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June 1992

DEFINITY ® Communications System Generic 2

Maintenance Repair Strategies

Notice

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You are responsible for the security of your system. AT&T does not warrant that this product is immune from or will prevent unauthorized use of common-carrier telecommunication services or facilities accessed through or connected to it. AT&T will not be responsible for any charges that result from such unauthorized use. Product administration to prevent unauthorized use is your responsibility and your system administrator should read all documents provided with this product to fully understand the features available that may reduce your risk of incurring charges.

Federal Communications Commission Statement

Class A Statement. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his/her own expense will be required to take whatever measures may be required to correcl the interference.

Network Registration Number. This equipment is registered with the FCC under FCC network registration number AS593M- 11 185-MFE.

Answer-Supervision Signaling. Allowing this equipment to be operated in such a manner as to not provide proper answer-supervision signaling is in violation of Part 68 rules. This equipment returns answer-supervision signals to the public switched network when:

- Answered by the called station
- Answered by the attendant
- Routed to a recorded announcement that can be administered by the CPE user.

This equipment returns answer-supervision on all DID calls forwarded back to the public switched telephone network. Permissible exceptions are:

- A call is unanswered
- A busy tone is received
- A reorder tone is received

Trademarks

DEFINITY is a registered trademark of AT&T. In this document, DEFINITY Communications System Generic 2 is often abbreviated to DEFINITY Generic 2 or Generic 2.

Ordering Information

The ordering number for this document is 555-105-118. To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800 -255-1242). For more information about AT&T documents, refer to the *Business Communications Systems Publications Catalog* (555-000-010).

Comments

To comment on this document, return the comment card at the front of the document.

Acknowledgment

This document was prepared by the AT&T Technical Publications Department, Denver CO.

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ABOUT THIS DOCUMENT

PURPOSE

This document provides fault-isolation and repair strategies for use in maintaining the DEFINITY® Communications System Generic 2 (G2.1 and G2.2) switch and switch-related components.

INTENDED AUDIENCES

This document is intended primarily for service technicians trained to maintain digital switching equipment. This document is designed to aid you whether you are at a *remote* location or at the switch site.

The document may also be used by others having a working knowledge of digital switching equipment and who are under the control and direction of a remote maintenance facility.

PREREQUISITE SKILLS AND KNOWLEDGE

To use this document, you must have a working knowledge of DEFINITY® Manager II. The switch-maintenance process is keyed to the use of Manager II connected to the switch.

You must also understand how the individual maintenance procedures function. Use the document describing the maintenance procedures, described later in this chapter, when you need more information about a particular maintenance procedure.

HOW THIS DOCUMENT IS ORGANIZED

This document is arranged as a troubleshooting guide for trained service technicians. Most of the document is written in a step-by-step, problem-solving format, as described below.

- Chapter 1, *Introduction*, introduces the general rules that you should follow when maintaining the switch. It also contains information on fault-diagnosis fault-isolation, and repair strategies. In addition, it describes the switch-recovery process and what you should do before leaving the site once a repair has been made.
- Chapter 2, *DEFINITY® Generic 2 Overview*, provides a brief overview of DEFINITY® Communications System Generic 2 and a description of the switch modules, cabinets, and carriers.

- Chapter 3, *User Interfaces,* describes the functions of the switch alarm panel and the use of microdiagnostic testing capabilities and maintenance commands used with DEFINITY® Manager II. Circuit pack LEDs, tools and test equipment, and preventive maintenance are also described.
- Chapter 4, *Escalation,* describes the escalation process that you should follow after you have been directed in this document to escalate a failure. You should escalate a failure after you have exhausted all possible isolation and repair steps associated with the failure, as described in this document.
- Chapters 5-8, concerning diagnostic procedures, provide step-by-step fault-isolation and repair strategies for “no response from the switch” trouble conditions, alarmed failures, user-reported troubles, and nonalarmed failures.
- Chapters 9-11, concerning component replacements, contain detailed instructions for replacing switch components, SMDR components, and auxiliary cabinet components that you have been asked to replace while you are performing the diagnostic procedures. Also provided are circuit-pack option settings and circuit-pack adjustments required as a result of circuit-pack replacement.
- Appendix A, *Specific Fault Codes,* contains a numeric list, by unit type, of all specific fault codes and their definitions.
- This document also includes a glossary and an index.

A knowledge of common procedures (such as opening cabinet doors and removing rear covers) is assumed. Such procedures are neither illustrated nor covered in the component-replacement procedures.

HOW TO USE THIS DOCUMENT

Normally service technicians should use this document to try to isolate and repair problems remotely first. If a problem needs local attention, they should then dispatch a service technician to the switch site. The local service technician should then use this document to isolate the customer’s problems and make necessary repairs.

To make the best use of this document, whether you are a remote and or local service technician, you should follow these steps:

1. The first time you use this document, page-the table of contents to become familiar with the document’s format, depth, and organization.
2. If you are unfamiliar with DEFINITY® Communications System Generic 2, read the introductory material in Chapters 1 and 2.
3. Refer to Chapters 5-8 for troubleshooting information and to Chapters 9-11 for step-by-step component replacement.
4. Use the table of contents or the index when you need to find information on a specific topic quickly.

CONVENTIONS USED IN THIS DOCUMENT

Bold type in this document is used to denote panel stampings. Italics are used to denote references to chapters and sections, and to emphasize words (such as *must).*

RELATED RESOURCES

Use the following resources when you need specialized information to perform the isolation and repair strategies in this document.

- *DEFINITY® Communications System Generic 2 Maintenance Procedures* (555-104-117) is a companion to the document at hand. It describes switch maintenance procedures and how to use them.
- *DEFINITY® Communications System Generic 2 Administration Procedures* (555-104-506) describes switch administration procedures and how to use them and is referred to frequently in this document..
- *DEFINITY® Communications System Generic 2 Administration of Features and Hardware* (555-104-507) describes how to administer your switch, attendant console, voice terminals and data modules, trunks, DCIU, and features.
- *DEFINITY® Manager II MS-DOS Version Operation* (555-104-505) describes how to use Manager II to perform maintenance and administration procedures.

HOW TO MAKE COMMENTS ABOUT THIS DOCUMENT

Reader comment cards are in the back of this document. While we have tried to make this document fit your needs, we are interested in your suggestions for improving it and urge to you fill a comment card out.

If the reader comment cards have been removed from this document, please send your comments to

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1. INTRODUCTION

This document is not intended to enable you to solve all levels of failures. Rather, it enables you to handle failures that can be solved using the DEFINITY® Manager II, common test equipment, and component replacements. When you reach the limit of the fault-isolation analysis and the failure is still not cleared, you are directed to a source of further fault-isolation information or you are directed to escalate the failure.

If you haven't worked on a DEFINITY® Communications System Generic 2 for awhile, or if this is one of your first sessions, you may need to review a few basic concepts and procedures. This chapter includes:

- General Rules
- Fault diagnosis strategy
- Fault islolation and repair techniques
- Recovery
- Precautions
- Leaving the site
- Preventive maintenance.

GENERAL RULES

When visiting a customer site, always:

- Consider customer troubles throughout the session
- Follow the document
- Notify the customer *before* shutting down a system that is providing service
- Block service if needed to prevent users from using the system during repair procedures
- Follow the precautions and listed steps before changing any circuit pack, internal cable, or other piece of hardware
- Verify that normal service has been resored after doing a repair procedure.
- Follow your local escalation procedures (see Chapter 4, *Escalation)* when a trouble cannot be corrected within a reasonable amount of time.

FAULT DIAGNOSIS STRATEGY

Before you attempt to isolate and repair a fault, be sure that you know your equipment. See Chapter 2, *DEFINITY Generic 2 Overview,* for a description of the different modules, cabinets, and carriers that constitute the DEFINITY Communications System Generic 2. Understand the differences between the traditional and universal modules, cabinets, and carriers.

The display on the DEFINITY Manager II helps you determine whether an equipment location is part of a traditional module or universal module. For example, the carrier location is numbered for a traditional cabinet and alphabetized for a universal cabinet.

Switch troubles fall into two categories: those that cause alarms and those that do not. For troubles that cause alarms, the approach is simple: use Procedure 600, Test 1 and solve the alarms in the order they appear. For troubles that do not raise alarms, you need to analyze and deduce the probable cause of the trouble and correct it.

While the procedures described in this document are not as simple as alarm resolution, the individual steps are generally easy to perform. If you cannot solve a particular trouble using the guidelines in this document, escalate the trouble using your local procedures.

CAUTION While you are encouraged to use your initiative while diagnosing and repairing a system failure, deviating from the procedures in this document could result in costly hardware damage and customer service interruptions.

If you have been dispatched to the site after a failure has already been diagnosed, you should ensure that no . other failures (potentially more service affecting) exist that may be in a higher functional area — an equipment area of the system that is more important to the function of the switch — than the failure you were dispatched to fix. You can do this by using the interfaces; that is, the alarm panel, the Manager II, and circuit pack LEDs. These interfaces are described in Chapter 3, *User Interfaces.*

The questions that you should ask yourself are

- Is the switch providing service?
- Are there active alarms?
- Are there customer troubles?

Figure 1-1, *Troubleshooting Flowchart,* provides an indication of what corrective action you should take (and in what order) based upon the answers to the above three questions.

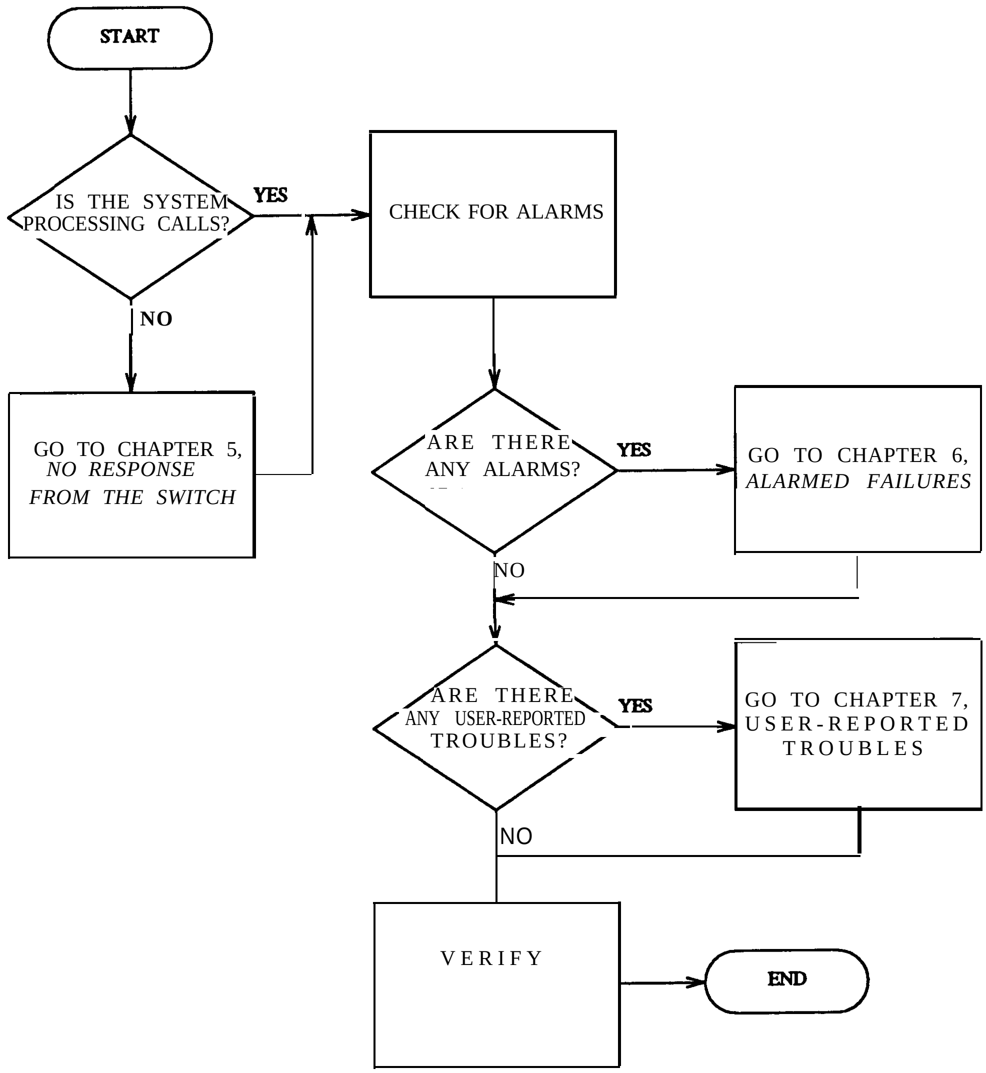


Figure 1-1. Troubleshooting Flowchart

FAULT ISOLATION AND REPAIR TECHNIQUES

There are three ways that a failure within the switch maybe indicated. You may investigate the indications locally or they maybe investigated by a remote maintenance facility. The failure indications are:

- NO response from the switch
- Alarmed failures
- User-reported troubles.

Fault isolation and repair techniques are based on the type of indication received and are covered in Chapter 5, *No Response From the Switch,* Chapter 6, *Alarmed Failures,* and Chapter *7, User-Reported Troubles.*

Items to Consider When Performing Fault Isolation and Repair

Fault isolation and repair can be affected by a number of items. To be effective at isolating and repairing faults, be sure that you consider the following:

- Supporting documentation for the system
  - The user order document. his document is required to identify the system assignments necessary to perform fault isolation and repair procedures.
- Scope of this document
  - Be aware that the fault isolation and repair techniques described in this document address failures within the DEFINITY Communications System Generic 2 and interfaces to peripherals. Peripherals such as the applications processor (AP), Manager II, remote maintenance facility, and so on are not covered in this document. You can isolate failures only between the DEFINITY Communications System Generic 2 hardware and the external facility.
- Timeliness of repairs
  - Fix failures in a timely manner to minimize the simultaneous occurrence of failures that could lead to confusing test results.
- Replacement hardware and test equipment
  - Replace, do *not* reseat, circuit packs.
  - Verify option settings (as appropriate) on original and replacement circuit packs prior to replacement of the circuit pack.
  - Verify that all replacement items are the correct type and the test equipment is fictional.

- **Repair techniques**
  - Check the AC circuit breakers on all cabinet power supplies and power distribution units before isolating the fault.
  - When replacement of equipment does not clear the trouble. reinstall the original equipment and use return-to-stock stickers.
  - Do not toggle the DC/DC converter handle when replacing circuit packs in the tire-multiplexed switch (TMS) or the module-control carriers.
  - Use the port tester to verify wiring.

Fault Isolation and Repair Techniques Priority

When more than one category of failure is either indicated or reported, you must clear the *No Response From the Switch* failure first, followed by *Alarmed Failures,* and then *User-Reported Troubles.*

Circuit Pack Replacement

Circuit packs that are identified as defective via remote or local testing *must* be replaced, *not* reseated. Refer to Chapter 9, *Switch Component Replacement,* for steps to replace circuit packs.

Recent studies have determined that restating a circuit pack is not the appropriate solution. In several cases, numerous field visits were made by technicians to reseat the same circuit pack that had been previously identified as defective. This action only delayed the eventual replacement of the circuit pack and prolonged the customer’s trouble.

In the best interests of AT&T and our customers, when a system technician requests a circuit pack replacement for the DEFINITY Communications System Generic 2, do *not* reseat it. When remote technicians isolate a defective circuit pack or when local trouble testing indicates a specific circuit pack is defective, do not reseat the circuit pack - replace it. If a replacement circuit pack is not immediately available and reseating seems to temporarily cure the trouble, do not close that trouble ticket. Order the appropriate circuit pack and replace it at your earliest convenience. After replacement, test the new unit to ensure that the problem is fixed. If the new unit fails, and other repair steps are not indicated, escalate the problem.

RECOVERY

DEFINITY Communications System Generic 2 has built-in recovery software to restore the switch integrity and availability after power failures and hardware failures.

When some of the longer recovery processes are being executed, you maybe tempted to take such actions as operating the **GO/HALT** switch, forcing a reload by depressing the **ENABLE** switch, and so on. However, if you do so, the recovery process maybe prolonged. In addition, the presence of test equipment (for example, TN514 scamper) connected to the system can interfere with the recovery process.

The estimated time for recovery software to rebuild is approximately 15 seconds per module, or a maximum of 20 minutes for a large switch.

You should wait the appropriate amount of time when the switch is not providing service before taking additional (or *premature)* manual recovery actions in the following areas:

- Short power failures
- Long power failures
- Use of the **GO/HALT** switch or the **RESET** switch
- Hardware failures.

Short Power Failures

When short power failures (less than 10 minutes) are experienced m systems without optional holdover, the common control continues to operate but the modules and TMS processors stop operating after power is removed for more than 100 milliseconds.

In duplicated 501CC switches, the common controls attempt a soft switch to recover from short power failures.

The recovery soft switch takes about a minute in switches with 16 megawords of memory. The modules initialize when power to modules are restored You should observe the module processors (TN380 in traditional modules, TN580 in universal modules) for a heartbeat, indicating initialization. Initialization of the modules takes less than 20 seconds for the switch.

Long Power Failures

For long power failures (longer than the 312A holdover capacity — approximately 10 to 30 minutes), the switch recovers by loading from disk or tape and initializing hardware.

The time required for the tape load depends on the configuration of the switch and initialization takes approximately another minute or so. You should wait approximately five minutes before taking any additional action.

You can monitor the tape load on site by directly connecting the Manager II to a PPG port, observing the LEDs on the TN563 circuit pack in the common-control carrier, and looking at the broadcast messages on the Manager II. The following occurs:

- The green LED in position 4 and the yellow LED in position 9 of the TN563 circuit pack are lighted to indicate the beginning of the tape load
- Next, the green LED in position 4 of TN563 starts flashing (fast, then slower) to indicate that the tape interface is being initialized.

- Then, data is read from tape and the Manager II is updated with broadcast messages from the TN563 circuit pack. The broadcast messages indicate the progress of the tape load.
- When the tape load is completed and successful, the **PASS** indicator on the alarm panel flashes at a one-second on, one-second off rate. There maybe a small delay before the heartbeat appears.

Initiaization of the modules takes less than 20 seconds for the switch. You should observe the module processors (TN380 in traditional modules, TN580 in universal modules) for a slow heartbeat, indicating initialization completion.

GO/HALT Switch and RESET Switch

When you halt the system using the **GO/HALT** switch, recovery takes approximately 20 seconds from when you return the switch to the **GO** position.

Similarly, when the system is removed from service due to suicide or emergency transfer recovery takes approximately 20 seconds from when you depress **RESET** if no serious hardware faults are experienced.

If serious hardware faults are experienced, recovery may take the rebuilding or reloading actions described above.

Before taking additional manual recovery action, you should try to determine what the switch is doing by:

- Observing the Manager II indications
- Observing LEDS on the alarm panel, module-control carriers (for example, TN380 or TN580 and TN401 or TN588), and critical port circuits (for example, touch-tone receivers)
- Waiting the appropriate time for the automatic recovery actions to take place.

Hardware Failures

For some hardware failures in the common control, software attempts to operate in the presence of the failure. The software that provides this function escalates from one level to the next level through a hierarchy of initializations that effectively turns off the cache memory, the data communications interface unit (DCIU), the tape, and the error-correction feature on the main memory. The software may take 50 minutes to go from level to level through its recovery attempts, but will typically take much less time. You should wait at least 10 minutes to give the software a chance to attempt its recovery before taking any manual recovery actions. If you see a very fast heartbeat (flutter) on the PASS lamp at the alarm panel, you *must* wait an additional 10 minutes.

PRECAUTIONS

When performing maintenance repairs on DEFINITY Communications System Generic 2 equipment, you must observe certain precautions.

You *must* observe cautions, warnings, and danger statements that appear in this document to prevent loss of service, possible equipment damage, and possible personnel injury.

In addition, you *must* observe the following precautions regarding electromagnetic interference and static electricity.

- *Electromagnetic Interference:* This equipment generates, uses, and can radiate radio-frequency energy. Electromagnetic fields radiating from the switch may cause noise to be introduced into the user's equipment. If the equipment is not installed and used in accordance with the instruction document, interference to radio communication maybe caused.

  WARNING

  To maintain the electromagnetic interference (EMI) integrity of the DEFINITY Communications System Generic 2, you must ensure (after performing any translation or maintenance activities) that all cabinet panels, covers, and the like are firmly secured in place before leaving the user's site.

- *Static Electricity* To prevent or reduce electrostatic discharge (ESD), you *must always* attach electromagnetic compatibility (EMC) wrist grounding straps before working on switch components or handling circuit packs. There is no method of testing for ESD damage; components so damaged may simply fail after a brief period of normal operation.

  WARNING

  Electrostatic discharge can damage or destroy circuit packs containing integrated circuits (ICs).

The EMC wrist grounding strap and cable assembly (cc900698226) is in the bottom of the module-control cabinet in a polyurethane bag (cc900492372) next to the AC distribution unit.

To avoid damaging ESD-sensitive components follow these basic ESD safety rules:

- Handle ESD-sensitive circuit boards only after you have attached a wrist strap to the bare skin of your body. Attach the other end of the writs strap to a ground that terminates at the system ground, such as a frame ground
- Handle a circuit board by the faceplate, latch, or top and bottom edges only. *Do not* touch components, leads, or connector pins.
- Keep circuit boards away from plastics and other synthetic materials such as polyester clothing.
- *Do not* transfer ESD-sensitive circuit boards to another person unless that person is grounded.

LEAVING THE SITE

When you resolve a failure, return the switch to service and verify good service. Before leaving the site, do the following:

1. Restore service.
2. Verify good service.
3. Check trouble tickets.
4. Check the alarm log.
5. Release busied-out circuits.
6. Perform preventive maintenance.

Restoring Service

If you blocked service (busied out, locked on-line, and so on), use the appropriate procedure to free the blocked ports for use.

Verifying Good Service

After solving any DEFINITY Communications System Generic 2 trouble, make sure that full service is restored as follows:

1. If you blocked service, restore full service.
2. Use a telephone to call a switch number to check for good response and verify that full service is available.
3. Double-check your trouble tickets to make sure that user troubles are solved and related features are working correctly.
4. Check the circuit packs and front panel lights for red (alarm) LEDs and verify that the fans are running.
5. Check the alarm log for new failures.

Checking Trouble Tickets

Verify that the original failure or customer trouble is solved and that related features are working correctly.

Checking Alarm Log

Before you leave the customer's site, examine the alarm log to determine if potential troubles exist. You can do this by executing Procedure 600, Test 2 to determine if any alarms or recorded errors exist for any circuit or unit type. Record the data displayed for each unit type and circuit for future use.

When you determine the entry for a particular unit type and circuit to be severe (such that it could affect customer service), enter the maintenance procedure for that unit type and circuit and perform corrective action as necessary to ensure that customer service is not affected.

When the switch is duplicated, examine both the on-line and off-line sides of the duplicated switch.

Releasing Busied-Out Circuits

When the BUSY OUT indication on the Manager II is on, typing *rb* (release busy) may release busied-out circuits, trunk groups, or carriers if the capability is provided by the maintenance procedure entered.

If the capability is not provided by the maintenance procedure or the BUSY OUT indication on the Manager II stays on because some other type of circuit is busied out, use Procedures 631 and 635 as necessary to release busy out circuits, trunk groups, or carriers. Enter Procedure 631 and Procedure 635 (as necessary) to determine the type and number of circuits, trunk groups, or carriers busied out. If circuits, trunk groups, or carriers are maintenance busied, you must determine the reason for their status and take corrective action (if required) before you released them from busy.

CAUTION

Know what you are doing. Some circuits, trunk groups, or carriers may have to be left maintenance busy because releasing them would cause interruption of customer service. If you cannot determine the reason for their maintenance-busy status, leave them maintenance busy. Get assistance from other levels of expertise before releasing any maintenance-busied circuits that you are not sure should be released from busy.

If the BUSY OUT indication on the Manager II remains on after all terminals, trunk groups, or carriers are released from busy, examine Procedure 635, Test 2 to determine the nonnetwork port users of the busy-out indicator. Nonnetwork port users are designated with an encode of 90 or higher in Field 2 of Procedure 635, Test 2. Enter the procedure referenced in Field 13 of Procedure 635, Test 2 to determine the busy out status of the appropriate nonnetwork port user.

Releasing integrated services digital network (ISDN) ports (primary rate (PRI) circuit pack ANN35 or PRI circuit packs TN555/TN767) requires that both switches (local and far end) agree on releasing the ISDN ports from busy out. If the far end does not agree, the ISDN port will stay in T_Limbo (trunk is in a limbo state). If the far end has the ISDN port in a maintenance-busy state, the ISDN port returns to a busy-out state at the far end even though you type *rb* (release busy) at the local switch.

Typing *rb* (release busy) does *not* make the ISDN ports available for use. Use procedure 635 or Procedure 648 or both to check the circuit status of the ISDN ports and ensure that the ISDN ports are released from busy. The circuit status of the ISDN ports is independent of the busy-out status or the busy-out indication on the Manager II.

PREVENTIVE MAINTENANCE

You should perform preventive maintenance according to schedule to keep the DEFINITY Communications System Generic 2 operating at peak efficiency. Regular checks can prevent more serious troubles later on.

Keep a log for each site so you know when a routine check or replacement is due.

You should routinely check DEFINITY Communications System Generic 2 equipment as part of your on-site service call prcocedure.

The following preventive maintenance procedures must be performed for Generic 2 systems:

- Check with the switch customer to determine if any type of intermittent troubles exist. Perform corrective action as appropriate.
- Inspect air filters and DTS filters once per year. Clean or replace them.

NOTE

Refer to Chapter 9, *Switch Component Replacement,* for steps on cleaning the DTS tape head and capstan.

- Clean tape heads and capstans once per year.
- Every two years replace the distributed OLS power battery for the 397 type power unit in the module control cabinet.
- Every two years replace the battery for the J87462A power unit.
- Every two years replace the battery for the 3965-2 OLS power charger.
- Every five years replace the battery for the TN492 remote interface.

The following preventive maintenance procedures must be performed for power systems:

- Retorque terminal connections on the power board and maintenance-free battery once per year.
- Check the float voltage on the maintenance-free battery and readjust it once per year.

- Check the electrolyte level and specific gravity of wet cells every three months.
- Float and equalize the voltage of wet cells every three months.
- Retorque terminal connections on wet cells every three months.
- Conduct a W-second operational test once per year on the power system.

The tables on the following two pages can be used as a log to record preventive maintenance activities. The first table also contains the com codes for the required equipment and tools.

AT&T PREVENTIVE MAINTENANCE LOG
SYSTEM 85/DEFINITY® GENERIC 2

AIR FILTERS & DTS FILTERS
Inspect annually
Clean or replace.

G2 Universal Cabinet
403-326-820

XE Cabinet
405-302-159

Traditional Cabinet
403-977-234

Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By

TAPE HEAD & CAPSTAN
Clean quarterly
(DTS / HCMR).

TexwipeTX813 Wet Swab
900-640-897

TexwipeTX712 Dry Swab
901-185-686

Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By

OLS POWER
UNIVERSAL MODULE CABINET
Distributed OLS Power
Battery for 397 Type Power Unit
Replace every 2 year.
403-302-912 (3 Required)

Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By

PRE OLS POWER
Battery for J87462A Power Unit
Replace every 2 years.
403-736-291

Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By

OLS POWER
Battery for 3965-2 Charger
Replace every 2 years.
403-736-291

Battery for TN492 Remote Interface
Replace every 5 years.
844-665-836

Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By

REFERENCE SYSTEM 85/DEFINITY GENERIC II MAINTENANCE MANUAL

NOTE: THIS FORM IS TO BE POSTED WITH THE EQUIPMENT

DATE SYSTEM INSTALLED ________

ISS 6/90

AT&T PREVENTIVE MAINTENANCE LOG
POWER SYSTEMS

	Sched. Date	Compl. Date	Compl. By	Sched. Date	Compl. Date	Compl. By
POWER BOARD Retorque teminal connections annually.						
MTCE FREE BATTERY Retorque terminal connections annually.						
MTCE FREE BATTERY Check float voltage & readjust annually.						
WET CELLS quarterly 1. Check electrolyte level 2. Check specific gravity 3. Float/equalize voltage 4. Retorque terminal connections						
OPERATIONAL TEST Conduct 30 second test annually.						

CAUTION: THE FOLLOWING SAFETY EQUIPMENT MUST BE AVAILABLE AND USED:
MTCE-FREE BATTERIES— EYEWASH KIT ONLY
WET CELLS — EYEWASH KIT, RUBBER GLOVES, RUBBER APRON, GOGGLES

REFERENCE: POWER MAINTENANCE MANUALS

NOTE: THIS FORM IS TO BE POSTED WITH THE EQUIPMENT'

ISS 6/90

DATE SYSTEM INSTALLED ______

2. DEFINITY GENERIC 2 OVERVIEW

This chapter provides a brief overview of the DEFINITY™ Communications System Generic 2 architecture and a description of the switch modules, cabinets, and carriers. For a more detailed description of the DEFINITY Generic 2, refer to the *DEFINITY Communications System Generic 2 System Description* (555-104-201) and the *DEFINITY Communications System Generic 2 New Capabilities* (555-104-401) documents.

SYSTEM ARCHITECTURE

The most significant change in DEFINITY Generic 2 architecture is the introduction of the universal module. This single-cabinet replacement for System 85 R2V4-type call-processing modules uses a modified module-control complex to run a DEFINITY Communications System Generic l-based port network. Fundamental differences in architecture between DEFINITY™ Communications System Generic 1 and DEFINITY Generic 2 necessitated the design of an intelligent interface circuit (the UN154 universal bus interface) to drive the DEFINITY Generic l-based port network. Moreover, firmware for the module processor had to be substantially revised.

A High-Level Look at DEFINITY Generic 2 Architecture

The following is a simplified description of DEFINITY Generic 2 operation and is true for both traditional modules and universal modules. DEFINITY Generic 2 uses a digital switch to route voice or data calls from one point to another. Figure 2-1, *Multimodule Switch, shows* a block diagram of the switch. Here is how it works:

- Thee common control supervises the operation of the call-processing modules and the TMS (time-multiplexed switch).
- Each call-processing module supervises the ports under its control by reporting all changes in port status to the common control. (All lines and trunks use port circuits to interface with the switch.)
- The common control sets up intramodule calls by telling the module to connect the ports at each end of the call.
- The common control sets up an intermodule call by telling the two modules to connect the ports at each end of the call to the TMS. The common control then instructs the TMS to complete the connection.
- When DEFINITY Generic 2 is configured as a single-module switch, intermodule calls never occur. Therefore, the TMS is not provided.

Common Control

The common control provides the highest level of control in the digital switching complex. It contains the 501CC processor, the “main” memory, an optional cache memory, the diagnostic processor, the DCIU (data communications interface unit), and a variety of other interface circuits.

The 501CC processor performs high-level call processing by executing programs stored in main memory. It monitors and controls port-to-port connections, provides status indications to users, and performs the operations necessary to implement system features.

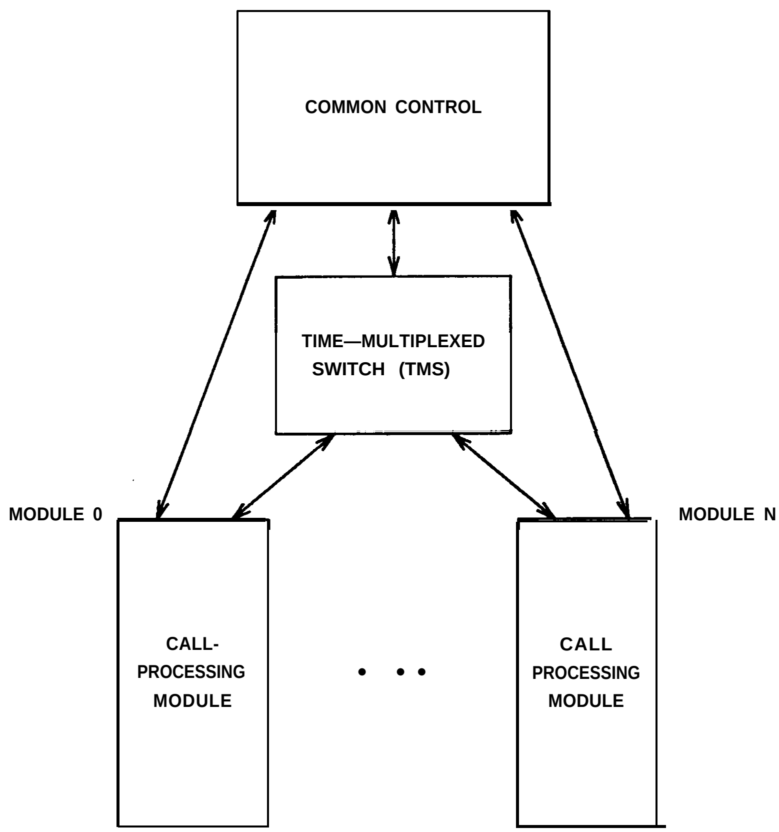


Figure 2-1. Multimodule Switch

Call-Processing Modules

A DEFINITY Generic 2 can have from one to 31 call-processing modules. Each module consists of a module control and a port network. The module control has three main functions:

- Connect the module's ports to each other, or to the TMS, when told to do so by the common control
- Supervise the module's ports by reporting line and trunk status changes to the common control
- Relay commands from the common control to the ports.

Time-Multiplexed Switch

The TMS is a digital switching unit that completes voice and data connections between modules in a multimodule DEFINITY Generic 2. Here is a closer look at how an intermodule connection is set up:

- The common control instructs the modules involved to setup two-way connections to their light-guide interface circuits.
- Each light-guide interface circuit sends a PCM (pulse coded modulation) voice or data sample to the TMS over an outgoing fiber-optic link. The light-guide interface circuit can time-multiplex up to 256 samples for transmission over the fiber-optic link.
- The TMS receives the samples in two of its module interface circuits.
- The common control instructs the TMS to make two one-way channels between these module interface circuits (first module interface circuit-to-second module interface circuit and second module interface circuit-to-first module interface circuit).
- The samples are passed through the TMS switch fabric over these channels and then on to the modules involved in the connection.
- The light-guide interface circuits in each module take the samples from the incoming fiber-optic links and move them to their intermodule data stores.
- The modules complete the connection by switching the samples from their intermodule data stems to the ports.

A Brief Description of Traditional Module Architecture

Traditional module architecture is depicted in Figure 2-2, *Traditional Module Block Diagram*.

The TN401 module control channel (not shown in Figure 2-2) is the interface between the 4-MHz serial I/O link from the common control and the module processor bus.

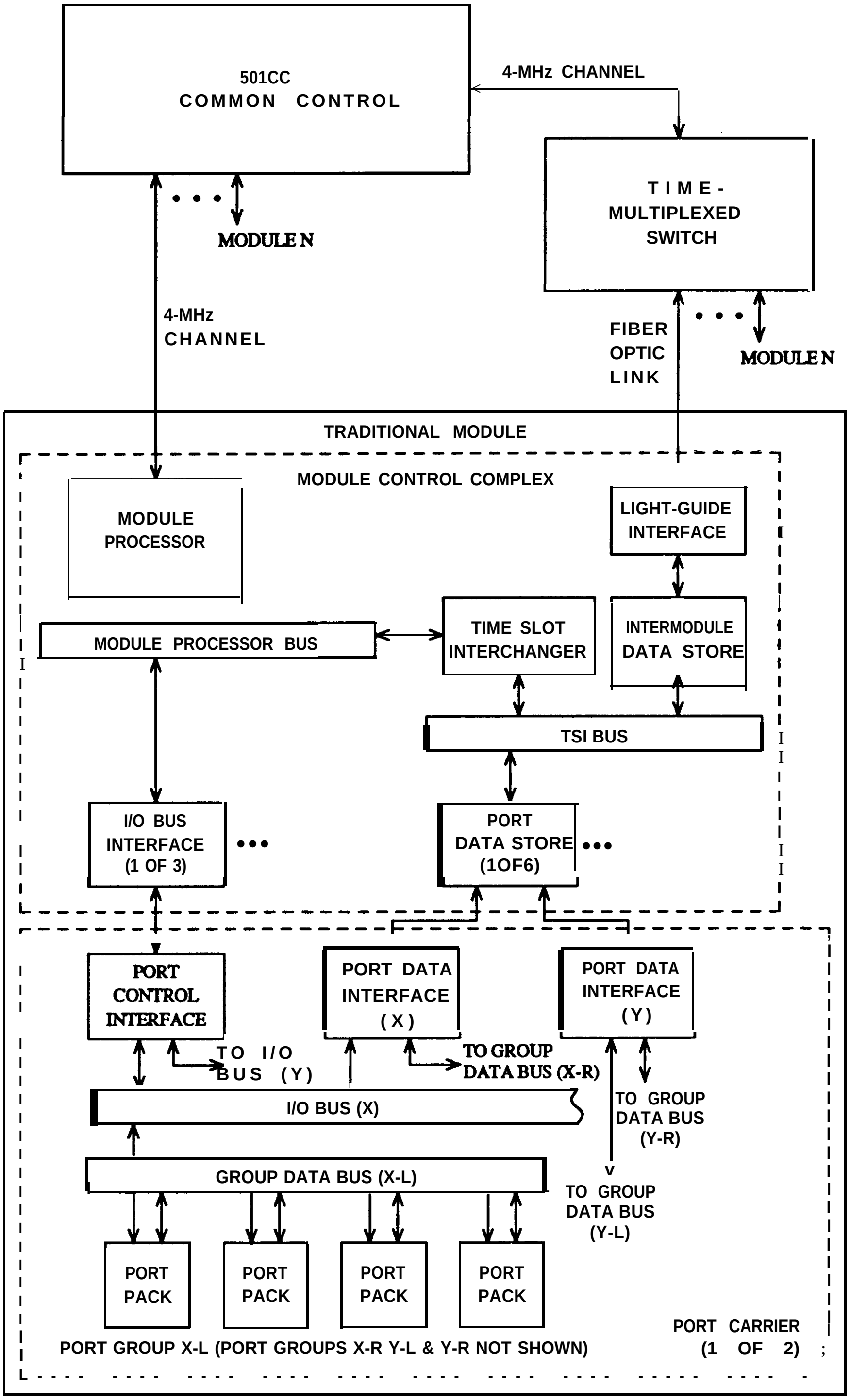


Figure 2-2. Traditional Module Block Diagram

The TN380D module processor performs the following tasks:

- Controls the TSI (time slot interchanger)
- Controls port circuits
- Scans ports for off-hook conditions and button depressions
- Collects dialed digits
- Sends rotary digits.
- Gathers traffic data
- Assists with maintenance.

The module I/O bus interface circuits (TN400Bs) allow the module processor to send control signals to, and receive status information from, the port carriers. Each TN400B serves three port carriers.

Two circuits make up the TSI: the TSI P-store (TN445) and the TSI ALU (arithmetic logic unit) (TN446). The TSI performs digital switching for the module. As with the two-port intramodule connection, the TSI can create a three-way conference connection, performing any necessary loss calculations with its ALU. The TSI also sets up part of the connection used for intermodule calls by connecting ports to the fiber-optic link that terminates at the TMS.

Port data stores (TN440Bs) hold PCM voice and data samples to be switched by the TSI. Port data stores also store PCM voice and data samples received from the TSI. A port data store buffers PCM voice and data samples received from the TSI bus. These received samples are sent over a PCM cable to a port data interface circuit in a port carrier. The port data interface circuit sends the samples to the desired port circuits. In the other direction, PCM voice and data samples are sent from the port circuits to a port data interface circuit in the port carrier. These samples are than sent over a PCM cable to a port data store circuit in the module control complex. The port data store buffers these samples and finally puts them onto the TSI bus. Each TN440B serves two port carriers.

The intermodule data store (TN441) is similar to a port data store. But, instead of storing transmit and receive samples for ports, the TN441 stores transmit and receive samples for the fiber-optic link to the TMS.

The light-guide interface (TN481) multiplexes PCM voice and data samples for transmission to the TMS. The TN481 also demultiplexes samples received from the TMS and sends them to the intermodule data store.

A Brief Description of Universal Module Architecture

Universal module architecture is a combination of DEFINITY Communications System Generic 2 and DEFINITY Communications System Generic 1 architectures. This design uses a modified DEFINITY Generic 2 module-control complex to operate a DEFINITY Generic 1 port network (see Figure 2-3, *Universal Module Block Diagram).*

Module-Control Complex

The introduction of DEFINITY Generic 1 port technology into DEFINITY Generic 2 required substantial changes to the module-control complex, the most important of which was the addition of the universal bus interface circuit. This circuit allows the module-control complex to operate a DEFINITY Generic l-based port network. It also eliminates the need for port data stores and I/O bus interface circuits.

Several changes and additions have been made to the module processor's firmware. As a result, on-board memory sizes (EPROM and RAM) have been increased. The module processor memory size increase required minor modifications to the duplication channel. The module-control channel was also modified to pass intracabinet control and alarm signals to and from the universal module over the 4-MHz channel.

Universal Bus Interface Circuit

The UN154 universal bus interface circuit performs several functions:

- Allows the module-control processor to Communicate with the DEFINITY Generic l-based port network. To the port network, the universal bus interface circuit looks like a DEFINITY Generic 1 network-control circuit.
- Sends dialed digits from ports to the module processor.
- Passes port status changes to the module processor.
- Transmits call set-up instructions to the port network.
- Passes PCM voice and digital data samples between the port network and TSI bus for intermodule calls. Although the module processor no longer uses the TSI for intramodule calls, the TSI is used for intermodule calls. To the TSI, the universal bus interface circuit looks like a pair of port data stores.
- Provides clock signals to the port network
- Provides an interface to the LAN bus for the UMP to terminate ISDN call control protocol.

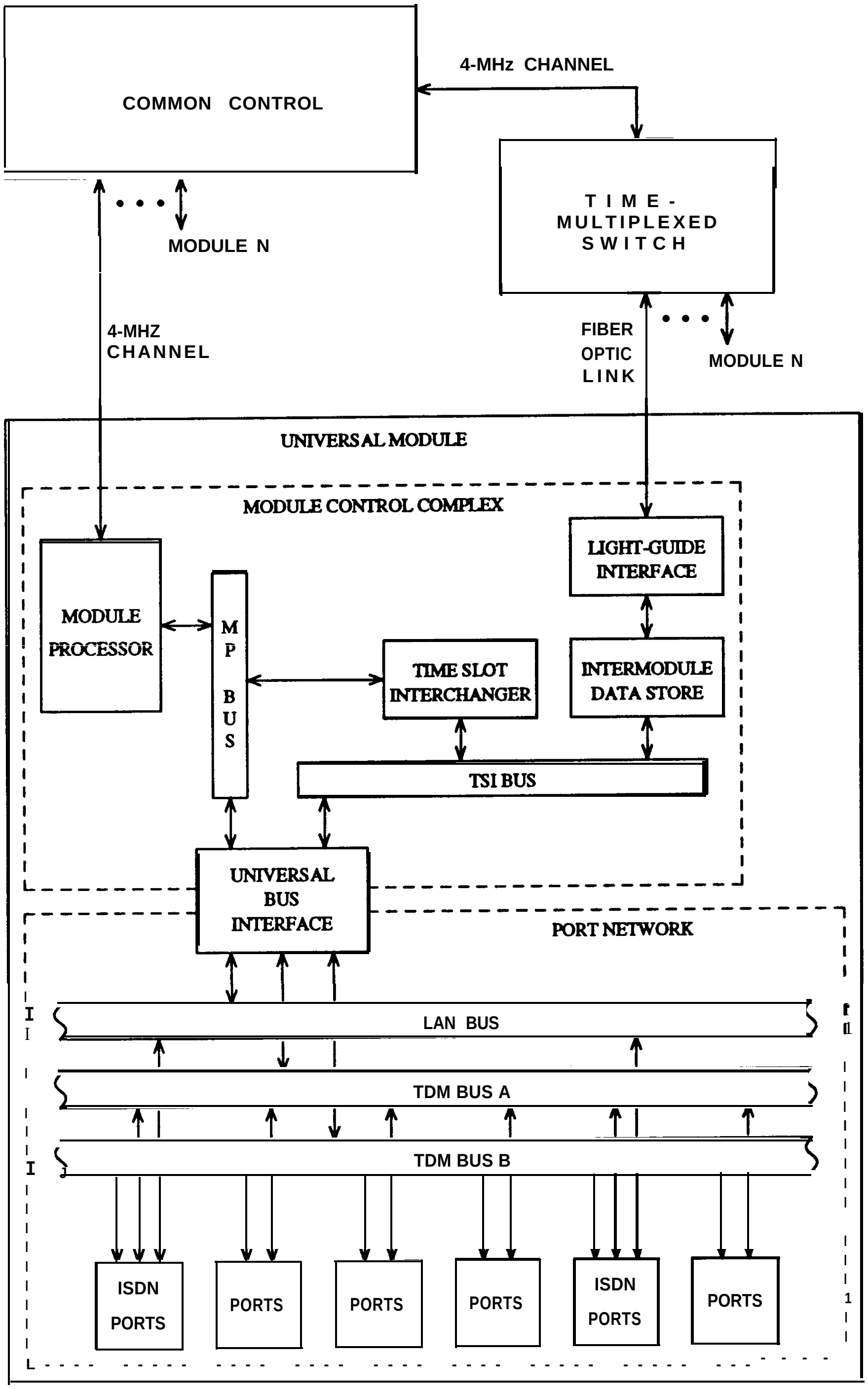


Figure 2-3. Universal Module Block Diagram

Module Processor

Three major changes or additions to firmware have been made:

- New firmware communicates with the universal bus interface circuit. This firmware replaces code that was used to control the I/O bus circuits and the port data stores.
- Several information elements have been altered in thc 501CC message queues (FIFOs).
- New firmware establishes and maintains level 2D-channel signaling links for BRI (basic rate interface) and PRI (primary rate interface) connections. The module processor handles up to 1500 point-to-point logical links and allows up to 127 outstanding frames to be buffered.

Duplication Channel

The address decoding device in the duplication channel has been altered to handle the RAM size increase in the module processor. The duplication-channel circuit pack (TN541) is not downward compatible with all previous System 85 R2 versions.

Module-Control Channel

The module-control channel has been modified to pass seven intracabinet environmental alarm leads and three intracabinet power control leads. The alarm leads are:

- Power unit shutdown
- Airflow restriction
- Over temperature
- High battery charge rate
- Battery reserve unit fault
- Battery depleted
- Battery reserve on line.

The three control leads are related to cabinet powering and do not exist in the traditional DEFINITY Generic 2 module cabinet. The control leads are:

- Port carrier power shutdown
- Cabinet power shutdown
- Battery overcharge LED control.

Port Network

Two parallel TDM buses form the backbone of the port network (see Figure 2-3, *Universal Module Block Diagram).* All PCM voice Samples, data samples, and control messages travel over the TDM buses. The LAN bus is an exception to this rule. The LAN bus is used to carry ISDN packets for ISDN port D channels. This is quite different from the approach used in a traditional module port network. There, PCM voice samples and data samples travel over group data buses while control messages travel over separate I/O buses (see Figure 2-2, *Traditional Module Block Diagram).*

When the universal module is compared with the traditional module, another difference becomes apparent. The universal module uses fewer common interface circuits; that is, there are no I/O bus interface, port control interface, or port data int.date circuit packs. There area couple of reasons for this:

- Samples and Control messages can travel over a single bus instead of separate buses. (Functionally, the two TDM buses can be viewed as a single bus carrying 512 time slots.)
- Universal module port circuit packs are microprocessor controlled and are more intelligent than their traditional-module counterparts. This eliminates the need for address decoding and signal routing circuitry to be provided by I/O bus interface circuit packs and port control interface circuit packs.

TDM Buses

A DEFINITY Generic 2 must be able to handle 8000 eight-bit samples a second from any of the ports it serves. To accomplish this, the port network in the universal module uses two TDM buses. Each TDM bus is designed to carry 256 time slots (channels) for a combined capacity of512 time slots. Since each TDM bus is an eight-bit parallel bus, one sample can be transmitted (in parallel) over each TDM bus during every clock cycle. The 2.048-MHZ clock rate used on each bus is divided into 8000 frames per second with each frame containing 256 samples.

The TDM buses are printed paths on the carrier backplanes. All port and module-control carriers are daisy-chained together with cables and bus extender circuits so that the two buses run continuously through the cabinet. Resistive bus terminator circuits are used on each end of the TDM buses.

Several TDM bus time slots are reserved for tone distribution and for the control channel. Eight time slots continuously carry the eight single-frequency components of the dual-tone multifrequency (DTMF) signaling tones. Other tones such as dial tone, ringback tone, busy tone, and intercept tone are provided in other dedicated time slots.

Control Channel

The first five time slots on each TDM bus are used as a control channel between the universal module interface circuit and the port circuits. The control channel can be active on only one TDM bus. By default, the control channel is active on TDM bus A, however, it can be moved to TDM bus B if TDM bus A fails.

The control channel operates in a polled mode, with the universal module interface circuit as master and the port board microprocessors as slaves. The first time slot of each frame (TS0) contains control addresses; the next four time slots (TS1 to TS4) contain control data. The universal module interface circuit grants bus usage to a particular port board microprocessor or group of port board microprocessors by transmitting a specific address in TS0. The direction of transmission during the control data time slots (TS1 to TS4) depends on the message type.

On each port boar&address recognition, control data buffering, and synchronization between the port board microprocessor and the control channel are done by a custom VLSI device known as the control interface (see Figure 2-4, *Port Board Architecture).* Each port carrier slot contains seven address pins that are hardwired to define a unique address. During initialization, the port board microprocessor reads this address, then writes the address to the address-detection portion of the control interface.

The universal bus interface circuit can address port board microprocessors individually or as a group. If the universal bus interface circuit wants to address a particular port boar&it sets the most significant bit (MSB) in TS0 to zero. The remaining seven bits contain that particular port board's address. If the universal bus interface circuit wants to address a group of eight port board microprocessors, it sets the most significant bit in TSO to one. The next four bits are used to address the group, and the remaining three bits indicate the type of scan or command that will follow.

LAN Bus

The universal bus interface circuit passes ISDN D-channel packets back and forth between the universal module processor and the LAN bus in the port network. All ISDN PRI and ISDN BRI port circuit packs are connected to the LAN bus.

The LAN bus is a 20-bit bus that operates at 2.048 MHz. Each 20-bit quantity (slice) contains two bytes of data. Each byte has two extra bits associated with it, a qualifier (Q) bit and a parity (P) bit. The Q bit is used on the last slice of a packet to indicate whether both bytes in the slice are valid packet bytes. The Q bit allows for transmission of odd byte packets. The P bit is calculated to create odd parity over the 10-bit field.

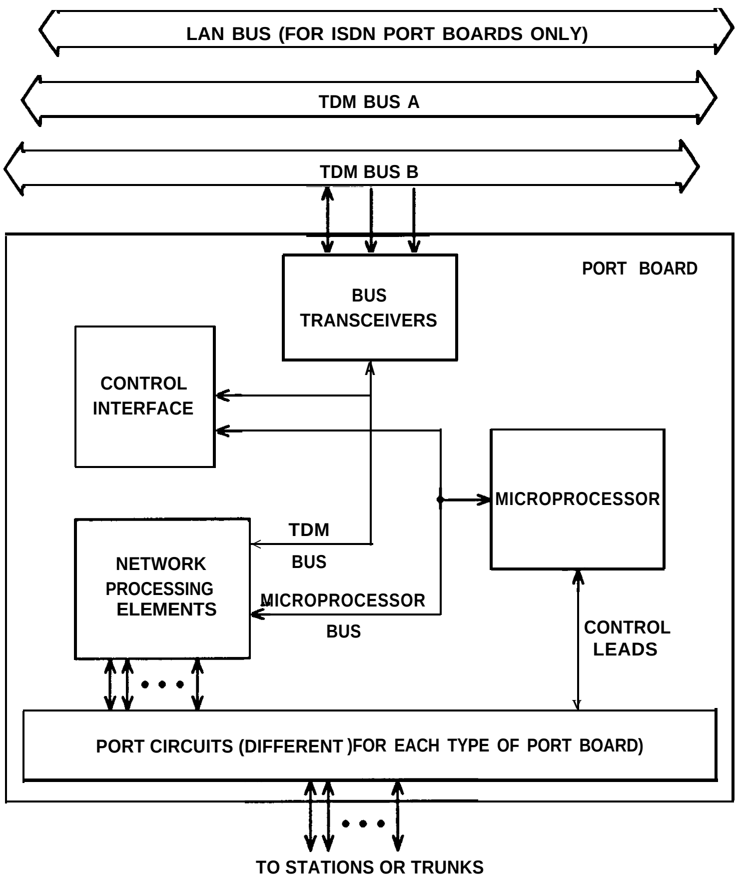


Figure 2-4. Port Board Architecture

SWITCH CABINETS

Here are the cabinets that make up the DEFINITY Communications System Generic 2:

- Unduplicated common-control cabinet (J58886J)
- Duplicated common-control cabinet (J58886K)
- CC (common control)/TMS (time-multiplexed switch) cabinet (J58886S)
- TMS (time multiplexed switch)/RMI (remote module interface) cabinet (J58886F)
- Module-control cabinet (J58886B)

- Port cabinet (J58886C)
- Universal module cabinet (J58890K-1).

The equipment contained in DEFINITYGeneric 2 traditional cabinets runs off of -48 VDC power. On a system-wide basis, power is supplied to switch cabinets in one of two ways (but not both):

- AC power is brought into the cabinet and converted to -48 VDC. AC-to-DC conversion is done using bulk OLS (off-line switcher) power supplies or by using rectifiers. (Cabinet figures in this document show only the OLS configuration.)
- Or 48 VDC is brought into the cabinet from an outside DC power source. This is the standby power option.

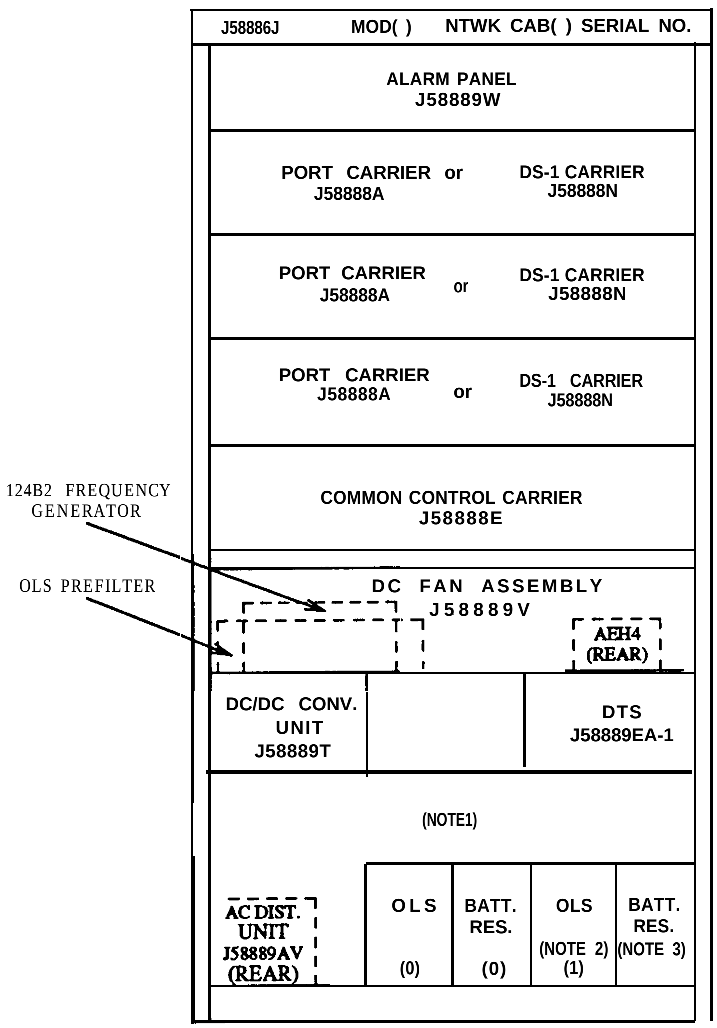
Unduplicated Common-Control Cabinet (J58886J)

An unduplicated common-control cabinet (see Figure 2-5, *Unduplicated Common-Control Cabinet (J58886J))* provides standard reliability common control for the digital switch. It contains the following equipment

- An unduplicated alarm panel
- Up to three port or DS-1 carriers
- A common-control carrier
- A DC fan assembly
- A frequency generator (if port carriers are provided)
- A DTS (disk tape system)
- An OLS power supply
- A DC-DC converter unit
- A bus bar.

The lower portion of this cabinet contains an AC distribution unit, an OLS power supply, and an OLS battery reserve unit mounted at the bottom. The DC-DC converter unit and the DTS are mounted under the fan assembly.

In non-OLS AC powered systems, this cabinet is not equipped with a rectifier. Instead, it comes with a battery reserve unit and a DC filter. The DC filter delivers -48 VDC power to the unduplicated common-control cabinet from the 309A/310A -48V rectifier in the cabinet housing module-control cabinet 00. This module-control cabinet must be adjacent to the unduplicated common-control cabinet.



NOTES:

1. Standard power equipment is shown here. For the standby power option, DC frame filter J58889AD replaces OLS units, battery rcscrve units, AC distribution unit, and the DC-DC converter unit,
2. This OLS unit is required when more than 40 ANN17s circuit packs are used.
3. This battery reserve unit is only used when a second OLS is required.

Figure 2-5. Unduplicated Common-Control Cabinet (J58886J)

In systems with the standby power option, DC frame filter J58889AD replaces the OLS power supplies, OLS battery reserve units, AC distribution unit, and the DC-DC converter.

One of two thermal sensors is provided:

- The ED- IE430-70, G2 is used if all carrier positions are occupied. It is included as part of the alarm panel assembly.
- The ED- 1E430-70, G1 is used if a vacant carrier position exists. It is placed above the topmost carrier.

Duplicated Common-Control Cabinet (J58886K)

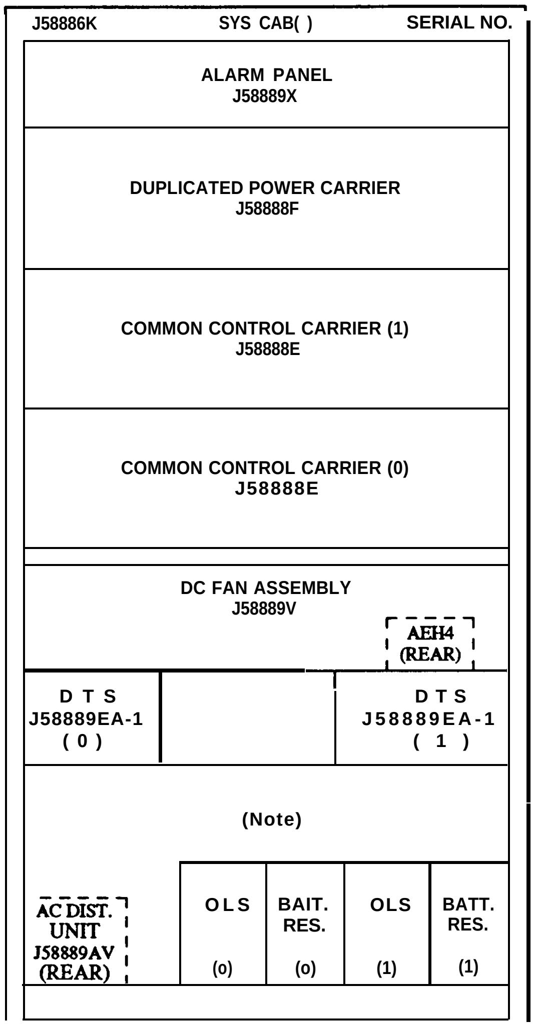
A duplicated common-control cabinet (see Figure 2-6, *Duplicated Common-Control Cabinet (J58886K))* provides high-reliability common control for the digital switch. It contains the following equipment

- A duplicated alarm panel and thermal sensor assembly
- Two common-control carriers
- One power carrier containing DC-DC converter units
- A DC fan assembly and alarm board
- Two DTSs (disk tape systems)
- A bus bar.

The lower portion of this cabinet contains an AC distribution unit, two OLS power supplies, and two OLS battery reserve units mounted at the bottom. Two DTSs are mounted under the fan assembly.

In non-OLS AC-powered systems, this cabinet is equipped with an AC distribution unit, two 334A rectifiers, and a battery reserve unit (for critical battery backup).

In systems th the standby power option, DC frame filter J58889AD replaces the OLS power supplies, OLS battery reserve units, AC distribution unit, and the DC-DC converter.



NOTE: Standard power equipment is shown here. For the standby power option, DC frame filtcr J58889AD rcplaccs OLS units, battery reserve units, and the AC distribution unit.

Figure 2-6. Duplicated Common-Control Cabinet (J58886K)

CC (Common ControL)/TMS (Time-Multiplexed Switch) Cabinet (J58886S)

The CC/TMS cabinet (see Figure 2-7, *Common Control/Time Multiplexed Switch Cabinet (J58886S))* replaces the unduplicated common-control cabinet *(J58886J)* and the duplicated common-control Cabinet (J58886K) in DEFINITY Generic 2 equipment line-ups. In most multi-module systems this cabinet also houses the TMS.

When the TMS cabinet is provided in new systems, all TMS basic and TMS growth carriers are housed in the TMS cabinet; CC/TMS cabinet positions reserved for the TMS are vacant.

The CC/TMS cabinet layout, from top to bottom, contains the following equipment:

- A J58889EA DTS (disk tape system) —An additional DTS is equipped for duplicated common-control configurations. On the same level in the cabinet, the power carrier (J58888Z) houses model 410AA and 494GA DC-DC converters
- An alarm panel (J58889X)
- A common-control carrier (J58888AA) — An additional common-control carrier is equipped for duplicated common-control configurations
- A DC fan and filter unit (J58889BB)
- An alarm distribution unit (AEH105)
- A TMS carrier (J58888C) — If the TMS is duplicated, both TMS carrier positions are configured as “basic," if not, the TMS carrier position directly below the fan assembly is configured as “growth” and the other TMS carrier position is configured as “basic.” This assumes that a TMS cabinet is not in the cabinet line up; if one is, then the TMS carrier positions in the CC/TMS cabinet are not equipped
- Standard AC power equipment —This includes an AC distribution unit (J58889AV), a bulk OLS power supply, and a battery reserve unit. If the common control is duplicated a second OLS power supply, with a battery reserve unit is provided
- DC power equipment (not shown in Figure 2-7) — A DC distribution unit (J58889AD) replaces all of the standard AC power equipment in the last listed bullet item.

Alarm Panel (J58889X)

The CC/TMS cabinet is equipped with the J58889X alarm panel. For unduplicated common control configurations half of the alarm panel is disabled.

Disk/Tape System (J58889EA)

The DTS loads the 501CC memory, performs translation updates, and administers program patches. Part of the DTS is a tape drive that is used for disk back up and disk initialization.

The DTS consists of a 140-Mbyte disk drive, a 125-Mbyte streaming tape drive, a TN563 host adaptor interface circuit, and an SCSI (small computer system interface) bus cable. Both the disk drive and the tape drive are SCSI compatible, and the TN563 host adaptor interface gives the 501CC processor access to the SCSI bus.

