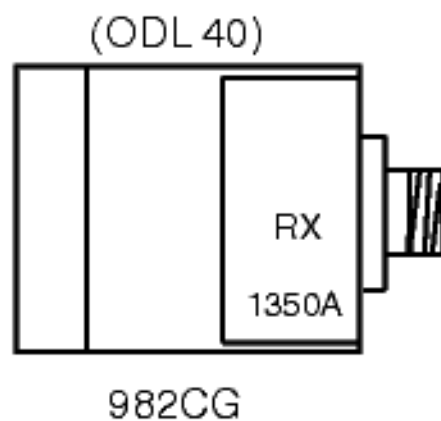


COMPLEX

CM2 TMS
CM2 TMS

UNIT

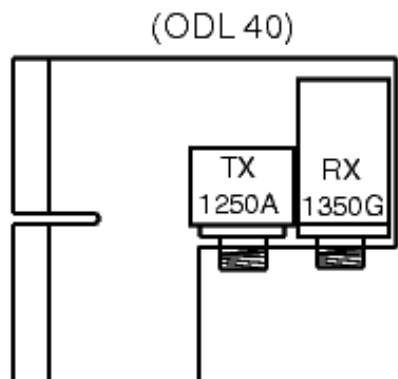
TMSU2
TMSU3



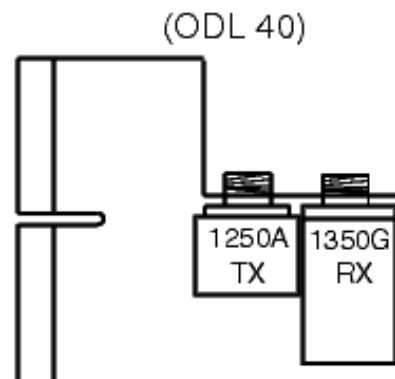
COMPLEX

UNIT

CM1 MSGS	MICU
CM1 MSGS	MICU2
CM1 TMS	TMCU
CM1 TMS	TMSU
MISC	TRCU-1
MISC	TRCU-2
SM	TSIU
SM	MCTU
SM	MCTU2
RSM	FIU2
RSM	FIU3



982TA



982WY

COMPLEX

CM1 TMS
SM
SM
SM

UNIT

TMSU
TSIU
MCTU
MCTU2

COMPLEX

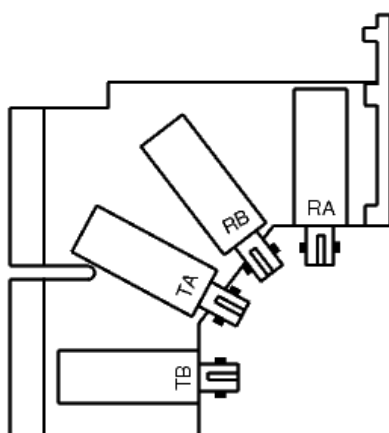
CM1 TMS
SM
SM
SM

UNIT

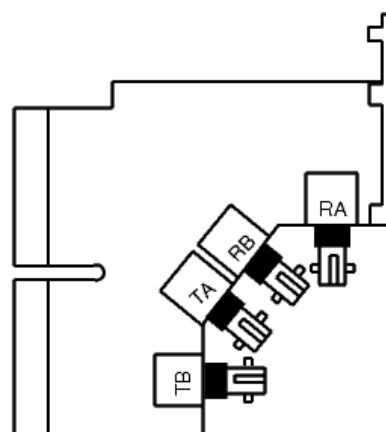
TMSU
TSIU (TN877)
MCTU
MCTU2

ODL50-S I
(Metal Conn.)

ODL50-S II
(Plastic Conn.)



982TT



982TTC

HEWLETT PACKARD
(Optical Plastic Conn.)

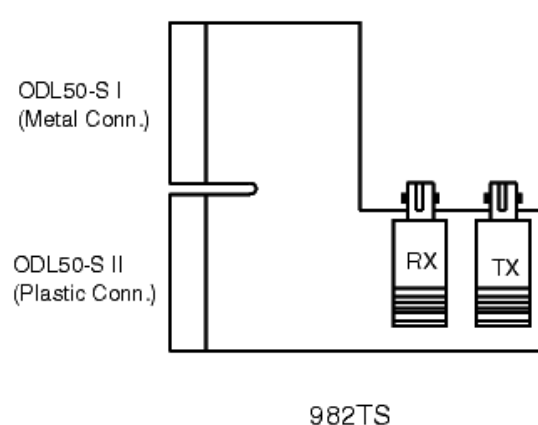
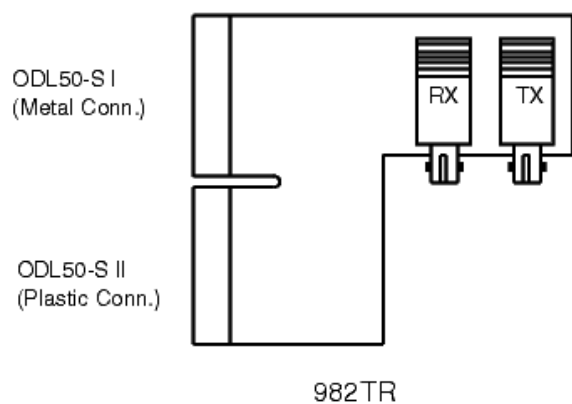
HONEYWELL
(Optical Metal Conn.)

COMPLEX

CM2 TMS
CM2 TMS

UNIT

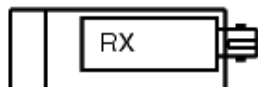
TMSU2
TMSU3



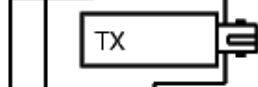
COMPLEX	UNIT
MISC.	TRCU-1
MISC.	TRCU-2
SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

COMPLEX	UNIT
SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

ODL50-S I
(Metal Conn.)



ODL50-S II
(Plastic Conn.)



982TRA

COMPLEX

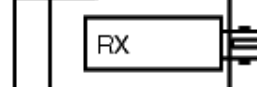
UNIT

MISC.	TRCU-1
MISC.	TRCU-2
SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

ODL50-S I
(Metal Conn.)



ODL50-S II
(Plastic Conn.)

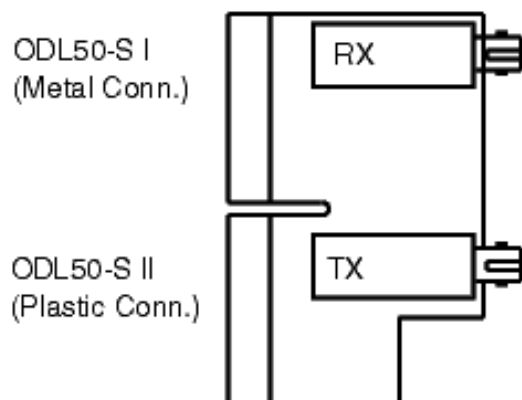


982TSA

COMPLEX

UNIT

SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

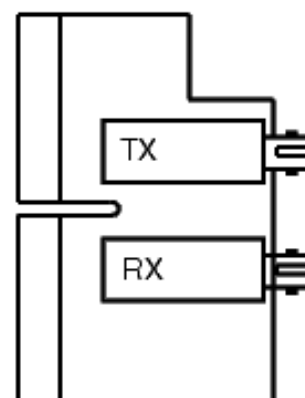


982TRAA-5

<u>COMPLEX</u>	<u>UNIT</u>
CM1 MSGS	MICU
CM1 MSGS	MICU2
CM1 TMS	TMSU
MISC	TRCU-1
MISC	TRCU-2
SM	TSIU
SM	MCTU
SM	MCTU2
RSM	FIU2
RSM	FIU3

ODL50-S I
(Metal Conn.)

ODL50-S II
(Plastic Conn.)



982TSAA-5

<u>COMPLEX</u>	<u>UNIT</u>
CM1 TMS	TMSU
CM1 TMS	TMSU
SM	TSIU (TN877)
SM	MCTU
SM	MCTU2
RSM	FIU3

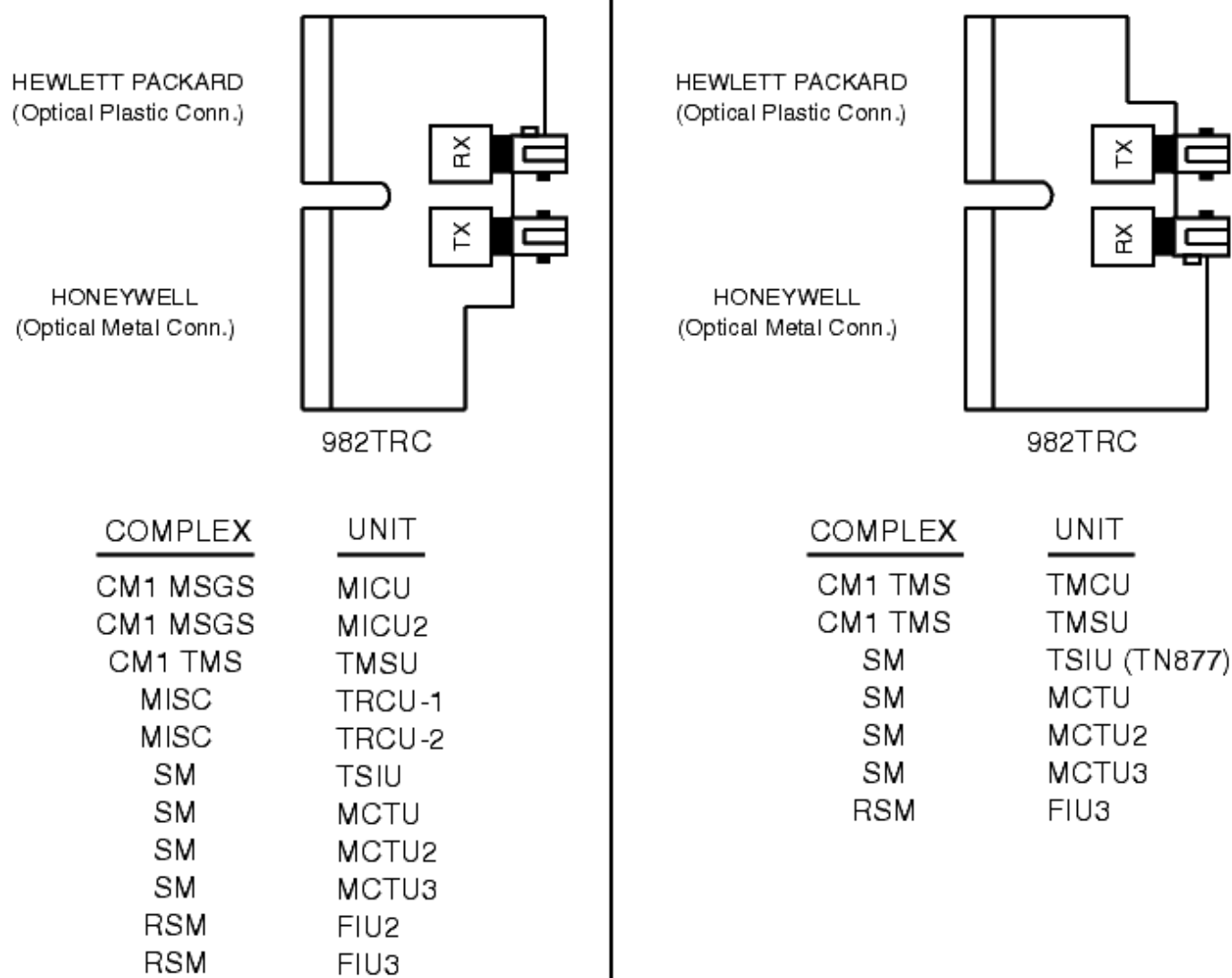


Figure 13.1.5-1 Lightwave Data Transceivers

SIDE 1 SM 003										SIDE 0 SM 003									
55	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	BKD7
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 02
51	PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03	PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07
	180	172	164	156	148	138	130	122	114	106	092	084	076	068	060	050	042	034	026
	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
47	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 00
	PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02	PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06
	180	172	164	156	148	138	130	122	114	106	092	084	076	068	060	050	042	034	026
43	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 04
	PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05	106	PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05
	180	172	164	156	148	138	130	122	114		092	084	076	068	060	050	042	034	026
	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1		BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2		BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA		DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK		LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 06
	PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04		PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04
	180	172	164	156	148	138	130	122	114		092	084	076	068	060	050	042	034	026

Figure 13.1.5-2 TSU4 Wiring Side Label Stamping Instructions

SIDE 1 SM 003										SIDE 0 SM 003									
55	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE		DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 02
51	PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03		PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11
	183	175	167	159	151	143	135	127	119	111		101	093	085	077	069	061	053	045
	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
47	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 00
	PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02		PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10
	183	175	167	159	151	143	135	127	119	111		101	093	085	077	069	061	053	045
43	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD4		BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2			BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA			DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK			LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 04
	PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05	PORT 01		PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09
	183	175	167	159	151	143	135	127	119	111		101	093	085	077	069	061	053	045
	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1			BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2			BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA			DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA
	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK			LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 06
	PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04			PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08
	183	175	167	159	151	143	135	127	119			101	093	085	077	069	061	053	045

Figure 13.1.5-3 TSIU4-2 Wiring Side Label Stamping Instructions

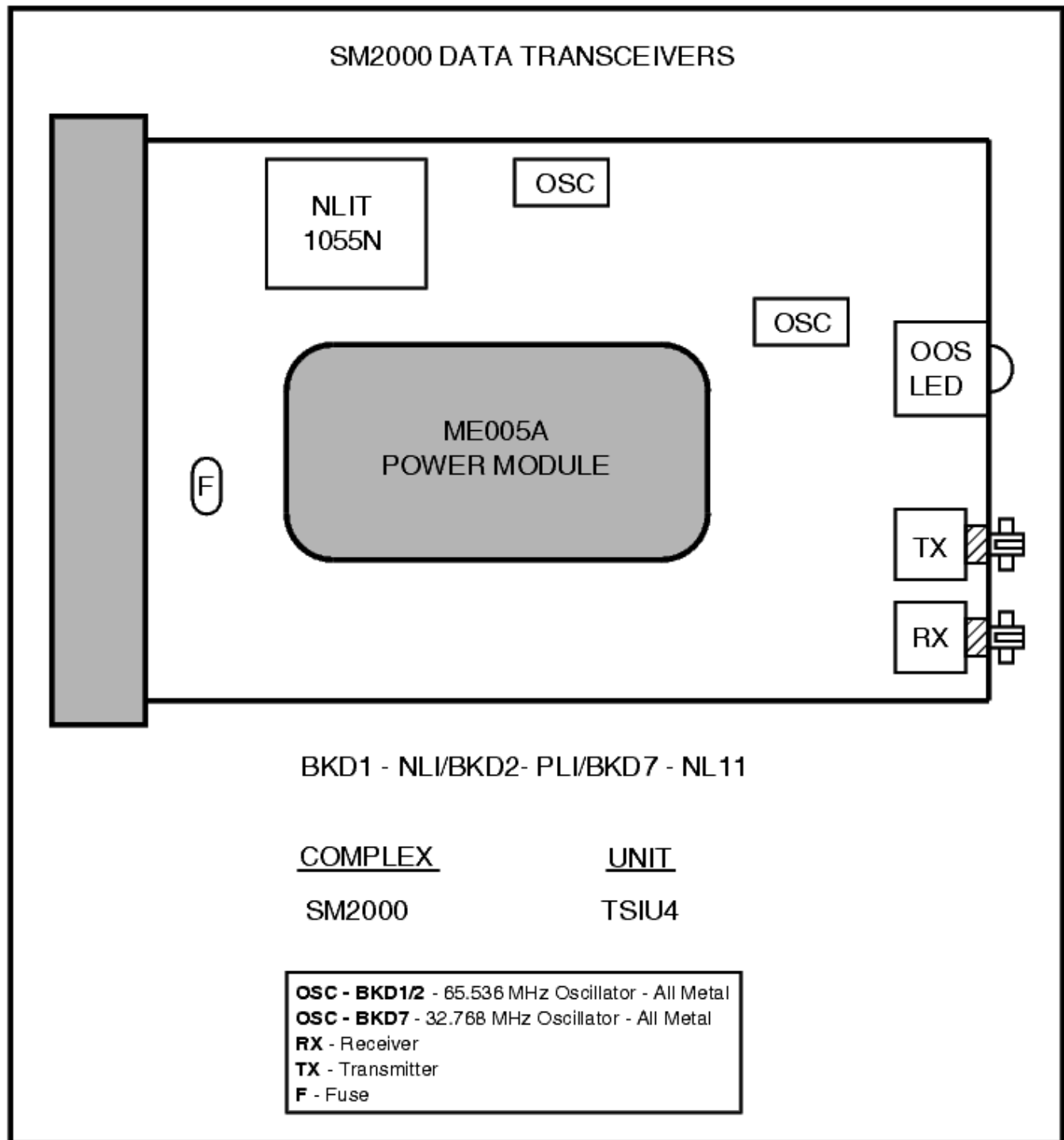


Figure 13.1.5-4 SM-2000 Data Transceivers

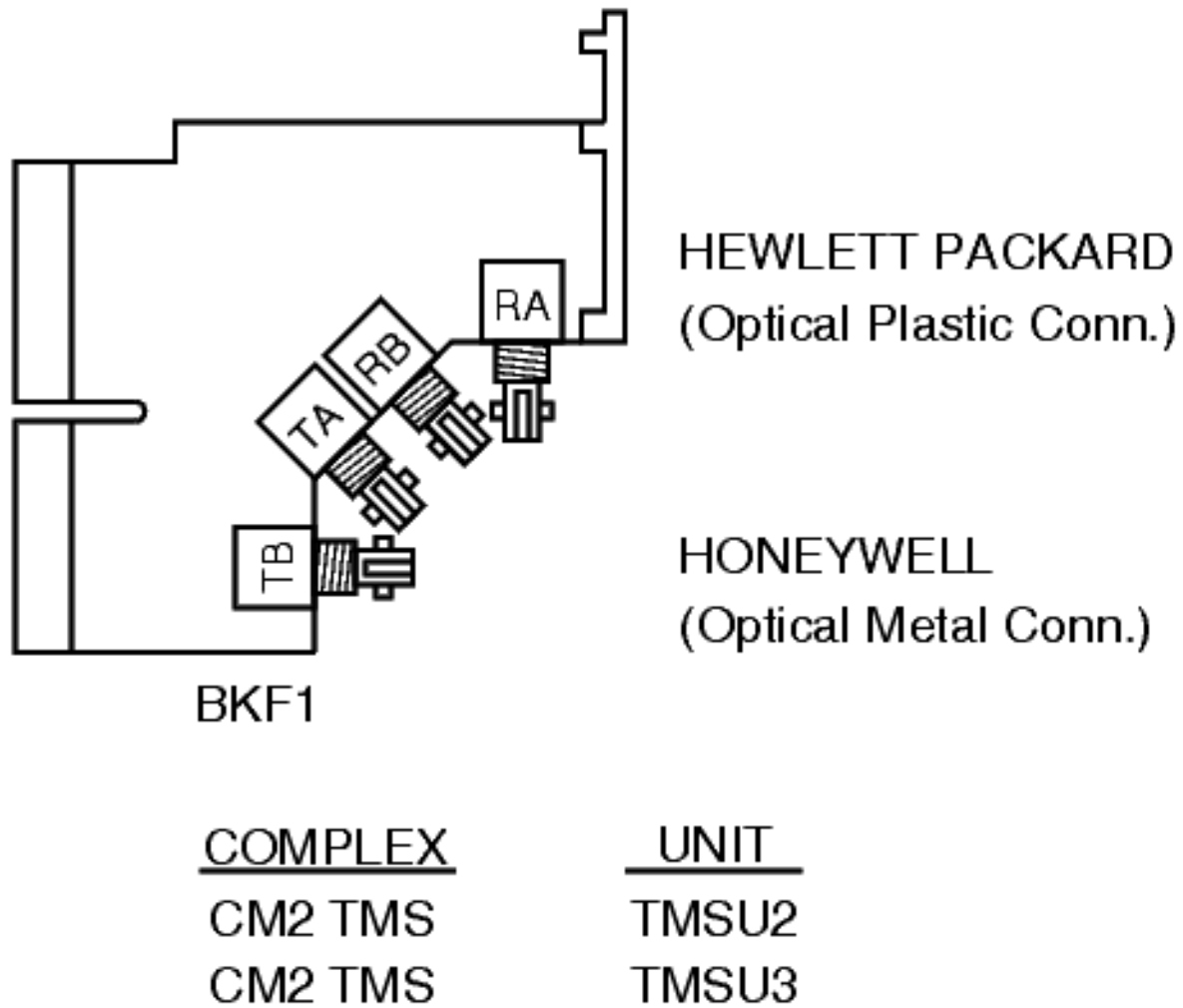
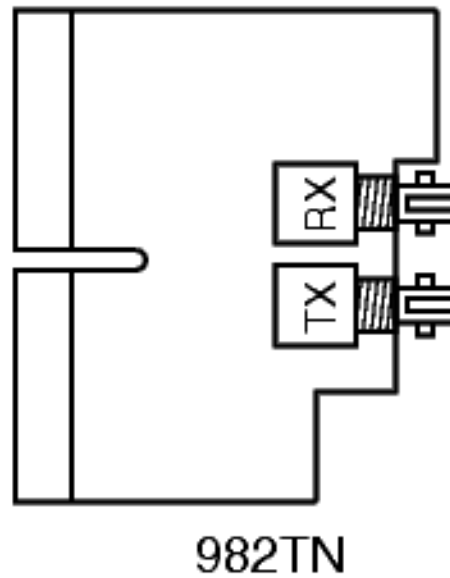


Figure 13.1.5-5 COT - CM2 Optical Transceiver

HEWLETT PACKARD
(Optical Plastic Conn.)

HONEYWELL
(Optical Metal Conn.)



COMPLEX
SM2K

UNIT
DNUS

Figure 13.1.5-6 Optical Transceivers - DNU-S

Procedure 13.2: RECOVER FROM A DEGRADED TRANSMISSION MULTIPLEXER (DGR TMUX)

OVERVIEW

A software update in Transmission Multiplexer (TMUX) units requires that an updated TMUX image be pumped from the Common Control (CC) to all the TMUXs in parallel that are not out of service (OOS). If an active (ACT) or standby (STBY) TMUX fails the pump, then the TMUX becomes degraded (DGR) if the following two prerequisites are met.

- (1) The subtending SONET Terminating Equipment (STE) is ACT, and
- (2) A sparing was not successful.

The following steps recover a DGR TMUX:

PROCEDURE

1. Retry the aborted **UPD:PMPPERF** command.
 - (a) If the command failed during **SOAK**, repoke **9320** or **9420** from 1960 page.
 - (b) If the command failed during **BKOUT**, repoke **9340** or **9440** from 1960 page.
 - (c) If the command failed during **BOLO**, repoke **9900** from 1950 page.
 - (d) If the command was entered manually through craft shell, reenter the command. Refer to 235-600-700, *Input Message Manual* for command format information on **UPD:PMPPERF**.

All the DGR TMUXs will be repumped. If retry is successful, a DGR TMUX will become either ACT or STBY, and the procedure is complete.

If a TMUX still fails the broadcast pump, it stays in the DGR state, providing the two prerequisites of a DGR state are still met. If the **UPD:PMPPERF** command aborts repeatedly, go to Step 2.

2. If the software update (SU) is still in the **SOAK** stage, back it out by entering **9340** from 1960 page. A repeated pump failure may indicate a bad software update or other software problems.

If the backout is successful, there should be no DGR TMUXs, and the procedure is complete.

If the backout is not successful and there are DGR TMUXs, continue with the next step.

NOTE: A DGR TMUX is considered inconsistent and therefore blocks an SU from being made official.

If the SU is not in the soak stage, then the cause is a software or hardware problem. **Seek technical support to identify the cause.**

Although a DGR TMUX is in a stable state and call processing is not affected, to continue with the next SU transaction, the aborted **UPD:PMPPERF** command must be concluded. To complete a **UPD:PMPPERF** command, the final state of a TMUX has to be either ACT, STBY, or OOS.

At this point, recovery of the DGR TMUXs has failed using the command **UPD:PMPPERF**, therefore, go to

the next step to recover the DGR TMUXs manually.

3. Use poke **33XY,UCL** from 1510 page to restore unconditionally a DGR TMUX XY. Being unconditional, the command preserves stable calls, does a processor reset and is followed by a restore.

If successful, a DGR TMUX becomes ACT, whether it is a spare or not a spare.

If restore fails, a DGR TMUX remains being DGR.

Repeat this step for all DGR TMUXs. If a restore fails repeatedly, go to the next step. Otherwise, go to Step 6.

4. Use poke **33XY** from 1510 page to restore conditionally a DGR TMUX XY. The command waits for a certain amount of time for the calls to complete before taking the DGR TMUX out of service.

NOTE: The feasibility of removing a DGR TMUX is subject to the OOS Threshold. Refer to 235-600-750, *Output Message Manual* for detailed information on **RMV:TMUX** and **APP:MAINT-RESP**. If it is infeasible to restore conditionally a DGR TMUX due to the OOS Threshold, poke **33XY[UCL]** to restore some other TMUX units until OOS Threshold no longer prevents a DGR TMUX from being restored conditionally. If it is infeasible to restore other OOS TMUX units, go to Step 5.

Once the DGR TMUX becomes OOS, a TMUX is board-reset then restored.

If successful, a DGR TMUX becomes ACT, whether it is a spare or not a spare.

If restore fails, a DGR TMUX becomes OOS.

Repeat this step for all DGR TMUXs. If a restore fails repeatedly, go to the next step. Otherwise, go to Step 6.

5. Since all restore attempts involving conditional removal of the DGR TMUX has failed, the only way to complete an **UPD:PMPPERF** command is to remove the DGR TMUX unconditionally so that it would become OOS and not be targeted by a subsequent **UPD:PMPPERF**.

CAUTION: This step is service-impacting and is not mandatory. It should be used only as the last resort to conclude the current **UPD:PMPPERF** so that other SU activities can proceed.

There are two ways to put a DGR TMUX to OOS unconditionally:

- (1) Use poke **23XY,UCL** from 1510 page to remove a DGR TMUX XY.
- (2) Use poke **24XY,UCL** from 1510 page to remove STE XY which services the DGR TMUX.

NOTE: When **23XY,UCL** or **24XY,UCL** is entered, there is no attempt to preserve the calls before removing the unit.

Refer to the 235-600-700, *Input Message Manual* for additional information on **RMV:TMUX**. Repeat this step for all DGR TMUXs; go to Step 6.

6. Verify there is no DGR TMUX, then repoke **UPD:PMPPERF**.

- (a) If the command failed during **SOAK**, repoke **9320** or **9420** from 1960 page.
- (b) If the command failed during **BKOUT**, repoke **9340** or **9440** from 1960 page.
- (c) If the command failed during **BOLO**, repoke **9900** from 1950 page.

- (d) If the command was entered manually through craft shell, reenter the command. Refer to 235-600-700, *Input Message Manual* for command format information on **UPD:PMPPERF**.

If successful, the procedure is complete.

If unsuccessful and there are DGR TMUXs, go to Step 1.

NOTE: Periodically, the software update levels of the DNU-S products are audited. Since DGR is considered a stable state, no corrective action will be scheduled. Recovery from a DGR TMUX can only be done through this manual procedure. The audit, however, will schedule corrective action for inconsistent TMUXs that are in ACT or STBY state.

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

14. POWER-UP/POWER-DOWN EQUIPMENT PROCEDURES

GENERAL

This section contains procedures to correctly power-up/power-down equipment

Procedure 14.1: PERFORM POWER-UP/POWER-DOWN OF EQUIPMENT

OVERVIEW

This procedure contains information for removing and restoring power to equipment. Most repairs of line and trunk units in 5ESS[®] switch modules do not require power removal/restoration as part of the repair process. Circuit pack replacement in these units [Line Unit (LU), Trunk Unit (TU), Digital Carrier Line Unit (DCLU), etc.] should be done without removing power from the backplane. However, the high-level control units [Control Unit (CU), Disk File Controller (DFC), Input/Output Processor (IOP), Message Switch Control Unit (MSCU), Message Switch Peripheral Unit (MSPU), Communication Module Processor Unit (CMPU), Office Network and Timing Complex (ONTC), Dual Link Interface (DLI), Remote Link Interface (RLI), and Module Controller/Time Slot Interchange (MCTSI)] are equipped with a power control/display pack, and these units do require unit (backplane) power removal before a circuit pack is pulled/replaced. The following is a list of power control/display circuit packs and their corresponding high-level control units.

- TN3B — DFC
- TN5B — Common Control (CC)
- TN6B — IOP
- SN412 — Control and display circuit
- SN516 — Control and display circuit
- TN1077 — DLI.