The TN563 also provides two ADU-type serial asynchronous ports for use by the DEFINITY Manager II. One of these ADU interfaces is a modular jack located on the front of the DTS housing, the other is a 50-pin connector located on the back of the DTS housing. A termination plug for the SCSI cable is also located on the back of the cabinet.

The disk drive and tape drive are contained in an 8-inch by 8-inch by 17-inch housing that is located at the top of the CC/TMS cabinet. In systems with duplicated common controls, two DTSs are provided. The DTS housing includes:

- A DC-DC converter that converts -48V to +5 and +12 volts for powering the disk and tape drives
- A temperature alarm thermostat that is connected to a sensing circuit on the TN563 circuit pack
- A fan unit
- An air filter.

The TN563 is housed in slot 20 of the common-control carrier and is connected to the DTS housing with the SCSI bus cable.

DC Fan and Filter Unit (J58889BB)

This unit contains six fans for cooling in both the upward and downward directions. The AHDl fan speed control/thermal alarm circuit is also included in the fan assembly. -48V power for the fans comes from the AEH105 alarm distribution circuit.

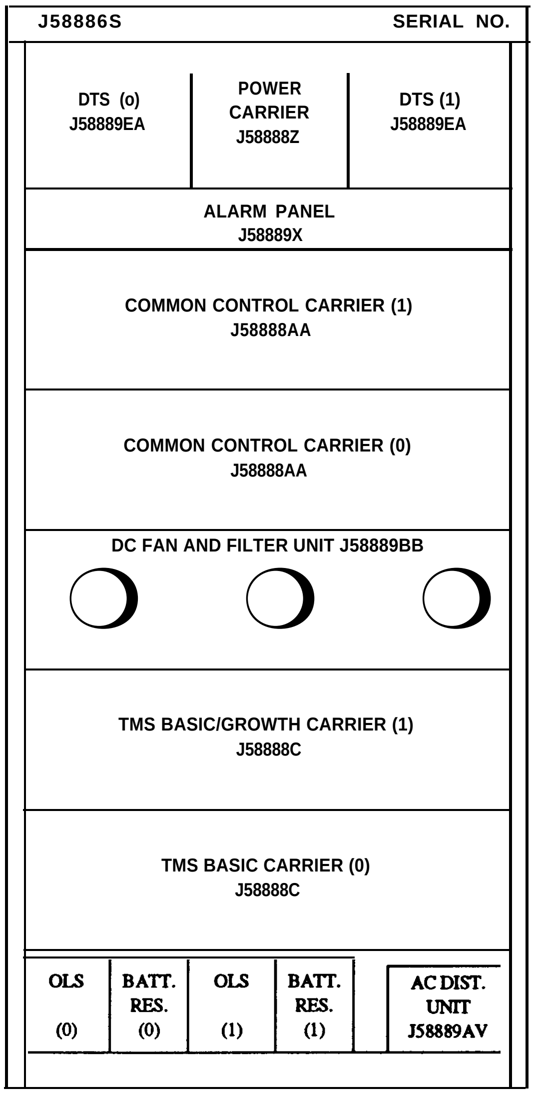
AEH105 Alarm Distribution Circuit

The AEH105 collects and distributes power and environmental alarms for the common control and TMS carriers.

Power Equipment

Standard AC power equipment consists of the AC distribution unit (J58889AV), a bulk OLS power supply, and a battery reserve unit. If the common control is duplicated, a second OLS power supply with battery reserve unit is provided.

The DC distribution unit (J58889AD), replaces the standard AC power equipment when required.



NOTE: Standard power cquipment is shown here. For the standby power option, DC distribution unit J58889AD replaces OLS units, battery rcscrve units, and the AC distribution unit.

Figure 2-7. Common Control/Time-Multiplexed Switch Cabinet (J58886S)

TMS (Time-Multiplexed Switch)/RMl (Remote Module Interface) Cabinet (J58886F)

The TMS/RMI cabinet (see Figure 2-8, *Time-Multiplexed Switch/Remote Module Interface Cabinet (J58886F))* is used only in multimodule systems. It contains the following equipment

- A thermal sensor assembly
- Up to four carriers. They area combination of TMS basic, TMS growth, and RMI carriers. A TMS basic carrier serves up to seven modules; systems having more than seven modules require from one to three TMS growth carriers. Each TMS growth carrier serves an additional eight modules.
- A DC fan assembly and alarm board
- A bus bar.

The lower portion of this cabinet contains an AC distribution unit, an OLS power supply, and an optional OLS battery reserve unit mounted at the bottom. If duplicated TMS or RMI carriers are housed, a second OLS power supply and a second optional OLS battery reserve unit are included.

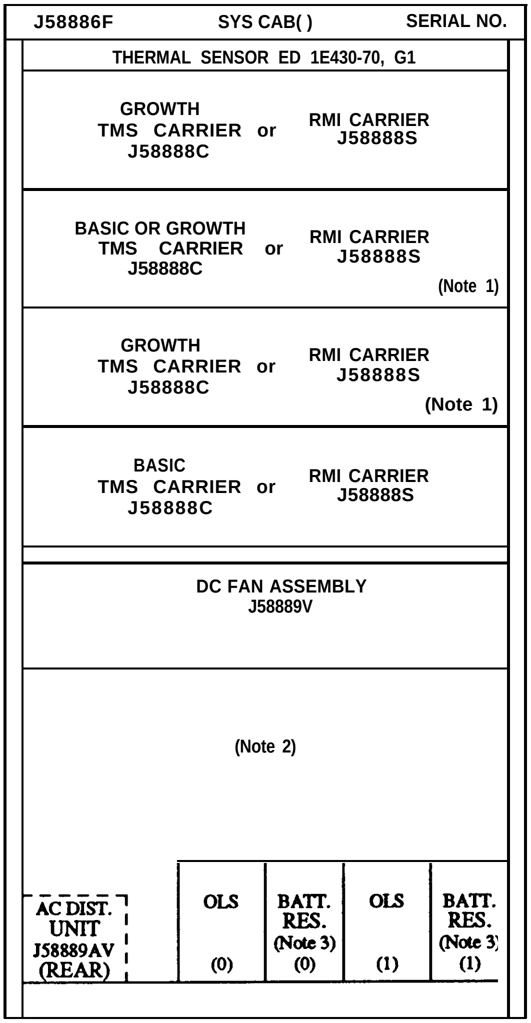
In non-OLS AC powered systems, this cabinet is equipped with an AC distribution unit, a 334A rectifier, and a battery reserve unit. A second 334A rectifier is provided if them are duplicated TMS carriers, duplicated RMI carriers, or three or more carriers in the cabinet.

In systems with the standby power option, DC frame filter J58889AD replaces the OLS power supplies, OLS battery reserve units, and the AC distribution unit.

The unduplicated TMS configuration includes the following:

- One basic TMS carrier
- Up to three growth TMS carriers
- Up to two RMI carriers in positions not containing TMS carriers. Each RMI carrier serves up to 16 remote modules. If a third RMI carrier is needed, an extra TMS/RMI cabinet must be provided since one TMS basic carrier and at least one TMS growth carrier will already be in the cabinet (leaving available two carrier positions, at most). RMI carriers can only be used in a traditional module control environment
- A no-carrier adapter (ED- 1E444) for each vacant carrier position.

A single duplicated TMS cabinet configuration supports up to 15 modules at the central location or seven modules with up to six of them being at a remote location. Additional TMS cabinets are required for larger duplicated configurations.



NOTES:

1. The ED-lE444 no-carrier adapter maybe used instead.
2. Standard power equipment is shown here. For the standby power option, DC frame filter J58889AD replaces OLS units, battery reserve units, and the AC distribution unit.
3. Battery reserve units for OLS (0) and OLS (1) are optional. If battery reserve is needed, it must be provided for both OLS units.

Figure 2-8. Time-Multiplexed Switch/Remote Module Interface Cabinet (J58886F)

The duplicated single TMS cabinet configuration includes the following:

- Two basic TMS carriers
- Either two growth TMS carriers or two RMI carriers
- A no-carrier adapter (ED- 1E444) for each vacant carrier position.

Larger duplicated configurations include the following:

- Two adjacent TMS/RMI cabinets, one housing the on-line TMS basic and growth carriers and the other housing the off-line carriers. Growth TMS carriers are always associated with the basic TMS carrier in their cabinet.
- RMI carriers that may occupy any vacant carrier position. If there are not enough vacant positions, a third TMS/RMI cabinet can be added that will house up to four RMI carries. RMI carriers can only be used in a traditional module control environment.
- A no-carrier adapter (ED- 1E444) for each vacant carrier position.

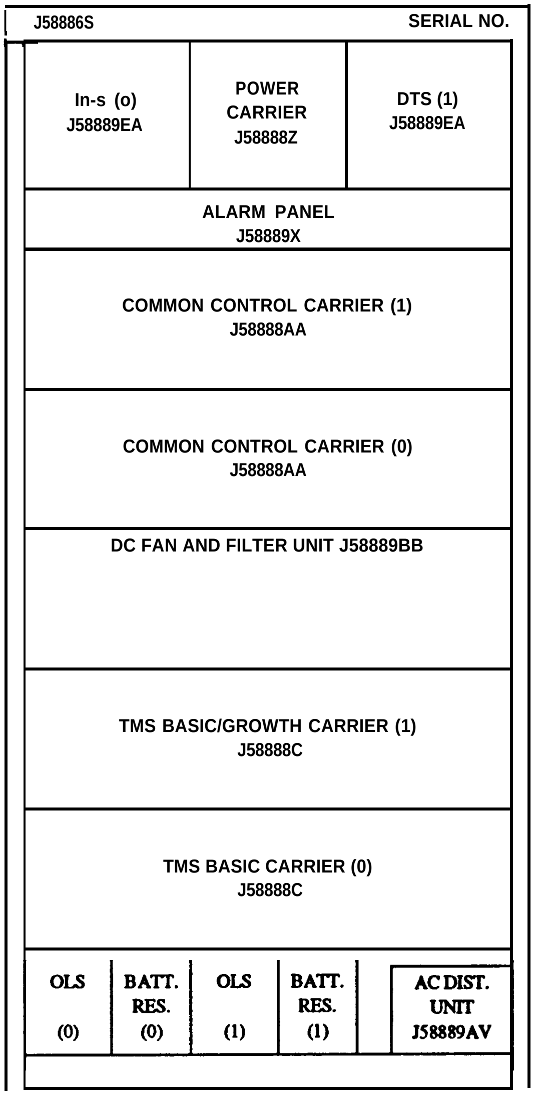
DEFINITY Generic 2 never has more than three TMS/RMI cabinets.

Module-Control Cabinet (J58886B)

The module-control cabinet (see Figure 2-9, *Module-Control Cabinet (J58886B))* houses module-control and port circuits. It contains the following equipment

- A thermal sensor assembly
- One module-control carrier and one no-carrier adapter for an unduplicated module control or two module-control carriers for a duplicated module control
- Up to three port or DS-1 carriers. Note that the DS-1 carrier cannot be installed in the bottom carrier position
- A DC fan assembly with frequency generator
- A bus bar.

The lower portion of this cabinet contains an AC distribution unit, an OLS power supply, and an optional OLS battery reserve unit mounted at the bottom. A second OLS power supply is provided for the duplicated module-control configuration. The second OLS is also provided for the unduplicated module-control configuration when more than 40 ANN17Bs are housed.



NOTE: Standard power equipment is shown here. For the standby power option, DC distribution unit J58889AD replaces OLS units, battery reserve units, and the AC distribution unit.

Figure 299. Module-Control Cabinet (J58886B)

In non-OLS AC-powered systems, this cabinet is equipped with an AC distribution unit and a 309A/310A -48V rectifier. An optional battery reserve unit can be accommodated. In this configuration, the cabinet can supply -48V power to an adjacent unduplicated common-control cabinet or to a port cabinet without a -48V rectifier. Any pair of cabinets sharing power must belong to the same module.

In systems powered from a standby power plant, this cabinet is equipped with a standby power DC filter for a -48V power source.

One module-control cabinet is required per module. This cabinet, with the RMI (remote module interface) circuitry and interconnections, may also serve as a module control in a remote module system configuration.

Port Cabinet (J58886C)

The port cabinet (see Figure 2-10, *Port Cabinet (J58886C))* houses carriers that contain port circuits. It contains the following equipment

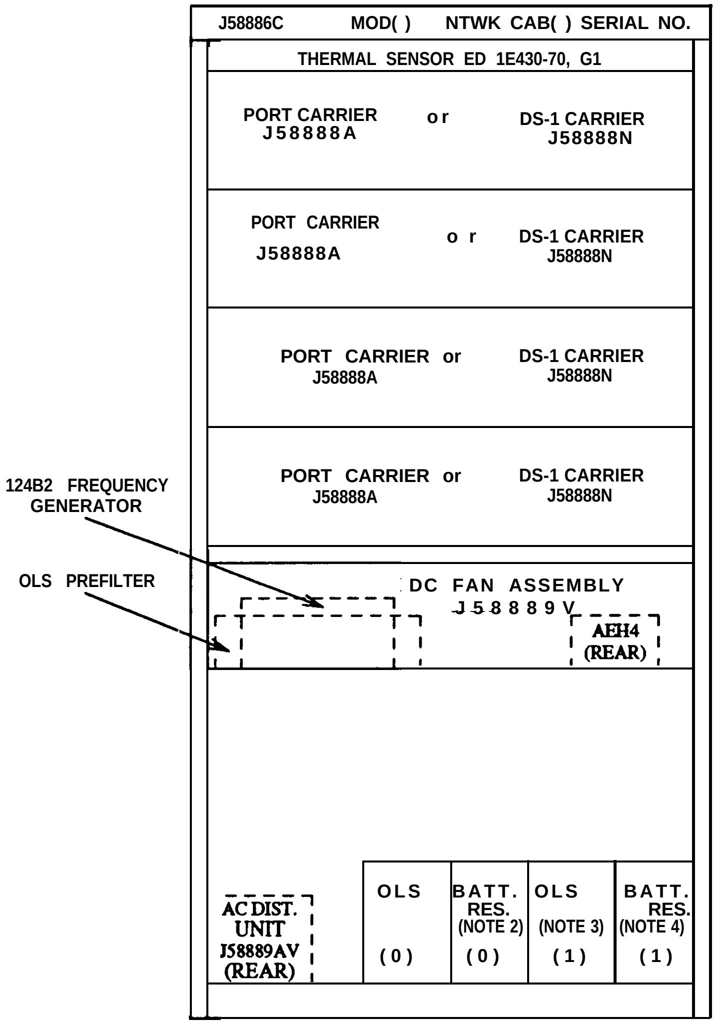
- A thermal sensor assembly
- Up to four port or DS-1 carriers
- A DC fan assembly with frequency generator
- A bus bar.

The lower portion of this cabinet contains an AC distribution unit, an OLS power supply, and an OLS battery reserve unit mounted at the bottom. If more than 40 ANN17Bs are housed, a second OLS power supply and battery reserve are provided.

In non-OLS AC-powered systems, this cabinet is equipped for one of two power arrangements. When equipped with an AC distribution unit and a 309A/31OA -48V rectifier, this cabinet can supply -48V power to an adjacent port cabinet without a -48V rectifier. An optional battery-reserve unit can be accommodated. When equipped with a DC filter only, this cabinet receives -48V power from an adjacent module-control cabinet or port cabinet equipped with a -48V rectifier. Any pair of cabinets sharing power must belong to the same module.

In systems powered from a standby power plant, this cabinet is equipped with a standby power DC filter for a -48V power source.

The number of port cabinets required depends on the number of port and DS-1 carriers to be equipped in the modules. This cabinet, with the proper interconnections, may also be used to house port interface circuits in a remote module system configuration.



NOTES:

1. Standard power equipment is shown here. For the standby power option, DC frame filter j58889AD replaces OLS units. Battery reserve unitys, AC distribution unit, and the DC-DC converter unit.
2. This battery reserve unit is optional.
3. This OLS unit is required when more than 40 ANN17s circuit pakcs are used.
4. This battery reserve unit is only used when a second OLS is required. Even then, it's an option; it's not required.

Figure 2-10. Port Cabinet (J58886C)

Universal Module Cabinet (J58890K-1)

This cabinet (see Figure 2-11, *Universal Module Cabinet (J58890K-1))* contains all the hardware and equipment required for a module. It weighs about 800 pounds when fully equipped and is 70 inches high, 32 inches wide, and 28 inches deep (including the door). Although the universal module cabinet is 4 inches deeps than a traditional DEFINITY Generic 2 cabinet the increased depth does not affect floor plans or existing cabinet line-up space requirements.

The following equipment is provided:

- Universal module-control carrier (J58890AK-1)
  - Current limiter board (CFY1)
  - 9823 (A or B) lightwave transceivers
- Common port carrier (J58890BB-3)
- TDM/LAN bus
- Power distribution unit and power supplies
  - SOPS (single-output power supplies)
  - DOPS (dual-output power supplies)
  - Frequency generator (124B2)
- Fan assembly unit (ED- 1E67077-30)
- Thermal sensor assembly (XXX) [part of the LCJ58890A cable assembly],

Universal modules can be located side by side with DEFINITY Generic 2 common-control, TMS, and traditional module and port cabinets, allowing them to become an integral part of the switch lineup. Furthermore, the universal cabinet accommodates DEFINITY Generic 2 overhead power and cable ducts, as well as decorative facia. Universal module cabinets located in a central equipment mom are equipped with overhead shielded cable duct. This duct houses the unshielded 4-MHz coaxial cables that connect each module to the common control.

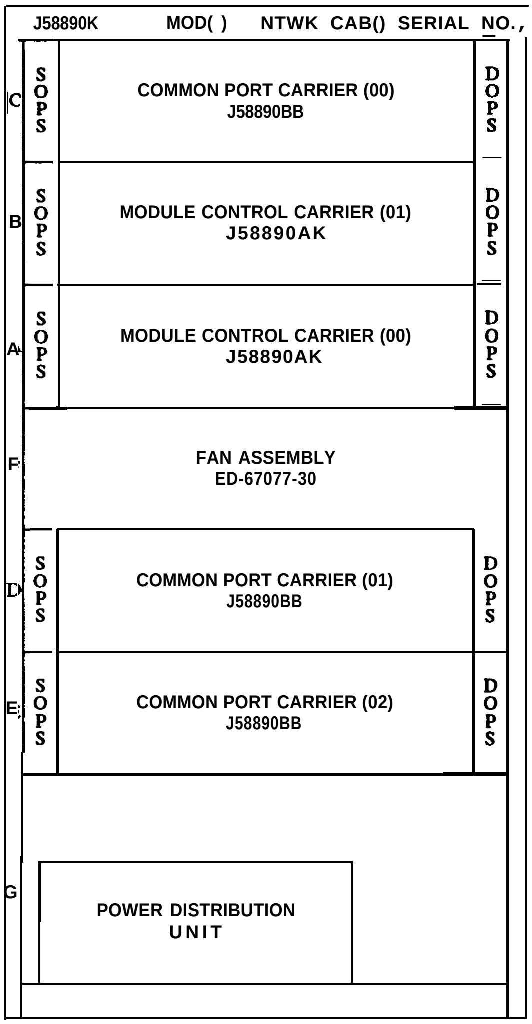


Figure 2-11. Universal Module Cabinet (J58890K-1)

Cabinet Equipment

Descriptions of universal module cabinet equipment are provided in the following paragraphs.

TDM/LAN Bus The TDM/LAN bus runs continuously through all the carriers within the universal module cabinet. his is accomplished with bus extension cables that connect the TDM bus from one carrier to another. Bus terminator packs are used at each end of the bus.

Current Limiter Paddleboard (CFY1) The CFY1 current limiter provides -48V power for the fans, frequency generator, and the three DEFINITY Generic 2 attendant consoles. It also delivers -48V and +5V leads to power-failure detection circuitry. One current limiter paddleboard is required per universal module. This paddleboard is mounted on the backplane behind slot 00 of the module control carrier in position A. The current limiter paddleboard is never equipped in position B. (See Figure 2-11, *Universal Module Cabinet (J58890K-1)* for carrier positions.)

9823 *(A and B) Lightwave Transceivers* One 9823A lightwave transceiver (short wavelength) or one 9823B lightwave transceiver (long wavelength) is required for each TN481 and TN456 equipped in the carrier. The 9823 lightwave transceiver mounts on the I/O connector plate located on the rear of the universal module control carrier. The short-wavelength 9823A lightwave transceiver is required whenever the module is a central module or a remote module located within 4,900 feet of the main equipment mom. The long-wavelength 9823B lightwave transceiver is required for remote modules located 4,900 feet to 25,000 feet from the main equipment room.

Power Distribution

The universal module cabinet can be provisioned to operate in an AC- or a DC-powered system. When the system is powered by AC, an AC power distribution unit and a AC carrier-mounted OLS power units are equipped. Likewise, when the system is DC powered a DC power distribution unit and a DC carrier-mounted power supplies are equipped

- 208 VAC power distribution (see Figure 2-12, *AC Power Distribution Diagram):*
  - — One 63lDA1 power supply per carrier (slot 00)
  - — One 63lDB1 power supply per carrier (slot 22)
- -48 VDC power distribution (see Figure 2-13, *DC Power Distribution Diagram):*
  - — One 644A1 power supply per carrier (slot 00)
  - — One 645B1 power supply per carrier (slot 22).

The power distribution unit equipped in the cabinet also determines the power cord and the dedicated power service required by the cabinet. Service requirements per cabinet are as follows:

- AC power distribution unit 208 VAC, 30A service
- DC power distribution unit: -48 VDC, 80A service.

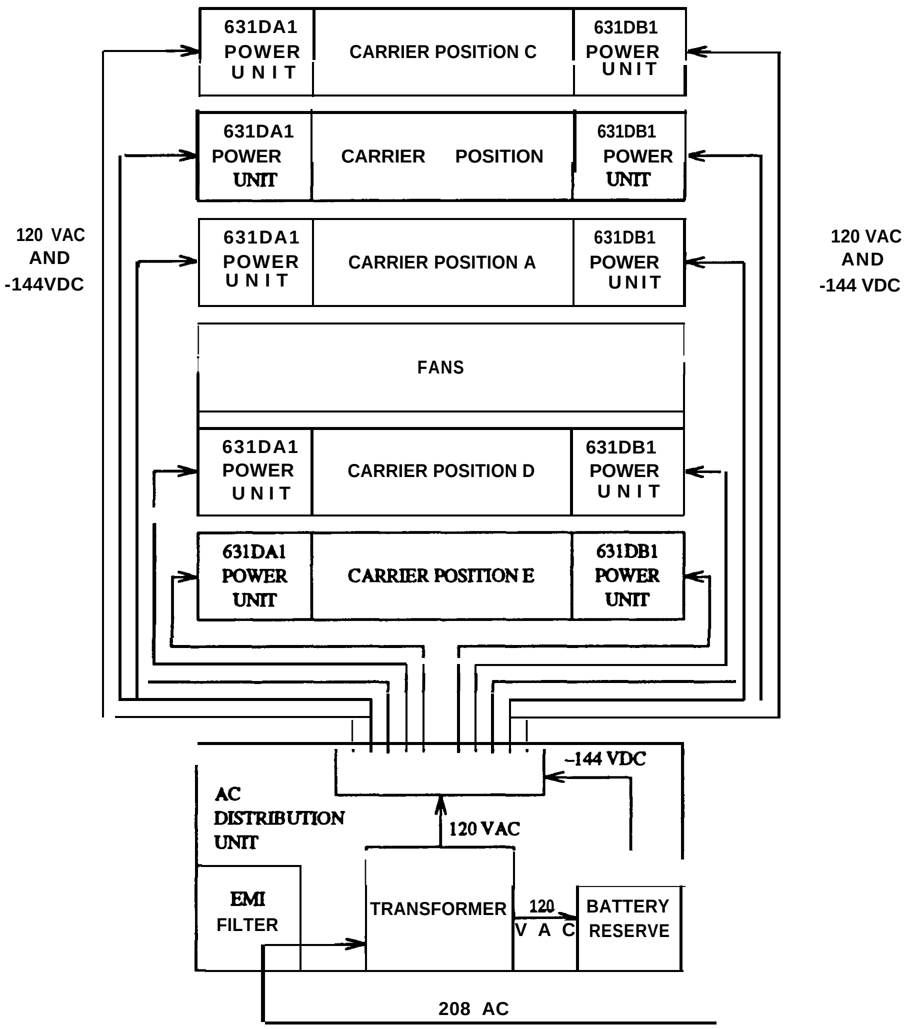


Figure 2-12. AC Power Distribution Diagram

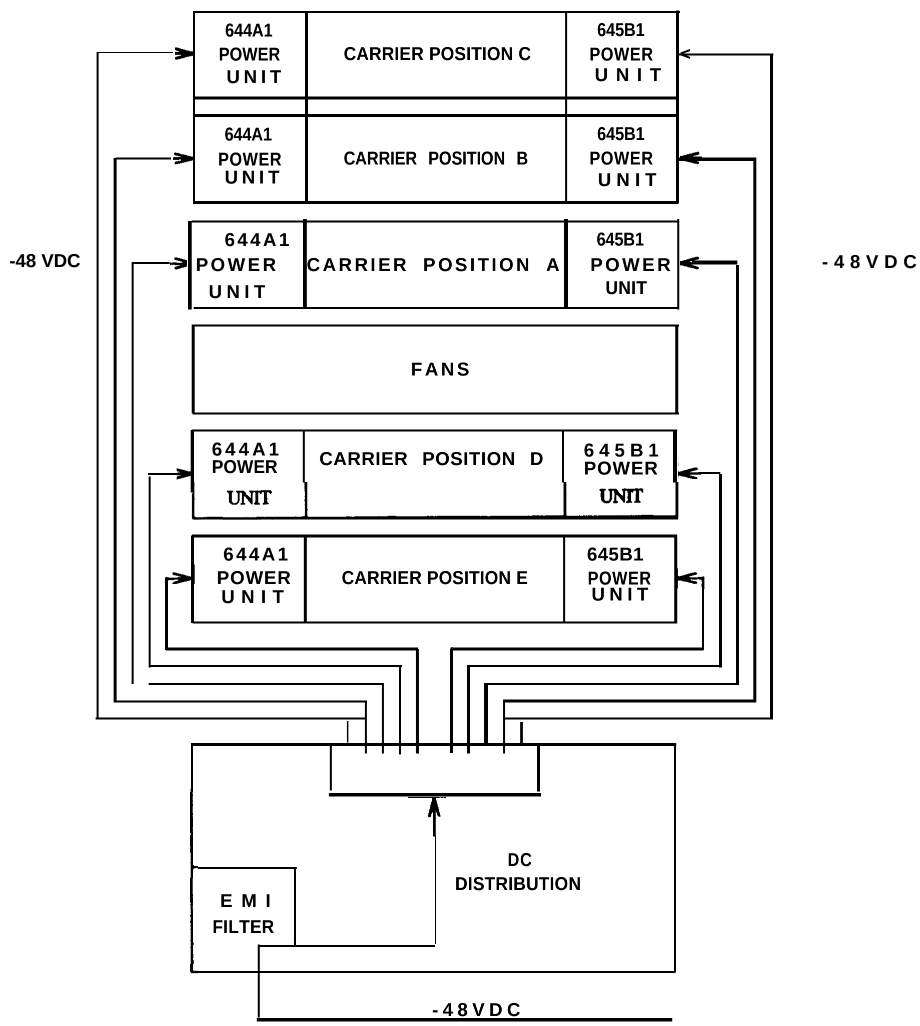


Figure 2-13. DC Power Distribution Diagram

SWITCH CARRIERS

Carriers are designed to hold circuit packs. This arrangement allows most of the system's circuitry to be replaced without the use of tools. The circuit packs are usually designed to accomplish one or more functions. This modular approach simplifies maintenance by making it easier to diagnose and isolate system problems. Each carrier is designed to accommodate specific types of circuit packs.

All loose wiring and cabling from the backplane to the circuit breakers and connectors are furnished with the carrier unit. Circuit breaker panels are located at the right front of the carrier. Connector are located on the backplane or on the cabinet skin. Carrier circuit-pack slots, when viewed from the front, are numbered from left to right beginning with 00.

Units other than carriers also house circuit packs. The carriers and units covered in this section are:

- Common-control carrier (J58888E or J58888AA)
- Unduplicated common-control DC-DC converter unit (J58889T)
- Duplicated common-control power carrier (J58888F)
- CC/TMS power carrier (J58888Z)
- TMS carrier (J58888C)
- Traditional module-control carrier (J58888M)
- Universal module-control carrier (J58890AK-1)
- Traditional port carrier (J58888A)
- Common port carrier (J58890BB-3)
- DS-1 carrier (J58888N)
- RMI carrier (J58888S)
- Remote group housing (J58889AN).

Common-Control Carrier (J58888E or J58888AA)

The common-control carrier (see Figure 2-14, *Common-Control Carrier (J58888E or J58888AA))* houses the TN- and UN-coded circuit packs that make up the 501CC processor complex and related I/O circuitry. The common-control carrier provides primary control, memory, and I/O channels for processing, supervising, and coordinating system operations.

For information on circuit packs in the common-control carrier, see Table 2-1, *Common-Control Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the common-control carrier. Circuit breakers are provided on the right side of the common-control carrier. Numbers are stamped adjacent to the circuit breakers to identify the slot numbers or components associated with each circuit breaker.

Figure 2-14 identifies the circuit pack type and code for each slot location in the common-control carrier.

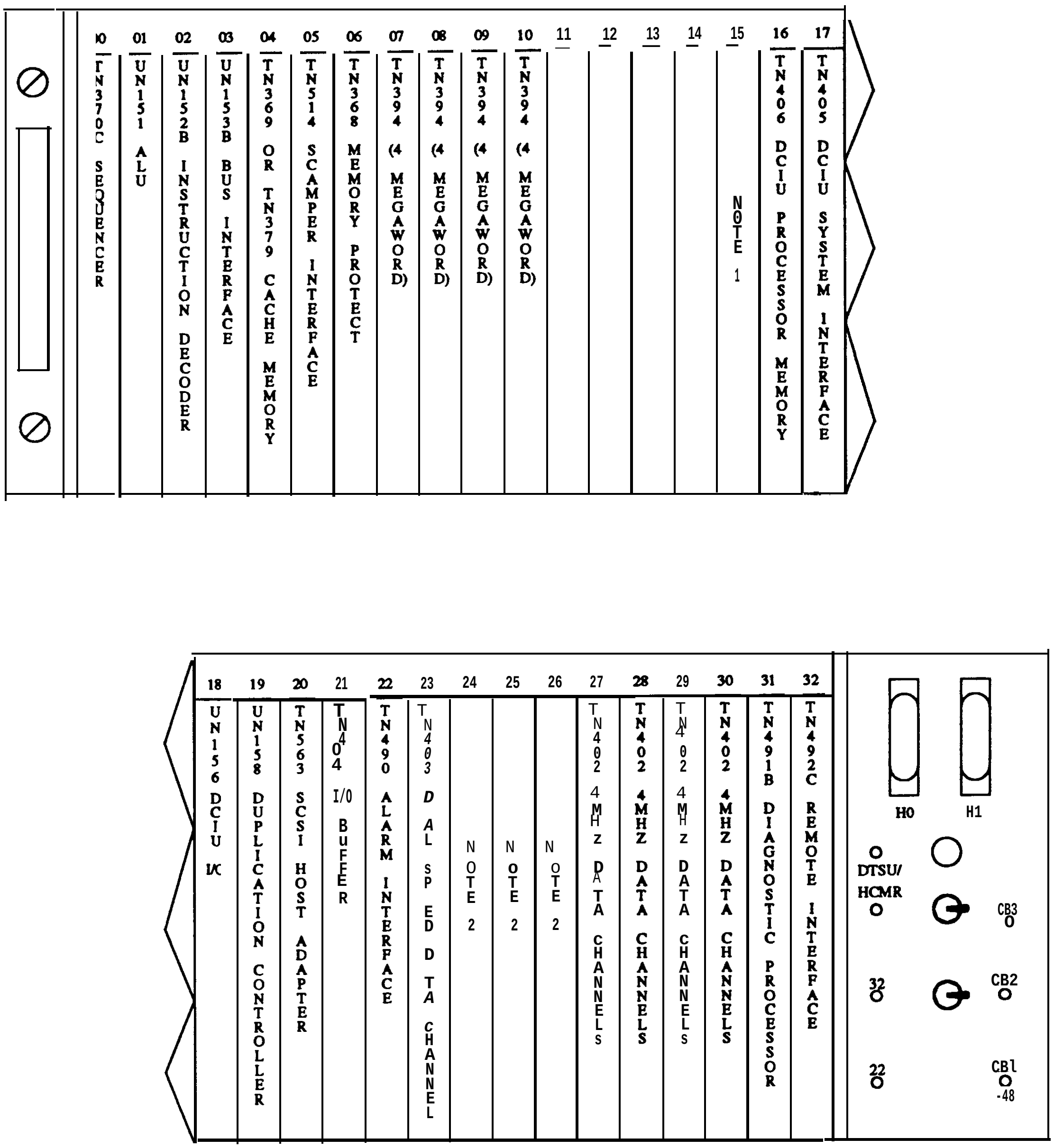
TABLE 2-1. Common-Control Carrier Circuit Packs

Code	Circuit Pack	Comments
TN368	Memory protect	One required per control carrier.
TN369 or TN379	Cache memory	One optionally required per control carrier based on processor occupancy.
TN370C	Sequencer	One required per control carrier.
TN394	4M RAM memory	Four required for DEFINITY Generic 2.
TN402	4-MHz channels	One required for one to seven modules; two required for eight to 15 modules; three required for 16 to 23 modules; four required for 23 to 31 modules.
TN403	Dual-speed channels	The first TN403 provides two dedicated channels (NCOSS and SMDR/CSMDR) and 13 undedicated channels; each additional TN403 provides 16 undedicated channels. Maximum of four per control carrier.

continued

TABLE 2-1 Common-Control Carrier Circuit Packs *(continued)*

Code	Circuit Pack	comments
TN404	I/O buffer	One required per control carrier.
TN405	DCIU interface	One required per control carrier when DCIU connectivity is required.
TN406	DCIU memory	One required per control carrier when DCIU connectivity is required.
TN563	SCSI host adapter	One required per control carrier.
TN474B	Processor communication circuit (PCC)	One required per control carrier when 3B2 CDRU or PCC direct output connectivity is required (used in slot 24,25, or 26).
TN490	Alarm interface	One required per control carrier.
TN491B	Diagnostic processor	One required per control carrier.
TN492C	Remote interface	One required per control carrier.
TN513	DCIU test support	Equipped in carrier only during high-level maintenance testing.
TN514	SCAMPER interface	Equipped in carrier only during high-level maintenance testing.
UN151	ALU	One required per control carrier.
UN152B	Instruction decoder	One required per control carrier.
UN153B	Bus interface	One required per control carrier.
UN156	DCIU I/O	One required per control carrier when DCIU connectivity is required.
UN158	Duplication control	One required per control carrier when duplicated common controls are provided.



NOTES:

1. Slot 15 maintains TN513 (DCIU Test Support) if shipped with the switch.
2. Carrier positions 24,25, and 26 can accept either TN403 Dual Speed Data Channel or TN474B Processor Communication Circuit

Figure 2-14. Common-Control Carrier (J58888E or J58888AA)

Unduplicated Common-Control DC-DC Converter Unit (J58889T)

The DC-DC converter unit (see Figure 2-15, *Unduplicated Common-Control DC-DC Converter Unit (J58889T))* provides DC power in the unduplicated common-control cabinet. It contains DC-DC converters that provide logic-level DC voltages required by the common-control carrier circuit packs. This unit is mounted in a shelf assembly next to the disk tape assembly.

Each DC-DC converter circuit pack is functionally partitioned in the carrier to simplify maintenance and replacement.

Circuit breakers are on the left side of the unduplicated common-control DC-DC converter unit. Numbers are stamped next to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 2-15 identifies the circuit pack type and code for each slot location in the unduplicated common-control DC-DC converter unit.

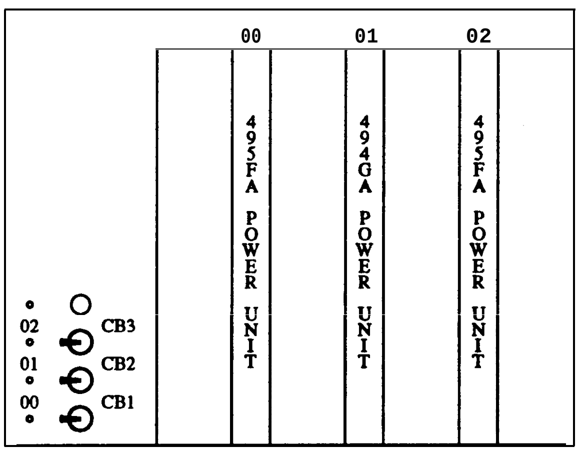


Figure 2-15. Unduplicated Common-Control DC-DC Converter Unit (J58889T)

Duplicated Common-Control Power Carrier (J58888F)

The power carrier (see Figure 2-16, *Duplicated Common-Control Power Carrier (J58888F))* provides DC power in the duplicated common-control cabinet. It contains DC-DC converters that provide logic-level DC voltages required by the two common-control carriers. his unit occupies one of the carrier positions in the cabinet and receives -48V DC through the bus bar. The carrier is fictionally segmented into two halves that provide fully isolated logic-level voltages to each of the common-control carriers.

Each DC-DC converter circuit pack is fictionally partitioned in the carrier to simplify maintenance and replacement.

Circuit breakers are on the right side of the duplicated common-control power carrier. Numbers are stamped next to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 2-16 identifies the circuit pack type and code for each slot location in the duplicated common-control power carrier.

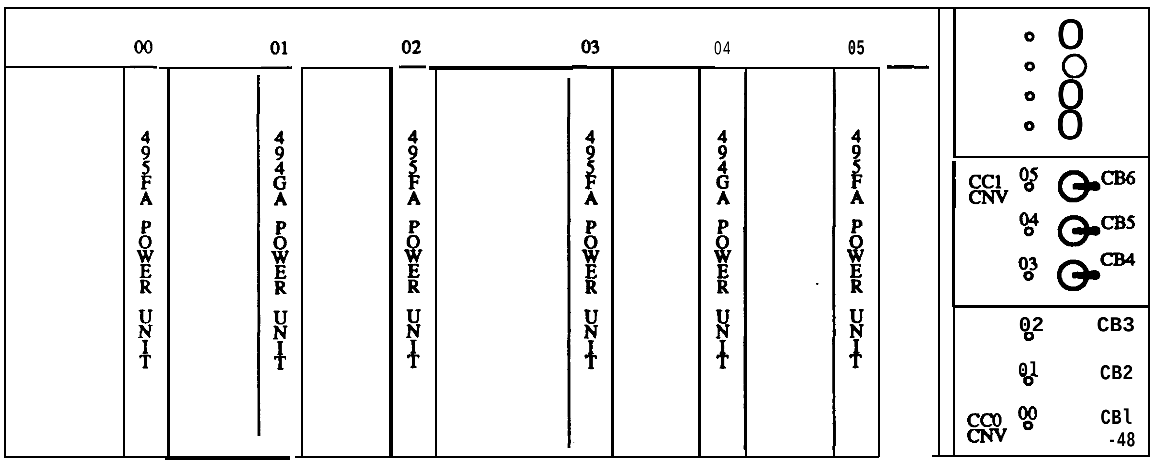


Figure 2-16. Duplicated Common-Control power Carrier (J58888F)

CC/TMS Common-Control Power Carrier (J58888Z)

The power carrier (see Figure 2-17, *CC/TMS Common-Control Power Carrier (J58888Z))* provides DC power in the CC/TMS cabinet. It contains DC-DC converters that provide logic-level DC voltages required by common-control carriers. It is located between two DTS units at the top of the CC/TMS cabinet. The carrier is functionality separated into two halves that provide fulIy isolated logic-level voltages to each of the common-control carriers.

Each DC-DC converter circuit pack is functionally partitioned m the carrier to simplify maintenance and replacement.

Circuit breakers are on the right side of the CC/TMS common-control power carrier. Numbers are stamped next to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 2-17 identifies the circuit pack type and code for each slot location in the CC/TMS common-controI power carrier.

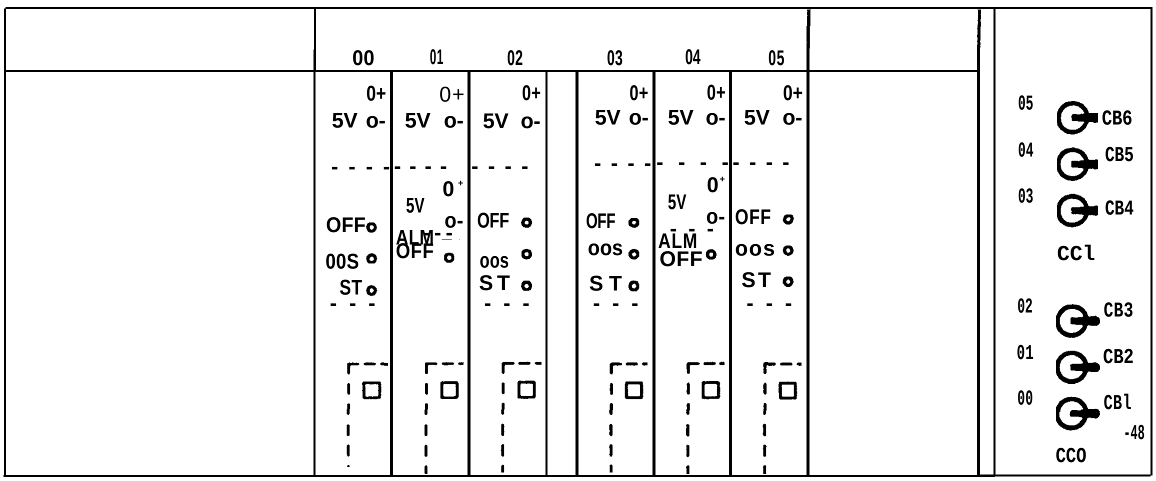


Figure 2-17. CC/TMS Common-Control Power Carrier (J58888Z)

TMS Carrier (J58888C)

The TMS carrier (see Figure 2-18, *TMS Carrier (J58888C))* houses a time-multiplexed space division switch that interconnects modules in a multimodule system.

The TMS carrier can be configured as "basic" or "growth." The basic configuration contains the TMS processor complex, a 4-MHz link to the common control, and switching fabric to support up to seven modules. The growth configuration adds enough switching fabric to support an additional eight modules, but does not contain a TMS processor complex or a 4-MHz link to the common control. Up to three growth carriers may be added

For infomation on circuit packs in the TMS carrier, see Table 2-2, TMS *Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the TMS carrier. Circuit breakers are on the right side of the TMS carrier. Numbers are stamped next to the circuit breakers to identify the slot numbers associated with each circuit broker.

Figure 2-18 identifies the circuit pack type and code for each slot location in the TMS carrier.

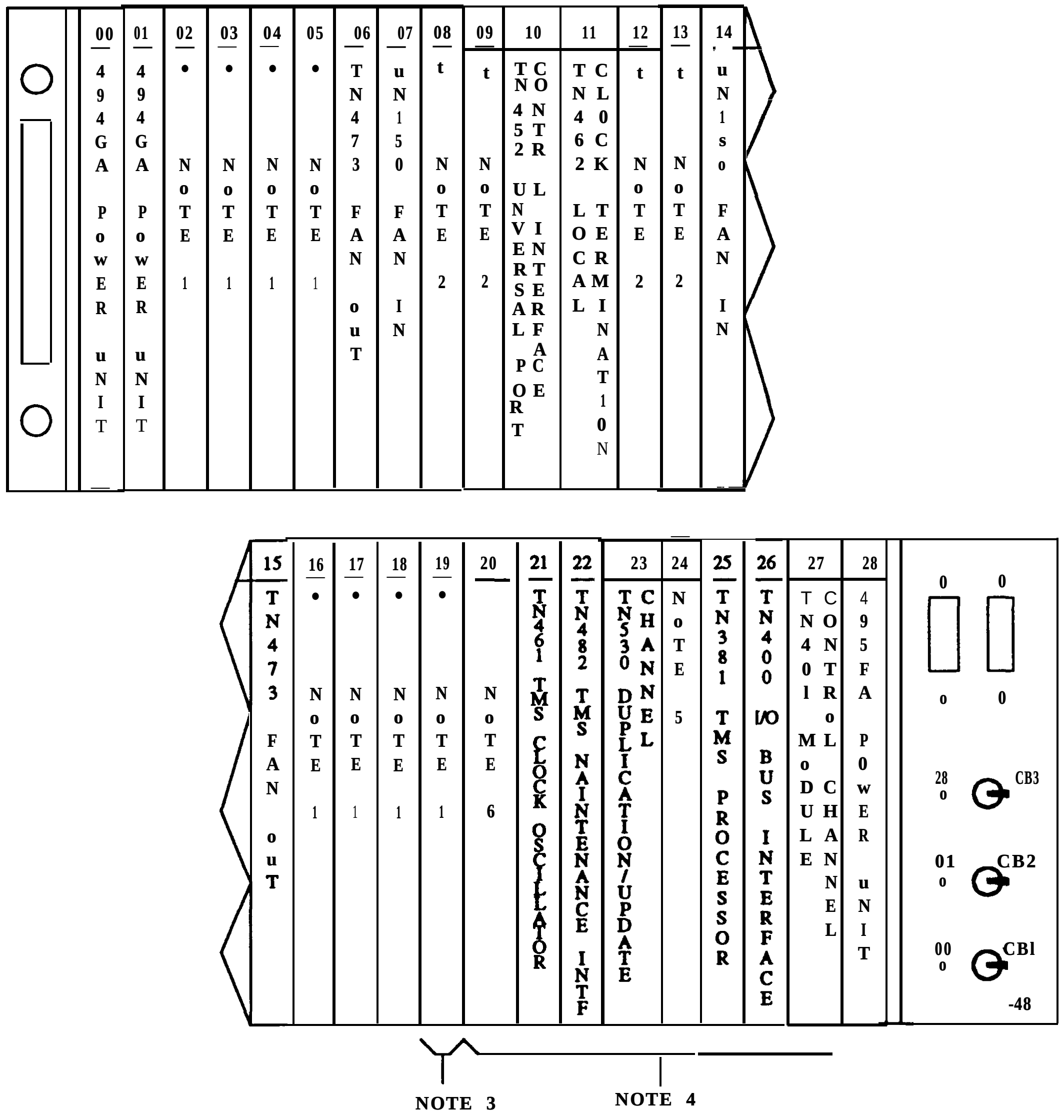
TABLE 2-2. TMS Carrier Circuit Packs

Code	Circuit Pack	Comments
TN381	TMS Processor	One required per basic carrier.
TN400B	I/O Bus Interface	One required per bike carrier.
TN401	Module Control Channel	One required per basic carrier.
TN452C	Universal Port Control Interface	One required per basic or growth carrier.
TN461	TMS Clock Oscillator	One required per basic carrier.
TN462	TMS Local Clock Termination	One required per basic or growth carrier.

continued

TABLE 2-2. TMS Carrier Circuit Packs *(continued)*

Code	Circuit Pack	Comments
TN463 TN2131	System Clock Synchronizer External Clock Interface	One required per basic carrier in a multimodule system with DS-1 or ISDN hunks.
TN470	TMS Multiplexer	Basic carrier: One required for first module and one required for each two additional modules up to seven modules. Four maximum per basic carrier. Growth carrier: One required for each two additional modules up to eight modules. Four maximum per growth carrier.
TN473	Fan-Out	Two required per basic or growth carrier.
TN480	Module Interface	Basic carrier: One required per module up to seven modules. Seven maximum per basic carrier. Growth carrier: One required per module up to eight modules. Eight maximum per growth carrier.
TN482	TMS Maintenance Interface	One required per basic carrier.
TN512B	Test Support	Not required for system operation. Equipped in carrier only during high-level maintenance testing.
TN530	Duplication/Update Channel	One required per basic carrier only when duplicated module controls are provided
UN150	Fan-In	Two required per basic or growth carrier.
494GA	DC-DC Converter	Two required per basic or growth carrier.
495FA	DC-DC Converter	One required per basic or growth carrier.



● = TN480 (module Interface)

t =TN470 (TMS Multiplexor)

NOTES:

1. One TN480 is required per module.
2. One TN470 is required in the basic TMS carrier for the first module an done TN470 is required for every two modules thereafter.
3. TN480 in slot 19 is not installed in the basic TMS carrier.
4. Circuit packs in slots 20-27 are not installed in TMS growth carriers.
5. Slot 24 contains TN512B (Test Support) if shipped with switch.
6. Slot 20 contains TN463 (System Clock Synchronizer) or TN2131 (External Clock Interface).

Figure 2-18. TMS Carrier (J58888C)

Traditional Module-Control Carrier (J58888M)

The traditional module-control carrier (see Figure 2-19, *Traditional Module-Control Carrier (J58888M))* provides module call processing and the associated circuits that detect and process requests for service. It controls the module switching network and seines as an intelligent interface between the common control and the port circuits. This carrier contains the hardware that allows the common control to interrogate and scan the ports, send instructions to them, and create transmission path connections.

The traditional module-control carrier is designed to accommodate TN-coded circuit packs and DC-DC converters, all using FASTECH® 963C 200-pin connectors.

For information on circuit packs m the traditional module-control carrier, see Table 2-3, *Traditional Module-Control Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the traditional module-control carrier. Circuit breakers are on the right side of the traditional module-control carrier. Numbers are stamped next to the circuit breakers to identify the slot numbers associated with each circuit breaker.

Figure 2-19 identifies the circuit pack type and code for each slot location in the traditional module-control carrier.

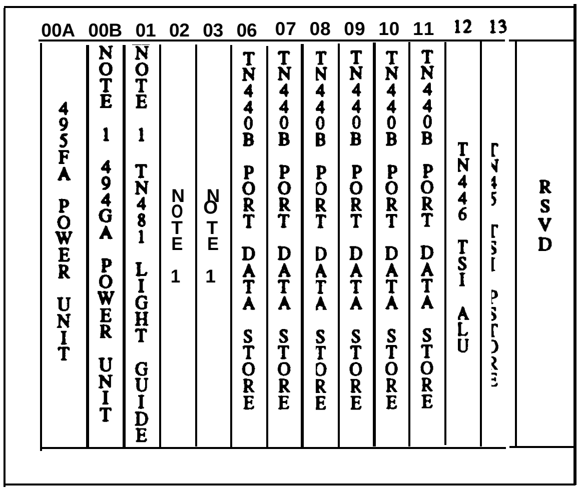
TABLE 2-3. Traditional Module-Control Carrier Circuit Packs

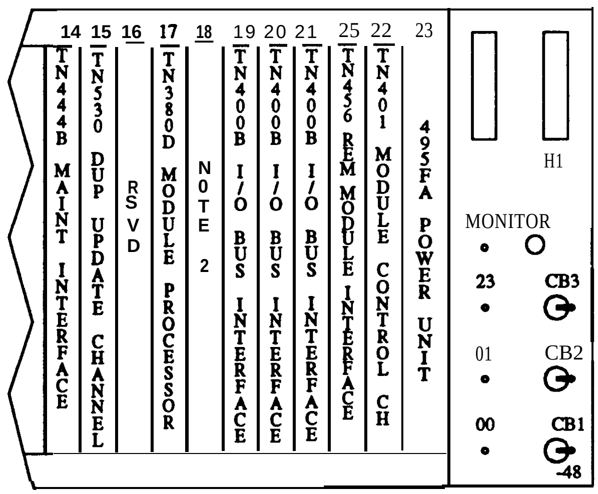
Code	Circuit Pack	Comments
TN380D	Module Processor	One required per control carrier.
TN400B	I/O Bus Interface	One required per control carrier to interface to a total of four port, DS-1, or RMI carriers. Three maximum per control carrier.
TN401	Module Control Channel	One required per control carrier.

continued

TABLE 2-3. Traditional Module-Control Carrier Circuit Packs *(continued)*

Code	Circuit Pack	Comments
TN440B	Port Data Store	One required per control carrier to interface to a total of two port or DS-1 carriers. Six maximum per control carrier.
TN441	Intermodule Data Store	One required per control carrier only in a multimodule system.
TN444B	Maintenance Interface	One required per control carrier.
TN445	TSI P-Store	One required per control carrier.
TN446	TSI ALU	One required per control carrier.
TN456	Remote Module Interface	One required per remote module at remote location and one per remote module at central location.
TN460C	Module Clock Oscillator	One required per control carrier only in a single-module system.
TN463 or TN2131	System Clock Synchronizer External Clock Interface	One required per control carrier in a single-module system with DS-1 or ISDN trunks.
TN481	Light Guide Interface	One required per control carrier only in a multimodule system.
TN512B	Test Support	Not required for system operation. Equipped only during high-level maintenance testing.
TN530	Duplication/Update Channel	One required per control carrier only when duplicated controls are provided.
494GA	DC-DC Converter	One required per control carrier only in multimodule systems with duplicated module controls.
495FA	DC-DC Converter	Two required per control carrier.





• TN481 or TN463

t TN441 or TN460C

NOTES

1. For a single-module unsynchronized switch, slots 00B, 01, and 02 are empty and TN460C (Module Clock) is used in slot 03. For a single-module synchronized switch, slots 00B and 01 are empty, TN463 (System Clock Synchronizer) or TN2131 (External Clock Interface) is used in slot 02, and TN460C is used in slot 03. For an unduplicated multimodule switch, slots 00B and 01 are empty, TN481 (Light Guide Interface) is used in slot 02, and TN441 (TMS Intermodule Data Store) is used in slot 03. For a duplicated multimodule switch, 494GA Power Unit is used in slot 00B, TN481 is used in slot 01, slot 02 is empty, and TN441 is used in slot 03.

2 TN512B (Test Support) is installed in slot 18 if shipped with the switch.

Figure 2-19. Trad itional Module-Control Carrier (J58888M)

Universal Module-Control Carrier (J58890AK-1)

The universal module-control carrier houses all the circuitry in the module's control complex. In addition, the carrier is equipped with two power supplies and can accommodate up to seven remote-module interface circuit packs (used for remote module applications). Two universal module-control carriers are equipped for each universal module in a critical reliability (duplicated) configuration.

The universal module-control carrier has the following features

- I/O connector plate on the rear of the carrier
- Twenty-three dedicated circuit pack slots (see Figure 2-20, *Universal Module-Control Carrier (J58890AK-1))*
- Carrier label on front cover.

The universal module-control carrier is intended for use in universal modules only; it will not work in traditional modules.

Table 2-4, *Universal Module-Control Carrier Circuit Packs,* lists the circuit packs used in the carrier and Table 2-5, *Universal Module-Control Carrier Circuit Pack Placement Rules,* gives the placement rules for circuit packs in the universal module-control carrier.

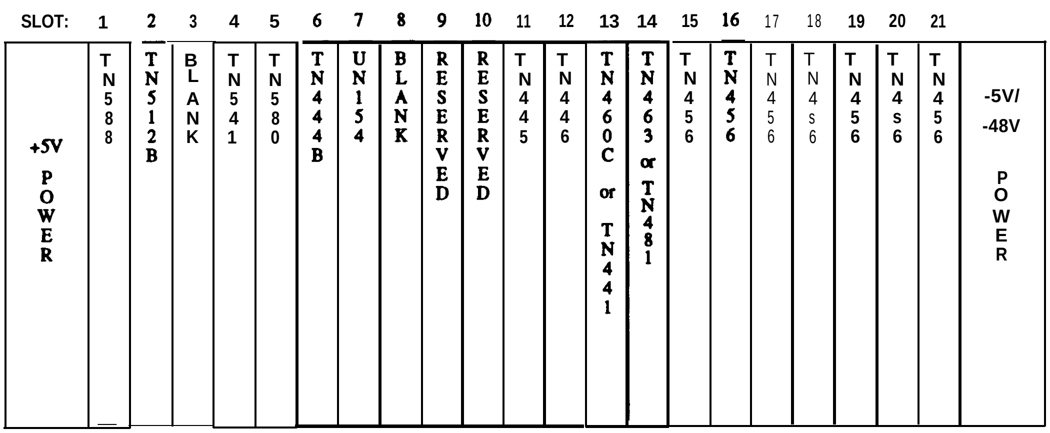


Figure 2-20. Universal Module-Control Carrier (J5S890AK-1)

TABLE 2-4. Universal Module-Control Carrer Circuit Packs

Code	Circuit Pack	Comments
TN588	Module Control Channel	One required per control carrier.
TN441	Intermodule Data Store	One required per control carrier only in a multimodule system.
TN444B	Maintenance Interface	One required per control carrier.
TN445	TSI P-Store	One required per control carrier.
TN446	TSI ALU	One required per control carrier.
TN456	Remote Module Interface	One required in each remote module. Each remote module must have a supporting TN456 at the central location. Module controls (universal modules) at the central location can house up to seven TN456s.
TN460C	Module Clock Oscillator	One required per control carrier only in a single-module system.
TN463 or TN2131	System Clock Synchronizer External Clock Interface	One required per control carrier in a single-module system with DS1 or ISDN trunks.
TN481	Light Guide Interface	One required per control carrier only in a multimodule system.
TN512B	Test Support	Not required for system operation. Equipped only when extensive maintenance testing is required.
TN541	Duplication/Update Channel	One required per control carrier only when duplicated controls are provided
TN580	Universal Module Processor	One required per control carrier.
UN154	Universal Bus Interface	One required per control carrier.

TABLE 2-5. Universal Module-Control Carrier Circuit Pack Placement Rules

Slot	Circuit Pack	Remarks
00	631DA1	Always required in AC powered systems.
	644AI	Always required in DC powered systems.
01	TN588	Always required (see Note).
02	TN512B	Test board; not shipped with system, blank faceplate cover used instead (Z100A).
03	—	Blank faceplate cover required (Z1OOA).
04	TN541	Required only when duplicated modules are provided.
05	TN580	Always required.
06	TN444B	Always required.
07	UN154	Always required.
08	—	Blank faceplate cover required (Z100A).
09	—	Blank faceplate cover required (Z100A).
10	—	Blank faceplate cover required (Z100A).
11	TN445	Always required.
12	TN446	Always required.
13	TN460C	Required only in single module systems.
	TN441	Required only in multimodule systems.
14	TN463 or TN2131	Required only in single module systems.
	TN481	Required only in multimodule systems.

continued

TABLE 2-5. Universal Module-Control Carrier Circuit Pack Placement Rules *(continued)*

slot	Circuit Pack	Remarks
15-21	TN456	Used for remote modules and remote module support. (Each remote module requires a TN456 in Slot 15 of its module control and another TN456 in the central location. Central location TN456s can be housed in Slots 15-21 of the module control in universal modules at the central location.)
22	63lDB1	Always required in AC powered systems.
	645B1	Always required in DC powered systems.
NOTE: Slot 01 is equipped with a 0.50-inch blank faceplate cover (Z100C). This cover is required in addition to TN588 to completely cover Slot 01.		

All unused circuit pack slots are equipped with a blank faceplate cover (Z100A). In the case of duplicated module-control carriers, the same circuit packs appear in both carriers.

Traditional Port Carrier (J58888A)

The traditional port carrier (see Figure 2-21, *Traditional Port Carrier (J58888A))* connects the system to external equipment (analog/digital, voice/data, and lines/trunks). This carrier provides dedicated port circuits determined by the peripheral terminal equipment or trunking facilities connected. It also provides an interface to the module control for port control and status information, and for PCM voice or data connections.

The port carrier accommodates SN-coded circuit packs using 100-pin 963G connectors and TN-coded circuit packs using 200-pin 963C connectors. The port carrier also accepts ANN17B circuits. When the ANN17B is installed in the port carrier, it provides four line circuits for 7300S series voice terminals. Any port circuit pack that needs access to eight or fewer time slots on the group bus maybe installed into any universal port position in the carrier. However, there are pairing rules for assigning these circuit packs due to cabling assignments to termination fields and number of circuits per circuit pack. Eight 25-pair connectors are provided for I/O cabling to termination fields with each connector accommodating the interfaces for two adjacent port circuit packs.

For information on circuit packs in the port carrier, see Table 2-6, *Traditional Port Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the port carrier. A fuse panel is on the right side of the port carrier. Numbers are stamped next to the fuses to identify the slot numbers associated with each fuse.

Figure 2-21 identifies the circuit pack type and code for each slot location in the port carrier.

TABLE 2-6. Traditional Port Carrier Circuit Packs

Code	Circuit Pack	Comments
ANN17B	7303/7305 Interface Circuit	Four lines per circuit pack when used in a port carrier (see Note).
SN224B	MFET Line Port	Four lines per circuit pack.
SN228B	OPS Line circuit	Eight lines per circuit pack
SN229	ONS Line Circuit	Eight lines per circuit pack Used only for loop lengths less than 3500 feet.
SN230B	CO Trunk	Four trunks per circuit pack.
SN231	Auxiliary Trunk	Four trunks per circuit pack.
SN232B	DID Trunk	Four trunks per circuit pack.
SN233C	Tie Trunk/Attendant Interface	Four trunks per circuit pack.
SN238	EIA port	Four lines per circuit pack.
SN241	Contact Interface	Eight make contacts per circuit pack.
SN243B	Data Port	Four lines per circuit pack.
SN244	ANI Data Transmitter	Two channel outputs per circuit pack.
SN250	Call Progress Tones	Eight progress tones generated. Two required per module.

continued

TABLE 2-6. Traditional Port Carrier Circuit Packs *(continued)*

Code	Circuit Pack	Comments
SN251	Touch-Tone Receiver	Four circuits per circuit pack. Number required per system is based on traffic engineering.
SN252	Touch-Tone Sender	Four circuits per circuit pack. Number required per system is based on traffic engineering.
SN253C	Auxiliary Tones	One required per module. Two required per module for reliability with certain optional features (that is, AUTOVON or terminal-dialed calls using modem pool or DS-1 trunks).
SN254	Attendant Conference circuit	One required for each six port attendant conference circuits. Thirteen maximum per system.
SN255	Tone Detector 2	Number based on traffic engineering.
SN261 or TN771B	Analog/Digital Facility Test or Maintenance Test Circuit Pack	One required per system. More may be required based on amount of ATMS testing scheduled.
SN270B	General-Purpose Port	Four lines per circuit pack to support the DCP (Digital Communications Protocol).
TN452C	Universal Port Control Interface	One required per port carrier.
TN454B	Universal Port Data Interface	Two required per port carrier (one for each carrier half).
494GA	DC-DC Converter	Two required per port carrier (one for each carrier half).

NOTE: Although the ANN17B has eight port circuits, only four of them maybe used when the ANN17B is installed in a traditional port carrier. (The four circuits are 0,2,4, and 6.)
However, when the ANN17B is installed in a DS-1 carrier, all eight port circuits may be used.

NOTES

1. Carrier positions 00-03, OS-OS, 13-16, 18-21 are universal port positions that can accept the following SN-coded circuit packs:

CKT Pack Code	Circuit Pack Name	CKT Pack Code	Circuit Pack Name
SN224B	MFET Line Port	SN250	Call Progress Tone
SN228B	Off Premises Line	SN251	Touch-Tone Receiver
SN229	On Premises Line	SN252	Touch-Tone Sender
SN230B	CO Trunk	SN253C	Auxiliary Tones
SN231	Auxiliary Trunk	SN254	Attendant Conferene
SN232B	DID Trunk	SN255	Tone Detector 2
SN233C	Tie Trunk/Attendant Interface	SN261 or TN771B	Analog/Digital Facility Teat or Maintenance Test Circuit Pack
SN238	EIA Interface	SN270B	General-Purpose Port
SN241	contact Interface		
SN243B	Data Port		

2. Carrier positions 00 through 02 can accept SN244 automatic number identification (ANI) circuit pack.

3. If the traditional port carrier is above a module-control carrier, where power units are at the ends of the carrier, place the SN232B circuit packs near the center of the traditional port carrier. If the traditional port carrier is above another traditional port carrier, where power units are at the center of the carrier, place SN232B circuit packs near the ends of the tradtional pat carrier. The reason SN232B circuit packs must be placed away from the power units is that the power units emit noise that is picked up by the tip and ring paths leads of the SN232B, which act as antennae. This placement of the SN232B circuit packs is required to pass FCC certification.

Figure 2-21. Traditional Port Carrier (J5S888A)

Common Port Carrier (J58890BB-3)

These carriers contain the universal module's port network complex that is made up of DEFINITY Generic l-based port and tone circuit packs. The main hardware components of the common port carrier are:

- I/O connector plate on the rear of the cabinet. This plate provides 20 25-pair connectors used to interface the circuit pack slots with the cross-connect field.

- Two dedicated slots for power units, one dedicated slot for service circuit packs, and 20 universal slots for port circuit packs (see Figure 2-22 *Common Port Carrier (J58890BB-2)).* Each of the 20 universal port slots has a connector appearance on the I/O connector plate.
- Carrier label mounted on the front cover.

The common port carrier is used in universal modules only; it will not work in traditional modules. The universal module houses one, two, or three port carriers. As can be seen in Figure 2-11, *Universal Module Cabinet (J58890K-1)*, port carrier 00 is installed in position C, port carrier 01 is in position D, and port carrier 02 is in position E. At least one port carrier is always equipped. For critical reliability configuration at least two port carriers must be equipped in each module. This allows tone-generator circuit packs to be installed in two different port carriers.

For more information on circuit packs in the common port carrier, see Table 2-7, *Common Port Carrier Circuit Packs.*

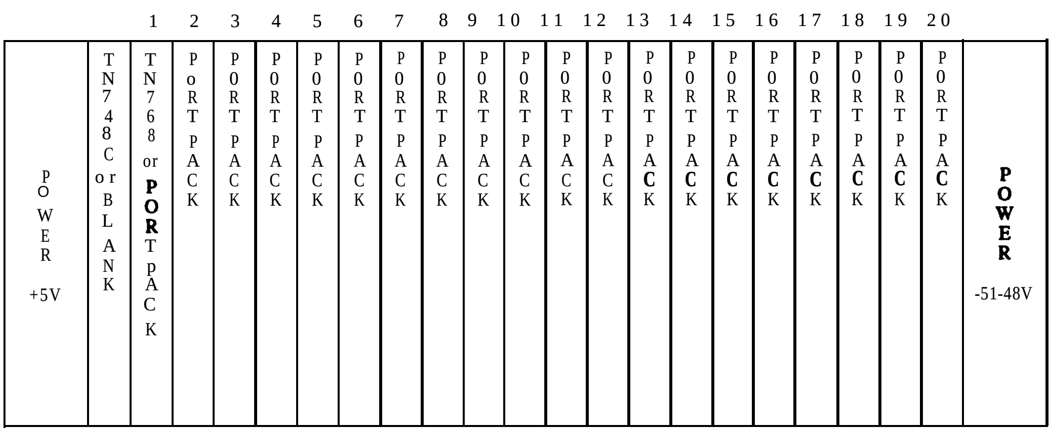


Figure 2-22. Common Port Carrier (J58890BB-3)

TABLE 2-7. Common Port Carrier Circuit Packs

Code	Circuit Pack	Comments
TN555	DS-1 Packet Adjunct	Twenty-four channels on a DS1 link. Used with TN767 to provide ISDN/PRI
TN556	ISDN BRI Line	Twelve ISDN BRI ports per circuit pack
TN726	Data Line (EIA)	Eight lines per circuit pack
TN735	MET Line	Four lines per circuit pack
TN742	Analog Line (OPS, ONS, OPX, Test)	Eight lines or eight contact interfaces or eight analog modems per circuit pack
TN746	Analog Line (ONS only)	Sixteen lines or sixteen contact interfaces per circuit pack. Used only for loop lengths less than 3100 feet (24 AWG Wire).
TN747B	CO Trunk	Eight trunks per circuit pack
TN748C	Tone Detector	Number of circuit packs required per system is based on traffic engineering. Minimum of two circuit packs per module that are mounted in the service slot.
TN753	DID Trunk	Eight trunks per circuit pack
TN754	Digital Line (MFDT)	Eight lies per circuit pack to support terminals that use the Digital Communications Protocol (DCP).
TN760C	Tie Trunk	Four trunks per circuit pack
TN762B	Universal Line (MFAT) (7300 series only)	Eight lines per circuit pack
TN763C	Auxiliary Trunk	Four trunks per circuit pack
TN767	DS-1 Interface	Twenty-fro ports per circuit pack. When used in the trunk mode, this circuit pack requires two adjacent carrier slots.
TN768	Tone Clock	One circuit pack required per module. (Two required if module is duplicated.) Maximum of one TN768 per port carrier.

continued

TABLE 2-7. Common Port Carrier Circuit Packs ***(continued)***

Code	Circuit Pack	Comments
631DA1	AC Single Output Power supply (+5V)	One required per port carrier in modules equipped with a AC power distribution unit.
631DB1	AC Dual Output Power Supply (-5V/-48V)	One required per port carrier in modules equipped with a AC power distribution unit.
644A1	DC Single Output Power supply (+5V)	One required per port carrier in modules equipped with a DC power distribution unit.
645B1	DC Dual Output Power Supply (-5V/-48V)	One required per port carrier in modules equipped with a DC power distribution unit.

DS-1 Carrier (J58888N)

This carrier (see Figure 2-23, *DS-1 Carrier (J58888N))* is a modified port carrier. It provides high-density dedicated interface circuits for DS-1 trunks or 7300S series voice terminals. The DS-1 carrier accommodates SN- or ANN-coded circuit packs using 100-pin 963G connectors or 150-pin 963M connectors and TN-coded circuit packs using 200-pin 963C connectors. Fifteen 25-pair connectors are provided for input/output cabling to termination fields with each connector providmg the interface for an ANN17B or an SN-coded circuit pack.

For information on circuit packs in the DS-1 carrier, see Table 2-8, *DS-1 Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the DS-1 carrier. A fuse panel is on the right side of the DS-1 carrier. Numbers are stamped next to the fuses to identify the slot numbers associated with each fuse.

Figure 2-23 identifies the circuit pack type and code for each slot location in the DS-1 carrier.

TABLE 2-8. DS-1 Carrier Circuit Packs

Code	Circuit Pack	Comments
ANNllE	DS-1 Trunk Interface	Two per carrier when used in the line+trunk mode; four per carrier when used in the line-only mode.
ANN15B	Remote Carrier Local	Equivalent to three line port packs or 24 line ports. up to four maximum per carrier installed when remote groups are provided.
ANN17B	7303/7305 Interface Circuit	Eight lines per circuit pack.
ANN35	ISDN Primary Rate port	Same carrier configuration as ANNllE line+trunk mode.
SNxxx	SN-Coded Port Circuit Packs	All SN-coded circuit packs in the traditional port carrier can be installed in the DS-1 carrier.
TN452C	Universal Port Control Interface	One required per carrier.
TN454B	Universal Port Data Interface	Two required per carrier (one for each carrier half).
494GA	DC-DC Converter	Two required per carrier (one for each carrier half).

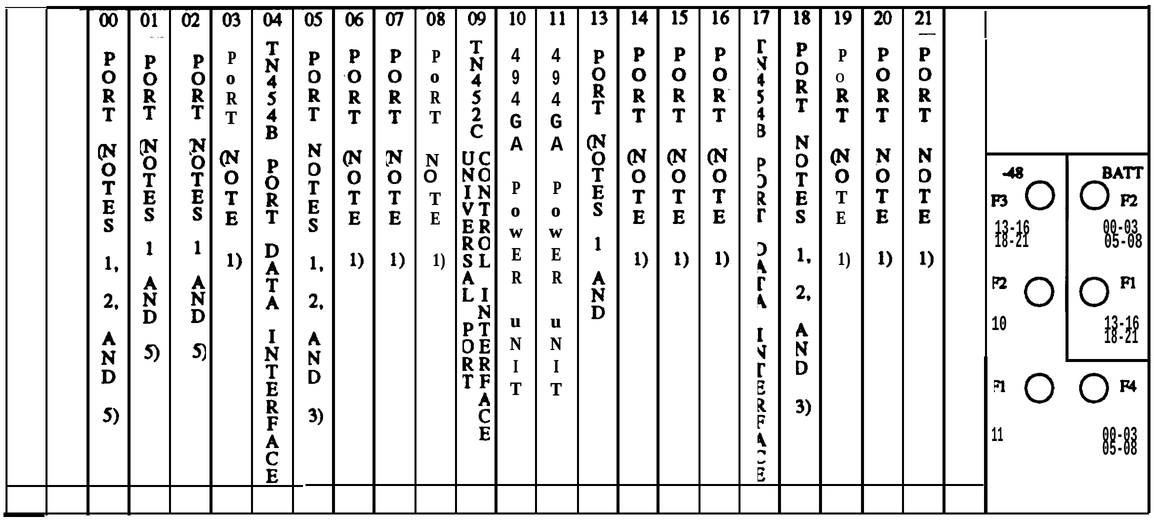
RMI Carrier (J58888S)

The RMI carrier (see Figure 2-24, *RMI Carrier (J58888S))* provides fiber-optic interface circuitry at the central location for connecting switch modules to remote modules. Each RMI carrier contains interface circuitry for up to eight remote modules with duplicated controls or up to 16 remote modules with unduplicated controls. A maximum of two RMI carriers are possible for a system with unduplicated module controls or four RMI carriers for a system with duplicated module controls.

For information on circuit packs in the RMI carrier, see Table 2-9, *RMI Carrier Circuit Packs.*

Backplane wiring provides connections between circuit packs in the RMI carrier. A circuit breaker panel is on the right side of the RMI carrier. Circuit breaker CB1 is associated with slots 00 through 10 and circuit breaker CB2 is associated with slots 11 through 22.

Figure 2-24 identifies the circuit pack type and code for each slot location in the RMI carrier.



NOTES:

1. Carrier positions 00-03,05-08,13-16,18-21 are universal port positions that can accept all SN-coded circuit packs and ANN17 MFAT line port.
2. Carrier positions (K), 05,13, and 18 can accept circuit pack ANN15 remote carrier local (RCL) or ANN11 DS-1 trunk interface. If ANN15 is used in slot 00, 05, 13, or 18, the next 2 adjacent slots to the right must be left vacant. ANN11 can be used in slots 00 and 13 in theline only mode and in slots 10 and 18 in the line+trunk mode.
3. Carrier positions 05 and 18 can accept circuit pack ANN11 DS-1 trunk interface or ANN35 ISDN primary rate port. If ANN11 or ANN35 is used in dot 05, slots 00,01,02, 06, and 07 cannot be used. However, slots 03 and 08 can be used for ANN17 or any port circuit when slot 05 is used for ANN11 or ANN35. If ANN11 or ANN35 is used in slot 18, slots 13,14,15, 19, and 20 cannot be used. However, slots 16 and 21 can be used for ANN17 or any port circuit when slot 18 is used for ANN11 or ANN35.
4. The DS-1 carrier is not intended to replace the port carrier. Use of SN port circuit packs in the DS-1 carrier causes inefficient usc of the wall field
5. Carrier positions 00 through 02 can accept SN244 automatic number identification (ANI) circuit pack.

Figure 2-23. DS-1 Carrier (J58888N)

TABLE 2-9. RMI Carrier Circuit Packs

Code	Circuit Pack	Comments
TN456	Remote Module Interface	One per remote module (two if duplicated TMS and module controls provided).
495FA	DC-DC Converter	Two required per carrier, one for each carrier half.
TN452C	Universal Port Control Interface	One required per carrier.

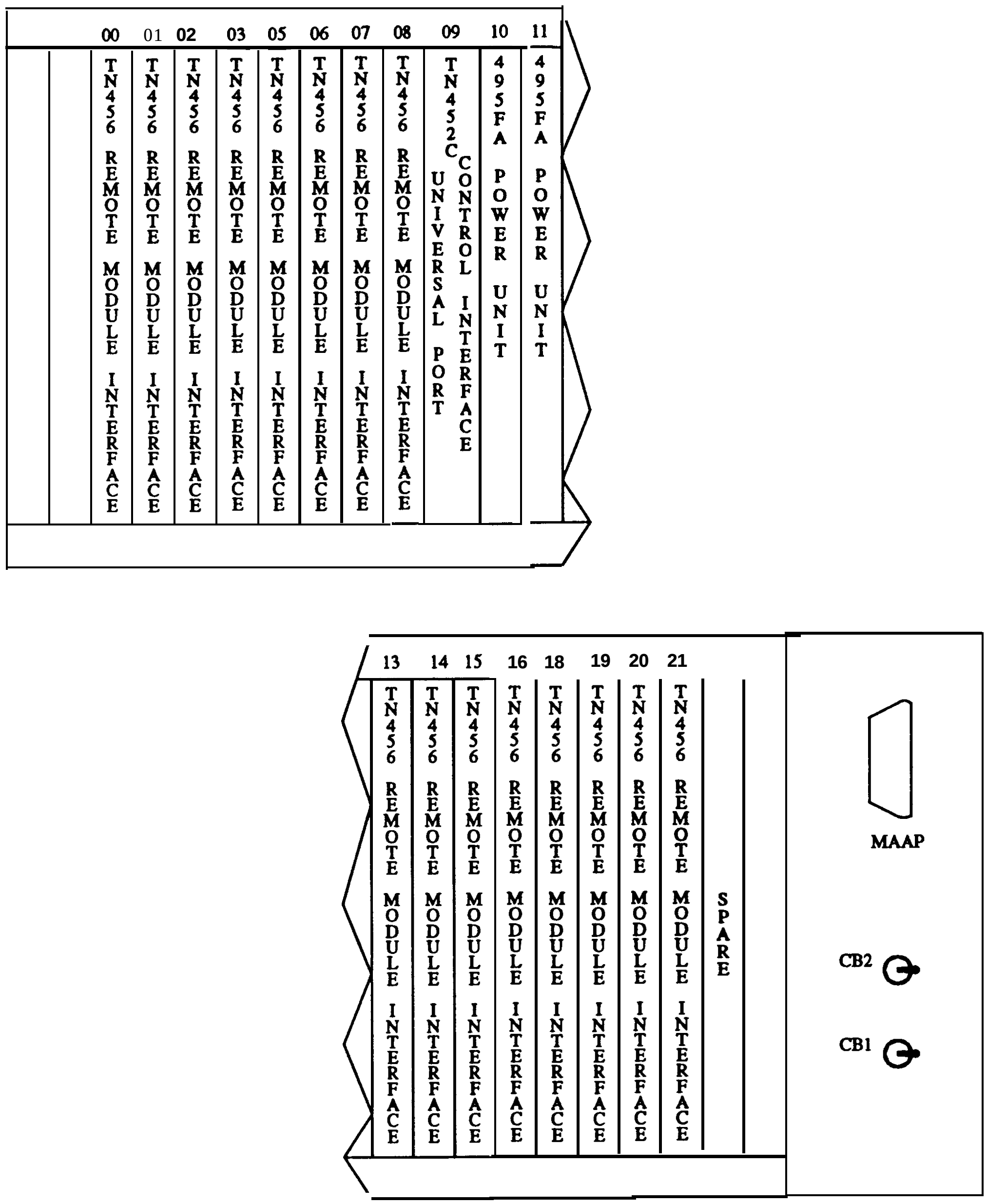


Figure 2-24. RMI Carrier

Remote Group Housing (J58889AN)

The remote group housing (see Figure 2-25, *Remote Group Housing (J58889AN))* is a hardware unit used at remote locations that contains line or data circuits, a cooling fan, a rectifier, an inverter (to supply ringing current), and a thermal sensor. It can be wall-mounted or set on a table or shelf.

In most cases, power for the housing comes from an AC feeder that is protected by a dedicated customer-provided fuse or circuit breaker. Disconnect switches, AC protector cabinets, or AC load centers are not required for the housing. Critical battery backup and standby power are optional. DC power is provided by a -48V rectifier unless the standby power option is used. For standby power, a DC-DC converter replaces the rectifier and provides low-level DC voltage to the port interface circuits.

The remote group housing provides the remoted line and data interface circuitry in a remote group system configuration. Though not a standard carrier housed in a network cabinet, this self-contained unit houses up to two remotely located port groups. Each port group consists of:

- One remote group interface-remote circuit pack (ANN16B)
- Up to three line or data interface circuit packs (analog, hybrid, digital, or EIA)
- One CAL1B frequency generator/alarm circuit pack that is shared with the other port group in the remote group housing.

The CAL1B frequency generator/alarm board is a special-application unit mounted inside a remote group housing. It provides 20-Hz ringing voltage for the remoted port groups. Ringing voltage is obtained from two DC-DC converter circuits that generate +90V and -190V from a -48V supply.

The CAL1B also provides low-voltage detection, alarm conversion, and other miscellaneous features. Up to four -48V fuse alarms and five contact closure alarms can be paralleled. Resistors are provided to facilitate two-speed fan operation and over-temperature shutdown.

For information on the other circuit packs in the remote group housing, see Table 2-10, *Remote Group Housing Circuit Packs.*

TABLE 2-10. Remote Group Housing Circuit Packs

Code	Circuit Pack	Comments
ANN16B	Remote Carrier Control	Terminates up to three line port circuit packs (24 time slots). Two maximum per remote group housing.
ANN17B	7303/7305 Interface Circuit	Eight lines per circuit pack.
SN228B	OPS Line Circuit	Eight lines per circuit pack
SN238	EIA Port	Four lines per circuit pack.
SN270B	General-Purpose Port	Four lines per circuit pack to support the DCP (Digital Communications Protocol).
CAL1B	Frequency Generator/Alarm	One required per remote group housing.

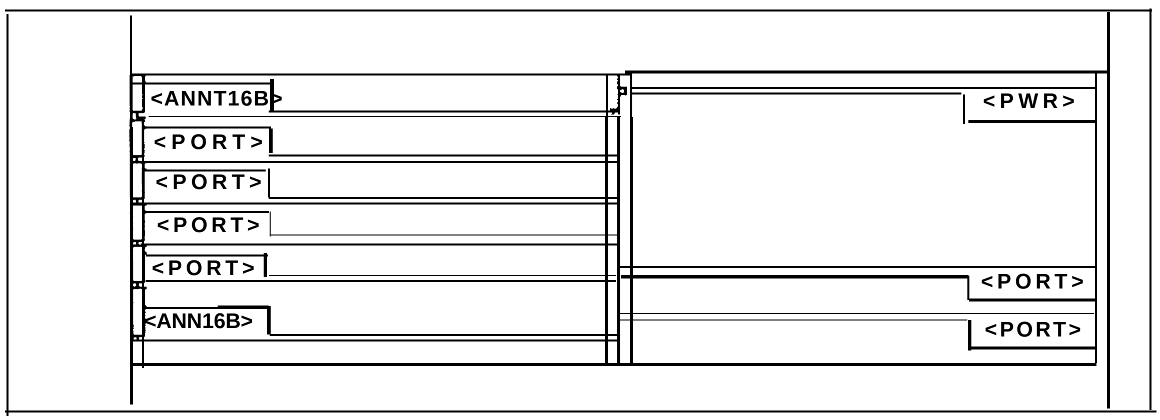


Figure 2-25. Remote Group Housing (J58889AN)

STATION MESSAGE DETAIL RECORDING (SMDR) CABINET

The SMDR cabinet (see Figure 2-26, *Station Message Detail Recording (SMDR) Cabinet)* contains the following equipment

- A Kennedy 9800 tape drive for driving a 9-track magnetic tape
- A 9-track magnetic tape that Stores information for approximately 330,000 calls (a readable form of the tape can be provided through machine processing)
- A clock and calendar display that provides a rneans for setting the time and date to be recorded onto the tape
- A call information display for displaying detailed call information for one call at a time
- A control panel providing a user interface to the nine-track tape operation for functions such as changing the tape, dumping memory, and clearing the display
- An SMDR carrier that contains the circuit packs that control SMDR operations
- A fan assembly for maintaining interior cabinet temperature
- A Kennedy 9217 tape formatter that records data on a standard nine-track magnetic tape
- An AC distribution unit for distributing AC power throughout the cabinet.

AUXILIARY CABINET

The auxiliary cabinet (see Figure 2-27, *Auxiliary Cabinet)* contains DEFINITY Communications System Generic 2 auxiliary equipment required by the customer.

This cabinet can contain:

- A fuse panel for mounting circuit fuses that protect auxiliary equipment
- A sensor for monitoring the cabinet temperature
- Auxiliary equipment providlng features such as radio paging access, recorded telephone dictation access, rewarded announcement, and so on
- A fan assembly for maintaining interior cabinet temperature
- A -48V rectifier that provides DC power to the auxiliary cabinet
- An AC filter for the -48V rectifier. When equipped with extended power reserve, a DC filter replaces the AC filter (AC distribution unit)
- An auxiliary alarm unit and a alarm distribution panel that detects and reports equipment malfunctions
- A DC filter that provides extended power reserve.

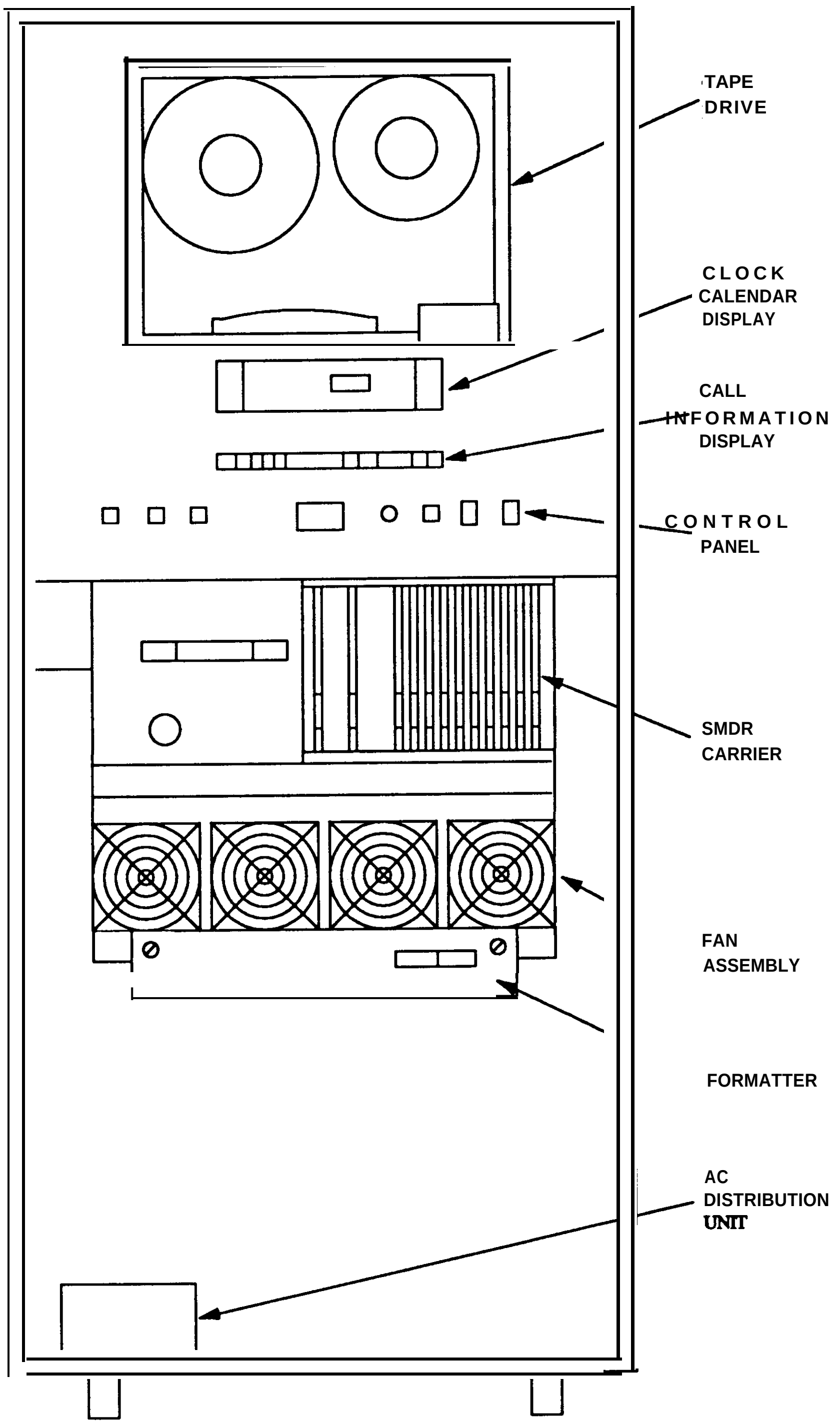


Figure 2-26. Station Message Detail Recording (SMDR) Cabinet

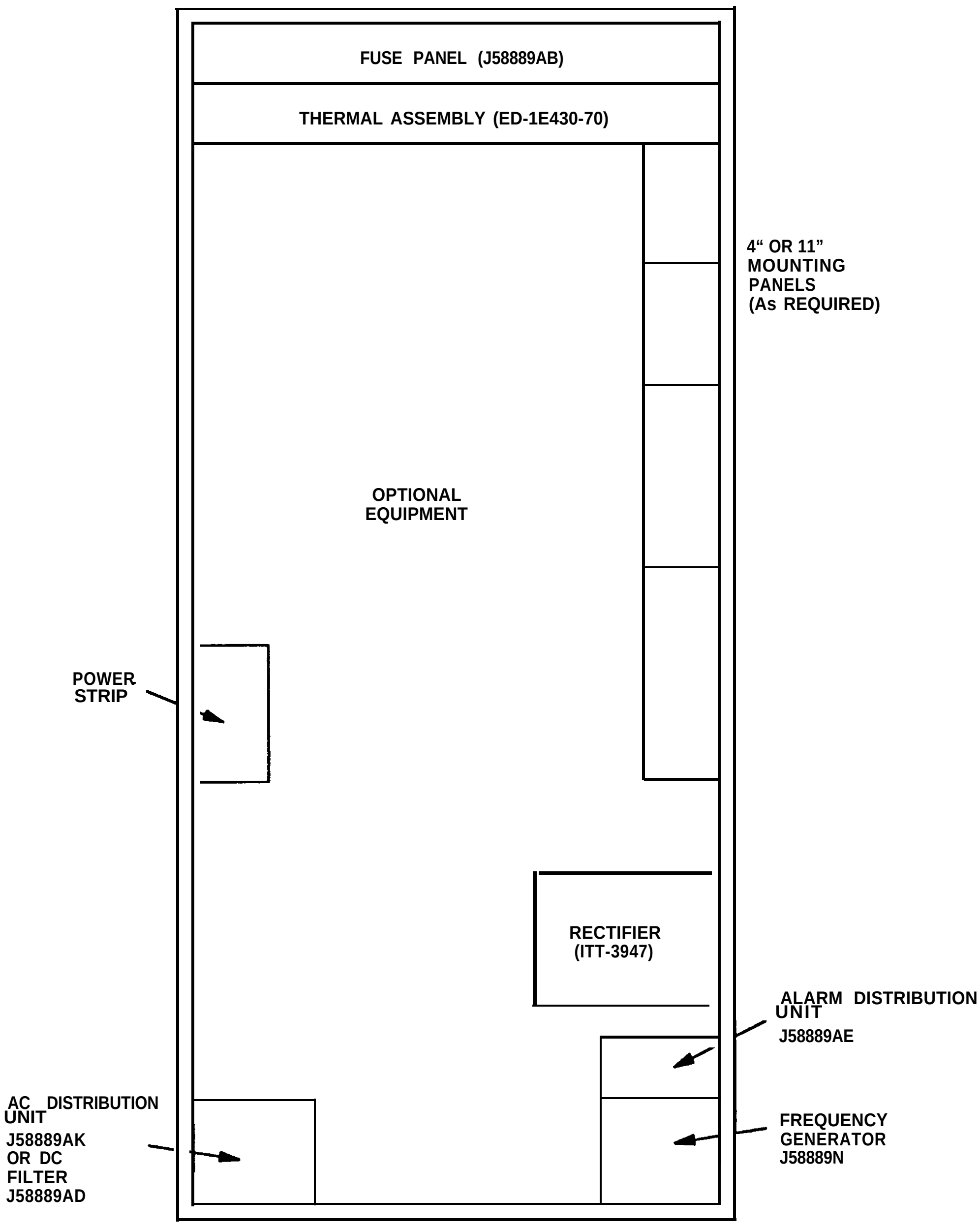


Figure 2-27. Auxiliary Cabinet

3. USER INTERFACES

You will use the DEFINITY™ Manager II, alarm panel, microdiagnostic tests, circuit pack LEDs, and tools and test equipment to maintain the switch. This chapter gives an overview of each of these interfaces.

GETTING STARTED WITH DEFINITY MANAGER II

This information is adapted from *DEFINITY™ Manager* II *MS-DOS® Version Operation,* (555-104-505 Issue 1).

Manager II is the name of software that you can use to administer and maintain DEFINITY™ Communications Systems Generic 2, System 85, and selected Dimension® systems from an AT&T-certified personal computer loaded with the MS-DOS operating system (version 3.2 or higher). This chapter introduces the capabilities of the Manager II software and its functional characteristics.

When an AT&T communications system is installed, AT&T provides software that determines how that system is to function. This software enables the features requested on your original customer order (for instance, class of service, dialing plan, and system features). The software is stored on a tape or disk that can be read into the system when initialization is required (such as in the event of power failure).

As communications needs change, communications systems must be changed to meet those needs. For example, when a person in your organization changes rooms, your communications system must be changed to reflect this relocation. Numbered procedures enable you to access configuration data in the system or to change the configuration of the system. In common with other system management devices, the Manager II software makes these numbered procedures available to you. And, because maintenance procedures are accessed in the same way, a qualified technician can use Manager II to perform system maintenance operations.

ENHANCED-MODE OPERATION

This chapter describes the principles of Manager II operation in the enhanced mode. Enhanced-mode operation accesses the numbered procedures in your system's software. The enhanced mode of the Manager II software makes use of a database: the switch support base that describes your DEFINITY Generic 2.

Break

Manager II has a break function that is similar to that of MS-DOS. That is, to stop an activity at any time, press either (CTRL-c) or (CTRL-BREAK). If a run file is active, control is returned to the environment from which it was executed either the MS-DOS operating system or the Manager II software's command line. If a connection sequence is in progress, it is halted and control is returned to the Manager II command line. Otherwise, the Manager II software is halted and control is returned to the MS-DOS operating system.

Cursor

The cursor is the visual indicator that appears as a blinking underline on Manager II displays. As you progress-your work, the cursor moves from one screen position to another to indicate where a character can be entered or deleted.

Enhanced-Mode Access

If your PC has the SSB database described above, enhanced mode is active immediately after you log in to Manager II. In this case enhanced mode is the default mode of operation. To access enhanced mode from another Manager II mode, simply enter enh at the command line. If an SSB is available, Manager 11 switches to enhanced mode operation.

Working Without a Connection

Before you connect to a switch, several functions of the Manager II software are available to you. For example, you can access the command help facility described below. You can also open a log file, or use the *hist* command to check the last few actions taken by Manager II. You can also modify your user database with the *udb* command.

Connection

After you log in to Manager II, you may connect to any of the switches supported by your user database. If your PC has two communication ports, you can connect to two switches simultaneously. To connect, in the sense used here, use the Manager II software to activate a PC communication port (and, perhaps, to dial the number of a switch) and to log into a switch.

In general, you can connect in either of two ways. If you use the *con* command without argument, you are presented with a menu that makes it possible to select switch and connection parameters interactively. If you use the *con* command with the switch name as an argument, the connection process begins immediately.

Regardless of how a connection is initiated, messages are displayed that report on the state of the connection attempt as it proceeds. When the attempt to connect fails, the software returns to its previous state. The last of the messages mentioned above gives you the reason for the failure. If you would like to review the last nine messages, enter `hist,` the history command. A display appears showing the last nine command lines, status and error messages, and procedure data- Press the function key labeled [F1 EXIT] to leave the display.When the attempt to connect succeeds, the software displays the active switch modes and returns the cursorto the command line to await your command.

DATA ENTRY

Once you have connected to a switch, you may access switch procedures to enter data into the switch. The switch procedures are numbered with three-digit numbers. The object of a switch procedure is to send data to the switch. These data consist of numbers, each of which has an effect on the switch's programming. In enhanced mode, Manager II arranges these numbers as *fields* (on an orderly display) for you to fill in.

Data Entry at the Command Line

Enter *p* followed by a procedure number to access that procedure. (Type p 600, for example, to access Procedure 600.) If you are familiar with the procedures, you can enter data directly on the same command line. For example,

P 600 t 2 3 x c f 2 4 ; l X

means the following. Summon Procedure 600 Test 2. Enter the number 3 in the first field, then execute test 2 and get any information known about that number (x). Change the contents of field two to 4; skip a field (the semicolon); and change the next field (field three) to 1. Finally, execute the test x). It is possible to eliminate some of the space-s in the command. One of the many equivalent ways the command line could have been entered is:

p600t2 3x cf2 4 ; lx

Command Help

Furthermore, an on-line help system is available for your use at any time whale using Manager II in enhanced mode. You can view either brief reminders of the meaning of the commands or complete descriptions of the commands and their use. Either press the function key labeled [F8 CMDS] or enter hc or **?** at the command line to view a display of commands and their meanings. To access the complete descriptions, either press the function key labeled [F5 HELP] or enter h or help at the command line.

Data Entry into the Fields

If you would rather enter data directly in the fields, proceed as follows. Access a procedure and wait for its display to appear. The display usually appears on your screen with the first field highlighted. The highlighted field is ready to accept data and is said to be active. The cursor is currently on the command line. Press the function key labeled [F3 DATA] to move the cursor to the highlighted field. Enter data into the field by entering new data while the curor is in the field. Edit the field with the following keys.

- The (BACKSPACE) key removes a character as the cursor moves backward over it.
- The function key labeled [F4 CLEAR] blanks the entire field.

Having filled in a field to your satisfaction, use the following keys to move to other fields.

- Any of the (ENTER), (TAB), (→), and (↓) keys enter the data in the active field and moves the cursor to to the next field. (his action leaves data in the new field intact.)
- Any of the [SHIFT-TAB], (←), and (↑) keys enters the data in the active field and moves the cursor to the preceding field. (This action blanks data in the new field.)

To Exit the Fields

Recall that you press the function key labeled [F3 DATA] to move the cursor to the active field. That act of pressing (F3) caused its label to change to [F3 CMD LN] Press this key again to return the cursor to the command line. The label of the key changes as appropriate to offer access to the command line or the active field.

Field Help

While a field is active (that is, while it is highlighted), an [F6 FIELD] label appears on the screen. Press (F6) to get help that pertains to the active field. This help maybe in the form of a range of possible values, if appropriate. Or, if more information is called for, this help may take the form of a window with text that you can scroll by means of the arrow and page keys. Each text element consists of an abbreviation (an *encode)* and supporting text describing the meaning of this encode in the current field.

In the latter case, a highlighted bar appears in the window. Use the arrow and page keys to scroll through potential entries until you find the correct one. To select the encode described in the window, place the highlighted bar on your choice of encodes, and press the function key labeled [F3 SELECT]. The Manager II software transfers the encode thus selected to the current field and exits the field-help facility. To exit the field-help facility without making a selection, press the function key labeled [F1 EXIT].

Figure 3-1 illustrates Procedure 600 Test 2 with field help active foeld field 2. In this case the user may have moved the cursor to field 2 and pressed the function key labeled [F6 FILED]. To find encode 3, the user may have pressed the function key labeled [F4 FIND] and then entered initialization. Now, if the user were to press the function key labeled [F3 SELECT]Manager II would enter the encode into field 2. In addition, the encode meaning would display to the right of field 6. So the lime surrounding field 2 would look like this:

```
3.  Unit Type  [3 ]  Initialization Cause
```

and the cursor would move onto field 3.

This example illustrates another facet of Manager II's enhanced mode field help. When you enter an encode in many procedure data fields, whether or not you have pressed [F6 FIELD], the meaning of that encode appears to the right of the field. This allows you to verify as you are entering digits that you have chosen the right encode.

```
                ENHANCED MODE - PROCEDURE: 600, TEST: 2
                  EXAMINE ALARMS AND ERRORS BY UNIT TYPE

  2. unit Type: 3
                                           TIME STAMP
EQUIPMENT LOCATION                          11.  Stamp Index -
   3.   Module: --                          12.          Day --
   4.  Cabinet: R                           13.         Hour --
   5.  Carrier: n                           14.       Minute: --
   6.     slot: --
   7.  Circuit: --                         15. Procedure Reference --

 8.        Alarm Status: -
 l= Environment
 2=Disk Tape System (DTS)
 3= Initialization causes
 4=Common cent rol I/0
 5=Memory
 6=Module Control Channel (MCC)
 7=Time multiplexed switch or module processor (TMS or MP)
 8.Maintenance Interface
Connected to CC0 ON-LINE
RANGE 1-99
enter command:
F1 EXIT | F3 RETURN | F3 SELECT | F4 FIND |
```

Figure 3-1. Procedure 600, Test 1 with Field Help

COMMAND SYNTAX

A commandline appears near the bottom of basic-mode and enhanced-mode Manager II Screens. When it is appropriate to enter a command, the cursor appears immediately after an enter command: prompt. Here are the general rules of syntax.

- Always enter a space between items of data. (Manager II interprets ``123" as data for one field, while "1 2 3" is read as data for three distinct fields.)
- Enter a series of commands, parameters, and data by pressing (ENTER) (or whatever the equivalent of "CARRIAGE RETURN" is called on your keyboard).
- Some commands require that (ENTER) be pressed before another command can be executed. For example an (ENTER) must immediately follow the task command.

In general, commands and data are easier to read (for example, in log files) if they are separated by spaces (or tabs or newlines), so it is a good idea to use such space as a rule. However, you will find that the Manager II software correctly interprets most commands whether they are entered like "p150w2" or "p 150 w 2".

Most basic-mode and enhanced-mode Manager II commands do not accept parameters at all. A few, however, require parameters. A parameter is a way to tell a command to change how it operates or to give the command enough information to perform its function. Parameters immediately follow the command itself. For example:

- The procedure command `,p,` requires number: `p 100`
- The equipment location command `,el,` requires an equipment location: `el 1 0 c 2 23`
- The run-program command, run, must have the quoted name of the program file to be run. (It may also take another parameter.): `run "cmd- file”`

Parameters are optional for a few commands. For example:

- The *get* command may take an option that modifies its effects or a file designator that specifies the files on which it operates or both: `get -a “file” or get`
- The *log* command may take the name of a log file (otherwise a default file name is used): `log “log-file'' or log`
- The switch-mode command, *m*, may take the number of the mode to be accessed (see the description on for details): `m 123 or m`

COMMAND REFERENCE

The commands listed below are basic-mode or enhanced-mode commands. Some of them can be used in *run files*, that is, in command scripts executed by the Manager II software. All of them can be used on the Manager II command line. Of the commands listed below that apply to procedures, not all apply to every procedure. Some commands work only with administrative procedures (procedures numbered from 000-499). Some work only with maintenance procedures (procedures with numbers greater than 499). Some are needed only with particular administrative or maintenance procedures. If a procedure cannot execute a command that you have used, it will respond with an error message.

bas— Basic Mode

Use ***bas*** to change to Manager II’s basic mode. (Find a description of basic mode in chapter 4.)

bo — Busy Out

Use *bo* to place circuit locations in maintenance busy-out status. Use this command either from a maintenance procedure that allows a circuit to be busied out (not all procedures allow this), or in one of the following busy-out procedures. (Not all procedures are available on all communications systems. Procedure 635 is available only on Generic 2 systems.):

Procedure 635- cause of maintenance busy out
Procedure 631- Trunk group busy out

CAUTION Equipment is removed from service when placed in busy-out status. Consider this effect before using the *bo* command.

cdx— Clear Data Execute

Use *cdx* to resolve alarms, that is, to clear the alarm-sent bits in the error log without clearing the record itself. Clearing the alarm-sent bit of an error record turns off the alarm indicator on the alarm panel and on the Manager II status line if there is no reason other than the state of the error log for the indicators to be on. Like certain other commands, cdx is effective only when used from within appropriate maintenance procedures (such as Procedure 600).

cc— Clear Entry

Use *ce* to clear the current input field. New data can now be entered in the cleared field, or, to leave the field blank, use the; command (described above) to move to the next input field.

cf — Change Field

Use *cf*, followed by a field number, to make the specified field go blank. The specified field lights up to indicate that it is ready for input. For example, `cf 4` changes the current input field to field 4 (provided, of course, that field 4 exists and accepts data).

con —Switch Connect

This command establishes a connection with a named switch. To use the command, enter con (for *connect)* then a space and a switch name and press (ENTER). (A switch name is the name of a particular switch, a name determined by you and included by AT&T in your Manager II user database.) The *con* command refers to the database for the default connection conditions associated with the named switch.

Users can override the following defaults: the connection type, the data (baud) rate, the port number, the wait timeout, and the number of attempts to connect. To do so, use the *con* command followed by any of the options given below.

`switch_name`	`-bBit_rate`	`-cConnect_type`
`-pPC_Port_No.`	`-wWait_timeout`	`-nNo._of_retries`

If you use the switch name, it must be the last option on the command line. The parameters introduced in the paragraph above are explained in Table 3-1, Connection Parameters.

TABLE 3-1. Connection Parameters

Name	Parameter	Comment
Connection type	hw md mp mt	hard-wired modem, digital (DTDM, PDM) modem, pulse dialing modem, tone dialing
Baud rate	300 1200 4800 9600 19.2	baud kilobaud
PC port number	1 2	COM1 COM2
wait timeout	10-99	number of seconds that modem waits from the start of dialing until the return of carrier detect signal
Number of attempts	1-9	to connect

Type `con` *without* specifying a switch name to access a menu system that will help make our connection. The switch name field on this menu is highlighted. Press the function key labeled [F6 FIELD] to make Manager II display a list of available switch names. On the resulting display, a hilighted bar emphasizes one of the switch names. To use this display, press any of the (↑), (↓), (PAGE UP), and (PAGE DOWN) keys to position the bar over the switch to which you want to connect. Then press either (ENTER) or the function key labeled [F3 SELECT].

At this point, the fields on the menu are filled by the default data associated with the switch just selected. You can change the contents of any of these fields by using the means you used to select the switch or by backspacing over the field and entering new contents.

As soon as a switch is selected, a [F2 CON] label appears on the screen. At the time you are ready to connect to a switch acceding to the conditions shown on the screen, simply press (F2). You are informed when your connection to the switch is successful.

Having connected to one switch, you might want to alternate between it and another switch as you work. You can connect to up to two switches at one time. To do so, simply attempt another connection. Messages are displayed that report on the status of the connection attempt as it proceeds. If the second switch connection is successful, this switch becomes the currently selected connection. While two connections are established, enter con without arguments to toggle between the two.

If *con* is issued from the command line and a failure occurs, the software returns to the previous state of your connections. That is, if there was no connection, there remains no connection. If a connection existed, the previously selected connection is reestablished as the currently selected connection.

If *con* is issued from a run file and a failure occurs, execution of the command file is always terminated. (This action prevents subsequent commands from affecting the wrong switch in the event of a previously established connection.)

The connect command allows you to specify the baud rate for your connection. However, the choices are limited by the hardware used in the link. RMATS ports for Generic 2 or System 85 communications systems work only at 1200 baud RMATS ports for Dimension systems work only at 300 baud. PPG ports (for Generic 2 systems) offer more flexibility. They can operate at from 300 to 19200 baud Of course, any modems that are part of the connection must also be able to work at the selected rate.

disc — Switch Disconnect

Use disc to disconnect from the current switch. This command releases the current connection and makes the currently used port and modem available for another *con* command. If you are connected to two switches when you use the disc command, then the alternate switch will become the current connection.

dx— Display Execute

Use *dx* to display data for the current procedure and word. (Seethe *dsp* command description.)

el —Equipment Location

Depending on the mix of features required of it, a given DEFINITY™communications system may contain network cabinets of either of two types: a *traditional* module or a *universal* module. Because of differing structures the two types of modules call for different forms of equipment-location codes. Equipment-location codes for traditional modules are of the form used for Dimension® and System 85 communications systems. Equipment-location codes for universal modules are of the form used for System 75 communications systems. Use *el* to translate an equipment location from universal to traditional forms or the reverse. The ***el*** command uses the syntax given below.

e 1 *module cabinet carrier [slot [circuit* ***]]***

Here, *module* and *cabinet* are numbers indicating their respective locations. The *carrier* argument is a letter from "a''-"e"if" the equipment location is universal and a number if the equipment location is traditional. The number of the *slot* or of the *slot* and *circuit* can also be specified. The results of the command are displayed on the message line just above the command line. Of course, to get a complete equipment location, you must specify slot and circuit. For instance the command:

```
el l0 e 15 20
```

causes Manager II to display the following message line:

```
Universal  1 0 E 15 20 corresponds to Traditional 1 3 1 0 4
```

The *el* command provides mapping only; there is no attempt to verify that a given equipment location exists on the current switch. Indeed, *el* works whether or not a switch is connected to your PC. Although the *el* command is especially helpful when you are using basic mode to administer the DEFINITY Communications system Generic 2, it is also useful to verify mapping information when you are using enhanced mode.

enh— Enhanced Mode

Use *enh* to change Manager II to the enhanced mode.Enhanced mode is only available if the applicable switch support base has been installed on your PC.

; —Advance One Field

Use; to leave a field's contents as they are. That is, use; to advance past the currently active field to the next-higher-numbered field without changing the contents of the field thus passed. If the current field is the last one (and therefore you cannot skip to a next field), use the change-field command *(cf)* to move to another field.

get —Get Support Files

Manager II require many files of switch data to support the switch-specific features of its enhanced and task modes. All Generic 2 systems contain such files in their magnetic storage facilities. These same files are also available on diskettes.

Use the *get* command to install the support files from the currently selected switch provided the connection is-a PPG port. Files cannot be copied to the switch by way of an RMATS port. To do so, use a command line of the following type:

`get [ -a] [ -g] [-s] [ "file_name_expression] (ENTER)`

Where:

-a Means: get all of the switch support database files. The default is to get from the switch only those which differ from those installed on the PC.

-g Means: get the specified information immediately. The default is to display a screen through which you can interactively refine the list of files you wish to obtain.

-s Means: do **not** synchronize copies of the switch database. This option is for use by qualified technicians only. It is always best to insure that the disk copy is up to date. Therefore, this option should be rarely if ever used.

file_name_expression are names of files you want to specify for installation or viewing. Wildcard file-name specifications maybe used. The conventions that apply to these specifications follow.

x A character (for example, *X)* not listed below matches itself.

X* A character not listed below followed by an asterisk matches *zero or* more occurrences of the character.

x+ A character not listed below followed by a plus sign matches *one* or more occurrences of the character.

* An asterisk at the beginning of an expression matches any string — including *.* and the null string.

• A period matches any single character.

[...1 Characters within brackets match any one of the enclosed characters. A pair of characters separated by - matches any character that falls between the pair (in ASCII order), including the pair itself. If the first character that follows the opening bracket is a circumflex ("), any character *not* enclosed is matched. (Therefore, for example, [ˆabc3 -7] matches any character except&b, c, or numbers 3 through 7.)

ˆ A circumflex (outside of brackets) matches the beginning of a line.

$ A dollar sign matches the end of a line.

A specification that begins with a circumflex and ends with a dollar-sign, therefore, matches an entire filename when used from the *get* command line. When used interactively from a *get* menu, such a specification is matched only by an entire line from the display. That is, the contents of that line must match the specification between the ˆ symbol and the $ symbol.

Unless you use the -g option, a screen resembling figure appears.

Unless the -a option was used, only files that differ between your communication system and your PC will be listed on the screen, and they will all be marked for downloading (with a yes in the first column). To mark a file so it will not be downloaded, use the (PAGE DOWN) and (↓) keys to highlight the line on which the file appears and press the function key labeled [F3 SELECT] to toggle the first field to no. If the menu is extensive, use the function key labeled [F4 FIND] to search for a filename. To use this facility, just press (F4) and then enter an expression of the type described above (do not quote the expression in this context). The Manager II software attempts to match your expression with a menu item. If a match is found, the highlight bar is moved to the matched item. Otherwise, the highlight bar is moved to the first item in the menu. To download the files marked yes, press the function key labeled [F2 GET]. To return to the enter command: prompt, press the function key labeled [F1 EXIT] . If the file you wanted to download is not listed, press the function key labeled [F6 ALL] .

Pressing (F6) in the context just described has the same effect as using the -a option with the `get` command. That is, all files are now available for your perusal, and all entries in the first column become `no.` Using the function keys as just described, select the files you want downloaded by marking them with yes in the first column. When all files are listed, the label for the F6 key changes to [F6 DELTA] offers the option of selecting a list of files that differ between system and PC.

help— General Help

Access help by entering h or help at the command line, or by pressing a function key on your set that is screen-labeled [F5 HELP] . Use these commands to access a menu of subjects appropriate to the currently selected procedure (or a menu of general subjects, if no procedure is selected). However you choose to et help, that menu that appears will display a highlighted bar over one of its items. Use the (↑), (↓), (PAGE UP), (PAGE DOWN), (HOME), and (END) keys to position the bar over the subject on which you need information. Then press the [F3 SELECT] function key or press (ENTER) to select a subject. This may lead to a screen with information or to a subordinate menu. If a menu is on your screen, proceed as above. If information is on your screen, scroll through it.

As you peruse the available help screens, several function-key labels variously appear and disappear on the screen. These are **F3 SELECT**, **F2 RETURN**, **F1 EXIT**, **F4 FIND**, **and** **F6 FIELD**. **The** **F3 SELECT** **function** key has already been described. Use the [F2 RETURN]function key to return to the previous menu. Use the [F1 EXIT] function key to exit the help facility. Use the [F4 FIND] function key to search for a help topic within a menu.

This FIND function is most useful when you are confronting a long list of possible topics. For example, there are hundreds of administrative procedures, each one with a set of help screens. Having accessed the administrative-procedure help menu, suppose you want to find Procedure 120. To do so, simply press [F4 FIND] and enter 120 on the command line followed by (ENTER). Manager II searches the list of procedures and the highlighted bar is moved to the line containing the number 120.

You can enter any string on the command line and have the FIND function look for a match. The function will even look for strings matched by the wildcard conventions used by the *get* command. Therefore, for example, you could enter

```
restrict. *search
```

to find the following string.

```
Procedure 283 Word 1 - Facility Restriction Level Related Searches.
```

Having used the [F4 FIND] function key to highlight the topic line, press the function key labeled **F3 SELECT** to view help on the highlighted topic.

The Manager II general-help facility lets you display information about the procedures on your system. You may even display the procedures themselves from general help. This is accomplished by using the [F6 FILED] function key in two different ways. First, the screen label appears when you ask for help on an administrative or maintenance procedure. Press the function key labeled [F6 FIELD] to bring to your PC's screen a duplicate of the procedure display. Thus, pressing (F6) once serves to display all the fields of the procedure. If you press (F6) again, help pertaining to the highlighted field appears.

The *help* displays just described are identical to the administration and maintenance displays. Be careful, therefore, not to confuse this general-help procedure display with an active procedure display. Data displayed or entered in the general-help display is local to general help and vanishes when you exit the help facility.

he— Help: Command

View a screen describing the Manager II commands by entering hc or ? at the command line, or by pressing a function key on your set that is screen-labeled [F8 CMDS] . This screen associates each basic-mode or enhanced-mode Manager II command with a descriptive phrase that identifies its function. When you are ready to leave this screen, press [F1 EXIT] or (ENTER).

hf —Help: Field

Access descriptions of the individual fields b entering hf at the command line, or by pressing a function key on your set that is screen-labeled [F6 FIELD] .

While a procedure field on your screen is ready to accept input (that is, while the field is active), the [F6 FIELD] label appears on your screen. If you press this function key or if you enter hf at the command line, you will receive a description of the active field. This description maybe in the form of a range of possible values, if appropriate. Or, if more information is called for, this description may take the form of a window with text that you can scroll by means of the arrow and page keys.

In the latter case, a highlighted bar appears in the window. To select one of the encodes described in the window, place the highlighted bar on your choice and press the function key labeled [F3 SELECT]. To exit the field-help facility without making a selection, press the function key labeled [F1 EXIT] .

hi —Help: Input Data Required to Execute Commands

In many switch administration or maintenance procedures, certain data must have been entered before the procedure can execute any given command. To display switch data associated with a given phone, for example, the phone must be identified by, say, extension number or equipment location. In this case, an identifying number must have been entered before *dx* can be executed.

To display a chart of commands associated with the data required for their execution, either enter hi from the command line or press the [F7 INPUT] function key. Such a chart may be much longer that the area available for its display. If so, use the (↑), (↓), (PAGE UP), and (PAGE DOWN) keys to scroll-it to find the information you need.

hist —Display History

Use *hist* to display the last nine events that have taken place. Such events may include commands, error messages, or switch data entries. If logging is active, the information thus displayed is identical to the last nine entries in the log file. Remove the history display by pressing (ENTER) or the function key labeled [F1 EXIT].

log —Open/Close Output Log File

Use the log command to open or close a file that logs Manager II activity. If you simply enter log, a default file is opened, namely MGRILLOG. (The actual name of the default file is specified in MGRILINI, Manager II's initiation file.) If, however, you want to specify a file name for the activity file, do so as an argument (between double quotes) to thecommand. Thus, the command log 'new. log" opens a log file named NEW.LOG.

Your commands and Manager II output are written to this file while it is open. The file is created in your current directory unless you specify a different directory with a full path name. The output file is closed by simply entering log a second time. Once you have created a log file, use commands provided by the MS-DOS operating system to print or view the file at your leisure.

m —Mode Procedure

Use *m* to specify the communications system mode for which you are in contention. Mode specification is only for Generic 2 and System 85s release R2V3 or later. The three modes that can be requested are the administration mode (l), maintenance mode (2), and tape mode (3). Type m and then any digit between *1* and *3* to toggle the corresponding mode between off and on (0 and 1) Type m alone (without any arguments) to display the current modes. A screen resembling Figure 3-2 appears. If the displayed mode has a value of 1 it is active; if it has a value of 0, it is inactive.

```
                       ENHANCED MODE PROCEDURE MODE
                   SYSTEM MANAGEMENT ACCESS PORT STATUS

CURRENT PORT                              MODE CONTROLLER
   1.   Administration: 0 Not Active        11.   Administration: - Not Active
   2.      Maintenance: 0 Not Active        12.      Maintenance: - Not Active
   3. Disk/Tape System: 0 Not Active        13. Disk Tape System: - Not Active
                                            14.             RAMP : - Not Active
AGENTS                                      15.             SMAP : - Not Active
   4.  TN492 Port 0: --
   5.  TN492 Port 1: --
   6.  TN563 Port 0: --
   7.  TN563 Port 1: --
   8. Pseudo Port 0: --
   9. Pseudo Port 1: --

Connected to CC0 ON-LINE

enter command:
                                 F5 HELP                          F8 CMDS
```

Figure 3-2. Mode Screen

The use of system modes allows several administrators to access one system at the same time. For example, one administrator could be executing administrative procedures on Manager II with the administration mode set. Another administrator could be executing maintenance procedures on the same system with the maintenance mode set.

You must have set the switch to *administration* mode to be able to change switch translations. You must have set the switch to maintenance mode to access maintenance procedures. (In addition, the ADMIN mode (Field 1) on the current port is required to be set when performing Procedures 642643,644,646, and 647. The TAPE mode (Field 3) on the current port must be set when performing Procedures 610,614, and RUN TAPE.) You must have set the switch to *tape* mode to copy to or from your switch's tape cartridge (or to disk, if your switch is so equipped).

NOTE

You *should not set* the ADMIN mode (Field 1) and the TAPE mode (Field 3) until the mode is required to perform maintenance tasks. If the ADMIN and TAPE modes are prematurely set, other facilities would be blocked from using these modes.

Some indication of when to set the modes on the current port are:

- When the Manager II is first connected and the MODE procedure appears
- After a tape reload and the MODE procedure appears (the MODE status display indicates whether another agent has control of the mode required to perform maintenance tasks)
- During maintenance tasks, when standard error code 76 (MODE required by PROC in use) appears as soon as the maintenance procedure is called in
- During administration tasks, when standard error code 76 (MODE required by PROC in use) appears after you enter *x* when performing an Add, Change, Display, or Remove operation

  If standard error code 76 (MODE required by PROC in use) appears in the Manager II error code field, it indicates that another facility is using the mode requested or the mode is not set.

Setting Required Modes Ports may attempt to change modes at any time, based on planned task activity. Requests are blocked if another port currently has control of a mode requested.

You may cause a port to display or set its current modes by entering *m*.

The current port is defined as the port (local or remote) that *activated the* MODE display.

For example, if you are using the local Manager II, the current port fields (Fields 1-3) provide information on the local Manager II modes.

Current port fields (Fields 1-3) display a 1 if the mode is active and a 0 if the mode is inactive.

Set the current port fields (Field 1 = ADMIN, Field 2 = MAINT, Field 3 = TAPE) by activating the Corresponding field number (l-3).

If a mode switch is not allowed, standard error code 76 (MODE required by PROC in use) appears in the Manager II error code field.

Local Manager II Port Contention Blocks The local Manager II may be blocked when a mode switch is attempted This results in standard error code 76 being displayed.

Tasks may also be blocked when they attempt to do things that require modes that are not available to the port.

This blocking is done at the time you type *x* for an administration procedure and at the time you enter a maintenance procedure.

Examples of blocking are:

- Trying to enter a maintenance procedure when the maintenance mode is not active
- Trying to Add, Change, Display, or Remove in an administration procedure when the administration mode is not active
- Trying to perform a task requiring the tape when the tape mode is not active.

Steps to Perform When Blocking Occurs

1. Any time blocking occurs, determine from the current MODE status display the port and agent that has control of the mode. You can refer to the explanation of the MODE procedure in *DEFINITY™ Communications System Generic 2 Administration Procedures* (555-104-506) *as* necessary for the definition of the encodes.
   - When the MODE display is active, fields Other than the current port fields (first three fields in the display) are status display only and are not controllable.
   - Fields 9-13 display an encode that identifies the port that has control of the given mode.
   - Fields 4-8 display an encode that identifies the agent who has control of the given mode.
   - The MODE status display is continuously updated when the display is active.
2. Wait for a few minutes to determine if the required mode changes on the MODE display. If the mode is released, activate the required mode for maintenance by entering the appropriate number.

   If the Manager II is left connected when inactive, the MODE display continues to show current mode status.
3. If the required mode does not change after a few minutes, refer to local records and determine the contact point for the agent having control of the mode required for maintenance.
4. Request the agent having control of the mode to release the mode in order that maintenance of the switch can be performed.
5. As soon as the mode is released, activate the required modes for maintenance by entering the appropriate number.

Performing or attempting to perform a common-control soft switch interacts with port contention.

You *must not* use Procedure 613 to perform a soft switch if any of the following ports are active (other than the access port Procedure 613 itself is using):

- Local Manager II
- Remote ports

- Run tape.

If you use Procedure 613, Test 3 to attempt a soft switch without the port contentions being released, special error code 80 (illegal switch attempt) appears in the Manager II error code field.

When Procedure 613 invokes a soft switch the port it is using to perform the soft switch is dropped.

You must reconnect to the switch and you must activate a new port by using the MODE status display in the new on-line side of the common control.

When maintenance in the on-line common control is completed and you wish to check the off-line common control in a duplicated system, you must ensure that the local Manager II is connected to the off-line common control and the modes required for maintenance are activated using the MODE status display procedure.

Mode information is *not* carried across from one common control to the other.

nc — Next Circuit

Where appropriate, use *nc* to make maintenance procedures select and display a new circuit location. Two uses of *nc* are possible to display stored circuit information and to select a circuit location for testing.

To display test results or failure history one circuit location at a time, enter nc once for each new circuit location.

To select a single circuit location for testing, enter nc to step-and display circuit locations one at a time until the circuit you wish to test appears.

nd —Next Data

Use *nd* to advance automatically to the next data item. In those procedures that have an *nd* function, use it to display recorded data for a field that contains multiple data entries. Use *nd* also to step manually-all entries associated with the display field.

For maintenance procedures, enter nd to display (for example) demand test results, periodic failure history data, and call processing failure history data. (These records are arranged by circuit location, one location per word.) Repeatedly enter nd to display data records one part at a time.

nf —Next Fault

Use *nf* to step-maintenance error records that have various fault codes, one fault code at a time.

nt —Next Test

Use *nt* to advance the maintenance procedure to the next test that can be run. If the current test displayed is the last test that the procedure can run, the test selected cycles to test number one. The new test selected will not start until you enter x (for *execute).*

nu —Next Unit

Use *nu to* select and display the next unit type for testing when a maintenance testis selected. You can select and display the first circuit of that unit type for testing by entering *nc* (for *next circuit).* When displaying failure history or test results, enter nu (for *next unit) to* look at the first circuit location recorded for the next unit type (numerically) in the failure history list.

p —Procedure

Use *p* followed by a procedure number to access that procedure. For multiword procedures, Word 1 is automatically accessed first. For a maintenance procedure, the default test (test number 1) is automatically selected. Leading zeros are not significant when specifying procedure numbers. For instance, p12 is equivalent to p012, and p0 produces the same effect as p000.

quit —Exit Manager II

Use the *quit* command to exit from the Manager II software in an orderly way. In response, Manager II will disconnect any active connections and return control to the MS-DOS operating system.

rb —Release from Busy

Use *rb* to release a circuit from maintenance busy-out status. Whenever the BUSY OUT indicator is on, *rb can be* used within an appropriate procedure to release a circuit location from maintenance-busy status. (The indicator does not disappear until all busied-out circuits have been released.)