After system installation and turnover, a loss of power from the -48 V DC power plant should seldom occur. However, when it does, Procedure 14.3, use Restore Primary Power Bus(es) at Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF), for bringing it back up to avoid potential damage to certain circuits in the system. Similarly, if it is necessary to (intentionally) remove -48 V DC power from a power bus at the PCFD, GPDF, or at the power plant, then use Procedure 14.6, Remove -48 V DC Power at Power Control Fuse Distribution, Global Power Distribution Frame or Power Plant. Special procedures are also required for certain blown fuse situations, and these are covered in Procedure 6.4, Respond to a Fuse Alarm (FA)/Power Alarm (PWR ALM) Failure, and Procedure 14.2, Resolve Power Problem at Power Control Fuse Distribution, Global Power Distribution Frame or Power Plant (simply replacing a blown fuse is not always appropriate).

CAUTION: Prior to replacing/inserting the Modular Fuse Filter Unit (MFFU) alarm card, one side of the MCTSI should be powered down. Failure to follow the proper procedure may result in lost or dropped calls.

NOTE: For the 5ESS[®] Switch Compact Digital Exchange (CDX), the power groups have changed with the CM2C. Removing power from either the MSCU, MSPU, or ONTC requires removing power from all of the units, as they share a common power source in the CM2C. For specific information on CDX, refer to the 235-120-010, *CDX Reference Guide* or the 235-120-020, *CDX User's Guide*. For specific information on VCDX, refer to the 235-120-110, *VCDX Reference Guide* or the 235-120-120, *VCDX User's Guide*. For specific information on the Distinctive Remote Module (DRM), refer to the 235-200-150, *Distinctive Remote Module (DRM) User's Guide*.

Fuse replacement information can be found at the end of this procedure in Table 14.1-1.

PROCEDURE

1. Depending on the affected unit and operation to be performed, proceed as follows:
 - (a) To remove power at the CU, DFC, IOP, MSCU, MSPU, CMPU, ONTC, DLI, RLI, or MCTSI, perform Steps 4 and 5.
 - (b) To remove power from an SBUS or Moving Head Disk (MHD), perform Steps 6 and 7.
 - (c) To restore power at the CU, DFC, IOP, MSCU, MSPU, CMPU, ONTC, DLI, RLI, or MCTSI, perform Steps 8 and 9.
 - (d) To restore power to an SBUS or MHD, perform Steps 10 and 11.
 - (e) For equipment groups (other than MCTSI, DLI, or RLI) in a switching module/switching module-2000 (SM/SM-2000), continue with Steps 2 and 3.
 - (f) When restoring power to the packet switch unit (PSU), continue with Step 12.
2. For equipment groups (other than MCTSI, DLI, or RLI) in an SM/SM-2000, power should not be removed from the unit's backplane before pulling/replacing a power converter or other circuit pack. (If an LU is involved, observe the **Caution** that follows.) In these units, power is removed from a pack when its lever switch is pulled down; power is restored to the pack when it is inserted and locked in position. On a power converter, the "ST" (start) switch must be momentarily pressed to turn the converter ON and the OFF Light Emitting Diode (LED) should go off.

CAUTION: In an LU, do not remove/insert a TN832(B) [or TN332(B)] pack without first unseating the associated TN831(B) [or TN331(B)] pack. Also, in a Model 1 LU, do not remove/insert a TN340(B) pack without first unseating the two associated TN338(B) packs.

3. **STOP. YOU HAVE COMPLETED THIS PORTION OF THE PROCEDURE.**

4. **NOTE:** Because there is no way to remove power from any individual Peripheral Controller (PC) slot or community within an IOP, the power must be removed from the IOP at the TN6B controller. Therefore, all peripheral controllers and communities will be out-of-service.

Locate the unit's power control/display pack (TN3B, TN5B, TN6B, SN412, SN516, TN1077, etc.) and remove power from the unit in Substeps (a) through (c) as follows:

- (a) Move the "ROS/RST" switch to the "ROS" position and wait until the RQIP LED is goes off.
 - (b) Verify that the unit's out-of-service (OOS) LED is ON.
 - (c) Press the unit's OFF switch and verify that the OFF LED lights.
5. **STOP. YOU HAVE COMPLETED THE UNIT POWER REMOVAL PROCEDURE.**
6. Remove power from an MHD as follows in Substeps (a) through (e):
 - (a) On the SBUS or MHD's control/display panel, move the "ROS/RST" switch to the "ROS" position.
 - (b) On the SBUS or MHD's control/display panel, verify that the MHD's OOS LED is ON.
 - (c) If the unit is a 300- or 340-MB MHD, release the MHD's "START" switch and verify that the START LED starts flashing. Wait until the START LED stops flashing before continuing.
 - (d) On the SBUS or MHD's control/display panel, press the "OFF" switch and verify that the OFF LED lights.

- (e) If the unit is a 300- or 340-MB MHD, locate the MHD's power supply (at the side of the disk drive) and open (turn-off) the "MAIN" circuit breaker switch (near top of faceplate).

7. STOP. YOU HAVE COMPLETED THE MHD POWER REMOVAL.

8. Locate the unit's power control/display pack (TN3B, TN5B, TN6B, SN412, SN516, TN1077, etc.) and restore power to the unit as follows:

- (a) On the unit's power control/display pack, press the "ON" switch and verify that the OFF LED goes off.
- (b) Wait 10 seconds, then to request diagnosis and restoration of the unit to service, move the "RST" (or "ROS-RST") switch to the "RST" position.
- (c) Verify the OOS led goes off.

9. STOP. YOU HAVE COMPLETED THE UNIT POWER RESTORE PROCEDURE.

10. Restore power to an SBUS or MHD as follows in Substeps (a) through (d):

- (a) If the unit is a 300- or 340-MB MHD, locate the MHD's power supply (at side of disk drive) and close (turn on) the "MAIN" circuit breaker switch (near the top of the faceplate).
- (b) On the MHD's control/display panel (below the disk drive), press the "ON" switch and verify that the OFF LED goes off and wait 60 seconds for the disk to get up to speed.
- (c) If the unit is a 300- or 340-MB MHD, locate the MHD's control/display panel, press the MHD's "START" switch and verify that the START LED starts flashing. Wait until the START LED stops flashing before continuing.
- (d) To request diagnosis and restoration of the MHD to service, on the MHD's control/display panel, move the "ROS/RST" switch to the "RST" position.

11. STOP. YOU HAVE COMPLETED THE MHD POWER RESTORE PROCEDURE.

12. Restore power to the PSU as follows in Substeps (a) through (e):

- (a) Before power can be restored to the PSU, determine the type of protocol handler (PH) that is present in the PSU.

CAUTION: Read and understand Substeps b and c before continuing. Failure to observe these steps could result in damage to some or all PH circuit packs.

- (b) If any of the PHs are MC5D100A1(TN1366), MC5D115A1(TN1081), or MC5D146A1(TN1367), unseat these PH circuit packs before restoring power.
- (c) If any of the PHs are MC5D146A1B(TN1367B) or MC5D160A1B(TN1371B), these PH circuit packs do **not** have to be unseated. These circuit packs are equipped with the auto power recovery (APR) feature which allows for power restoration without damage to the circuit pack(s).

NOTE: Please note that the PH circuit packs could be mixed with both APR and non-APR type packs.

- (d) Restore power at fuse filter unit, the PCFD, or GPFD.
- (e) Reseat any PH circuit packs that were unseated.

13. STOP. YOU HAVE COMPLETED THE PSU POWER RESTORE PROCEDURE.

Table 14.1-1 Fuse Replacement Information

PART NUMBER	ULTM ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
70A	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203322 Description: FUSE, MINIATURE, ALARM, 1.33 amp, 125 V AC or DC (White) Approval: UL Recognized Supplier: Lucent Technologies
70B	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747527 Description: FUSE, FAST ACTING, ALARM, 2.0 amp, 125 V AC or DC (Orange) Approval: UL Recognized Supplier: Lucent Technologies
70C	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747535 Description: FUSE, FAST ACTING, ALARM, 3.0 amp, 125 V AC or DC (Blue) Approval: UL Recognized Supplier: Lucent Technologies
70D	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747543 Description: FUSE, FAST ACTING, ALARM, 5.0 amp, 125 V AC or DC (Green/Black) Approval: UL Recognized Supplier: Lucent Technologies
70F	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203371 Description: FUSE, MINIATURE, ALARM, 0.25 amp, 125 V AC or DC (Violet) Approval: UL Recognized Supplier: Lucent Technologies
70G	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747501 Description: FUSE, FAST ACTING, 0.5 amp, 125 V AC or DC (Red) Approval: UL Recognized Supplier: Lucent Technologies
70H	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203397 Description: FUSE, MINIATURE, ALARM, 0.75 amp, 125 V AC or DC (Brown) Approval: UL Recognized Supplier: Lucent Technologies
74A	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747519 Description: FUSE, VERY FAST ACTING 1.25 amp, 125 V AC or DC Approval: UL Recognized Supplier: Lucent Technologies
74B	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 102630308 Description: FUSE, MISCELLANEOUS, 3.0 amp, 125 V AC or DC Approval: UL Recognized Supplier: Lucent Technologies
74C	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 102630316 Description: FUSE, MISCELLANEOUS, 5.0 amp, 125 V AC or DC Approval: UL Recognized

		Supplier: Lucent Technologies
74D	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747568 Description: FUSE, VERY FAST ACTING, 10.0 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74E	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406808469 Description: FUSE, MISCELLANEOUS, 15.0 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74F	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406808477 Description: FUSE, VERY FAST ACTING, 20.0 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74J	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 103228425 Description: FUSE, MISCELLANEOUS, 7.5 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
—	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747550 Description: FUSE, FAST ACTING, 7.0 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
—	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747576 Description: FUSE, VERY FAST ACTING, 12.0 amp, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
251 002	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403871973 Description: FUSE, SUBMINIATURE, 2.0 amp, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
251 005	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403832538 Description: FUSE, SUBMINIATURE, 5.0 amp, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
25101.5	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403871965 Description: FUSE, SUBMINIATURE, 1.5 amp, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
255 003	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 405432410 Description: FUSE, SUBMINIATURE, 3.0 amp, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
315	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403424583 Description: FUSE, MINIATURE, 0.5 amp, 250 V AC Approval: UL Recognized Supplier: LITTELFUSE, Inc.

315.500	Category: JDYX File # E10480 Marking: 1	COMCODE: 402928089 Description: FUSE, MINIATURE, 0.5 amp, 250 V AC Approval: UL Listed Supplier: LITTELFUSE, Inc.
315.750	Category: JDYX File # E10480 Marking: 1	COMCODE: 404073405 Description: FUSE, MINIATURE, 0.75 amp, 250 V AC Approval: UL Listed Supplier: LITTELFUSE, Inc.
KS-19780 L26	Category: JDYX2 File # E39265 Marking: 1	COMCODE: 405171703 Description: FUSE, 30 amp, 130 V AC Approval: UL Recognized Supplier: SAN-O Industrial Corp.
WP90192 L16H	Category: JDYX File # E39265 Marking: 1	COMCODE: 403797798 Description: FUSE, 2 amp, 250 V AC Approval: UL Listed Supplier: SAN-O Industrial Corp.
Notes:		
a. Company name or trade name and catalog, series, type, model, or code designation..		

Procedure 14.2: RESOLVE POWER PROBLEM AT POWER CONTROL FUSE DISTRIBUTION, GLOBAL POWER DISTRIBUTION FRAME OR POWER PLANT

OVERVIEW

This procedure contains information for the application and verification of -48 V DC power from the -48 V DC power plant to the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) that is used with the 5ESS[®] switch equipment.

This procedure should only be needed when a fuse blows at the PCFD/GPDF or when there is an interruption in one or more of the primary -48 V DC power plant buses to the PCFD/GPDF. These should be rare events since local power converters and fusing at the individual units should isolate most power problems to a single unit.

CAUTION 1: To prevent the blowing of a good fuse due to heavy in-rush current when replacing a blown fuse at the PCFD or restoring a -48 V circuit breaker at the power plant and to prevent damage to certain Line Unit (LU) packs, the following procedures must be followed. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 2: The following procedures should be followed before restoring -48 V DC power at the power plant or replacing a blown fuse at the PCFD if an Integrated Services Line Unit (ISLU) is powered by the primary bus. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 3: The GPDFs are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

PROCEDURE

1. At the PCFD/GPDF, determine the severity of the power outage and use the appropriate procedures as indicated in Steps 2 through 4.
2. If one or more of the eight primary power buses (designated as A1, B1, A2, B2, A3, B3, A4, B4) is nonoperational [for example, all filter fuse light-emitting diodes (LED) are ON], use Procedure 14.3, Restore Primary Power Bus(es) at Power Control Fuse Distribution or Global Power Distribution Frame, to restore each bus that is down.

NOTE: If several power buses are down, restore power to the Administrative Module (AM) first and make sure Control Unit (CU) recovery is started, then restore power to the Communications Module (CM) and make sure at least one side of the Office Network and Timing Complex (ONTC) is restored to service, and then, restore the SM/SM-2000s.

3. If only one filter fuse is blown, use Procedure 14.4.1, Replace Blown Filter Fuse at Power Control Fuse Distribution or Global Power Distribution Frame, to replace the filter fuse.
4. If only one load bus is down (for example, the load fuse is blown), use Procedure 14.5, Replace Load and Indicator Fuses at Power Control Fuse Distribution or Global Power Distribution Frame, for restoral.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 14.3: RESTORE PRIMARY POWER BUS(ES) AT POWER CONTROL FUSE DISTRIBUTION OR GLOBAL POWER DISTRIBUTION FRAME

OVERVIEW

This procedure is to be used in the rare case that one or more of the primary power buses (designated as A1, B1, A2, B2, A3, B3, A4, or B4) from the -48 V DC power plant to the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) must be restored. Simply closing an open circuit breaker or replacing a blown fuse is not appropriate.

CAUTION 1: This procedure must be carefully followed in order to prevent the blowing of a good fuse due to heavy in-rush current when replacing a blown fuse at the PCFD or restoring a -48 V DC to filter circuits and to avoid potential damage to certain circuits in the system. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 2: This procedure must be followed in order to restore the -48 V DC power at the power plant if an Integrated Services Line Unit (ISLU) is powered by the primary bus. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 3: The GPDFs are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted, arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

NOTE 1: This procedure is written assuming that the charge circuit (CHG CKT) at the PCFD is operational and no fault occurs during execution of the procedure. However, the GPDF is not equipped with a charge circuit. For detailed information for performing a routine maintenance check on the charge circuit assembly, refer to 235-105-210, *Routine Operations and Maintenance Procedures*.

NOTE 2: If all or several primary power buses are down, this procedure should be repeated for each bus that is down as follows:

- (a) Restore power to the Administrative Module (AM) first and make sure that Control Unit (CU) recovery is started.
- (b) Restore power to the Communications Module (CM) and make sure at least one side of the Office Network and Timing Complex (ONTC) is restored to service.
- (c) Restore the Switching Modules/Switching Module-2000s (SM/SM-2000s).

Automatic system recovery action should normally recover basic AM, CM, and SM/SM-2000 services upon power restoral. 235-105-250, *System Recovery Manual*, provides procedures to check system recovery progress and initiate manual action if necessary.

PROCEDURE

1. Determine if any Line Units (LU) that are not equipped for Line Unit Auto Power Recovery (LUAPR) are powered by any primary power bus to be restored. If so, observe the following **Caution** and unseat the TN831(B) [or TN331(B)] packs, the TN832(B) [or TN332(B)] packs, and all TN838, TN1048 or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not

require unseating for this procedure. This action prevents any possible damage to the LU packs when power is restored.

CAUTION: Always unseat the TN831(B) [or TN331(B)] packs before unseating the associated TN832(B) [or TN332(B)] packs; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) packs.

2. Determine if any ISLUs are powered by any primary buses to be restored. If so, determine what type of charge panel the PCFD or GPDF is equipped with. If equipped with an ED-83024-30 G1 (2 amp) charge panel, perform Substeps (a) and (b). If equipped with an ED-83024-30 G5 or G6 (15 amp), go to Step 3.
 - (a) Locate the cabinet of the ISLU.
 - (b) Open the ISLU fuse panel cover above the unit and remove the fuses in the fuse panel associated with each affected primary power bus.
3. If any Moving Head Disks (MHD) in the AM are powered by the primary power bus to be restored, release the "START" switch and turn off (open) the "MAIN" circuit breaker switch on each affected MHD's power supply (beside the disk drive). This action prevents any possible damage to the disk packs when power is restored.
4. Perform the applicable Substep (a) or (b):
 - (a) At the PCFD load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 24 indicator fuses (designated as FA1-FA24), the 24 load fuses (designated as F1-F24), and the associated 3 filter fuses (no designation).
 - (b) Determine which GPDF power bus(es) is without -48 volt power and associate the affected bus(es) with its power plant circuit. If the affected bus provides -48 volt power to a CNI Ring Node (RN) cabinet or to a LU that is not equipped with all TN1058C grids, then perform the appropriate practice. Prepare the RN circuits for the return of -48 volt power by unseating the affected RN circuit packs and power unit packs. Prepare the non-APR compatible LUs for the return of -48 volt power by unseating the TN831 and TN832 gdxacc packs and all grids in the affected LU.

CAUTION: The GPDF is compatible with the Automatic Power Recovery (APR) feature, which means, GPDF fuses do not have to be unseated when restoring power to a GPDF bus. However, if a GPDF fuse powers a unit/circuit that is not APR compatible the non-APR compatible units/circuits must be conditioned for in-rush current before power is restored.
5. At the -48 V power plant circuit breaker panel, position the appropriate circuit breaker to the "ON" position for each primary power bus to be restored. Then continue with Step 6 for PCFD and Step 10 for GPDF.
6. At the PCFD (on the control panel), pull outward on the CHG PROBE and insert the probe into the first open filter fuse position (filter fuse was removed in Step 4). Push the "CAP CHG TEST" switch and verify that the CAP CHG light-emitting diode (LED) comes on (RED) and goes off. Remove the CHG PROBE and quickly (within 6 seconds) insert the filter fuse.
7. For the other filter fuse positions (removed in Step 4), repeat Step 6 for all primary power buses being restored.
8. At the PCFD, charge up the first load distribution bus for the first primary power bus to be restored as follows in Substeps (a) through (c):
 - (a) Insert the CHG PROBE into the first open indicator fuse position (FA1) for the first load fuse (F1) and rotate it clockwise to lock it in position.

- (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG LED come on (RED) and go off; and with the other hand, insert the load fuse (F1).
 - (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the appropriate indicator fuse (FA1).
9. For each primary bus being restored, repeat Step 8 for the remaining load distribution buses.
 10. Reinstall any ISLU fuses that were removed in Step 2 and return equipment to its normal state.
 11. Restore power to any MHD that was turned off in Step 3 by performing Substeps (a) through (d):
 - (a) On the MHD's power supply (beside the disk drive), close (turn-on) the "MAIN" circuit breaker.
 - (b) On the MHD's power control/display panel (below the disk drive), press the "ON" switch and verify that the OFF LED goes off.
 - (c) On the MHD's power control/display panel (below the disk drive), press the "START" switch and verify that the START LED is flashing (green). Wait until this LED stops flashing before continuing.
 - (d) On the MHD's power control/display panel (below the disk drive), move the "ROS/RST" switch to the RST position.
 12. Restore power to all units [push the "ON" switch on unit power control pack or push the "ST" (start) switch on the service group power converters]. Model 2 or 3 LUs equipped for LUAPR do not require manual power converter operation.
 13. If any LU packs were unseated in Step 1, observe **Caution** and reseal them.

CAUTION: Always reseal the TN832(B) [or TN332(B)] before resealing the associated TN831(B) (or TN331(B)); and in Model 1 LU grids, always reseal the TN340(B) pack before resealing either TN338(B) pack.
 14. Unconditionally restore all units to service using the appropriate **RESTORE** commands on the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
 15. At the PCFD, verify that all the applicable indicator fuses are installed.
 16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 14.4: REPLACE BLOWN FILTER FUSE AT POWER CONTROL FUSE DISTRIBUTION OR GLOBAL POWER DISTRIBUTION FRAME

OVERVIEW

This procedure is to be used when one of the three filter fuses for a primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) at the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) has blown, but power has not been interrupted to the units on the associated 24 load-distribution buses. Simply replacing the blown fuse with a good fuse is not sufficient for the PCFD, however, it could be all that is needed for the GPDF. Capacitor charging is required to prevent blowing a good fuse with heavy in-rush current on the PCFD.

PROCEDURE

1. This procedure is divided into the following two sections:
 - (a) Procedure 14.4.1 — Replace Blown Filter Fuse at PCFD
 - (b) Procedure 14.4.2 — Replace Blown Filter Fuse at GPDF.

Procedure 14.4.1: Replace Blown Filter Fuse at PCFD

PROCEDURE

1. At the PCFD (on the control panel), locate the cabinet alarm light, the visual panel alarm light, and the fuse indicating light.
2. Determine what is powered by the blown fuse using the Fuse Assignment Table. Using the MCC, determine if the unit has power?

If **YES**, replace indicator fuse only. This should remove the visual alarm and the indicator fuse will remain normal. If unsuccessful, **seek technical assistance**.

If **NO**, first remove the indicator fuse then the blown fuse.

3. Obtain a replacement 30-ampere (KS-19780, L6) filter fuse and place into fuse cap.
4. At the PCFD (on the control panel), perform Substeps (a) through (c) as follows:
 - (a) Pull outward on the CHG PROBE and insert, turn, and lock the probe into the open filter fuse position.

NOTE: The replacement filter fuse must be inserted into position within 6 seconds or the capacitor charge will be depleted. If this occurs, then the "CAP CHG TEST" will need to be performed again.

- (b) Push and hold the "CAP CHG TEST" switch and watch the CAP CHG light-emitting diode (LED) light (RED) and go off.

NOTE: If the filter capacitor does not charge up within 30 seconds, the yellow LOAD FAULT LED will light indicating that the charger is shut off (and will remain off for the next 30 seconds). If this happens (and the procedure for capacitor charging was followed correctly), then there is some trouble (perhaps a shorted filter capacitor) causing excessive current load on that fuse that must be cleared. If unable to resolve, seek the next higher level of technical assistance.

- (c) Remove the CHG PROBE and quickly (within 6 seconds) insert the replacement 30-ampere filter fuse. Replace CHG PROBE into proper position and replace the indicator fuse.
5. Observe that the visual panel alarm indicator is off and indicator fuse remains normal.

If **YES**, you have successfully replaced a blown filter fuse.

If **NO**, repeat replacement procedure, Step 2. If unsuccessful, **seek technical assistance**.

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

Procedure 14.4.2: REPLACE BLOWN FILTER FUSE AT GPDF

OVERVIEW

CAUTION: GPDFs are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted, arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

NOTE: If one or more filter fuse alarm LEDs are active (FF1 through FF4) on a GPDF power bus, the mostly likely cause is a tripped/opened power plant circuit.

PROCEDURE

1. Unseat the GPDF fuse connector with the LED active. With the fuse still in the connector, observe the north to south relationship the fuse has with the connector.
2. Remove the fuse and replace it with a good 25 amp fuse. Make sure the fuse is inserted the same way that was observed in Step 1.
3. Reinsert the fuse connector. If the LED goes off, proceed to Step 4. If the LED remains lighted, observe the caution below.

CAUTION: If the LED does not go off, 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, refer to Procedure 16.1 .

4. Once -48 V power has been restored, the units without the APR backplane options must be powered up. Proceed to the affected units and perform Substep (a) or (b).
 - (a) Units with SN516 controllers, press the **ON** button.
 - (b) Units with power converters, press the **ST** button.
5. Once the units have been powered up, return the affected units to the operational state.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 14.5: REPLACE BLOWN LOAD FUSES AT POWER CONTROL FUSE DISTRIBUTION OR GLOBAL POWER DISTRIBUTION FRAME

Overview

This procedure is to be used to replace a blown Power Control Fuse Distribution (PCFD) load fuse and a Global Power Distribution Frame (GPDF) blown fuse that powers down-stream equipment in the applicable hardware cabinets. The PCFD is equipped with a load and pilot fuse where the GPDF is only equipped with a load fuse.

CAUTION 1: Perform this procedure in order to prevent the blowing of a good fuse due to heavy in-rush current when applying -48 V DC power to load distribution buses and to avoid potential damage to certain circuits in the system. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 2: Perform this procedure before replacing a blown fuse at the PDF if an Integrated Services Line Unit (ISLU) is powered by the primary bus. Otherwise, the special capacitive load charging procedures will fail.

CAUTION 3: The GPDFs are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted, arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

NOTE: This procedure is written assuming that the charge circuit (CHG CKT) on the PCFD is operational and that no fault occurs during execution of the procedure. However, the GPDF is not equipped with a charge circuit. For detailed information applicable to a routine maintenance check of the charge circuit assembly, refer to 235-105-210, *Routine Operations and Maintenance*.

PROCEDURE

1. This procedure is divided into the following two sections to properly explain the differences between the PCFD and GPDF:
 - (a) Procedure 14.5.1 — Replace Blown Load and Indicator Fuses at Power Control Fuse Distribution (PCFD)
 - (b) Procedure 14.5.2 — Replace Blown Load Fuses at Global Power Distribution Frame (GPDF).

Procedure 14.5.1: REPLACE BLOWN LOAD AND INDICATOR FUSES AT PCFD

PROCEDURE

1. Determine if any Line Units (LU) that are not equipped for Line Unit Auto Power Recovery (LUAPR) are powered by any primary power bus to be restored. If so, observe **Caution** and unseat the TN831(B) [or TN331(B)] packs, The TN832(B) [or TN332(B)] packs, and all TN838, TN1048 or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not require unseating for this procedure.

CAUTION: Always unseat the TN831(B) [or TN331(B)] pack before un-seating the associated TN832(B) [or TN332(B)] pack; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) pack.

2. Determine if any ISLUs are powered by the load fuse to be replaced. If so, determine what type of charge panel the PCFD is equipped with. If equipped with an ED-83024-30 G1 (2 amp) charge panel, proceed with Substeps (a) and (b). If equipped with an ED-83024-30 G5 or G6 (15 amp) charge panel, go to Step 3.
 - (a) Locate the cabinet of the ISLU.
 - (b) Open the ISLU fuse panel cover above the unit and remove the fuses in the fuse panel associated with the PCFD load fuse.
3. If a Moving Head Disk (MHD) in the Administrative Module (AM) is powered by the load fuse to be replaced, release the "START" switch and turn off the "MAIN" circuit breaker switch on the affected MHD's power supply (beside the disk drive).
4. Determine what is powered by the blown fuse using the Fuse Assignment Table. Using the MCC, does the unit have power?

If **YES**, replace indicator fuse only. This should remove the visual alarm and the indicator fuse will remain normal. If unsuccessful, **seek technical assistance**.

If **NO**, first remove the indicator fuse then the blown fuse.

5. At the PCFD (on the control panel), perform Substeps (a) through (c) as follows:
 - (a) Pull outward on the CHG PROBE, insert it into the open indicator fuse position, and rotate it to lock it in.
 - (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG light-emitting diode (LED) light (RED) and go off; and with the other hand, insert the load fuse.

NOTE: If the load bus does not charge up within 30 seconds, the yellow LOAD FAULT LED will light indicating that the charger is shut off (and will remain off for the next 30 seconds). If this happens and the procedure for capacitive load charging was followed correctly, the trouble causing the excessive load on that load bus must be cleared before the load bus can be restored. If unable to resolve, seek the next higher level of technical assistance.

- (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the indicator fuse.
6. Reinstall any ISLU fuses that were removed in Step 2.
7. Restore power to any MHD that was turned off in Step 3 by performing Substeps (a) through (d) as follows:

- (a) On the MHD's power supply (at side of disk drive), close (turn on) the "MAIN" circuit breaker (near top of faceplate).
 - (b) On the MHD's power control/display panel (below the disk drive), press the "ON" switch and verify that the OFF LED goes off.
 - (c) On the MHD's power control/display panel (below the disk drive), press the "START" switch and verify that the START LED (green) starts flashing. Wait until this LED stops flashing before continuing.
 - (d) To request diagnosis and restoral of the MHD to service (on the MHD's control/display panel), move the "ROS/RST" switch to the "RST" position.
8. Restore power at all units and service groups [push "ON" switch on unit power control packs or push "ST" (start) switch on service group power converters].
9. If any LU packs were unseated in Step 1, observe **Caution** and reseal them.

CAUTION: Always reseal the TN832(B) [or TN332(B)] pack before re-seating the TN831(B) [or TN331(B)] pack; and in Model 1 LU grids, always reseal the TN340(B) pack before reseating either TN338(B) pack.
10. Unconditionally restore all units to service by using the appropriate **RESTORE** commands on the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 14.5.2: REPLACE BLOWN LOAD FUSES AT GPDF

OVERVIEW

Use this section to replace a blown GPDF load or filter fuse.