Use Procedure 635 — the *cause of maintenance busy out* procedure — to search for circuits that are in busy-out status. Or you may use this command from any maintenance procedure that allows a circuit to be released from maintenance-busy. See the busy-out command, *bo,* for further information.

rs —Reset

rs reinitializes and reenters the procedure as if the *procedure* command, *p,* had been used. All displayed fields are empty. For multiword procedures, *reset* reinitializes the currently displayed word. For a maintenance procedure, the nominal start configuration appears. Most often, this is test one, displayed with blank fields. (Some maintenance procedures require a second reset before all fields are cleared.)

s —Stop

Use s to halt test execution when a maintenance procedure test is running. Not all maintenance tests recognize this command. To stop such tests, request another procedure using the *p* command.

sw —Switch (Change) Common Controllers

The *sw* command switches the remote end of the currently selected connection to communicate with the other common controller (CC) in a duplicated CC machine. his command works only if your PC is connected to the RMATS port (labeled TN492) of your system. For example, suppose communication is currently with CC0-an RMATS port. Issuing the *sw* command switches communication to common controller 1 (CC1). This change is reflected on the status line (fourth from the bottom) of the screen.

t —Test

The test command, *t,* is used to change from one procedure test to another. Use *t* followed by the number of the desired test. For example, to request test number two, enter:

t2

Most procedures have either words or tests. Procedures with words are generally used for administration while procedures with tests are designed for maintenance tests. The word command,*w,* is used to change from one procedure word to another. Requesting a test from a procedure with words is of little use, as is requesting a word from a procedure with tests. Some procedures need only one screen, and therefore have neither words nor tests. A command closely related to the test command is the next-test command, *nt* (described elsewhere in this chapter).

x —Execute

Use *x* to initiate some activity. The activity will depend on the current procedure. In many cases execute, *x* is used in conjunction with another command. For instance, administration procedures routinely accept the following command combinations

- *ax:* add execute
- *cx:* change execute
- dx: display execute

Some of these procedures interpret *x* or *dx* to mean the same thing: display execute.

With respect to maintenance procedure the execute command is usually used by itself. The *x* command typically tells the procedure to display fault information or to start a maintenance test.

Some maintenance procedures call for *x* to be entered twice. (Because of the importance of the test or activity, the procedure requires the execution command to be confirmed.) When performing such a procedure, press (ENTER) after the first execution of *x*. Then enter the second *x* command on the next command line.

FUNCTION KEY COMMAND REFERENCE

Access the commands listed below by pressing function keys when their labels are present on the Manager II screen.

[F1 EXIT] - Exit current menu

Use the function key labeled[F1 EXIT] to exit the current menu and return to the command line.

[F2 CON]—Connect

Having filled in the fields on the communications system connection menu, use the function key labeled [F2 CON] to connect to that system.

[F2 GET] -Get SSB Files

his label appears only on the get command screen. Use the function key labeled [F2 GET] to initiate the process of getting SSB files from the system.

[F2 MORE]–Display More Information

Use the function key labeled [F2 MORE] to bring the next display to your screen.

[F2 RETURN] —Display Previous Information

Use the function key labeled [F2 RETURN] to return the previous display to your screen.

[F3 CHANGE] —Change User Database

Use the function key labeled [F3 CHANGE] to make a change in the user database.

[F3 CMD LN]–Move Cursor to Command Line

Use the function key labeled [F3 CMD LN] to move the cursor from the active data field to the command line so you can execute a command.

[F3 DATA]—Move Cursor to Data Field

Use the function key labeled [F3 DATA] to move the cursor from the command line to the active data field so that you can enter data directly into the field.

[F3 SELECT]–Select a Menu Item

Use the function key labeled [F3 SELECT] to select the menu item that is currently highlighted.

[F4 CLEAR]–Clear Field

While you are editing fields in a menu or procedure, use the function key labeled [F4 CLEAR] to clear the active field.

[F4 FIND]—Search a Menu

Use the function key labeled [F4 FIND] to search an extensive menu. To use this facility, press (F4) and then enter an expression. The Manager II software attempts to match that expression with a menu item. If a match is found, the highlight bar is moved to the matched item. Otherwise, the highlight bar is moved to the first item in the menu.

[F5 ERRORS] —Interpret Error Codes

Use the function key labeled [F5 ERRORS] to get an interpretation of error code numbers that can arise while using a procedure.

[F5 HELP]–Find General Help

Use the function key labeled [F5 HELP] to access a system of “help” menus that describe the details of Manager II operation.

[F6 ALL] –Display All SSB Files

This label appears on *get* command screens. Use the function key labeled [F6 ALL] to make Manager II rebuild the screen. The new display includes all possible SSB files.

F6 DELTA –Display Different SSB Files

This label appears on *get* command screens. Use the function key labeled [F6 DELTA] to make Manager II rebuild the screen. The new display includes only those SSB files on the current switch that are different from your SSB.

F6 FIELD –Describe Field

While you are editing fields in a menu or procedure, use the function key labeled [F6 FIELD] to access a description of data that maybe entered in the active field. This description maybe in the form of a range of possible values, if appropriate. Or, if more information is called for, this description may take the form of a window with text that you can scroll by means of the arrow and page keys.

In the latter case, a highlighted bar appears in the window. To select one of the encodes described in the window, place the highlighted bar on your choice and press the function key labeled [F3 SELECT]. To exit the field-help facility without making a selection, press the function key labeled [F1 EXIT] .

F7 INPUT –Display Required Input Data

Procedures require a certain minimum of data before a change can be executed. Use the function key labeled [F7 INPUT] to find out what is required by the procedure you are using. This information ma need more room than the area available for its display. If so, use the (↑), (↓), (PAGE UP), and (PAGE DOWN) keys to scroll-it to find the information you need.

F8 CMDS –Display Command-Line Commands

Use the function key labeled [F8 CMDS] to access a display of commonly used Manager II commands. If you are using the Manager II enhanced mode, and if you require further information about these commands, press the function key labeled [F1 EXIT] to leave the CMDS display. Then press the function key labeled [F5 HELP] to view the more detailed help displays.

ALARM PANEL

The alarm panel indicates the seriousness of system problems by displaying the level (major, minor, or warning) of any active alarm. The alarm panel also indicates the hardware area (processor/memory, environment, network, and so on) that caused the alarm.

The alarm panel (see Figure 3-3, *Unduplicated Common-Control Alarm Panel*, and Figure 3-4, *Duplicated Common-Control Alarm Panel)* is located at the top of the common-control cabinet.

The system's state of health is indicated by the use of alarm and equipment failure indicators. Equipment failure indicators are grouped functionally by their potential importance to system operation and call-processing integrity.

The alarm panel indicators permit effective use of the maintenance fault isolation and repair procedures. Some indicators on the alarm panel have a number in parentheses adjacent to the indicators. This number designates a procedure that maybe used to access specific information about system problems, such as the location of faulty equipment or the exact cause of a problem.

You can troubleshoot the main processing unit from the alarm panel with micmdiagnostic tests of the main processor and memory. The results are displayed by PASS and FAIL indicators on the alarm panel.

In addition to troubleshooting capabilities, you can use the alarm panel to:

- Manually control the emergency transfer capability
- Stop and start the common-control processor
- Control which processor (CC0 or CC1) is on line in a duplicated common-control system
- Reset the suicide timer after time-out.

See Table 3-2 *Alarm Panel Indicators,* for a description of each alarm panel indicator. See Table 3-3, *Alarm Panel Controls,* for a description of each alarm panel switch and connector.

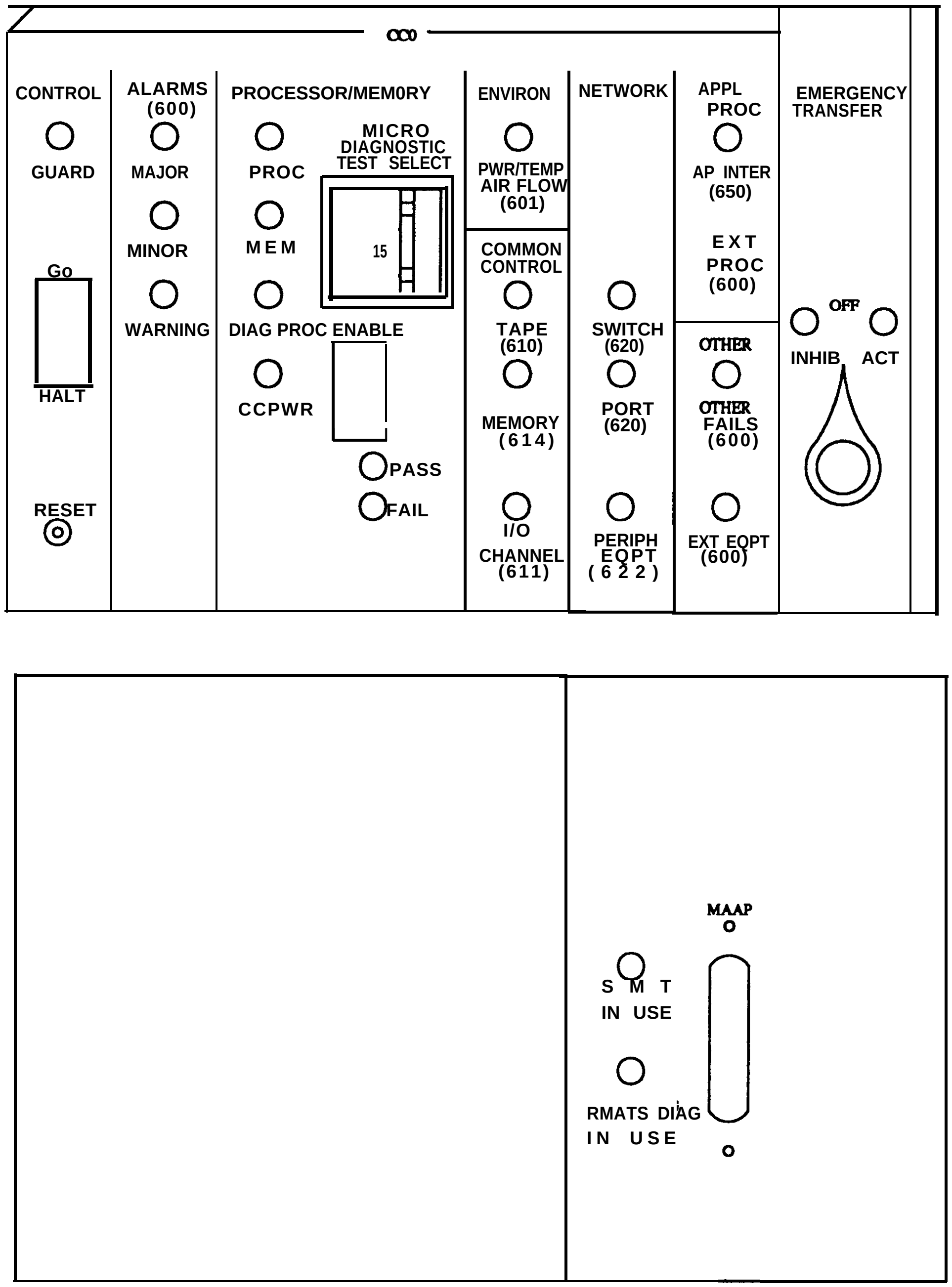


Figure 3-3. Un duplicated Common-Control Alarm Panel

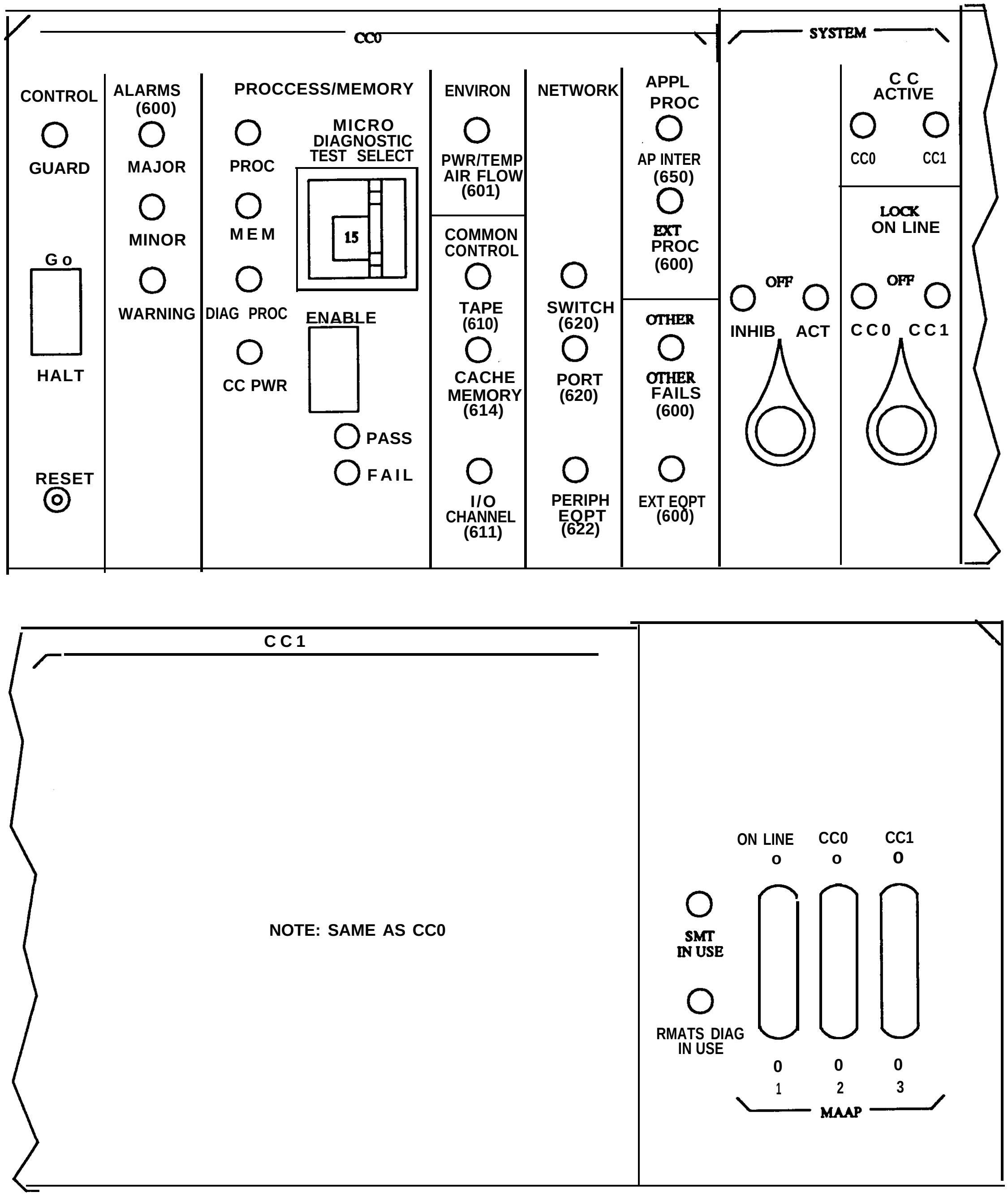


Figure 3-4. Duplicated Common-Control Alarm Panel

TABLE 3-2. Alarm Panel Indicators

Section	Indication	Color	Meaning	Origin
CONTROL	GUARD	Red	The processor is halted.	Hardware
ALARMS	MAJOR	Red	A major alarm is active.	Both
	MINOR	Red	A minor alarm is active.	Both
	WARNING	Red	A warning alarm is active.	Both
PROCESSOR/ MEMORY	PROC	Red	A processor failure has been detected.	Hardware
	MEM	Red	A memory failure has been detected.	Hardware
	DIAG PROC	Red	The diagnostic processor has failed.	Hardware
	CC PWR	Red	The common-control power has been interrupted.	Hardware
	PASS	Green	Functions as a system “heartbeat” and also indicates that the processor passed the selected microdiagnostic test.	Software
	FAIL	Red	The processor failed the selected microdiagnostic test or common-control suicide.	Software
ENVIRON	PWR/TEMP AIR FLOW	Red	A power, temperature, or airflow failure has been detected.	Software
COMMON CONTROL	TAPE	Red	Tape errors of some kind have been found.	Software
	CACHE/ MEMORY	Red	Cache memory errors have been detected.	Software
	110 CHANNEL	Red	A failure in a common-control I/O channel has occurred.	Software

continued

TABLE 3-2. *Alarm Panel Indicators (continued)*

Section	Indication	Color	Meaning	Origin
NETWORK	SWITCH	Red	A failure in a digital network module has occurred	Software
	PORT	Red	A failure in a port circuit has occured.	Software
	PERIPH EQPT	Red	A network peripheral (for example, terminal) problem exists.	Software
APPL PROCR	AP INTER	Red	A DCIU or applications processor (adjunct) link has failed.	Software
	EXT PROC	Red	An external processor problem exists.	Hardware
OTHER	OTHER FAILS	Red	Some software-detected problem not covered by the equipment failure LEDs listed above has occured.	Software
	EXT EQPT	Red	A failure outside the system proper that is not detectable by software has occurred.	Hardware
EMERGENCY TRANSFER	INHIB	Yellow	An automatic switch to the emergency transfer condition is inhibited.	Hardware
	ACT	Red	Emergency transfer has been activated.	Both
CC ACTIVE	CC0	Green	Common control 0 is on line.	Software
	CCl	Green	Common control 1 is on line.	Software
LOCK ON LINE	CC0	Yellow	Common control 0 has been locked on line.	Hardware
	CCl	Yellow	Common control 1 has been locked online.	Hardware

continued

TABLE 3-2. Alarm Panel Indicators *(continued)*

Section	Indication	Color	Meaning	Origin
MAAP	SMT IN USE	N/A	Not used.	N/A
	RMATS DIAG IN USE	Red	The remote maintenance, administration, and traffic system (RMATS) is connected to the switch and is executing microdiagnostic tests.	Hardware

TABLE 3-3. Alarm Panel Controls

Section	Control Connector	Component Type	Reason for Use
CONTROL	GO/HALT	Switch	Normally in the GO position for system operation. Halts the common-control processor when pressed to the HALT position.
	RESET	Button	Allows the suicide timer in the common control to be reset.
PROCESSOR/ MEMORY	MICRO DIAGNOSTIC TEST SELECT	Thumbwheel switch	Allows a microdiagnostic test to be selected for execution.
	ENABLE	Switch	Causes the microdiagnostic test selected to be executed.
SYSTEM	EMERGENCY TRANSFER	Switch	Allows the emergency transfer capability to be manually activated or inhibited.
	CC LOCK ON LINE	Switch	Allows one or the other common control. in a duplicated system, to be locked on line, preventing a software switch between common controls.
MAAP	MAAP	Connector	Not used.

MICRODIAGNOSTICS

Microdiagnostics area series of test programs used by the processor for fault detection and isolation of the main processor and its associated components. Microdiagnostics are performed because:

- The switch is down (indicated by the MAJOR, PROC, and FAIL indicators being lighted).
- Emergency transfer is indicated on the alarm panel.
- The generic or X-ray tape cannot be loaded.
- The main processor and its associated circuitry must be kept in proper working condition.
- Procedure 612 (Initialization Causes) indicates the cache is off for recovery (Fault Code 37) and you wish to test the cache memory (microdiagnostic test 14).
- A more complete test of the cache memory in an off-line common control of a duplicated common-control switch is needed (microdiagnostic test 14).
- Procedure 600 (Alarm Causes/Error Log) indicates diagnostic processor failures (unit type 60) and you wish to test the diagnostic processor (microdiagnostic test 0).
- Unusual circumstances exist where hardware or software causes for problems are equally likely. (For these cases successful pass of microdiagnostics indicates that hardware in the common-control switch is less likely the cause of these types of problems.)
- A tape has been reloaded and the current memory is not needed.
- An X-ray tape has been replaced by a generic tape.

CAUTION

When a tape is reloaded or an X-ray tape is replaced with a generic tape, performing microdiagnostic test 15 does not clear MSTAT memory. False alarms may be service affecting and emergency transfer can occur. Perform all microdiagnostic tests (0-15) when reloading a tape or replacing an X-ray tape with a generic tape.

CIRCUIT PACK LEDS

Circuit pack LEDs in a traditional module and a universal module are similar in their operation. Circuit packs in a universal module common port carrier have three LEDs — red for alarm green for test, and yellow for busy. Circuit packs in a traditional module and a universal module-control carrier may have more than three LEDs.

Any differences between traditional and universal module circuit packs are noted in the following paragraphs.

Each circuit pack in the traditional digital network and common-control carriers contains an ID chip. The universal module circuit packs have an equivalent functionality in the circuit packs' firmware.

The ID chip has provision for driving red and green LEDs on the circuit pack edge. When lighted, the red LED indicates that the circuit pack is defective (failed) and the green LED indicates that the circuit pack is good (passed).

In a traditional module and a universal module common-control carrier, there may also be a green *pilot* LED, and possibly one or more yellow in-use LEDs on the circuit pack edge.

LED Strategy

The red and green LEDs are useful in the demand verification mode and in the periodic detection mode when the Manager II is connected to the switch.

Demand Verification Mode

The two kinds of demand verification are normal and automatic.

With *normal verification,* you are able to run a verification test on a given circuit pack by using appropriate maintenance procedures.

When the verification test is complete, the results are displayed on the Manager II and the red or green LED on the circuit pack tested is lighted, depending on the outcome of the test — green for pass, red for fail. The lighting of the circuit pack's LED provides additional feedback to you on the outcome of the verification test and aids in locating the faulty circuit pack

With *automatic verification,* when the diagnostic analysis and verification test is run from appropriate maintenance procedures, a faulty circuit location appears that points to the circuit pack to replace.

At the same time as the diagnostic testis run, the red LED on that circuit pack's edge is lighted. While a circuit pack's red LED is lighted in this mode, the circuit pack is scanned at a high rate by software to determine when it is unseated and a circuit pack is replaced. After the circuit pack is replaced, a verification sequence is run by software on the circuit pack, and the results are displayed. The appropriate LED on the circuit pack edge is lighted.

Periodic Detection Mode

With *periodic detection,* feedback on the frequency and coverage of periodic tests in the digital network is valuable for isolating serious software problems in the field. Feedback is provided only when the Manager II is connected to the switch.

To provide this feedback, each periodic test associated with the digital network recognizes when the Manager II is connected and lights the green LED on the edge of the main circuit pack under test. The LED is left on until the conclusion of the test. This use of the green LED provides a maintenance *heartbeat that* indicates the frequency and coverage of periodic test routines in the network.

Green Pilot LEDs

Green pilot LEDs denote that a circuit pack has power and is operational. Some power supply boards and 20 Hz-ringing generators have green pilot LEDs.

The tape interface circuit pack (TN563) has a green LED that provides a *heartbeat* that indicates the state of the tape subsystem. A fast heartbeat (5 Hz) indicates that TN563 is off the bus. A slow heartbeat (1 Hz) indicates that TN563 is allowed on the bus.

The module interface circuit pack (TN480) in the TMS carrier has a green LED in position 4, indicating communication with the associated light-guide interface circuit pack (TN481) in the module control carrier.

The light-guide interface circuit pack (TN481) in the module control carrier has a green LED in position 4, indicating communication with the associated module interface circuit pack (TN480) in the TMS carrier.

Yellow In-Use LEDs

Yellow in-use LEDs are used to denote that a circuit pack is in an idle or an in-use state. The following circuit packs contain yellow in-use LED indicators

- TMS or module-control channel (MCC) circuit pack (TN401 or TN588): The MCC has two yellow LEDs; one flashes when the MCC is communicating with CC0, and the other flashes when the MCC is communicating with CC1.
- Duplication channel ciruit apck (TN530/TN54 1): The duplication channel circuit pack has one yellow LED to indicate if it is in the on-line side of the common-control carrier.
- Light guide interface circuit pack (TN481): The light-guide interface circuit pack has one yellow LED to indicate if it is in the on-line side of the module control carrier.
- Port circuit packs: Except for the tone plant and the touch-tone dailing senders and receivers in a traditional module, each port circuit pack has one yellow LED that is lighted if there is activity in any of the ports on the circuit pack.
  - Removing the circuit pack when the yellow LED is lighted disrupts service on the circuits in use.
  - The touch-tone dialing sender and receiver circuit packs in a traditional module have one yellow LED per port (four per circuit pack).
- CC/TMS power supplies: The yellow LED indicates that the unit has input power and is operational.

- Universal module carrier power units: The yellow LED indicates that the unit has input power and is operational.

Red LEDs

- Universal module carrier power units: The red LED indicates that the unit has input power but is not operational.
- 397B or 397C battery charger/power unit: The red LED indicates that the unit has input power but is not operational.
- CC/TMS power supplies: The red LED indicates that the unit has input power but is not operational.
- Traditional port carrier power units: The red LED indicates that the unit has input power but is not operational.

System Clock Synchronizer (SCS) Circuit Pack (TN463)

The SCS circuit pack has eight LEDs:

- Yellow LEDs in positions four and five dedicated to the primary and secondary synchronization reference sources, respectively. If either of these LEDs is lighted, the associated reference is unusable (out of lock).
- Yellow LEDs in positions 14, 15, and 16, indicating, when lighted, the reference that is on line.

  Position 14 is for the internal high-accuracy clock (HAC), position 15 is for the primary synchronization reference, and position 16 is for the secondary synchronization reference.
- A yellow LED in position 17 that is used for duplicated module control (single module system) or duplicated TMS (multi-module system) carrier applications. When lighted, it indicates that the synchronization reference is receiving clock reference from the synchronization reference in the on-line duplicated carrier. This LED should always be lighted in the off-line carrier.
- Red and green LEDs in positions 18 and 19, indicating, when lighted, the FAIL and PASS status of the circuit pack when a diagnostic testis performed.

Remote Module Interface (RMI) Circuit Pack (TN456)

The RMI circuit pack has seven LEDs:

- A yellow LED in position 7, indicating the on-line status when lighted
- A yellow LED in position 9, indicating the Manager II in-use status when lighted
- A red LED in position 11, indicating the LFAIL status when lighted
- A green LED in position 14, indicating the transmit (FTA) status when lighted
- A green LED in position 16, indicating the receive (FRA) status when lighted
- Red and green LEDs in positions 18 and 19, indicating, when lighted, the FAIL and PASS status of the circuit pack when a diagnostic testis performed.

DS-1 Circuit Pack(ANN11)

The DS-1 circuit pack has five LEDs:

- A green LED in position 7, indicating a red alarm if not lighted
- A greenn LED in position 8, indicating a yellow alarm if not lighted
- A yellow LED in position 9, indicating initialization or busy when lighted

  A *fast flash* of the yellow LED indicates that the DS-1 circuit pack failed initialization.
- Red and green LEDs in positions 18 and 19, indicating, when lighted, the FAIL and PASS status of the circuit pack when a diagnostic test is performed.

Remote Carrier Group Circuit Packs

The remote carrier group contains one or two remote carrier control (RCC) circuit packs (ANN16) and from three to six port circuit packs.

The RCC circuit pack has four LEDs:

- A green LED that provides a heartbeat indicating the state of the remote carrier group. A fast heartbeat indicates that communication with the remote carrier local (RCL) circuit pack in the switch has been lost. A slow heartbeat indicates that communications with the RCL is established.
- A yellow LED in position 9, indicating initialization or busy when lighted.

  The yellow LED on the general-purpose port (SN270 or SN271) circuit pack in the remote carrier group . is not used.
- Red and green LEDs in positions 18 and 19, indicating, when lighted, the FAIL and PASS status of the circuit pack when a board insertion testis performed.

Except for the yellow LED on the general-purpose port (SN270 or SN271) circuit pack (that is not used), the port circuit packs in the remote carrier group have the same type of LEDs as they do in the traditional carriers of the switch.

Primary Rate Port Circuit Pack (ANN35)

The primary rate port circuit pack has five LEDs:

- A green LED in position 7, indicating local flaming status. If on, the local primary rate port is framing properly. If off, either a local loss of framing alignment has occurred or the local receiver is shut down due to a loss of the incoming signal.
- A green LED in position 8 indicating remote framing status. If on, both the local primary rate port and the remote end are framing properly. If off, a remote frame alarm is received by the primary rate port circuit pack or local framing is lost.
- A yellow LED in position 9, indicating that the signaling channel is active.

  A *fastflash* of the yellow LED indicates that the primary rate port circuit pack failed initialization.
- Red and green LEDs in positions 18 and 19, indicating, when lighted, the FAIL and PASS status of the circuit pack when a diagnostic test is performed.

Downloadable Module Processor (TN590)

This section explains the flash rates of the LEDs on the Downloadable Module Processor (DMP). Further information on the interpretation of these LEDs and recommended actions can be found in the maintenance procedures manual under the section for PROC 621, test 5.

The green LED slow heartbeat (500 msec on, 500 msec off) is the normal operating mode for the DMP. A slow heartbeat indicates that the DMP is running, firmware is downloaded, and the DMP is initialized correctly. Problems may exist that affect calls, but the DMP is initialized correctly. The possibility exists, however, that the firmware that is loaded may not match the load that the switch software expects.

During the two minutes when firmware is being downloaded, the green LED will be on solidly for about a minute and then switch to a flutter until the download is complete, when it will return to the normal slow heartbeat. During the download, error code 91 will be displayed indicating a download is taking place.

Red and Green LEDs Both Off This state indicates the 5V power to the board is absent or has failed.

Green LED Off— Red LED On If the LEDs are in this state, the DMP is in shutdown.

Green LED in Super-Slow Heartbeat When the LEDs are in this state (green LED on for several seconds then off for several seconds, red LED on or off solid), the DMP might have failed some part of an initialization.

Another possibility that can cause this LED state is a hardware fault on the TDM or LAN bus that is preventing the DMP from performing call processing.

Green LED in Off-Line DMP On or Off During Soft Switch During a soft switch, the green LED might be on or off for three to four seconds, after which it returns to its normal slow heartbeat.

Green and Red LEDs Solid On If the green and red LEDs remain on in any situation other than during a download, the DMP is in shutdown. This is the same situation as when the green LED is solid off.

Green LED in Fast Heartbeat A fast heartbeat is 100 msec on, 100 msec off. This state indicates that the DMP is running and that firmware is downloaded but also that the DMP has failed some portion of initialization.

Green LED in Flutter

Anew LED state, flutter, has been added specifically for the DMP. A flutter is 30 msec on 30msec off, (16 flashes per second). The fluttering green LED means that a firmware download is required.

Physical Placement of LEDs

In a universal module common port carrier, there are three LED positions on the edge of each circuit pack. The positions are approximately in the top third portion of the circuit pack. The first position is for the alarm LED (red), the second position is for the test LED (green), and the third position is for the busy LED (yellow). In a universal module common-control carrier, there are 11 LED positions on the edge of each circuit pack. The LED positions correspond to those used in a traditional module.

In a traditional module, there are 19 LED positions on the edge of each circuit pack. The positions start from the top of the circuit pack (as it sits in a carrier) and extend most of the way down to the circuit pack's connector. The position at the top is number one and at the bottom is position number 19.

The standard configuration in a traditional module places the maintenance ID chip red and green LEDs in positions 18 and 19 respectively. When there is a single yellow in-use LED, it is in position nine. If there are several yeIlow LEDs, they start from position one down and continue to as many contiguous positions as are needed. Green pilot LEDs are in position one to prevent confusion between the green pilot LED and the green maintenance LED.

TOOLS AND TEST EQUIPMENT

Tools and test equipment required for maintenance of the DEFINITY Communications System Generic 2 consist of:

- Digital multimeter KS-20599, L4 or equivalent
- Digital voltmeter
- Screwdriver
- Wrench
- Card extender
- Test panel
- Oscilloscope
- Port tester Issue 2 (comcode 105138424)
- Loop-back plug (ED1E422-Group 10, Group 11, or Group 12)
- One-pair five-foot patch cord (comcode 103908349 or equivalent)
- RS232 loop-back plug (ED1E422-Group 7)
- 2012D transformer (comcode 102600517)
- 400B adapter (comcode 104152558)
- 248B adapter (comcode 102802113)
- Seven-foot eight-terminal modular cord (comcode 102872512)
- Seven-foot, six-terminal D6AP-87 power cord (comcode 102938620)
- Loop-around test fixtures
- Touch-tone telephone set
- Rotary dial telephone set
- W1AP test cords (2) (comcode 1025OO4O2)
- 249A adapter (comcode 10258 1071)
- 1013 type hand set (comcode 104227752)
- Backplane Voltage Test Circuit Pack (BVT-CP) - TN2036 (comcode 846329290)
- ANI Data Link Test Set (J59204AJ) and connector cable (List 4).

A digital multimeter (KS-20599, L4 or equivalent) and voltmeter is required when you perform Procedure 601 (environmental), procedure 618 (external equipment), and Procedure 620 (unit type 74 — remote carrier group) to measure voltages at test points to determine the corrective action to be performed.

The screwdriver and wrench are needed to remove and replace components in the module cabinets, network cabinets, auxiliary cabinet, SMDR cabinet, and console.

The card extender, test panel, and oscilloscope is required when you perform Procedure 655 (SMDR) to make adjustments on tape drive circuit packs 3645, 3844,4139, and 4306.

The port tester Issue 2 is required when you need to verify the continuity of station wiring at various locations from the wall jack of a peripheral (or terminal) to the port the peripheral (or terminal) is connected to.

A loop-back plug, a one-pair five-foot patch cord, an RS232 loop-back plug, a 2012D transformer, a 400B adapter, a 248B adapter, a seven-foot, 6-terminal D6AP-87 power cord, and a seven-foot eight-terminal modular cord are required when you perform Procedure 651 (Processor Communication Circuit) in order to perform the end-to-end loop test.

Loop-around test fixtures are required when you perform Procedure 650 (DCIU) in order to perform the external manual loop-around test.

A telephone set with W1AP test cords and a 249A adapter or a 1013 hand test set and 249A adapter are required when you make terminal-to-trunk test calls or listen to transmitted tones at the test line in a traditional module. These tools are used when you perform Procedure 642 (Terminal-to-Trunk Test Call), Procedure 643 (Terminal-to-Tone Test Call), and Procedure 644 (Terminal-to-Auxiliary Tone Test Call).

The ANI Data Link Test Set (J59204AJ) and connector cable (List 4) are required when you perform Procedure 623, Tests 2 through 4 (ANI Failures) to prevent test messages from being sent to the central office. A diagram of the test configuration is shown in Figure 3-5, *ANI Data Link Test Set*.

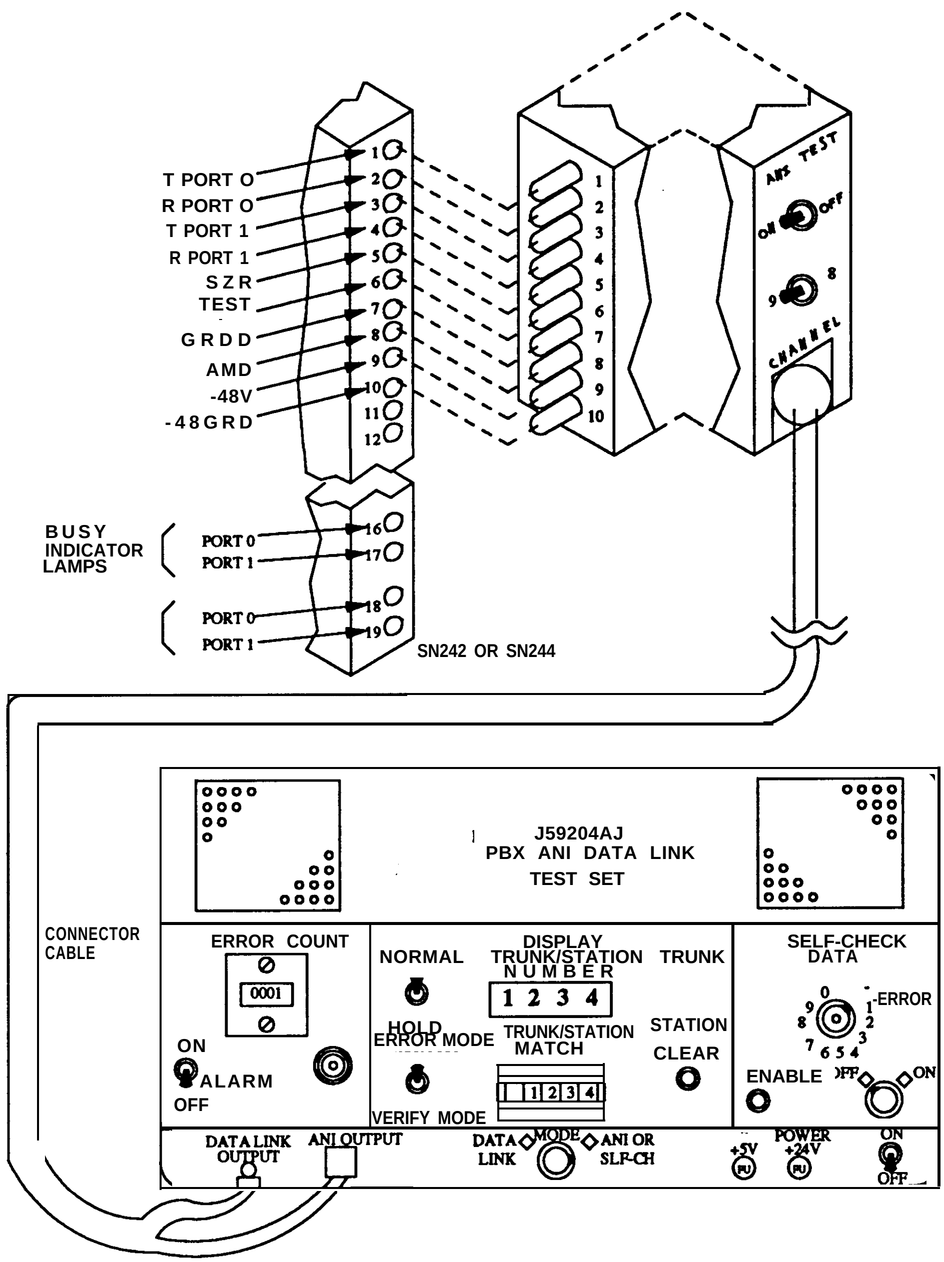


Figure 3-5. ANI Data Link Test Set

4. ESCALATION

When this document directs you to escalate a failure, it assumes that you have performed all possible isolation and repair steps associatedwith the failure.

The scope of this manual is not all inclusive. The maintenance tasks that are listed for isolation and repair for the indicated trouble or failure are those procedures that would normally fix the trouble or failure.

Further assistance may be required for those failures or troubles that still exist. The escalation process is the way to receive assistance in isolating and repairing the indicated, alarmed, or user-reported trouble or failure.

The *DEFINITY® Communications System Generic 2 Product Support Plan* and the *Technical and Administrative Escalation Plan* provide detailed information on the escalation process.

The subjects covered in the *Technical and Administrative Escalation Plan* include:

- Technical support escalation plan
- Technical support levels
- Technical support escsalation plan priorities
- Escalation procedures and responsibilities
- Centrally supported and national account services
- Administrative support escalation plan.

The portions of the DEFINITY® Communications System Generic 2 Product Support Plan and the Technical and Administrative Escalation Plan that pertain to you (the system technician) are covered in the following paragraphs.

EXTRACTS FROM THE DEFINITY COMMUNICATIONS SYSTEM GENERIC 2 PRODUCT SUPPORT PLAN

Technical support escalation is the process whereby complex service problems pass-a series of increasingly higher levels of technical support at predetermined stages to

- Determine the specific cause of the problem
- Solve the problem in the shortest period of time
- Permit problem solution at the lowest possible level in the technical support hierarchy
- Provide feeback to product development organizations.

Administrative support escalation is the process of notifying various levels of management of the status of a service outage.

The field services operations (FSO) system technicians provide on-site corrective action to resolve equipment troubles.

The national customer support center (NCSC) provides remote support, including remote alarm reception, remote testing, trouble escalation, and technician dispatch.

The technical assistance center (TAC) provides technical support at the start of general availability. Normally, the TAC provides assistance on all troubles escalated by the FSO or by the customer service support operations (CSSO) using remote diagnostic troubleshooting.

When technical support is requested, the support organization assigns a maintenance specialist (MS) in the TAC the responsibility of resolving the problem. The MS, working with the system technician, either fixes the problem or determines if the problem requires additional test equipment, software expertise, or technical assistance at the switch site.

The development and manufacturing organizations provide vendor support for troubles that are escalated to them from technical support. Either the trouble is cleared at this stage or the trouble is identified as a design or manufacturing problem and referred to the appropriate organization for resolution. The resolution may result in the issue of a Quality Protection Plan Change Notice (QPP CN).

Maintenance Process

The maintenance process begins when any one of the following occurs:

- The customer calls an expanded 800 service number to report a trouble to maintenance or to the serving CSSO.
- System technicians working under dedicated service receive trouble reports directly from their customers and relay the report to CSSO technical support.
- DEFINITY® Communications System Generic 2 automatic alarm reporting initiates the report to the initialization and administration system (INADS).

A customer report, received via expanded 800 service, enters the maintenance process at the repair answering position in the CSSO. Technicians handle reports routed to the testing process. These technicians are qualified in diagnosing troubles that involve either hardware or software.

INADS is the primary test support system for DEFINITY Communications System Generic 2 and is used in conjunction with the DEFINITY® Manager II. You, the system technician, will use INADS with Manager II to remotely detect, analyze, isolate, and clear troubles. You can also use INADS to poll alarm conditions and generate trouble tickets.

The testing process results in comet.ion of the problem, request for dispatch to site, trouble report referral, or escalation to technical support.

Dispatches to the switch site should be made only when a hardware fault has been detected or when additional testing requires the presence of on-site personnel. If a hardware fault is detected before dispatch, the field support system technician is informed which hardware components are required.

On-Site Maintenance

The FSO handles requests for dispatches to the switch site when the NCSC/CSSO initiates dispatch requests. The FSO assigns troubles to the responsible system technician and relays trouble data to the system technician by telephone. The FSO monitors progress and records clearance information.

The system technician visits the switch site, contacts the customer, locates troubles, and makes appropriate repairs. Technical support personnel at the NCSC/CSSO provide remote support assistance to the field support system technician as requested.

The system technician must notify the NCSC/CSSO and the customer of the status of the trouble (corrected, referred, or escalated).

If terminal equipment is the cause of the trouble, the system technician repairs the terminal equipment or requests the advice of the NCSC/CSSO.

The system technician may determine that the problem is not an AT&T trouble (for example, no central office dial tone). The system technician then confers with the remote support technician; and, if they agree, the NCSC/CSSO technician then refers the case to another support level and the system technician is released.

If the problem is in the DEFINITY Communications System Generic 2 and help is required, the system technician calls the CSSO technician according to the instruction he or she received from the dispatcher.

If the system technician cannot fix the trouble after consulting with the CSSO technician the trouble escalation process begins. At this point, the system technician maybe released or told to remain on site to assist the TAC support personnel.

The system technician always reports trouble status to the customer before leaving the customer's site. If the system technician has fixed the trouble, he or she obtains customer concurrence and checks for additional problems before leaving the customer's site. If the trouble is not fixed, the systems technician explains to the customer what is being done.

EXTRACTS FROM THE TECHNICAL AND ADMINISTRATIVE ESCALATION PLAN

As technical escalation occurs, it is imperative that there be a smooth hand-off, clearly communicated to the customer, regarding who has the responsibility for clearing the failure.

In all instances, the system technician or the FSO services manager shall keep the customer apprised of the status of service restoration. This should continue up-service restoration regardless of the level to which the technical problem has been escalated.

In no instance should the responsible services' individual terminate contact with the customer without advising the customer as to who will assume responsibility for the problem.

The FSO technician will, on an ongoing basis and independent of the potential need to escalate problems associated with major failures, reaffirm with the customer the appropriate maintenance contact number to call in the event of any service problem.

Technical Support Escalation Plan

The technical support escalation plan references a four-level support structure that defines various degrees of expertise.

Within the technical support process, a problem is worked within prescribed time frames by succeedingly higher levels of technical expertise until the problem is resolved.

The purpose of the technical support escalation plan is to ensure that no one support level expends undue amounts of time attempting to resolve a problem.

Technical Support Levels

The term "support level" denotes a level of experience, expertise, problem management skills, and knowledge required to cope with installation or maintenance problems of a defined degree of complexity.

The technical support levels are as follows:

- Field support — FSO and customer service management system (CSMS) system technicians
- Remote support — maintenance operations control center (MOCC), national systems support center (NSSC), and NCSC
- Technical support — technical support organization (TSO), TAC, field engineering areas (FEA), NCSC, and NSSC
- Vendor support (technologies) — technical field support, product engineering control center (PECC), Bell laboratories, and general trade product equivalent.

Three of the support levels in the hierarchy exist in the operations environment. The fourth support level is available-such organizations as AT&T Bell Laboratories and outside vendors.

For a level-structured technical support plan to be feasible, the majority of problems must be solved at the field and remote level, reserving the technical and vendor levels for the complex problems that often require extensive diagnostics, experimentation, and, in some cases, corrective design work in order to effect a solution to the system or product problem.

Remote support is positioned in the CSSO to provide centralized test access to diagnose the problem before a systems technician is dispatched. For all products that do not have a remote diagnostic channel, escalation proceeds directly from field support to technical support.

SYSTEM TECHNICIAN RESPONSIBILITIES

You, the system technician, upon arrival on site, should immediately notify the customer that repairs have begun.

Next, you should, as appropriate, establish a communication link with the MOCC (CSSO, NCSC NSSC) before beginning service restoration.

If service has not been restored within two hours after your arrival on site, you must escalate the outage to the MOCC in the CSSO (NCSC, NSSC) for equipment that is remotely accessible, or to the TAC for equipment that is not remotely testable by the CSSO.

You should advance the escalation if it becomes obvious that additional technical support will be necessary.

Additionally, when diagnostic procedures are delayed due to lack of spare maintenance parts as called for in this document, you should bring in the TSO so that alternative diagnostic procedures maybe considered.

When material, such as circuit packs and power supplies, is required, you should contact the material management services (MMS) and provide them with the trouble ticket number in case an emergency *out-of-service* order for material is required.

You are responsible for informing the customer of the trouble clearance status, notifying the customer when the trouble is cleared, and closing out the report with the field service administration center (FSAC) and TAC.

5. NO RESPONSE FROM THE SWITCH

Trouble clearing, when there is no response from the switch, depends on the symptoms of the total switch failure.

No dial tone, cannot dial out, and other problems reported by the customer or loss of communications between the switch and a remote maintenance facility (if provided) are types of total switch failure.

If no dial tone is reported and the common control appears to have a normal heartbeat, multiple simultaneous seizures that are not followed by dialing may be occurring. Typically, the multiple seizures result in high processor occupancy. Procedure 420 allows you to display processor occupancy to verify that the lack of dial tone is not the result of an overloaded processor.

You should busy out any alarmed DS-1 circuit packs to eliminate them as a potential source of multiple seizures.

Contacting the user and examining the alarm panel helps you to determine how the switch is functioning and the type of trouble-clearing procedure to perform.

- If no LEDs on the alarm panel are lighted, a total switch failure has probably occurred. Perform the trouble-clearing steps listed under *System Down— No LEDs Lighted* to restore the switch.
- If the switch is in the emergency transfer mode, indicated by the **EMERGENCY TRANSFER ACT** indicator lighted on the alarm panel, perform the trouble-clearing steps listed under *Emergency Transfer* to restore the switch.
- If a remote maintenance facility (if provided) cannot communicate with the switch, perform the trouble-clearing steps listed under *Communications with Remote Maintenance Facility Lost* to restore communications.

SYSTEM DOWN — NO LEDS LIGHTED

1. Determine if AC power is available at the customer-provided AC panel.
   - If AC power is available, go to Step 2.
   - If AC power is not available, contact the customer.
2. At all cabinets, visually inspect fuses, circuit breakers, on/off switches (bulk OLS power supplies), and power cables.
   - If no problem is found, go to Step 3.
   - If a problem is found, replace the fuses, reset the circuit breakers or the on/off switches, or replace the power cables as appropriate.

3. At all cabinets, check the rectifier and DC/DC converter output voltages, backplane voltages, (using the Backplane Voltage Test Circuit Pack - TN2036), the green LEDs on the bulk OLS power supplies, and the yellow LEDS on the universal carrier power supplies. See Table 5-1, *Cabinet Power Supply Voltage Measurements,* Table 5-2 *DC/DC Converter Voltage Measurements,* and Table 5-2A, *Backplane Voltage Circuit Pack Voltage Measurements* **,** for the minimum and maximum voltages.
   - If the voltages are within acceptable limits, and the green LEDs on the bulk OLS power supplies and only the yellow LEDs on the universal carrier power supplies are lighted, go to Step 4.
   - If abnormal voltages are noted or the green LEDs on the bulk OLS power supplies or the yellow LEDs are not lighted on the universal carrier power supplies, replace the DC/DC converter circuit packs, DC/DC converter, AC or DC universal power supply, rectifier, or bulk OLS power supply as appropriate.
4. Perform microdiagnostic testing.

EMERGENCY TRANSFER

1. Inspect the alarm panel.
   - If the **EMERGENCY TRANSFER ACT** indicator is lighted and the **PASS** indicator is flashing, ensure that the **EMERGENCY TRANSFER** switch is set to the **OFF** position. Then, go to Step 8.
   - If the **EMERGENCY TRANSFER ACT** and MAJOR indicators are lighted and the **CC PWR** indicator is not lighted, go to Step 2.
   - If the **EMERGENCY TRANSFER ACT, MAJOR,** and **CC PWR** indicators are lighted, go to Step 6.
2. Inspect the traditional network cabinets for tripped circuit breakers, blown fuses, and on/off switches (bulk OLS power supplies).
   - If no problem is found, go to Step 3.
   - If a problem is found, reset the circuit breakers or on/off switches, or replace the blown fuses (as appropriate). If the circuit breaker, on/off switch, or blown fuse continues to fail, replace the appropriate component until the circuit breaker, on/off switch, or blown fuse works correctly. Then, go to Step 8.
3. At the traditional network cabinets, measure the rectifier and DC/DC converter output voltages and check the green LED on the bulk OLS power supplies. See Table 5-1, *Cabinet Power Supply Voltage Measurements,* and Table 5-2, *DC/DC Converter Voltage Measurements,* for the minimum and maximum voltages.
   - If all voltages are within acceptable limits and the green LED is lighted, go to) Step 4.
   - If some voltages are not within acceptable limits or the green LED is not lighted, replace DC/DC converter circuit packs, rectifier or associated circuit packs, bulk OLS power supply, or wiring (as appropriate) to restore voltages to within acceptable limits. Then, go to Step 8.

TABLE 5-1. Cabinet Power Supply Voltage Measurements

Cabinet	Type of Rectifier	Minimum	Maximum
Common Control, Module Control, Port, TMS, RMI, Universal	309A/310, 334A, BATT, J58890CE-l	-46V	-52 V

TABLE 5-2. DC/DC Converter Voltage Measurements

Converter	Voltage	Minimum	Maximum
490AA, 494GA, 495FA	5V	4.9 v	5.3 v

TABLE 5-2A. Backplane Voltage Test Circuit Pack Voltage Measurements

Voltage	Minimum	Maximum
+5 VDC	4.95 VDC	5.35 VDC
-5 VDC	-4.95 VDC	5.35 VDC
-48 VDC	-43 VDC	-53 VDC
Ringing	+75 VAC	+115 VAC

4. Inspect the universal cabinets for tripped circuit breakers and blown fuses.
   - If no problem is found, go to Step 5.
   - If a problem is found, reset the circuit breakers or replace the blown fuses (as appropriate). If the circuit breaker or blown fuse continues to fail, replace the appropriate component until the circuit breaker or blown fuse works correctly. Then, go to Step 8.
5. At the universal cabinets, measure the AC or DC power supply output voltages and check the red LED on the universal carrier power supplies. See Table 5-1, *Cabinet Power Supply Voltage Measurements,* for the minimum and maximum DC voltages.
   - If all voltages are within acceptable limits and the red LEDs are not lighted, go to Step *8.*
   - If some voltages are not within acceptable limits or the red LED is lighted, replace the carrier power supplies or AC power supply (as appropriate). Then, go to Step 8.
6. Inspect the common-control cabinet for tripped circuit breakers, on/off switches (bulk OLS power supplies), and blown fuses.

- If no problem is found, go to Step 7.
- If a problem is found, reset the circuit breakers or on/off switches, or replace the blown fuses (as appropriate). If the circuit breaker, on/off switch, or blown fuse continues to fail, replace the appropriate component until the circuit breaker, on/off switch, or blown fuse works correctly. Then, go to step 8.

7. At the common-control cabinet, measure the rectifier and DC/DC converter output voltages and check the green LED on the bulk OLS power supplies.
   - If all voltages are within acceptable limits or the green LED is lighted, go to Step 8.
   - If some voltages are not within acceptable limits or the green LED is not lighted, replace DC/DC converter circuit packs, rectifier or associated circuit packs, bulk OLS power supply, or wiring (as appropriate) to restore voltages to within acceptable limits. Then, go to Step 8.
8. At the alarm panel, depress **RESET** and momentarily set the **HALT/GO** switch to **HALT,** then to **GO.**
   - If the **PASS** indicator is flashing and the **CC PWR, MAJOR,** and **ACT** indicators are not lighted, the emergency transfer trouble is corrected. Perform Procedure 600, Test 1 and Test 2 to determine the health of the switch.
   - If the **PASS** indicator is not flashing, perform microdiagnostic testing.

COMMUNICATIONS WITH REMOTE MAINTENANCE FACILITY LOST

Perform the following steps when you suspect that communications with the remote maintenance facility is lost.

1. At the common-control carrier, verify that circuit breaker **CB2** is not tripped.
   - If circuit breaker **CB2** is not tripped, go to Step 3.
   - If circuit breaker **CB2** is tripped, reset the circuit breaker. Then, go to Step 2.
2. Use Procedure 618, Test 4 and Test 5 to determine if contact with the remote maintenance facility is established..
   - If contact is established, corrective action is complete.
   - If contact is not established, go to Step 3.
3. At the data set associated with the remote maintenance facility, verify that power is provided and the appropriate LEDs are lighted.
   - If power to the data set is provided and the appropriate LEDs are lighted, go to Step 5.
   - If power to the data set is not available or the appropriate LEDs are not lighted, correct the problem. Then, go to Step 4.
4. Use Procedure 618, Test 4 and Test 5 to determine if contact with the remote maintenance facility is established.
   - If contact is established, corrective action is complete.
   - If contact is not established. go to Step 5.

5. At the cross-connect field, visually inspect wiring for the remote maintenance facility.
   - If the wiring is correct, go to Step 7.
   - If the wiring is not correct, correct the wiring. Then, go to Step 6.
6. Use Procedure 618, Test 4 and Test 5 to determine if contact with the remote maintenance facility is established.
   - If contact is established, corrective action is complete.
   - If contact is not established, go to Step 7.
7. Replace circuit pack TN492C.

   a. Before replacing circuit pack TN492C, ensure that the battery (comcode 844665836) is connected (or connect) to the back side of the circuit pack.

   b. Mark the date of the next battery replacement (month and year) on the date label that is attached to the battery.

   Establish the battery replacement date by adding 5 years to the date of installation of the TN492C circuit pack and associated battery. For example, TN492C circuit pack replaced July 1989; date to be written on the label is July 1994.

   c. Affix the date label to the faceplate of the TN492C circuit pack.

CAUTION If the yellow LED is lighted after the circuit pack is replaced, the battery is not connected or the battery is wired incorrectly.

8. Use Procedure 618, Test 4 and Test 5 to determine if contact with the remote maintenance facility is established.
   - If contact is established, corrective action is complete.
   - If contact is not established, go to Step 9.
9. Replace the data set associated with the remote maintenance facility.
10. Use Procedure 618, Test 4 and Test 5 to determine if contact with the remote maintenance facility is established.
    - If contact is established, corrective action is complete.
    - If contact is not established, check the wiring between the circuit breaker, cross-connect field, TN492C, and data set. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Microdiagnostics

Microdiagnostic test execution requires that the common-control carrier is operable and can perform the tests.

Tests 0 through 6 require power from DC/DC converters in the common-control power carrier (slots 1 and 2 for CC0 and slots 4 and 5 for CC1). Tests 7 through 15 require power from all three DC/DC converters for each common control (slots 0, 1, and 2 for CC0 and slots 3,4, and 5 for CC1).

The **HALT/GO** switch associated with the common-control being tested *must* be set to the **GO** position.

Microdiagnostic Tests 3 through 6 and 13 are spare tests that are reserved for future use. Each spare testis executed in microdiagnostic test sequence.

Test 10 tests the disk tape subsystem (DTS). For this test, you must place a tape in the tape drive and connect the DEFINITY™ Manager II for consultation on failures.

Test 15 provides an abbreviated subset of tests (7,8, and 9) and a memory load of the data on the tape. For this test, you must place a tape in the tape drive and connect the Manager II to determine the progress of the memory load.

Sixteen microdiagnostic tests are provided. With the exception of Test 0, each test uses circuits tested by the previous test. When testing a particular part of the main processor, each test uses parts outside the area under test. A test may fail because the fault lies outside the part of the main processor under test.

Microdiagnostic tests are described below according to increasing interdependencies. When you execute the microdiagnostic tests you should follow this same ordering scheme. Microdiagnostic tests invoked from the alarm panel are:

- Test 0 — Diagnostic processor circuit pack demand test
- Test 1 — Maintenance bus demand test
- Test 2 — Alarm interface circuit pack demand test
- Test 3 — Spare (reserved for future use)
- Test 4 — Spare (reserved for future use)
- Test 5 — Spare (reserved for future use)
- Test 6 — Spare (reserved for future use)
- Test 7 — 501CC processor circuit packs demand test
- Test 8 — System bus and buffered bus demand test
- Test 9 — 501CC instruction set demand test
- Test -10 — Disk tape system demand test
- Test11 — Main memory system demand test
- Test 12 — Memory protect circuit pack demand test
- Test 13 — Spare (reserved for future use)
- Test 14 — Cache memory circuit pack demand test
- Test 15 — An abbreviated test and a forced load.

Perform microdiagnostics starting with Test 0 and continuing in numerical order to Test 15. If a failure is indicated, perform corrective action and repeat the test. If the test passes after corrective action, repeat all tests starting with Test 0 and continue through Test 15.

Microdiagnostic Testing

You perform microdiagnostic testing as follows:

1. Select the test to be executed.
2. Momentarily depress the **RESET** switch.
3. Momentarily depress the **ENABLE** switch.

The 501CC begins test execution by clearing most of the alarm panel LEDs and lighting the LEDs related to the test.

The pass and fail LEDs are cleared by the 501CC until the test result is determined. If a test passes, the pass LED on the alarm panel is lighted. If a test fails, the fail LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is most likely the cause of the fault.

Other circuit packs that could be causing the test to fail are listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence, in the* order of their likelihood as causes of the problem.

- CKT 1 in Table 5-3 is the fitting circuit with the red LED lighted.
- The second most likely circuit pack is indicated as CKT 2 in Table *5-3.*
- In some cases, one of the circuit packs listed in Table 5-3 maybe the same as the circuit pack with the red LED lighted.
- When a circuit pack is listed in Table 5-3 as a replacement that has already been replaced, the sequence in Table 5-3 to be followed is the lowest circuit pack *not* replaced. For example, if circuit pack 4 (CKT 4) has been replaced, replace CKT 3, then CKT 5, and soon.

TABLE 5-3. Microdiagnostics Circuit Pack Replacement Sequence

Test	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8
0	[1]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
1	[1] [2]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
2	[1]	TN490 Slot 22	TN491B Slot 31	TN492C Slot 32				
3	[1]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
4	[1]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
5	[1]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
6	[1]	TN491B Slot 31	TN492C Slot 32	TN490 Slot 22				
7	[1]	UN152B Slot 02	UN151 Slot 0l	TN491B Slot 31	TN370C Slot 00	UN153B Slot 03		
8	[1]	TN404 Slot 21	UN153B Slot 03	TN491B Slot 31	TN368 Slot 06			
9	[1]	UN152B Slot 02	UN153B Slot 03	TN370C Slot 00	UN151 Slot 01	TN394 Slot 07	TN404 Slot 21	TN368 Slot 06
10	[1]	TN563 Slot 20	UN153B Slot 03	TN394 Slot 07	TN368 Slot 06	TN491B Slot 31		

continued

TABLE 5-3. Microdiagnostics Circuit Pack Replacement Sequence ***(continued)***

Test	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8
11	[1]	TN368 Slot 06	TN404 Slot 21	UN153B Slot 03	TN370C Slot 00			
12	[1]	TN368 Slot 06	TN404 Slot 21	UN153B Slot 03	TN370C Slot 00			
13	[1]	TN370C Slot 00	TN491B Slot 31	TN492C Slot 32				
14	[1]	TN369 or TN379 Slot 04 [3]	UN152B Slot 02	TN490 Slot 22	UN153B Slot 03	TN370C Slot 00		

[1] = Circuit pack with the red LED lighted.

[2] = For Test 1, replace all circuit packs with the red LED lighted and all circuit packs with no LEDs lighted.

[3] = Replace TN369 or TN379 (Slot 04) if installed.

Test 0 — Diagnostic Processor Circuit Pack Demand Test

Microdiagnostic Test 0 checks the diagnostic processor circuit pack and parts of the remote interface. The diagnostic processor performs self tests to verify the cyclic redundancy check (CRC) checksum of the read only memory (ROM), conducts a memory test of its random access memory (RAM) and data RAM, tests the status register and I/O register, and performs a preliminary test of the maintenance bus control interface.

To execute microdiagnostic Test 0:

1. Set the **TEST SELECT** switch to 0.
2. Depress **RESET, ENABLE.** While Test 0 is executing, the **MAJOR** and **DIAG PROC** indicators are lighted.
   - If Test 0 fails to affect alarm panel LEDs, check the power and cabling.

     Test 0 requires power from DC/DC converters in the common-control power carrier (slots 1 and 2 for CC0 and slots 4 and 5 for CC1).
   - If the **PASS** indicator turns on, Test 0 executed successfully. Continue with microdiagnostic Tests 1 through 15. The **DIAG PROC** indicator is also lighted when Test 0 passes.

- If Test 0 fails, the FAIL LED On the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.

3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator is on, continue with microdiagnostic Tests 1 through 15.
   - If the FAIL indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 0. Then, go to Step 5.
5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 0 are replaced. Then, go to Step 6.
6. If Test 0 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 0 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 1 — Maintenance Bus Demand Test

Test 1 checks the maintenance bus. The maintenance bus test begins by lighting the red LEDs on all circuit packs in the common control for approximately three seconds. The test continues with an inventory of the circuit packs in the common-control carrier, writes and reads back the complement of each circuit pack board-select number, tests for stuck-at faults, and performs a test of the board select leads.

To execute microdiagnostic Test 1:

1. Set the **TEST SELECT** switch to 1.
2. Depress **RESET, ENABLE.** While Test 1 is executing, the **MAJOR** indicator is lighted. In Test 1, the red and green LEDs (positions 18 and 19 respectively) are lighted on all common-control carrier circuit packs.

   NOTE

   After the **ENABLE** switch is depressed, the red LED on the circuit packs are lighted for approximately three seconds and the green LED on the circuit packs remain lighted until another test is selected.

   - If any circuit packs fail to light or remains with a red LED lighted in position 18, replace the circuit packs.

     NOTE

     If a circuit pack was replaced in Step 2, repeat all microdiagnostic tests starting with Test 0.

   - If the **PASS** indicator turns on, Test 1 executed successfully. Continue with micrdiagnostic Tests 2 through 15.
   - If Test 1 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.

3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdiagnostic tests Starting with Test 0.
   - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 1. Then, go to Step 5.
5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 1 are replaced. Then, go to Step 6.
6. If Test 1 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 1 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 2 — Alarm Interface Circuit Pack Demand Test

Test 2 checks the alarm interface circuit pack and the alarm panel. During this test, the alarm panel LEDs may momentarily change. As part of the test, the INIT* lead is set and cleared (causing and canceling the suicide condition). The software-controlled alarm register and external alarm register are also tested.