CAUTION: GPDFs are designed to withstand in-rush current that occurs when power is restored to a GPDF bus. However, when a GPDF load fuse is inserted, arcing may occur causing sparks to exit from the front and back of the GPDF fuse block. 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 insert fuse holder into base quickly to reduce the amount of arcing).

NOTE: If one or more filter fuse alarm LEDs are active (FF1 through FF4) on a GPDF power bus, the most likely cause is a tripped/opened power plant circuit.

PROCEDURE

1. Unseat the GPDF fuse connector with the LED active. With the fuse still in the connector, observe the north to south relationship the fuse has with the connector.
2. Remove the fuse and replace it with a good 25 amp fuse. Make sure the fuse is inserted the same way that was observed in Step 1.
3. Reinsert the fuse connector. If the LED goes off, proceed to Step 4. If the LED remains lighted, observe the caution below.

CAUTION: If the LED does not go out, 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, refer to **Procedure 16.1**.

4. Once -48 V power has been restored, the units without the APR backplane options must be powered up. Proceed to the affected units and perform Substep (a) or (b).
 - (a) Units with SN516 controllers, press the **ON** button.
 - (b) Units with power converters, press the **ST** button.
5. Once the units have been powered up, return the affected units to the operational state.

Procedure 14.6: REMOVE -48 V DC POWER AT POWER CONTROL FUSE DISTRIBUTION, GLOBAL POWER DISTRIBUTION FRAME OR POWER PLANT

OVERVIEW

This procedure is for use when it is absolutely necessary to remove -48 V DC power from a power bus at the Power Control Fuse Distribution (PCFD), Global Power Distribution Frame (GPDF) or at the power plant. This should rarely be required, but if required, observe the **Cautions**.

CAUTION 1: Removal of power to operating line/trunk units causes interruption of service to those lines/trunks. Removal of power from both sides of the duplicated control units causes a complete Local/Remote Switching Module or a total system outage.

CAUTION 2: Power can be removed from units/circuits without causing component damage, but damage may occur due to in-rush current. The appropriate power-up procedure, either Procedure 14.3, Restore Primary Power Bus(es) at Power Control Fuse Distribution or Global Power Distribution Frame, or Procedure 14.5, Replace Load and Indicator Fuses at Power Control Fuse Distribution or Global Power Distribution Frame, must be followed closely to avoid damage to certain circuits.

NOTE: When only removing power from 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, 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. For each Line Unit (LU) not equipped for Line Unit Auto Power Recovery (LUAPR) on the power bus to be shut down, observe **Caution** and unseat the TN831(B) [or TN331(B)] pack, the TN832(B) [or TN332(B)] and all TN838, TN1048, or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not require unseating for this procedure.

CAUTION: Always unseat the TN831(B) [or TN332(B)] pack before unseating the associated TN832(B) [or TN332(B)] pack; and in the Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) pack.

3. For each ISLU/RISLU, if the power bus to be shut down is in a GPDF cabinet, or if the PCFD cabinet is equipped with a ED82950-30 **G2** (15-amp) charge circuit, then power down the ISLU/RISLU by unseating the ISLU power converter. If the PCFD is equipped with a ED82950-30 **G1** (2-amp) charge circuit, then unseat the ISLU power converters and unseat the ISLU cabinet fuses.
4. 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)].
5. 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.
6. For each Moving Head Disk (MHD) on the power bus to be shut down, remove power from the SMD-340 MHDs, by performing Substeps (a) through (c) and for the SCSI-DUP MHDs, perform Substep (d).

- (a) Release the MHDs **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).
 - (d) Press the **OFF** button on the SCSI-DUP.
7. For each 3B21D SCSI MHD and Digital Audio Tape (DAT) on the power bus to be shut down, press the **OFF** button on the SCSI MHD and DFC face plate (MHD = UN375; DFC = UN373 or UN580; DAT = UN376).
8. For each PCFD or GPDF power bus (designated as A1, A2, A3, B1, B2, etc.) to be shut down, perform the tasks described in the following substeps in the exact order specified.

NOTE: The units that are powered by the power bus to be shut down should be OOS. If they are not, hardware interrupts will be reported.

- (a) At the PCFD power bus(es) to be shut down, unseat the 24 indicator fuses (FA1-FA24) first, then the 24 load fuses (F1-F24), then the filter fuses.
- (b) GPDF fuses do not have to be unseated but, if they power a unit/circuit that is not APR compatible [such as, the CNI Ring Node cabinet or a LU that is not equipped with all TN1058C grids], unit circuit packs must be unseated before power is restored to the GPDF bus.
- (c) At the office power plant (in power/battery room), identify the power plant circuit (circuit breaker or fuse) that supplies power to the PCFD power bus to be shut down. Then remove power from the associated PCFD power bus(es) by opening the PCFD circuit.

CAUTION: The power plant circuit (circuit breaker or fuse) should have stamping that indicates the PCFD number and power bus it powers (that is, PCFD 00 - A2). Do not open a power plant circuit that does not identify the PCFD or GPDF power bus it feeds.

STOP! If this section has been completed, -48 volt power has been removed from the targeted PCFD/GPDF power bus(es). For assistance with system recovery decisions, refer to 235-105-250 , *System Recovery* manual.

Procedure 14.7: PERFORM POWERUP OF LUs AND ISLUs

OVERVIEW

This procedure contains information for restoring power in one or more Line Units (LU). Use of this procedure will prevent damage to certain LU circuit packs that can occur from an improper powerup.

Powerup, as used in this procedure, is defined as restoring an LU or service group to service once the red (OFF) light-emitting diodes (LED) are lighted on both service group power converters (494 or 495 type), possibly due to a blown fuse or low-voltage powerdown.

Also included in this section is the power restoral procedure for the Integrated Services Line Unit (ISLU), which is a unit of the Integrated Services Digital Network (ISDN).

CAUTION: When restoring power to an LU or ISLU, be sure to return the lines associated with the LU or ISLU back to in-service once the unit is powered up to prevent service interruptions.

PROCEDURE

1. Depending on the LU model, proceed as follows:
 - (a) For Model 1 LUs, perform Steps 2 through 12.
 - (b) For Model 2, 3, and 4 LUs not equipped for Line Unit Auto Power Recovery (LUAPR), perform Steps 13 through 23.
 - (c) For Model 2, 3, and 4 LUs equipped for LUAPR, perform Steps 18 through 22.
 - (d) For an ISLU, proceed to Step 24.
2. Verify that the red (OFF) LED is lighted on both service group power converters.
3. Unseat one TN331(B) and one TN332(B) board in that sequence for **each service group**.
4. Unseat two TN338(B) boards and one TN340(B) board in that sequence for **each equipped GRID**.
5. Push the "ST" button on each powered down 495B power converter and observe that the red (OFF) LED goes off.
6. Insert one TN332(B) and one TN331(B) board in that sequence for **each service group**.
7. Insert one TN340(B) and two TN338(B) boards in that sequence for **each equipped GRID**.

NOTE: Repeat Steps 2, 3, and 4 for each powered down LU.

8. At the Master Control Center (MCC), bring up either Page 103X,Y (service group 0) or 104X,Y (service group 1), where X = LU number in the switching module/switching module-2000 (SM/SM-2000) and Y = SM/SM-2000 number.
9. Use the **340** poke command to run diagnostics and restore the LU COMC. If a Phase 1, Segment 1, Test 1 failure is obtained, reenter the **340** poke command. In any one SM/SM-2000, only one LU restoral can be run at a time. However, during this same time, another LU in a different SM/SM-2000 can also be restored. This step should be repeated until all LU service groups have been restored.

10. At the MCC, bring up Page 102X,Y, where X = LU number in the SM/SM-2000 and Y = SM/SM-2000 number. If any grids are out of service (OOS), diagnose them with a **50X**, where X = grid number. Upon receiving an all tests passed (ATP) message, restore the grids with a **30X,UCL** poke command.
11. When all grids have been restored and while still on MCC Page 102X,Y, use a **51X,AUD** poke command on all of the restored grids.
12. **STOP. YOU HAVE COMPLETED THE POWERUP PROCEDURE FOR MODEL 1 LINE UNITS.**
13. Verify that the red (OFF) LED is lighted on both service group power converters.
14. Unseat one TN831(B) and one TN832(B) board in that sequence for each service group. If the service group is equipped with BOTH TN831C and TN832C circuit packs, leave them seated.
15. Unseat all of the TN838, TN1048, or TN1058(B) grid boards in each service group. TN1058C grid boards do not require unseating for this procedure.
16. Push the "ST" button on each powered down 494 power converter and observe that the red (OFF) LED goes off.
17. Insert one TN832 and one TN831 board in that sequence for each service group.

NOTE: Repeat Steps 13, 14, and 15 for each powered down LU.

18. At the MCC, bring up either Page 103X,Y (service group 0) or 104X,Y (service group 1), where X = LU number in the SM/SM-2000, and Y = SM/SM-2000 number.
19. Use the **340** poke command to run diagnostics and restore the LU COMC. If a Phase 1, Segment 1, Test 1 failure is obtained, reenter the **340** poke command. In any one SM/SM-2000, only one LU restoral can be run at a time. However, during this same time, another LU in a different SM/SM-2000 can also be restored. This step should be repeated until all LU service groups have been restored.
20. Reseat any grid boards unseated in Step 15 for each service group.
21. At the MCC, bring up Page 102X,Y, where X = LU number in the SM/SM-2000 and Y = SM/SM-2000 number. If any grids are OOS, diagnose them with a **500X** or a **501X**, where X = grid number. Upon receiving an ATP message, restore the grids with a **300X,UCL** or **301X,UCL** poke command.
22. When all grids have been restored and while the MCC is still on Page 102X,Y, use poke command **502X,AUD** or **503X,AUD** on all restored grids.
23. **STOP. YOU HAVE COMPLETED THE POWERUP PROCEDURE FOR MODELS 2 AND 3 LINE UNITS.**
24. For any ISLU, determine which type of power is to be restored:
 - (a) When replacing a line group fuse (0-15) in the ISLU equipment cabinet, unseat the corresponding KCD3 Line Group Controller Board prior to replacement.

CAUTION: Failure to follow Step (a) could interfere with customer service.

- (b) Remove the blown fuse and insert the new fuse. If the fuse holds, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.** If it continues to blow see Note 3.

NOTE: If the fuse continues to blow, refer to Procedure 6.4 , Respond to a Fuse Alarm (FA)/Power Alarm (PWR ALM) Failure.

- (c) When replacing a -48 V circuit breaker at the power plant, proceed to Step 25.
 - (d) When replacing a fuse at the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF), proceed to Step 35.
25. If the charge circuit at the PCFD is equipped with an ED-83024-30 G1 (2 amp) charge panel, locate the cabinet of the ISLU and proceed with Step 26. If equipped with an ED-83024-30 G5 or G6 (15 amp) charge panel, go to Step 27.
26. Open the ISLU fuse panel cover above the unit and remove the fuses in the fuse panel associated with each affected primary bus.
27. Perform the applicable Substep (a) or (b):
- (a) At the PCFD load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 24 indicator fuses (designated as FA1-FA24), the 24 load fuses (designated as F1-F24), and the associated 3 filter fuses (no designation).

NOTE: For primary power buses A4 and B4 there are only 18 load and indicator fuses for each panel.
 - (b) Determine which GPDF power bus(es) is without -48 volt power and associate the affected bus(es) with its power plant circuit.

CAUTION: The GPDF is compatible with the Automatic Power Recovery (APR) feature, which means, GPDF fuses do not have to be unseated when restoring power to a GPDF bus. However, if a GPDF fuse powers a unit/circuit that is not APR compatible, the non-APR compatible units/circuits must be conditioned for in-rush current before power is restored.
28. At the -48 V power plant circuit breaker panel, position the appropriate circuit breaker to the "ON" position for each primary bus to be restored. Then continue with Step 29 for PCFD and Step 33 for GPDF.
29. At the PCFD (on the control panel), pull outward on the CHG PROBE and insert the probe into the first open filter fuse position. Push the "CAP CHG TEST" switch and verify that the CAP CHG LED comes on (RED) and goes off. Remove the CHG PROBE and quickly (within 6 seconds) insert the filter fuse.
30. For the other filter fuse positions, repeat Step 27 for all primary power buses being restored.
31. At the PCFD, charge up the first load distribution bus for the first primary power bus to be restored as follows in Substeps (a) through (c):
- (a) Insert the CHG PROBE into the first open indicator fuse position (FA1) for the first load fuse (F1) and rotate it clockwise to lock it in position.
 - (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG LED come on (RED) and go off; and with the other hand, insert the load fuse (F1).
 - (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the appropriate indicator fuse (FA1).
32. For each primary bus being restored, repeat Step 31 for the remaining load distribution buses.
33. Reinstall all ISLU fuses (if removed in Step 26) and return equipment to its normal state.
34. **STOP. YOU HAVE COMPLETED THIS PORTION OF THE ISLU POWER RESTORAL PROCEDURE.**
35. Locate the cabinet of the ISLU.

36. Open the ISLU fuse panel cover above the unit and remove the fuses in the fuse panel associated with the blown PCFD or GPDF fuse.
37. Perform the applicable Substep (a) or (b):
 - (a) At the PCFD load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 24 indicator fuses (designated as FA1-FA24), the 24 load fuses (designated as F1-F24), and the associated 3 filter fuses (no designation).
 - (b) Determine which GPDF power bus(es) is without -48 volt power and associate the affected bus(es) with its power plant circuit. If the affected bus provides -48 volt power to a CNI Ring Node (RN) cabinet or to a LU that is not equipped with all TN1058C grids, then perform the appropriate practice. Prepare the RN circuits for the return of -48 volt power by unseating the affected RN circuit packs and power unit packs. Prepare the non-APR compatible LUs for the return of -48 volt power by unseating the TN831 and TN832 gdxacc packs and all grids in the affected LU.

CAUTION: The GPDF is compatible with the Automatic Power Recovery (APR) feature, which means, GPDF fuses do not have to be unseated when restoring power to a GPDF bus. However, if a GPDF fuse powers a unit/circuit that is not APR compatible, the non-APR compatible units/circuits must be conditioned for in-rush current before power is restored.

38. At the PCFD (on the control panel), perform Substeps (a) through (c) as follows:
 - (a) Pull outward on the CHG PROBE and insert it into the open indicator fuse position and rotate it to lock it in.
 - (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG LED come on (RED) and go off; and with the other hand, insert the load fuse.

NOTE: If the load bus does not charge up within 30 seconds, the yellow LOAD FAULT LED will come on indicating the charger is shut off (and will remain off for the next 30 seconds). If this happens and the procedure for capacitive load charging was followed correctly, then the trouble causing excessive load on that load bus must be cleared before the load bus can be restored. If unable to resolve, seek the next higher level of technical assistance.
 - (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the indicator fuse.

39. Reinstall all ISLU fuses.

40. **STOP. YOU HAVE COMPLETED THIS PORTION OF THE ISLU POWER RESTORAL PROCEDURE.**

15. UTILITY CALL TRACE PROCEDURES

GENERAL

This section contains procedures to perform the utility call trace function.

Procedure 15.1: CALL TRACE PROCEDURES

OVERVIEW

This procedure serves as an index into a group of subprocedures covering the following:

- Utility Call Trace
- In-Progress Call Trace
- Nuisance Call Trace.

NOTE: Nuisance Call Trace includes procedures for Terminating, Interoffice, and Tandem Call Trace.

For Utility Call Trace, all hardware information associated with a traced call is displayed on the master control center (MCC) video terminal display Pages 131-140 and 150 for the 5E7 software releases, and Pages 131-140, 150, and 151 for the 5E8 and later software releases.

NOTE: Utility Call Trace may be initiated by using either an input message or a poke command from any Call Trace page.

For general information about Call Trace features, refer to 235-190-115, *Local and Toll System Features*. For specific input/output messages, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

PROCEDURE

1. To obtain information applicable to Utility Call Trace, perform any of the procedures identified in Substeps (a) through (d) as follows:
 - (a) Determine Hardware and Software Used During Call Processing—Procedure 15.2 .
 - (b) Obtain Most Recent Software Call Trace Data—Procedure 15.3 .
 - (c) Analyze Hardware Summary Output Messages—Procedure 15.4 .
 - (d) Analyze Software Data Output Messages—Procedure 15.5 .
2. To obtain information applicable to In-Progress Call Trace, perform Procedure 15.6 , Perform In-Progress Call Trace.
3. To obtain information applicable to Nuisance Call Trace, perform Procedure 15.7 , Perform Nuisance (Terminating, Tandem/Interoffice) Call Trace.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 15.2: DETERMINE HARDWARE AND SOFTWARE USED DURING CALL PROCESSING

General

This procedure may be used to troubleshoot and resolve hardware problems associated with any calls that fail.

Hardware and Software Configurations

Utility Call Trace provides 5ESS[®] switch owners with the capability to identify the specific hardware and software configurations used during call processing.

All hardware (units/circuits) associated with a call may be displayed on the master control center (MCC) video terminal by utilizing Display Pages 131 through 140, 150, and 151.

Utility Call Trace can be initiated with either an input message or a poke command (CMD). The applicable poke commands, which can be found on MCC Pages 131 and 132, are as follows:

- (a) **401,X TRACE DN (X=Telephone Number) {[,CH=D | B1 | B2] [,PKT] [,SA=SUBADDRESS | ALL] [,CID=CALLID | ALL]}**
- (b) **402,X TRACE LEN X (X=SM, LU, GR, BD, SW, LV)**
- (c) **403,X TRACE SLEN X (X=SM, DCLU, RT, LINE)**
- (d) **404,X TRACE MLHG X (X= GRP, MEM) {[,CH=D | B1 | B2] [,PKT] [,SA=SUBADDRESS | ALL] [,CID=CALLID | ALL]}**
- (e) **405,X TRACE LCEN X (X=SM, LU, LG, LC) [,CH=D | B1 | B2] [,PKT]**
- (f) **406,X TRACE ILEN X or PUB43801 (X=SM, IDCU, RT | IFAC (plus 51), LINE | DS0) [,CH=D | B1 | B2] [,PKT]**
- (g) For 5E9(2) to 5E12(1)
407,X TRACE NEN X (X=SM-2000, DNU, DG, STS, VT, DS0)
 For 5E13(1) and later
407,X TRACE NEN X (X=SM-2000, DNU, DG, STE, STS, VTG, VTM, DS0)
- (h) **408,X TRACE PSUEN X (X=SM, PSU, PSU SHLF, PSU CHGRP, PSU CHMEM)**
- (i) **409,X TRACE LCKEN X (X=SM, ILSU, LG, LP, LC) [,CH=D | B1 | B2] [,PKT]**
- (j) **410,X TRACE PORT X (X=SM-2000, PORT NAME) [,PKT]**
- (k) **411,X TRACE CKT X (X=SM/SM-2000, CKT NAME)**
- (l) **412,X TRACE TKGMN X (X= GRP, MEM)**
- (m) **413,X TRACE TEN (X=SM/SM-2000, TU, SG, BD, CKT)**
- (n) **414,X TRACE DEN (X=SM/SM-2000, DLTU, DFI, CH)**
- (o) **415,X TRACE TS X (X=SM-2000, TSDBKEY)**

- (p) **416,X TRACE LUCHAN X (X=SM/SM-2000, LU, SG, CHBD, CH-CKTNUM)**
- (q) **417,X TRACE BST X (X=OSC, POS) [,CH=D | B1]**
- (r) **418,X TRACE OPT X (X=OSC, POS) [,LOOP=1 | 2 | 3] [,CH=D | B1]**
- (s) **419,X TRACE RAF X (X=SM/SM-2000, RAF, CH)**
- (t) **420,X TRACE SAS X (X=SM/SM-2000, SAS, CH)**
- (u) **424,X TRACE INEN X (X=SM, DNU, RDT, LINE) [,CH=D | B1 | B2] [,PKT].**
- (v) **440,X TRACE PID X (X=PN-SM-UNIQ).**
- (w) **450,X TRACE DUMP X (X=[PID=PN-SM-UNIQ], [STRUCTS=TYPE]) .**

NOTE: The Utility Call Trace poke commands can only be entered on one of the previously listed Utility Call Trace MCC pages.

Data Structures

The dynamic data structures collected during a call trace can be printed on the receive-only printer (ROP) using Procedure 15.3, Obtain Most Recent Software Call Trace Data. These data snapshot structures represent the hardware used by an in-progress call. For troubleshooting purposes, this information is valuable in that the equipment utilized is identified either immediately before or during the time in which a call failed.

Input/Output Messages

In this procedure and other subprocedures associated with Utility Call Trace, typical input/output messages are presented because software release dependencies may exist for unique office applications. 235-600-700, *Input Messages Manual*, and 235-600-750, *Output Messages Manual*, should be referenced for specific message parameter meanings. Additionally, office records should be referred to for specific equipment allocations or assignments.

PROCEDURE

1. **NOTE 1:** For the 5E9(1) and earlier software releases, the FORMAT option is available on all poke commands. If external (EXT) is specified, the output will be in the diagnostic format (hardware) external representation. If internal (INT) is specified, the output will be in the internal software (as key data structures) representation. If neither is specified, EXT is the default option.

NOTE 2: Appropriate ranges for the commands are on **APP:RANGES** appendix in the Appendixes section of the 235-600-700, *Input Messages Manual*.

If call trace is associated with:

- (a) TRACE DN X, proceed to Step 2.
- (b) TRACE LEN X, proceed to Step 3.
- (c) TRACE SLEN X, proceed to Step 4.
- (d) TRACE MLHG X, proceed to Step 5.

- (e) TRACE LCEN X, proceed to Step 6.
- (f) TRACE ILEN X, proceed to Step 7.
- (g) TRACE NEN X, proceed to Step 8.
- (h) TRACE PSUEN X, proceed to Step 9.
- (i) TRACE LCKEN X, proceed to Step 10.
- (j) TRACE PORT X, proceed to Step 11.
- (k) TRACE CKT X, proceed to Step 12.
- (l) TRACE TKGMN X, proceed to Step 13.
- (m) TRACE TEN X, proceed to Step 14.
- (n) TRACE DEN X, proceed to Step 15.
- (o) TRACE TS X, proceed to Step 16.
- (p) TRACE LUCHAN X, proceed to Step 17.
- (q) TRACE BST X, proceed to Step 18.
- (r) TRACE OPT X, proceed to Step 19.
- (s) TRACE RAF X, proceed to Step 20.
- (t) TRACE SAS X, proceed to Step 21.
- (u) TRACE INEN X, proceed to Step 22.
- (v) TRACE PID X, proceed to Step 23.

2. At the MCC video terminal, to trace a call using **DN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:DN=a {[,CH=b][,PKT] | [,SA=c] | [,CID=d]};**
- (b) If via a poke CMD, enter
CMD **401,a {[,CH=b][,PKT] | [,SA=c] | [,CID=d]}.**

Where:

- a = Directory number (DN) (up to 15 digits) of line to be traced
- b = Channel type [D (default), B1, or B2]
- c = Subaddress number (0-15) or ALL
- d = Call id (0-31) or ALL.

Response: If printout follows (**PF**) followed by event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

3. At the MCC video terminal, to trace a call using **LEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:LEN=a-b-c-d-e-f;**
- (b) If via a poke CMD, enter CMD **402,a,b,c,d,e,f.**

Where:

a = Switching module/switching module-2000 (SM/SM-2000) number
 b = Line Unit (LU) number
 c = Grid number
 d = Switch board number (LU1, LU2, LU3).
 e = Switch number
 f = Level number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

4. At the MCC video terminal, to trace a call using **SLEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:SLEN=a-b-c-d;**
 (b) If via a poke CMD, enter
 CMD **403,a,b,c,d** .

Where:

a = SM/SM-2000 number
 b = Digital Carrier Line Unit (DCLU) number
 c = Remote terminal number
 d = Line number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

5. At the MCC video terminal, to trace a call using **MLHG X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:MLHG=a-b {[,CH=c][,PKT] | [,SA=d] | [,CID=e]};**
 (b) If via a poke CMD, enter
 CMD **404,a,b {[,CH c][,PKT] | [,SA d] | [,CID=e]}.**

Where:

a = Group number
 b = Member number
 c = Channel type identifier [D (default), B1, or B2]
 d = Subaddress number (0-15) or ALL
 e = Call id (0-31) or ALL.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

6. At the MCC video terminal, to trace a call using **LCEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:LCEN=a-b-c-d [,CH=e][,PKT]**
 (b) If via a poke CMD, enter
 CMD **405,a,b,c,d [,CH=e][,PKT].**

Where:

a = SM/SM-2000 number
 b = LU number
 c = Line group number
 d = Line card number
 e = Channel type identifier [D (default), B1, or B2].

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

7. At the MCC video terminal, to trace a call using **ILEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:ILEN=a-b-c-d[,CH=e] [,PKT]**
 (b) If via a poke CMD, enter CMD **406,a,b,c,d [,CH=e][,PKT]** .

Where:

a = SM/SM-2000 number
 b = IDCU number
 c = Remote terminal number or DS1 serving PUB - 43801 number
 d = RT line number or DS0 serving PUB - 43801 number.
 e = Channel type identifier [D (default), B1, or B2].

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

8. At the MCC video terminal, to trace a call using **NEN X** when the software release is 5E9(2) and later, enter Substep (a) or (b) as follows:

- (a) For 5E9(2) to 5E12(1)

TRC:UTIL:NEN=a-b-c-e-f-i;

For 5e13 and later

TRC:UTIL:NEN=a-b-c-d-e-g-h-i;

- (b) If via poke CMD,

For 5e9(2) to 5e12(1) enter CMD

407,a,b,c,e,f,i.

For 5E13(1) and later, enter CMD

407,a,b,c,d,e,g,h,i.

Where:

a = SM/SM-2000 number
 b = DNU-S number
 c = Data group (DG) number
 d = SONET termination equipment (STE) number [5E13(1) and later]
 e = Synchronous transport signal (STS) number
 f = Virtual tributary 1.5 (VT 1.5) number [5E9(2) to 5E12(1)]
 g = VT group (VTG) number [5E13(1) and later]

h = VT member (VTM) number [5E13(1) and later]
 i = Digital signal level 0 (DS0) number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

9. At the MCC video terminal, to trace a call using **PSUEN X** when the software release is 5E10 and later, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:PSUEN=a-b-c-d-e;**
- (b) If via poke CMD, enter CMD **408,a,b,c,d,e.**

Where:

a = SM/SM-2000 number
 b = Packet switching unit (PSU) unit number
 c = PSU shelf number
 d = PSU channel group number
 e = PSU channel group member number

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

10. At the MCC video terminal, to trace a call using **LCKEN X** when the software release is 5E10 and later, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:LCKEN=a-b-c-d-e;**
- (b) If via poke CMD, enter CMD **409,a,b,c,d,e.**

Where:

a = SM/SM-2000 number
 b = Line Unit number
 c = Line Group number
 d = Line Pack number
 e = Line Circuit number

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise proceed to Step 25.

11. At the MCC video terminal, to trace a call using **PORT X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:PORT=a-b [,PKT];**
- (b) If via a poke CMD, enter
 CMD **410,a,b [,PKT].**

For 5E9(1) and earlier software releases,

Where:

a = Global name of port to be traced (use H'a)
 b = SM/SM-2000 number.

For 5E9(2) and later software releases,

Where:

a = SM/SM-2000 number
b = Global name of port to be traced (use H'b)

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

12. At the MCC video terminal, to trace a call using **CKT X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:CKT=a-b;**
- (b) If via a poke CMD, enter
CMD **411,a,b** .

For 5E9(1) and earlier software releases,

Where:

a = Circuit name to be traced (key of CDBCOM)
b = SM/SM-2000 number.

For 5E9(2) and later software releases,

Where:

a = SM/SM-2000 number
b = Circuit name to be traced (key of CDBCOM)

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

13. At the MCC video terminal, to trace a call using **TKGMN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:TKGMN=a-b;**
- (b) If via a poke CMD, enter
CMD **412,a,b** .

Where:

a = Trunk group number
b = Member number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

14. At the MCC video terminal, to trace a call using **TEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:TEN=a-b-c-d-e;**
- (b) If via a poke CMD, enter
CMD **413,a,b,c,d,e** .

Where:

a = SM/SM-2000 number
 b = Trunk unit (TU) number
 c = Service group number
 d = Channel board number
 e = Circuit number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

15. At the MCC video terminal, to trace a call using **DEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:DEN=a-b-c-d;**
- (b) If via a poke CMD, enter
CMD **414,a,b,c,d** .

Where:

a = SM/SM-2000 number
 b = Digital Line and Trunk Unit (DLTU) number
 c = Digital Facilities Interface (DFI) number
 d = Channel number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

16. At the MCC video terminal, to trace a call using **TS X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:TS=a-b;**
- (b) If via a poke CMD, enter
CMD **415a,b** .

For 5E9(1) and earlier software releases,

Where:

a = Key of source time slot data block to be traced
 b = SM/SM-2000 number.

For 5E9(2) and later software releases,

Where:

a = SM/SM-2000 number
 b = Key of source time slot data block to be traced.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

17. At the MCC video terminal, to trace a call using **LUCHAN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:LUCHAN=a-b-c-d-e;**
- (b) If via a poke CMD, enter
CMD **416,a,b,c,d,e** .

Where:

a = SM/SM-2000 number
 b = LU number
 c = Service group number
 d = Channel board number
 e = Channel circuit number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

18. At the MCC video terminal, to trace a call using **BST X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:BST=a-b [,CH=c];**
- (b) If via a poke CMD, enter CMD **417,a,b [,CH=c]**.

Where:

a = Operator service center number where the traced directory assistance (DA) operator position resides
 b = Relative position number of the Basic Services Terminal (BST) operator position within the operator service center
 c = Channel type identifier [D (default) or B1].

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

19. At the MCC video terminal, to trace a call using **OPT X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:OPT=a-b [,LOOP=c][,CH=d];**
- (b) If via a poke CMD, enter CMD **418,a,b [,LOOP=c][,CH=d]**.

Where:

a = Operator service center number for the Operator Services Position System (OSPS) office where the traced T/A position resides
 b = Relative position number of the Operator Position Terminal (OPT) operator position within the operator service center
 c = OPT operator call loop number (defaults to active loop) Enter zero to trace the active loop.
 d = Channel type identifier [D (default) or B1].

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

20. At the MCC video terminal, to trace a call using **RAF X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:RAF=a-b-c;**
- (b) If via a poke CMD, enter CMD **419,a,b,c**.

Where:

a = SM/SM-2000 number

b = Recorded Announcement Facility (RAF) unit number
 c = RAF channel number.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

21. At the MCC video terminal, to trace a call using **SAS X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:SAS=a-b-c;**
- (b) If via a poke CMD, enter CMD **420,a,b,c**.

Where:

a = SM/SM-2000 number
 b = Service Announcement System (SAS) unit number (0-7)
 c = SAS channel number (0-31).

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

22. At the MCC video terminal, to trace a call using **INEN X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:INEN=a-b-c-d [,CH=e][,PKT];**
- (b) If via poke CMD, enter CMD **408,a,b,c,d [,CH=e][,PKT]**.

Where:

a = SM/SM-2000 number
 b = DNU—S number
 c = Remote terminal number
 d = Line number
 e = Channel type identifier [D (default), B1, or B2].

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

23. At the MCC video terminal, to trace a call using **PID X**, enter Substep (a) or (b) as follows:

- (a) **TRC:UTIL:PID=a-b-c;**
- (b) If via a poke CMD, enter CMD **440,a,b,c**.

Where:

a = Process number of PID to trace
 b = SM/SM-2000 number of PID to trace
 c = Uniqueness number of PID to trace.

Response: If **PF** followed by an event tag is printed, proceed to Step 24; otherwise, proceed to Step 25.

24. Identify the system response printed on the ROP. To analyze hardware summary output messages, refer to Procedure 15.4 . To analyze software data output messages, refer to Procedure 15.5 . If data dumps are

desired, refer to Procedure 15.3 , Obtain Most Recent Software Call Trace Data. Proceed to Step 25.

25. The trace request was not accepted. This is most likely because of an error in the request. Check the syntax of the request and refer to the **TRC:UTIL** input manual page in the 235-600-700 , *Input Message Manual*, if necessary, and repeat the procedure.
26. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 15.3: OBTAIN MOST RECENT SOFTWARE CALL TRACE DATA

OVERVIEW

The **OP:TRC** input message is used to request a printout of the most recent software trace data after a Utility Call Trace has been run. The resulting output message(s) contains hexadecimal dumps of data representing the traced call.

NOTE: Utility Call Trace must be completed before requesting software call trace data.

PROCEDURE

1. At the master control center (MCC) video terminal, to dump trace data, enter Substep (a) or (b) as follows:

(a) **OP:TRC: [,PID=a-b-c][,STRUCTS=d];**

(b) If via a poke command (CMD), enter
CMD 450 [,PID=a-b-c][,STRUCTS=d].

Where:

a =	Process number of the process identification (PID)
b =	Switching Module/Switching Module-2000 (SM/SM-2000) number of the PID
c =	Uniqueness number of the PID
d =	Data structures to be printed.

NOTE: Refer to the **OP:TRC** input manual page in the 235-600-700, *Input Message Manual*, for a complete list of the data structures that can be requested.

2. At the MCC video terminal, what is the response in the output message? Refer to Substeps (a) or (b) as follows:
 - (a) If printout follows (**PF**), the requested trace data will be printed out as a series of **OP:TRC** output messages. All output messages have the same given event tag. The data printed reflects the most recent trace data collected. If a visual display is needed, refer to Note 3 and perform the remaining steps in this procedure.
 - (b) If no good process identification (**NG PID**), there is no data for the given PID. Other responses could be no data collected or internal error. Refer to **OP:TRC** input manual page in the 235-600-700, *Input Message Manual*. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

NOTE: When call processing involves complex usage of circuits, lines, and/or trunks throughout the 5ESS® switch, MCC Display Pages 131-140 and 150 for the 5E7 software release, and Pages 131-140, 150, and 151 for the 5E8 and later software releases are available for display. This availability is indicated on Display Page 131.

3. To select the appropriate MCC video terminal display page, enter the following:

CMD 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 150, and 151

4. Analyze each parameter indicated in the output message to identify equipment associated with the corresponding call trace output message. Refer to Procedure 15.5, *Analyze Software Data Output Messages*, for analyzing data dumps.

5. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Procedure 15.4: ANALYZE HARDWARE SUMMARY OUTPUT MESSAGES

OVERVIEW

This procedure describes the different hardware summary output messages associated with Utility Call Trace. Typical summary output messages are presented for Utility Call Trace procedures because software release dependencies may exist for unique office applications. 235-600-750, *Output Message Manual*, should be referenced for specific message parameter meanings. Additionally, office records should be referenced for specific equipment allocations or usage.

PROCEDURE

1. The following hardware summary output messages are associated with Utility Call Trace:
 - (a) **TRC:UTIL-4WLN** - Describes a 4-wire line (4WLN) connection
 - (b) **TRC:UTIL-CONF** - Describes a connection to a conference circuit
 - (c) For 5E8 and earlier software releases,
TRC:UTIL-ERR - Used to report an error that occurred during Utility Call Trace
 For 5E9(1) and later software releases,
TRC:UTIL-FAILED - Used to report a failure or error that occurred during Utility Call Trace
 - (d) **TRC:UTIL-HSM** - Describes the host switching module (HSM) portion for a Utility Call Trace of a call involving both an HSM and a remote switching module (RSM)
 - (e) **TRC:UTIL-IDLE** - Reports the status of an idle port, time slot, process, or circuit
 - (f) For 5E9(1) and earlier software releases,
TRC:UTIL-INTERN - Summarizes the data describing one connection of a call in the internal (software) format
 - (g) **TRC:UTIL-LINE** - Describes a line connection from the directory number (DN) or multiline hunt group (MLHG) and member through the line unit (LU)
 - (h) **TRC:UTIL-LINK** - Describes an application processor (AP) data link (DL)
 - (i) **TRC:UTIL-MBTP** - Describes a monitoring bridge terminal process connection
 - (j) **TRC:UTIL-TRK** - Describes a trunk (TRK), intermodule trunk (IMT), recorded announcement facility (RAF), or service announcement system (SAS) connection.
2. For the appropriate hardware message listed, analyze the equipment usage by referring to 235-600-750, *Output Message Manual*.
3. To select the appropriate master control center (MCC) video terminal display page, enter the following command (CMD): CMD **131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 150, and 151**
4. Observe the appropriate display page for the desired circuit or unit operational status.
5. Formulate an equipment list from the output message parameters to investigate any trouble conditions indicated or suspected equipment failures.
6. Use the output messages and indicators identified in Substeps (a) through (e) as follows to isolate the

source of trouble:

- (a) MCC video terminal page display
 - (b) Diagnostic test output messages having suspected faulty equipment list responses
 - (c) Interrupt failure output messages
 - (d) Indicators on control and display circuit packs
 - (e) Any **REPT** output message(s) for the appropriate circuit or unit.
7. At the MCC video terminal (for the applicable unit or circuit), enter the appropriate input message or poke command to remove from, diagnose, or restore to service when isolating the source of trouble.
 8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 15.5: ANALYZE SOFTWARE DATA OUTPUT MESSAGES

OVERVIEW

This procedure describes the different software data output messages associated with Utility Call Trace. Typical output messages are presented for Utility Call Trace procedures in order to accommodate the different software release dependencies used in the various office applications. 235-600-750, *Output Message Manual*, should be referenced for specific message parameter meanings. The *Dynamic Data Manuals* should be referenced for decoding hexadecimal data dumps. For currently supported software releases the following documents are used:

- 235-600-209 for Software Releases 5E9(1) and 5E9(2)
- 235-600-230 for Software Release 5E10
- 235-600-208 for Software Release 5E11.

PROCEDURE

1. To analyze the output message, refer to **OP:TRC-EVENT** in the 235-600-750, *Output Message Manual*.
 - (a) **OP:TRC-ACCS** - Dumps the automated calling card service data block (ACCSDB) and the calling card query data block (QRYDB) for OSPS
 - (b) **OP:TRC-ALCB** - Dumps the access line control block (ALCB) for a packet call
 - (c) **OP:TRC-APB** - Dumps the associated process block (APB) for OSPS
 - (d) **OP:TRC-B-CHAN** - Dumps the B-channel data for a packet call
 - (e) **OP:TRC-BST** - Dumps the directory assistance (DA) operator position data block (POSDB) and the supplementary protocol block (SPB) for OSPS
 - (f) **OP:TRC-CHAN** - Dumps the data describing the peripheral time slot (channel) and related data structures linking it to a process
 - (g) **OP:TRC-CKT** - Dumps the data blocks describing circuits allocated to the traced call connection
 - (h) **OP:TRC-CLDB** - Dumps the call leg data block (CLDB)
 - (i) **OP:TRC-COIN** - Dumps the toll and assistance (T/A) automated coin data block (COINOT) for OSPS
 - (j) **OP:TRC-CR** - Dumps the call record (CR) which is associated with the printing of the originating end of each call
 - (k) **OP:TRC-D-CHAN** - Dumps the D-channel data for an ISDN call
 - (l) **OP:TRC-DISP** - Dumps the data blocks associated with the ISDN terminal display feature
 - (m) **OP:TRC-EIS** - Dumps the external information system (EIS) data blocks for OSPS.
 - (n) **OP:TRC-HLSC** - Dumps the high-level service circuit (HLSC) which is collected for line connections only

- (o) **OP:TRC-ISDN** - Dumps the data blocks associated with an ISDN call
 - (p) **OP:TRC-ISDN2** - Dumps additional data blocks associated with an ISDN call
 - (q) **OP:TRC-LCN** - Dumps the logical channel control block (LCCB) associated with a specified logical channel number (LCN) for a packet call
 - (r) **OP:TRC-LOOP** - Dumps the DA operator position call loop data block (LOOPDB) for OSPS
 - (s) **OP:TRC-MDB** - Dumps the model data block (MDB)
 - (t) **OP:TRC-NTWK** - Dumps the data structures which describe the network path
 - (u) **OP:TRC-PKL2DATA** - Dumps the packet level 2 data structures for a packet call
 - (v) **OP:TRC-PROC** - Dumps the data describing a process and port, and is normally used for internal debugging
 - (w) **OP:TRC-SHDN** - Describes the data blocks that are associated with a shared directory number (SHDN) or multiline hunt group (MLHG) member number call
 - (x) **OP:TRC-SRVOT** - Dumps the call and service-related data for an OSPS Listing Service call.
 - (y) **OP:TRC-SUM** - Dumps the summary information for a packet call
 - (z) **OP:TRC-T-CHAN** - Dumps the data describing the X.75 or X.75' trunk channel (T-CHAN) switching module/switching module-2000 (SM/SM-2000)
 - (aa) **OP:TRC-TALOOP** - Dumps the T/A operator position call loop data blocks (TALOOPDB), up to 3 loops, for OSPS
 - (ab) **OP:TRC-TEILA** - Dumps the terminal endpoint identifier linkage area(s) (TEILA) for an ISDN call
 - (ac) **OP:TRC-OPT** - Dumps the T/A operator position data block (TAPOSDB), the QRYDB, and the SPB for OSPS.
2. To decode the hexadecimal data dumps included in the software data messages, refer to the desired relation in the appropriate *Dynamic Data Manual*. Use the relation layouts to find and analyze the desired field in the hexadecimal data dump.
 3. If necessary, seek the next higher level of technical assistance.
 4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 15.6: PERFORM IN-PROGRESS CALL TRACE

OVERVIEW

In-Progress Call Trace can be initiated by using either the directory number (DN), the multiline hunt group (MLHG), or the trunk group and member (TKGMN) of the line to be traced.

For information on specific input/output messages, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

PROCEDURE

1. At the master control center (MCC), enter Substep (a) as follows:
 - (a) **TRC:IPCT:{DN=a|MLHG=b-c|TKGMN=d-e|PID=f-g-h}[.HARDHOLD][.END=i];**

Where:

a =	DN of the line to be traced
b =	Group number of the MLHG of the line to be traced
c =	Member number of the MLHG of the line to be traced
d =	Trunk group number of the trunk to be traced
e =	Member number of the trunk to be traced
f =	Process number of PID to be traced
g =	SM/SM-2000 number of PID to be traced
h =	Uniqueness number of PID to be traced
i =	End trace flag.
2. Depending on the acknowledgment, do one of the following:
 - (a) If not accessible (NA) or repeat later (RL), repeat Step 1.
 - (b) If printout follows (PF), proceed with Step 3.
 - (c) If any other acknowledgment, seek higher technical assistance.
3. Receive and interpret the resulting **TRC IPCT** output message.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 15.7: PERFORM NUISANCE (TERMINATING, TANDEM/INTEROFFICE) CALL TRACE

OVERVIEW

This procedure gives instructions on how to do the following:

- Perform Terminating Call Trace
- Perform Tandem/Interoffice Call Trace.

Terminating Call Trace causes the receive-only printer (ROP) to print out a message indicating the date, time, and calling party for a specific directory number (DN) or multiline hunt group (MLHG) member. However, unless the office is equipped with a primary rate interface (PRI) or a common channel signaling 7 (CCS7) trunk, the calling party will be shown as a trunk on non-intra-office calls. Offices equipped with a PRI or CCS7 trunk show the calling party's DN.

Tandem/Interoffice Call Trace identifies nuisance calls from other offices by creating a calling line identification (CLID) list which compares the routing DN with DNs on the CLID. If a match occurs, it is printed on the ROP.

Private Branch Exchange Direct Inward Dialing (PBX DID) lines with hundreds group routing can be traced using Interoffice Call Trace or by the special Terminating Call Trace procedure described as follows.

For information on specific input/output messages, refer to 235-600-700, *Input Message Manual*, and 235-600-750, *Output Message Manual*.

NOTE: Overuse of this feature may cause loss of ROP messages by overloading message queues. Exercise discretion when assigning this feature.

PROCEDURE

1. Select and perform one of the following:
 - (a) **Terminating Call Trace:** Continue with Step 2.
 - (b) **Tandem/Interoffice Call Trace:** Go to Step 11.
2. To enable or disable Terminating Call Trace at the master control center (MCC), enter recent change/verify (RC/V) by entering Substep (a):
 - (a) **RCV:MENU,APPRC;**
3. Select and perform one of the following:
 - (a) **Terminating Call Trace on a PBX DID Line with Hundreds Group Routing:** Go to Step 7.
 - (b) **Terminating Call Trace on Other Lines:** Go to Step 4.
4. To enable Terminating Call Trace, select and perform the appropriate options:
 - (a) For an analog DN, enter view 1.6 and set **TRC** to "Y. "
 - (b) For a digital DN, enter RC/V view 23.2 and set **TRC** to "Y. "

- (c) For a specific MLHG member, enter RC/V view 3.2 and set **TRC** to "Y. "
- (d) For a specific MLHG, enter RC/V view 3.5 and set **GROUP TRC** to "Y. "
- 5. To disable the Terminating Call Trace, repeat the previous step and reset the call trace flag to "N. "
- 6. **STOP. YOU HAVE COMPLETED THE TERMINATING CALL TRACE PROCEDURE.**
- 7. To enable Terminating Call Trace on a PBX DID line with hundreds group routing, perform the following substeps:
 - (a) Update RC/V view 4.14 to assign a circuit routing module to the hundreds group. Do this by updating RC/V view 4.14 to **RMTYPE=C** , then specify a switching module/switching module-2000 (SM/SM-2000) number.
 - (b) A line class code (LCC) with **TERM TREATMENT=RI** is needed. If one does not exist, insert one in RC/V view 4.1.
 - (c) Insert RC/V view 1.5 for line to be traced. Apply LCC defined in **b** of this step. Use routing index (RTI) from RC/V view 4.14 and set **TRC=Y**. This will assign the one DN to its own RTI, while the rest of the hundreds group continues to be routed by the hundreds route index (HRI).
- 8. To remove Nuisance Call Trace set **TRC=N** in RC/V view 1.5.
- 9. To return the individual line to hundreds group routing, delete RC/V view 1.5 for the individual line.
- 10. **STOP. YOU HAVE COMPLETED THE PBX DID TERMINATING CALL TRACE PROCEDURE.**
- 11. To enable Tandem/Interoffice Call Trace, at the MCC enter substep (a):
 - (a) **TRC:CLID,ADD,DN=a;**

Where:
 a = DN of the line to be added to the CLID.

NOTE: This is the DN used by routing. It is not necessarily the dialed DN.
- 12. Verify that the DN just entered is in the CLID listing. Display the CLID by entering substep (a):
 - (a) **OP:CLID;**
- 13. To disable Tandem/Interoffice Call Trace, remove the DN from the CLID by entering substep (a):
 - (a) **TRC:CLID,DEL,DN=a;**

Where:
 a = DN of the line to be deleted from the CLID.
- 14. To verify that the DN just removed is no longer on the CLID list, repeat Step 12.
- 15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. OFFICE DEPENDENT DATA - MAINTENANCE PROCEDURES

GENERAL

This section contains procedures for the office dependent data (ODD).

INTRODUCTION

This section contains a series of task-oriented corrective maintenance procedures that can be used by trained maintenance personnel performing corrective maintenance (trouble clearing) on the Office Dependent Data (ODD) associated with the 5ESS[®] switch. The procedures contained herein include guidelines for solving minor problems associated with the ODD. Some of the reference information that applies to specific functions (that is, system recovery, audits, asserts, input/output messages, etc.) is contained within other 5ESS[®] switch documentation. For a complete listing of all documentation associated with the 5ESS[®] switch, refer to 235-000-000, *Numerical Index*.

If a procedure applies to a specific software release, then the applicability is indicated within the procedure.

OFFICE DEPENDENT DATA (ODD) — The ODD within a 5ESS[®] switch is a series of software data structures that define:

- Switching office hardware
- Originating and terminating characteristics for lines and/or trunks
- Routing data for call processing.

The ODD is commonly referred to as **Translation Data**.

EQUIPMENT CONFIGURATION DATA (ECD) — The ECD is the Duplex Multi-Environment Real-Time Operating System (DMERT) and/or UNIX[®]

RTR Operating System software's data base that identifies the operating environment of the Administrative Module (AM). The ECD includes equipment configuration information on such items as disks, memories, terminals, data links, synchronous timing sources, craft language options, etc.

Procedure 16.1: ADD OR CHANGE OFFICE DEPENDENT DATA USING RECENT CHANGE/VERIFY

OVERVIEW

This procedure contains information for adding new and/or changing existing Office Dependent Data (ODD) using the appropriate Recent Change/Verify (RC/V) mode and manuals. The ODD is commonly referred to as ***Translation Data***.

PROCEDURE

1. Determine the type of RC/V available from one of the following commands:
 - (a) RCV-MENU MODE
 - (b) RCV-TEXT INTERFACE MODE
 - (c) RCV-RMAS MODE
 - (d) RCV-BATCH RELEASE MODE.
2. Once the available mode and software release has been determined, obtain the appropriate RC/V manual. The RC/V document identification numbers are 235-118-2XX (where XX is the currently supported document identifiers.)
3. Using the information provided within the appropriate RC/V manual, add, change, or delete Translation Data (as required) per the appropriate information within the service order.
4. If problems are encountered while performing an RC/V activity, try to resolve the problem locally by close coordination with the maintenance personnel responsible for switch maintenance. If the problems cannot be resolved, seek the next higher level of technical assistance.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 16.2: ANALYZE AND RESOLVE AN AUDIT ERROR REPORT

OVERVIEW

An audit, as the name implies, is a process located in the system integrity software subsystem (under the maintenance software) that is used to verify data in five major software areas:

- (1) Operating System
- (2) Call Processing
- (3) Maintenance
- (4) Administrative Services
- (5) Data Bases.

There are two types of audits: system and application. System audits help maintain the Administrative Module (AM) and run under the control of the *UNIX*® System V RTR Operating System. For detailed information applicable to system audits, refer to the 235-600-400, *Audits Manual*.

Application audits run under the control of Operating System for Distributed Switching (OSDS) and are explained in detail in 235-600-400, *Audits Manual*.

An audit error report is an output message printed on the Receive-Only Printer (ROP) located at the Master Control Center (MCC). This report conveys information to trained persons responsible for analyzation and correction of data base errors or hardware equipage that is not consistent with the relation data base. Figure 16.2-1 is an example of one type of audit error output message.

In Figure 16.2-1, the letter "A" in the left margin indicates that the error can be corrected locally and manual action is required. The "ENV=OKP" entry indicates the Operational Kernel Process and the "TKQUE" and "ERROR-CODE=PORT" entries indicate that the trunk queue audit has detected PORT errors. Normally, PORT errors result from an inconsistency within the ODD and will continue (repeat) until fixed by a maintenance person. The total number of errors equals four. The EVENT NUMBER for this audit is 756. This number allows a maintenance person to collect and assimilate all the messages related to this error because all other messages will have the same EVENT NUMBER.

PROCEDURE

1. Analyze the audit error message by checking the appropriate error code comment block provided in the ERROR DESCRIPTION of 235-600-400, *Audits Manual*.
2. If the ERROR DESCRIPTION indicates that the error is associated with one or more relation(s), then an analysis of the affected relation(s) is(are) necessary using the field layout contained in 235-600-200, *Translations and Dynamic Data Manual*.
3. When a specific relation(s) and tuple(s) in that relation(s) is(are) identified, the Office Data Base Editor (ODBE) subsystem should be used to display the attributes of the affected tuple(s). Refer to Procedure 16.5, Change, Modify, or Review a Data Base Relation Using ODBE.
4. Look for errors or inconsistencies in the tuple(s) and its attribute values. Perhaps a tuple in one relation is not consistent with a tuple in another relation. Perhaps there is associated hardware that is not installed/operating consistent with the population of the relation(s) in the data base.

5. If an inconsistency or error in the data base is found, try correcting it using the appropriate RC/V mode and manual. Refer to Procedure 16.1, Add or Change Office Dependent Data Using Recent Change/Verify.
 6. If the correction cannot be made using RC/V, use of the Office Data Base Editor (ODBE), Procedure 16.5, Change, Modify, or Review a Base Relation Using ODBE, may be required along with expert assistance.
 7. Once relation(s) is(are) corrected, the user should verify the correction by observing the ROP printout to ensure that an identical audit error is not being repeated.
 8. If an audit error message cannot be resolved using the previous steps, seek the next higher level of technical assistance.
 9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
-

```
A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756  
ERROR-ADDR=H'0 BAD-DATA=H'0  
LOG-KEY=H' a 10e0002 GOOD-DATA=H'0
```

```
A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756  
ERROR-ADDR=H'0 BAD-DATA=H'0  
LOG-KEY=H' a 13e0002 GOOD-DATA=H'0
```

```
A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756  
ERROR-ADDR=H'0 BAD-DATA=H'0  
LOG-KEY=H' 140d0002 GOOD-DATA=H'0
```

```
A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756  
ERROR-ADDR=H'0 BAD-DATA=H'0  
LOG-KEY=H' a 10a002 GOOD DATA=H'0
```

```
AUD ENV=OKP TKQUE COMPLETED ERRORS=4 EVENT=756
```

Figure 16.2-1 Typical Audit Error Output Message

Procedure 16.3: USING AUTOMATED STATIC ODD (SODD) AUDIT

General

Effective with the 5E9(1) software release, the existing switch-resident ODD Population Rule Audit is replaced by the Automated SODD Audit, a version that allows the operating company to maintain a clean data base. The new audit is automatically generated from the Population Rule Language, version 5.0 (PRL5.0) data base population rule source files, ensuring completeness and accuracy.

The new audit scheduling capabilities and error messages are different from those provided by the ODD population rule audit. The output of this feature is in PRL5 format. Therefore, special on-the-job or formal training is required for TELCO personnel identified as static data audit subject-matter experts. A high degree of data base familiarity is assumed for the person who interprets the error output of the automated static ODD audit. See 235-105-210, *Routine Operations and Maintenance Manual* for a complete description on how to use this feature.

The SODD audit prints an error message for every check that failed. The output is grouped by check, and for each failing check, a description of each failing tuple is presented.

There are three forms of error output that can occur:

- The Standard message. (See Figure 16.3-1)
- The Functional message. (See Figures 16.3-2 and 16.3-3)
- The Custom message. (See Figure 16.3-4)

The standard message is the one most commonly found. The functional message appears only if a check is in a PRL5 function. The custom message is quite rare but appears if there is a custom message written for a particular check.

Standard Message

The *Standard Message* is the default error output.

The sample output shows the basic parts of the *standard* output:

- The relation name and file line number in the on-line poprule .R file. This line number points to the location of the data integrity check failure.
- The poprule segment (RULE) containing the data inconsistency.
- The information about tuples violating the poprule (CONTEXT).

The Relation and Line Number

The first field shows the line number of the check (within the RL*.R file)

The Code Segment (RULE)

The standard message contains a segment of PRL code that shows the check that caused the error to be found. This piece of code is not exactly how the code is written in the poprule file. However, the form in which the code is presented assists in identifying the meaning of the check that failed.

Code Segment Construction

First, the assertion causing the error is isolated from other assertions. Then, the surrounding "context" of the assertion is included, which means that all enclosing for-loops, etc. are attached. Thus the code segment looks as if the violated assertion is the only check performed.

Note that any statement label in the code segment (RULE) that begins with an underscore should be ignored; these labels do not exist in the source code and are used by an internal mechanism. Labels that do not begin with an underscore are "real" labels that can be found in the source code listings. In Figure 16.3-1, the label "_1:" should be ignored because it does not appear in the original source-code listing.

The Context

Each violating tuple is summarized with a "CONTEXT" as shown as follows:

- (1) The first line identifies the error or warning number.
- (2) The second line identifies the module (processor number). A "-1" indicates that the distribution type of the particular relation should be determined to find the tuple location. The tuple can be found on any processor on which the relation resides (as dictated by the distribution rules).
- (3) The remaining lines identify variable values. The first of these indicates the relation name and the key to the base relation.
- (4) If the failing check is a count or find, the last line will indicate the number of tuples that were found.

The context format is shown in Figure 16.3-1 :

For 5E9(2) and earlier software releases:

```
CONTEXT for Error 5:
<current_pcr=1>
<ar_cf=<AR_CF:206:1>>
Actual Number of Tuples Found = 0
```

For 5E10 and later software releases:

```
CONTEXT for Error 5:
<current_pcr=1>
<ar_cf=<AR_CF:processor=206:feat_id=1>>
Actual Number of Tuples Found = 0
```

RLar_cf.R, line 148

```
RULE:
for ar_cf in RLar_cf
begin
  _1:
  find exactly 1 facname in RLfacname on am
  where ((facname.facid equals ((MFAR shifted left 10) + ar_cf.feat_id))
  and (facname.class equals FACBRCS))
  and (facname.subclass equals SCL_FEAT));
end
```

The Following Data Violate This Rule:

For 5E9(2) and earlier software releases:

```
CONTEXT for Error 5:
<current_pcr=1>
<ar_cf=<AR_CF:206:1>>
Actual Number of Tuples Found = 0
CONTEXT for Error 6:
<current_pcr=1>
<ar_cf=<AR_CF:206:2>>
Actual Number of Tuples Found = 0
```

For 5E10 and later software releases:

```
CONTEXT for Error 5:
<current_pcr=1>
<ar_cf=<AR_CF:processor=206:feat_id=1>>
Actual Number of Tuples Found = 0

CONTEXT for Error 6:
<current_pcr=1>
<ar_cf=<AR_CF:processor=206:feat_id=2>>
Actual Number of Tuples Found = 0
```

*****END*****

Figure 16.3-1 Example of Standard Error Message

Functional Message

The *Functional Message* of error output is used when a check is performed in a PRL5 function. The functional message is largely identical to the standard message with the exception that instead of the code segment (RULE), there is only one line of source code printed, along with a message to look at the on-line source code listings for the entire check. A sample of a functional error message is shown in Figure 16.3-2 and the PRL5 code corresponding to the error is shown in Figure 16.3-3.