To execute microdiagnostic Test 2:

1. Set the **TEST SELECT** switch to 2.
2. Depress **RESET, ENABLE. While** Test *2 is* executing, the **MAJOR** and **PROC** indicators are lighted.
   - If the **PASS** indicator turns on, Test 2 executed successfully. continue with microdiagnostic Tests *3* through 15. The **PROC** indicator is also lighted when Test *2* passes.
   - If Test 2 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
   - If the **FAIL** indicator turns on, rplace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 2. Then, go to Step **5.**
5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 2 are replaced. Then, go to Step 6.
6. If Test 2 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 2 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 3 — Spare (Reserved for Future Use)

Test 3 is a spare test reserved for future use but *must* be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 3:

1. Set the **TEST SELECT** switch to 3.
2. Depress **RESET, ENABLE.** The **PASS** indicator is always turned on, indicating that Test 3 executed successfully.
3. Continue with microdiagnostic Tests 4 through 15.

Test 4 — Spare (Reserved for Future Use)

Test 4 is a spare test reserved for future use but *must* be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 4:

1. Set the **TEST SELECT** switch to 4.
2. Depress **RESET, ENABLE.** The **PASS** indicator is always turned on, indicating that Test 4 executed successfully.
3. Continue with microdiagnostic Tests 5 through 15.

Test 5 — Spare (Reserved for Future Use)

Test 5 is a spare test reserved for future use but *must* be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 5:

1. Set the **TEST SELECT** switch to 5.
2. Depress **RESET, ENABLE.** The **PASS** indicator is always turned on, indicating that Test 5 executed successfully.
3. Continue with microdiagnostic Tests 6 through 15.

Test 6 — Spare (Reserved for Future Use)

Test 6 is a spare test reserved for future use but *must* be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 6

1. Set the **TEST SELECT** switch to 6.
2. Depress **RESET, ENABLE.** The **PASS** indicator is always turned on, indicating that Test 6 executed successfully.
3. Continue with microdiagnostic Tests 7 through 15.

Test 7 — 501CC Processor Circuit Packs Demand Test

Test 7 checks the 501CC processor circuit packs. The 501CC processor test consists of four signature accumulator chip (SAC) tests, one for each processor circuit pack.

To execute microdiagnostic Test 7:

1. Set the **TEST SELECT** switch to 7.
2. Depress **RESET, ENABLE.** While Test 7 is executing, the **MAJOR** and **PROC** indicators are lighted.
   - If the **PASS** indicator is on, Test 7 executed successfully. Continue with microdiagnostic Tests 8 through 15. The **PROC** indicator is also lighted when Test *7* passes.
   - If Test 7 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdianostic tests starting with Test 0.
   - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Puck Replacement Sequence,* for Test 7. Then, go to Step 5.
5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 7 are replaced. Then, go to Step 6.
6. If Test 7 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 7 do not correct . the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 8 — System Bus and Buffered Bus Demand Test

Test 8 checks the ability of the 501CC circuit packs to communicate. Major portions of circuit packs UN153B, TN404, and TN491B are tested. Failures are detected on 501CC circuits that affect the ability to communicate over the system and buffered bus.

To execute microdiagnostic Test *8:*

1. Set the **TEST SELECT** switch to 8.
2. Depress **RESET, ENABLE.** While Test 8 is executing, the **MAJOR** and **I/O CHANNEL** indicators are lighted.
   - If the **PASS** indicator turns on, Test 8 executed successfully. Continue with microdiagnostic Tests *9* through 15. The **I/O CHANNEL** indicator is also lighted when Test 8 passes.
   - If Test 8 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**

- If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
- If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 8. Then, go to Step 5.

5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 8 are replaced. Then, go to Step 6.
6. If Test 8 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 8 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 9 — 501CC Instruction Set Demand Test

Test 9 checks the 501CC instruction set. The function of the 501CC instruction set testis to exercise the emulation microcode, verify the correct operation of most of the instruction set, and verify the correct operation of the 501CC at full speed.

To execute microdiagnostic Test 9:

1. Set the **TEST SELECT** switch to 9.
2. Depress **RESET, ENABLE.** While Test 9 is executing, the **MAJOR** and **PROC** indicators are lighted.
   - If the **PASS** indicator turns on, Test 9 executed successfully. Continue with microdiagnostic Tests 10 through 15. The **PROC** indicator is also lighted when Test 9 passes.
   - If Test 9 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is tiling.
3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
   - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 9. Then, go to Step 5.

5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 9 are replaced. hen, go to Step 6.
6. If Test 9 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 9 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 10 — Disk Tape System (DTS) Demand Test

Test 10 checks the DTS and the SCSI host adapter (TN563) by placing a call to the system to perform its own self tests.

Information concerning the success or failure of these self tests is displayed by the pass or fail indicators on the alarm panel and with broadcast messages to the Manager II (or any dumb terminal that has an ADU connected to it) if the Manager II is connected directly to a PPG port at the front of the DTS or at the back of the cabinet.

The LEDs on circuit pack TN563 and the DTS and the Manager II display are used to monitor the progress of microdiagnostic Test 10.

The green LED in position 4 of TN563 is always a heartbeat. The yellow LED in position 9 of TN563 is lighted during initialization of circuit pack TN563. After the TN563 is initialized, the yellow LED indicates disk or tape access. The DTS LEDs indicate when the tape drive or the disk drive or both are in use.

The Manager II display during execution of microdiagnostic Test 10 provides the following broadcast messages:

- The bootware issue number of the TN563 EPROMs. The content of the bootware issue message is: TN563 *Bootware Issue BWx.y —Copyright (C)AT&T 1988, All rights reserved,* where x.y is the issue number of the EPROMS (for example 1.1).
- The pumpware issue number of the TN563 pumpware file read off the tape. The content of the pumpware issue message is: *TN563 Pumpware Issue PWx.y —Copyright (C) AT&T 1989, All rights reserved.,* where x.y is the issue number of the pumpware file on the tape (for example 1.4).
- Failure information (if any) on the state of health of the DTS. See Table 5-4, *Fatal Circuit Failure Broadcast Messages,* for the types of failure information that maybe displayed.
- DTS DIAGNOSTICS
- PASSED
- FAILED
- THANK YOU
- DTS DIAGNOSTICS COMPLETE

To execute microdiagnostic Test 10:

1. Ensure that a tape is in the DTS and that it is firmly seated.

   Ensure that you insert the cartridge with the metal portion to the left and with the tape opening pointing up.

2. Connect the Manager II directly to a PPG port at the front of the DTS or at the back of the cabinet.

   If the Manager II is connected to the front of the DTS, the PADUB connector (two if duplicated) on the rear of the cabinet must be connected to the ADU jacks on the rear of the DTS.

3. Set the **TEST SELECT** switch to 10.

4. Depress **RESET, ENABLE.** While Test 10 is executing, the **MAJOR** and **TAPE** indicators are lighted.

   Test 10 may take up to six minutes to complete.

TABLE 5-4. Fatal Circuit Failure Broadcast Messages

Failure Type	Message Content
Overtemperature Test	Check Fan/Filter/Sensor
Tape Drive & Cartridge Test	Tape Drive Failure
	Tape Cartridge Unreadable
	Verifying Complete Tape - WAIT”;
	Verifying Read Circuitry - WAIT”;
Disk Drive Test	

continued

TABLE 5-4. Fatal Circuit Failure Broadcast Messages

Failure Type	Message Content
On-board	RAM block O
	RAM block 1
	RAM Block 2
	Dual port RAM
	Memory mapper
	SCSI bus interface
	Serial interface A
	Serial interface B
	DMA controller
	Interrupt controller O
	Interrupt controller 1
	Maintenance register
	Control register
	80186
	ROM checksum
501CC interface	Initialization opcode not received from 501CC
	501CC preventing access to system bus
	Invalid opcode received from 501CC

continued

TABLE 5-4. Fatal Circuit Failure Broadcast Messages *(continued)*

Failure Type	Message Content
Off-board	Mailbox access
	Tape drive not ready or cartridge not in place
	SCSI cabling or DTS power
	Tape drive failure
	Disk drive failure
	FIFO A interface
	FIFO B interface
	Maintenance bus access
	System bus access
	Write abort test
	Bus parity test
	Bus timeout test
Pumpware load	Unable to locate or load pumpware
	Bad pumpware file
	Unable to completely load pumpware
	Pumpware checksum failed
	Failure relocating pumpware

5. While Test 10 is executing, observe the LEDs on the DTS.
   - If the LEDs on the DTS never light, inspect the power cabling and the TN563 SCSI cable to the DTS.
     — If the power cabling and the TN563 SCSI cable are good, escalate the failure.
     — If the power cabling or the TN563 SCSI cable is not good, replace the power cabling or the TN563 SCSI cable (as appropriate). Repeat all microdiagnostic tests starting with Test 0.
   - If the LEDS on the DTS light, determine the status of the PASS and FAIL indicators.
     — If the **PASS** indicator turns on, Test 10 executed successfully. Continue with microdiagnostic Tests 11 through 15. The **TAPE** indicator is also lighted when Test 10 passes.
     — If Test 10 fails, the **FAIL** LED on the alarm panel is lighted. The Manager II displays a broadcast message that indicates the functional area in the disk tape subsystem that is suspected of failing.

6. Read the broadcast message on the Manager II to determine the content of the fatal circuit failure message. The fatal circuit failure message follows the TN563 bootware issue message.

   See Table 5-4, *Fatal Circuit Failure Broadcast Messages,* for a definition of the failure type and the message content of the fatal circuit failure message.

7. Perform corrective action based on the failure type of the fatal circuit failure message.

   - If the failure type of the fatal circuit failure message in Table 5-4 is on-board, replace TN563. Then, go to Step 18.

   - If the failure type of the fatal circuit failure message m Table 5-4 is 501CC interface, repeat microdiagnostic Test 10 a maximum of three times. If you continue to *receive the same* fatal circuit failure message or the same failure type, go to Step 18. If a different failure type exists, start over with Step 6.

   - If the failure type of the fatal circuit failure message m Table 5-4 is off-board, the corrective action is based on the content of the fatal circuit failure message.

     — If the fatal circuit failure message is one of the following: *mailbox access, FIFO A interface, FIFO B interface, maintenance bus access, system bus interface, write abort test, bus parity test,* or *bus timeout test,* go to Step 18.

     — If the fatal circuit failure message is *tape drive not ready or cartridge not in place,* go to Step 9.

     — If the fatal circuit failure message is *SCSI cabling or DTS power failure,* go to Step 13.

     — If the fatal circuit failure message is *tape drive failure,* go to Step 14.

     — If the fatal circuit failure message is *disk drive failure,* go to Step 14.

   - If the failure type of the fatal circuit failure message in Table 5-4 is pumpware load, replace the tape cartridge with anew tape cartridge. Then, go to Step 8.

     Ensure that you insert the tape cartridge with the metal portion to the left and with the tape opening pointing up.

   - If there is no broadcast message on the Manager II, the PPG port is bad. Go to Step 16.

8. Depress **RESET, ENABLE.**

   - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.

     Dispose of the old tape cartridge in accordance with your local instructions. Do *not* return the tape cartridge to the factory.

   - If the **FAIL** indicator turns on and the same failure type exists, escalate the failure. If a different failure type exists, start over with Step 6.

9. Remove and reinstall the tape cartridge.

   Ensure that you insert the tape cartridge with the metal portion to the left and with the tape opening pointing up.

10. Depress **RESET, ENABLE.**

    - If the **PASS** indicator turns on, repeat all microdiagnostic tests stating with Test 0.

    - If the **FAIL** indicator turns on and the same fatal circuit failure message (tape drive not ready or cartridge not in place) exists, replace the tape cartridge. Ensure that you insert the tape cartridge with the metal portion to the left and with the tape opening pointing up. Then, go to Step 11.

If a different failure message exists, start over with Step 6.

11. Depress **RESET, ENABLE.**
    - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.

      Dispose of the old tape cartridge in accordance with your local instructions. Do *not* return the tape cartridge to the factory.
    - If the **FAIL** indicator turns on and the same fatal circuit failure message (tape drive not ready or cartridge not in place) exists, replace the DTS. Tag the DTS with a suspected tape drive not ready or the cartridge is not in place. Then, go to Step 12.

      NOTE Refer to Chapter 9, *Switch Component Replacement,* for steps to replace the disk tape system.

      If a different failure message exists, start over with Step 6.
12. Depress **RESET, ENABLE.**
    - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
    - If the **FAIL** indicator turns on and the same fatal circuit failure message (tape drive not ready or cartridge not in place) exists, escalate the failure.

      If a different failure message exists, start over with Step 6.
13. Check the power to the DTS by turning the circuit breaker labeled DTS/HCMR on the side of the carrier off, then on, and observing the tape and the disk LED.
    - If the tape whirs and the disk LED lights, the power is good. Replace the SCSI cable. Then, go to Step 18.
    - If the tape does not whir and the disk LED does not light, check the DTSA-HCMR breaker and the -48V to the circuit breaker. Repair or replace as necessary. Then, go to Step 18.
14. Replace the DTS. Tag the DTS with a tape drive failure or a suspected disk drive failure (as appropriate) Then, go to Step 15.

    NOTE Refer to Chapter 9, *Switch Component Replacement,* for steps to replace the disk tape system.
15. Depress **RESET, ENABLE.**
    - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test O.
    - If the **FAIL** iindicator turns on and the same fatal circuit failure message (tape drive failure or disk drive failure as appropriate) exists, escalate the failure.

      If a different failure message exists, start over with Step 6.
16. Connect a RS-232 terminal using 1200 baud to the PPG port that failed. Then, go to Step 17.
17. Depress **RESET, ENABLE.**

- If the **PASS** indicator turns on, there is a problem with the Manager II. Refer the problem to the appropriate personnel.
- If the **FAIL** indicator turns on, determine if there is a broadcast message on the Manager II. If there is a broadcast message, start over with Step 6. If there is no broadcast message, check the PPG cabling from TN563 to the DTS.
  - If the cabling is bad, replace it. Then, go to Step 18.
  - If the cabling is good, replace TN563. Then, go to Step 18.

18. Depress **RESET, ENABLE.**
    - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
    - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 10. Then, go to Step 19.
19. Repeat Step 18 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 10 are replaced. Then, go to Step 20.
20. If Test 10 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 10 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 11 — Main Memory System Demand Test

Test 11 checks the main memory system. The functions of main memory are tested by the 501CC performing a main memory test, an error correction circuitry (ECC) test, a memory fabric test, and parity tests.

The main memory test reads the ID chip on each memory circuit pack, translates the code into a memory circuit pack density, and decides if ECC is to be tested.

- Red and green LEDs on the memory circuit packs light momentarily as part of the ID chip tests. If the ID chip contains a code that is not in the testable range, the main memory test fails immediately.
- If an empty memory slot between two occupied memory slots exists, the main memory test fails immediately. The common-control carrier must not contain memory circuit packs of different densities, as this also causes the main memory test to fail.

The memory fabric test checks many functions on the equipped memory circuit packs in a series. (For example, one function is tested on all circuit packs before testing the next function.) During two of the memory fabric subtests, the green LED on the memory circuit pack currently being tested is lighted to indicate test progression.

NOTE

The memory fabric test destroys all information in the memory configuration, including the MSTAT data.

The test of the error-correcting circuitry involves testing the RAM used to store the six check bits. The green LED on the memory circuit pack currently being tested is lighted to indicate test progression.

TN394 (4 megawords) in slots 08 through 10 are tested by the 501CC if they are installed.

To execute microdiagnostic Test 11:

1. Set the **TEST SELECT** switch to 11.
2. Depress **RESET, ENABLE.** While Test 11 is executing, the **MAJOR** and **MEM** indicators are lighted.
   - If the **PASS** indicator turns on, Test 11 executed successfully. Continue with microdiagnostic Tests 12 through 15. The **MEM** indicator is also lighted when Test 11 passes.
   - If Test 11 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted.
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
   - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 11. Then, go to Step 5.
5. Repeat Step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 11 are replaced. Then, go to Step 6.
6. If Test 11 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 11 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 12 — Memory Protect Circuit Pack Demand Test

Test 12 checks the memory protect circuit pack. The memory protect circuit pack (TN368) contains the system write-protect circuit, the system fetch-protect circuit, the system bus mastership-arbitration circuit, the I/O SANITYl timer, and the power-on and clear flip-flops.

TN394 (4 megawords) in slots 08 through 10 are tested by the 501CC if they are installed.

Before performing Test 12, remove the TN514 (scamper) circuit pack if it is installed.

To execute microdiagnostic Test 12:

1. Set the **TEST SELECT** switch to 12.
2. Depress **RESET, ENABLE.** While Test 12 is executing, the **MAJOR** and **MEM** indicators are lighted.
   - If the **PASS** indicator turns on, Test 12 executed successfully. Continue with microdiagnostic Tests 13 through 15. The **MEM** indicator is also lighted when Test 12 passes.
   - If Test 12 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted.
4. Depress **REST, ENABLE.**

- If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
- If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 12. Then, go to Step 5.

5. Repeat Step 4 until the PASS indicator turns on, or until all circuit packs listed in Table 5-3 for Test 12 are replaced. Then, go to Step 6.
6. If Test 12 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 12 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 13 — Spare (Reserved for Future Use)

Test 13 is a spare test reserved for future use but *must* be executed when microdiagnostic testing is being performed.

To execute microdiagnostic Test 13:

1. Set the **TEST SELECT** switch to 13.
2. Depress **RESET, ENABLE.** The **PASS** indicator is always turned on, indicating that Test 13 executed successfully.
3. Continue with microdiagnostic Tests 14 and 15.

Test 14 — Cache Memory Circuit Pack Demand Test

Test 14 checks the cache memory circuit pack (TN369 or TN379) and the bus interface circuit pack (UN153B) to the cache memory. TN369 or TN379 (cache memory) in slot 04 is tested if it is installed.

To execute microdiagnostic Test 14:

1. Set the **TEST SELECT** switch to 14.
2. Depress **RESET, ENABLE.** While Test 14 is executing, the **MAJOR** and **CACHE/MEMORY** indicators are lighted.
   - If the **PASS** indicator turns on, Test 14 executed successfully. Continue with microdiagnostic Test 15. The **CACHE/MEMORY** indicator is also lighted when Test 14 passes.
   - If Test 14 fails, the **FAIL** LED on the alarm panel is lighted and a red LED is lighted in position 18 of the circuit pack that is failing.
3. Replace the circuit pack with the red LED lighted
4. Depress **RESET, ENABLE.**
   - If the **PASS** indicator turns on, repeat all microdiagnostic tests starting with Test 0.
   - If the **FAIL** indicator turns on, replace the next circuit pack listed in Table 5-3, *Microdiagnostics Circuit Pack Replacement Sequence,* for Test 14. Then, go to step 5.
5. Repeat step 4 until the **PASS** indicator turns on, or until all circuit packs listed in Table 5-3 for Test 14 are replaced. Then, go to step 6.

6. If Test 14 continues to fail, the circuit pack replacements listed in Table 5-3 for Test 14 do not correct the problem. Perform additional corrective action as listed under *Repair Guide for Microdiagnostic Testing* (after Test 15).

Test 15 —Abbreviated Test and Forced Load

Test 15 performs an abbreviated test and a forced load. When you execute Test 15 the system is cycled through a number of tests before the load is attempted. Test 15 does *not* clear MSTAT memory.

- The diagnostic processor circuit pack requests the 501CC to perform the SAC tests (microdiagnostic Test 7). Each of the four SAC tests is executed and the results verified.
- The system bus and buffered bus tests (microdiagnostic Test 8) are performed interactively between the 501CC and the diagnostic processor circuit pack.
- The 501CC instruction set test (microdiagnostic Test 9) is performed.

If any of these tests fail, the load from tape is aborted and the diagnostic processor circuit pack forces suicide.

The forced load is now executed.

NOTE: The forced load does not interrogate main memory before it makes a decision whether or not to load from tape. It assumes that main memory is corrupt and initiates a load from tape.

The order in which events occur during execution of microdiagnostic Test 15 areas follows:

- The green LED in position 4 and the yellow LED in position 9 of the TN563 circuit pack are lighted.
- The green LED in position 4 of the TN563 circuit pack starts flashing (fast, then slower), indicating that the tape interface is being initialized. A message is broadcast to the Manager II indicating the bootware issue.

  The content of the bootware issue message is: *TN563 Bootware Issue BWx.y — Copyright (C) AT&T 1988, All rights reserved.,* where x.y is the issue number of the EPROMS (for example 1.1).
- A special file (pumpware) is then read from tape into TN563 RAM. The green LED in position 4 of the TN563 circuit pack changes to a new rhythm and a message is broadcast to the Manager II indicating the pumpware issue.

  The content of the pumpware issue message is: *TN563 Pumpware Issue PW.x.y — Copyright (C) AT&T 1989, All rights reserved.,* where x.y is the issue number of the pumpware file on the tape (for example 1.4).
- The area currently being read from tape, the completion of the tape load, and any failure messages (see Table 5-4, *Fatal Circuit Failure Broadcast Messages) are* indicated on the Manager II using broadcast messages. The content of the broadcast messages for the tape load, except for the failure messages, are as follows:

  — *Insufficient system memory for this DEFINITY Communications System Generic 2 load.* This broadcast message means that the DTS tested the DEFINITY Communications System Generic 2 501CC main memory and found that the correct memory size is not installed or the memory is not functional

- — *Reading system directory block*
- — *Performing system load from tape*
- — *Restoring disk from tape*
- — *Performing system load from disk*
- — *Load status:* %. The load status broadcast message display on the Manager II increments (for example, 22, 44, 88, 100%)
- — *Insufficient System Memory for this Load.*
- — *Reading System Directory Block.*
- — *Tape Cartridge Corrupted*
- — *Tape Drive Fault.*
- — *Error, Cartridge Must Be in Tape Drive*
- — *Tape and Disk Images Match*
- — *Image Mismatch, Transferring Tape Image to Disk*
- — *Disk Drive Fault: Performing System Load from Tape.*
- — *Performing System Load from Disk.*
- — *System Load Failed.*
- — *System Load Complete.*
- — *System available for access.*

CAUTION

If microdiagnostic Test 15 is executed without performing microdiagnostic Tests 0-14 during a reload of tape, false alarms and emergency transfer can occur that may affect service. MSTAT memory is not cleared by Test 15.

To execute microdiagnostic Test 15:

1. Ensure that a tape is in the DTS and that it is firmly seated.

   Ensure that you insert the cartridge with the metal portion to the left and with the tape opening pointing up.

2. Connect the Manager II directly to a PPG port at the front of the DTS or at the back of the cabinet.

   If the Manager II is connected to the front of the DTS, you must connect the PADUB connector (two if duplicated) on the rear of the cabinet to the ADU jacks on the rear of the DTS.

3. Set the **TEST SELECT** switch to 15.

4. Depress **RESET, ENABLE.** While Test 15 is executing, the **MAJOR, PROC,** and **TAPE** indicators are lighted.

   - When the tape load is completed and successful, the **PASS** indicator on the alarm panel flashes at a one-second on, one-second off rate. In addition, the green LED in position 4 of TN563 is flashing (indicating a heartbeat). There is a slight delay before the heartbeat appears.
   - If the tape load is not successful, failure indicators **MAJOR, PROC,** and **TAPE** are lighted. The **PASS** indicator does not flash and the FAIL indicator is lighted.

5. If the **PASS** indicator does not flash or if any of the failure broadcast messages are displayed on the Manager II, execute microdiagnostic Tests 0-14 to find the cause of the failure.

   See Table 5-4, *Fatal Circuit Failure Broadcast Messages,* for a definition of the failure messages that can be displayed on the Manager II using broadcast messages.

Repair Guide for Microdiagnostic Testing

1. Determine from Table 5-5, *Circuit Packs Required to Perform Microdiagnostic Tests,* the circuit packs that are required to perform the microdiagnostic test being executed.
2. Unseat all circuit packs in the common-control carrier that are *not* required to perform the microdiagnostic test being executed.
3. Depress **RESET, ENABLE.**
   - If the **FAIL** indicator turns on, reseat all circuit packs unseated in step 2. Then, go to Step 12.
   - If the **PASS** indicator turns on, reseat one circuit pack unseated in step 2. Then, go to Step 4.
4. Depress **RESET, ENABLE.**
   - If the **FAIL** indicator turns on, go to Step 5.
   - If the **PASS** indicator turns on, go to step 9.
5. Replace the reseated circuit pack.
6. Depress **RESET, ENABLE.**
   - If the **FAIL** indicator turns on, go to Step 7.
   - If the **PASS** indicator turns on, go to step 9.
7. Replace the circuit pack in the same slot.

> **Important**
>
> Do not replace more than two circuit packs in the same slot.

8. Depress **RESET, ENABLE.**
   - If the **FAIL** indicator turns on, reseat any unseated circuit packs. Then, go to Step 12.
   - If the **PASS** indicator turns on, go to step 9.
9. Determine if other circuit packs are to be reseated.
   - If all circuit packs are reseated, go to step 11.
   - If any circuit packs are unseated, reseat the next circuit pack. Then, go to step 10.
10. Depress **RESET, ENABLE.**
    - If the **FAIL** indicator turns on, go back to step 5.

- If the **PASS** indicator turns on, repeat step 9.

11. Determine if any circuit packs were replaced in step ***5.***
    - If no circuit packs were replaced, go to step 12. Suspect an intermittent trouble.
    - If a circuit pack was replaced, repeat all microdiagnostic test starting with Test 0.

12. If the circuit pack replacements or the power and cabling checks do not reveal the source of the problem, check the backplane wiring. If the backplane wiring is satisfactory or if you have replaced it and the failure still exists, escalate the failure.

TABLE 5-5. Circuit Packs Required to Perform Microdiagnostic Tests

Test	Circuit Packs Required for Test to Execute
0	TN490 (Slot 22), TN491B (Slot 31), andd TN492C (Slot 32).
1	TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
2	TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
3	TN490 (Slot22), TN491B (Slot 31), and TN492C (Slot 32).
4	TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
5	TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
6	TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
7	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
8	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN404 (Slot 21), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
9	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN394 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
10	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN394 (Slot 07), TN563 (Slot 20), TN404 (Slot 21), TN490 (Slot 22), TN403 (Slot 23), TN491B (Slot 31), and TN492C (Slot 32).
11 [1]	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN394 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
12 [1]	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN394 (Slot 07), TN404 (Slot 21), TN490 (Slot 22)9 TN491B (Slot 31), and TN492C (Slot 32).

continued

TABLE 5-5. Circuit Packs Required to Perform Microdiagnostic Tests *(continued)*

Test	Circuit Packs Required for Test to Execute
13	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN404 (Slot 21), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).
14 [2]	TN370C (Slot 00), UN151 (Slot 01), UN152B (Slot 02), UN153B (Slot 03), TN368 (Slot 06), TN394 (Slot 07), TN404 (Slot 21), TN490 (Slot 22), TN491B (Slot 31), and TN492C (Slot 32).

[1] = TN394 in slots 08-10 are tested (if installed).
[2] = TN369 or TN379 in slot 04 is tested (if installed).

6. ALARMED FAILURES

You can visually observe alarms at the customer's premises via the alarm panel, on the customer's attendant consoles, or on the DEFINITY® Manager II. In addition, major and minor alarms are automatically reported to a remote maintenance facility (if provided).

The alarm panel contains alarm and fault indicators that you can use to determine system status. The alarm panel displays such alarms as major, minor, and warning. Fault indicators are associated with major functional areas of the system.

CLEARING ALARMS

You clear alarms by investigating, isolating, and correcting the cause of the alarm condition. This requires access to maintenance Procedure 600 switch failure information and the referenced procedure. After you make a repair, run the appropriate verification test using the maintenance procedure associated with testing the circuit to ensure that the problem is corrected.

- When the circuit verification test is successfully run without a failure, the alarmed entry in the periodic maintenance information data structure (PMIDS) is automatically resolved and the associated fault indicator is turned off (if no other alarmed entries are affecting the same fault indicator).
- When more than one alarm cause exists at a particular level, all alarm causes must be resolved before the fault indicator is automatically turned off.

When it is necessary to further isolate an alarm cause, use Procedure 600 (Alarm Causes/Error Log) to manually turn off one or all fault indicators while retaining the failure history. The fault indicator is reactivated by any subsequent errors that cause an alarm threshold to be exceeded.

FAULT ISOLATION OF ALARMED FAILURES

Alarms are generated by hardware or software detection. Maintenance diagnostics, which are an integral part of the system software, monitor system parameters and turn on alarm indicators when unacceptable limits are exceeded.

You can use specific maintenance procedures to isolate the cause of the fault indicator being lighted.

Maintenance Procedures

Maintenance procedures (in general) consist of at least three types of tests:

- Failure history —This test displays the results of maintenance testing that is active during normal call processing. It is the starting point for alarm indicator trouble analysis. You should record and maintain a list of the failing circuits for comparison of results in later tests.
- Demand diagnostic testing of all circuits — These tests are under your control and they can check all circuits of the same type. Make a list of any failures and use the list to determine the corrective action required to clear the alarm indicator. Corrective action to be taken is based upon failure codes, failure patterns, or failing circuits.
- Demand continuous testing of individual circuits— The primary purpose of this test is to check for intermittent failures and to facilitate checking of wiring problems. You should check circuits you recorded in the failure history that you did not record in the demand diagnostic test by using the continuous test.

Comparison of Results

When you take corrective action (replacement of circuit pack and so on) as a result of demand diagnostic testing, repeat the demand diagnostic test to determine if the failure is corrected and to turn off the alarm indicator.

When failures still exist, make a comparison to determine if the *same* failure code, failure pattern, or failing circuit is the problem. This is required because all circuits of the same type maybe tested. The comparison can be accomplished by recording each failure and comparing the new list against the original list, or by typing *nc* (next circuit) and comparing the failures displayed against the original list.

Further corrective action depends upon the results of the comparison.

PROCEDURE 600 — ALARM CAUSES/ERROR LOG

Important

The starting point for investigating and isolating the cause of the lighted fault indicator is maintenance Procedure 600, Test 1, which provides you the sequence of maintenance procedures to perform.

The Alarm Causes/Error Log maintenance procedure displays the contents of the *current* PMIDS error log.

Each entry displayed identifies the unit type, the equipment location of the probable cause of the alarm, the present alarm status, the number of recorded errors, a reference to the maintenance procedure to be performed for further tests to determine the cause of the error, and a time stamp indicating when the entry was alarmed.

Produre 600, Test 1 provides a display of alarms by order of severity and by priority (fictional ares) within alarm levels (major, minor and warning).

- All major alarms are displayed first, minor alarms are displayed next, and warning alarms are displayed last.
- Within each alarm category, entries are (displayed in numerical order by unit type. Unit types are listed in descending order of importance of the functional area to the switch.
- When two or more alarms of the same level are displayed, the functional area that is most important to the operation of the switch is dispIayed first. Investigate this alarmed entry first, as its cause may affect the remaining alarmed entries.

Use the maintenance procedure referenced in Field 15 of Procedure 600 to diagnose and isolate the cause of the alarmed failure.

Figure 6-1, *Maintenance Repair Strategy for Alarmed Unit Types,* provides a general approach for clearing alarms until the switch is alarm free. These figures also provide:

- The relationship between the unit type and functionalarea
- The maintenance procedure to perform to isolate alarmed failures for the unit type/functional area
- The components tested by the maintenance procedure
- The test equipment required to test the functional area
- Any other maintenance procedure or test required to check out the functional area
- A reference to the section of Chapter 6 that provides step-by-step fault isolation and repair techniques for the functional area unit type.

Figure 6-1 assumes that only one failure exists. The one failure is in one of the unit type/functional areas.

When more than one failure exists, begin troubleshooting with the unit type for the most important functional area (that is, the first failure displayed in Procedure 600, Test 1).

In order to determine if a failure pattern exists for the unit type that is alarmed when more than one failure exists, you can type *nc* (next circuit) and record each failure for that unit type until the unit type in Field 2 changes. Analyzing the circuits that are alarmed for that unit type may help you to determine if a failure pattern exists.

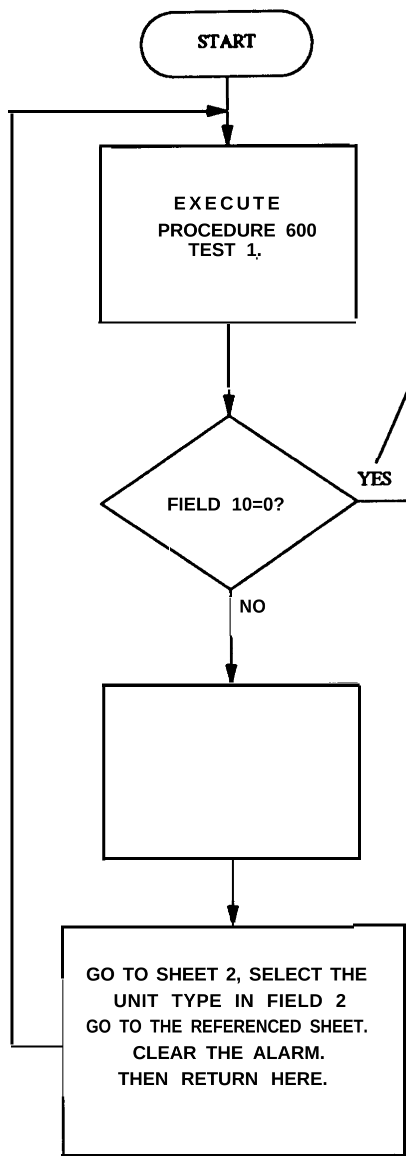


Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

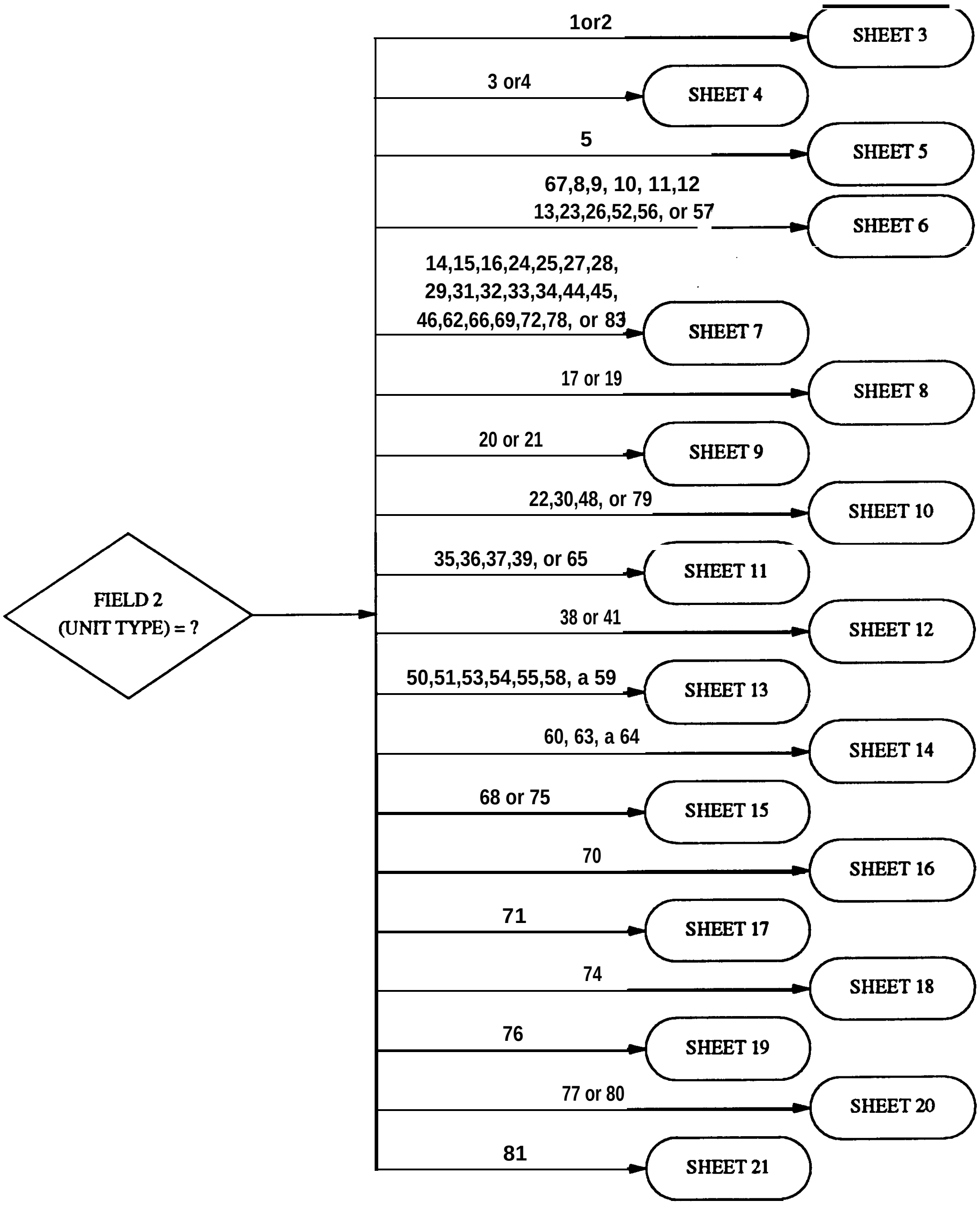


Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 1 — Environmental	
Diagnostic and verification test performed by	Procedure 601, Test 2
Components tested	Traditional module cabinet power AC/48 volts, fuse/breaker, DC-DC converter, frequency generator, air flow, temperature, holdover, module control power. Universal module — high battery charge rate, battery reserve unit, power unit shutdown, ring voltage, air flow, temperature, battery reserve online.
Tools and test equipment required	Screwdriver (phillips or flat head) to remove and replace hardware components. Digital multimeter and voltmeter to make voltage measurements Backplane Test Circuit Pack (BVT-CP TN2036).
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 601

Unit Type 2 — Tape	
Diagnostic and verification test performed by	Procedure 610, Test 2
Components tested	TN563, tape cartridge, disk tape system, cable, fan, serial port.
Tools and test equipment required	Screwdriver to remove and replace the disk tape system.
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 610

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 3 — Initialization Causes	
History of initialization causes indicated by	Procedure 612
Components indicated as a possible cause of initialization problems	TN368, TN370, TN369 or TN379, TN394, TN490, TN491, UN151, UN152, UN153, UN158
Tools and test equipment required	None
Related procedures required	Procedure 600 to determine if unit type 22 (duplication processor) problems exist when fault code 35 is displayed in Procedure 612. Procedure 613, Test 3 to determine how many manual switches have occurred when fault code 35 is displayed in Procedure 612. Procedure 600 to determine the health of the switch when fault code 38 is displayed in Procedure 612.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 612

Unit Type 4 — Common-Control I/O	
Diagnostic and verification test performed by	Procedure 611, Test 2
Components tested	TN402, TN403, TN404
Tools and test equipment required	None
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 611

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 5 — Main Memory and Unit Type 18 — Cache Memory	
Diagnostic and verification test performed by	Procedure 614, Tests 2 through 4
Components tested	TN394, TN397
Tools and test equipment required	None
Related procedures required	Procedure 600, Test 2 to determine the status of memory audit peg counts (unit type 43). Procedure 610 to correct tape problems. Procedure 611, Test 2 to test possible failing I/O circuits. Procedure 612 to determine the status of initialization problems. Procedure 613 to determine the cause of a parity error. Procedure 999 to correct the failing common-control processor. Administration procedure 490 to find the number of patches on both the on-line and off-line common-control tapes. In addition, procedure 490 is used (as necessary) to add missing patches.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 614

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types — Network-Control Carrier	
Unit Type 6 — TMS, Universal, or Module-Control Channel, Unit Type 7 — TMS, Universal, or Module Processor, Unit Type 8 — Maintenance Interface, Unit Type 9 — Module Clock Unit Type 10 — TSI — ALU, Unit Type 11 — TSI — PSTORE, Unit Type 12 — I/O Bus Interface (IOBI), Unit Type 13 — Port Data Store (PDS), Unit Type 23 — TMS, Universal, or Network Duplication Channel, Unit Type 26 — Network I/0, Unit Type 52 — System Clock Synchronizer (SCS), Unit Type 56 — Intermodule Data Store (IDS), or Unit Type 57 — Light Guide Interface (LGI),	
Diagnostic and verification test performed by	Procedure 620, Test 4
Components tested	TN401/TN588, TN380/TN381/TN580, TN444, TN460, TN446, TN445, TN400, TN440, TN530/TN541, TN463, TN441, TN481
Tools and test equipment required	None
Related procedures required	Procedure 611, Test 2 to test the common-control channels when special error code 88 is displayed. Procedure 621, Test 2 to perform a soft switch when special error code 90 is displayed for unit type 23.
Other tests to be performed	Tree-slot interchanger (TSI) demand test when any circuit packs in unit type 8,9, 10, 11, or 13 are replaced.
Fault isolation and repair techniques described in	Procedure 620, Module Control Carrier

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types — Port Carrier	
Unit Type 14 — Port Control Interface (PCI), Unit Type 15 — Port Data Interface (PDI), Unit Type 16 — Tone Plant or Universal Tone Generator, Unit Type 24 — Touch-Tone Sender or Universal Tone Detector, Unit Type 25 — Touch-Tone Receiver or Universal Tone Detector, Unit Type 27 — General Purpose Port (GPP) or Universal Digital Line Circuit, Unit Type 28 — 72 Series Multifunctional Electronic Telephone (MFET) or Universal Multibutton Electronic Telephone (MET) Line Circuit, Unit Type 29 — Line Circuit, Unit Type 31 — Auxiliary Tone Plant, Unit Type 32 — Central Office (CO) Trunk Unit Type 33 — Direct Inward Dialing (DID) Trunk, Unit Type 34 — Tie Trunk/Release Link Trunk/Data Port, Unit Type 44 — Attendant Console Interface, Unit Type 45 — Auxiliary Trunk, Unit Type 46 — Attendant Conference, or Unit Type 62 — Analog/Digital Facility Test Circuit (ADFTC) or Maintenance Test Circuit Pack (MTCP)	
Diagnostic and verification test performed by	procedure 620, Test 4
Components tested	TN452, TN454, SN250/TN768, SN252/TN748, SN251/TN748, SN270/TN754, SN224/TN735, SN228/SN229/TN742/TN746, SN253/TN768, SN230/TN747, SN232/TN753, SN233/SN243/TN760, SN233, SN231/TN763, SN254, SN261/TN771B
Tools and test equipment required	None
Related procedures required	Procedure 646, Test 1 to test the failing equipment location if special error code 90 is displayed for unit type 27.
Other tests to be performed	TSI demand test when any circuit pack in unit type 15 is replaced. Hyperactivity testing if specific fault code 337 is displayed for unit type 27,29,3233,34,44,45, or 62 in Procedure 620, Test 1.
Fault isolation and repair techniques described in	Procedure 620, Port Carrier

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types — Port Carrier (continued) Unit Type 66 — Tone Detector 2, Unit Type 69 — MultifunctionaI Analog Terminal (MFAT) or Universal Line Circuit, Unit Type 72 — Electronics Industries Association (EIA) Interface or Universal Data Line Circuit, Unit Type 78 — Basic Rate Interface (BRI), or Unit Type 83 — Network Processing Element (NPE)	
Diagnostic and verification test performed by	Procedure 620, Test 4
Components tested	SN255/TN748, ANN17TN762, SN238/TN726, TN556
Tools and test equipment required	None
Related procedures required	Procedure 646, Test 1 to test the failing equipment location if special error code 90 is displayed for unit type 72.
Other tests to be performed	Hyperactivity testing if specific fault code 337 is displayed for unit type 72 in Procedure 620, Test 1.
Fault isolation and repair techniques described in	Procedure 620, Port Carrier

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 17 — Attendant Console	
Diagnostic and verification test performed by	Procedure 653, Test 2
Components tested	Local and remote consoles
Tools and test equipment required	Screwdriver to remove and replace console components.
Related procedures required	Procedure 620, Test 4 to test the SN233 attendant console interface. Procedure 611, Test 3 to determine if an I/O failure exists.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 653

Unit Type 19 — Data Communications Interface Unit (DCIU)	
Diagnostic and verification test performed by	Procedure 650, Test 2
Components tested	TN405, TN406, UN156
Tools and test equipment required	None
Related procedures required	Procedure 614 when fault code 15 is recorded in Procedure 650 to isolate the cause of the failure.
Other tests to be performed	Demand reinitialization when required. Loop-around testing when required. Internal loop-around test is used to test the data link interface hardware. External loop-around testing is used to test the data link cabling between the backplane and the connector and between the connector and the data set.
Fault isolation and repair techniques described in	Procedure 650

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 20 — Station Message Detail Recording (SMDR)	
Diagnostic and verification test performed by	Procedure 655, Tests 2 through 5
Components tested	SMDR carrier, formatter, and tape drive
Tools and test equipment required	HP-HO5-1O525T logic probe to check components of the SMDR. Screwdriver to remove and replace SMDR circuit packs and components. A card extender, test panel, and oscilloscope for making adjustments on tape drive circuit packs 3645, 3844,4139, and 4306 (if replaced).
Related procedures required	Procedure 611, Test 2 to check for I/O failures between the dual-speed data channel and the SMDR.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 655

Unit Type 21 — Automatic Number Identification (ANI)	
Diagnostic and verification test performed by	Procedure 623, Test 2
Components tested	SN244
Tools and test equipment required	J59204AJ ANI Data Link Test Set when performing Test 2 to verify the 4-digit trunk and station number assignment.
Related procedures required	Procedure 620, Test 3 to check the module-control channel when failure code 1 is displayed in Procedure 623.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 623

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 22 — Processor Duplication (501 CC)	
Diagnostic and verification test performed by	Procedure 613, Test 2 and Test 3
Components tested	TN491, UN151, UN158
Tools and test equipment required	None
Related procedures required	Procedure 600 (unit type 4) to investigate off-line common control I/O failures. Procedure 650 to check the off-line DCIU. Procedure 612 to clear the health code of the off-line processor.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 613

Unit Type 30 — Even Numbered Port Peripherals, Unit Type 48 — Odd Numbered Port Peripherals, Or Unit Type 79 — ISDN Basic Rate Interface (BRI) Terminals	
Diagnostic and verification test performed by	Procedure 622 Test 2
Components tested	Network peripherals and BRI terminals
Tools and test equipment required	Port tester to verify the continuity of station wiring at various locations from the wall jack of a peripheral to the port to which the peripheral is connected.
Related procedures required	Procedure 620, Test 4 to test the hardware connected to the peripheral. Procedure 628, Test 2 to test the LAN bus.
Other tests to be performed	Port circuit pack insertion test when the port circuit pack is located at a remote carrier group. Hyperactivity testing if specific fault code 337 is displayed in Procedure 622, Test 1. BRI terminal self test.
Fault isolation and repair techniques described in	procedure 622

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 35 — Digital Trunk, Unit Type 36 — Digital User Problem, or Unit Type 65 — Modem Pooling	
Diagnostic and verification test performed by	Procedure 646, Test 1 for ADFTC, Procedure 646, Test 3 for modem pool members and digital facilities.
Components tested	SN238/TN726, SN243/TN742, SN261/TN771B, SN270/TN754, modems, TDM/2
Tools and test equipment required	None
Related procedures required	Procedure 620, Test 2 to test time slots (range on PDIs). Procedure 620, Test 4 to test GPPs, data ports, or ADFTCs. Procedure 620, Test 4 to test unit type 7 (module processor). Procedure 620, Test 4 to test unit type 12 (IOBI) and unit type 14 (PCI).
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 646

Unit Type 37 — Calling Number Display and Unit Type 39 — Force Administration Display System (FADS)	
Diagnostic and verification test performed by	Procedure 654, Test 2
Components tested	102D, 102F, 102G terminal and 211A power unit
Tools and test equipment required	None
Related procedures required	Procedure 611 Test 3 to determine if an I/O failure exists.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 654

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 38 — Time-of-day Clock Synchronizer	
Diagnostic and verification test performed by	Procedure 652, Test 2
Components tested	TN492
Tools and test equipment required	None
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 652

Unit Type 41 — Trunk	
Failure history and monitoring of trunk activity performed by	Procedure 640, Test 1 and Test 2
Components tested	Trunk activity
Tools and test equipment required	A 249A adapter and telephone set or hand test set when performing outgoing calls using Procedure 642, Test 2. Procedure 642, Test 2 cannot be used on universal trunk circuits.
Related procedures required	Procedure 620, Test 4 to test the associated trunk circuit packs. Procedure 642, Test 2 to make outgoing calls on the suspected Wing trunk (outgoing trunks only).
Other tests to be performed	Interpretation and appropriate corrective action by higher level system technicians on the trunk data displayed in Procedure 640, Test 2.
Fault isolation and repair techniques described in	Procedure 640

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types — TMS Carrier Unit Type 50 — TMS Clock Oscillator (TCO), Unit Type 51 — Local Clock Termination (LCT), Unit Type 53 — Multiplexer, Unit Type 54 — Fan Out (FO), Unit Type 55 — Module Interface (MI), Unit Type 58 —Fan In (FI), Unit Type 59 — TMS Maintenance,	
Diagnostic and verification test performed by	Procedure 620, Test 4
Components tested	TN461, TN462, TN470, TN473, TN480, UN150, TN482
Tools and test equipment required	None
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 620, TMS Carrier

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 60 — Diagnostic Processor, Unit Type 63 — External Equipment, and Unit Type 64 — External Processsor	
Diagnostic and verification test performed by	Procedure 618 Test 1 and Test 3
Components tested	TN491, TN492, auxiliary cabinet components
Tools and test equipment required	Digital multimeter to measure output voltages at the auxiliary cabinet rectifier. Screwdriver to remove and replace auxiliary cabinet components. Wrench to remove hex nuts when replacing the auxiliary cabinet rectifier.
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 618

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types Unit Type 68 —DS-1 Interface or Unit Type 75 — Primary Rate Interface (PRI) or DS-1 Interface with Packet Adjunct	
Diagnostic and verification test performed by	Procedure 620, Test 2 and Test 4
Components tested	ANN11/TN767, ANN35/TN555/TN763
Tools and test equipment required	None
Related procedures required	Procedure 600, Test 3 to determine if the problem has occurred many times. Procedure 618, Test 1 to determine if an external equipment alarm associated with the DS-1 or PRI exists or if there is an alarm in the external synchronization hardware. Procedure 620 to busy out or release busy the DS-1 or PRI circuit packs. Procedure 620, Test 2 to perform a range test on unit type 68 (DS-l) and unit type 75 (PRI) to determine if other DS-1 or PRI facilities are experiencing troubles. Procedure 620, Test 4 to test the DS-1 or PRI circuit pack and associated facilities. Procedure 621, Test 2 to soft switch the time multiplexed switch (TMS) and the network module-control complex. Procedure 625, Test 1 to determine the health status of a DS-1, PRI, or clock reference and to determine if the DS-1 or PRI circuit passes or fails by observing the performance measurements. Procedure 625, Test 2 to select another facility as a synchronization reference or to determine if the facility is the on-line reference or that a reference is on line. Procedure 635 or Procedure 648 to determine the maintenance busy status of integrated services digital network (ISDN) trunks and to busy out or release from busy the DS-1 or PRI trunks.

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Types (continued) Unit Type 68 — DS-1 Interface or Unit Type 75 — Primary Rate Interface (PRI) or DS-1 Interface with Packet Adjunct	
Related procedures required (continued)	Procedure 642 to perform a terminal-to-trunk test call. Procedure 647, Test 2 to perform an automatic transmission measurement system (ATMS) supervision test call. Procedure 648, Tests 2 and 3 to determine if layer 2 and layer 3 ISDN communications exist. Administration Procedure 107 to check the thresholds that are set- Administration Procedure 178, Word 1 to find the trunk group number and member number for the equipment location of the facility in question. Administration Procedure 260 to: administer internal and external loop back, check the facility in question to determine if it is administered as a synchronization reference source, administer a reference, or to change the equalization options for the TN circuit packs.
Other tests to be performed	A trunk verification voice terminal (TVVT) call using the DS-1 or PRI to verify that the DS-1 or PRI facility is functioning. Hyperactivity testing if specific fault code 337 is displayed for unit type 68 in Procedure 620, Test 1. LAN bus testing for unit type 75 in Procedure 628, Test 2.
Fault isolation and repair techniques described in	Procedure 620, DS-1 Interface

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 70 — Automatic Transmission Measurement System (ATMS)	
Diagnostic and verification test performed by	Procedure 647, Test 2
Components tested	Trunk circuit, translation, far end
Tools and test equipment required	None
Related procedures required	Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) to test the ADFTC circuit pack. Procedure 620, Test 4 to test the busy or failing circuit. Procedure 642, Test 2 to make a terminal-to-terminal test call on the failing circuit. Administration Procedure 107 to correct translation for the ATMS. Administration Procedure 000 and Procedure 010 to check the translation assignment of the OTL. Administration Procedure 254 to determine if originating registers are assigned. Administration Procedure 350 Word 2, Procedure 285, and Procedure 103 to check the translation of the dial code assignment and trunk type for the trunk verification voice terminal (TVVT) feature. Administration Procedure 100 Word 1, Procedure 175, Procedure 010 Word 3 and Procedure 350 Words 1 and 2 to check the translation of the trunk type, trunk group translations, and restrictions for the trunk group dial access code.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 647

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Type Unit Type 71 — Remote Module Interface (RMI)	
Diagnostic and verification test performed by	Procedure 620, Test 4
Components tested	TN456 central or remote
Tools and test equipment required	None
Related procedures required	None
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 620, RMI

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Network Unit Type Unit Type 74 — Remote Carrier Group (RCG)	
Diagnostic and verification test performed by	Procedure 620, Test 2 and Test 4
Components tested	ANN15, ANN16, remote carrier group ports (GPP, line, MFAT, EIA). RCG environmental components (DC-DC converter, -48 volt AC rectifier, CDM, CEM, analog rining generator, over temp, fan, battery holdover).
Tools and test equipment required	Digital multimeter to measure AC rectifier voltages. Screwdriver to remove and replace RCG auxiliary cabinet components. Wrench to remove hex nuts when replacing the auxiliary cabinet rectifier.
Related procedures required	Procedure 625, Test 1 to determine the health status of the RCG facility. Procedure 642, Test 2 to make a terminal-to-terminal test call on the RCG. Administration Procedure 260 to check the DS-1/Tl assignment or to check the fiber option setting.
Other tests to be performed	ANN16 or port circuit pack insertion test when the port circuit pack is located at the remote carrier group.
Fault isolation and repair techniques described in	Procedure 620, RCG

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 76 — Integrated Services Digital Network (ISDN) Error Processing	
Diagnostic and verification test performed by	Procedure 648, Test 2 and Test 3
Components tested	ANN35/TN767/TN555, trunk circuit, translation, far end
Tools and test equipment required	None
Related procedures required	Procedure 620, Test 4 to test the failing PRI circuit. Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) to test the ADFTC. Procedure 611, Test 2 to test the I/O channels. Procedure 635 to perform a busy out, release busy sequence. Procedure 600, Test 1 and Test 2 to determine if alarms or recorded errors could be contributing to this failure. Administration Procedure 010 Word 1, Procedure 010 Word 3, Procedure 051 Word 1, and Procedure 052 Word 1 to determine if the ADFTC is administered. Administration Procedure 275 Word 4, Field 14 to determine if ISDN is activated. Administration Procedure 000 and Procedure 010 to determine the assignment of the OTL. Administration Procedure 350 Word 2, Procedure 285, and Procedure 103 to determine the dial code assignment and trunk type of the TVVT feature. Administration Procedure 010 Word 3, Field 18 to determine the origination restriction. Administration Procedure 100, Word 1 to determine the ISDN trunk type for the near end. Administration Procedure 254 to determine if originating registers are assigned.
Other tests to be performed	Repair procedure in Procedure 614, Unit Type 68 — DS-1 Interface and Unit Type 75 — PRI to test the failing circuit.
Fault isolation and repair techniques described in	Procedure (648)

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 77 — Processor Communication Circuit (PCC)	
Diagnostic and verification test performed by	Procedure 651, Test 2 and Test 3
Components tested	TN474 and link to the 3B2 LSU peripheral
Tools and test equipment required	A loopback plug; a one-pair, five-foot patch cord; an RS232 loopback plug; a 2012D transform, a 400B adapter, 248D adapter a seven-foot, six-terminal power cord; and a seven-foot, eight-terminal modular cable to perform the end-to-end loop test.
Related procedures required	None
Other tests to be performed	End-to-end loop-around Test
Fault isolation and repair techniques described in	Procedure 651

Network Unit Type Unit Type 80 — Universal Bus Interface (UBI)	
Diagnostic and verification test performed by	Procedure 620, Test 4
Components tested	UN154
Tools and test equipment required	None
Related procedures required	None
Other tests to be performed	LAN bus test in Procedure 628 if specific fault code 3066 is displayed for unit type 80 in Procedure 620, Test 1 and the failure is still indicated in Procedure 620, Test 1 after passing Procedure 620, Test 4.
Fault isolation and repair techniques described in	Procedure 620, UBI

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

Unit Type 81 — Universal Bus	
Diagnostic and verification test performed by	Procedure 628, Test 2 and Test 3
Components tested	LAN bus and TDM A/B buses
Tools and test equipment required	None
Related procedures required	Procedure 620, Test 2 to perform a range test on unit type 80 (universal bus interface circuit pack). Procedure 620, Test 2 to perform a range test on tone detector circuit packs. Procedure 621, Test 2 to soft switch to the off-line module-control carrier. Procedure 622, Test 2 to perform a range test on all BRI circuits. Procedure 648, Test 2 to perform a range test on all ISDN circuits. Procedure 620, Test 2 to perform a range test on Unit Type 23 (duplication channel circuit packs). Administration Procedure 290, Word 1 to determine if at least 3 LAN bus interface circuit packs are translated. Administration Procedure 000, Word 1 to administer three port circuit packs.
Other tests to be performed	None
Fault isolation and repair techniques described in	Procedure 628

Figure 6-1. Maintenance Repair Strategy for Alarmed Unit Types

DUPLICATED COMMON-CONTROL SWITCHES, TIME-MULTIPLEXED SWITCH (TMS)/NETWORK/UNIVERSAL CONTROL COMPLEXES

When there are failures in the same fictional area in both common controls, clear the alarm indicators lighted on the active (on line) common control first unless you can perform the maintenance procedure referenced in Field 15 of Procedure 600, Test 1 offline.

Maintenance Procedure 610 (Tape Tests), Procedure 611 (Common-Control Tests), Procedure 612 (Initialization Causes), Procedure 614 (Memory Read/Memory Match Tests), Procedure 618 (Diagnostic Processor/Remote Interface/Alarm Interface Test) except Tests 4 and 5, Procedure 650 (Data Communications Interface Unit (DCIU) Tests), and Procedure 652 (Time-of-Day Clock Synchronizer) can be performed on-line and off-line.

When alarm failures in a duplicated TMS/network/universal complex are indicated, perform tests off-line by soft locking the TMS/network/universal complex on-line to prevent unexpected switches (if possible). Take repair action. Test on line (after releasing the soft lock) to verify that the trouble is cleared. Then switch to the best side of the TMS/network/universal complex (if appropriate or required).

FAULT ISOLATION AND REPAIR TECHNIQUES FOR ALARMED FAILURES

Important

This document assumes that you understand how the individual maintenance procedures function. Use the document *DEFINITY™ Communications System Generic 2 Maintenance Procedures* (555-104-117) as a reference when you need to refer to a particular description or operation of a maintenance procedure.

Alarmed failures are displayed in Procedure 600, Test 1. Field 15 references a maintenance procedure that you can use to diagnose, analyze, and isolate the cause of the failure for the indicted functional area.

The following sections of this chapter provide fault isolation and repair techniques for various functional areas using the appropriate maintenance procedure. The sections are in numerical sequence by maintenance procedure number.

PROCEDURE 601 — ENVIRONMENTAL (UNIT TYPE 1)

Unit Type 1 — Environmental	
Diagnostic and verification test	Procedure 601, Test 2
Components tested	Traditional module cabinet power (AC and 48 VDC), fuse/breaker, DC-DC converter, frequency generator, air flow, temperature, holdover, module control power. ● Universal module — high battery charge rate, battery reserve unit, power unit shutdown, ring voltage, air flow, temperature, battery reserve on line. ● 309A, 310A, 631DA1, 631DB1, 644A1, and 645B1 power supplies ● 3965-2 battery charger holdover unit ● 397B battery charger ● AC or DC power distribution units ● AC power distribution unit batteries ● Alarm board AEH4 ● 3965-1 bulk OLS power supply ● DC/DC converter ● OLS carrier converters (631DA, 63lDB, 644A 645B) ● Fans ● Fan assembly ● Fan speed controller ● Frequency generator.
Tools and test equipment	Screwdriver (phillips or flat head) to remove and replace hardware components. Digital multimeter (DMM) to make voltage measurements.
Related procedures	● Procedure 275, Word 3 to determine if the cabinet is a CC or TMS cabinet when field 2 contains a 99.

General Repair Steps

If there is an environmental alarm, **ENVIRON PWR/TEMP AIR FLOW** and **MAJOR** or **MINOR** alarm indicators on the alarm panel are lighted or Procedure 600 references Procedure 601. Use the following repair steps to isolate and repair the problem.

1. Execute Procedure 600, Test 1

   Record the equipment location of all alarms.

2. Execute test 2.

   - If field 4 contains a 99, use procedure 275, Word 3 to find the type of cabinet (CC or TMS).
   - Execute procedure 601, Test 2.
     — If Test 2 passes, go to Step 8.
     — If Test 2 fails, record the equipment location, the module encode in Field 4, and the cabinet alarm causes.

     The cabinet' alarm cause fields (Fields 5- 14) display a 1 in the appropriate cabinet alarm cause field to show the function that is detected as failing.
   - Determine from the module encode appearing in Field 4 the type of module in which the failing cabinet resides.
     - If encode 0 or 1 appears, the failing cabinet is in a traditional module. The CC/TMS cabinet is in a traditional module.
     - If encode 2 or 3 appears, the failing cabinet is in a universal module.
   - Look at the cabinet alarm causes appearing in Fields 5-14 to determine the type of corrective action to do.

     When more than one cabinet alarm cause appears for the failing cabinet, isolate and repair the alarm causes from left to right (Field 5- Field 14).

     One cabinet alarm cause may affect other cabinet alarm causes for the failing cabinet. When the first cabinet alarm cause is corrected, the other causes may not be valid. You must therefore determine the effect one cabinet alarm cause has on other cabinet alarm causes and the appropriate repair action to take.