RLdn_feats.R, line 3409

```
RULE FRAGMENT FROM WITHIN A FUNCTION BODY (TO VIEW THE COMPLETE RULE,
PLEASE REFER TO THE PRL5 ON-LINE LISTINGS, WHICH CAN BE ACCESSED VIA
DIAL-UP CONNECTION TO THE ELECTRONIC MEDIA NETWORKED SERVICE.)
_179:
assert(bfgmatch.act{bit_count} equals ftent.mastsw);
```

The Following Data Violate This Rule:

For 5E9(2) and earlier software releases:

```
CONTEXT for Error 20:
<current_pcr=193>
<bfgmatch=<BFGMATCH:193:100>>
<bit_count=7>
<tdn_feats=<DN_FEATS:7:0 LTM_ISDN 256 0>>
<dn_feats=<:7:0 LTM_ISDN 256 0>>
```



```
<range_var=0>
<tdn_feats=<DN_FEATS:7:0 LTM_ISDN 256 0>>
<bfgmatch=<BFGMATCH:193:100>>
```

For 5E10 and later software releases:

```
CONTEXT for Error 20:
<current_pcr=193>
<bfgmatch=<BFGMATCH:processor=193:bfgid=100>>
<bit_count=7>
<tdn_feats=<DN_FEATS:processor=7:lead_module=0 Hm_type=LTM_ISDN
    ltm_idx=256 range=0>>
<dn_feats=<:processor=7:lead_module=0 Hm_type=LTM_ISDN ltm_idx=256
    range=0>>
<range_var=0>
<tdn_feats=<DN_FEATS:processor=7:lead_module=0 Hm_type=LTM_ISDN
    ltm_idx=256 range=0>>
<bfgmatch=<BFGMATCH:processor=193:bfgid=100>>
```

Figure 16.3-2 Example of Functional Error Message

```
where (dn_feats.range == 0 &&
      dn_feats.lead_module == 0)

begin
  let maxrange = (dn_feats.feat_cnt-1)/6;
  for range_var in {0 thru maxrange}
  begin
    begin
      function func2() returning boolean
      begin
        find == 1 bfgmatch in RLbfgmatch on am
        where (bfgmatch.bfgid == dn_feats.ltm_idx)
        when_found
        begin
          bit_count = bfgmatch.feat_cnt-bfgmatch.dnft_cnt;
          find == 1 tdn_feats in RLdn_feats on ldbfg_gpd(dn_feats.
            ltm_type, dn_feats.lead_module, dn_feats.ltm_idx)
          where (tdn_feats.ltm_idx == dn_feats.ltm_idx &&
            tdn_feats.ltm_type == dn_feats.ltm_type &&
            tdn_feats.lead_module == dn_feats.lead_module &&
            tdn_feats.range == range_var)

          when_found
          begin
            for ftent in {dn_feats.ftent[*]}
            begin
              if (ftent.fid != 0) then
              begin
                assert(ftent.mastsw == ftent.active);
                -----> assert(bfgmatch.act {bit_count} == ftent.mastsw);
              end
              bit_count = bit_count + 1;
            end
          end
        end
      end
    end
  end
end
```

```

        end
    end
    return true;
end
func2();
end
end
end
end

```

Figure 16.3-3 PRL5 Error Code of the Functional Message

Custom Message

The default error message can be replaced by a custom message, which includes text and data as specified in a custom message file. See Figure 16.3-4.

RLannc_hdr.R, line 5522

```

The following APPLICATION/PHRASES entered on the ANNHD form
(view 8.61) do not have the corresponding APPLICATION/PHRASE
ID entered on the PHRASE form (view 8.63) .

```

```

The following data contains the APPLICATION, HEADER_ID and
PHRASE in error.

```

RULE FRAGMENT FROM WITHIN A FUNCTION BODY (TO VIEW THE COMPLETE RULE, PLEASE REFER TO THE PRL5 ON-LINE LISTINGS, WHICH CAN BE ACCESSED VIA DIAL-UP CONNECTION TO THE ELECTRONIC MEDIA NETWORKED SERVICE.)

```

ann8a:
find exactly 1 phrases in RLphrases on am
where(phrases.ph_id equals annc_hdr.phrase1
and phrases.appl equals annc_hdr.appl);

```

The Following Data Violate This Rule:

For 5E9(2) and earlier software releases:

```

CONTEXT for Error 3:
<current_pcr=1>
<annc_hdr=<ANNC_HDR:1:FCOSPS_TA 15000>>
Actual Number of Tuples Found = 0

```

For 5E10 and later software releases:

```

CONTEXT for Error 3:
<current_pcr=1>
<annc_hdr=<ANNC_HDR:processor=1:appl=FCOSPS_TA hdr_id=15000>>
Actual Number of Tuples Found = 0

```

Figure 16.3-4 Example of Custom Error Message

Labels

Some checks have statement labels attached to them. These can be identified as a name followed by a colon.

(Do not confuse labels with the section names in the poprule source file; the section names are also of the form of a name followed by a colon. Refer to the 235-600-107, *Translations Data Manual*, for descriptions of the section names.) A label is used merely as the name for a particular check and uniquely identifies a check within a file.

If a labeled check fails in an audit, the error message contains the label of the check. The same label can also be found in the poprule source code. Please note that in the error message, the label is always moved to the line before the associated check, whereas in the source code file, the label is usually at the beginning of the same line. Figure 16.3-5 is an example of an error message with a label. The label in the example illustrated in Figures 16.3-5 and 16.3-6 is "lines_194:".

```
RLis_line.R, line 2241
```

```
RULE:
for is_line in RLis_line
begin
    if(is_line.shared equals DBYES) then
    begin
        lines_194:
        find greater than or equal to 1 shterm in RLshterm on
        sm(is_line.lead_module)
        where(shterm.lead_module equals is_line.lead_module
        and shterm.ltm_id
xi equals is_line.ltm_idx and shterm.range is_in {0, 7});
        end
    end
```

The Following Data Violate This Rule:

For 5E9(2) and earlier software releases:

```
CONTEXT for Error 192:
<current_pcr=2>
<is_line=<IS_LINE:2:2 5>>
Actual Number of Tuples Found = 0
```

```
CONTEXT for Error 193:
<current_pcr=2>
<is_line=<IS_LINE:2:2 16>>
Actual Number of Tuples Found = 0
```

For 5E10 and later software releases:

```
CONTEXT for Error 192:
<current_pcr=2>
<is_line=<IS_LINE:processor=2:lead_module=2 ltm_idx=5>>
Actual Number of Tuples Found = 0
```

```
CONTEXT for Error 193:
<current_pcr=2>
<is_line=<IS_LINE:processor=2:lead_module=2 ltm_idx=16>>
Actual Number of Tuples Found = 0
```

Figure 16.3-5 Error Message with Label

The rule causing the error can be found in the PRL code shown in Figure 16.3-6. Make note that the error output will reformat the code, including moving the position of the label.

```

/*RULE about RLis_line.shared: */
for is_line in RLis_line
begin
    if (is_line.shared == DBYES) then
    begin
lines_194:      find >= 1 shterm in RLshterm on sm(is_line.lead_module)
                where (shterm.lead_module == is_line.lead_module &&
                        shterm.ltm_idx1 == is_line.ltm_idx1 &&
                        shterm.range is_in {0, 7})
                when_found
                begin
                    if (shterm.range == 0) then

```

Figure 16.3-6 Poprule with Labels

PROCEDURE

1. If the audit error message is a custom error message, then perform error resolution by referring to the RC/V views and attributes identified in the error message. If the error message is a standard or functional message, continue to the next step.
2. If the error message is a standard error message, relation and attribute data inconsistencies will be identified, and a portion of the PRL will be presented where the data error occurred. If the error message is a functional error message, relation and attribute data inconsistencies will be identified, but the portion of the PRL where the data error occurred will not be presented. The applicable PRL can be obtained from the 235-600-107, *Translations Data Manual* or the PRL on-line listings. The on-line listings are the recommended source for functional error message PRL lookup, since the listings will be the most current source and provide character string search tools to assist in locating the applicable PRL. Entry into the PRL relation file should be made initially by using the line number provided in the functional error message.
3. Investigate the specific PRL code, relations, tuples, and attributes identified in the error messages using the office data base editor (ODBE). (Refer to Procedure 16.6, Change, Modify, or Review a Data Base Relation Using ODBE.) Look for errors or inconsistencies in the tuple(s) and its attribute values [for example, a tuple in one relation is not consistent with a tuple in another relation or associated hardware is not installed/operating consistently with the data populated in the relation(s)].
4. If an inconsistency or error in the data base is found, try correcting it using the appropriate RC/V mode and manual. Refer to Procedure 16.2, Add or Change Office Dependent Data Using Recent Change/Verify.
5. If the correction cannot be made using RC/V, use ODBE, Procedure 16.6, Change, Modify, or Review a Base Relation Using ODBE, along with expert assistance if necessary.
6. Once the relation(s) is(are) corrected, the user should verify the correction by executing the SODD Entity Audit on the relation(s) that caused this failure. The ROP printout of the SODD Entity Audit should be examined to ensure that the audit error is not being repeated.
7. If an audit error message cannot be resolved by using the previous steps, seek the next higher level of technical assistance.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 16.4: ANALYZE AND RESOLVE AN ASSERT ERROR REPORT

OVERVIEW

An assert is a statement within a software release that performs a defensive check for detection of possible data base (software) errors. An assert error report is generated when a defensive check failure has occurred that requires manual action. Refer to 235-600-750, *Output Message Manual*, for details.

PROCEDURE

1. The output message format is as follows:

REPT MANUAL ACTION ASSERT=a b [=c] EVENT=g

h AT LINE i

j

Where:

a =	Assert number
b =	Processor environment which assert occurred:
	AM ENV=OKP SMKP - Administrative Module
	CMP - Communication Module Processor
c =	SM - Switching Module/Switching Module-2000
	Reporting processor's number:
	SM number (if reporting processor is SM)
	CMP number (if reporting processor is CMP)
	where c = d-e f and:
d =	Message Switch (MSGS) side
e =	Physical CMP number
f =	MATE or PRIM (mate or primary CMP).
g =	Event number associated with this report
h =	Name of file where defensive check failed
i =	Line number of defensive check
j =	Additional information and data that will be referenced by 235-600-500, <i>Asserts Manual</i> .

2. When the output message is printed on the ROP located at the MCC, refer to 235-600-500, *Asserts Manual*, or 235-600-510, *Software Analysis Guide*, for the manual action required.
3. If the problem cannot be resolved, seek the next higher level of technical assistance.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 16.5: CHANGE, MODIFY, OR REVIEW A DATA BASE RELATION USING ODBE

OVERVIEW

The Office Data Base Editor (ODBE) is an interactive tool that provides a trained craftsperson with the capability to make manual changes to a data base relation. For detailed information concerning the attribute and relation descriptions, population rules, and other applicable information, refer to the currently supported Translations Data Manual, 235-600-1XX (where XX is the currently supported document identifier.)

When using ODBE, it is imperative that the craftsperson be thoroughly trained in all aspects of the 5ESS® switch software data bases.

CAUTION: By use of ODBE, it is possible to update, delete, or insert information into ODD relations that is critical to the operation of the 5ESS® switch. Improper use of ODBE can be service affecting or possibly bring a processor down. Before updating, deleting, or inserting information into a base relation or overwriting data, consult local supervision concerning policy or seek the next higher level of technical assistance for advice.

The following generalized information, concepts, and rules apply to ODBE. All of these should be thoroughly reviewed before attempting to use ODBE.

Use of ODBE is controlled by an input message from the Recent Change/Verify (RC/V), the Trunk and Line Work Station (TLWS), the Supplementary TLWS (STLWS) video display terminal, or by using poke **194** at the Master Control Center (MCC). The output information from ODBE can only be displayed on the video terminal being used as the input device.

The following input message (MML format) is used to access ODBE:

rcv: menu:odbe; PF

NOTE 1: If the switch accepts the input message [as evidenced by a printout follows (PF) entry at end of input message], then the output message (**OFFICE DATA BASE EDITOR, version X.0**) should appear on the second line of the video terminal display. The **X.0** may be either **5.0** or **6.0**, depending on the software release.

NOTE 2: A password may optionally be required to use ODBE. The prompt string **Password:** will be printed on the terminal, and the ODBE password must be entered.

The ODBE may operate in either of the following states:

- **Enter Processor Number**
- **Enter Relation Name**
- **Enter Tuple Operation**
- **Enter Primary Key**
- **Enter Attribute Value.**

If the ODBE is in the **Enter Processor Number** state, the ``CTRL" (control) and ``d" keys on the video terminal keyboard are used to exit ODBE. Both keys must be simultaneously pressed.

When using ODBE, the user response to a given prompt is usually a data base defined name, an encoded choice

from a menu of options, or an ODBE special character. Special characters have a meaning only if they are the first character in a user response. The special characters and their meanings are as follows in (a) through (f):

- (a) **The Question (?) Symbol:** This signifies "help" and the switch displays a list of the valid options.
- (b) **The Plus (+) Symbol:** This displays information relevant to the current state (for example, lists all valid relation names in the system).
- (c) **The Exclamation (!) Symbol:** This causes a backup to the next higher data base state (for example, **Enter Processor Number** being the highest state and **Enter Attribute Value** being the lowest state).
- (d) **The Less Than (<) Symbol:** This causes a return to the previous attribute. Valid only when the ODBE is in the **Enter Attribute Value** state.
- (e) **The Greater Than (>) Symbol:** This causes a skip of all the remaining attributes within a tuple and performs the appropriate tuple operation. Valid only when the ODBE is in the **Enter Attribute Value** state.
- (f) **The Carriage Return <cr> Key:** This causes a skip of the attribute and performs an update operation. It leaves the current value of the attribute unchanged. Valid only when the ODBE is in the **Enter Attribute Value** state.

The ODBE states, along with the various user operations applicable to those states, are further described as follows in (a) through (e):

- (a) Administrative Module (AM), Switching Module/Switching Module-2000 (SM/SM-2000) number, or the Communications Module Processor (CMP) where the base relation resides. If a question (?) symbol is entered while in this state, the following prompts are displayed.
 - (1) **1-192** for the SM number
 - (2) **193** for the CP (also known as the AM)
 - (3) **194-205** for the primary Communication Module Processor (CMP) number
 - (4) **206-217** for the mate CMP number
 - (5) **ALL** for redundant tuple read (refer to **Note 3**)
 - (6) A **control-d** to exit the ODBE.

NOTE: The **ALL** option allows the user to examine redundant tuples across all SM processors. Upon selecting this option, the user is prompted for the relation name and a key value. All tuples that match this key (across all SMs) are written to a user-specified file. This feature is useful for debugging split translations when one SM has data inconsistent with the other SMs.

- (b) **Enter Relation Name State:** This state of the ODBE prompts the user for the base relation name. If a question (?) symbol is entered while in this state, the following prompts are displayed:
 - (1) **A relation name:** When a relation name is input, it must be entered in UPPERCASE lettering. If the relation name contains an underscore (_), then the underscore must be preceded by a backslash (\) (entry of the backslash is optional). Upon accepting a valid relation name, the ODBE goes into the **Enter Tuple Operation** state.
 - (2) **PARAMETER to edit parameters:** This option is used when entering global parameters. Extreme

Caution is required when using this option.

- (3) **An Exclamation (!) Symbol:** If this option is input, it changes the editor options in the base state. Use of this symbol always shifts the user to the next higher data base state.
- (4) **A Plus (+) Symbol:** If this option is input, it lists all the valid relation names in the system (this list could be rather long).
- (5) **STORAGE to modify storage table relations:** This option is used to read or insert tuples of a storage table relation. Extreme **Caution** is required when using this option. If this option is input, the user will be prompted for the **Storage Table Name**. Upon accepting a valid **Storage Table Name**, the ODBE goes into the **Enter Tuple Operation** state.

- (c) **Enter Tuple Operation State:** This state prompts for the tuple operation to be performed. The valid tuple operations are as follows:

I	=	Insert (add a new tuple)
R	=	Review (display a tuple)
U	=	Update (modify a tuple)
D	=	Delete (remove a tuple)
W	=	Write a tuple to a file
BI	=	Batch Insert (add tuples from a file)
BR	=	Batch Review (output a relation to a file)
BW	=	Batch Write (output tuples to a file)
VIRT	=	Displays information about a virtual relation (only valid or displayed when a virtual relation name is entered).

The valid storage table tuple operations are as follows:

I	=	Insert (add a new Generated Key tuple)
R	=	Review (display a tuple without entering the generated key)
BI	=	Batch Insert (add generated key tuples from a file)
BR	=	Batch Review (output storage tuples to a file)
GKR	=	Generated Key Review (displays a tuple with the generated key entered)
GKVIRT	=	Displays the virtual update relations of a Generated Key relation.

The Storage Table Relation Insert or Batch Insert Operations are not logged and would be lost if the affected processor were pumped. In order to make the Storage Table Insert or Batch Insert Operations permanent, a back-up of the ODD of that processor is required. Refer to 235-105-210, *Routine Operations and Maintenance Procedures*.

Since the CMP mate side ODD is updated through continuous roll forward using the CMP log file, and ODBE Storage Table Inserts and Batch Inserts are not logged, the Storage Table Inserts and Batch Inserts will not roll forward to the mate side. In order to get the mate side to contain the Storage Table Inserts or Batch Inserts that the active side has, a soft switch of the CMP is required. Refer to **SW:CMP** in 235-600-700, *Input Message Manual*.

If a question (?) symbol is entered while in this state, the output message **You may enter:** and the following prompts are displayed (refer to **Note 4**):

- (1) A tuple operation code (I, R, U, D, W, BI, BR, BW, or OVWTODD)
- (2) An exclamation (!) symbol.

NOTE 1: Upon entering an I, R, U, or D tuple operation, the ODBE goes into the **Enter Primary Key** state. With the W, BI, and BR tuple operation, this is slightly modified. Upon entry of the W tuple operation, the user is prompted by the following output message:

Enter UNIX[®] system file for tuple review output:

It then prompts for the **Primary Key** state. Upon entry of the BI or BR tuple operation, the prompt is for the UNIX system file name in which to print or store the data. When entering the UNIX system file name, you must be in a directory, then any file name can be used.

NOTE 2: Operations for the MATE CMP and Reverse Index type relations will be only a subset of the tuple operations.

- (d) **Enter Primary Key State:** In this state, the user is prompted by name for the components of the key which uniquely defines a tuple in the relation. If a question (?) symbol is entered, the following prompts are displayed:
- (1) **Enter Primary Key:** Refer to Figures 16.5-1, 16.5-2, 16.5-3, 16.5-4, and 16.5-5.
 - (2) An exclamation (!) symbol to change tuple operations.
 - (3) A plus (+) symbol to list key information.
 - (4) A "0" Null character string.
 - (5) **Control-d** to exit.
- (e) **Enter Attribute Name or >:** With this prompt, the user can enter the attribute name or use the greater than (>) symbol. If an attribute name is entered, it must be entered exactly as it appears in the base relation. If the greater than symbol is entered, the ODBE displays the item(s), their existing value, and in the update (U) tuple operation, an enter new value prompt for each item displayed.
- (f) **Enter Attribute Value State:** In this state, the user is prompted (depending on the tuple operation) for the value associated with the attribute name(s). Once the attribute name(s) and attribute value are displayed, the user is prompted to enter a new value or a greater than (>) symbol. If a new value is entered, it is displayed. If the greater than symbol is used, then the ODBE sends the user to the end of the tuple. If a question (?) symbol is entered, the output message **You may enter:** and the following prompts are displayed:
- (1) **An attribute value:** If specified, the ODBE allows entry of the attribute value.
 - (2) **A Backslash or <cr> Symbol:** Used to keep old value.
 - (3) **A Less Than (<) Symbol:** Used to go back to the previous item.
 - (4) **A Greater Than (>) Symbol:** Used to skip remaining items and update.
 - (5) **An Exclamation (!) Symbol:** Used to cancel this tuple update.

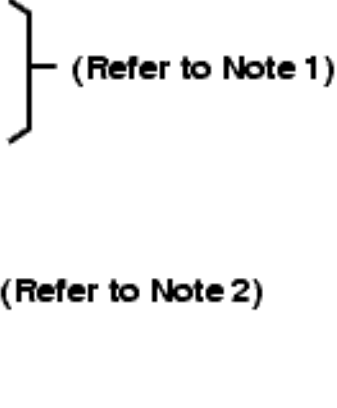
PROCEDURE

1. At the appropriate designated video display terminal, determine the ODBE operation to be performed per Substeps (a) through (o) as follows:
 - (a) Insert Tuple Operation — Figure 16.5-1
 - (b) Review Tuple Operation — Figure 16.5-2

- (c) Update Tuple Operation — Figure 16.5-3
 - (d) Delete Tuple Operation — Figure 16.5-4
 - (e) Write Tuple Operation — Figure 16.5-5
 - (f) Batch Insert Tuple Operation — Figure 16.5-6
 - (g) Batch Review Tuple Operation — Figure 16.5-7
 - (h) Batch Write Tuple Operation — Figure 16.5-8
 - (i) VIRT Operation — Figure 16.5-9
 - (j) Insert Generated Key Tuple Operation — Figure 16.5-10
 - (k) Review Storage Table Operation — Figure 16.5-11
 - (l) Batch Insert Generated Key Tuples Operation — Figure 16.5-12
 - (m) Batch Review Storage Table Operation — Figure 16.5-13
 - (n) Generated Key Review Storage Table Operation — Figure 16.5-14
 - (o) GKVIRT Operation — Figure 16.5-15
2. Using the appropriate information provided in the OVERVIEW and the figures as guidelines, perform the appropriate data base changes. If any error occurs that cannot be resolved, seek the next higher level of technical assistance.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): I
Enter Primary Key
key item 1: servclas = FC_INDVDL
key item 2: signal = FCSSNULL
key item 3: sigtype = DBTT
Enter Attribute Value
enter item 4: critical = 4000
enter item 5: partial = 20000
enter item 6: permsig = 10000
enter item 7: ovldpart = 10000
enter item 8: ovldperm = 1000

Enter Primary Key
key item 1: servclas = ! (**Refer to Note 3**)



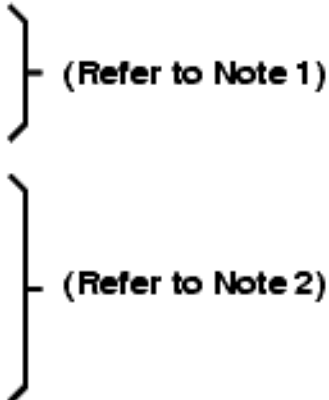
Note 1: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 2: These values are enumerations only. Refer to the appropriate TDM.

Note 3: The tuple is inserted, but not committed until the exclamation (!) symbol is entered.

Figure 16.5-1 Typical Insert Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): R
Enter Primary Key
 key item 1: servclas = FC_INDVDL
 key item 2: signal = FCSSNULL
 key item 3: sigtype = DBTT
Enter Attribute Value
 enter item 4: critical = 4000
 enter item 5: partial = 20000
 enter item 6: permsig = 20000
 enter item 7: ovldpart = 10000
 enter item 8: ovldperm = 10000



The diagram shows two groups of items. The first group consists of three key items (1, 2, and 3) and is bracketed together, with a label '(Refer to Note 1)' to its right. The second group consists of five attribute values (4, 5, 6, 7, and 8) and is bracketed together, with a label '(Refer to Note 2)' to its right.

Enter Primary Key

Note 1: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 2: These values are enumerations only. Refer to the appropriate TDM.

Figure 16.5-2 Typical Review Tuple Operation

Enter Processor Number (1-217): 1
 Enter Relation Name: DA_TIMER
 Enter Primary Key
 key item 1: servclas = !
 Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): U
 Enter Primary Key
 key item 1: servclas = FC_INDVDL
 key item 2: signal = FCSSNULL
 key item 3: sigtype = DBTT } (Refer to Note 1)
 Enter Attribute Name or (>): > (Refer to Note 2)
 enter item 4: critical = 4000 enter new value = 5000
 enter item 5: partial = 20000 enter new value =
 enter item 6: permsig = 20000 enter new value =
 enter item 7: ovidpart = 10000 enter new value =
 enter item 8: ovidperm = 10000 enter new value =
 Tuple Rewritten (Refer to Note 3)

Enter Primary Key
 key item 1: servclas = ! (Refer to Note 3)

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): U
 Enter Primary Key
 key item 1: servclas = FC_INDVDL
 key item 2: signal = FCSSNULL
 key item 3: sigtype = DBTT } (Refer to Note 1)
 Enter Attribute Name or >: critical (Refer to Note 2)
 enter item 4: critical = 5000 enter new value = 4000
 enter item 5: partial = 20000 enter new value = >
 Tuple Rewritten (Refer to Note 3)
 Enter Primary Key
 key item 1: servclas = ! (Refer to Note 3)

Note 1: Refer to appropriate Translations Data Manual (TDM) for entries.

Note 2: The attribute name selected must be entered exactly as it appears in the base relation. If the greater than (>) symbol is selected, ODBE prompts for the next item, its existing value, and enter new value prompt. This action continues in numerical sequence until the end of all items. With the enter new value prompt, a new value may be entered or the existing value retained. (The values shown in the above example are enumerations only, refer to the appropriate TDM for specific values.) To continue from one key item to another, press the "RETURN" key. If the greater than (>) symbol is entered for the enter new value prompt, ODBE defaults the rest of the tuple to the state it was in before the update.

Note 3: Tuple update is not committed until an exclamation (!) symbol is entered.

Figure 16.5-3 Typical Update Tuple Operation

```
Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW) = D
Enter Primary Key
    key item 1: servclas = FC_INDVDL
    key item 2: signal = FCSSNULL
    key item 3: sigtype = DBTT      } (Refer to Note 1)
Would you like to see the tuple before you delete it? (y/n): n
Tuple Deleted ( Refer to Note 2 )
Enter Primary Key
    key item 1: servclas = ! ( Refer to Note 2 )
```

Note 1: Refer to the appropriate Translation Data Manual (TDM) for these entries.

Note 2: The tuple delete is not committed until the explanation(!) symbol is entered.

Figure 16.5-4 Typical Delete Tuple Operation

Enter Processor Number (1-217): 1

Enter Relation Name: DA_TIMER

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): W

Enter an asterisk (*) for output at your terminal or

enter UNIX system file name for directed output: (**Refer to Note 1**)

Enter Primary Key

key item 1: servclas = FC_INDVDL

key item 2: signal = FCSSNULL

key item 3: sigtype = DBTT

} (**Refer to Note 2**)

item 4: critical = 4000

item 5: partial = 20000

item 6: permsig = 20000

item 7: ovldpart = 10000

item 8: ovlpem = 10000

} (**Refer to Note 3**)

Enter Primary Key

key item 1: servclas = ! (**Refer to Note 4**)

Tuple printout completed

Note 1: Response to this prompt must be made from a UNIX system directory using any valid file name from that directory. If an asterisk (*) is entered, output goes only to terminal; otherwise, output goes to both terminal and file.

Note 2: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 3: The values shown are enumeration only. Refer to the appropriate TDM for specific values.

Note 4: The write operation is not committed until the exclamation (!) symbol is entered.

Figure 16.5-5 Typical Write Tuple Operation

Enter Processor Number (1-217): 1

Enter Relation Name: DA_TIMER

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BI

Enter UNIX system file name: /tmp/datimer (**Refer to Note 1**)

Enter an asterisk (*) symbol for error messages to terminal or enter

UNIX system file name for directed output: *

If you want new tuples to overwrite existing tuples, enter (y or n): y

Insert processing completed. (**Refer to Note 2**)

DA_TIMER 145 tuples inserted, 0 errors detected (**Refer to Note 2**)

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): !

Enter Relation Name: !

Enter Processor Number (0-192): !

} (**Refer to Note 3**)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. This file name in this example is the datimer base relation from the previous batch review (BR).

Note 2: This entry is a switch response.

Note 3: Use of the exclamation symbol (!) allows sequential backup to the **Enter Processor Number** state. Once in this state, the "CTRL-d" keys may be used to exit ODBE.

Figure 16.5-6 Typical Batch Insert (BI) Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BR
Enter UNIX system file name: /tmp/datimer (**Refer to Note 1**)

Review processing completed. (**Refer to Note 2**)
147 tuples written to File /tmp/datimer (**Refer to Note 2**)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. The file name used in this example is applicable to the da_timer base relation. Refer to

Note 2: This entry is a switch response.

Figure 16.5-7 Typical Batch Review (BR) Tuple Operation

```

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BW
    Enter UNIX system file name: da_timer,bw (Refer to Note 1)
Enter Primary Key
    key item 1: servclas = FC_INDVDL
    key item 2: signal = FCSSNULL
    key item 3: sigtype = DBTT
    } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
    key item 1: servclas = FC_INDVDL
    key item 2: signal = FCSSNULL
    key item 3: sigtype = DBTT
    } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
    key item 1: servclas = FC_INDVDL
    key item 2: signal = FCSSNULL
    key item 3: sigtype = DBTT
    } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
    key item 1: servclas = FC_INDVDL
    key item 2: signal = FCSSNULL
    key item 3: sigtype = DBTT
    } (Refer to Note 2)
Enter Primary Key
    key item 1: servclas = ! (Refer to Note 3)
    Batch write processing completed.
    3 tuples written to File da_timer,bw

```

Note 1: Response to this prompt must be made from a UNIX system directory using any valid file name from that directory. The file name in this example is the da_timer base relation from the batch write operation.

Note 2: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 3: The batch write is not committed until the explanation (!) symbol is entered.

Figure 16.5-8 Typical Batch Write (BW) Tuple Operation

Enter Processor Number (1-217): 194
 Enter Relation Name: RC_LDRMK
 Enter Tuple Operation (I,R,U,D,W,BI,BR,BW,VIRT): VIRT

Virtual general use relation RC_LDRMK is composed of physical relations:
 LDRMK_R, REM_G

RC_LDRMK.1dit, RC_LDRMK.rcdigs are keys to LDRMK_R (1dit,rcdigs).
 LDRMK_R.remarks is key to REM_G (gkREM_G).

RC_LDRMK.1dit is a key attribute.
 RC_LDRMK.rcdigs is a key attribute.
 RC_LDRMK.rem comes from REM_G.rem.

Virtual relation description output completed

Figure 16.5-9 Typical VIRT Operation

Enter Processor Number (1-217): 1
 Enter Relation Name: STORAGE
 ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
 Enter Storage Table Name: REM_G
 Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): I
 Enter Generated Key
 key item 1: GK=5
 Enter Attribute Value
 enter item 2: remark=SMOPER **(Refer to Note 1)**

Tuple Inserted

Note 1: Refer to the appropriate Translations Data Manual.

Figure 16.5-10 Typical Generated Key Table Insert Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying Storage Table Relations, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): R
Enter Primary Key
 enter item 2: remark=SMOPER **(Refer to Note 1)**

Note 1: Refer to the appropriate Translations Data Manual.

Figure 16.5-11 Typical Storage Table Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying Storage Table Relations, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): BI
Enter UNIX system file name: /tmp/rem_g (Refer to Note 1)
Enter an asterisk (*) symbol for error messages to the terminal or enter
UNIX system file name for directed output: *

Insert processing completed.

REM_G 13 tuples inserted, 0 errors detected. (Refer to Note 2)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. The file name in this example is the rem_g base relation from the previous batch review (BR).

Note 2: This entry is a switch response.

Figure 16.5-12 Typical Generated Key Tuple Batch Insert Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): BR
Enter UNIX system file name: /tmp/rem_g

Review processing completed.
13 tuples written to file /tmp/rem_g **(Refer to Note 1)**

Note 1: This entry is a switch response.

Figure 16.5-13 Typical Storage Table Batch Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): R
Enter Generated Key
 key item 1: GK=5
 item 2: remark=SMOPER

Enter Generated Key
 key item 1: GK=

Figure 16.5-14 Typical Storage Table Generated Key Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): GKVIRT
5 Updatable virtual relations use GK relation REM_G:
1. Virtual rel 1 (uses REM_G 2 times) (**Refer to Note 1**)
2. Virtual rel 2
3. Virtual rel 3
4. Virtual rel 4
5. Virtual rel 5

Parent relation output completed

Note 1: If a GK relation is used multiple times in a virtual relation, then the "(uses . . .)" message will be printed.

Figure 16.5-15 Typical Storage Table GKVIRT Operation

Procedure 16.6: ANALYZE AND CLEAR SPLIT TRANSLATIONS (TRANSACTIONS)

OVERVIEW

Each Recent Change/Verify (RC/V) transaction performed on the 5ESS® switch may change one or more relations on the Administrative Module (AM), the Communication Module Processor (CMP), and/or each Switching Module/Switching Module-2000 (SM/SM-2000). Although information for these RC/V transactions appear on several views (if using menu mode) or Form IDs (if using text interface mode), they are logically dependent on each other and must be made as a unit to ensure proper operation of the switch.

It is possible that only part of these RC/V changes are committed to the data base; therefore, the terminology "split transactions" applies. If the terminology "split translations" or "split(s)" is used, this represents an error condition that must be resolved for the proper operation of the 5ESS® switch.

If during an RC/V operation a split translation occurs, this is an error condition and manual intervention is required to restore logical consistency to the Office Dependent Data (ODD).

CAUTION: Use of the Office Data Base Editor (ODBE) provides the user with the capability of identifying and correcting most split translations. However, use of ODBE should never be attempted by a novice.

Most translation splits are detected during an attempted review or modification of an RC/V view or an RC/V Form ID. If an attempted RC/V operation fails with the following message, a split translation problem may or may not exist.

xx-yyy STORED DATA CONFLICT [further error information]

In the message, the **xx** identifies the view or the form identification (ID) number and the **yyy** identifies the error number. The [further error information] usually contains sufficient information to identify the problem area, plus it may or may not identify one or more base relation(s) that are experiencing erroneous data. Since only one or two lines are displayed on the video screen (at any one time), it is extremely important that the complete contents of this output message be obtained and recorded before attempting any repair of the base relations, using ODBE.

A split translation may also be detected due to the improper operation of a line, trunk, or other equipment that is dependent on accurate relations. For example, a subscribing customer's line may be experiencing trouble in receiving a dial tone or the customer's line being dead (completely inoperative).

CAUTION 1: By use of ODBE, it is possible to overwrite, delete, or insert information critical to the operation of the 5ESS® switch.

CAUTION 2: When using ODBE on any relation, it is extremely important that the user identify and know ALL relations that are affected before attempting any changes. For a detailed listing of all base relations that are associated with applicable RC/V Views, Menu Mode or Form ID, and Text Interface Mode, refer to the applicable Recent Change Manuals identified in Procedure 16.2, Add or Change Office Dependent Data Using Recent Change/Verify.

PROCEDURE

1. The exact procedure to be followed in correction of a split translation depends on: (1) the applicable RC/V View or Form ID and (2) the nature and severity of the split. In some cases, a few ODBE operations are all that are required. In others, more extensive operations are required to correct the base relations and repopulation of the data.
2. In case of STORED DATA CONFLICTS, the error information provided by the output error message may be

sufficient to identify the data modification required. For example, it may be required to insert a tuple in a relation. However, once the tuple is inserted, a different error condition may be reported. When using ODBE, the transaction halts after any inconsistency is detected; therefore, each error condition must be corrected as they are discovered. Extreme patience is required to eliminate the possibility of creating a human error.

3. In case of redundant data splits, a manual search of each and every base relation may be required to ensure that all base relations are free from any erroneous data.
4. To further assist in solving split translations, the input message **EXC:SODD** can be very useful. However, certain limitations apply when using this input message. Refer to 235-600-700, *Input Message Manual*, for further information and exact message formats.
5. If a split translation cannot be resolved using the previous steps, seek the next higher level of technical assistance.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Procedure 16.7: PERFORM MANUAL REORGANIZATION OF HASHED RELATIONS PLUS ADDITIONAL DATA BASE MAINTENANCE PROCEDURES USING THE ACCESS EDITOR (ACCED)

General - Access Editor

The Access Editor (ACCED) is an interactive tool that provides a craftsperson with the capability to manually locate, investigate, and correct 5ESS[®] switch data base corruption, and to reorganize hashed relations. This procedure provides guideline information for performing each of the six main operations in ACCED: REVIEW, SCAN, OVERWRITE, DESTROY, REORG, and HASHSIM. For additional overview material and discussion of ACCED operations, refer to 235-105-110, *System Maintenance Requirements and Tools*.

When using ACCED, it is imperative that the craftsperson be thoroughly trained in all aspects of the 5ESS[®] switch software data bases.

CAUTION: With ACCED, it is possible to modify ODD information that is critical to the operation of the 5ESS[®] switch. Improper use of ACCED can be service affecting or possibly bring a processor down. Before modifying data with ACCED (via DESTROY, OVERWRITE, or REORG operations), consult local supervision concerning policy or seek the next higher level of technical assistance for advice.

The following generalized information, concepts, and rules apply to ACCED. All of these should be thoroughly reviewed before attempting to use ACCED.

Use of ACCED is controlled by an input message from the Recent Change/Verify (RC/V), the Trunk Line Work Station (TLWS), or the Supplementary TLWS (STLWS) video display terminal. ACCED can also be executed via the screen program (**RCV:MENU:SCREEN**) or Control/Display (C/D) Page 194, thus permitting ACCED use on the Master Control Center (MCC) or the Switching Control Center (SCC). The output information from ACCED is displayed on the video terminal being used as the input device. Also, ACCED output messages (OM) may be printed on the read only printer (ROP). The OM printing is controlled by the craftsperson (refer to the discussion on special characters).

The following input message (MML format) is used to access ACCED:

```
rcv:menu:acced; PF
```

NOTE 1: If the switch accepts the input message [as evidenced by a printout follows (PF) entry at end of input message], then the first ACCED prompt **Processor Number?** appears on the second line of the terminal display.

NOTE 2: A password may optionally be required to use ACCED. If the prompt string **Password:** is printed on the terminal, then the ACCED password must be entered.

ACCED operations are specified through a series of prompts. When using ACCED, the response to a given prompt is usually a data base defined name, an encoded choice from a menu of options, a (hexa)decimal number, or an ACCED special character. Exceptions to this set of allowable responses are specified in the individual prompt descriptions.

ACCED Special Characters

Special characters have a meaning only if they are the first character in a response. Special characters and their meanings are as follows:

- (a) The "CTRL" (control) and ``d" keys on the video terminal keyboard are used to exit ACCED. Both keys must be simultaneously pressed.

- (b) **The Exclamation (!) Symbol:** This causes a backup to the next higher prompt (for example, **Processor Prompt** is one level higher than **Operation Prompt**).
- (c) **The 'p' Character:** This toggles output message printing status from ON to OFF, or from OFF to ON. The OM printing status ON means ACCED OMs for all operations are printed on the ROP. The OM printing status OFF means ACCED output messages for critical operations (DESTROY and OVERWRITE) are printed on the ROP, and OMs for noncritical operations are not printed on the ROP. This feature provides the craftsperson with the flexibility to keep a ROP record of all ACCED operations, or to reduce ROP output by recording any critical ACCED operations. The default OM printing status is OFF.
- (d) **The Carriage Return <cr> Key:** This leaves the current value displayed at the prompt unchanged. A <cr> is a valid response only when a default value is displayed and when ACCED states that <cr> keeps the default.

ACCED Prompts and Operations

The ACCED prompts, along with the various responses applicable to those prompts, are described in (a) through (ac):

- (a) **Processor Prompt:** This prompts the craftsperson for the Administrative Module (AM), Communication Module Processor (CMP), or Switching Module/Switching Module-2000 (SM/SM-2000) number where the relation resides. The processor prompt is displayed as follows:

Processor Number?

Valid processor numbers are as follows:

- (1) **1-192** for the SM/SM-2000 number
- (2) **193** for the AM
- (3) **194-205** for the primary CMP
- (4) **206-217** for the mate CMP.

Only special characters or the previous processor numbers are accepted; any other input is rejected.

- (b) **Operation Prompt:** This prompts the craftsperson to select one of six ACCED operations, or to select an option to quit ACCED. Typing control-d at any prompt also quits ACCED. The operation prompt is displayed as follows:

1. REVIEW	- review data by relation or by BID
2. SCAN	- scan a relation for corrupted data
3. REORG	- manually reorganize a relation
4. DESTROY	- destroy (part of) a relation
5. OVERWRITE	- overwrite 1, 2, or 4 bytes of memory
6. HASHSIM	- run hashing simulator
7. QUIT	
Operation?	

Selection 1 enters the REVIEW operation which enables the craftsperson to review a relation's head table, intermediate data pages, data pages, access dictionary, and tuple information. Also, disk or memory contents may be reviewed given a physical address or a block ID. From selection 1, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it displays **Review Prompt**. See **Review Prompt** for subsequent REVIEW operation prompts.

Selection 2 enters the SCAN operation which enables the craftsman to scan a relation for corrupted tuples. From selection 2, ACCED prompts for a relation name (see **Relation Name Prompt**), followed by **Data Page Prompt** (and **Intermediate Data Page Prompt** if relation is 3-level indexed) to get the data page at which to start scanning. Specifying DP 0 (and IDP 0 for 3-level indexed relations) scans the whole relation. If the specified starting data page is empty, ACCED will begin scanning the relation at the next non-empty data page.

Selection 3 enters the REORG operation which enables the craftsman to reorganize hashed (DBACC_HASH) or generated key (DBACC_GK) relations. From selection 3, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it gives the craftsman an opportunity to run a hashing simulation (HASHSIM) before prompting for reorganization parameters via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt** (or **Tmax Range Prompt**), and **Data Page Size Prompt** (or **Data Page Size Range Prompt**).

Selection 4 enters the DESTROY operation which enables the craftsman to destroy a whole relation, a single data page, or a single intermediate data page. From selection 4, ACCED prompts for a relation name (see **Relation Name Prompt**), followed by **Destroy Prompt**. See **Destroy Prompt** for subsequent DESTROY operation prompts.

WARNING: DESTROY is a dangerous operation! Refer to warnings and notes enumerated in Destroy Prompt description [item (d)].

Selection 5 enters the OVERWRITE operation which enables the craftsman to overwrite one, two, or four bytes of disk or memory contents. From selection 5, ACCED prompts for information it needs for the overwrite via **Overwrite Length Prompt**, **Physical Address Prompt**, **Old Data Prompt**, and **New Data Prompt**.

NOTE: For CMP, a soft switch is required after OVERWRITE to update the memory on the mate CMP. An ODD backup is required immediately after OVERWRITE on ALL affected processors to preserve the overwrite since OVERWRITE is not logged.

Selection 6 enters the HASHSIM operation which enables the craftsman to simulate hashing of hashed (DBACC_HASH) or generated key (DBACC_GK) relations. From selection 6, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it prompts for hashing parameters via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt** (or **Tmax Range Prompt**), and **Data Page Size Prompt** (or **Data Page Size Range Prompt**).

Selection 7 quits ACCED.

Only special characters or selections 1 through 7 are accepted; any other input is rejected.

- (c) **Relation Name Prompt:** This prompt, which appears after REVIEW, SCAN, REORG, DESTROY, or HASHSIM is selected from the **Operation Prompt**, prompts the craftsman for the name of the relation on which to operate. The relation name prompt is displayed as follows:

Relation Name? (<CR> leaves it unchanged)

The name may be typed in uppercase or lowercase. Entering carriage return (<CR>) leaves the current relation name unchanged. Only special characters or names of relations whose access types are DBACC_DIR, DBACC_CIND, DBACC_HASH, DBACC_GK, DBACC_IND, or DBACC_LIN are accepted; any other input is rejected. Also, the current processor and relation's distribution type must be compatible. [For example, a relation with distribution type FP (fixed partitioned) is not valid on the AM.]

- (d) **Destroy Prompt:** This prompts the craftsman to specify which part of the relation to destroy. The destroy prompt is displayed as follows:

1. Whole Relation

2. Data Page

3. Intermediate Data Page

Destroy What?

Selection 1 is available for all relations, selection 2 is displayed for all but 1-level indexed relations, and selection 3 is displayed for 3-level indexed relations. Only special characters or selections 1 through 3 are accepted; any other input is rejected.

Selection 1 destroys a whole relation and sets the head table entry in the relation's access dictionary (**acc_head**) to zero (DBNULL). Before the destroy occurs, ACCED allows the craftsperson to modify the access dictionary. From selection 1, ACCED prompts the craftsperson for new access dictionary values via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt**, and **Data Page Size Prompt**. If the relation resides on more than one SM/SM-2000, then ACCED allows the craftsperson to specify whether or not the destroy should operate on all SM/SM-2000s simultaneously.

Selection 2 destroys a data page in the current relation given a data page number (and intermediate data page number if the relation is 3-level indexed). From selection 2, ACCED prompts the craftsperson for DP (and IDP information, if the relation is 3-level indexed) via **Data Page Prompt** and **Intermediate Data Page Prompt**. Then ACCED displays the BID for that DP and requests the craftsperson to verify that the BID corresponds to the specified page.

Selection 3 destroys an intermediate data page in the current relation given an intermediate data page number. From selection 3, ACCED prompts the craftsperson for IDP information via **Intermediate Data Page Prompt**. Then ACCED displays the BID for that IDP and requests the craftsperson to verify that the BID corresponds to the specified page.

WARNING: Destroying Generated Key (GK) Access Method Storage relations should be attempted only by experts in ODD Data Base Administration and the GK Access Method.

The GK relations have unique and very different properties from other types of relations. Improper GK modifications may lead to widespread office data corruption and could negatively impact call processing. See **Notes 1** and **2** in Section 16.7.

It is important to note the following:

- (1) Recent Change (RC) must be inhibited before destroying (part of) a relation to avoid possible ODD splits, RC can be inhibited with the input message **INH:RC**.
- (2) Following a destroy of a generated key (GK) relation, the craftsperson should execute a successful generated key compaction and collection (GKCCR) before batch inserting GK tuples. The GKCCR is executed via the **EXC:GKCCR** input message. The GKCCR will detect several problems resulting from the destroy, so the craftsperson should expect several **REPT:GKCCR** output messages and accompanying asserts.
- (3) Before destroying a GK ROOT relation, the craftsperson should have previously batch reviewed the VIRTUAL relation in the Office Data Base Editor (ODBE). Following the DESTROY, the craftsperson must then batch insert the VIRTUAL relation in ODBE to populate the ROOT relation.
- (4) The DESTROY operation is logged for the CMP so the mate CMP will be updated through continuous roll-forward. The DESTROY operation is not logged on processors other than the CMP.
- (5) An ODD backup is required immediately after a DESTROY operation to preserve the deletions on processors other than the CMP since the destroy is not logged for those processors.

- (e) **Data Page Prompt:** This prompts the craftsperson to specify a data page number, which corresponds to an index into the relation's head table (or an index into an intermediate data page, if the relation is 3-level indexed). The data page prompt is displayed as follows:

Data page number?

Only special characters or an index within the bounds of the head table (or an intermediate data page) are accepted; any other input is rejected.

- (f) **Intermediate Data Page Prompt:** This prompts the craftsperson to specify an intermediate data page number, which corresponds to an index into the relation's head table. The intermediate data page prompt is displayed as follows:

Intermediate data page number?

Only special characters or an index within the bounds of the head table are accepted; any other input is rejected.

- (g) **Review Prompt:** This prompt, displayed after REVIEW is selected from the **Operation Prompt**, prompts the craftsperson to select a REVIEW operation. The review prompt is displayed as follows:

1. Information (data page and tuple information)

2. Access Dictionary

3. Address

4. Block ID

5. Data Page

6. Head Table

7. Intermediate Data Page

Review What?

Selections 1 through 5 are available for all relations, selection 6 is displayed for all but 1-level indexed relations, and selection 7 is displayed for 3-level indexed relations.

Selection 1 displays information about a tuple given a tuple key. Examples of tuple information are DP number, DP block ID, tuple address, and physical tuple size. From selection 1, ACCED prompts for a tuple key via **Primary Key Prompt**. For a detailed description of tuple information provided by ACCED, refer to 235-105-110, *System Maintenance Requirements and Tools*.

Selection 2 displays the access method common dictionary and access method specific dictionary for the current relation, or for the access dictionary entry given an index into the access dictionary. If the relation is access type DBACC_GK, the GK parent (DB_GKPRNT) and GK control (DB_GKCTRL) dictionaries are also displayed. From selection 2, ACCED prompts for the access dictionary version (CURRENT, ODD, or ANY) via **Dictionary Prompt**. If version is ANY, ACCED prompts for the access dictionary index via **Dictionary Index Prompt**.

Selection 3 displays the contents of memory or disk given a physical address and review length. From selection 3, ACCED prompts for the memory type (DISK or MEMORY) if the processor is AM; memory type is assumed to be MEMORY on all other processors. Then ACCED prompts for information it needs for the review via **Physical Address Prompt** and **Dump Length Prompt**.

Selection 4 displays the contents of memory or disk given a block ID, a memory type, a starting relative address, and a review length. From selection 4, ACCED prompts for the memory type (AM is either DISK or MEMORY, SM/SM-2000 is either RRAM or NRAM/URAM; CMP is assumed to be NRAM/URAM). Then ACCED prompts for information it needs for the review via **Block ID Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Selection 5 displays the contents of a data page given a data page number, a starting relative address into the data page, and review length. From selection 5, ACCED prompts for information it needs for the review via **Intermediate Data Page Prompt**, (if the relation is 3-level indexed), **Data Page Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Selection 6 displays the contents of the relation's head table given a starting relative address into the head table, and a review length. From selection 6, ACCED prompts for information it needs for the review via **Relative Address Prompt** and **Dump Length Prompt**.

Selection 7 displays the contents of an intermediate data page given an intermediate data page number, a starting relative address into the intermediate data page, and a review length. From selection 7, ACCED prompts for information it needs for the review via **Intermediate Data Page Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Only special characters or selections 1 through 7 are accepted; any other input is rejected.

- (h) **Block ID Prompt:** This prompts the craftsman to specify a memory or disk block ID. The block ID prompt is displayed as follows:

Block ID to review?

Only special characters or a block ID within the bounds of the ODD memory space are accepted; any other input is rejected.

- (i) **SM Memory Type Prompt:** This prompts the craftsman to specify an SM memory type, which is needed to uniquely identify a memory block ID. The SM memory type prompt is displayed as follows:

1. RRAM - SM redundant ODD

2. NRAM/URAM - SM non-redundant ODD and unprotected ODD

Which SM memory type?

Only special characters or selections 1 or 2 are accepted; any other input is rejected.

- (j) **AM Memory Type Prompt:** This prompts the craftsman to specify an AM memory type, which is needed to uniquely identify a block ID or address as being in disk or memory address space. The AM memory type prompt is displayed as follows:

1. DISK - disk ODD

2. MEMORY - AM protected and unprotected ODD

Which AM memory type?

Only special characters or selections 1 or 2 are accepted; any other input is rejected.

- (k) **Dictionary Prompt:** This prompts the craftsman to specify which access dictionary to review. The dictionary prompt is displayed as follows:

1. Current

2. ODD

3. Any

Which Dictionary?

Selection 1 displays the current run time version of the current relation's access dictionary.

Selection 2 displays the ODD run time version of the current relation's access dictionary. The ODD version is located in the control ODD. The current run time version and ODD run time version are usually identical.

They differ only while the access dictionary is being updated, during the period between the beginning of the transaction and the moment the transaction commits.

Selection 3 prompts further for an access dictionary index [see **Dictionary Index Prompt**, item (l)], and then displays the current run time version of the access dictionary with the given index. This is useful for reviewing future or past versions of the current run time dictionary. It is not possible to specify an index into the ODD run time dictionary. To review ODD versions of the different relations, change relations (see **Relation Name Prompt**) and return back to the **Dictionary Prompt** and choose selection 2.

Only special characters or selections 1 through 3 are accepted; any other input is rejected.

- (l) **Dictionary Index Prompt:** This prompt, which is part of the REVIEW access dictionary operation, prompts the craftsman to specify an index into the current run time access method common dictionary (DB_ACCDICT). The dictionary index prompt is displayed as follows:

Index to access method common dictionary?

The index refers to a specific access method common dictionary entry for a specific relation. For example, if a relation has past or future versions of its access dictionary, those versions are unique entries in the DB_ACCDICT dictionary. The dictionary index of the past version is found in the current version's **acc_bidx** entry. The dictionary index of the future version is found in the current version's **acc_nidx** entry.

Only special characters or a nonzero access dictionary index (decimal number) are accepted; any other input is rejected.

- (m) **Relative Address Prompt:** This prompts the craftsman to specify a starting relative address at which to begin the review. The relative address prompt is displayed as follows:

Beginning relative address (decimal)?

The address is a byte offset from the beginning of the object being reviewed. For example, when reviewing a data page, a starting relative address of 4 means "display data page contents starting with the fifth byte of data."

Valid relative addresses depend on the object being reviewed as follows:

- Review Data Page - a number less than the data page size.
- Review Intermediate Data Page - an even number less than the intermediate data page size.
- Review Block ID - a number less than the block size (256 for a memory block, or 2048 for a disk block).
- Review Head Table - an even number less than the head table size.

Only special characters or a valid relative address are accepted; any other input is rejected.

- (n) **Physical Address Prompt:** This prompts the craftsman to specify a starting physical address at which to begin the review. The physical address prompt is displayed as follows:

Beginning physical address (hexadecimal)?

The address must be within the ODD address range for the particular memory type being reviewed, either DISK, PRAM, RRAM, or NRAM/URAM [see **SM Memory Type Prompt** and **AM Memory Type Prompt**, items (i) and (j) respectively]. Only special characters or a valid physical address are accepted; any other

input is rejected.

- (o) **Dump Length Prompt:** This prompts the craftsperson to specify a length (number of bytes) to review. The dump length prompt is displayed as follows:

Number of bytes to dump?

Valid dump lengths depend on the object being reviewed as follows:

- Review Data Page - a number such that it plus the starting relative address is less than the data page size.
- Review Intermediate Data Page - an even number such that it plus the starting relative address is less than the intermediate data page size.
- Review Block ID - a number such that it plus the starting relative address is less than the block size (256 for a memory block, or 2048 for a disk block).
- Review Head Table - an even number such that it plus the starting relative address is less than the head table size.
- Review Address - a number that is the smaller of 8196 or the difference between the physical address and the end of the ODD address range.

Only special characters or a valid dump length are accepted; any other input is rejected.

- (p) **Overwrite Length Prompt:** This prompt, displayed after OVERWRITE is selected from the **Operation Prompt**, prompts the craftsperson to specify the number of bytes of disk or memory data to overwrite. The overwrite length prompt is displayed as follows:

Number of bytes of overwrite (1, 2, or 4)?

Only one, two, or four bytes of data may be overwritten. Only special characters or the numbers '1', '2', or '4' are accepted; any other input is rejected.

- (q) **Old Data Prompt:** This prompt, which is part of the OVERWRITE operation, prompts the craftsperson to specify the data value that currently exists at the location that is to be overwritten. The old data prompt is displayed as follows:

Old data value in hexadecimal?

This prompt ensures that the craftsperson is aware of the current memory or disk contents before permitting the overwrite to continue. One, two, or four bytes of data must be specified, depending on the overwrite length entered at the **Overwrite Length Prompt**. One byte of data is specified with two hexadecimal characters, two bytes of data are specified with four hexadecimal characters, and four bytes of data are specified with eight hexadecimal characters. Only special characters or two, four, or eight hexadecimal characters are accepted; any other input is rejected.

- (r) **New Data Prompt:** This prompt, which is part of the OVERWRITE operation, prompts the craftsperson to specify the new data value to overwrite. The new data prompt is displayed as follows:

New data value in hexadecimal?

One, two, or four bytes of data must be specified, depending on the overwrite length entered at the **Overwrite Length Prompt**. One byte of data is specified with two hexadecimal characters, two bytes of

data are specified with four hexadecimal characters, and four bytes of data are specified with eight hexadecimal characters. Only special characters or two, four, or eight hexadecimal characters are accepted; any other input is rejected.

- (s) **Probe Depth Prompt:** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craftsperson to specify a new probe depth value for the current relation's **acc_probdepth** access dictionary entry. The probe depth prompt is displayed as follows:

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)?

DESTROY and REORG actually change the probe depth value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

For relations with access type DBACC_HASH, the probe depth represents the maximum number of element searches on a data page in the event of a hashing collision. For relations with access type DBACC_GK, the probe depth represents the "goal size" of each generated key bucket, where "goal size" is a number to strive to remain less than, but it is not a strict limit.

Entering carriage return (<CR>) leaves the current probe depth value unchanged. Only special characters, a carriage return, or a decimal probe depth value are accepted; any other input is rejected.

- (t) **Head Table Size Prompt:** This prompt, which is part of the DESTROY and REORG operations, prompts the craftsperson to specify a new head table size value for the current relation's **rel_hsze** access dictionary entry. The head table size prompt is displayed as follows:

Head table size (rel_hsze) (<CR> keeps default)?

This prompt does not appear for relations of access type DBACC_GK.

The head table is a power of two between 256 and 8192, inclusive. Entering carriage return (<CR>) leaves the current head table size unchanged. Only special characters, a carriage return, or a valid head table size are accepted; any other input is rejected.

- (u) **Data Page Size Prompt:** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craftsperson to specify a new data page size value for the current relation's **rel_dsze** access dictionary entry. The data page size prompt is displayed as follows:

Data page size (rel_dsze) (<CR> keeps default)?