     NOTE

     When you repeat Procedure 601, Test 2 for one cabinet alarm cause, it may be possible that the other multiple cabinet alarm causes no longer exist.
   - Do one of the following fault isolation and repair procedures, depending on the module encode and cabinet alarm cause appearing in Fields 4-14.
     - Traditional module, Field 5= 1 — *Cabinet PowerAC (Traditional Cabinet)*
     - Universal module, Field 5 = 1 — *High Battery Charge Rate (Universal Cabinet)*
     - Traditional module, Field 6 = 1 — *Cabinet Power 48 Volts (Traditional Cabinet)*
     - Traditional module, Field 7 = 1 — *Fuse/Breaker (Traditional Cabinet)*

- Universal module, Field 7 = 1 — *Battery Reserve Unit (Universal Cabinet)*
- Traditional module, Field 8 = 1 — *DC/DC Converter (Traditional Cabinet)*
- Universal module, Field 8 = 1 — *Power Unit Shutdown (Universal Cabinet)*
- Traditional module, Field 9 = 1 — *Frequency Generator (Traditional Cabinet)*
- Universal module, Field 9 = 1 — *Ring Voltage (Universal Cabinet)*
- Traditional module, Field 10= 1 — *Air Flow (Traditional Cabinet)*
- Universal module, Field 10= 1 — *Air Flow (Universal Cabinet)*
- Traditional module, Field 11= 1 — *Temperature (Traditional Cabinet)*
- Universal module Field 11= 1 — *Temperature (Universal Cabinet)*
- Traditional module, Field 12= 1 — *Holdover (Traditional (Cabinet)*
- Universal module, Field 12= 1 — *Battery Reserve (Universal Cabinet)*
- Traditional module, Field 13 or Field 14= 1 — *Module-Control Carrier Power (Traditional Cabinet).*

NOTE

Fields 6, 13, and 14 are not used for universal cabinets.

- After the first failing cabinet passes, repeat steps 2-6, as appropriate, for all equipment locations recorded in Procedure 601, Test 1 with an alarm status of 1 or 2 (major or minor) to turn off the **ENVIRON PWR/TEMP AIRFLOW** fault indicator.

  The **MAJOR** or **MINOR** alarm indicator also goes off if no other sources are affecting the major or minor alarm indicator.

Cabinet Power AC (Traditional Cabinet)

The cabinet power AC alarm cause indicates that the power source's internal circuitry is not functioning properly.

1. Determine the type of power source installed in the traditional cabinet equipment location appearing in Fields 2 and 3.
   - If the equipment location is a CC/TMS cabinet, the power source is a bulk OLS power supply.
   - If the equipment location is a duplicated common-control cabinet a time-multiplexed switch (TMS) cabinet, or a remote module interface (RMI) cabinet, the power source is a 334A power unit or a bulk OLS power supply.
   - If the equipment location is a module-control cabinet or a port cabinet, the power source is a 309A/310A power supply or a bulk OLS power supply.
     - If the power source is a bulk OLS power supply, go to step 14.
     - If the power source is not a bulk OLS power supply, go to step 2.

2. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine if the circuit breaker on the power source is tripped.
   - If the circuit breaker is tripped, go to step 3.
   - If the circuit breaker is not tripped, go to step 8.
3. Reset the circuit breaker.
   - If the circuit breaker trips again, do steps 4-7 (as required).
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes the problem is fixed for this cabinet.
     - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
4. Replace the AEN1 circuit pack in the 334A power unit or 310A power supply (as appropriate) as follows:
   a. Set the AC circuit breaker on the power source to OFF.
   b. Remove the two screws (one on each side) from the front panel of the power source.
   c. Unplug the AEN1 circuit pack and remove the circuit pack the the power source.
   d. Replace the AEN1 circuit pack.
   e. Secure the power source front panel with the two screws.
   f. Set the circuit breaker on the power source to ON.
5. Determine if the circuit breaker trips again after replacing the AEN1 circuit pack.
   - If the circuit breaker trips, go to step 6.
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test 2 fails, go to step 6.
6. Replace the 334A power unit or the 309A/310A power supply (as appropriate).
7. Determine if the circuit breaker trips again after replacing the power source.
   - If the circuit breaker trips, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
8. Determine if the proper AC power to the power source is present.
   - If the proper AC power is absent, go to step 9.
   - If the proper AC power is present, go to step 10.
9. Correct the problem. Then, use a digital multimeter at the test points to measure the power source output voltages. See the table below for the comet minimum and maximum voltages.

- If the power source voltages are not within tolerance, go to step 11.
- If the power source voltages are within tolerance, repeat Procedure 601, Test 2 for the same cabinet.
  - — If Test 2 passes, the problem is fixed for this cabinet.
  - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.

Cabinet	Type of Rectifier	Minimum	Maximum
Common Control, Module Control, Port, TMS, and RMI	309A/310	-46V	-52 V
	334A	-46V	-52 V
	BATT	-46V	–52 V

10. Use a digital multiimeter at the test points to measure the power source output voltages.
    - If the power source voltages are not within tolerance,go to step 11.
    - If the power source voltages are within tolerance, repeat Procedure 601, Test 2 for the same cabinet.
      - — If Test 2 passes, the problem is fixed for this cabinet.
      - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
11. Replace the AEN1 circuit pack in the 334A power unit or 310A power supply (as appropriate) as follows:
    a. Set the AC circuit breaker on the power source to OFF.
    b. Remove the two screws (one on each side) from the front panel of the power source.
    c. Unplug the AENl circuit pack and remove the circuit pack from the power source.
    d. Replace the AEN1 circuit pack.
    e. Secure the power source front panel with the two screws.
    f. Set the circuit breaker on the power source to ON.
12. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, replace the 334A power unit or the 309A/310A power supply (as appropriate). Then, go to step 13.
13. Measure the power source output voltages.
    - If the voltages are not within tolerance, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

- If the voltages are within tolerance, repeat Procedure 601, Test 2 for the same cabinet.
  - — If Test 2 passes, the problem is fixed for this cabinet.
  - — If Test 2 fails, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

14. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine the status of the bulk OLS power supply On/off switch.
    - If the on/off switch is on, go to step 15.
    - If the on/off switch is off, turn it on. Then, repeat Procedure 601, Test 2 for the same cabinet.
      - — If Test 2 passes, the problem is fixed for this cabinet.
      - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
15. Determine if the proper AC power to the bulk OLS power supply is present.
    - If the proper AC power is present, replace the bulk OLS power supply. Then, repeat Procedure 601, Test 2 for the same cabinet.
      - — If Test 2 passes, the problem is fixed for this cabinet.
      - — If Test 2 fails, check the wiring associated with the bulk OLS power supply. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
    - If the proper AC power is absent, correct the problem. Then, repeat Procedure601, Test 2 for the same cabinet.
      - — If Test 2 passes, the problem is fixed for this cabinet.
      - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.

Cabinet Power -48 Volts (Traditional Cabinet)

A green pilot LED on the front panel of the power source is on when the power source is producing -48 volts at its output. The green pilot LED does not indicate that the output voltage is within regulation limits.

Appropriate test points are available on the front panel of the power source for measuring the output voltage and determining the power source doance.

NOTE

Output voltage measurements and power supply doance for the bulk OLS power supply cannot be determined because the bulk OLS power supply does not have test points.

1. Determine the alarm status of the failing traditional cabinet.
   - If the alarm status displayed in Field 15 is 1 (major), go to step 4.
   - If the alarm status displayed in Field 15 is 2 (minor) or 4 (errors recorded), go to step 2.

2. At the rear of the failing traditional cabinet replace alarm board AEH4.
3. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
4. Determine the type of power source installed in the traditional cabinet equipment location appearing in Fields 2 and 3.
   - If the equipment location is a CC/TMS cabinet, the power source is a bulk OLS power supply.
   - If the equipment location is a duplicated common-control cabinet, a TMS cabinet, or an RMI cabinet, the power source is a 334A power unit or bulk OLS power supply.
   - If the equipment location is a module-control cabinet or a port cabinet the power source is a 309A/310A power supply or bulk OLS power supply.
     - — If the power source is a bulk OLS power supply, go to step 16.
     - — If the power source is not a bulk OLS power supply, go to step 5.
5. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine if the green pilot LED is lighted at the power source.
   - If the green pilot LED is not lighted, go to step 6.
   - If the green pilot LED is lighted, go to step 12.
6. Determine if the circuit breaker on the power source is tripped.
   - If the circuit breaker is tripped, go to Step *7*.
   - If the circuit broker is not tripped, go to step 12.
7. Reset the circuit breaker.
   - If the circuit breaker trips again, do steps 8-11 (as required).
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test 2 fails, go to step 12.
8. Replace the AENl circuit pack in the 334A power unit or 310A power supply (as appropriate) as follows:
   a. Set the AC circuit broker on the power source to OFF.
   b. Remove the two screws (one on each side) from the front panel of the power source.
   c. Unplug the AENl circuit pack and remove the circuit pack from the power source.
   d. Replace the AEN1 circuit pack.
   e. Secure the power source front panel with the two screws.
   f. Set the circuit breaker on the power source to ON.
9. Determine if the circuit breaker trips again after replacing the AENl circuit pack.

- If the circuit breaker trips, go to step 10.
- If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
  - If Test 2 passes, the problem is fixed for this cabinet.
  - If Test 2 fails go to step 10.

10. Replace the 334A power unit or the 309A/310A power supply (as appropriate).
11. Determine if the circuit breaker trips again after replacing the power source.
    - If the circuit breaker trips, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
    - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
      - If Test 2 passes, the problem is fixed for this cabinet.
      - If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
12. Use a digital multimeter at the test points to measure the power source output voltages to determine if the voltages are within tolerance, marginal, or fluctuating.
    - If the voltages are marginal or fluctuating, go to step 13.
    - If all voltages are within tolerance without fluctuation, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
13. Replace the AENl circuit pack in the 334A power unit or 310A power supply (as appropriate) as follows:
    a. Set the AC circuit breaker on the power source to OFF.
    b. Remove the two screws (one on each side) from the front panel of the power source.
    c. Unplug the AENl circuit pack and remove the circuit pack from the power source.
    d. Replace the AENl circuit pack.
    e. Secure the power source front panel with the two screws.
    f. Set the circuit breaker on the power source to ON.
14. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, replace the 334A power unit or the 309A/310A power supply (as appropriate). Then, go to step 15.
15. Measure the power source output voltages.
    - If the voltages are not within tolerance or fluctuate, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
    - If the voltages are within tolerance, repeat Procedure 601, Test 2 for the same cabinet.
      - If Test 2 passes, the problem is fixed for this cabinet.
      - If Test 2 fails, check the wiring associated with the power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

16. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine if the green pilot LED is lighted at the bulk OLS power supply.
    - If the green pilot LED is not lighted, go to step 17.
    - If the green pilot LED is lighted, go to step 19.
17. Determine the status of the bulk OLS power supply on/off switch.
    - If the on/off switch is off, turn it on. Then, go to step 18.
    - If the on/off switch is on, go to step 19.
18. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
19. Replace the bulk OLS power supply.
20. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, check the wiring associated with the bulk OLS power supply. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Fuse/Breaker (Traditional Cabinet)

Fuses and circuit breakers provide visual indications when and if they operate.

1. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine if any fuses are blown or circuit breakers tripped.
    - If any fuse is blown or a circuit breaker is tripped, go to step 2.
    - If no fuses are blown and no circuit breakers are tripped, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
2. Replace the blown fuse, or reset the circuit breaker.
    - If the fuse does not blow again or the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same Cabinet
        - — If Test 2 passes, the problem is fixed for this cabinet.
        - — If Test 2 fails, check the wiring associated with the blown fuse or the tripped circuit breaker. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
    - If the fuse blows again or the circuit breaker trips, the corrective action to be taken depends on the blown fuse or tripped circuit breaker.
        - — If the circuit breaker is associated with the DC/DC converter, do fault isolation and repair procedure *DC/DC Converter (Traditional Cabinet).*
        - — If the fuse is associated with the frequency generator, do fault isolation and repair procedure *Frequency Generator (Traditional Cabinet).*

— If the fuse is associated with the fans, do fault isolation and repair procedure *Air Flow (Traditional Cabinet).*

— If the fuse is part of the port carrier, do steps 3-5 below.

— If the fuse is associated with the consoles, do steps 6-8 below.

3. Disconnect all circuit packs associated with the blown fuse. Replace the blown fuse.
4. Reconnect one circuit pack at a time, observing the associated fuse. When the fuse blows again, replace the faulty circuit pack.
5. Replace the blown fuse.
   - If the fuse does not blow again, reconnect all circuit packs. Repeat steps 4 and 5 until all circuit packs are reset. Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, the problem is fixed for this cabinet.
     — If Test 2 fails, check the wiring associated with the blown fuse. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the fuse blows again, check the wiring associated with the faulty circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Disconnect the console mounting cord associated with the blown fuse.
7. Replace the blown fuse.
   - If the fuse does not blow again, replace the console. Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, the problem is fixed for this cabinet.
     — If Test 2 fails, check the wiring associated with the blown fuse. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the fuse blows again, disconnect the console connector cable from the common-control connector.
8. Replace the blown fuse.
   - If the fuse does not blow again, the problem is fixed for this cabinet.
   - If the fuse blows again, check the wiring between the fuse and the associated console. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

DC/DC Converter (Traditional Cabinet)

The faulty DC/DC converter is identified within a cabinet by its illuminated red LED. If there is a protective shutdown, use the reset toggle switch located behind the front panel faceplate of the DC/DC converter.

1. Check the circuit breaker associated with the DC/DC converter.
   - If the circuit breaker is tripped go to step 2.
   - If the circuit breaker is not tripped, go to step 3.

2. Reset the circuit breaker.
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test *2* fails, check the wiring associated with the circuit breaker. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the circuit breaker trips again, check the wiring between the circuit breaker and the DC/DC converter. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
3. At the traditional cabinet equipment location appearing in Fields 2 and 3, use a DVM to measure the output voltage at the test points of the failing DC/DC converter.
   - If the voltage reading is greater than 0, do step 4.
   - If the voltage reading is 0, do steps 5-8.
4. Replace the DC/DC converter. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, replace circuit packs one at a time in the half of the carrier served by the DC/DC converter, repeating Procedure 601, Test *2* after each circuit pack is replaced.

     The problem could be in the program resistors on the circuit packs in the half of the carrier served by the DC/DC converter.
     - — If Test 2 passes, install the original circuit packs that did not cause the trouble. Corrective action is complete.
     - — If Test 2 fails, install all the original circuit packs and check the wiring associated with the DC/DC converter. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Unseat all circuit packs in the half of the carrier associated with the failing DC/DC converter.

   CAUTION Ensure that the toggle switch is in the up position before reseating the handle.

   Activate the reset toggle switch by pulling the DC/DC converter handle halfway out without unseating the m circuit board, and then reseat the handle.
6. Measure the output voltage at the DC/DC converter.
   - If the voltage reading is 0, go to step 7.
   - If the voltage reading is greater than 0, go to step 8.

Converter	Voltage	Minimum	Maximum
410AA	5V	4.9 v	5.3 v
494GA	5V	4.9 v	5.3 v
495FA	5V	4.9 v	5.3 v

7. Reseat all circuit packs. Replace the DC/DC converter. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the backplane wiring for a short causing overcurrent shutdown. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
8. Reseat the circuit packs one at a time.

NOTE: The red LED lights on the DC/DC converter when the faulty circuit pack is seated.

9. When the red LED on the DC/DC converter lights, replace the faulty circuit pack and reseat any disconnected circuit packs. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the wiring associated with the faulty circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Frequency Generator (Traditional Cabinet)

1. Determine the type of frequency generator installed in the traditional cabinet equipment location appearing in Fields 2 and 3.
   - If the frequency generator is a 124B, go to step 4.
   - If the frequency generator is a 124B1 or 124B2 go to step 2.
2. Check the reset button (l-amp) at the front of the frequency generator.
   - If the reset button is flush (not popped out), go to step 4.
   - If the reset button is popped out go to step 3.
3. Push the reset button in.
   - If the reset button pops out again, check the wiring to the output loads to determine the cause of the trouble. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the reset button does not pop out, repeat Procedure 601, Test 2 for the same cabinet.

— If Test 2 passes, the problem is fixed for this cabinet.

— If Test 2 fails, go to step 6.

4. Check the fuse (2-amp) on the fuse panel associated with the frequency generator.
   - If the fuse is blown, go to step 5.
   - If the fuse is not blown, go to step 6.
5. Replace the blown fuse.
   - If the fuse does not blow, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, the problem is fixed for this cabinet.
     — If Test 2 fails, go to step 6.
   - If the fuse blows again, check the wiring between the fuse and the frequency generator. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. At the traditional cabinet equipment location appearing in Fields 2 and 3, replace the frequency generator.
7. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, replace alarm board AEH4 at the back of the cabinet.
8. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the wiring associated with the frequency generator. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Air Flow (Traditional Cabinet)

Insufficient air flow for cooling the cabinet may be caused by dirty air filters or improperly operating fans.

1. At the traditional cabinet equipment location appearing in Fields 2-4, inspect for restriction in the air flow or a dirty filter.
   - If air flow is restricted of the filter is dirty, go to step 2.
   - If no restrictions are present and the filter is clean, go to step 3.
2. Clear the restriction or replace the filter. Allow enough time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
3. Determine if the fans are running.
   - If no fans are running, go to step 5.

- If fans are running, go to step 4.

4. Determine if all fans are operating properly.
   - If all fans are opening properly, refer to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
   - If all fans are not operating properly, replace any defective fan and allow time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, the problem is fixed for this cabinet.
     — If Test 2 fails, check the wiring associated with the replaced fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Check the fuse (F1 or F2) associated with the fans. (F1 controls the upper fan assembly and F2 controls the lower fan assembly.)
   - If the fuse is blown, go to step 6.
   - If the fuse is not blown, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
6. Replace the blown fuse.
   - If the fuse does not blow again, allow time for the cabinet interior to cod. Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, the problem is fixed for this cabinet.
     — If Test 2 fails, check the wiring associated with the blown fuse. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the fuse blows again, replace the fan assembly associated with the blown fuse. Then, go to step 7.
7. Replace the blown fuse and allow time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the wiring between the fuse and the fan assembly. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Temperature (Traditional Cabinet)

An overtemperature alarm cause indicates that a predetermined cabinet temperature has been exceeded.

1. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine if fans are provided.
   - If no fans are provided, go to step 6.
   - If fans are provided, determine if the fans are running.
     — If no fans are running, go to step 3.
     — If fans are running, go to step 2.

2. Determine if all fans are operating properly.
   - If all fans are operating properly, refer to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
   - If all fans are not operating properly, replace any defective fan and allow enough time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test 2 fails, check the wiring associated with the replaced fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
3. Check the fuse (F1 or F2) associated with the fans. (F1 controls the upper fan assembly and F2 controls the lower fan assembly.)
   - If the fuse is blown, go to step 4.
   - If the fuse is not blown, go to step 6.

   It is possible for excessive heat in the room to cause the temperature alarm.
4. Replace the blown fuse.
   - If the fuse does not blow again, allow enough time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, the problem is fixed for this cabinet.
     - — If Test 2 fails, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
   - If the fuse blows again, replace the fan assembly associated with the blown fuse. Then, go to step 5.
5. Replace the blown fuse and allow enough time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the wiring between the fuse and the fan assembly. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Determine if the environmental temperature is above the maximum for the switch.
   - If the environmental temperature is above the maximum leave the cabinet open to allow cooling, and refer the problem to local engineering.
   - If the environmental temperature is not above the maximum, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.

Holdover (Traditional Cabinet)

Nominal or extended holdover is provided by a 312 holdover power unit, a J87462A holdover power unit (consisting of a charger and battery system), or a 3965-2 battery charger.

The LEDs on the power unit or battery charger show whether the switch failed or is drawing battery power because cabinet AC voltage is absent.

Appropriate test points are available on the power unit or battery charger for determining the holdover unit's doance.

1. Determine the type of holdover unit installed in the traditional cabinet equipment location appearing in Fields 2 and 3.
2. Determine the type of power source installed in the equipment location appearing in Fields 2 and 3.
   - If the equipment location is a CC/TMS cabinet, the power source is a bulk OLS power supply.
   - If the equipment location is a duplicated common-control cabinet, a TMS cabinet, or an RMI cabinet, the power source is a 334A power unit or a bulk OLS power supply.
   - If the equipment location is a module-control cabinet or a port cabinet, the power source is a 309A/310A power supply or a bulk OLS power supply.
     - — If the power source is a bulk OLS power supply, go to step 9.
     - — If the power source is not a bulk OLS power supply, go to step 3.
3. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine the cause of the holdover alarm by checking the LEDs on the appropriate holdover unit.
   - If the **BTY ON LINE** LED is lighted, check the cabinet AC voltage. (The cabinet is being powered by the battery system of the appropriate power unit.)
   - If the **RSV FAIL** or **RSV ALM** LED is lighted, use the test points on the appropriate holdover unit to determine the cause of the problem.
     - — Check for -48 volts using a DVM connected between test points **-48V** and **GRD.**
     - — Check for BTY (-48 volts) using a DVM connected between test points **BTY** and **GRD.**
4. If -48 volts is present but BTY is not, go to Step 5.

   If -48 volts is absent, check the wiring between the appropriate holdover unit and the voltage source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Replace the CP1 circuit pack (charger and alarm board) in the 312 holdover power unit or the AMC-1 circuit pack (power board) in the J87462A holdover power unit by doing the following.
   a. Set the battery circuit breaker on the 312 holdover power unit or the J87462A holdover power unit (as appropriate) to **OFF.**
   b. Set the AC circuit broker on the 334A power unit or the 309A power supply (as appropriate) to **OFF.**
   c. Disconnect the AC power cord from the 334A power unit or the 309A power supply (as appropriate).
   d. Remove the four screws from the front panel of the 312 holdover power unit or the J87462A holdover power unit (as appropriate).

      NOTE Do not disconnect the grounding wire from the panel of the J87462A holdover power unit.

   e. Unplug the CP1 or the AMC-1 circuit pack (as appropriate) and remove the circuit pack from the 312 holdover power unit or the J87462A holdover power unit (as appropriate).

f. Replace the CP1 or the AMC-1 circuit pack (as appropriate).

NOTE

If the AMC-1 circuit pack in the J87462A holdover power unit has an AMD-l circuit pack (logic board) attached to it, replace both circuit packs as a set.

g. Secure the 312 holdover power unit or the J87462A holdover power unit front panel (as appropriate) with the four screws.

h. Connect the AC power cord to the 334A power unit or the 309A power supply (as appropriate).

i. Set the circuit breaker on the 334A power unit or the 309A power supply (as appropriate) to **ON.**

j. Set the battery circuit breaker on the 312 holdover power unit or the J87462A holdover power unit (as appropriate) to **ON.**

6. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, proceed as follows:
     — If the nominal or extended holdover is a 312A or 312C holdover power unit, or a J87462A List 6 or List 7 holdover power unit, repeat steps 5 and 6 for the other CPl or AMC-1 circuit pack.

       If both CP1 or AMC-1 circuit packs are replaced, go to step 7.

     — If the nominal or extended holdover is a 312B holdover power unit or a J87462A List 5 " holdover power unit, go to step 7.

7. At the traditional cabinet equipment location appearing in Fields 2 and 3, replace the 312 holdover power unit or the J87462A holdover power unit (as appropriate).

8. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this Cabinet.
   - If Test 2 fails, check the wiring associated with the 312 holdover power unit or the J87462A holdover power unit (as appropriate). If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

9. At the traditional cabinet equipment location appearing in Fields 2 and 3, determine the cause of the holdover alarm by checking the LEDs on the 3965-2 battery charger holdover unit.
   - If the yellow LED is lighted, Check the cabinet AC voltage. (The cabinet is being powered by the 3965-2 battery charger holdover unit.)
   - If the green LED is lighted, use the test points on the appropriate holdover unit to determine the cause of the problem.

     Check for -48 volts using a DMM connected between test points **BATT +** and **BATT -.**

     — If -48 volts is absent, check the Wiring between the appropriate holdover unit and the voltage source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

— If -48 volts is present, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.

— If the voltage is between 0 and -48 volts replace the battery pack hen, go to step 10.

10. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, replace the 3965-2 battery charger holdover unit at the traditional cabinet equipment location appearing in Fields 2 and 3. Then, go to step 11.
11. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, check the wiring associated with the 3965-2 battery charger holdover unit. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Module-Control Carrier Power (Traditional Cabinet)

The module-control carrier power (left or right) cabinet alarm cause indicates that a change in the power to the module-control carrier occurred.

1. At the traditional cabinet equipment location appearing in Fields 2 and 3, use a DVM to measure the output voltage at the test points of the left or right DC/DC converter associated with the cabinet alarm cause (left or right) to determine if the voltages are marginal or fluctuating.
    - If all voltages are within tolerance without fluctuation, go to fault isolation and repair procedure *Other Repair steps (Traditional Cabinet)* for further isolation techniques.
    - If any voltage is marginal or fluctuates, go to step 2.
2. Replace the DC/DC converter. Then, measure the output voltages.
    - If all voltages are within tolerance and do no fluctuate, repeat Procedure 601, Test 2 for the same cabinet.
        - If Test 2 passes, the problem is fixed for this cabinet.
        - If Test 2 fails, check the wiring associated with the DC/DC converter. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
    - If any voltage is not within tolerance, or fluctuates, check the wiring associated with the DC/DC converter. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Other Repair steps (Traditional Cabinet)

If an alarm cause is present but the equipment associated with the alarm cause is functioning properly (or unable to function because of a suspected sensor or detector malfunction), the sensor, detector, or alarm board corresponding to the cabinet alarm cause is probably faulty.

1. At the rear of the failing cabinet, replace alarm board AEH4 (if it has not already been replaced).

2. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, check the sensor or detector and replace as appropriate. Then, go to step 3.
3. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails,check the wiring between the sensor or detector and the module-control channel. Correlations of the TMS/module-control carrier backplane lead names to the sensor or detector corresponding to the traditional cabinet alarm causes appearing in Fields 5-14 are listed below:

     Field 5— Cabinet power AC = RCTALM (n*)

     Field 6 — Cabinet power 48 Volts = L48ALM (n*)

     Field 7— Fuse/breaker= FUSALM (n*)

     Field 8— DC/DC converter= CNVALM (n*)

     Field 9— Frequency generator= FGNALM (n*)

     Field 10 — Air flow = FANALM (n*)

     Field 11— Temperature= OTPALM (n*)

     Field 12 — Holdover = HVRALM (n*)

     Field 13 — Module control carrier power left= PFAILL (n*)

     Field 14 — Module control carrier power right= PFAILR (n*).

     NOTE n* = Cabinet number 0-7.

   - If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

High Battery Charge Rate (Universal Cabinet)

This alarm cause indicates that the battery has been charging at a high rate for more than 30 hours.

1. At the universal cabinet equipment location appearing in Fields 2 and 3, determine if the red LED on the 397B battery charger is lighted.

   l If the red LED is lighted, replace the AC power distribution unit batteries. Then, go to step 11.

   CAUTION Ensure that the 397B battery charger is turned off before replacing it. Refer to Chapter 9, Switch Component Replacement for proper replacement procedures.

   - If the red LED is not lighted, toggle the on/off switch on the 397B battery charger. Then, go to step 2.

2. Determine if the red LED on the 397B battery charger is lighted.
   - If the red LED is not lighted, unplug the connector cord at the front of the 397B battery charger. Plug the connector cord back in. Then, go to step 3.
   - If the red LED is lighted, go to step 4.
3. Determine if the red LED on the 397B battery charger is lighted.

   CAUTION: Replacing the TN588 disrupts service. If the system has a duplicated network, soft switch the module control off-line and then replace the TN588.

   - If the red LED is not lighted, replace TN588 in the on-line universal module-control carrier. Then, go to step 4.
   - If the red LED is lighted, go to Step 4.
4. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, go to step 5.
5. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the 397B battery charger. Then, go to step 6.
6. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, the problem is fixed for this cabinet.
   - If Test 2 fails, go to step 7.
7. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the AC/DC power distribution unit batteries. Then, go to step 8.

   CAUTION: Ensure that the 397B battery charger is turned off before disconnecting the batteries. Refer to Chapter 9, Switch *Component Replacement* for proper replacement procedures.

8. Do a clear data, execute sequence in Procedure 601, Test 1 for the same failing cabinet by typing *cdx.*
9. Wait 30 hours.

   NOTE: It takes a maximum of 30 hours for the new batteries to complete charging.

10. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, check the wiring associated with the AC/DC power distribution batteries, the 397B battery charger, and the TN588 circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

11. Do a clear data, execute sequence in Procedure 601, Test 1 for the same failing cabinet by typing *cdx.*
12. Wait 30 hours.

NOTE It takes a maximum of 30 hours for the new batteries to complete charging.

13. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, go to step 14.
14. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the 397B battery charger. Then, go to step 15.

CAUTION Be sure to follow the replacement steps in Chapter 9, *Switch Component Replacement,* to avoid damaging the 397B battery charger.

15. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, go to step 16.
16. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN588 in the on-line universal module-control carrier. Then, go to step 17.
17. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, the problem is fixed for this cabinet.
    - If Test 2 fails, check the wiring associated with the AC/DC power distribution batteries, the 397B battery charger, and the TN588 circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Battery Reserve Unit (Universal Cabinet)

This alarm cause indicates that there is a fault with the battery reserve unit.

1. Ensure that the batteries are connected and verify correct polarity.
2. At the universal cabinet equipment location appearing in Fields 2 and 3, check the on/off switch on the 397B battery charger.
    - If the on/off switch is on go to Step 4.
    - If the on/off switch is off turn it on. Then, go to Step 3.
3. Repeat Procedure 601, Test 2 for the same cabinet..

- If Test 2 passes, corrective action is complete for this cabinet.
- If Test 2 fails, go to Step 4.

4. At the universal cabinet equipment location appearing in Fields 2 and 3, use a battery load test set (if available) or a voltmeter to check the battery voltages by performing the following steps.

CAUTION If you use a voltmeter, ensure that the voltmeter is set on the DC volts scale or you could damage the voltmeter.

a. Open the battery cover.

b. Insert meter probes into test points.

c. Turn the 397B battery charger off. (If the 397B battery charger remains on, you are actually measuring the output of the battery charger, which should always be greater than the battery output under normal operating conditions.)

d. Measure the voltages between test points.

e. After you have measured the battery voltages, connect all battery leads and close the battery cover.

5. Determine the voltages of the batteries.
   - If the voltage is greater than 170 volts, replace the 397B battery charger. Then, go to Step 6.
   - If the voltage is between 0 and 120, replace the 397B battery charger. Then, go to Step 6.
   - If the voltage is between 120V and 170V, go to Step 7.
6. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, go to Step 8.
7. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN588 in the on-line universal module-control carrier.
8. Repeat Procedure 601, Test 2 for the same cabinet..
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, escalate the failure.

Power Unit Shutdown (Universal Cabinet)

The power unit shutdown alarm indicates a loss of one or more of the +5V or -48V/-5V power supply units. You may have either simplex or a duplex power distribution unit. Follow the steps for the type of power distribution unit you have.

Simplex Power Distribution Unit

The power supply units for an AC universal cabinet are the 63lDA1 (AC single output power supply (+5 V)) and the 63lDB1 (AC dual output power supply (-5V/-48V)). Fuses at the rear of the AC power distribution unit provide 110V to the power supply units. The five fuses provide protection for the power supply units as follows:

- Fuse F1 controls both sides of the A carrier

- Fuse F2 controls the right side of the B and C carriers
- FUse F3 controls the left side of the B and C carriers
- Fuse F4 controls the right side of the D and E carriers
- Fuse F5 controls the left side of the D and E carriers.

The power supply units for a DC universal cabinet are the 644A1 (DC single output power supply (+5V)) and the 645B1 (DC dual output power supply (–5V/-48V)). The six circuit breakers at the rear of the DC power distribution unit provide 48V to the power supply units protection for the power supply units and DC filter as follows:

- Circuit breaker CB1 controls both sides of the A carrier
- Circuit breaker CB2 controls the right side of the B and C carriers
- Circuit breaker CB3 controls the left side of the B and C carriers
- Circuit breaker CB4 controls the right side of the D and E carriers
- Circuit breaker CB5 controls the left side of the D and E carriers
- Circuit breaker CB6 provides protection for the filter inside the DC power distribution unit.

1. At the universal cabinet equipment location appearing in Fields 2 and 3, check the status LEDs of the power supply units in all of the carriers in the cabinet.
   - If the status LEDs on all of the power supply units are dark, go to Step 2.
   - If the status LEDs on pairs or combinations of pairs of power supply units are dark, go to Step 6.
   - If the status LED on only one power supply unit is dark, go to Step 7.
   - If the status LED on only one power supply unit is lighted red, determine if the power supply unit is in the universal module-control carrier.
     - If the power supply unit is on the left side of the universal module-control carrier, go to Step 11.
     - If the power supply unit is on the right side of the universal module-control carrier, go to Step 9.
   - If the status LEDs of all power supply units except the universal module-control carriers A and B (if duplicated) are lighted red, go to Step 17.
   - If the status LEDs of the power supply units on both sides of one carrier are lighted red, determine if the carrier is carrier A.
     - If the carrier is carrier A, go to Step 19.
     - If the carrier is not carrier A, go to Step 21.
2. Check the system AC or DC power source.
   - If there is no trouble with the system AC or DC power source, go to Step 4.
   - If there is a problem with the AC or DC power source, correct it. Then, go to Step 3.
3. Repeat Procedure 601, Test *2* for the same cabinet.
   - If Test 2 passes, corrective action is complete for this Cabinet.

- If Test 2 fails, go to Step 4.

4. Check the main circuit breaker in the AC or DC power distribution unit.
   - If the circuit breaker is tripped, go to Step 5.
   - If the circuit breaker is not tripped, go to Step 6.
5. Reset the circuit breaker.
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, corrective action is complete for this cabinet.
     — If Test 2 fails, go to Step 6.
   - If the circuit breaker trips again, check the wiring between the circuit breaker and the AC power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Check all fuses or circuit breakers in the back of the AC or DC power distribution unit.
   - If there is no problem with fuses or circuit breakers, escalate the failure.
   - If there is a problem with fuses or circuit breaker, correct it by replacing fuses or resetting circuit breakers (as appropriate). Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, corrective action is complete for this cabinet.
     — If Test 2 fails, escalate the failure.
7. Check that the power plug on the power supply unit is properly inserted and that the on/off switch, if any, is set to on.
   - If the power plug is properly inserted and the on/off switch is set to on, go to Step 9.
   - If the power plug is not properly inserted or the on/off switch is not set to on, correct the problem. Then, go to Step 8.
8. Repeat Procedure 601, Test *2*.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, go to Step 9.
9. Replace the power supply unit with the red LED lighted or no LED lighted.
   - If the power supply unit status LED is now lighted yellow, go to Step 10.
   - If the power supply unit status LED is not lighted green, escalate the failure.
10. Repeat Procedure 601, Test 2.
    - If Test 2 passes, corrective action is complete for this Cabinet.
    - If Test 2 fails, escalate the failure.
11. Replace the 63lDA1 or 644A1 power supply unit on the left side of the universal module-control carrier A.
    - If the power supply unit status LED is now lighted yellow, go to Step 12.
    - If the power supply unit status LED is lighted red again, go to Step 13.

12. Repeat Procedure 601, Test 2.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test *2* fails, go to Step 13.
13. Unseat all the circuit packs in the universal module-control carrier.
    - If the 631DA1 or 644A1 power supply unit status LED now lights yellow, go to Step 14.
    - If the 631DA1 or 644A1 power supply unit status LED remains red, reseat all the circuit packs. Then, escalate the failure.
14. While observing the 63lDA1 or 644A1 power supply unit status LED, reseat the circuit packs one at a time.

    NOTE The status LED lights red on the power supply unit when a faulty circuit pack is seated.

15. If the status LED on the power supply unit lights red after a circuit pack is reseated, replace that circuit pack. Continue to replace circuit packs one at a time until all circuit packs have been reseated. Replace any circuit pack if the status LED on the power supply unit lights red.
16. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, escalate the failure.
17. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN588 in the on-line universal module-control carrier.
18. Repeat Procedure 601, Test *2* for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, escalate the failure.
19. At the universal cabinet equipment location appearing in Fields 2 and 3, check fuse F1 or circuit breaker CB1 at the back of the AC or DC power distribution unit.
    - If fuse F1 is blown or circuit breaker CB1 is tripped, go to Step 20.
    - If fuse F1 is not blown or circuit breaker CB1 is not tripped, go to Step 21.
20. Replace the blown fuse, or reset the circuit breaker.
    - If the fuse does not blow again or the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
      - If Test *2* passes, corrective action is complete for this cabinet.
      - If Test 2 fails, check the wiring associated with the blown fuse or the tripped circuit breaker. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure
    - If the fuse blows again or the circuit breaker trips, go to Step 21.
21. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the 631DA1 or the 644Al power supply unit on the left side of the carrier.

- If the power supply unit status LED is now lighted yellow, go to Step 22.
- If the power supply unit status LED is lighted red again, go to Step 25.

22. Repeat Procedure 601, Test *2*.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, go to Step 23.
23. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the 631DB1 or the 645B1 power supply unit on the right side of the carrier.
    - If the power supply unit status LED is now lighted yellow, go to Step 24.
    - If the power supply unit status LED is lighted red again, go to Step 25.
24. Repeat Procedure 601, Test 2.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, go to Step 25.
25. Unseat all the circuit packs in the universal module-control carrier or port carrier (as appropriate).
    - If the 63lDA1 and 63lDB1 or 644A1 and 645B1 power supply units' (as appropriate) status LEDs now light yellow, go to Step 26.
    - If the 63lDA1 and 63lDB1 or 644A1 and 645B1 power supply units' (as appropriate) status LEDs remain red, reseat all the circuit packs. Then, escalate the failure.
26. While observing the 631DA1 and 631DB1 or 644A1 and 645B1 power supply units' (as appropriate) status LEDs, reseat the circuit packs one at a time.

    NOTE The status LEDs light red on the power supply units when a faulty circuit pack is seated.

27. If the status LEDs on the power supply units light red after a circuit pack is reseated, replace that circuit pack. Continue to replace circuit packs one at a time until all circuit packs have been reseated. Replace any circuit pack if the status LEDs on the power supply units light red.
28. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, escalate the failure.

Duplex Power Distribution Unit

The power supply units for a duplex DC universal cabinet are the 644A1 (DC single output power supply (+5V)) and the 645B1 (DC dual output Power supply (-5V/-48V)). Circuit breakers at the rear of the DC power distribution unit provide 48V to the power supply units. The 12 circuit breakers provide protection for the power supply units and DC filters as follows:

- Circuit breaker CB1 controls the right side of the A carrier.

- Circuit breaker CB2 controls the right side of the B carrier.
- Circuit breaker CB3 controls the right side of the C carrier.
- Circuit breaker CB4 controls the right side of the D carrier.
- Circuit breaker CB5 controls the right side of the E carrier.
- Circuit breaker CB6 provides protection for filter B.
- Circuit breaker CB7 provides protection for filter B.
- Circuit breaker CB8 controls the left side of the A carrier.
- Circuit breaker CB9 controls the left side of the B carrier.
- Circuit breaker CB10 controls the left side of the C carrier.
- Circuit breaker CB11 controls the left side of the D carrier.
- Circuit breaker CB12 controls the left side of the E carrier.

1. At the universal cabinet equipment location appearing in Fields 2 and 3, check the status LEDs of the power supply units in all of the carriers in the cabinet.
   - If the status LEDs on all of the power supply units are dark, go to Step 2.
   - If any combination of the status LEDs on the power supply units is dark, go to Step 7.
   - If any status LEDs on the power supply units are red, go to Step 10.
2. Check the system DC power source.
   - If there is no trouble with the system DC power source, go to Step 4.
   - If there is a problem with the DC power source, correct it. Then, go to Step 3.
3. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, go to Step 4.
4. Check the main circuit breaker in the DC power distribution unit.
   - If the circuit breaker is tripped, go to Step 5.
   - If the circuit breaker is not tripped, go to Step 6.
5. Reset the circuit breaker.
   - If the circuit breaker does not trip, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, corrective action is complete for this cabinet.
     — If Test 2 fails, go to Step 6.
   - If the circuit breaker trips again, check the wiring between the circuit breaker and the DC power source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Check all circuit breakers in the back of the DC power distribution unit.
   - If there is no problem with circuit breakers, go to Step 7.

- If there is a problem with circuit breakers, correct it by resetting circuit breakers. Then, repeat Procedure 601, Test 2 for the same cabinet.
  - If Test 2 passes, corrective action is complete for this cabinet.
  - If Test 2 fails go to Step 7.

7. Check that the power plug on the power supply unit is properly inserted and that the on/off switch, if any, is set to on.
   - If the power plug is properly inserted and the on/off switch is set to on, go to Step 9.
   - If the power plug is not properly inserted or the on/off switch is not set to on, correct the problem. Then, go to Step 8.
8. Repeat Procedure 601, Test 2.
   - If Test 2 passes, corrective action is complete for this cabinet
   - If Test 2 fails, go to Step 9.
9. Replace the power supply unit with the dark LED.
   - If the power supply unit status LED is now lighted yellow, go to Step 10.
   - If the power supply unit status LED is dark again, escalate the failure.
   - If the power supply unit status LED is red, go to Step 11.
10. Repeat Procedure 601, Test 2.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, go to Step 11.
11. Unseat all the circuit packs associated with that status LED.
    - If the status LEDs now light yellow, go to Step 12.
    - If the status LEDs remain red, reset all the circuit packs. Then, escalate the failure.
12. While observing the status LEDs, reseat the circuit packs one at a time.

NOTE The status LED lights red on the power supply unit when a faulty circuit pack is seated.

13. If the status LED on the power supply unit lights red after a circuit pack is reseated, replace that circuit pack. Continue to replace circuit packs one at a time until all circuit packs have been reseated. Replace any circuit pack if the status LED on the power supply unit lights red.
14. Repeat Procedure 601, Test 2 for the same cabinet
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, escalate the failure.

Ring Voltage (Universal Cabinet)

The frequency generator supplies ringing voltage for analog voice terminals. Trouble in the frequency generator is indicated if all analog voice terminals fail to ring on incoming calls or if the ringing is faint or distorted.

1. At the AC or DC power distribution unit in the universal cabinet equipment location appearing in Fields 2 and 3, check the reset button (l-amp) at the front of the frequency generator.
   - If the reset~ button is flush (not popped out), go to Step 3.
   - If the reset button is popped out, go to Step 2.
2. Push the reset button in.
   - If the reset button pops out again, check the wiring to the output loads to determine the cause of the trouble. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If the reset button does not pop out, repeat Procedure 601, Test 2 for the same cabinet.
     - — If Test 2 passes, corrective action is complete for this cabinet.
     - — If Test 2 fails, go to Step 3.
3. Originate calls to several analog stations on different port circuit packs in different carriers of the universal cabinet.
   - If no called stations ring, go to Step 6.
   - If all called stations ring, go to Step 11.
   - If called stations in a particular carrier do not ring but other called stations in other carriers ring, go to step 4.
4. At the carrier location where the called stations did not ring, check the power supply (631DA1 and 631DB1 or 644A1 and 645B1) LEDs on both sides of the carrier.
   - If the red LED is lighted on one or both of the power units, replace the power unit. (Refer to the power unit shutdown procedures given in this chapter.) Then, go to Step 5.
   - If the red LED is not lighted, check the circuit breakers on the back of the DC power supply or the fuses on the back of the AC power supply. hen check the circuit breaker on the 645B power unit and check that the power supply plug is correctly seated. Then check the wiring associated with the power units. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, check the wiring associated with the replaced power unit. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the frequency generator.
7. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.

- If Test 2 fails, go to Step 8.

8. Originate a call to an analog station in one of the carriers in the same cabinet.
   - If the called station rings, go to Step 11.
   - If the called station does not ring, go to step 9.
9. Check the -48V power unit (631DB1 or 645B1) in the carrier where the called station is located
   - If the red LED is lighted, replace the power unit. Then, go to Step 10.
   - If the red LED is not lighted, check either the circuit breakers on the unit and on the back of the power supply or the fuses on the back of the AC power supply. Then replace the current limiter circuit pack CFY1 at the back of the universal-module control carrier A. Then, go to Step 10.
10. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, check the wiring associated with the replaced power unit or the current limiter circuit pack CFY1. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
11. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN768B.

    CAUTION Replacing the TN768B can affect service. If the TN768Bs are duplicated, switch the tone and clock functions to the other TN768B before replacing the circuit pack.

12. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, check the harness connector P1 from the wiring harness to the port carrier that contains TN768B. If the harness connector P1 and the wiring are satisfactory or you have replaced them and the failure still exists, escalate the failure.

Air Flow (Universal Cabinet)

The air flow alarm cause indicates that the fan filters are blocked or clogged.

1. At the universal cabinet equipment location appearing in Fields 2 and 3, determine if the fans are spinning.
   - If no fans are spinning, go to Step 9.
   - If fans are spinning, go to Step 2.
2. At the universal cabinet equipment location appearing in Fields 2 and 3, remove the air filters from their positions above and below the fan assembly. Check the air filters for possible air flow restriction.
   - If air flow is restricted or the filter is dirty, go to Step 3.
   - If no restrictions are present and the filter is clean, go to Step 4.

3. Clear the restriction or replace the filter. Allow sufficient time for the cabinet interior to cool. hen, repeat Procedure 601, Test 2 for the same cabinet..
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, go to Step 4.
4. Determine if all fans are operating properly.
   - If all fans are operating properly, go to Step 5.
   - If some, but not all, fans are operating properly, first check for properly fastened connectors; then, replace any defective fan. Allow sufficient time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
     - If Test 2 passes, corrective action is complete for this cabinet.
     - If Test 2 fails, check the wiring associated with the replaced fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN588 in the on-line universal module-control carrier.
6. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this Cabinet.
   - If Test 2 fails, go to Step 7.
7. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the fan speed controller ADH1 circuit pack in the fan assembly.
8. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, check the wiring between the fan and the fan assembly. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
9. At the universal cabinet equipment location appearing in Fields 2 and 3, check the -48V power supply (63lDB1 or 645B1) LED on the right side of the universal module-control carrier A.
   - If the red LED is lighted, replace the power unit. Then, go to Step 10.
   - If the red LED is not lighted and the yellow LED is lit, or neither LED is lit, check the circuit breakers on the back of the DC power supply or the fuses on the back of the AC power supply and check the power supply itself. Then replace the current limiter board CFYl at the back of the universal module-control carrier A. hen, go to Step 10.
10. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 failed, escalate the failure.

Temperature (Universal Cabinet)

An overtemperature alarm cause indicates that a predetermined cabinet temperature has been exceeded.

1. Determine if the environmental temperature is above the maximum for the switch.
   - If the environment temperature is above the maximum, leave the cabinet door open at the universal cabinet equipment location appearing in Fields 2 and 3 to allow for cooling. Refer the problem to local building engineering and have the problem corrected.
   - If the environmental temperature is not above the maximum, go to Step 2.
2. At the universal cabinet equipment location appearing in Fields 2 and 3, determine if the fans are spinning.
   - If no fans are spinning, go to Step 12.
   - If fans are spinning, go to Step 3.
3. At the universal cabinet equipment location appearing in Fields 2 and 3, remove the air filters from their positions above and below the fan assembly. Check the air filters for possible air flow restriction.
   - If air flow is restricted or the filter is dirty, go to Step 4.
   - If no restrictions are present and the filter is clean, go to Step 5.
4. Clear the restriction or replace the filter. Allow sufficient time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test 2 fails, go to Step 5.
5. Determine if all fans are operating properly.
   - If all fans are operating properly, go to Step 6.
   - If some, but not all, fans are operating properly, first check for properly fastened connectors; then, replace any defective fan. Allow sufficient time for the cabinet interior to cool. Then, repeat Procedure 601, Test 2 for the same cabinet.
     — If Test 2 passes, corrective action is complete for this cabinet.
     — If Test 2 fails, check the wiring associated with the replaced fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. At the universal cabinet equipment location appearing in Fields 2 and 3, replace TN588 in the on-line universal module-control carrier.

CAUTION Replacing the TN588 disrupts service. If the system has a duplicated network, soft switch the module control off-line and then replace the TN588.

7. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.

- If Test 2 fails, go to Step 8.

8. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the fan speed controller ADH1 circuit pack in the fan assembly.
9. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.
   - If Test *2* fails, go to Step 10.
10. At the universal cabinet equipment location appearing in Fields 2 and 3, replace the temperature sensor.
11. Repeat Procedure 601, Test *2* for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, check the wiring between the fan, the fan assembly, and the temperature sensor. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
12. At the universal cabinet equipment location appearing in Fields 2 and 3, check the -48V power supply (63lDB1 or 645B1) LED on the right side of the universal module-control carrier A.
    - If the red LED is lighted, replace the power unit. Then, go to Step 13.
    - If the red LED is not lighted, check the circuit breakers on the back of the DC power supply or the fuses on the back of the AC power supply, the power supply itself, and the wiring. Then replace the current limiter board CFYl at the back of the universal module-control carrier A. Then, go to Step 13.
13. Repeat Procedure 601, Test 2 for the same cabinet.
    - If Test 2 passes, corrective action is complete for this cabinet.
    - If Test 2 fails, escalate the failure.

Battery Reserve (Universal Cabinet)

The battery reserve alarm cause indicates that the switch is running off battery power instead of commercial AC power.

1. At the universal cabinet equipment location appearing in Fields 2 and 3, determine the cause of the battery reserve alarm by checking the LED on the 397B battery charger.
   - If the red LED is lighted, go to Step 2. (The cabinet is being powered by the batteries in the AC Distribution Unit.)
   - If the red LED is not lighted, go to Step 4.
2. Determine if the proper AC voltage to the cabinet is present.
   - If the proper AC power to the cabinet is absent, correct the problem. Then, go to Step 3.
   - If the proper AC power to the cabinet is present, escalate the failure.
3. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet.

- If Test 2 fails, go to Step 4.

4. At the universal cabinet equipment location appearing m Fields 2 and 3, replace circuit pack TN588 in the on-line universal module-control carrier.
5. Repeat Procedure 601, Test 2 for the same cabinet.
   - If Test 2 passes, corrective action is complete for this cabinet..
   - If Test 2 fails, check the wiring associated with the AC power, the 397B battery charger, and TN588. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Battery Reserve Unit (XE Module)

If long-term holdover power is required, an external Uninterruptible Power Supply (UPS) may be attached to the XE module to provide an alternate source of power during a commercial power failure. A battery reserve unit fault is generated by the UPS if it senses an internal problem.

1. Make sure that AC power is supplied to the UPS.
2. Refer to the UPS manufacturers documentation for steps on repairing the UPS.
3. After you repair the UPS, run Procedure 601 Test 2 to resolve the alarm.
4. If the alarm still appears, check the cabling from the UPS to the RMI EMT connector.
5. If an alarm still appears, replace the on-line TN588.
6. If the failure still exists, escalate.

XE Fault (XE Module)

If an XE Fault appears, there maybe an over-temperature problem, a ringing voltage generator failure, or a power supply failure. You may need replacement parts at the XE Module site to repair any of these problems.

1. Open the front panels and look at each power supply. Replace a supply if the red LED is lit.
2. If the yellow LED on a power supply is not lit (no LEDS on the supply are lit) and the breaker is off, turn the breaker to the ON position.
3. If all the fans are off, check the voltage (where the fans mount two pin connector) port carriers (12 VDC) and module carriers (48 VDC). Check the cable connector from the power supplies to the fans. Replace the power supplies. In the module, replace the CURL (in a duplicated system) then the power supply.
4. If all the fans are off, replace the power supply.
5. Replace the CFY1 current limiter bead.
6. If a fm is not spinning, replace the defective fan.
7. Run test 2 to ensure that the problem is fixed.

8. If an alarm still appears, replace the on-line TN588.
9. If the failure still exists, escalate.

Ring Voltage (XE Module)

The on-line tone generator in an XE module tests the ring voltage in the port carrier where it is present. If there is no ring voltage on a port carrier backplane an alarm is generated. Only one port carrier contains the on-line tone generator. Ring voltage failures in other port carriers maybe present, but they will appear as XE alarms instead of Ring Voltage alarms.

1. If user reports a lack of ringing (ringing generator is not working), locate the carrier connected to the users phone and replace the carrier power supply.
2. If ring voltage is not supplied to the port carrier, replace the power supply.

   Note that if the tone clock board is in a carrier that contains a defective power supply, XE Fault and Ringing faults will appear.
3. If ring voltage is supplied to all port carriers, then replace the on-line TN768C (Tone/Clock board).
4. If the failure still exists, escalate.

Battery Reserve on-line (XE Module)

The battery reserve on-line indicates that the XE module is getting power from the UPS instead of commercial AC supply.

1. If a UPS is not connected to the XE module, replace the on-line TN588.
2. If the alarm still appears, check the cabling to the RMI EMT connector.
3. If there is no AC power to the UPS, comet the problem.
4. If AC power is present, check to see if AC service was temporarily lost to the UPS.

   For example, someone may have thrown the supply breaker before you got to the site.
5. If there was no interruption in AC service, repair the UPS according to the manufacturer’s repair steps.
6. Remove the alarm leads between the RMI EMT connector to the UPS and run test 2 to see if an alarm still appears.
7. If the TN588 still reports the_ replace the on-line TN588.
8. If the failure still exists, escalate the failure.

PROCEDURE 610 — TAPE (UNIT TYPE 2)

When the **COMMON CONTROL TAPE** and **MAJOR** or **MINOR** fault indicators on the alarm panel are lighted (indicating a tape failure), or when Procedure 610 is referenced from Procedure 600, perform the following steps to isolate and repair the faulty unit.

When Test *2* passes, the **COMMON CONTROL TAPE** fault indicator is turned off and the tape alarmed entries in the periodic maintenance information data structure (PMIDS) are marked as resolved.

Refer to Chapter 9, *Switch Component Replacement*, for steps on replacement of the disk tape system (DTS).

1. Execute Procedure 610, Test 1. Step through the failure history and record the results.
2. Ensure that a tape cartridge is in the DTS before performing Test 2. When a tape cartridge is not installed, Test 2 fails. An invalid replacement type is also indicated in Fields 2 through 8.
3. Execute Procedure 610, Test 2 and record the results.

   NOTE It may take up to six minutes to completely test the tape.

   - If no failures are detected in Test 2 and alarmed tape entries were recorded in Step 1, perform microdiagnostic Test 10 when traffic permits to determine if intermittent tape failures exist.
   - If any failures are detected in Test 2, display the tape failure on the DEFINITY™ Manager II. Then, go to Step 4.
4. Determine the type of equipment to replace, indicated by a 1 displayed in one of the DTS equipment type fields (Fields 2 through 8).
   - If a 1 is displayed in Field 2 (563) or Field 3 (serial port), replace the TN563 circuit pack. Then, go to step 5.
   - If a 1 is displayed in Field 4 (disk drive) or Field 6 (tape drive) replace the DTS. Tag the DTS with the failure indication, either disk" drive or tape drive. Do *not* try to replace the disk drive or tape drive. Then, go to Step 7.
   - If a 1 is displayed in Field 5 (fan), go to Step 9.
   - If a 1 is displayed in Field 7 (cable or power), go to Step 14.
   - If a 1 is displayed in Field 8 (cartridge), replace the tape cartridge. Then, go to Step 5.
5. Repeat Procedure 610, Test 2.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, go to Step 6.

6. Determine, as appropriate, if Field 2 (563), Field 3 (serial port), or Field 8 (cartridge) still displays a 1. The equipment type may now be different from the original equipment type, indicating that the original replacement corrected part but not all of the problem.

   - If the same type of equipment is indicated in Field 2, Field 3, or Field 8 (as appropriate), check the wiring associated with the TN563 circuit pack. Also check (if appropriate) the tape cartridge. If the wiring or the tape cartridge (as appropriate) are satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.

7. Repeat Procedure 610, Test 2.

   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, go to Step 8.

8. Determine if Field 4 (disk drive) or Field 5 (tape drive) as appropriate still displays a 1. The equipment type may now be different from the original equipment type, indicating that the original replacement corrected part but not all of the problem.

   - If the same type of equipment is indicated in Field 4 or Field 5 (as appropriate), check the wiring associated with the DTS. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
   - If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.

9. Remove and clean the fan filter; then install it.

10. Repeat Procedure 610, Test 2.

    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 11.

11. Determine if Field 5 (fan) still displays a 1. The equipment type may now be different from the original equipment type, indicating the original replacement corrected part but not all of the problem.

    - If Field 5 still displays a 1, replace the DTS. Then, go to Step 12.
    - If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.

12. Repeat Procedure 610, Test 2.

    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 13.

13. Determine if Field 5 (fan) still displays a 1. The equipment type may now be different from the original equipment type, indicating the original replacement corrected part but not all of the problem.

- If Field 5 still displays a 1, check the wiring associated with the fan and the DTS. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
- If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.

14. Visually inspect the small computer system interface (SCSI) cable and the power cable. Look at the pins and reseat both cables. Then, go to Step 15.
15. Repeat Procedure 610, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 16.
16. Determine if Field 7 (cable and power) still displays a 1. The equipment type may now be different from the original equipment type, indicating the original replacement corrected part but not all of the problem.
    - If Field 7 still displays a 1, replace the SCSI cable between the TN563 interface and the DTS. Then, go to step 17.
    - If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.
17. Repeat Procedure 610, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 18.
18. Determine if Field 7 (cable and power) still displays a 1. The equipment type may now be different from the original equipment type, indicating the original replacement corrected part but not all of the problem.
    - If Field 7 still displays a 1, replace the original cable between the TN563 interface and the DTS. Replace the power cable to the DTS. Then, go to Step 19.
    - If a different type of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.
19. Repeat Procedure 610, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 20.
20. Determine if Field 7 (cable and power) still displays a 1. The equipment type may now be different from the original equipment type, indicating the original replacement corrected part but not all of the problem.
    - If Field 7 still displays a 1, replace the original power cable. Then, escalate the failure.
    - If a different type, of equipment is indicated (a 1 displayed in one of the other equipment type fields), go back to Step 4.

PROCEDURE 611 — COMMON CONTROL I/O (UNIT TYPE 4)

Unit Type 4 — Common-Control I/O	
Diagnostic and verification test	Procedure 611, Test 2
Components tested	TN402, TN403, TN404

General Repair Steps

If there is a common-control channel failure, the switch tights **COMMON CONTROL I/O CHANNEL** and **MAJOR** and Procedure 600 references Procedure 611.

Use the following steps to isolate and repair the failure.

1. Execute Procedure 611, Test 1.

   Record the equipment location and specific fault code for each failure.

2. Execute Test 2.

   Record the equipment location and the specific fault code for each common-control I/O channel failure.

   - If all common-control I/O channels pass, but test 1 contained 4-MHz channel or dual-speed data . channel alarms, go to *Testing for Intermittent Faults* to ensure that there are no intermittent failures.
   - If there are any common-control I/O channels failures, display the common-control I/O channel failure on your screen.

     While the failing channel is on your screen, the switch turns on the red LED on the failing circuit pack.

     If over 50 percent of the translated channels fail, the switch lights the red LED on the I/O buffer circuit pack, instead of the red LEDs on the channels that failed because of the failing I/O buffer circuit pack.

     When all common-control I/O channels pass, the switch turns off **COMMON CONTROL I/O CHANNEL** fault indicator and marks the common-control I/O channel alarm resolved.

3. Replace the circuit pack with the red LED lighted.

4. Repeat test 2.

   - If test 2 passes, you have fixed the problem.
   - If test 2 fails, step through each failure.
     - — If there are new failures, repeat steps 3-5.
     - — If the same failure exists, check the wiring to the circuit pack you replaced. Check the wiring to the circuit pack you replaced.

- **If the wiring is satisfactory, escalate the failure.**
- **If the wiring is not satisfactory replace or reseat the wiring.**

— Repeat steps 3-6.

Testing for Intermittent Faults

1. Execute test *3 to* continuously test the suspect 4-MHz channel or dual-speed data channel.
   - If the 4-MHz channel or dual-speed data channel passes, you have fixed the problem.
   - If the 4-MHz channel or dual-speed data channel fails, replace the circuit pack with the red LED lighted.
2. Repeat test 3.
   - If test 3 passes, repeat test 2 so the switch can turn off the **COMMON CONTROL I/O CHANNEL** indicator.
   - If test 3 fails, check the wiring to the circuit pack you replaced.
     — If the wiring is satisfactory and the failure still exists, escalate the failure.
     — If the wiring is not satisfactory replace or reseat the wiring.

PROCEDURE 612 — INITIALIZATION CAUSES (UNIT TYPE *3)*

Unit Type 3 — Initialization Causes	
History of initialization causes indicated by	Procedure 612
Components indicated as a possible cause of initialization problems	TN368, TN370, TN369 or TN379, TN394, TN490, TN491, UN151, UN152, UN153, UN158
Related procedures	• Procedure 600 to determine if unit type 22 (duplication processor) problems exist when fault code 35 appears in Procedure 612. • Procedure 613, Test 3 to determine how many manual switches have occurred when fault code 35 appears in Procedure 612. • Procedure 600 to determine the health of the switch when fault code 38 appears in Procedure 612.

Alarms generated by initialization causes do not usually indicate that there is a faulty circuit pack. However, the system analyzes unit type faults in a predefined order and arranges them for testing in sequence. This internal proms can take considerable time, and clearing the maintenance data using Procedure 612 delays the error-correction process. The data stored in the maintenance procedures can be invaluable when attempting to isolate and clear unusual problems that occur during normal switch operation. Indiscriminately clearing this data can make finding the cause of problems difficult, and at times impossible. Therefore, do not arbitrarily clear maintenance data, but test the faults in the order they appear in the maintenance procedures.

See Table 6-1, *Initialization Causes Fault Codes to* determine the cause of the initialization alarm, primary and secondary suspect circuit packs or other possibilities that you should investigate.

TABLE 6-1. Initialization Causes Fault Codes

Fault Code	Primary suspect	Secondary suspect
1	Input power	
2	TN370, UN151, UN152, UN153	software
3	UN152	software
4	TN368	
5	TN394	
6	TN394	
7	TN394	
8	TN370, UN151, UN152, UN153	
9	Look for other initialization causes.	software, TN368

(continued)

Table 6-1. Initialization Causes Fault Codes *(continued)*

Fault Code	Primary Suspect	Secondary Suspect
10	Look for other initialization causes.	software, TN368
11	TN370, UN151, UN152, UN153	
12	UN153, anything on bus	Software
13	UN158	Cable between channels
14	software	
15	TN369 or TN379	UN153
16	TN369 or TN379	UN153
17	TN369 or TN379	UN153
18	TN491	
19	Look for other initialization causes.	
20	software	UN151
21	Power outage	Power supply
22	Reload from microdianostic Test 15	
23	Software	UN151
24	Software	TN370, UN151, UN152, UN153
25	Software	TN370, UN151, UN152 UN153
26	Software	TN370, UN151, UN152, UN153
27	UN158	TN490

(continued)

Table 6-1 Initialization Causes Fault Codes *(continued)*

Fault Code	Primary Initialization Cause	Secondary Suspect
28	Look for other initialization causes.	
29	Look for other initialization causes.	
30	Software (for example, patches not in both machines, and soon)	111394, UN158
31	TN394	TN370, UN151, UN152, UN153
32	TN370, UN151, UN152 UN153	
33	TN394	TN368
34	TN370, UN151, UN152, UN153	
35	23-hour switch	Manual switch (Procedure 613, Test 3), software recovery. (Refer to Procedure 600.)
36	Switch toggled	
37	TN369 or TN379	UN153
38	Look for other initialization causes.	No other initialization causes, refer to Procedure 600.

continued

Table 6-1 Initialization Causes Fault Codes *(continued)*

Fault Code	Primary Suspect	Secondary Suspect
39	Ensure that the module processor is working.	Ensure that the TMS is working.
40	software error	Sanity time out
41	Check duplication circuit packUN158.	
42	Check SIO or TPIO failure.	Check the circuit pack indicated by the address displayed in Procedure 612, or check circuit pack TN404.