This prompt does not appear for relations of access type DBACC_GK.

DESTROY and REORG actually change the data page size value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

The data page size is a power of two between 256 and 8192, inclusive. However, data page size must not exceed 2048 unless the relation's physical tuple size is a power of two. (This guarantees that no tuple will cross a data page boundary which would violate the memory protection mechanism.) Entering carriage return (<CR>) leaves the current data page size unchanged. Only special characters, a carriage return, or a valid data page size are accepted; any other input is rejected.

- (v) **Data Page Size Range Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craftsperson to specify a new data page size value, or range of data page size values, for use in a hashing simulation. The data page size range prompt is displayed as follows:

Enter <CR> to keep default dsze, or enter new dsze or range of dsze's (example range: 256 - 512):

This prompt does not appear for relations of access type DBACC_GK.

HASHSIM simply uses the value(s) in a hashing simulation, and it does not change the relation's access dictionary.

A data page size is a power of two between 256 and 8192, inclusive. The craftsperson may enter a single data page size or a range of data page sizes. A range is specified by separating two data page size values with a single hyphen ('-'). The first data page size value in a range must be less than or equal to the second data page size value. If a range is specified, then more than one hashing simulation may run.

Entering carriage return (<CR>) leaves the current data page size unchanged. Only special characters, a carriage return, a valid data page size, or a valid data page size range are accepted; any other input is rejected.

- (w) ***Tmax Prompt:*** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craftsperson to specify a new maximum number of tuples (tmax) value for the current relation's **rel_tmax** access dictionary entry. The tmax prompt is displayed as follows:

Maximum number of tuples (rel_tmax) (<CR> keeps default)?

DESTROY and REORG actually change the tmax value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

Entering carriage return (<CR>) leaves the current tmax value unchanged. Only special characters, a carriage return, or a valid tmax value are accepted; any other input is rejected.

- (x) ***Tmax Range Prompt:*** This prompt, which is part of the HASHSIM operation, prompts the craftsperson to specify a new maximum number of tuples (tmax) value, or range of tmax values, for use in a hashing simulation. The tmax range prompt is displayed as follows:

Enter <CR> to keep default tmax, or enter new tmax or range of tmax's (example range: 10 - 100):

HASHSIM simply uses the value(s) in a hashing simulation, and it does not change the relation's access dictionary.

The craftsperson may enter a single tmax value or a range of tmax values. A range is specified by separating two tmax values with a single hyphen ('-'). The first tmax value in a range must be less than or equal to the second tmax value. If a range is specified, then more than one hashing simulation may run.

Entering carriage return (<CR>) leaves the current tmax value unchanged. Only special characters, a carriage return, a valid tmax value, or a valid tmax range are accepted; any other input is rejected.

- (y) ***Fold Type Prompt:*** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craftsperson to specify a new fold type value for the current relation's **acc_foldtyp** access dictionary entry. The fold type prompt is displayed as follows:

1. DBDEFAULT

2. DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

This prompt appears for relations of access type DBACC_HASH only.

Selection 1 sets the current relation's hashing fold type to DBDEFAULT.

Selection 2 sets the current relation's hashing fold type to DBG31.

DESTROY and REORG actually change the fold type value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

Only special characters or selections 1 through 2 are accepted; any other input is rejected.

- (z) **Hash File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craftsperson to specify the type of file input they are providing to the hashing simulation. The hash file prompt is displayed as follows:

1. Folded key file
2. ASCII input file
3. Neither

Which of the following are you providing?

This prompt appears for relations of access type DBACC_HASH only.

Selection 1 indicates that the craftsperson will provide to the hashing simulation a file containing the relation's folded keys.

Selection 2 indicates that the craftsperson will provide to the hashing simulation a file (refer to the following **Note**) containing an ASCII representation of the relation's data.

NOTE: An ASCII file may be obtained in ODBE via the batch review (BR) operation.

Selection 3 indicates that the craftsperson has neither a folded key file nor an ASCII input file. In this case, HASHSIM will batch review the relation automatically before continuing.

Only special characters or selections 1 through 3 are accepted; any other input is rejected.

- (aa) **Read File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craftsperson to specify the name of a file which is to be opened for reading. The read file prompt is displayed as follows:

Enter filename:

The file, which contains either folded keys or ASCII data for the relation, may be specified as full UNIX[®] system path name or a relative path name. Only special characters or a valid UNIX system file name are accepted; any other input is rejected.

- (bb) **Write File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craftsperson to specify the name of a file where the relation's automatically generated ASCII information is to be saved. The write file prompt is displayed as follows:

Enter UNIX system filename to save relation ASCII to:

This prompt appears only when HASHSIM automatically generates ASCII information, that is, when the craftsperson supplies neither folded key nor ASCII data [see **Hash File Prompt**, item (z)].

The file may be specified as full UNIX system path name or a relative path name. Only special characters or a valid UNIX system file name are accepted; any other input is rejected.

- (cc) **Primary Key Prompt:** This prompt, which is part of the REVIEW tuple information operation, prompts the craftsperson to specify the name of the component(s) of the key which uniquely identifies a tuple in the

relation. The primary key prompt is displayed as follows:

Enter Primary Key

For each component of the tuple key, a prompt is displayed where the craftsman is required to specify an attribute value (and subattribute values, if any) to uniquely identify a tuple. One of the following special characters (refer to the following **Note**) may be entered at the primary key attribute (or subattribute) prompt:

- (1) A question mark (?) to list the possible input options available.
- (2) A plus (+) symbol to list key attribute domain.
- (3) An exclamation (!) symbol to back up to the previous prompt.
- (4) A control-d to exit ACCED.

NOTE: These special characters are exclusively for the **Primary Key Prompt**, and, **for this prompt only**, they override the previously described special characters!

This procedure provides general guidelines for the SCAN, REORG, DESTROY, and HASHSIM operations. Relative to these operations, REVIEW and OVERWRITE operations are more straight forward and guidelines are not provided. For details on REVIEW, refer to item (g) in the OVERVIEW (Procedure 16.7) and the following:

- (1) Figure 16.7-1 — Review Information Operation
- (2) Figure 16.7-2 — Review Access Dictionary (Current Version) Operation
- (3) Figure 16.7-3 — Review Access Dictionary (Any Version) Operation
- (4) Figure 16.7-4 — Review Address Operation
- (5) Figure 16.7-5 — Review Block ID Operation
- (6) Figure 16.7-6 — Review Data Page Operation
- (7) Figure 16.7-7 — Review Head Table Operation
- (8) Figure 16.7-8 — Review Intermediate Data Page Operation.

For details on OVERWRITE, refer to item (p) in the OVERVIEW (Section 16.7) and Figure 16.7-14 .

Following the sections is a list of ACCED operations and corresponding figures. Using the information provided in the OVERVIEW (Section 16.7), coupled with the guidelines and figures that follow, perform the appropriate data base reorganization, corruption detection, corruption investigation, and corruption correction. If any error(s) occur that cannot be resolved, seek the next higher level of technical assistance.

PROCEDURE

1. SCAN Operation Guidelines

The SCAN operation is useful for detecting and reporting corrupted tuples for relations of access type DBACC_HASH and DBACC_LIN. SCAN cannot detect corruption in relations of access types other than

DBACC_HASH and DBACC_LIN.

Corruption is detected by searching for discrepancies between the actual tuple status and the status bitmap located in the last two bytes of each data page. The bitmap is read from right to left, with each bit in the bitmap representing the status of one tuple. A one (1) in the bitmap corresponds to an available element slot, which should contain all 0's or all 1's in the first two bytes of the tuple. If this is not the case, then SCAN reports tuple corruption. A zero (0) in the bitmap corresponds to an occupied element slot, which can contain any bit pattern, including all 0's and all 1's in the first two bytes of the tuple. SCAN cannot detect corruption in occupied element slots.

2. REORG Operation Guidelines

The REORG operation provides a way to manually reorganize relations of access type DBACC_HASH and DBACC_GK. Relations are reorganized to eliminate overflow tuples. [Note that the hashing simulator (HASHSIM operation) can help avoid costly iterations of unsuccessful reorganization attempts. The REORG operation offers the opportunity to run a hashing simulation before running the actual reorganization. Refer to Section 16.7, "HASHSIM Operation Guidelines" for details on the hashing simulator.] The **rel_tmax** value (maximum number of tuples) in a relation may be any reasonable number depending on the relation being reorganized. Although the head table size does not affect hashing, it must be large enough to accommodate the number of data pages required by the relation, including overflow pages.

The **rel_tmax** and **rel_dsize** (data page size) values both affect reorganization. The new **rel_tmax** must exceed the actual number of tuples currently in the relation. The attribute **acc_tpag** contains the number of tuples per page. This number, times the number of pages in overflow, gives a minimum number of tuples to increase **rel_tmax**.

The first attempt at reorganization should adjust **rel_tmax** as recommended in the previous paragraph. This process should be repeated until no further improvement is made in the number of overflow pages or until the number of overflow pages reaches zero. If a point is reached where no further improvement is made and the number of overflow pages is greater than zero, altering the data page size, **rel_dsize** may help. If the relation still has overflow, try setting **rel_tmax** to the actual number of tuples. If this does not work, other attempts with increasing **rel_tmax** by the value of **acc_tpag** may be successful.

Other attributes which can be changed are the probe depth, **acc_probdepth** and the fold type, **acc_foldtyp**. For relations with access type DBACC_HASH, the probe depth represents the maximum number of element searches on a data page in the event of a hashing collision. For relations with access type DBACC_GK, the probe depth represents the "goal size" of each generated key bucket, where "goal size" is a number to strive to remain less than, but it is not a strict limit. Fold type specifies the folding algorithm to use when hashing. Fold type values are DBDEFAULT or DBGC31. These two algorithms drastically affect the ability of a relation to hash well. Which algorithm works best depends on the relation. Use the hashing simulator (HASHSIM) to analyze the effect of different probe depth and fold type values. Note that, for access type DBACC_GK, the fold type is always DBGC31.

3. DESTROY Operation Guidelines

The DESTROY operation allows the user to destroy a whole relation, an intermediate data page (for 3-level indexed relations), or a data page. If a whole relation is destroyed, the head table block ID in access dictionary is zeroed out. If an IDP is destroyed, ACCED prompts for the IDP number whose entry in the head table is zeroed out. If a DP is destroyed, ACCED prompts for the DP number whose entry in the head table (or IDP for 3-level indexed relations) is zeroed out.

When destroying a whole relation, ACCED permits the user to modify the access dictionary. This is similar to modifying the access dictionary during a reorganization. A series of prompts will ask to change access dictionary values or keep default values. When destroying a whole relation on a SM/SM-2000, ACCED

allows the user to authorize DESTROY to proceed on all SM/SM-2000s (not just the current SM/SM-2000).

WARNING: The DESTROY operation can have dangerous results. It is important to note the following:

- (1) Recent Change (RC) must be inhibited before destroying (part of) a relation to avoid possible ODD splits. An RC can be inhibited by typing input message **INH:RC**.
- (2) Following a destroy of a generated key (GK) relation, the craftsman should execute a successful generated key compaction and collection (GKCCR) before batch inserting GK tuples. The GKCCR is executed via the **EXC:GKCCR** input message. The GKCCR will detect several problems resulting from the destroy, so the craftsman should expect several REPT:GKCCR output messages and accompanying asserts.
- (3) Before destroying a GK ROOT relation, the craftsman should have previously batch reviewed the VIRTUAL relation in the Office Data Base Editor (ODBE). Following the DESTROY, the craftsman must then batch insert the VIRTUAL relation in ODBE to populate the ROOT relation.
- (4) The DESTROY operation is logged for the CMP so the mate CMP will be updated through continuous roll-forward. The DESTROY operation is not logged on processors other than the CMP.
- (5) An ODD backup is required immediately after a DESTROY operation to preserve the deletions on processors other than the CMP since the destroy is not logged for those processors.

4. HASHSIM Operation Guidelines

The HASHSIM operation runs a hashing simulation of DBACC_HASH and DBACC_GK relations to help the user determine optimal dictionary values for manual reorganization.

The simulation is based on the relation's folded key file, which can be provided in one of the following ways. The user specifies which way at the **Hash File Prompt**.

- (1) The user can provide the simulator with a previously generated file of folded keys.
- (2) The user can provide the simulator with the relation's ASCII file. (This may be obtained via ODBE batch review.) The simulator will generate a folded key file from the ASCII file.
- (3) The user cannot provide the simulator with a folded key file or an ASCII file. The simulator will generate an ASCII file first, and then generate a folded key file from the ASCII file.

The first option is the fastest because no action is required to generate the folded key. The second option is marginally slower because it must read the ASCII file and generate the folded keys. The third option is considerably slower because generating the ASCII file adds even more time. The length of time depends on the size of the relation.

The user provides the simulator with additional access dictionary information through a series of prompts. Simulation parameters provided by the user are probe depth (**acc_probdepth**), TMAX (**rel_tmax**), fold type (**acc_foldtyp**), and DSZE (**rel_dsze**) (for DBACC_HASH relations). The TMAX and DSZE may be provided by the user as a range of values, for example 256-1024 for DSZE. Specifying TMAX and DSZE as single values yields a single set of simulation results. Specifying a range for TMAX and/or DSZE yields up to three sets of simulation results using the best combinations of TMAX and DSZE.

Simulation results include the following:

- TMAX value used

- DSZE value used
- Head table size required
- Number of data pages required for each stage
- Tuples per page (**acc_tpag**) that was calculated
- Number of tuples that would end up in overflow
- Total kilobytes of memory allocated
- Load factor (percent of space allocated that is actually occupied, including overflow pages)
- Average search time that would exist
- Maximum search time that could result
- A score based on overflow, load factor, average search time, maximum search time, and memory usage.

The score is provided to help assess simulation results. Lower scores are better, but do not judge results on score alone. Watch for values for number of data pages, load factor, and search time that may degrade performance or use memory inefficiently. Also, values that result in overflow should never be used.

5. **ACCED Operations and Figures**

- (1) At the appropriate designated video display terminal, determine the ACCED operation to be performed, per Substeps (a) through (q) as follows:
 - (a) Review Information Operation — See Figure 16.7-1 .
 - (b) Review Access Dictionary (Current Version) Operation — See Figure 16.7-2 .
 - (c) Review Access Dictionary (Any Version) Operation — See Figure 16.7-3 .
 - (d) Review Address Operation — See Figure 16.7-4 .
 - (e) Review Block ID Operation — See Figure 16.7-5 .
 - (f) Review Data Page Operation — See Figure 16.7-6 .
 - (g) Review Head Table Operation — See Figure 16.7-7 .
 - (h) Review Intermediate Data Page Operation — See Figure 16.7-8 .
 - (i) Scan Operation — See Figure 16.7-9 .
 - (j) Reorg Operation — See Figure 16.7-10 .
 - (k) Destroy Whole Relation Operation — See Figure 16.7-11 .
 - (l) Destroy Data Page Operation — See Figure 16.7-12 .
 - (m) Destroy Intermediate Data Page Operation — See Figure 16.7-13 .
 - (n) Overwrite Operation — See Figure 16.7-14 .

- (o) Hashsim Operation with Folded Key Input File — See Figure 16.7-15 .
- (p) Hashsim Operation with ASCII Input File — See Figure 16.7-16 .
- (q) Hashsim Operation with Neither ASCII Nor Folded Key File — See Figure 16.7-17 .

(2) STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 1

Enter Primary Key

key item 1: atttn = 15

Tuple information for rel=TM_ATTT, pcr=193, memtype=DBPRAM

```

Head Table Address      h'009c1f00
Head Table Block ID      1247
DP Number                0
DP Address              h'009c3000
DP Block ID             1264
Tuple Address           h'009c3000
Tuple Number in DP      0
Physical Tuple Size      152
Logical Tuple Size       248

```

Figure 16.7-1 Review Information Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID

- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) rc_loceq

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 2

- 1: Current
- 2: ODD
- 3: Any (must provide index)

Which Dictionary? 1

Access dictionary for rel=RC_LOCEQ, pcr=193, version=current, index=11,
memtype=DBPRAM, acctype=DBACC_HASH

ACCDICT:

```
acc_rid    =      23
acc_head   =     821
acc_rcnt   =       0
acc_wflg   =       0
acc_state  = ACCCURRENT
acc_nidx   =       0
acc_bidx   =       0
rel_hsize  =     256
```

Hit <CR> to see access method specific dictionary

ACC_HASH:

```
acc_rid      =      23
acc_oflg     =       0
acc_foldtyp  = DBDEFAULT
acc_probdepth =       3
acc_tpag     =      25
rel_dsze     =     512
acc_npag     =       1      1      1      1      1
acc_totp     =       5
rel_tmax     =      17
```

There are 0 pages of overflow

Figure 16.7-2 Review Access Dictionary (Current Version) Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) rc_loceq

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 2

- 1: Current
- 2: ODD
- 3: Any (must provide index)

Which Dictionary? 3

Index to access method common dictionary? 44

Access dictionary for rel=TM_ATTT, pcr=193, version=ANY, index=44,
memtype=DBPRAM, acctype=DBACC_HASH

ACCDICT:

```
acc_rid   =      7
acc_head  =    1247
acc_rcnt  =      0
acc_wflg  =      0
acc_state = ACCCURRENT
acc_nidx  =      0
acc_bidx  =      0
rel_hsze  =    256
```

Hit <CR> to see access method specific dictionary

ACC_HASH:

```
acc_rid      =      78
acc_oflg     =      0
acc_foldtyp  = DBDEFAULT
acc_probdepth =      3
acc_tpag     =     13
rel_dsze     =    2048
acc_npag     =      2      1      1      1      1
acc_totp     =      6
rel_tmax     =     40
```

There are 0 pages of overflow

Figure 16.7-3 Review Access Dictionary (Any Version) Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 3

- 1: DISK - disk ODD
- 2: MEMORY - AM protected and unprotected ODD

Which AM memory type? 2

Beginning physical address (hexadecimal)? 9c1f00

Number of bytes to dump? 64

Data at physical address h'9c1f00, pcr=193, memtype=MEMORY

```
04f004e8 04f80000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

Figure 16.7-4 Review Address Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 4

- 1: DISK - disk ODD
- 2: MEMORY - AM protected and unprotected ODD

Which AM memory type? 2

Block ID to review? 1264

Beginning relative address (decimal)? 0

Number of bytes to dump? 12

Data for block ID 1264, pcr=193, memtype=DBPRAM
 Starting address = 0 (relative), h'9c3000 (absolute)
 000f0000 00000000 00000000

Figure 16.7-5 Review Block ID Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 5

Data page number? 0

Beginning relative address (decimal)? 0

Number of bytes to dump? 64

Data page contents for DP=0, rel=TM_ATTT, pcr=193

Starting address = 0 (relative), h'9c3000 (absolute)

```
000f0000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 0000b000 39850505 05010909
```

Figure 16.7-6 Review Data Page Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 6

Beginning relative address (decimal)? 0

Number of bytes to dump? 64

Head table contents for rel=TM_ATTT, pcr=193

Starting address = 0 (relative), h'9c4d00 (absolute)

```
1620      0 1604 1588 1608 1616 1624 1592
1612      0 1584 1596 1600      0      0      0
      0      0      0      0      0      0      0      0
      0      0      0      0      0      0      0      0
```

Figure 16.7-7 Review Head Table Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory

6: HASHSIM - run hashing simulator
 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) fc_trunk

1: Information (data page and tuple information)
 2: Access Dictionary
 3: Address
 4: Block ID
 5: Data Page
 6: Head Table
 7: Intermediate Data Page

Review What? 7

Intermediate data page number? 0

Beginning relative address (decimal)? 128

Number of bytes to dump? 128

Data page contents for IDP=0, rel=FC_TRUNK, pcr=2,
 Starting address = 128 (relative), h'21a885c (absolute)

0	0	0	0	0	0	0	0
0	0	0	0	9316	9317	9318	9319
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	9320	9321
9322	9323	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Figure 16.7-8 Review Intermediate Data Page Operation

Processor Number? 2

1: REVIEW - review data by relation or by BID
 2: SCAN - scan a relation for corrupted data
 3: REORG - manually reorganize a relation
 4: DESTROY - destroy (part of) a relation
 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
 6: HASHSIM - run hashing simulator
 7: Quit

Operation? 2

Relation Name? (<CR> leaves it unchanged) fc_trunk

Intermediate data page number? 0

Data page number? 0

SCAN will start from DP 0 of IDP 0

If this is not an allocated data page, then SCAN will start from the next available allocated data page.

SCAN completed, no corrupt data found

Figure 16.7-9 Scan Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 3

Relation Name? (<CR> leaves it unchanged) tm_attt

ACCDICT:

```
acc_rid      =      78
acc_head     =     1292
acc_rcnt     =       0
acc_wflg     =       0
acc_state    = ACCCURRENT
acc_nidx     =       0
acc_bidx     =       0
rel_hsize    =     256
```

Hit <CR> to see access method specific dictionary

ACC_HASH:

```
acc_rid      =      78
acc_oflg     =       0
acc_foldtyp  = DBDEFAULT
acc_probdepth =       5
acc_tpag     =      13
rel_dsze     =     2048
acc_npag     =       4      1      1      1      1
acc_totp     =       8
rel_tmax     =      80
```

There are 0 pages of overflow

Do you want to run a hashing simulation before REORG? (y or <cr>) n

Enter desired access dictionary values for REORG:

acc_probdepth = 5

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 3

acc_foldtyp = DBDEFAULT

1: DBDEFAULT

2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

rel_hsze = 256

Head table size (rel_hsze) (<CR> keeps default)?

rel_dsize = 2048

Data page size (rel_dsize) (<CR> keeps default)? 1024

rel_tmax = 80

Maximum number of tuples (rel_tmax) (<CR> keeps default)? 100

After REORG, the new access dictionary will be the following:

ACCDICT:

acc_rid = 78

acc_head = 1292

acc_rcnt = 0

acc_wflg = 0

acc_state = ACCCURRENT

acc_nidx = 0

acc_bidx = 0

rel_hsze = 256

Hit <CR> to see access method specific dictionary

ACC_HASH:

acc_rid = 78

acc_oflg = 0

acc_foldtyp = DBDEFAULT

acc_probdepth = 3

acc_tpag = 6

rel_dsize = 1024

acc_npag = 13 5 1 1 1

acc_totp = 21

rel_tmax = 100

There are 0 pages of overflow

Please confirm: are these the access dictionary values
you want? (y or <cr>) y

REORG in progress ... please wait

REORG COMPLETED:

Access dictionaries used for REORG on pcr=193, rel=TM_ATTT,


```
acctype=DBACC_HASH
```

```
ACCDICT:
```

```
acc_rid    =      78
acc_head   =     1293
acc_rcnt   =       0
acc_wflg   =       0
acc_state  = ACCCURRENT
acc_nidx   =       0
acc_bidx   =     1052
rel_hsze   =     256
```

Hit <CR> to see access method specific dictionary

```
ACC_HASH:
```

```
acc_rid      =      78
acc_oflg     =       0
acc_foldtyp  = DBDEFAULT
acc_probdepth =       3
acc_tpag     =       6
rel_dsze     =     1024
acc_npag     =      13      5      1      1      1
acc_totp     =      21
rel_tmax     =     100
```

There are 0 pages of overflow

Figure 16.7-10 Reorg Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) fc_trunk

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 1

DESTROY whole relation also modifies access dictionary.
Enter desired access dictionary values:

```
rel_hsze = 256
```

Head table size (rel_hsize) (<CR> keeps default)?

rel_dsize = 256

Data page size (rel_dsize) (<CR> keeps default)? 512

rel_tmax = 100

Maximum number of tuples (rel_tmax) (<CR> keeps default)?

After DESTROY, the new access dictionary will be the following:

ACCDICT:

```
acc_rid    =      35
acc_head   =     9788
acc_rcnt   =       0
acc_wflg   =       0
acc_state  = ACCCURRENT
acc_nidx   =       0
acc_bidx   =       0
rel_hsize  =     256
```

Hit <CR> to see access method specific dictionary

ACC_CIND:

```
acc_rid    =      35
rel_dsize  =     512
rel_tmax   =     100
rel_isize  =     256
inc_maxelt =    128   128   10
inc_eltsize =      2    2   24
sk_len     =     16    0    0    0    0    0
inc_keylen =      4
inc_cksplit =      0    0    0
sk_byteoff =      0    0    0    0    0    0
sk_bitoff  =      0    0    0    0    0    0
inc_kstore =      0
inc_itype  =      IND3
```

Please confirm: are these the access dictionary values you want?
(y or <cr>) y

Do you want to destroy across all SMs? (y or <cr>) y

DESTROY continuing on all SMs

*** The DESTROY operation is irreversible.

*** The entire relation will be removed from the ODD.

Do you wish to continue? (y or <cr>) y

Destroy being performed on relation FC_TRUNK, processor 2

Destroy SUCCEEDED on relation FC_TRUNK, processor 2

Destroy being performed on relation FC_TRUNK, processor 4

Destroy SUCCEEDED on relation FC_TRUNK, processor 4

Destroy being performed on relation FC_TRUNK, processor 5

Destroy SUCCEEDED on relation FC_TRUNK, processor 5

Whole relation destroyed

Figure 16.7-11 Destroy Whole Relation Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) fc_trunk

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 2

Intermediate data page number? 0

Data page number? 76

The BID for the page to destroy is 9316.

Is this the correct page? (y or <cr>) y

*** The DESTROY operation is irreversible.

*** The entire data page will be removed from the ODD.

Do you wish to continue? (y or <cr>) y

Destroy results for rel=FC_TRUNK, pcr=2
DP=76 (BID=9316) on IDP=0 destroyed

Figure 16.7-12 Destroy Data Page Operation

Processor Number? 194

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation

- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) acb_port

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 3

Intermediate data page number? 416

The BID for the page to destroy is 7872.

Is this the correct page? (y or <cr>) y

*** The DESTROY operation is irreversible.

*** The entire intermediate data page will be removed from the ODD.

Do you wish to continue? (y or <cr>) y

Destroy results for rel=ACB_PORT, pcr=194

IDP=416 (BID=7872) destroyed

Figure 16.7-13 Destroy Intermediate Data Page Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 5

Number of bytes to overwrite (1, 2, or 4)? 2

Beginning physical address (hexadecimal)? 21a885c

Old data value in hexadecimal? 0000

New data value in hexadecimal? ffff

Overwrite at address h'21a885c, pcr=2, memtype=MEMORY

Old data: h'0000

New data: h'ffff

Figure 16.7-14 Overwrite Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 1

Enter filename: tm_attt.fold

Enter parameters for hashing simulation ...

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsize = 1024

Enter <CR> to keep default dsize, or enter new
dsize or range of dsize's (example range: 256 - 512): 256 - 1024

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new
tmax or range of tmax's (example range: 10 - 100): 10 - 100

HASH STAGED SIMULATION: PROBE DEPTH=3 PSZE=152

FOLDTYPE=DBDEFAULT

1 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	7	2	1	1	1	TOTAL=12
PAGES ALLOCATED:	7	2	0	0	0	TOTAL=9
PERCENT OCCUPIED:	100.00	100.00	0.00	0.00	0.00	

TUPLES=27	PAGES=9	SEARCH=2.481
TMAX=22	TPAG=3	LOAD=84.375
OVFLW=0	MSEARCH=6	K-BYTES=4.750
HSZE=256	IHSZE=N/A	DSZE=512
SCORE=30.685		

2 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	8	2	1	1	1	TOTAL=13
PAGES ALLOCATED:	8	2	0	0	0	TOTAL=10

PERCENT OCCUPIED: 100.00 50.00 0.00 0.00 0.00

TUPLES=27	PAGES=10	SEARCH=1.740
TMAX=31	TPAG=3	LOAD=76.339
OVFLW=0	MSEARCH=6	K-BYTES=5.250
HSIZE=256	IHSIZE=N/A	DSIZE=512
SCORE=31.811		

3 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	11	4	1	1	1	TOTAL=18
PAGES ALLOCATED:	11	0	0	0	0	TOTAL=11
PERCENT OCCUPIED:	81.81	0.00	0.00	0.00	0.00	

TUPLES=27	PAGES=11	SEARCH=1.407
TMAX=43	TPAG=3	LOAD=69.701
OVFLW=0	MSEARCH=3	K-BYTES=5.750
HSIZE=256	IHSIZE=N/A	DSIZE=512
SCORE=32.619		

Figure 16.7-15 Hashsim Operation with Folded Key Input File

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 2

Enter filename: tm_attt

Enter parameters for hashing simulation ...

acc_foldtyp = DBDEFAULT

1: DBDEFAULT

2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsize = 1024

Enter <CR> to keep default dsize, or enter new dsize or range of dsize's (example range: 256 - 512): 512 - 2048

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new tmax or range of tmax's (example range: 10 - 100): 50 - 200

HASH STAGED SIMULATION: PROBE DEPTH=3 PSIZE=152
FOLDTYPE=DBDEFAULT

1 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	19	7	2	1	1	TOTAL=30
PAGES ALLOCATED:	12	0	0	0	0	TOTAL=12
PERCENT OCCUPIED:	47.36	0.00	0.00	0.00	0.00	

TUPLES=27	PAGES=12	SEARCH=1.370
TMAX=65	TPAG=3	LOAD=64.125
OVFLW=0	MSEARCH=3	K-BYTES=6.250
HSIZE=256	IHSIZE=N/A	DSIZE=512
SCORE=38.325		

2 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	7	5	1	1	1	TOTAL=15
PAGES ALLOCATED:	7	0	0	0	0	TOTAL=7
PERCENT OCCUPIED:	64.28	0.00	0.00	0.00	0.00	

TUPLES=27	PAGES=7	SEARCH=1.370
TMAX=50	TPAG=6	LOAD=55.280
OVFLW=0	MSEARCH=3	K-BYTES=7.250
HSIZE=256	IHSIZE=N/A	DSIZE=1024
SCORE=48.670		

3 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	2	1	1	1	1	TOTAL=6
PAGES ALLOCATED:	2	1	0	0	0	TOTAL=3
PERCENT OCCUPIED:	96.15	15.38	0.00	0.00	0.00	

TUPLES=27	PAGES=3	SEARCH=2.296
TMAX=50	TPAG=13	LOAD=64.125
OVFLW=0	MSEARCH=5	K-BYTES=6.250

HSZE=256 IHSZE=N/A DSZE=2048
 SCORE=50.085

Figure 16.7-16 Hashsim Operation with ASCII Input File

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 3

Enter UNIX system filename to save relation ASCII to: tm_attt

Enter parameters for hashing simulation ...

acc_foldtyp = DBDEFAULT

- 1: DBDEFAULT
- 2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsze = 1024

Enter <CR> to keep default dsze, or enter new
 dsze or range of dsze's (example range: 256 - 512): 2048

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new
 tmax or range of tmax's (example range: 10 - 100):

HASH STAGED SIMULATION: PROBE DEPTH=5 PSZE=152
 FOLDTYPE=DBDEFAULT

1 of 1

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	6	1	1	1	1	TOTAL=10
PAGES ALLOCATED:	6	0	0	0	0	TOTAL=6
PERCENT OCCUPIED:	34.61	0.00	0.00	0.00	0.00	

TUPLES=27	PAGES=6	SEARCH=1.222
TMAX=100	TPAG=13	LOAD=32.716
OVFLW=0	MSEARCH=2	K-BYTES=12.250
HSZE=256	IHSZE=N/A	DSZE=2048
SCORE=69.754		

Figure 16.7-17 Hashsim Operation with Neither ASCII nor Folded Key File

Procedure 16.8: CHANGE OR MODIFY A COMMON NETWORK INTERFACE DATA BASE STRUCTURE USING CNIDBOC

OVERVIEW

The Common Network Interface Data Base Consolidator (CNIDBOC) is an interactive *UNIX*® system process (menu-driven) which incorporates the Functional Listing, Recent Change (RC), and Disk verification and modification of individual fields of RC structures. It is used by Common Network Interface (CNI) applications for emergency purposes, such as field troubleshooting or if the application's RC interface to CNI becomes inoperable.

PROCEDURE

1. The CNIDBOC can be accessed from any Trunk and Line Work Station (TLWS) or Recent Change/Verify (RC/V) terminal by entering the following:

```
rcv:menu:cnidboc
```

NOTE: For 5E7 and later software releases, CNIDBOC can also be accessed from the **screen** program (MCC Page 194) by entering menu option ``c".

The following menu will be displayed on the screen for 5E8 and earlier software releases:

<<CNIDBOC (CNI)>>			
CCS Node Data:	(C)	Cluster/Member:	(M)
Critical Event Table:	(E)	Exception Table:	(X)
GT Translator Data:	(G)	History File Descriptor:	(F)
Network Identifier:	(N)	Logical-Physical:	(L)
Office Data:	(O)	Permanent Relation:	(R)
Subsystem Data:	(S)	Schedule Table:	(H)
Protocol Timer/Parameter Data:	(P)	User View Table:	(U)

The following menu will be displayed on the screen for 5E9(1) and later software releases:

<<CNIDBOC (CNI)>>			
CCS Node Data:	(C)	Domestic Routing Data:	(M)
Critical Event Table:	(E)	Exception Table:	(X)
GT Translator Data:	(G)	History File Descriptor:	(F)
		Logical-Physical:	(L)
Office Data:	(O)	Permanent Relation:	(R)
Subsystem Data:	(S)	Schedule Table:	(H)
Protocol Timer/Parameter Data:	(P)	User View Table:	(U)
	EXIT CNIDBOC:	(!)	
Enter the type of data table ('?'=help):			

2. Select and enter the letter associated with the desired data.
3. The CNIDBOC has printed the RC type and the name of the tables that may be modified (Figure 16.8-1). Select the table to be modified.
4. After selecting the table to be modified, the following will be displayed:

```
Enter Operation (R, RB, RD, RDB, RC, U, ?, !):
```

Enter the desired operation. Each operation is defined as follows:

- (a) The **R** and **RB** operations are for Review in core and Batch Review in core.

- If either one of these options are selected, then CNIDBOC will verify the table contents which are modified by the different RC types. The static field names in each structure and their contents will be printed for each RC type. For fields which have symbolic values, the actual value will be displayed in parentheses on the right-hand side of the symbolic name.

```

< ** Linknode Data ** >
rc.type = LNDATA, DISK_LND
Tables impacted:
  Clbitmap      - (bitmap for linknode allocation)      (E)
*Clrnaoffset and Clnodedata - (linknode data)            (C)
  cH7gtxtab     - (global title translator table)       (G)
  cH1xp_tab, cHpxl_tab, cHvl_tab, ln7slots - (log/phy)    (L)
  cMA6lk        - (CCS6 active link Meas buffers)       (W)
  cMA6lk        - (CCS6 passive link Meas buffers)      (X)
  cMA7lk        - (CCS7 active link Meas buffers)       (Y)
  cMA7lk        - (CCS7 passive link Meas buffers)      (Z)
  cNlsrel, cNls_cnt, cNls_rna - (ls related tables)      (R)
  cSadjstp      - (adjacent STPs tables)                 (D)
  cSbrdcst      - (broadcast list table)                 (B)
  cSpermrel     - (permanent relation table)             (M)

* These tables are directly recent changable.

```

Please enter input: C

Figure 16.8-1 Typical CNIDBOC Menu Response

- The user has the option of verifying the tables either by viewing a specific element on the terminal (selection **R**) or writing all the table elements to a file (selection **RB**). If the **RB** option is chosen, the user must specify the disk filename where the output should be stored. The path to the disk file will be defaulted to the */updtmp* directory (or to a user specified directory by entering the full directory path and filename).
- (b) The **RD** and **RDB** operations are for Disk Verification.
- The following disk files may be verified:
 - **c_office** (office data)
 - **cet** (critical event table)
 - **excp** (exception table)
 - **hfdt** (history file descriptor table)
 - **locssn** (local subsystem data)
 - **Inxxyy** (linknode data table - where **xx** is frame and **yy** is member)

- **lpx_tab** (logical to physical data)
 - **nids** (network identifier) (5E8 and earlier software releases)
 - **ptp** (protocol timer and parameter data) [5E9(1) and later software releases]
 - **permrel** (permanent relation data)
 - **pxl_tab** (physical to logical data)
 - **schd** (schedule table)
 - **ssdist** (subsystem data)
 - **uvdt** (user view descriptor table)
 - **vl_tab** (logical link identification for CCS7 links)
 - cluster (cluster data) (5E8 and earlier software releases)
 - member (member data) (5E8 and earlier software releases)
 - ccs7_pc (CCS7 point code routing table) [5E9(1) and later software releases]
 - rtg_patterns (routing pattern table) [5E9(1) and later software releases].
- The user has the option of verifying the disk files either by viewing one element at a time on the terminal (selection **RD**) or writing all the table elements to a file (selection **RDB**). The pathname for the saved file is also defaulted to the */updtmp* directory (or to a user specified directory by entering the full directory path and filename).

(c) The **RC** operation is for Recent Change data.

- The **RC** provides the terminal interface for changing and creating the following CNI data:
 - Domestic routing data
 - Global title translation table
 - Linknode data
 - Office data
 - Permanent relation data
 - Logical to physical table
 - Subsystem data
 - Cet, excp, hfdt, schd, uvdt tables.
- If the **RC** option is chosen, the contents of each different field in the **work list** will be printed and the user will be prompted to enter a new value. Pressing the **RETURN** key will retain the current field contents.

- For all **RC** types (except the last one which is RC measurement), if for some reason the user decides not to continue with the transaction that has been started, an **!** may be entered at which time the user can return to the RC menu.

(d) The **U** operation is for modification of an individual field.

Caution: The U operation is potentially service affecting. It should only be used with Lucent Technologies technical assistance either present or on line.

- The modification of an individual field allows the user to change an individual field without going through the error check software process CNIDBA. Since it is potentially service affecting, access may be gained only through the use of a password, which may be obtained through the assistance of the Regional Technical Assistance Center (RTAC). A message is sent to the Receive-Only Printer (ROP) and to a log file indicating entrance to and exit from this option. Logging is to the RPTERR0 or RPTERR1 file under the directory */log/log*.
- If the user entered this option and selected a field, the contents for that field will be printed and the user will be prompted to enter a new value. If the user decides not to update this field, either press the **RETURN** key or enter **!**, which returns to the prompt **Any other fields?**. If the field is to be updated, the new value is to be entered. Upon updating the field in the Protected Application Segment (PAS), the modified field along with its old and new values are also sent to the ROP and log file.
- The amount of information which must be entered will vary depending on the table and the operation selected.

(e) The **?** symbol means that the information to assist the user (help screen) will be displayed.

(f) The **!** symbol means that the current menu will be exited and the previous menu is displayed. If the user is in the main menu and enters **!**, CNIDBOC will terminate.

If the RC fails, an error message will appear at the ROP. If the user updates the PAS through the update mode, a message will be printed on the ROP and in a log file indicating the old and the new values.

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

Procedure 16.9: CORRUPTED GK TUPLE DATA CONTENT CORRECTIVE PROCEDURE

OVERVIEW

In the event that a generated key (GK) relation has corrupted GK tuple data, the generated key collection and compression routine (GKCCR) will be capable of finding the error and reporting it using the **REPT:GKCCR** output message. This error must be corrected, if the GKCCR was not able to, although the corrupted GK tuple was marked so that access to any virtual relation using that GK tuple is prevented. The procedure for correcting the corruption is described as follows.

WARNING: Only Qualified ODD Maintenance Personnel experienced in virtual relation recovery procedures should attempt recovery of errors reported by the GKCCR. Inappropriate recovery of GK tuple corruption can lead to Call Processing and System Failures and may inadvertently modify a large number of virtual relation tuples with incorrect attribute values. Seek the appropriate level of technical assistance before executing any of the following recovery procedures.

The GKCCR will fix all problems found with a GK relation except those errors that may have corrupted tuple data content. If tuple content has been corrupted, the data content must be corrected by updating the **VIRTUAL** tuples that use any of the corrupted GK relation tuples.

WARNING: At no time should any attempt be made to correct corruption by modifying GK relation tuples directly.

Recovering from errors identified by **REPT:GKCCR** output messages as requiring manual action entails the following high-level procedure steps:

- Determine what Virtual Relations use the reported corrupt GK relation(s).
- Identify the set of tuples in those Virtual Relations that actually reference the missing or corrupted GK relation tuple(s).
- Correct the virtual relation tuples that use the problem GK tuples with appropriate attribute data values by using the office data base editor (ODBE).
- Manually execute the GKCCR using the **EXC:GKCCR** command.
- Repeat the procedure until the manual GKCCR command no longer reports any manual action requiring error report messages (**REPT:GKCCR**).

The following text gives a detailed expansion of each of these high-level steps to fixing corrupted or inconsistent virtual relation tuples.

PROCEDURE

1. Determine the Impacted Virtual Relations

Because multiple virtual relations may reference the same GK relation, the first step to solving corrupted virtual relation problems is to determine what virtual relations need to be fixed. The ODBE has been enhanced in the 5E7 and later software releases to provide this information.

- (a) Execute the ODBE tool (see Procedure 16.5 for instructions on how to invoke the tool).
- (b) Using the relation name provided by the **REPT GKCCR** output message that requires manual action, execute the **GKVRT** operation as described in Procedure 16.5 of this document.

The **GKVIRT** operation will provide a list of all Virtual relations using the **REPT:GKCCR** output message specified GK relation.

2. Identify Virtual Tuples Using Corrupted or Missing GK Tuples

Since multiple virtual tuples from the same or many virtual relations may reference the same GK tuple, the next step is to find all of the virtual tuples that reference problem GK tuples.

- (a) Execute the ODBE tool (see Procedure 16.5 for instructions on how to invoke the tool).
- (b) For each virtual relation determined in the previous step using GKVIRT, use the batch review (BR) operation and place the output into separate *UNIX*[®] files for each virtual relation.
- (c) If any virtual tuples are referencing GK tuples that are missing or corrupted, one of the following error messages will appear:

Error: ODD inconsistency encountered on tuple number #### tuple contains incorrect values

Error: ODD corruption encountered on tuple number #### tuple contains incorrect values

Where: #### stands for the tuple number (or line) in the BR output.

For example, if #### was a 4, this would indicate that the 4th tuple output by the BR has either inconsistencies or corruption.

The ODD inconsistency example found references to a GK tuple that does not exist in the virtual relation by the #### virtual tuple in the output file.

The second example indicates that a virtual tuple references a GK that has been marked by the GKCCR as containing corrupt information.

- (d) Only the key fields of the virtual tuple should be considered valid, the remaining attribute values may be invalid. Since the entire virtual tuple could not be completely assembled, the BR function used whatever data content existed in the tuple buffer.
- (e) Using office data records, determine the proper data content of the virtual tuples. If the relation has a distribution type that stores the same tuple in multiple processors, use ODBE to R the tuple in one of these other processors in order to find out all the attribute contents that should exist for the tuple on the processor being fixed.
- (f) Do all of the previous steps for each virtual relation determined from the step that used the GKVIRT ODBE operation.

3. Correct the Problem Virtual Tuples

Now that the set of problem virtual tuples has been determined, the ODBE tool will be used again to correct each tuple.

- (a) Execute the ODBE tool (see Procedure 16.5 for instructions on how to invoke the tool).
- (b) For each problem virtual tuple found, specify the virtual relation name and then use the Update (U) operation.
- (c) Specify the virtual relation keys for each tuple found in the previous steps.

- (d) Provide the appropriate attribute contents that should exist for this virtual tuple. Be sure to update every attribute in the tuple.
- (e) After completing the update operation, the virtual tuple will now be able to be reviewed (R option) without an error.

4. Verify All of the Corruption Has Been Fixed

After all of the corrupt virtual tuples have been updated, manually execute the GKCCR process on the processors that reported the need for manual action using the **EXC:GKCCR** input command.

Continue the entire process until no manual action **REPT:GKCCR** output messages occur following **EXC:GKCCR** input messages.

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

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

AGC

Automatic Gain Control

AIM

Application Integrity Monitor

AIU

Access Interface Unit

AIS

Alarm Indication Signal

ALCB

Access Link Control Block

ALE

Automatic Line Evaluation

ALIT

Automatic Line Insulation Test

AM

Administrative Module

AMA

Automatic Message Accounting

AMADL

Automatic Message Accounting Data Link

AMARC

Automatic Message Accounting Recording Center

AMATPS

Automatic Message Teleprocessing System

APPLVL

Application Initialization Level Counter

APR

Automatic Power Recovery

APT

Automatic Progression Testing

ARR

Automatic Ring Recovery

ASC

Alarm Status Circuit

ASM

Administrative Services Module

ASU

Alarm Status Unit

ATP

All Tests Passed

ATTS

Automatic Trunk Test Scheduler

AUTISSING

Automatic Time-Slot Switching

BI

Batch Insert

BIST

Built In Self Test

BLKSZ

Block Size

BOLO

Back Out Last Official

BR

Batch Review

BRI

Basic Rate Interface

BST

Basic Services Terminal

BUD

Backup Update Data Base

BWM

Broadcast Warning Message

CA

Call Appearance

CAICOM

Call Appearance ICOM

CAMA

Centralized Automatic Message Accounting

CAROT

Centralized Automatic Reporting on Trunks

CATP

Conditional All Tests Passed

CC

Common Control

CCB

Channel Control Block

CCP

Common Control Processor

CCS

Common Channel Signaling

C/D

Control and Display

CD

Common Data

CDA

Configuration Status Audit

CDX

Compact Digital Exchange

CFGSTAT

Configuration Status

CGA

Carrier Group Alarm

CH

Channel

CHAN

Channel

CI

Control Interface

CIB

Control Interface Bus

CKT

Circuit

CLI

Change Level Indicator

CLNK

Communication Link

CLRT

Communication Link Receiver/Transmitter

CLR

Clear

CM

Communication Module

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

CN

Change Notice

CNI

Common Network Interface

CNIDBOC

Common Network Interface Data Base Consolidator

CNR

Critical Node Recovery

CNTL

Control

CO

Central Office

COMDAC

Common Data and Control

CONCEN

Concentrator

CONT

Controller

CORC

Customer-Originated Recent Change

CP

Central Processor

CPE

Customer Premises Equipment

CRC

Cyclic Redundancy Check

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

Customer Technical Support

CTTU

Centralized Trunk Test Unit

CU

Channel Unit

CU

Control Unit

CUD

Current Update Data Base

DA

Direct Audit

DACS

Digital Access Cross Connect System

DAM

Dual Access Memory

DAP

Display Administration Process

DAS/C

Directory Assistance System/Computer

DAT

Digital Audio Tape

DBM

Data Base Manager

DCI

Dual Serial Channel Computer Interconnect

DCLU

Digital Carrier Line Unit

DCMS

Design Change Management System

DCS

Digital Cross Connect System

DCTU

Directly Connected Test Unit

DCTUCOM

DCTU Common Control

DEN

Digital Equipment Number

DFC

Disk File Controller

DF

Digital Facility

DFI

Digital Facility Interface

DFI2

Digital Facility Interface - Model 2

DFIH

Digital Facility Interface Host

DFIR

Digital Facility Interface Remote

DG

Data Group

DFSA

Disk File System Access

DGN

Diagnostic

DGR

Degraded Grid State

DGRF

Degraded Forced

DI

Data Interface

DIOP

Disk Independent Operation

DLC

Digital Loop Carrier

DLI

Dual Link Interface

DLM

Disk Limp Mode

DLN

Direct Link Node

DLTU

Digital Line Trunk Unit

DLTUH

DLTU Host

DLTUR

DLTU Remote

DMA

Direct Memory Access

DMERT

Duplex Multiple Environment Real Time Operating System

DMI

Dual Message Interface

DNU-S

Digital Networking Unit - SONET

DNUSCC

Digital Networking Unit - SONET Common Control

DNUSCD

Digital Networking Unit - SONET Common Data

DMQ

Diagnostic Message Queue

DN

Directory Number

DOC

Dynamic Overload Control

DS0

Digital Signal Level 0

DSC

Digital Service Circuit

DSIG

Direct Signaling

DSL

Digital Subscriber Line

DSLG

Digital Subscriber Lines Group

DSN

Defense Services Network

DSP

Digital Signal Processor

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

DUP

Disk Unit Package

EA

Emergency Action

EADAS

Engineering and Administration Data Acquisition System

EAI

Emergency Action Interface

EAN

Equipment Access Network

ECD

Equipment Configuration Data

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

FA

Fuse Alarm

FAB

Fabric Exercise

FABEX

Fabric Exerciser

FAC

Facility

FELP

Far-End Loop

FEX

Feature Execution

FI

Facility Interface

FIDB

Facility Interface Data Bus

FMGR

File Manager

FPC

Foundation Peripheral Controller

FPI

Full Process Initialization

FSDB

File System Debugger

FTS

Field Test Set

GDSU

Global Digital Service Unit

GDSF

Global Digital Services Function

GDSUCOM

GDSU Common Control

GDX

Gated Diode Crosspoint

GDXACC

Gated Diode Crosspoint Access

GDXC

Gated Diode Crosspoint Compensator

GDXCON

Gated Diode Crosspoint Control

GPDF

Global Power Distribution Frame

GRASP

Generic Access Package

HDFI

Host Digital Facility Interface

HLSC

High-Level Service Circuit

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

Hz

Hertz (Unit of Frequency)

I/O

Input/Output

ICB

Interface Control Bus

ICOM

Intercom

IDCU

Integrated Digital Carrier Unit

IDCU COM

IDCU Common Board

IDS

Interprocessor Data Synchronization

IDUMP

Interactive Dump Utility

IFAC

IDCU Facility

ILEN

IDCU Line Equipment Number

IM

Interface Module

IMS

Interprocess Message Switch

INIT

Initialization

IOP

Input/Output Processor

ISDN

Integrated Services Digital Network

ISLU

Integrated Services Line Unit

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

LASS

Local Area Signaling Service

LC

Line Card

LCC

Line Class Code

LCCB

Logical Channel Control Block

LCEN

Line Card Equipment Number

LCN

Line Card Number

LDFT

Load Disk From Tape

LDSF3

Local Digital Service Function 3

LDSU

Local Digital Service Unit

LDSUCOM

LDSU Common Control

LED

Light Emitting Diode

LEN

Line Equipment Number

LG

Line Group

LGC

Line Group Controller

LI

Line Interface

LIM

Local Interface Module

LLA

Low-Level Access

LN

Link Node

LNGRP

Line Group

LSI

Loop Side Interface

LSM

Local Switching Module

LTP

Line Trunk Peripheral

LTP

Logical Test Port

LU

Line Unit

LUCHAN

Line Unit Channel Circuit

MA

Metallic Access

MAB

Metallic Access Bus

MCC

Master Control Center

MCRT

Maintenance Cathode Ray Terminal

MCTSI

Module Controller and Time Slot Interchanger

MCTU

Module Controller and Time Slot Interchange Unit

MCTU2

Module Controller and Time Slot Interchange Unit - Model 2

MDF

Main Distributing Frame

MDII

Machine Detected Interoffice Irregularity

MEM

Member

MF

Multifrequency

MFFU

Module Fuse Filter Unit

MHD

Moving Head Disk

MI

Message Interface

MIB

Message Interface Bus

MI/NC

Message Interface/Network Clock

MINMODE

Minimum Configuration Mode

MLHG

Multiline Hunt Group

MLT2

Mechanized Loop Testing System Generation 2

MML

Man-Machine Language

MMP

Module Message Processor

MOOS

Manual Out of Service

MP

Module Processor

MSCU

Message Switch Control Unit

MSGCLS

Message Class

MSGS

Message Switch

MSPU

Message Switch Peripheral Unit

MSU

Message Signal Unit

MSU

Metallic Service Unit

MSUCOM

MSU Common Controller

MT

Magnetic Tape

MTIB

Metallic Test Interface Bus

MTIBAC

Metallic Test Interface Bus Access

MTTY

Maintenance Teletypewriter

MTTYC

Maintenance Teletypewriter Controller

NC

Network Clock

NCT

Network Control and Timing

NEN

DNU-S Networking Equipment Number

NLI

Network Link Interface

NM

Network Management

NMI

Nonmaskable Interrupt

NO2SES

No. 2 Service Evaluation System

NT1

Network Termination 1

OAP

OSPS Administrative Processor

ODBE

Office Data Base Editor

ODD

Office Dependent Data

OFFN

Off Normal

ONTC

Office Network Timing Complex

ONTCCOM

Office Network Timing Complex Common

OOD

Out-of-Date

OOS

Out-of-Service

OOSF

Out-of-Service Family

OOSP

Out-of-Service Power

OOST

Out-of-Service Transient

OPD

Outpulse Digits

OPT

Operator Position Terminal

ORM

Optically Remote Module

OS

Operating System

OSC

Operator Service Center

OSDS

Operating System for Distributed Switching

OSPS

Operator Services Position System

OSPSDA

OSPS Directory Assistance

OSPSRC

OSPS Recent Change

OSPSTA

OSPS Toll and Assistance

OTC

Operating Telephone Company

OTF

Operational Test Failure

PAS

Protected Application Segment

PC

Peripheral Controller

PCFD

Power Control Fuse Distribution

PCM

Pulse Code Modulation

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

PER

Protocol Error Records

PFR

Peripheral Fault Recovery

PF

Packet Fanout

PGTC

Pair Gain Test Controller

PH

Protocol Handler

PHDB

Protocol Handler Data Bus

PICB

Peripheral Interface Control Bus

PID

Process Identification

PIDB

Peripheral Interface Data Bus

PKT

Packet

PLS

Protection Line Switch

PMU

Precision Measurement Units

PN

Private Network

POP

Point of Presence

PPC

Pump Peripheral Controller

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

RAS

Remote Alarm Section

RC

Recent Change

RCL

Remote Communication Link

RCLK

Remote Clock

RC/V

Recent Change/Verify

RDFI

Remote Digital Facility Interface

REX

Routine Exercise

RFAC

Remote Facility

RISLU

Remote Integrated Services Line Unit

RLI

Remote Link Interface

RMAS

Remote Memory Administration System

RN

Ring-Node

RNC

Ring-Node Cabinet

ROH

Receiver Off Hook

ROP

Receive-Only Printer

ROS

Request Out of Service

ROTL

Remote Office Test Line

RPCN

Ring Peripheral Control Node

RSM

Remote Switching Module

RT

Remote Terminal

RTAC

Regional Technical Assistance Center

RTFAC

Remote Terminal Facility

RTR

Real-Time Reliable

RTRS

Real-Time Rating System

RTTU

Remote Trunk Test Unit

RT&M

Remote T&M

SAM

Stand-alone Monitor

SAS

Service Announcement System

SBUS

SCSI Bus

SCANS

Software Change Administration and Notification System

SCB

Stack Control Block

SCC

Switching Control Center

SCCS

Switching Control Center System

SCSI

Small Computer System Interface

SDFI

Subscriber Loop Carrier Digital Facility Interface

SDL

Synchronous Data Link

SDLC

Synchronous Data Link Controller

SFI

STSX-1 Facility Interface

SG

Service Group

SI

Selective Initialization

SID

Site Identification Number

SIM

System Integrity Monitor

SLEN

Subscriber Loop Carrier Line Equipment Number

SM

Switching Module

SM-2000

Switching Module-2000

SMD

Storage Module Device

SODD

Static ODD

SONET

Synchronous Optical Network

SPD

Secondary Power Distribution

SPID

Service Profile Identifier

SRC

Software Recovery Control

SSA

Summary Status Area

STE

SONET Termination Equipment

STEFAC

SONET Terminating Equipment Facility

STF

Some Tests Failed

STS

Synchronous Transport Signal

STLWS

Supplementary Trunk and Line Work Station

SXS

Step-by-Step

SYSSTAT

System Status

T&M

Talk and Monitor

TAP

Trouble Analysis Procedure

TAP

Trouble

TAU

Test Access Unit

TCAP

Transaction Capability

TCTS

TRCU Control Time Slot

TEI

Terminal Endpoint Identifier

TEN

Trunk Equipment Number

TID

Terminal Identifier

TKGMN

Trunk Group and Member Number

TLWS

Trunk and Line Work Station

TM

Terminal Maintenance

TMC

Time Slot Management Channel

TMP

Transmission Measurement Plan

TMS

Time Multiplexed Switch

TMSLNK

TMS Link

TMUX

Transmission Multiplexer

TOPAS

Testing, Operations, Provisioning, and Administration System

TP

Test Position

TRCU3

Transmission Rate Converter Unit 3

TRCUPATH

TRCU Path from host TRCU to remote TRCU

TRCURMK

TRCU Remark

TRM

Transmissionless Remote Module

TRM

Two-Mile Optically Remoted Module

TSDBKEY

Time Slot Data Block Key

TS

Time Slot

TSI

Time Slot Interchanger

TSI

Time Slot Interchanger Unit

TSIG

Trunk Signaling

TSIU

Time Slot Interchanger Unit

TSSR

Time Slot Select Register

TTF

Transmission Test Facility

TTYC

Teletypewriter Controller

TU

Trunk Unit

UC

Utility Circuit

UCB

Unit Control Block

UCONF

Universal Conference Circuit

UCI

Unified Control Interface

UID

Utility Identification

UNEQ

Unequipped

UNIQ

Uniqueness Field - OSDS

UNVP

Unavailable Power

UPEDCUD

Current Update Data Base and History File Editor

USPID

User Service Profile Identifier

UTD

Universal Tone Decoder

UTG

Universal Tone Generator

VBS

Voiceband Signaling

VCDX

Very Compact Digital Exchange

VDT

Video Display Terminal

VERTPOS

Vertical Position

VT

Virtual Tributary

VTG

Virtual Tributary Group

VTM

Virtual Tributary Member

WB

Wideband

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