PROCEDURE 613 — 501CC PROCESSOR DUPLICATION (UNIT TYPE 22)

Unit Type 22 — Processor Duplication (501 CC)	
Diagnostic and verification tests	Procedure 613, Test 2 and Test 3
Components tested	TN491, UN151, UN158
Related procedures	• MODE Procedure to determine if encodes 0-4 are active and that the remote ports and the run tape agent are not active. • Procedure 600 (unit type 4) to determine if any common-control problems exist and to investigate off-line common control I/O failures. • Procedure 612 to clear the health code of the off-line processor after circuit pack replacement. • Procedure 650 to check the off-line data communications interface unit (DCIU).

General Repair steps

When a duplicate processor control and test failure is indicated (Procedure 613 referenced from Procedure 600 as the cause for the OTHER FAILS fault indicator being lighted), or when a soft switch is attempted and fails, perform the following steps to isolate and repair the faulty unit.

Before performing the repair procedure, verify that:

- The DEFINITY™ Manager II is connected to the processor that is on line (that is, CC0 or CC1).
- The off-line processor is not halted.
- An off-line procedure is not in the off-line processor.

NOTE

Test 2 or 3 may block transfer into the off-line processor's Manager II procedure memory buffer and cause the off-line processor to reload if a procedure is in the off-line processor.

- The **LOCK ON LINE** switch on the alarm panel is set to the **OFF** position.

CAUTION

The off-line processor may reload if a procedure is requested in the off-line processor while Test 2 or 3 is executing.

- The port contention modes are not active. To determine if the port contention modes are active, proceed as follows:
  - — Enter **m**
  - — Examine Fields 9-13 of the MODE display procedure to determine which encodes are displayed.

    If encode 0 appears, it should be the local Manager II's current port that you are using.

    If encode 3 or 4 appears, determine from Fields 6 and 7 if the agent encode displayed is 10 (run tape).
  - — If any of the encodes are displayed, contact the appropriate users to obtain full release of all remote ports and the pseudo port performing a run tape.

After you have completed the soft switch and performed the necessary repair action, notify the previous users of the modes that you have completed your task so that they can continue their tasks.

Duplicate Processor Control and Test Failure Indicated

1. Execute Procedure 613, Test 1. Record the failure history including the specific fault code for each failure.
2. Execute Procedure 613, Test 2.
   - If Test 2 passes, go to step 3.
   - If Test 2 fails, record the failure codes. Then, go to step 5.
3. Attempt a soft switch of the common-control processors using Procedure 613, Test 3.
   - If the soft switch is successful, go to step 4.
   - If the soft switch fails, indicated by a 1 displayed in Field 2 (processor status) and failure code 95 (switch attempt failed) displayed in Field 12, go to step 3 of fault isolation and repair procedure *Soft Switch Failure Indicated.*
4. Repeat Procedure 613, Test 2 to turn off the **OTHER FAILS** fault indicator (assuming no other sources are affecting the fault indicator).
   - If Test 2 passes, you have fixed the problem. The duplicate processor control and test alarmed entry in the periodic maintenance information data structure (PMIDS) is marked as resolved.
   - If Test 2 fails, record the failure codes. Then, go to Step 5.
5. Refer to Table 6-2, *Duplicate Processor Control and Test Failure Codes,* and perform the corrective action indicated for the failure code recorded.

   After performing corrective action, use Procedure 612 to clear the health code of the off-line processor.
6. Enter Procedure 613, Test 3 and attempt a soft switch.
   - If the soft switch is successful, go to step 7.
   - If the soft switch fails (indicated by a 1 in Field 2 and a failure code of 95 in Field 12), repeat steps 5 and 6 until all circuit packs listed in Table 6-2 *Duplicate Processor Control and Test Failure Codes,* for the failure code recorded are replaced. Then, go to step 8.

7. Repeat Procedure 613, Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the fault indicator).
   - If Test 2 passes, you have fixed the problem. The duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
   - If Test 2 fails (indicated by a 1 in Field 2 and a failure code of 95 in Field 12), repeat steps 5-7 until all circuit packs listed in Table 6-2, *Duplicate Processor Control and Test Failure Codes,* for the failure code recorded are replaced. Then, go to step 8.
8. *If the* soft switch or Test 2 still fails, perform fault isolation and repair procedure *Soft Switch Failure Indicated.*
9. *If* Test 2 still fails after performing fault isolation and repair procedure *Soft Switch Failure Indicated, go to* fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

TABLE 6-2. Duplicate Processor Control and Test Failure Codes

Failure Code	Corrective Action
1	Replace the following components in the order listed, testing after each replacement, until the failure is corrected A. UN158 in the off-line processor. B. UN158 in the on-line processor. C. Cabling between the UN158 circuit packs. D. TN491 in the on-line processor.
11, l2 51, 61-63, and 98	Replace UN158 in the on-line processor.
21 through 24	Replace UN151 in the on-line processor.
31-34,41, and 42	Replace the following components m the order listed, testing after each replacement, until the failure is corrected A. Investigate the off-line common-control failures using Procedure 600 (Unit Type 4). Take corrective action as appropriate. B. UN158 in the off-line processor. C. UN158 in the on-line processor. D. Cabling between the UN158 circuit packs.
35-38,43, and 97	Replace the following components in the order listed, testing after each replacement until the failure is corrected A. UN158 in the off-line processor. B. UN158 in the on-line processor. C. Cabling between the UN158 circuit packs.
96	Check the off-line DCIU status by going to *Procedure 650 — DCIU (unit type 19).*
99	Stop and re-execute Procedure 613, Test 2 after the off-line processor has completed reloading.

Soft Switch Failure Indicated

1. Use the MODE display procedure to ensure that the remote ports and the run tape agent are not active.
2. Execute Procedure 613, Test 2. Record the results.
   - If Test 2 passes, go to step 4.
   - If Test 2 fails, perform steps 5-8 of fault isolation and repair procedure *Duplicate Processor Control and Test Failure Indicated* (above).

3. If the failure was not corrected in step 2, replace the following circuit packs in the order listed:
   a. UN158 — In the off-line processor.
   b. UN158 — In the on-line processor.

   After each circuit pack replacement, use Procedure 612 to clear the health code of the off-line processor.
4. Enter Procedure 613, Test 3 and attempt a soft switch.
   - If the soft switch is successful, go to step 5.
   - If the soft switch fails (indicated by a 1 in Field 2 and a failure code of 95 in Field 12), repeat steps 3 and 4 until all circuit packs listed in step 3 are replaced. Then, go to step 6.
5. Repeat Procedure 613, Test 2 to turn off the OTHER FAILS fault indicator (assuming no other sources are affecting the fault indicator).
   - If Test 2 passes, you have fixed the problem. The duplicate processor control and test alarmed entry in PMIDS is marked as resolved.
   - If Test 2 fails (indicated by a 1 in Field 2 and a failure code of 95 in Field 12), repeat steps 3-5 until all circuit packs listed in step 3 are replaced. Then, go to step 6.
6. If the soft switch or Test 2 still fails, go to fault isolation and repair step *Specific Fault Codes* for further isolation techniques.

Soft A or Soft B

After all repair actions are performed and soft A or soft B failure indications are still displayed (1 in Fields 4,5,7, or 8), execute Procedure 600, Test 2 to determine if any common-control problems exist.

Specific Fault Codes

Appendix A, *Specific Fault Code Definitions,* lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Analyze the specific fault codes recorded from PMIDS (recorded in Test 1).
   - If specific fault code 915 was recorded in Test 1 and a failure still exists, the off-line common control is not equipped identically to the on-line common control. Ensure that both common controls are equipped the same way. Then start over with step 1 of fault isolation and repair procedure *Duplicate Processor Control and Test Failure Indicated.*
   - If specific fault code 915 was not recorded in Test 1, go to step 2.
2. Determine from the specific fault codes recorded (using Appendix A, Specific Fault *Code Definitions*, if any additional corrective action can be performed (for example, other circuit packs to replace or cabling).

3. If all circuit packs and cabling (as appropriate) are replaced, check the wiring associated with the circuit packs and the cabling between the duplication channels depending upon the specific fault code recorded in Test 1. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

PROCEDURE 614 — MAIN MEMORY (UNIT TYPE 5) OR CACHE MEMORY (UNIT TYPE 18)

Unit Type 5 — Main Memory and Unit Type 18 — Cache Memory	
Diagnostic and verification tests	Procedure 614, Tests 2-4
Components tested	TN394, TN397
Related procedures	• Administration Procedure 490 to find the number of patches on both the on-line and off-line common-control tapes and to add missing patches. • Procedure 600 to check for common-control I/O failures and Test 2 to determine the status of memory audit peg counts (unit type 43). • Procedure 610, Test 2 On both processors to determine if a tape problem exists. • Procedure 611, Test 2 to test for failing I/O circuits. • Procedure 612 to determine the status of initialization problems. • Procedure 613 to determine the cause of a parity error. • Procedure 999 to correct a failing common-control processor.

General Repair Steps

If there is a memory read/memory match failure, the switch lights, MEM or CACHE/MEMORY on the alarm panel, and procedure 600 references procedure 614. Use the following steps to isolate and repair the failure.

1. Execute Procedure 614, Test 1.

   Record the failure history.

   - If fault code 10-15 or 17 is not displayed for any failure, go to Step 3.
   - If fault code 10-15 or 17 appears for a failure, perform fault isolation and repair step *Failure Codes 10 Through 15 or 17* for that failure.

2. Execute test 2.

   - If test 2 passes, execute test 4 on each memory block and address recorded in test 1 to ensure that no intermittent failures exist.

- If test 2 fails, execute test 3 on the area of memory where the failure occurred. Then, go to step 4.

3. Record the failure code displayed in Field 8 for the failed memory block and location detected in Test 3.

Isolation and repair steps for the failure codes are detailed in the following sections.

Failure Code 1

There are two parts to repair strategy for failure code 1: the translation fault isolation and repair techniques (memory area encodes 4-7 or 12-15) and the patch/program fault isolation and repair techniques (memory area encodes 1-3 or 9-11).

Translation Fault Isolation and Repair Techniques

1. Determine the status of customer service. Good customer service is defined as follows:
   - The most recent changes made to the switch are added and are working properly.
   - No trouble reports exist.
   - Attendant consoles are not malfunctioning.
   - An abnormal number of status memory audit peg counts do not exist.

     Perform Procedure 600, Test 2 — unit type 43 to investigate the status memory audit peg counts.
   - No initialization problems exist.

     Go to *Procedure 612 — Initialization Causes,* to determine the status of initialization problems.
   - If customer service is good, go to step 2.
   - If customer service is not good, go to step 11.
2. Perform a run tape in the on-line processor.
3. Load the off-line processor with the on-line tape by performing the following.
   a. Remove the tape cartridge from the on-line disk tape system (DTS).
   b. Install the tape cartridge into the off-line DTS.
   c. Set the off-line processor's **TEST SELECT** switch to 15.
   d. Depress the off-line processor's **RESET** and **ENABLE** switches.
   e. Wait until the off-line processor completes reloading.
   f. Remove the tape cartridge from the off-line DTS.
   g. Install the tape cartridge into the on-line DTS.
4. Execute test 2 to check for a memory mismatch.
   - If the two processors match, go to step 5.

     If the memories match, the switch turns off **MEM** and/or **CACHE/MEMORY** fault indicators if there is no other reason for them to be on.

- If the two processors do not match, go to *Procedure 610 — Tape,* and use Procedure 610 on both processors to correct the problem.

5. Perform a run tape on the off-line tape by performing the following.
   a. Install the original off-line tape cartridge in the off-line DTS.
   b. Enter `rtx`.

CAUTION A hard switch of common controls results in loss of service.

6. Do a hard switch of common-control processors by setting the on-line common control's **GO/HALT** switch to **HALT.**
7. Set the new off-line processor's GO/HALT switch to the GO position.
8. *Determine the* status of customer service in the new on-line processor.
   - If customer service is good, go to step 9.
   - If customer service is not good, go to step 10.
9. Execute test 2 to check for a memory mismatch.
   - If the two processors match, you have fixed the problem. The **MEM** and/or **CACHE/MEMORY** fault indicator turns off when the memories match and no other failures are detected in Test 2.
   - If the two processors do not match, go to *Procedure 610 — Tape,* and use Procedure 610 on both processors to correct the problem.
10. Reload the new off-line processor by performing the following.
    a. Set the off-line processor's **TEST SELECT** switch to 15.
    b. Depress *the* off-line processor's **RESET** and **ENABLE** switches.
    c. Wait until the off-line processor completes reloading.

CAUTION A hard switch of common controls results in loss of service.

11. Perform a hard switch of common controls by setting the on-lie common control **GO/HALT** switch to **HALT.**
12. Set the new off-line processor's **GO/HALT** switch to the **GO** position.
13. Determine the status of customer service in the new on-line processor.
    - If customer service is good, go back to step 2 above.
    - If customer service is not good, start at step 3 above with backup tapes in an attempt to provide good customer service.

At this point, both processors are reloaded independently without achieving good customer service.

Patch and Program Fault Isolation and Repair Techniques

Customer service must be good before you can proceed with the patch and program fault isolation and repair techniques. If customer service is not good, perform the translation fault isolation and repair techniques first. If customer service is good or if you have performed the translation fault isolation and repair techniques above and customer service is still not good, proceed with step 1 below.

1. Use administration Procedure 490 to find the total number of patches on both the on-line and off-line common-control tapes.
   - If both tapes have the same number of patches, go to step 5.
   - If both tapes do not have the same number of patches, go to step 2.
2. Use administration Procedure 490 to add the missing patches to the appropriate tape.
3. Reload the appropriate common control by performing the following.
   a. Set the **TEST SELECT** switch to 15.
   b. Depress the **RESET** and **ENABLE switches.**
   c. Wait until the processor completes reloading.
4. Execute Procedure 614, Test 2. Check for a memory mismatch.
   - If there are no mismatches, you have fixed the problem. The **MEM** and/or **CACHE/MEMORY** fault indicator turns off when the memories match and no other failures are detected in Test 2.
   - If a mismatch still exists, go to *Procedure 610 — Tape,* and use Procedure 610 to isolate the problem to the tape or DTS.
5. *If the* problem is in the program memory area only (encode 1 displayed in Field 7), acquire second-level maintenance assistance to determine which processor is in error. hen, use Procedure 999 to correct the failing processor.
6. If the problem is in the patch memory area only (encode 2 displayed in Field 7) or in the program and patch memory area (encode 3 displayed in Field 7), go to step 16.
7. If the problem is other than the program memory area only (encode 1) or patch memory area only (encode 2), go to Step 8.
8. Reload the appropriate common control by performing the following.
   a. Set the **TEST SELECT** switch to 15.
   b. Depress the **RESET** and **ENABLE** switches.
   c. Wait until the processor completes reloading.
9. Execute Procedure 614, Test 2. Check for a memory mismatch.
   - If there are no mismatches, go to step 12.
   - If a mismatch still exists, go to step 10.
10. Reload the incorrect common control with the tape from the correct common control by performing the following.

a Remove the tape cartridge from the *correct* common-control DTS.

b. Install the tape cartridge into the *incorrect* common-control DTS.

c. Set the TEST SELECT switch to 15.

d. Depress the RESET and ENABLE stitches.

e. Wait until the processor completes reloading.

f. Remove the tape cartridge from the *incorrect* common-control DTS.

g. Install the tape cartridge into the *correct* common-control DTS.

1 I. Execute Procedure 614, Test 2. Check for a memory mismatch.

- If there are no mismatched, the tape in the incorrect common control is defective. Replace the tape and rerun the test from the beginning.
- . If a mismatch still exists, go to *Procedure 610 — Tape,* and use Procedure 610 to isolate the problem to the tape or DTS on the *incorrect* common control.

12. Execute Procedure 614, Test 4 on the failed memory locations.

- If the two tapes match, the error was intermittent and you have fixed the problem.
- If the two tapes mismatch, go to step 13.

13. Replace the defective memory board. The memory block displayed in Field 2 indicates which memory board to replace; for example, if Field 2 = 0, replace memory board in Slot 07 of the common control carrier.

NOTE

Block numbers and slot numbers are on a 16-to-l basis when TN394 is installed in the common-control carrier. Block numbers 0-17 (in octal) displayed in Field 2 correspond to slot number 7; block numbers 20 through 37 (in octal) displayed in Field 2 correspond to slot number 8; block numbers 40-57 (in octal) correspond to slot number 9; and block numbers 60 through 77 (ii octal) correspond to slot number 10.

14. Reload the tape.

15. Execute Procedure 614, Test 2 to resolve the memory mismatch cause of the **MEM** and/or **CACHE/MEMORY** fault indicator being lighted.

16. Execute Procedure 614, Test 3. Determine which patch is missing from the defective tape by counting the number of failed locations.

17. Use administration Procedure 490 to add the missing patch to the defective tape.

18. Reload both tapes.

19. Execute Procedure 614, Test 2. Check for a memory mismatch.

- If both tapes match, you have fixed the problem. The **MEM** and/or **CACHE/MEMORY** **fault** indicator turns off when the memories match and no other failures are detected in Test 2.
- If the two tapes still mismatch, go to *Procedure 610 — Tape,* and use Procedure 610 on **both** processors to correct the problem. Suspect a defective DTS.

Failure Codes 2,3,6,7, or 8 (Memory Failures)

1. Replace circuit pack TN394 associated with the memory block displayed in Field 2.

   NOTE

   Block numbers and slot numbers are on a 16-to-l basis when TN394 is installed in the common-control carrier. Block numbers 0-17 (in octal) displayed in Field 2 correspond to slot number 7; block numbers 20 through 37 (in octal) displayed in Field 2 correspond to slot number 8; block numbers 40-57 (in octal) correspond to slot number 9; and block numbers 60 through 77 (in octal) correspond to slot number 10.

2. Repeat Procedure 614, Test 3 on the memory block and location that failed with a failure code of 2, 3,6,7, or 8.
   - If Test 3 passes, execute Procedure 614, Test 2 to turn off the **MEM** and/or **CACHE/MEMORY** fault indicators.
   - If Test 3 fails, check for bent pins on the backplane. If the failure still exists, escalate the failure.

Failure Code 4 (Parity Error)

1. Record the memory block and location displayed in Fields 2 and 3.
2. Go to *Procedure 613 — 501CC Processor Duplication,* to determine the cause of the parity error.

Failure Code 5 or 16 (I/O Failures)

1. Execute Procedure 600, Test *2.* Check for common-control I/O failures (unit type 4).
2. Go to *Procedure 611 — Common Control I/O,* and execute Procedure 611, Test 2 on the circuits displayed in Procedure 600, Test 2. Perform corrective action (as appropriate) listed in Procedure 611 on the failing I/O circuits.
3. Execute Procedure 614, Test 4 to continuously test the memory block and location that failed Procedure 614, Test 3 with a failure code of 5 or 16.
   - If the memory block and location now passes, execute Procedure 614, Test 2 to turn off the **MEM** and/or **CACHE/MEM ORY** fault indicators.
   - If the memory block and location fails, check for bent pins on the backplane. If the failure still exists, escalate the failure.

Failure Codes 10 Through 15 or 17 (Cache Failures)

1. Go to *Procedure 612 — Initialization Causes, to determine the* number of init As for unit type 18 (cache). Record the number of write aborts, illegal opcodes, and cache parity errors.
2. Execute Procedure 614, Test 6 on the failure displayed in Procedure 614, Test 1.

- If Test 6 passes, go to step 4.
- If Test 6 fails, replace TN369 or TN379 in slot 04 of the common-control carrier. Then, go to step 3.

3. Repeat Procedure 614, Test 6 on the same failing circuit.
   - If Test 6 passes, execute Procedure 614, Test 2 to turn off the **MEM** and/or **CACHE/MEMORY** fault indicators.
   - If Test 6 fails, replace UN153B in slot 03 of the common-control carrier. Then, go to step 6.
4. Go to *Procedure 612 — Initialization Causes,* to determine if the number of init As recorded in step 1 for unit type 18 (cache) is the same or greater.
   - If the init As are the same or lower, corrective action is complete. Execute Procedure 614, Test 2 to turnoff the **MEM** and/or **CACHE/MEMORY** fault indicators.
   - If the init As are grater, replace TN369 or TN379. Then, go to step 5.
5. Repeat Procedure 614, Test 6 on the same failing circuit.
   - If Test 6 passes execute Procedure 614, Test 2 to turn off the **MEM** and/or **CACHE/MEMORY** fault indicators.
   - If Test 6 fails, replace UN153B in slot 03 of the common-control carrier. Then, go to step 6.
6. Repeat Procedure 614, Test 6 on the same failing circuit.
   - If Test 6 passes, execute Procedure 614, Test 2 to turn off the **MEM** and/or **CACHE/MEMORY** fault indicators.
   - If Test 6 fails, check for bent pins on the backplane. If the failure still exists, escalate the failure.

PROCEDURE 618 — DIAGNOSTIC PROCESSOR (UNIT TYPE 60), EXTERNAL EQUIPMENT (UNIT TYPE 63), OR EXTERNAL PROCESSOR (UNIT TYPE 64)

Unit Type 60— Diagnostic Processor, Unit Type 63— External Equipment and Unit Type 64 — External Processor	
Diagnostic and verification tests	Procedure 618 Test 1 and Test 3
Components tested	TN491, TN492, auxiliary cabinet components
Tools and test equipment	Digital multimeter to measure output voltages at the auxiliary cabinet rectifier. Screwdriver to remove and replace auxiliary cabinet components. Wrench to remove hex nuts when replacing the auxiliary cabinet rectifier.

General Repair Steps

If the diagnostic processor, remote equipment, or the external processor fails, the switch lights **OTHER FAILS** and procedure 600 references procedure 618. Use the following steps to isolate and repair the failure.

1. Execute Procedure 618, Test 1.

   Record the unit type, equipment location, and the alarm status displayed in Fields 2-7.

2. If there is a failure go to one of the following sections.

UNIT TYPE	SECTION
60	*Unit Type 60 (Diagnostic Processor)*
63	*Unit Type 63 (External Equipment)*
64	*Unit Type 64 (External Processor)*

If you have to replace the DC filter in the auxiliary cabinet, or the battery on circuit pack TN492, refer to Chapter 9, *Switch Component Replacement*, for replacement steps. *Put info about battery replacement in Chapter 9.*

If you have to replace the fans, fan assembly, frequency generator, or the rectifier in the auxiliary cabinet, refer to Chapter 11, *Auxiliary Cabinet Component Replacement,* for replacement steps.

Unit Type 60 (Diagnostic Processor)

Specific Fault Code 914, 916, 917, or 972

1. Correct the configuration settings on the 1200-baud modem connected to the TN492C circuit pack at the equipment location on your screen for slot 32.
2. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, replace the 1200-baud modem.
3. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, replace the cabling to the 1200-baud modem.
4. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, replace circuit pack TN492C at the equipment location displayed in slot 32.

NOTE

Before you replace circuit pack TN492C, make sure that the battery (comcode 844665836) is connected to the back of the circuit pack. Refer to Chapter 9 for battery replacement steps. If the yellow LED is lighted after you replace the circuit pack, the battery is *not* connected or wired correctly.

5. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, replace circuit pack TN491.
6. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, check the cabling and wiring between the modem and the circuit packs you replaced. If the wiring and cabling is satisfactory or you have replaced it and the failure still exists, escalate the failure.
7. Replace the circuit pack at the equipment location displayed in Fields 3-6.
8. Execute test 3.
   - If the same failure does not appear, you have repaired the problem.
   - If the same failure appears, determine if slot 22 or 32 appears in Field 6.
     - If slot 22 or 32 does not appear, check the UART cable E26 — E26 and the wiring to the circuit packs you replaced or do microdiagnostic Test 0 in the off-line side of a duplicated common-control switch. In an unduplicated switch, do microdiagnostic testing *only* when traffic permits, since microdiagnostic testing takes the switch down.
     - If slot 22 or 32 appears, replace TN491 in slot 31 at the equipment location shown in fields 3-6.

9. Execute test *3*.
   - If the same failure is not displayed, you have repaired the problem.
   - If the same failure appears, check the UART cable E26 — E26 and the wiring associated with the circuit packs replaced or do microdiagnostic Test 0 in the off-line side of a duplicated common-control switch. If the switch is unduplicated, do microdiagnostic testing *only* when traffic permits, since microdiagnostic testing takes the switch down.
10. Repeat steps 1-17 for each diagnostic processor failure from test 1.

Unit Type 63 (External Equipment)

There are two types of external equipment alarm indications displayed by Procedure 618. They are the stratum 3 clock and the auxiliary cabinet alarms.

To find type of alarm, you need to examine fields 3,4 and 7.

- If Fields 3 and 7 contain data (not dashed *and* Field 4 is dashed, go to fault isolation and repair procedure *Stratum 3 Clock Repair Strategy*.
- If Fields 3 and 4 contain data, go to fault isolation and repair procedure *Auxiliary Cabinet Repair Strategy*.

Stratum 3 Clock Repair Strategy

1. Does Procedure 618 indicate a problem with the stratum 3 hardware or circuit pack TN2131?

   When external synchronization is provided, 10 isolated contact closures are used to indicate problems in the synchronization hardware. The indicators are connected to the Generic 2 remote interface unit and problems can be viewed by using Procedure 618. The indications are:

   - Loss of input reference A to the stratum 3 clock
   - LOSS of input reference B to the stratum 3 clock
   - LOSS of both input reference signals
   - Loss of one clock unit
   - Loss of both clock units
   - LOSS of one -48V supply
   - Loss of both -48V supplies
   - Loss of input A composite clock from the stratum 3 hardware
   - Loss of input B composite clock from the stratum 3 hardware
   - Loss of eight KHz output from the TN2131 circuit pack to the system backplane.

   Execute Procedure 618, Test 1 and determine, based on system wiring information and your local records for the facility, if there is an alarm in the external synchronization hardware.

   The unit number in Field 3 and the alarm status in Field *7*, in addition to the wiring information for the stratum 3 clock external equipment alarm hardware, provide the indications listed above. Note that field 4 is dashed for stratum 3 clock hardware.

An example of how the indications maybe wired follows:

FIELD3	FIELD7	INDICATION
Unit Type 25	Minor	loss of reference A
Unit Type 26	Minor	loss of input reference B
Unit Type 27	Minor	loss of both input reference signaIs
unit type 28	Minor	loss of one but not both clock units
Unit type 28	Minor	Both clock units are lost
Unit type 29	Minor	one, but not both, -48V supplies lost
Unit type 29	Minor	both -48V supplies lost
Unit type 30	Minor	loss of input A composite clock from the stratum 3 hardware
Unit type 31	Minor	loss of input B composite clock from the stratum 3 hardware
Unit type 32	Minor	loss of eight KHz output from the TN2131 circuit pack to the system backplane

Remember, that these are just examples. Consult your local records for the correct wiring of the alarm indications. Record this information for use in the following steps.

Determine from the data displayed in field 3 and field 7, and your local records if the alarm is a stratum 3 clock indication or TN2131 circuit pack indication.

- If the alarm is a stratum 3 clock hardware, go to fault isolation and repair procedure *Stratum 3 Clock Indications.*
- If the alarm is a TN2131 circuit pack, go to fault isolation and repair procedure *TN2131 Circuit Pack Indications.*

Stratum 3 Clock Indications

1. Check the stratum *3* clock hardware wiring through the cross-connect field to the backplane behind the TN2131 and TN492C to the channel service units (CSU).
   - If the wiring is *correct,* go to *Procedure 620 — DS-1 Interface (Unit Type 68) or Primary Rate Interface (Unit Type 69),* and do the *Synchronization Problem Investigation — Systems With External Synchronization Hardware.*
   - *If the wiring* is *not correct,* fix it. Then, go to step 2.
2. *Start Procedure 618,* Test 1 and enter `cdx`
3. Wait five minutes.

4. Execute Procedure 618, Test 1.
5. Determine if the same entry for unit type 63 appears.
   - If the same entry is not displayed, you have fixed the problem.
   - If the same entry appears, go to *Procedure 620 — DS-1 Interface (Unit Type 68) or Primary Rate Interface (Unit Type 69),* and do the *Synchronization Problem Investigation — Systems With External Synchronization Hardware.*

TN2131 Circuit Pack Indications

1. Check the stratum *3* clock hardware wiring through the crossconnect field to the backplane behind the TN2131 and TN492C to the channel service units (CSU).
   - If the wiring is correct, go to step 2.
   - If the wiring is *incorrect, fix* it. Then return to the beginning of procedure 618 and start again.
   - Replace the TN2131 circuit pack. Then, go to step 3.
   - Perform a clear data, execute sequence in Procedure 618, Test 1 by typing *cdx* to clear the alarmed entry. Then, wait at least *5* minutes.
   - Execute Procedure *618,* Test 1.
   - Determine if the same entry for unit type 63 appears.
     - If the same entry is not displayed, you have fixed the problem.
     - If the same entry appears, escalate the failure.

Auxiliary Cabinet Repair Strategy

1. Record the unit number of the external equipment and the external equipment encode displayed in Fields 3 and 4 of each unit type 63 entry displayed in Test 1.
2. Determine from local records if you are at the customer's premises associated with the unit number displayed in Field 3.
   - If you are not at the customer's premises, either go to the correct location or refer the problem to the remote maintenance facility (if available) or to higher-level maintenance (as appropriate).
   - If you are at the customer's premises, the repair steps to use depend on the external equipment encode in field 4.

The following paragraphs describe the repair steps based on the external equipment encodes in field 4 of Procedure 618.

Encode 1 The DC filter provides extended holdover or extended power reserve. If field 4 contains encode 1, replace the DC filter.

Encode 2 An overtemperature alarm signifies that a predetermined cabinet temperature is exceeded.

1. Are there fans in the auxiliary cabinet?
   - If there are no fans, go to step 7.

- If the cabinet has fans, are the fans working properly?
  - If all fans are not operating properly, replace any defective fan. Let the cabinet interior cool. Then, go to step 8.
  - If all fans are operating properly, refer to fault isolation and repair procedure *Other Repair steps.*
- Check the fuses (F1 or F2) that control the fans. (F1 controls the upper fan assembly and F2 controls the lower fan assembly.)
  - If the fuse is blown, go to step 5.
  - If the fuse is not blown, an overtemperature alarm may appear because the room is too hot.
- Replace the blown fuse.
  - If the fuse does not blow again, let the cabinet interior cool. Then, go to step 8.
  - If the fuse blows again, replace the fan assembly associated with the blown fuse.
- Replace the blown fuse. Let the cabinet interior cool. Then, go to Step 8.
- If there are no fans, or if you suspect that the room is too hot, check the mom temperature tO make sure that it is not higher than the maximum for the auxiliary cabinet.
  - If the environmental temperature is above the maximum, leave the cabinet Open SO that it (can cool and refer the problem to local engineering.
  - If the environmental temperature is not above the maximum, refer to fault isolation and repair procedure *Other Repair steps.*
- Start Procedure 618, Test 1 and enter cdx to clear the alarmed entry. Then, wait five minutes.
- Execute Procedure 618, Test 1.
- Determine if the same entry for unit type 63 appears.
  - If the same entry does not appear, you have repaired the problem.
  - If the same entry appears, check the wiring from the fuse to the fan assembly. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Encode 3 If encode 3 appears, a fan may be malfunctioning.

1. Determine if the fans are running.
   - If no fans are running, go to step 3.
   - If fans are running, go to Step 2.
2. Determine if all fans are operating properly.
   - If al1 fans are operating properly, refer to fault isolation and repair procedure *Other Repair steps.*
   - If all fans are not operating properly, replace any defective fan. Let the cabinet interior coo1. Then, go to step 6.
3. Check the fuse (F1 or F2) that control the fans. (F1 controls the upper fan assembly and F2 controls the lower fan assembly.)
   - If either fuse is blown, go to step 4.

- If the fuse is not blown, refer to fault isolation and repair procedure *Other Repair steps.*

4. Replace the blown fuse.
   - If the fault does not blow again, let the cabinet interior cool. Then, go to step 6.
   - If the fuse blows again, replace the fan assembly controled by the blown fuse.
5. Replace the blown fuse. Allow sufficient time for the cabinet interior to cool.
6. Start Procedure 618, Test 1 and enter `cdx` to clear the alarmed entry. Then, wait at least 5 minutes.
7. Execute Procedure 618, Test 1.
8. Determine if the same entry for unit type 63 appears.
   - If the same entry is not displayed, corrective action is complete.
   - If the same entry appears, check the wiring to the fan and between the fan and circuit breaker. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Encode 4

1. If no fuses are blown or circuit breakers tripped, refer to fault isolation and repair procedure *Other Repair Steps.*
2. If a fuse is blown or circuit breaker tripped, replace the blown fuse, or reset the circuit breaker.
3. If the fuse does not blow again or the circuit breaker does not trip, go to step 4.
4. If the fuse blows again or the circuit breaker trips, go to step 3.
5. Perform the following corrective action depending on the blown fuse or tripped circuit breaker.
   a. Replace components associated with the blown fuse or circuit breaker.
   b. Check the wiring or cabling associated with the fuse or circuit breaker. If the wiring and cabling is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Start procedure 618, Test 1 and enter `cdx` to clear the alarmed entry. Then, wait five minutes.
7. Execute Procedure 618, Test 1.
8. Determine if the same entry for unit type 63 appears.
   - If the same entry does not appear, you have repaired the problem.
   - If the same entry appears, check the wiring for the fuse or circuit breaker. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Encode 5

1. Determine the type of frequency generator installed in the auxiliary cabinet.
   - If the frequency generator is a 124B, go to step 4.
   - If the frequency generator is a 124B1 or 124B2, go to step 2.
2. Check the l-amp reset button at the front of the frequency generator.
   - If the reset button is flush (not popped out), go to step 4.

- If the reset button has popped out, go to step 3.

3. Push the reset button in.
   - If the reset button does not pop out go to step 8.
   - If the reset button pops out again, check the wiring to the output loads to determine the cause of the trouble. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
4. Check the 2-amp fuse on the fuse panel associated with the frequency generator.
   - If the fuse is blown, go to step 5.
   - If the fuse is not blown, go to step 6.
5. Replace the blown fuse.
   - If the fuse does not blow, go to step 7.
   - If the fuse blows again, check the wiring between the fuse and the frequency generator. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Replace the frequency generator.
7. Start Procedure 618, Test 1 and enter `cdx` to clear the alarmed entry. Then, wait five minutes.
8. Execute Procedure 618, Test 1.
9. Determine if the same entry for unit type 63 appears.
   - If the same entry is not displayed, corrective action is complete.
   - If the same appears, check the wiring associated with the frequency generator. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Encode 6 A green pilot LED located on the front panel of the rectifier is lighted when the rectifier is producing -48 volts on its output.

The green pilot LED does not indicate that the output voltage is within regulation limits.

Appropriate test points are available on the front panel of the rectifier for measuring the output voltage and determining the rectifier performance.

1. At the rectifier, determine if the green pilot LED is lighted.
   - If the green pilot LED is not lighted, go to step 2.
   - If the green pilot LED is lighted, go to step 9.
2. Determine if the circuit breaker associated with the rectifier is tripped.
   - If the circuit breaker is tripped, go to step 3.
   - If the circuit breaker is not tripped, go to step 6.
3. Reset the circuit breaker.
   - If the circuit breaker does not trip, go to step 12.
   - If the circuit breaker trips again, replace the rectifier.

4. If the circuit breaker does not trip again after you have replaced the rectifier, go to step 12.
5. If the circuit breaker trips again after you have replaced the rectifier, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
6. Measure the rectifier output voltages at the test points using a digital multimeter. (At the auxiliary cabinet rectifier, minimum and maximum voltage readings should be between -46 volts and -52.6 volts, respectively.)
   - If all voltages are within tolerance, refer to fault isolation and repair procedure *Other Repair steps.*
   - If all voltages are not within tolerance, go to Step 7.
7. Replace the rectifier.
8. Measure the output voltages. (At the auxiliary cabinet rectifier, minimum and maximum voltage readings should be between -46 volts and -52.6 volts, respectively.)
   - If all voltages are within tolerance, go to step 12.
   - If all voltages are not within tolerance, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
9. Determine if marginal or fluctuating voltages exist at the rectifier test points by measuring the output voltages using a digital multimeter. (At the auxiliary cabinet rectifier, minimum and maximum voltage readings should be between -46 volts and –52.6 volts, respectively.)
   - If all voltages are within tolerance without fluctuation, refer to fault isolation and repair procedure *Other Repair steps.*
   - *If* voltages are marginal or fluctuating, go to step 10.
10. Replace the rectifier.
11. Measure the output voltages. (At the auxiliary cabinet rectifier, minimum and maximum voltage readings should be between -46 volts and -52.6 volts, respectively.)
    - If all voltages are within tolerance and do not fluctuate, go to step 12.
    - If voltages are not within tolerance or fluctuate, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
12. Perform a clear data, execute sequence in Procedure 618, Test 1 by typing *cdx* to clear the alarmed entry. Then, wait at least 5 minutes.
13. Execute Procedure 618, Test 1.
14. Determine if the same entry for unit type 63 appears.
    - If the same entry is not displayed, corrective action is complete.
    - If the same entry appears, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Other Repair steps: If an alarm encode is present but the equipment associated with the alarm encode is functioning properly (or unable to function because of a suspected sensor or detector malfunction), the sensor, detector, or alarm board corresponding to the auxiliary cabinet encode is probably faulty.

1. Replace the auxiliary cabinet alarm unit.
2. Perform a clear data, execute sequence in Procedure 618, Test 1 by typing *cdx* to clear the alarmed entry. Then, wait at least 5 minutes.
3. Execute Procedure 618, Test 1.
4. Determine if the same entry for unit type 63 appears.
   - If the same entry is not displayed, corrective action is complete.
   - If the same entry appears, go to step5.
5. Check the sensor or detector and replace as appropriate.
6. Perform a clear data, execute sequence in Procedure 618, Test 1 by typing *cdx* to clear the alarmed entry. Then, wait at least 5 minutes.
7. Execute Procedure 618, Test 1.
8. Determine if the same entry for unit type 63 appears.
   - If the same entry is not displayed, corrective action is complete.
   - If the same entry appears, go to step 9.
9. If the sensor or detector is functioning correctly or, after replacement of the sensor or detector, the failure still exists, check the wiring between the sensor or detector and the module control channel. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Encode 7 (multiple external and/or auxiliary equipment failures) and encode 8 (type of trouble is unknown) requires that you investigate the entire auxiliary cabinet to determine the location of the trouble.

Unit Type 64 (External Processor)

1. Record the unit number of the external processor in field 3 of each unit type 64 entry displayed in Test 1.
2. Determine from the local records if you are at the site of the external equipment associated with the unit number displayed in Test 1.
   - If you are at the site of the external equipment, repair the external processor or refer the problem to the appropriate personnel.
   - If you are not at the site of the external equipment, either go to the correct location or refer the problem to the remote maintenance facility (if available) or to higher-level maintenance (as appropriate).

PROCEDURE 620 — NETWORK UNIT TYPES

The starting point for isolating and repairing network circuit failures is Procedure 620, Test 1. To isolate a network failure displayed in Procedure 620, Test 1, execute Procedure 620, Test 4 to find where a failure is located in the network. However, if specific fault code 337 (hyperactive port — receiving too many signals) is displayed in Procedure 620 Test 1, perform hyperactivity testing instead of the demand diagnostic test executed by Procedure 620, Test 4.

In Procedure 620, Test 1, alarmed failures appear in order of severity: major alarm failures first, followed by minor alarm failures, and warning alarm failures displayed last. In each alarm category, alarmed failures are displayed by unit types (functional areas) with to the most important functional area displayed first.

When you do Procedure 620, Test 1 and multiple alarmed failures are logged in the failure history, try to find a failure pattern. Some examples of failure patterns are:

- In Procedure 620, Test 1 network circuit failures appear in different unit types.
- In Procedure 620, Test 1 multiple alarmed network circuit failures appear within the same unit type.
- In Procedure 620, Test 1, multimodule switch alarms with more than one unit type 13 (port data store) failure appear with specific fault code 70 and more than one unit type 53 (multiplexer) failure with specific fault code 611.

The steps you use to repair network failures depends on the failure pattern in the failure history. An example of a failure pattern that can affect corrective action is a failure in a port control interface (PCI or a port data interface (PDI) that causes failures on port circuits. If such failures exist, you must correct the PCI or PDI failure before you try to correct any port circuit failures.

Procedure 620, Test 4 performs a diagnostic analysis on the failing network circuit beginning at the specified circuit location. If the circuit fails, other tests may be executed by software on the circuit pack and the paths leading into the circuit pack (data I/O, maintenance interface, and so on) to determine if a failure lies inside the circuit pack or along one of the interface paths.

If the fault lies outside of the circuit pack, Test 4 continues testing until the fault is isolated. If the failure is found on a circuit pack other than the one originally specified, this circuit pack is indicated as the cause of the failure.

Procedure 620, Test 4 provides for replacement of alternate circuit packs (if any are available). Replace the alternate circuit packs in order of decreasing probability until all possibilities (maximum of three — two alternate circuit packs) are replaced or the failure is corrected.

Failure Isolation

If there is a network failure, the switch lights **NETWORK SWITCH** or **PORT** or both indicators, and the **MAJOR** or **MINOR** or both indicators on the alarm panel, or Procedure 600 references Procedure 620. Use the following steps to isolate and repair the failure.

1. Execute Procedure 620, Test 1.

   Record the equipment location of all circuits that are alarmed, the severity of the alarms, and the order in which the network unit types (functional areas) appear.

Record the unit types, equipment locations, remote status, and specific fault code of the failing network circuits.

- If only one failing circuit was recorded, go to Table 6-3, *Procedure 620 — Network Unit Types,* and select the fault isolation and repair steps to be performed.

  Table 6-3 provides the number of the unit type, its functional area, the circuit packs tested when the unit type is tested, the type of carrier that the circuit pack resides in, and the Procedure 620 subsection that contains the fault isolation and repair steps to be performed to isolate failures for the unit type.

- If more than one failing circuit was recorded, go to Step 4.

2. Analyze the failures recorded in Step 2 to determine if the failures could have been caused by a common interface failure.

   Examples of a common interface failure causing other failures is a failure in an input/output bus interface (IOBI) circuit pack affecting several PCIs, a failure in a port data store (PDS) affecting several PDIs, and so on.

   - If the analysis does not indicate a common interface failure, go to Table 6-3 and select the unit type with the most severe alarm and the lowest unit type number to begin corrective action. hen, go to step 5.
   - If the analysis indicates a common interface failure as the potential problem, go to Table 6-3 and select the unit type of the common interface to begin corrective action. Then, go to Step 5.

3. If the unit type passes, repeat Steps 1 through 4 (as appropriate) until all alarmed failures pass Procedure 620, Test 4.

When all alarmed failures recorded in test 1 pass test 4, the switch turns off **NETWORK SWITCH** or **PORT** on the common control alarm panel. The switch turns off **MAJOR** and/or **MINOR** if there is no other reason for them to be on.

TABLE 6-3 Procedure 620 — Network Unit Types

unit Type	Functional Area	Circuit Pack Tested	Type of Carrier
6	TMS, universal, or module-control channel	TN401 or TN588	Module control, TMS
7	TMS, universal, or module processor	TN380, TN381, or TN580	Module control, TMS
8	Maintenance interface	TN444	Module control
9	Module clock	TN460	Module control
10	Time slot interchanger (TSI) — ALU	TN446	Module control
11	TSI — P-store	TN445	Module control
12	I/O bus interface (IOBI)	TN400	Module control
13	Port data store (PDS)	TN440	Module control
14	Port control interface (PCI)	TN452	Port, TMS, DS-1, RMI
15	Port data interface (PDI)	TN454	Port, DS-1
16	Tone plant or universal tone source	SN250 or TN768	Port
23	TMS, universal, or network duplication channel	TN530 or TN541	Module control, TMS
24	Touch-tone sender or universal tone detector	SN252 or TN748	Port
25	Touch-tone receiver or universal tone detector	SN251 or TN748	Port
26	Network I/O	Not applicable	Module control
27	General-purpose port (GPP) or universal digital line circuit	SN270 or TN754	Port RCG

continued

TABLE 6-3. Procedure 620 — Network Unit Types *(continued)*

Unit Type	Functional Area	Circuit Packs Tested	Type of Carrier
28	72 series multifunctional electronic telephone (MFET) port or universal multibutton electronic telephone (MET) line circuit	SN224 or TN735	Port
29	Line circuit	SN228, SN229, TN742, or TN746	Port, RCG
31	Auxiliary tone plant	SN253 or TN768	Port
32	Central office (CO) trunk, hardware	SN230 or TN747	Port
33	Direct inward dialing (DID) trunk hardware	SN232 or TN753	Port
34	TIE trunk/release link trunk (RLT)/data port hardware	SN233, SN243, or TN760	Port
44	Attendant console interface	SN233	Port
45	Auxiliary trunk, hardware	SN231 or TN763	Port
46	Attendant conference	SN254	Port
50	TMS clock oscillator (TCO)	TN461	TMS
51	Local clock termination (LCT)	TN462	TMS
52	System clock synchronizer (SCS)	TN463	Module control, TMS
53	Multiplexer (MPX)	TN470	TMS
54	Fan out (FO)	TN473	TMS
55	Module interface (MI)	TN480	TMS
56	Intermodule data store (IDS)	TN441	Module control

continued

TABLE 6-3. Procedure 620 — Network Unit Types *(continued)*

Unit Type	Functional Area	Circuit Packs Tested	Type of Carrier
57	Light guide interface (LGI)	TN481	Module control
58	Fan in (FI)	UN150	TMS
59	TMS maintenance interface (TMIF)	TN482	TMS
62	Analog/digital facility test circuit (ADFTC)	SN261 or TN771B	Port
66	Tone detector 2 or universal tone detector	SN255 or TN748	Port
68	DS-1 interface	ANNll or TN767	Port, DS-1
69	Multifunctional analog terminal (MFAT) or universal line circuit	ANN17 or TN762	Port, RCG
71	Remote module interface (RMI)	TN456	RMI, module control
72	Electronic industries association (EIA) interface or universal data line circuit	SN238 or TN726	Port
74	Remote carrier group (RCG)	ANN15 and ANN16	RCG, DS-1
75	Primary rate interface (PRI) or DS-1 interface with packet adjunct circuit	ANN35 or TN767 with TN555	Port, DS-1
78	Basic rate interface (BRI)	TN556	Port
80	Universal bus interface (UBI)	UN154	Universal module control only

continued

TABLE 6-3. Procedure 620 — Network Unit Types *(continued)*

Unit Type	Functional Area	Circuit Packs Tested	Type of Carrier
83	Network processing element (NPE)	TN556, TN726, TN735, TN742, TN746, TN747, TN753, TN754, TN760, TN762, TN763, TN767, and TN768	Common port only

See the section *Multi Module Switch Alarms* for multimodule switch alarms with more than one unit type 13 (port data store) failure with specific fault code 70 and more than one unit type 53 (multiplexer) failure with specific fault code 611.

Fault Isolation and Repair Steps

Procedure 620 — Network Unit Types, is divided into eight subsections containing fault isolation and repair steps for network circuit failures.

The fault isolation and repair steps are oriented by carrier type (module control, port, and TMS), each covered in a separate subsection.

Fault isolation and repair steps for unit types 68 or 75 (DS-l or PRI), 71 (RCG), 74 (RCG), and 80 (UBI) contain their own separate subsection because of the uniqueness of the fault isolation and repair steps for these unit types.

The eight subsections that follow are:

- Module control carrier unit types
- Port carrier unit types
- TMS carrier unit types
- DS-1 interface or primary rate interface
- Remote module interface
- Remote carrier group
- Universal bus interface
- Multi-module switch alarms with more than one unit type 13 (port data store) failure with specific fault code 70 and more than one unit type 53 (multiplexer) failure with specific fault code 611.

Procedure 620 — Module-Control Carrier Unit Type 6,7,8,9,10,11,12,13, 23,26,52,66, or 57

Network Unit Types — Network-Control Carrier	
Unit Type 6 — TMS, Universal, or Module-Control Channel, **Unit Type 7 — TMS, Universal, or Module Processor,** **Unit Type 8 — Maintenance Interface,** **Unit Type 9 — Module Clock,** **Unit Type 10 — TSI — ALU,** **Unit Type 11 — TSI — PSTORE,** **Unit Type 12 — I/O Bus Interface (IOBI),** **Unit Type 13 — Port Data Store (PDS),** **Unit Type 23 — TMS, Universal, or Network Duplication Channel,** **Unit Type 26 — Network I/O,** **Unit Type 52 — System Clock Synchronizer (SCS),** **Unit Type 56 — Intermodule Data Store (IDS),** **or** **Unit Type 57 — Light Guide Interface (LGI),**	
Diagnostic and verification test	Procedure *620*, Test 4
Components tested	TN401/TN588, TN380/TN381/TN580, TN444, TN460, TN446, TN445, TN400, TN440, TN530/TN541, TN463, TN441, TN481
Related procedures	● Administration Procedure275, Word 1 to determine if the common control is duplicated. ● Procedure 611, Test 2 to test the common-control I/O or 4-MHz channels when section 88 appears. ● Procedure 621, Test 2 to soft switch if special error code 90 appears for unit type *23*.
Other tests	Time-slot interchanger (TSI) demand test when any circuit packs in unit type 8,9, 10, 11, or 13 are replaced.

Special error code 81 appears on your screen when the common control cannot communicate with a network module. The problem is somewhere above the module-control channel or in the cabling between the module-control channel and the 4-MHz channels.

Specific fault codes 400,401,402,403,404, 405, 406, 407,408,409,410,425, 426,432,433, 437,444 445,446,451, and 453 are logged in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) software program. These specific fault codes appear in Test 1 but do *not* appear when you execute the demand diagnostic test or verification test in Test 4.

If you are diagnosing specific fault codes 607,612,630, or 638 for unit type 57, service maybe interrupted for an extra six seconds when testing an unduplicated TMS, universal, or network module complex. It typically takes about three minutes to test unit type 57 (if it passes).

If you replace any circuit packs with unit types 8,9, 10, 11, or 13, go to *TSI Demand Test* before leaving the switch site.

The following repair steps cover failures with unit types 6,7,8,9,10,11, 12, 13,23,26,52,56,57.

Fault Isolation

1. *Start Procedure 620,* Test 1 and display the failure.

   Record the specific fault code.

2. start test 4.

   - If Field 10 contains a 4, go to step 4.

     If field 10 contains a 4 before you execute test 4, the circuit pack may not be plugged in or there may be a faulty ID chip on the circuit pack. In a universal module, a circuit status of 4 can also indicate that the circuit pack is in an insane state.

   - If Field 10 does not contain a 4, go to step 5.

     — If you are running test 4 remotely, go to step 5.

     — If you are running test 4 at the switch site, (or if you are in contact with maintenance personnel at the switch site), check to ensure that the circuit pack is plugged in.

     - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to step 5.

     - If the circuit pack is firmly plugged in, go to step 5.

3. Execute test 4.

4. If special error code 81 (the message transmission to the module processor failed, try again) appears on the Manager II.

   - If special error code 81 appears, go to step 7.

   - If special error code 81 is not displayed, go to step 8.

5. Repeat test 4.

   - If special error code 81 does not appear again, go to step 8.

   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing *x*.

     — If TN380, TN381, or TN580 fails, go to Step 18.

     — If TN380, TN381, or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the 4-MHz channels.

     — If TN380,381, or TN580 passes, execute test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.

6. Determine if special error code 88 (see documentation for replacement of circuit packs) appears on the Manager II.

- If special error code 88 appears, go to fault isolation and repair procedure *Special Error Code 88* for further diagnosis of the failure.
- If special error code 88 *is* not displayed, go to step *9.*

7. Look at the specific fault code appearing in Field 12.
   - If specific fault code 23 appears in Field 12, go to step 10.
   - If specific fault code 23 is not displayed in Field 12, go to step 12.
8. Use administration Procedure 250 to determine if the module/TMS processor is duplicated.
   - If it is, switch the on-line processor. Go to step 7.
   - If it is not, go to step ll.
9. Use administration Procedure 275, Word 1 to determine if the common control is duplicated (Field 10 equals 1).
   - If Field 10 does not equal 1, administer the common control. Then go back to step 1 and repeat this procedure for the same failure.
   - If Field 10 equals 1, the common control is translated as a duplicated common control. Determine if both common controls are equipped the same way.
     — If the common controls are equipped the same, escalate this failure.
     — If the common controls are not equipped the same, add the necessary equipment. Then go back to step 1 and repeat this procedure for the same failure.
10. Determine if special error code 90 (test passed, see documentation) appears on the Manager II.
    - If special error code 90 appears, go to fault isolation' and repair procedure *Special Error Code* 90 for further isolation techniques.
    - If special error code 90 is not displayed, go to step 13.
11. Determine the status of the circuit by observing the LEDs on the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

    NOTE The unit type and equipment location displayed in Fields 2-7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

    - If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 14.
    - If the circuit fails, indicated by a specific fault code appearing in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code appearing in Field 12. Then, go to step 19.
12. Look at the circuit status appearing in Field 10.
    - If Field 10 equals 4 (unable to communicate or not plugged in), the problem is a faulty ID chip on the circuit pack or the circuit pack is in an insane state. Go to step 30.
    - If Field 10 does not equal 4, go to step 15.

13. Determine if OEP specific fault code 400,401,402,403, 404,405,406,407,408, 409, 410, 425, 426,432,433,437,444, 445,446,451, or 453 was recorded in step 1 for this failure.
    - If any of these specific fault codes was recorded for this failure,go to step 16.
    - If none of these specific fault codes was recorded for this failure and the failure was alarmed in test 1 and then passes the diagnostic analysis test in Procedure 620, Test 4 run a continuous test of the circuit in Procedure 620, Test 3 to ensure that the failure is not intermittent. To do this, go to Step 27.
14. Perform a clear data, execute sequence in test 1 by typing *cdx* for the failure that displayed specific fault code 400,401,402403,404,405, 406,407,408,409,410, 425,426, 432, 433,437,444,445, 446,451, or 453.
15. Wait five minutes.
16. Execute test 1.
    - If the same specific fault code (Step 14 above) appears again for the same failure, escalate the failure.
    - If a different specific fault code appears for the same failure, go back to step 2.
    - If the same failure does not appear again, corrective action is complete for this failure.
17. At the equipment location displayed in Fields 2-6, replace the circuit pack
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed.
        — If special error code 90 (test passed, see documentation) appears on the Manager II, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.
        — If the circuit pack replaced was a unit type 8,9, 10, 11, or 13, go to fault isolation and repair procedure *TS1 Demand Test* for further isolation techniques.
        — If the circuit pack replaced was not a unit type 8,9, 10, 11, or 13 *and* special error code *90* is not displayed, corrective action for this failure is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to step 21.
19. Type nc to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step 22.
20. At the equipment location displayed in Fields 3-6, replace the alternate circuit pack.
21. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate circuit pack, the circuit pack passed.
        — If special error code 90 (test passed, see documentation) appears on the Manager II, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.

   — If the circuit pack replaced was a unit type 8,9, 10, 11, or 13, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.

   — If the circuit pack replaced was not a unit type 8,9, 10, 11, or 13 *and* special error code 90 is not displayed, corrective action for this failure is complete.

 - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to step 24.

22. Type nc to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 25.

23. At the equipment location displayed in Fields 3-6, replace the second alternate circuit pack.

24. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed.
      — If special error code 90 (test_ see documentation) appears on the Manager II go to fault isolation and repair procedure *Special Error Code* 90 for further isolation techniques.
      — If the circuit pack replaced was a unit type 8,9, 10, 11, or 13, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.
      — If the circuit pack replaced was not a unit type 8,9, 10, 11, or 13 *and* special error code 90 is not displayed, corrective action for this failure is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

25. Execute test 3 on the failure appearing in test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then type *s.*
    - If the circuit passes Test 3, repeat Test 4 on the same circuit to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, record the specific fault code appearing in Field 12. Then, go to step 28.

26. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.

27. Repeat test 3. Allow Test 3 to execute for the same period of time (or longer). Then types.
    - If the circuit passes Test 3, determine the type of circuit pack that was replaced.
      — If the circuit pack replaced was a unit type 8,9, 10, 11, or 13, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.
      — If the circuit pack replaced was not a unit type 8,9, 10, 11, or 13, repeat Test 4 to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

28. When a circuit status of 4 indicates a faulty ID chip or an insane state on the circuit pack, determine if the circuit pack was plugged in or installed in step 4.

- If the circuit pack was plugged in or installed, go to step 32.
- If the circuit pack was not plugged in or installed, go to step 31.

29. Determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go back to step 5.
    - If the circuit pack is firmly plugged in, go to step 32.
30. At the equipment location displayed in Fields 2-6, replace the circuit pack.
31. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed.
      - If the circuit pack replaced was a unit type 8,9, 10, 11, or 13, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.
      - If the circuit pack replaced was not a unit type 8, 9, 10, 11, or 13, corrective action for this failure is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Special Error Code 88

Perform the following fault isolation and repair steps if special error code 88 appears on the Manager II when you are testing unit type 6.

1. Go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the common-control channels.
   - If Test 2 passes, go to step 2.
   - If Test 2 fails, perform the corrective action listed in Procedure 611 until Test 2 passes. Then, go to step 2.
2. Execute test 4 on the same unit type 6 circuit that displayed special error code 88.
   - If Test 4 passes, you have fixed the problem for this unit type 6 circuit.
   - If Test 4 fails, check the cabling and wiring between the module-control channel and the common control. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, escalate the failure.

Special Error Code 90

Special error code 90 (test passed, see documentation) can occur when testing unit type 23 (TMS universal, or network duplication) after the diagnostic or verification test passes for unit type 23.

Special error code 90 indicates that you should perform the following diagnosis for unit type 23 to ensure that the failure has been corrected.

1. Record the TMS, universal, or network duplication channel appearing in Fields 2-7.
2. Enter Procedure 621, Test 2. Perform a soft switch of the TMS, universal, or network duplication channel displaying special error code 90.
3. Enter test 4. Enter the TMS, universal, or network duplication channel recorded in step 1 in Fields 2-7.
4. Execute test 4.
5. Determine the status of the circuit by observing the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

   NOTE The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

   - If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 6.
   - If the circuit fails, indicated by a specific fault code displayed in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 12. Then, go to step 8.
6. If special error code 90 (test passed, see documentation) appears on the Manager II, go to step 7.

   NOTE Both sides of the TMS, universal, or network duplication channel have passed and special error code 90 has appeared on the Manager II for both sides.

7. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), the problem is a faulty ID chip on the circuit pack or the circuit pack is in an insane state. Go to step 16.
   - If Field 10 does not equal 4, corrective action for this unit type 23 failure is complete.
8. At the equipment location displayed in Fields 2 through 6, replace the circuit pack.
9. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack
   - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this unit type 23 failure is complete.
   - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to step 10.
10. Type `nc` to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step1l.

11. At the equipment location displayed in Fields 2 through 6, replace the alternate circuit pack.
12. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate circuit pack, the circuit pack passed. Corrective action for this unit type 23 failure is complete.
    - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to step 13.
13. Type nc to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 14.
14. At the equipment location displayed in Fields 3 through 6, replace the second alternate circuit pack.
15. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed. Corrective action for this unit type 23 failure is complete.
    - If the red LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack failed again. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
16. When a circuit status of 4 indicates a faulty ID chip or an insane state on the circuit pack, determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack, Then, go back to step 4.
    - If the circuit pack is firmly plugged in, go to step 17.
17. At the equipment location displayed in Fields 3-6, replace the circuit pack.
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this unit type 23 failure is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed. Check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

TSI Demand Test

To run the TSI demand test, perform the following steps:

1. Enter test 2.
2. Use the change field sequence to enter unit type 99 in Field 2. You cannot select Unit type 99 by typing *nu* (next unit).

3. Execute test 2.
   - If Test 2 passes the TSI demand test, corrective action is complete.
   - If Test 2 fails the TSI demand test, go to step 4.
4. Enter Test 4 and test the following unit types in the order listed by typing *nu* (next unit) and *nc* as applicable to select the unit type and circuit pack to be tested. Perform the steps listed under *Fault Isolation* above for each unit type and circuit pack (as applicable) that fails including 11, 13 (test all PDS circuit packs 0-5),15 (test all PDI circuit packs, 0-23),9,8,10
5. When all unit types listed in step 4 pass, corrective action is complete.

Specific Fault Codes

Appendix A, *Specific Fault Code Definitions*, lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes you recorded in step 1 (Test 1), step 12 (Test 4), or step 26 (Test 3).
   - If all components have been replaced, escalate the failure.
   - If circuit pack TN402 has not been replaced, go to *Procedure 611 — Common Control I/O (Unit Type 4)*, and use Procedure 611, Test 2 to test the I/O channels.
   - If other components have not been replace, go to step 2.
2. Use test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing unit type 6 circuit as the limiting factor on the range test.

   NOTE Refer to Table 6-3, *Procedure 620 — Network Unit Types*, to determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to step 4.
   - If the range test fails, go to step 3.
3. Enter test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to step 4.
   - If Test 4 fails, repeat steps 2 and 3 until all components are replaced. If Test 4 continues to fail after all components are replaced, escalate the failure.
4. Execute test 4 on the failure you are testing.
   - If Test 4 passes, corrective action for this failure is complete.
   - If Test 4 fails, determine if any other component is to be replaced.

- — If no other component can be replaced, escalate the failure.
- — If there are other components to replace,repeat steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — Port Carrrier Unit Type 14,15,16,24,25,27,28,29,31,32,33,34,44,45, 46,62,66,69,72,78,or83

This repair strategy contains fault-isolation and repair steps for failing circuits m the following unit types:

- Unit type 14 — port control interface (PCI)
- Unit type 15 —port data interface (PDI).
- Unit type 16 — tone plant or universal tone generator
- Unit type 24 — touch-tone sender or universal tone detector
- Unit type 25 — touch-tone receiver or universal tone detector
- Unit type 27 — general purpose port (GPP) or universal digital line circuit
- Unit type 28 — 72 series multifunctional electronic telephone (MFET) port or universal multibutton electronic telephone (MET) line circuit
- Unit type 29 — line circuit
- Unit type 31 — auxiliary tone plant
- Unit type 32 - CO trunk
- Unit type 33- DID trunk
- Unit type 34 — tie trunk/release link trunk/data port
- Unit type 44 — attendant console interface
- Unit type 45 — auxiliary trunk
- Unit type 46— attendant conference
- Unit type 62 — analog/digital facility test circuit (ADFTC) or maintenance test circuit pack (MTCP).
- Unit type 66 — tone detector 2
- Unit type 69 — multifunctional analog terminal (MFAT) or universal line circuit
- Unit type 72 — Electronics Industries Association (EIA) interface or universal data line circuit
- Unit type 78 — basic rate interface (BRI)
- Unit type 83 — network processing element (NPE).

In addition to Procedure 620, you maybe required to perform one or more of the following administration and maintenance procedures when you are performing the repair steps in this procedure.

- Administration Procedure 290, Word 1 to determine if unit type 27 or unit type 72 is a line or trunk circuit.
- Procedure 611, Test 2 to the 4 MHz channels.
- Procedure 622 to verify the operation of a terminal.
- Procedure 635 to busy out or release busy a circuit pack or circuits.
- Procedure 646, Test 1 to test the failing equipment location if special error code 90 is displayed for unit type 27 or unit type 72.

When you are asked to perform administration procedures, you can refer to *DEFINITY™ Communications System Generic 2 Administration Procedures (555-104-106) as necessary* for the definition and operation of the administration procedure.

To ensure the integrity of the switch, perform fault isolation and repair procedure *TSI Demand Test* before leaving the customer's premises when you have replaced any circuit packs in unit type 15 (PDI).

Specific fault codes 408,427,429,433,436, 441,454,455,456,457, and 458 are logged in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) software program. These specific fault codes are displayed in Test 1 but are *not* displayed when the demand diagnostic test or verification test in Test 4 is executed.

Hyperactivity testing is required if specific fault code 337 (hyperactive port — receiving too many signals) is displayed in Procedure 620, Test 1 for a unit type 27, 29, 32,33, 34, 44,45, 72, or 62 failure. Perform hyperactivity testing instead of demand diagnostic testing when specific fault code 337 appears on the DEFINITY™ Manager II.

When an attendant console interface circuit (unit type 44) is the failing circuit, you must ensure that the associated headset or handset is unplugged or the circuit fails the diagnostic test.

When a one-way incoming or one-way outgoing auxiliary trunk circuit (unit type 45) is the failing circuit in a traditional module (SN231), you must ensure that the option settings are set for two-way transmission or the circuit fails the diagnostic test. There are no option switches on an auxiliary trunk circuit (TN763) in a universal module.

Before testing a traditional module auxiliary trunk circuit, perform the following:

- Remove the auxiliary trunk circuit pack (SN231).
- Check the option settings on the circuit to be tested.
  - If the auxiliary trunk circuit is a two-way transmission (option Q — switches 2 and 3 in the up position), the test can be performed.
  - If the auxiliary trunk circuit is a one-way incoming (option S — switch 2 up and switch 3 down) or a one-way outgoing (option R —switch 2 down and switch 3 up), record the switch settings. Then, set both switches (2 and 3) to the up position. The test can now be performed.
- After the test passes (corrective action taken if necessary), ensure that the switch settings are correctly positioned (recorded above) for the type of transmission required (one-way incoming or one-way outgoing) on the traditional module auxiliary trunk circuit tested.

It should be noted that when you remove port circuit packs in a common port carrier, a port board insertion test is performed by maintenance software to busy out all translated circuits on the circuit pack that you remove. This is true even if you busy out or do not busy out the circuits on the common port circuit pack you want to remove.

NOTE It may take software a while to busy out all the translated circuits on the circuit pack. The circuit status may not be in a valid state.

When you replace the circuit pack that you removed in a common port carrier, all circuits busied out are released from busy by the port board insertion test software. If you want to keep a circuit in a busy state you *must* record the circuit that you wish to keep busy and then busy out the circuit again after the circuit pack is replaced.

If a circuit pack is removed and replaced quickly enough in a common port carrier, the port board insertion software may not be able to respond quickly enough to busy out, then release busy the circuits on the common port carrier circuit pack.

You should be aware that when you replace circuit pack TN748C in a common port carrier, that slot 0 appearing on the Manager II is the service slot in the common port carrier.

Fault Isolation

1. Display the failing circuit in Procedure 620, Test 1. Record the specific fault code displayed in Field 12.
2. Enter Procedure 620, Test 4.
3. Look at the specific fault code appearing in Field 12.
   - If specific fault code 337 is displayed in Field 12, go to fault isolation and repair procedure *Hyperactivity Testing* for further isolation techniques.
   - If any other specific fault code is displayed in Field 12, go to Step 4.
4. Look at the remote status appearing in Field 8.
   - If the remote status displayedin Field 8 equals 0 (local), go to Step 5.
   - If the remote status displayed in Field 8 equals 1 (remote T1) or 2 (remote fiber), go to *Procedure 620 — Remote Carrier Group (Unit Type 74),* for further diagnosis of the failure.
5. Determine if a unit type 27 circuit is the failing circuit.
   - If a unit type 27 circuit is the failing circuit, ensure that the translated peripheral is connected. When the terminal is powered by external sources, such as commercial power, ensure that the terminal is turned on, or turn it on. Then, go to Step 6.

     NOTE Tests may fail with a specific fault code other than the expected specific fault code 351 (GPP DTL idle bit set) or specific fault code 3032 (no response from EPF restoral test) when the peripheral is disconnected or does not have power on when required.

   - If a unit type 27 circuit is not the failing circuit, go to Step 6.
6. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), go to Step 7.

     The possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 is displayed in Field 10 before Test 4 is executed. For circuit packs in a universal module, a circuit status of 4 can also indicate that the circuit pack is in an insane state.
   - If Field 10 does not equal 4, go to Step 8.

NOTE If Field 10 equals 1 (on line and in use), Test 4 cannot be performed for port circuits without busying them out. Wait until the circuit is not in use or perform tests on other alarmed circuits.

7. Determine if Test 4 is being run remotely or locally.
   - If Test 4 is being run remotely, go to Step 8.
   - If Test 4 is being run locally (or maintenance personnel are on the Customers premises), determine if the circuit pack is plugged in.
     — If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to Step 8.
     — If the circuit pack is firmly plugged in, go to Step 8.
8. Look at the circuit status appearing in Field 10.

CAUTION Busying out a port circuit results in loss of customer calls when the port circuit is in use.

   - If Field 10 equals 1, you should not busy out the port circuit because it is on line and in use. Busying out in-use port circuits and performing tests results in loss of calls or data.
   - If Field 10 equals 3 (maintenance busy), go to Step 9.
   - If Field 10 does not equal 1 or 3, and you wish to test the circuit, type *bo (busy* out). Then, go to step 9.
9. Execute Procedure 620, Test 4.
10. Determine if special error code 81 (the message transmission to the module processor failed, try again) appears on the Manager II.
   - If special error code 81 is displayed, go to Step 11.
   - If special error code 81 is not displayed, go to Step 12.
11. Repeat Procedure 620, Test 4.
   - If special error code 81 does not appear again, go to Step 12.
   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing *x* (execute).
     — If TN380, TN381, or TN580 fails, go to Step 21.
     — If TN380, TN381, or TN580 tests yield an error code 88, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the 4-MHz channels.
     — If TN380, TN381, or TN580 passes, execute Procedure 620, Test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.
12. Determine if special error code 90 (test passed, see documentation) appears on the Manager II.
   - If special error code 90 is displayed, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.

- If special error code 90 is not displayed, go to Step 13.

13. Determine if a unit type 27 circuit is being tested.
    - If a unit type 27 circuit is being tested, look at the specific fault code appearing in Field 12.
        - If specific fault code 351 or 3032 is displayed in Field 12, it is probably the result of a disconnected or powered down peripheral. Go to Step 14.
        - If specific fault code 350, 352354, or 356 is displayed in Field 12, it may be the result of excessive backplane noise coupled into the conductors to the peripheral. Go to Step 14.
        - If specific fault code 350,351,352,354, or 356 is not displayed in Field 12, go to Step 15.
    - If a unit type 27 circuit is not being tested, go to Step 15.
14. Verify that the peripheral is connected. When the terminal is powered by external sources, such as commercial power, the power to the terminal *must* be turned on.
    - If the peripheral is not connected or powered up or both when required, connect or turn on (or both) the peripheral. Then, repeat the test from Step 9.
    - If the peripheral is connected and has power on when required, go to Step 15.
15. Determine the status of the circuit by observing the LEDs on the faceplate of the circuit pack displayed in Fields 3 through 6 or by looking at Field 12.

    NOTE The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

    - If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to Step 16.
    - If the circuit fails, indicated by a specific fault code appearing in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code appearing in Field 12. Then, go to step 21.
16. Look at the circuit status appearing in Field 10.
    - If Field 10 equals 4 (unable to communicate or not plugged in), the problem is a faulty ID Chip on the circuit pack or the circuit pack is in an insane state. Go to Step 32.
    - If Field 10 does not equal 4, go to Step 17.
17. Determine if OEP specific fault code 408,427,429,433,436, 441,454,455,456,457, or 458 was recorded in Step 1 for this circuit.
    - If any of these specific fault codes was recorded for this circuit, go to Step 18.
    - If none of these specific fault codes was recorded for this circuit and the circuit was alarmed in Procedure 620, Test 1 and then passes the diagnostic analysis test in Procedure 620, Test 4 run a continuous test of the circuit in Procedure 620, Test 3 to ensure that the failure is not intermittent. To do this, go to Step 29.
18. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit that displayed specific fault code 408,427,429,433,436, 441,454,455,456,457, or 458.

19. Wait five minutes.

20. Execute Procedure 620, Test 1.
    - If the same specific fault code (Step 17 above) appears again for the same circuit, escalate this failure.
    - If a different specific fault code appears for the same circuit, go back to Step 4.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

21. At the equipment location displayed in Fields 2 through 6, replace the circuit pack.

22. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed.

      If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo (busy* out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work.

      — If special error code 90 (test passed, see documentation) appears on the Manager II, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.

      — If the circuit pack replaced was a unit type 15, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.

      If the circuit pack replaced was not a unit type 15, *and* special error code 90 is not displayed, corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to Step 23.

23. Type `nc` (next circuit) to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2 through 14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack is displayed in Fields 3 through 6 if an alternate circuit pack exists. Go to Step 24.

24. At the equipment location displayed in Fields 3 through 6, replace the alternate circuit pack.

25. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate circuit pack, the circuit pack passed.

      If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo (busy* out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work

      — If special error code 90 (test passed, see documentation) appears on the Manager II, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.

      — If the circuit pack replaced was a unit type 15, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.

      If the circuit pack replaced was not a unit type 15, and special error code 90 is not displayed, corrective action for this circuit is complete.

- If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to Step 26.

26. Type nc (next circuit) to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2 through 14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack is displayed in Fields 3 through 6 if another alternate circuit pack exists. Go to Step 27.
27. At the equipment location displayed in Fields 3 through 6, replace the second alternate circuit pack.
28. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed.

      If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo* (busy out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work.

      — If special error code 90 (test passed, see documentation) appears on the Manager II, go to fault isolation and repair procedure *Special Error Code 90* for further isolation techniques.

      — If the circuit pack replaced was a unit type 15, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.

      If the circuit pack replaced was not a unit type 15, *and* special error code 90 is not displayed, corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
29. Execute Procedure 620), Test 3 on the circuit appearing in Procedure 620, Test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then types (stop).
    - If the circuit passes Test 3, repeat Test 4 on the same circuit to turn off the **NETWORK PORT** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, record the specific fault code appearing in Field 12. Then, go to Step 30.
30. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
31. Repeat Procedure 620, Test 3. Allow Test 3 to execute for the same period of time (or longer). Then type s (stop).
    - If the circuit passes Test 3, determine the type of circuit pack that you replaced.

      — If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo* (busy out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work.

      — If you replaced a unit type 15 circuit pack, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques.

      — If you did not replace a unit type 15 circuit pack, repeat Test 4 for any other circuit pack that you replaced including SN231 or TN763 (unit type 45) to turn off the **NETWORK PORT** fault indicator, assuming that no other alarm sources are active.

- If the circuit fails Test 3, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

32. When a circuit status of 4 indicates a faulty ID chip or an insane state on the circuit pack, determine if the circuit pack was plugged in or installed in Step 7.
    - If the circuit pack was plugged in or installed, go to Step 34.
    - If the circuit pack was not plugged in or installed, go to Step 33.
33. Plug in or install the circuit pack. Then, go back to Step 8.
34. At the equipment location displayed in Fields 2 through 6, replace the circuit pack.
35. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed.
      - If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo* (busy out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work.
      - If you replaced a unit type 15 circuit pack, go to fault isolation and repair procedure *TSI Demand Test* for further isolation techniques. .
      - If you replaced any other circuit pack but a unit type 15 circuit pack including SN231 or TN763 (unit type 45), corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Check “ the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate this failure.

Special Error Code 90

Special error code 90 (test passed, see documentation) can occur when testing a trunk in unit type 27 (GPP or universal digital line circuit) or a trunk in unit type 72 (EIA interface or universal data line circuit) after the diagnostic or verification test *passes* for these unit types.

Special error code 90 indicates that you should perform further diagnosis to ensure that the failure has been corrected.

Unit Type 27 Trunk Fault Isolation

1. Execute Procedure 646, Test 1 on the equipment location appearing in Fields 3 through 7.
    - If Procedure 646, Test 1 passes, execute Procedure 620, Test 4 on the same unit type 27 circuit to resolve the cause of the alarm affecting the fault indicator.
    - If the GPP trunk or universal digital line circuit fails Procedure 646 Test 1, replace circuit pack SN270 or TN754 at the equipment location appearing in Fields 7 through 11 of Procedure 646. Then, go to Step 2.

2. Repeat Procedure 646, Test 1.
   - If Procedure 646 Test 1 passes, execute Procedure 620, Test 4 on the same unit type 27 circuit to resolve the cause of the alarm affecting the fault indicator.
   - If Procedure 646 Test 1 fails again, check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate this failure.

Unit Type 72 Trunk Fault Isolation

1. Execute Procedure 646, Test 1 on the equipment location appearing in Fields 3 through 7.
   - If Procedure 646 Test 1 passes, execute Procedure 620, Test 4 on the same unit type 72 circuit to resolve the cause of the alarm affecting the fault indicator.
   - If the EIA trunk or universal digital line circuit fails Procedure 646 Test 1, replace circuit pack SN238 or TN726 at the equipment location appearing in Fields 7 through 11 of Procedure 646. Then, go to step 2.
2. Repeat Procedure 646, Test 1.
   - If Procedure 646 Test 1 passes, execute Procedure 620, Test 4 on the same unit type 72 circuit to resolve the cause of the alarm affecting the fault indicator.
   - If Procedure 646 Test 1 fails again, check the option settings on the terminal associated with the equipment location appearing in Fields 7 through 11 of Procedure 646.
     - If the option settings are correct, escalate this failure.
     - If the option settings are not correct, set the option settings as appropriate. Then, go to Step 3.
3. Repeat Procedure 646, Test 1.
   - If Procedure 646 Test 1 passes, execute Procedure 620, Test 4 on the same unit type 72 circuit to resolve the cause of the alarm affecting the fault indicator.
   - If Procedure 646 Test 1 fails again, check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate this failure.

Hyperactivity Testing

Hyperactive signaling by any port can cause serious resource contention problems within Generic 2. If the hyperactivity is severe or continues for very long, the switch suffers a severe degradation of service.

Hyperactivity software detects, identifies, tracks, arrests the message flow, and indicts a port as being hyperactive. Once the port is considered to be hyperactive it is busied out and specific fault code 337 (hyperactive port —receiving too many signals) is logged against the port in the software error log (PMIDS). Every five minutes thereafter, the port is conditionally released busy. If the hyperactivity is no longer present at that time, the port is restored to full service and the hyperactivity alarm is resolved.

During the arrested message flow, the customer observes that his or her terminal's lamps and ringers work in the normal mode but do not respond to an off-hook or button pushes. An incoming call causes the terminal to ring and the line appearance to flash, but the incoming call cannot be answered. If the hyperactivity persists and the terminal is maintenance busied (port indicted as being hyperactive) by the hyperactivity software, the terminal set goes dark and does not respond to user actions.

The hyperactivity may be intermittent and have many causes. There is no demand test for you to perform to isolate hyperactive ports. The hyperactivity software prevents any signaling from the hyperactive port from being processed. Testing a hyperactive port using Procedure 620 demand tests (Tests 2 through 5) can lead to contradictory test results. Procedure 620, Test 1 displays specific fault code 337 (carried over from another procedure). Executing Procedure 620, Tests 2-5 (the demand tests) displays a specific fault code, indicating that the test received no signal from the device under test (the specific fault code displayed depends on the unit type being tested).

The demand tests do not run the hyperactivity software and can never report specific fault code 337 after execution. In addition, analog (non-GPP) trunks are not tested based on signals received and therefore pass the demand test even though they are hyperactive. Because some causes of hyperactivity are transitory and originate in distant end equipment, the demand test could reveal no trouble found.

The causes of hyperactivity depend on whether the circuit is assigned as a line or trunk circuit. Hyperactivity may arise from hardware failures, firmware failures, or exploratory user activity (for example, rapidly pushing buttons on the user's terminal).

Analog trunk hyperactivity can be caused by local or distant-end hardware failure, by cabling, or reversed cable pairs. The causes of line hyperactivity vary. EIA ports have been observed to generate repeated uplink messages at the rate of 40 to 60 messages per second. One person running a finger rapidly over the three appearance buttons while off hook can generate 25 uplink messages per second, which is magnified by software rebuffering to produce an apparent load of 50 messages per second.

In all cases of trunk hyperactivity, you should suspect that somewhere outside the boundaries of Generic 2 equipment apiece of test equipment is connected that is causing the circuit or span to become hyperactive. The problem may also lie in faulty hardware outside the boundaries of the Generic 2 equipment.

Use the following repair steps to eliminate hyperactive ports when specific fault code 337 is displayed in Procedure 620, Test 1 for unit type 27, unit type 29, unit type 32, unit type 33, unit type 34, unit type 44, unit type 45, unit type 62, or unit type 72.

Unit Type 27 or Unit Type 72 Hyperactivity Fault Isolation

1. Display the failing circuit in procedure 620, Test 1. Record the unit type and equipment location appearing in Fields 2 through 7.
2. Execute administration Procedure290, Word 1, entering the equipment location recorded in Step 1 (Fields 3 through 6) in Fields 2 through 5 of Procedure 290, Word 1.
3. Look at the port type appearing in Field 1.
   - If the port type is an EIA or GPP line, go to *EIA* or *GPP Line.*
   - If the port type is a GPP trunk, go to *GPP Trunk.*
   - If the port type is an EIA trunk, go to *EIA Trunk.*

EIA or GPP Line

1. Determine if the end user pushed the buttons on the terminal abnormally to reduce the possibility that the user caused the problem.
2. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
3. Wait five minutes.
4. Execute Procedure 620, Test 1.
   - If specific fault code 337 appears again for the same circuit, go to Step 5.
   - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
   - If the same circuit does not appear again, corrective action is complete for this circuit.
5. Replace the terminal connected to the GPP or EIA equipment location you recorded. Then, go to Step 6.
6. Verify correct operation of the terminal by performing a old-up test.
   - If the dial-up test passes, go to Step 7.
   - If the dial-up test fails, go to step 11.
7. Execute Procedure 622, Test 2 on the equipment location you recorded and its associated terminal replaced in step 5.
   - If Procedure 622, Test 2 passes, go to Step 8.
   - If Procedure 622, Test 2 fails after you have taken all corrective action, escalate this failure.
8. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
9. Wait five minutes.

10. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 11.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.
11. At the equipment location you recorded, replace the circuit pack. Then, go to Step 12.
12. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
13. Wait five minutes.
14. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 15.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.
15. Check the cabling between the circuit pack and the terminal with the LA85 port tester.
    - If the cabling is satisfactory, escalate this failure.
    - If the cabling is not satisfactory, repair or replace it. Then, go to Step 16.
16. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
17. Wait five minutes.
18. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, escalate this failure.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

GPP Trunk

1. Replace the data module connected to the GPP equipment location you recorded.
2. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
3. Wait five minutes.
4. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 5.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

5. At the equipment location you recorded, replace the circuit pack. Then, go to Step 6.
6. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
7. Wait five minutes.
8. Execute Procedure 620, Test 1.
   - If specific fault code 337 appears again for the same circuit, go to Step *9.*
   - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
   - If the same circuit does not appear again,k corrective action is complete for this circuit.
9. Check the point-to-point wiring and cabling from the equipment location you recorded to the distant end.
   - If the wiring and cabling are satisfactory, escalate this failure.
   - If the wiring and cabling are not satisfactory, repair or replace the wiring or cabling or both. Then, go to Step 10.
10. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
11. Wait five minutes.
12. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, escalate this failure.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

EIA Trunk

1. Disconnect the equipment from the ADU.
2. Perform a clear data, execute sequence in Procedure *620,* Test 1 by typing *cdx* for the circuit you recorded.
3. Wait five minutes.
4. Execute Procedure 620, Test 1.
   - If specific fault code 337 appears again for the same circuit, go to step 5.
   - If a different specific fault code is displayed for the same circuit, go to Step 4 Of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
   - If the same circuit does no t appear again, refer the problem to the appropriate personnelat the distant end.
5. Replace or have the ADU replaced by the appropriate personnel. Then, go to Step 6.
6. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.

7. Wait five minutes.
8. Execute Procedure 620, Test 1.
   - If specific fault code 337 appears again for the same circuit, go to Step 9.
   - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
   - If the same circuit does not appear again, corrective action is complete for this circuit.
9. At the equipment location you recorded, replace the circuit pack. Then, go to Step 10.
10. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
11. Wait five minutes.
12. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to GPP Trunk Step 9.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

Unit Type 29, 32, 33, 34, 44, 45, or 62 Hyperactivity Fault Isolation

1. Display the failing circuit in Procedure 620, Test 1. Record the unit type and equipment location appearing in Fields 2 through 7.
2. Look at the unit type appearing in Field 2.
   - If unit type 62 is displayed in Field 2, go to *ADFTC.*
   - If unit type 29 or 44 is displayed in Field 2, go to *Analog Lines or Attendant Consoles.*
   - If unit type 32, 33,34, or 45 is displayed in Field 2, go to *Trunks.*

ADFTC

1. At the equipment location you recorded, replace the circuit pack.
2. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
3. Wait five minutes.
4. Execute Procedure 620, Test 1.
   - If specific fault code 337 appears again for the same circuit, escalate this failure.
   - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
   - If the same circuit does not appear again, corrective action is complete for this circuit.

Analog Lines or Attendant Consoles

1. Enter Procedure 635, Test 1. Enter the equipment location you recorded in Fields 3 through 6 of Procedure 635, Test 1.
2. Busy out the circuit pack by typing *bo* (busy out) twice to busy out all ports on the circuit pack.

CAUTION Busying out a port circuit results in loss of customer calls when the port circuit is in use.

3. Type nc (next circuit) to display the first circuit on the circuit pack.
4. Type *rb* (release busy).
5. Wait one minute.
6. Determine the maintenance-busy status of the circuit by looking at Field 11.
   - If the circuit is still not busy, repeat Steps 3 through 6 until all circuits are released from busy.
   - If none of the circuits are automatically maintenance busied by the hyperactive software, corrective action is complete for this circuit.
   - If the circuit is automatically maintenance busied by the hyperactive software, record its equipment location (including the circuit number). hen, go to Step 7.
7. Determine if the end user has used the buttons on the terminal abnormally to minimize the possibility that the user has caused the problem.
8. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
9. Wait five minutes.
10. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 11.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit,
11. Replace the terminal connected to the equipment location you recorded Then, go to Step 12.
12. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.

13. Wait five minutes.
14. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 15.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.
15. At the equipment location you recorded, replace the circuit pack. Then, go to Step 16.
16. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you recorded.
17. Wait five minutes.
18. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 19.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.
19. Check the cabling between the circuit pack and the terminal.
    - If the cabling is satisfactory, escalate this failure.
    - If the cabling is not satisfactory, repair or replace it. Then, go to Step 20.
20. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the circuit you “ recorded.
21. Wait five minutes.
22. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, escalate this failure.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

Trunks

1. Enter Procedure 635, Test 1. Enter the equipment location you recorded (Fields 3 through 6) in Fields 3 through 6 of Procedure 635, Test 1.
2. Busy out the circuit pack by typing *bo* (busy out) twice to busy out all ports on the circuit pack.

   CAUTION Busying out a port circuit results in loss of customer calls when the port circuit is in use.

3. Type nc (next circuit) to display the first circuit on the circuit pack.
4. Type *rb* (release busy).
5. Wait one minute.
6. Determine the maintenance-busy status of the circuit by looking at Field 11.
   - If the circuit is still not busy, repeat steps 3 through 6 until all circuits are released from busy. If none of the circuits are automatically maintenance busied by the hyperactive software, escalate this failure.
   - If the circuit is automatically maintenance busied by the hyperactive software, record its equipment location (including the circuit number). Then, go to Step 7.
7. Check the point-to-point wiring and cabling from the equipment location you recorded to the distant end
   - If the wiring and cabling are satisfactory, go to Step 11.
   - If the wiring and cabling are not satisfactory, repair or replace the wiring or cabling or both. Then, go to Step 8.
8. Perform a clear data, execute sequence in procedure 620, Test 1 by typing *cdx* for the circuit you recorded
9. Wait five minutes.
10. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, go to Step 11.
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.
11. At the equipment location you recorded, replace the circuit pack. Then, go to Step 12.

    If you replaced a SN231 or TN763 auxiliary trunk (unit type 45), type *bo* (busy out). Then, type *rb* (release busy). Busying out and release busying the circuit pack ensures that all features associated with the auxiliary trunk circuit pack (for example, music on hold) will work.
12. Perform a clear data, execute sequence in Procedure *620*, Test 1 by typing *cdx* for the circuit you recorded.
13. Wait five minutes.

14. Execute Procedure 620, Test 1.
    - If specific fault code 337 appears again for the same circuit, escalate this failure or report the trouble to the far end (if appropriate).
    - If a different specific fault code is displayed for the same circuit, go to Step 4 of fault isolation and repair procedure *Fault Isolation* for further isolation techniques.
    - If the same circuit does not appear again, corrective action is complete for this circuit.

TSI Demand Test

To run the TSI demand test, perform the following steps:

1. Enter Procedure 620, Test 2.
2. Use the change field sequence to enter unit type 99 in Field 2. You cannot select Unit type 99 by typing *nu* (next unit).
3. Execute Procedure 620, Test 2.
    - If Test 2 passes the TSI demand tests, corrective action is complete.
    - If Test 2 fails the TSI demand test, go to Step 4.
4. Enter Test 4 and test the following unit types in the order listed by typing *nu* (next unit) and *nc* (next circuit) as applicable to select the unit type and circuit pack to be tested. Perform the steps listed under *Fault Isolation* above for each unit type and circuit pack (as applicable) that fails.
    - Unit type 11 — TSI PSTORE
    - Unit type 13 — PDS (test all PDS circuit packs, 0 through 5)
    - Unit type 15 — PDI (test all PDI circuit packs 0 through 23)
    - Unit type — module clock
    - Unit type 8 — maintenance interface
    - Unit type 10 — TSI ALU.
5. When all unit types listed in Step 4 pass, corrective action is complete.

Specific Fault Codes

Appendix A, *Specific Fault Code Definitions,* lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes you recorded (Test 1), Step 12 (Test 4), or Step 26 (Test 3).
    - If all components have been replaced, escalate this failure.
    - If circuit pack TN402 has not been replaced, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the I/O channels.

- If other components have not been replaced, go to Step 2.

2. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing unit type 6 circuit as the limiting factor on the range test.

NOTE Refer to Table 6-3, Procedure 620 — *Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

- If the range test passes, go to Step 4.
- If the range test fails, go to Step 3.

3. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.

- If Test 4 passes, go to Step 4.
- If Test 4 fails, repeat Steps 2 and 3 until al1 components are replaced. If Test 4 continues to fail after all components are replaced, escalate this failure.

4. Execute Procedure 620, Test 4 on the failure you are testing.

- If Test 4 passes, corrective action for this circuit is complete.
- If Test 4 fails, determine if any other component is to be replaced.
  - If no other component can be replaced, escalate this failure.
  - If there are other components to replace, repeat Steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — TMS Carrier Unit Type 50,51,53,54,55,58,or59

Network Unit Types — TMS Carrier Unit Type 50 — TMS Clock Oscillator (TCO), Unit Type 51— Local Clock Termination (ICT), Unit Type 53— Multiplexer, Unit Type 54 — Fan Out (FO), Unit Type 55 — Module Interface (MI), Unit Type 58 — Fan In (FI), or Unit Type 59 — TMS Maintenance,	
Diagnostic and verification test	Procedure 620, Test 4
Components tested	TN461, TN462, TN470, TN473, TN480, UN150, TN482

General Repair Steps

Specific fault codes 411,412,413,414,415, 416,417,418,419,420, 421,422,423,424,430, 447,449, 450,451,452, and 469 are logged in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) software program. These specific fault codes are displayed in Test 1 but are *not* displayed when the demand diagnostic test or verification test in Test 4 is executed.

Fault Isolation

1. Display the failing circuit in Procedure 620, Test 1.

   Record the specific fault code displayed in Field 12.

2. Enter test 4.
3. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), go to step 4.

     The possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 appears in Field 10 before Test 4 is executed.

   - If Field 10 does not equal 4, go to step 5.
4. Determine if Test 4 is being run remotely or locally.
   - If Test 4 is being run remotely, go to step 5.
   - If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
     — If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to step 5.

— If the circuit pack is firmly plugged in, go to step 5.

5. Execute test 4.
6. Determine if special error code 81 (the message transmission to the module processor failed, try again) appears on the DEFINITY™Manager II.
   - If special error code 81 appears, go to Step 7.
   - If special error code 81 is not displayed, go to step 8.
7. Repeat test 4.
   - If special error code 81does not appear again, go to Step 8.
   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing *x*
     - — If TN380, TN381, or TN580 fails, go to *Procedure 620 — Common-Control Carrier Unit Types,* for further fault isolation techniques on unit type 7.
     - — If TN380, TN381, or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the 4-MHz channels.
     - — If TN380,TN381, or TN580 passes, execute test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.
8. Determine the status of the circuit by checking the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

   NOTE The unit type and equipment location appearing in Fields 2-7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

   - If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 9.
   - If the circuit fails, indicated by a specific fault code displayed in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 12. Then, go to step 14.
9. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in) the problem is a faulty ID chip on the circuit pack. Go to step 30.
   - If Field 10 does not equal 4, go to step 10.
10. Determine if OEP specific fault code 411,412, 413,414,415,416,417, 418, 419,420, 421,422, 423,424,430,447,449, 450,451, 452, or 469 was recorded in step 1 for this circuit.
    - If any of these specific fault codes was recorded for this circuit, go to Step 11.
    - If none of these specific fault codes was recorded for this circuit and the circuit was alarmed in test 1 and then passes the diagnostic analysis test in test 4 run a continuous test of the circuit in test 3 to ensure that the failure is not intermittent. To do this, go to step 27.
11. Perform a clear data, execute sequence in test 1 by typing *cdx* for the circuit that displayed the specific fault code recorded in step 1.

12. Wait 5 minutes.
13. Execute test 1.
    - If the same specific fault code (Step 10 above) appears again for the same failing circuit, escalate the failure.
    - If a different specific fault code appears for the same failing circuit, go back to Step 2.
    - If the same circuit does not appear again, corrective action is complete for this type of circuit,
14. At the equipment location displayed in Fields 2-6, replace the circuit pack.
15. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. GO to Step 16.
16. Type `nc` to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. GO to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step 17.
17. At the equipment location displayed in Fields 3-6, replace the alternate circuit pack.
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate alternate pack, the circuit pack passed. Corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to step 19.
19. Type `nc` to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. GO to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 20.
20. At the equipment location displayed in Fields 3-6, replace the second alternate circuit pack
21. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed. Corrective action for this circuit is complete.
    - If the red LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack failed again. Go to step 22.
22. Determine if unit type 53 (multiplexer) is being tested.

- If unit type 53 is being tested and specific fault code 636 appears in Filed 12, go to step 23.
- If unit type 53 is not being tested or if specific fault code 636 is *not* displayed in Field 12 for unit type 53, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

23. Enter test 3.
24. At Slot 23 of the TMS carrier, replace TN530.
25. Execute test 3. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then type *s*.
    - If the multiplexer circuit passes Test 3, repeat Test 4 to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the multiplexer circuit fails Test 3, replace TN462 in Slot 11 of the TMS carrier. Then, go to Step 26.
26. Repeat test 3. Allow Test 3 to execute for the same period of time (or longer). Then, types.
    - If the multiplexer circuit passes Test 3, repeat- Test 4 to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the multiplexer circuit fails Test 3, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
27. Execute test 3 on the circuit appearing in test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then, types.
    - If the circuit passes Test 3, repeat Test 4 to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, record the specific fault code displayed in Field 12. Then, go to step 28.
28. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
29. Repeat test 3. Allow Test 3 to execute for the same period of time (or longer). Then, types.
    - If the circuit passes Test 3 (indicated by a 0 displayed in Field 14), repeat Test 4 to turn off the **NETWORK SWITCH** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
30. When a circuit status of 4 indicates a faulty ID chip on the circuit pack, determine if the circuit pack was plugged in or installed in step 4.
    - If the circuit pack was plugged in or installed, to step 32.
    - If the circuit pack was not plugged in or installed, go to step 31.
31. Determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. then, go back to step 5.
    - If the circuit pack is firmly plugged in, go to step 32.
32. At the equipment location displayed in Fields 2-6, replace the circuit pack.
33. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.

- If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this circuit is complete.
- If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed. Check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Specific Fault Codes

Appendix A, *Specific Fault Code Definitions,* lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes you recorded in step 1 (Test 1) and step 8 (Test 4) or step 27 (Test 3).
   - If all components have been replaced, escalate the failure.
   - If all components have not been replaced, go to step 2.
2. Use test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing circuit as the limiting factor on the range test.

   NOTE: Refer to Table 6-3, *Procedure 620 — Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to step 4.
   - If the range test fails, go to step 3.
3. Enter test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to step 4.
   - If test 4 fails, repeat steps 2 and 3 until all components are replaced. If Test 4 continues to fail, escalate the failure.
4. Execute test 4 on the failing circuit.
   - If Test 4 passes, corrective action for this circuit is complete.
   - If Test 4 fails, determine if any other component is to be replaced.
     — If no other component can be replaced, escalate the failure.
     — If there are other components to replace, repeat steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — DS-1 Interface (Unit Type 66) or PRI (Unit Type 75)

Network Unit Types, Unit Type 68 — DS-1 Interface, or Unit Type 75 — Primary Rate Interface (PRI) or DS-1 Interface with Packet Adjunct

- Diagnostic and verification tests
  - Procedure 620, Test 2 and Test 4
- Components tested
  - ANNll
  - TN767
  - ANN35
  - TN555
  - TN763
- Related procedures
  - Administration Procedure 107 to check the thresholds that are set.
  - Administration Procedure 178, Word 1 to find the trunk group number and member number for the equipment location of the facility in question.
  - Administration Procedure 260, Word 1 to:
    - Administer internal and external loopback
    - Check the facility in question to determine if it is administered as a synchronization reference source
    - Administer a reference
    - Change the equalization options for the TN circuit packs.
  - Procedure 600,620,625,627, and 648 to determine if a common cause exists for excessive switchovers.
  - Procedure 600, Test 3 to determine if the problem has occurred many times.
  - Procedure 618, Test 1 to determine if an external equipment alarm associated with the DS-1, or PRI exists, or if there is an alarm in the external synchronization hardware.
  - Procedure 620 to busy out or release busy the DS-1 or PRI circuit packs.
  - Procedure 620, Test 2 to perform a range test on unit type 68 (DS-l) and unit type 75 (PRI) to determine if other DS-1 or PRI facilities are experiencing troubles.
  - Procedure 620, Test 4 to test the DS-1 or PRI circuit pack and associated facilities.
  - Procedure 621, Test 2 to soft switch the time multiplexed switch (TMS) and the network module-control complex.
  - Procedure 625, Test 1 to determine the health status of the DS-1, PRI, or clock reference and to determine if the DS-1 or PRI circuit pack passes or fails by observing the performance measurements.

— Procedure 625, Test 2 to select another facility as a synchronization reference or to determine if the facility is the on-line reference or to determine that a reference is on line.

— Procedure 627, Test 1 to examine D channel switchover history.

— Procedure 628, Test 2 to test the LAN bus.

— Procedure 635 or Procedure 648 to determine the maintenance busy status of integrated services digital network (ISDN) trunks and to busy out or release from busy the DS-1 or PRI trunks.

— Procedure 642 to perform a terminal-to-trunk test call.

— Procedure 647, Test 2 to perform an automatic transmission measurement system (ATMS) supervision test call.

— Procedure 648 Tests 2 and 3 to determine if layer 2 and layer 3 ISDN communications exist.

- Other tests

— A trunk verification voice terminal (TVVT) call using the DS-1 or PRI to verify that the DS-1 or PRI facility is functioning.

— Hyperactivity testing if specific fault code 337 appears for unit type 68 in Procedure 620, Test 1.

— LAN bus testing for unit type 75 in Procedure 628, Test 2.

General Repair Steps

The starting point for investigating DS-1 or PRI alarms and problems is presented in the section *DS-1 or PRI Alarm Investigation*.

This repair strategy assumes that system technicians are diligent about following the repair process, being particularly careful in checking for items like cables being terminated on the correct backplane pins, backplane pins are not bent, and so on.

System level fault isolation for DS-1 (unit type 68) or PRI (unit type 75) alarmed failures is defined as the isolation of faults among the various subsystems:

- Generic 2 DS-1 or PRI circuit packs
- Channel division multiplexer (CDM)
- Channel expansion multiplexer (CEM)
- Network channel terminating equipment (NCTE)
- Digital access and cross-connect systems (DACS)
- ACCULINK ™ multiplexer
- Other associated equipment (for example, on-site wiring, carrier span line equipment, digital microwave radio equipment, and any special service equipment).

For a more detailed explanation of how DS-1 and to some degree PRI applies to Generic 2, refer to document *DEFINITY™ Communications System Generic 1 and Generic 2 DS-1/DMI/ISDN-PRI Interface* (555-025-101).

Fault isolation is based on using the maintenance procedures to determine

- The condition that existed when a problem was last observed on the alarmed facility
- The present status of the facility
- The location, on-site or off-site, of existing problems and the equipment in trouble
- The need for an in-depth analysis at the time of the alarm investigation.

In isolating DS-1 or PRI alarmed failures, start by checking the current health and status of the circuit in question by using Procedure 625, Test 1.

Before testing DS-1 or PRI circuits, you *must* make a test call to determine the present service-supporting ability of the DS-1 or PRI circuit. The test call can be an ATMS supervision callusing Procedure 647, a trunk verification by voice terminal (TVVT) call, anon destructive ISDN facility test using Procedure 648, a terminal-to-trunk test call using Procedure 642, or any other calls that you are certain will, if they successfully complete, ensure that the facility presently supports service. If the call completes and is of acceptable quality or if the ISDN test passes, then you should defer additional maintenance (clearing of the alarmed failure) until after hours when destructive testing is acceptable to the customer.

The result of the test call attempt and the Procedure 625 status determines what, if any, action you are to perform.

When using Procedure 620 to test a DS-1 or PRI alarmed failure, be aware that:

- Procedure 620, Tests 2 and 3 are non destructive and provide the same testing capability as scheduled tasks.
- Procedure 620, Tests 4 and 5 are destructive tests that start by checking for the presence of transmission facility faults. If faults are found, they are stored until the interface is checked.
- Test 4 shows facility faults only when no other failure is found on the circuit pack

You should not use Procedure 620, Test 4 and Test 5 to check the status of the circuit pack. Tests 4 and 5 are destructive tests (service affecting to all 24 channels on the circuit pack) and you should only use them when the facility is unavailable for service or during out of hours.

When DS-1 and PRI circuit packs fail, specific fault codes (SFCs) are logged against the interface or facility. Interface SFCs are logged against the circuit pack and facility SFCs are logged against the network (link). It maybe helpful to you to refer to Appendix A, *Specific Fault Codes*, as you investigate problems.

Before performing tests that require external looparound, busy out the DS-1 or PRI trunks. After removing the looparound, release the DS-1 or PRI trunks from busy out to restore service to the DS-1 or PRI facility.

You can use Procedure 635 or Procedure 648 to ensure that ISDN trunks are busied out or released from busy by checking the circuit status of the ISDN trunks. The circuit status of the ISDN trunks is independent of the busy out status and/or the busy out indication on the DEFINITY™ Manager II.

To isolate a DS-1 or PRI alarmed failure or problem, begin by performing the following steps.

1. Enter Procedure 620, Test 1.
2. Display the original DS-1 or PRI failure.

Record the unit type, equipment location and SFC.

3. Go to the section, *DS-1 or PRI Alarm Investigation*, to investigate the alarmed failure or problem.

DS-1 or PRI Alarm Investigation

Figure 6-2, *Processing of DS-1 or PRI Alarms*, is a guide to investigating DS-1 or PRI alarms. Use this section and these figures when investigating a DS-1 or PRI alarm, when investigating chronic nonalarmed DS-1 or PRI problems, or to verify that no problems remain after a repair action is taken. The flowchart blocks include the text step number that further describes the actions that you need to perform to isolate the trouble.

With the exception of some of the noted alternative options in Step 3 and circuit pack replacement in step 13, you can perform all these steps remotely. Note that many text step numbers cover more than one box in the flowchart

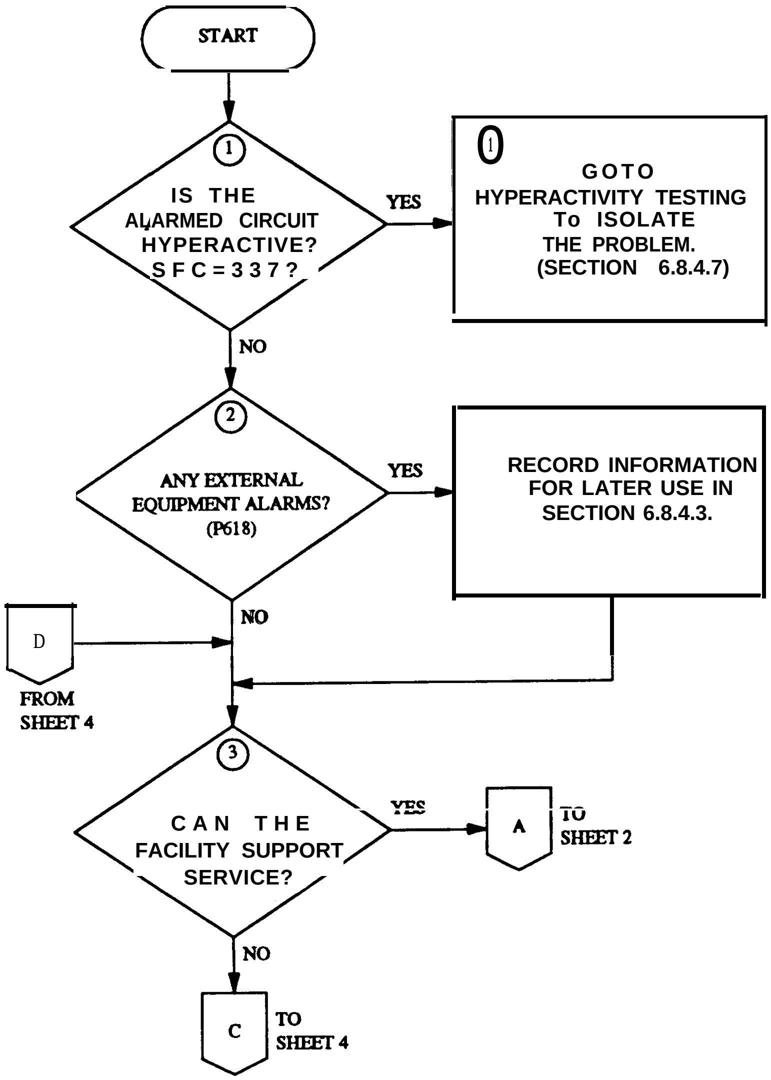


Figure 6-2. Processing of DS-1 or PRI Alarms

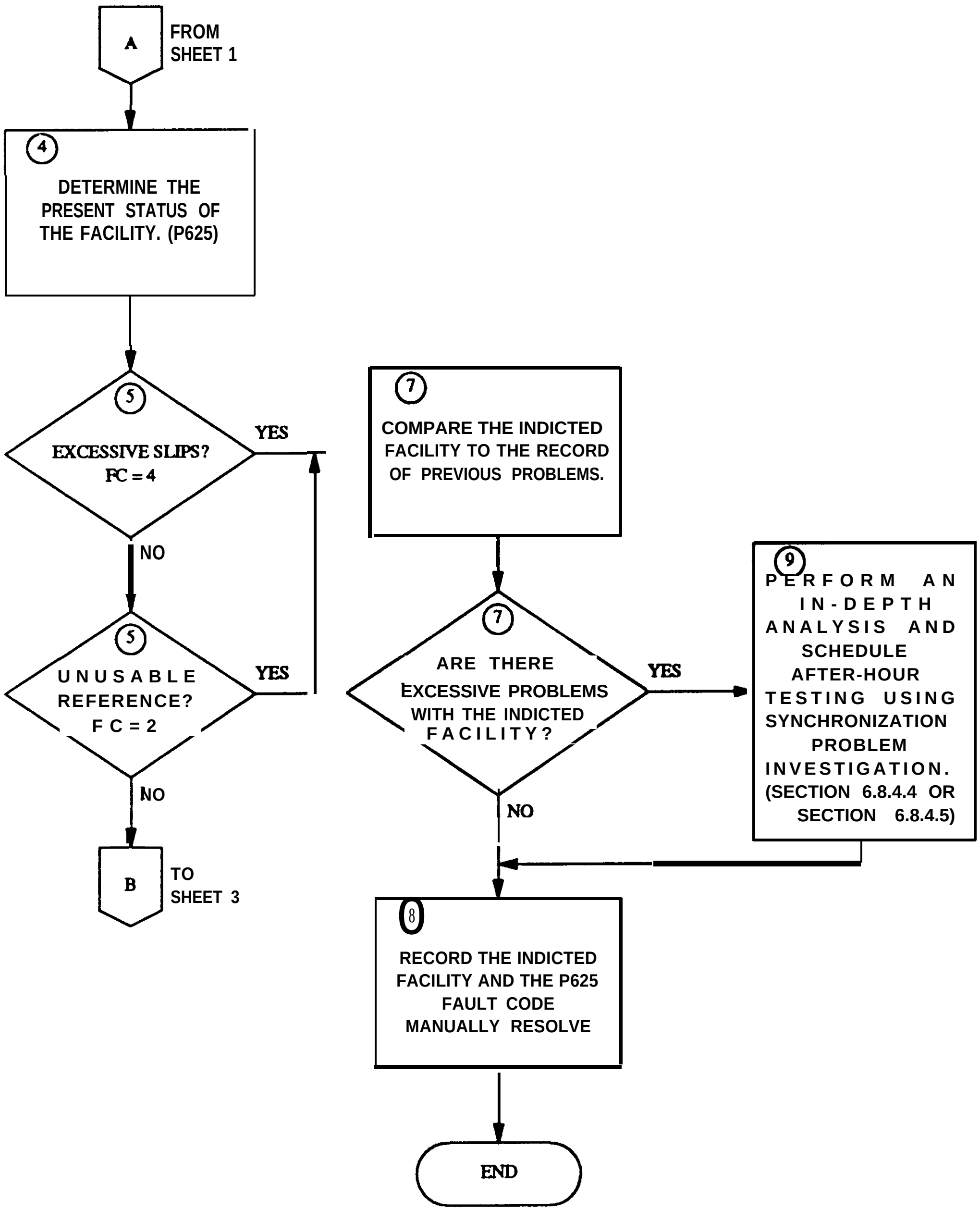


Figure 6-2. Processing of DS-1 or PRI Alarms

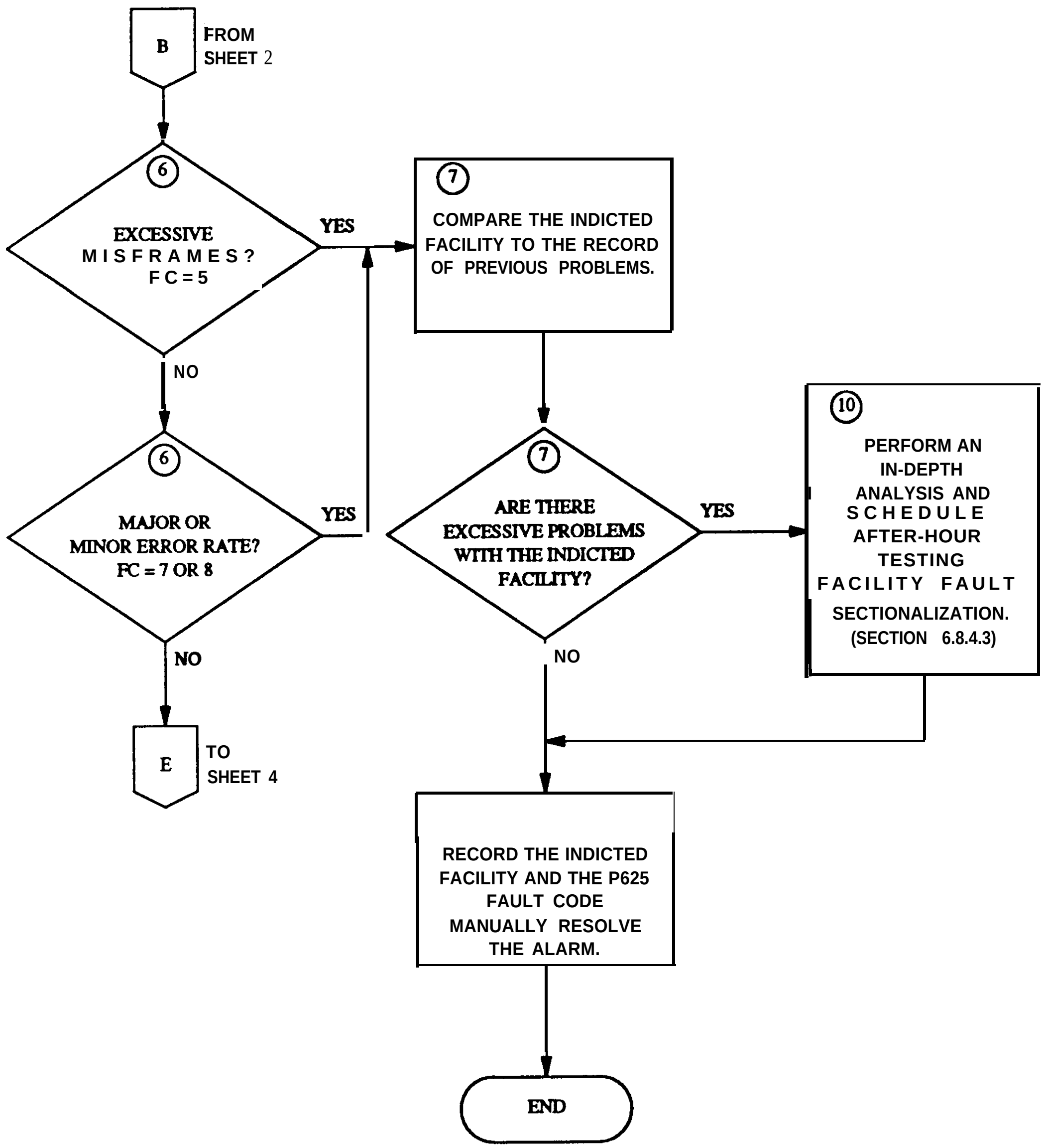


Figure 6-2. Processing of DS-1 or PRI Alarms

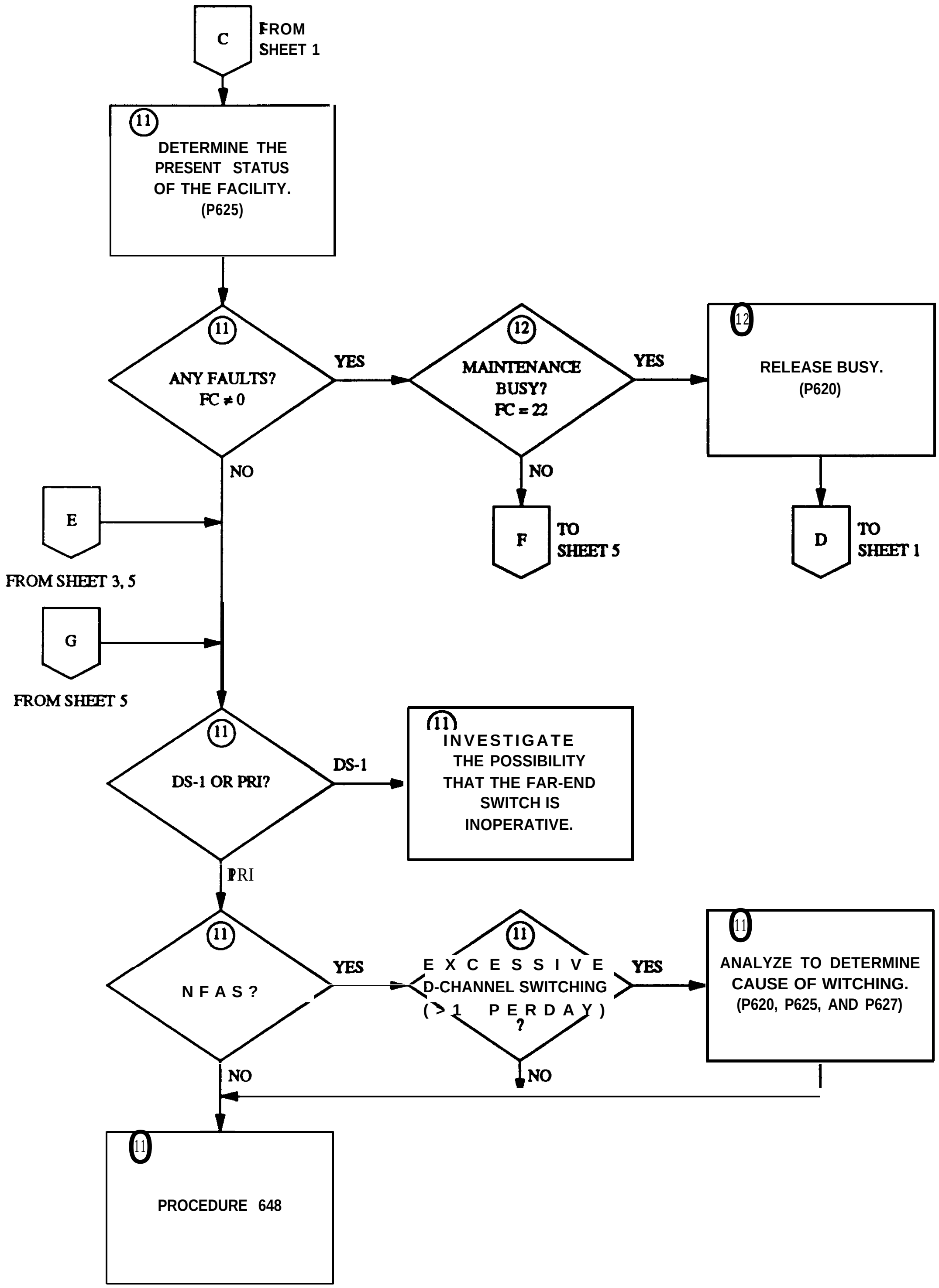


Figure 6-2. Processing of DS-1 or PRI Alarms

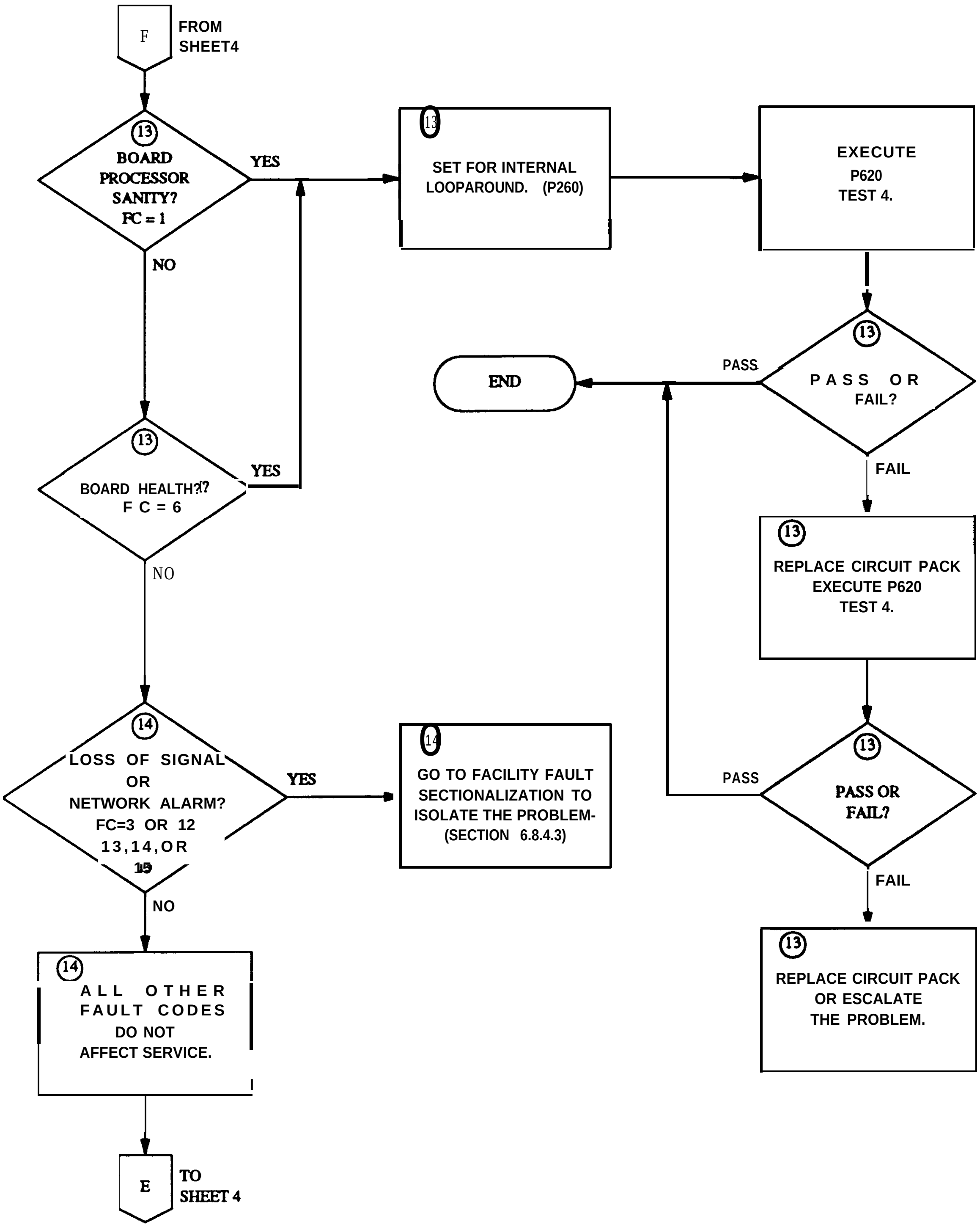


Figure 6-2. Processing of DS-1 or PRI Alarms

1. Is the alarmed circuit hyperactive?

   The condition that was last observed by periodic maintenance on the alarmed facility is determined by the display of SFC information using test 1. If the problem is hyperactivity — that is if SFC 337 (hyperactive port — receiving too many signals) is recoded in section 6.8.4.1, General, for unit type 68 — use the hyperactivity trouble processing in the section *Hyperactivity Testing* to isolate the problem.

   Hyperactivity testing is performed instead of the demand diagnostic test when SFC 337 appears.

2. Any external equipment alarms?

   Use Procedure 618, Test 1 to determine the existence of external equipment alarms. Record the alarm information for later use in the section *Facility Fault Sectionalization,* to:

   - Perform on-site fault isolation
   - Support an in-depth analysis after you have determined the facility can support service.

3. Can the facility support service?

   Determine whether the facility can support service by performing one of a number of fictional tests. The following lists some of the possible functional tests that you can use to determine if the facility can support service. Administration procedures maybe needed to support the functional tests discussed here.

   To find the trunk group number and member number needed in the following tests, use administration procedure 178, Word 1 and enter the equipment location recorded in step 3 of the section *General*, in Fields 7-11. Perform a display, execute sequence to display the trunk group number in Field 1, the dial access code in Fields 2-5, and the member number in Field 6 for the equipment location you entered.

   - TVVT — For this method, specify the trunk group and member over which the call is to be placed and a terminating number and then use the TVVT feature to force the call to use the facility in question.

     If the call completes to the specified terminating number and the quality of the transmission is acceptable, the facility supports service.

     This method is limited to circumstances where access to a system line is provided and is therefore usually not appropriate for use from remote maintenance centers.

   - Procedure (647 Test 2 — For this method, specify the trunk group and member in Fields 2 and 3 or the equipment location (recorded in step 3 of the section, *General)* in Fields 4-8 and execute Procedure 647, Test 2 to force the call to use the facility in question. If the facility supports service, Field 12 (fault code) of Procedure 647 displays either a 0 or 11-63.

     — If Field 12 displays a 0, all the tests pass and the facility unquestionably supports service.

     — If Field 12 displays 11-63, one or mom of the transmission thresholds are not met. Determine the difference between the thresholds and the measured values by examining the thresholds set in administration Procedure 107, Word 2 and the measured values displayed in Procedure 647, Test 2.

     The ability to provide service exists if the differences are small (that is, one to two dB of loss). The ability to provide service does not exist if the measured values are excessive (that is, 20 dB of loss).

If the ability to provide service is not obvious from the measured values, either use another technique or refer to your local records for expected transmission performance values.

- Procedure 648, For this method, specify the trunk group and member in Fields 2 and 3 and execute Procedure 648, Test 3 to force the call to use the facility in question.
  - If Field 14 (fault code) equals 0, the facility unquestionably supports service.
  - If Field 14 equals 7,26, or 27, the facility does not support service.
  - If Field 14 equals 18, the facility may support service: the far-end terminating test line (TTL) could be inoperative or the facility does not support service. Determine if the TTL is operative or attempt to verify service by trying another type of test call.
  - If Field 14 equals 31 or 32, the bit or block error rates exceed the threshold. The ability to provide service does not exist if the error rates are abnormally high (that is bit error rates of one in 1000 or block error rates of one in 100 in error).
  - If any other fault codes are displayed in Field 14, attempt to verify service by trying another type of test call.
- Procedure 642 — For this method, you can specify a combination of parameters, such as the dial access code in Fields 12-15, the trunk group in Field 16, or the equipment location (recorded in step 3 of the section, *General)* in Fields 7-10. Execute Procedure 642 to force the call to use the facility in question.

  If the call completes to the dialed terminating number, the facility supports service.

  This method is limited to circumstances where access to a system line is provided.

If the facility can support service,further testing during busy hours is not recommended for two reasons

- The problem that caused the alarm may have been corrected and any further action is not productive
- Further investigation at this time may disrupt service.

4. Determine the present status of the facility.

   Execute Procedure 625, Test 1 to determine the status of the facility.

5. Excessive slips or unusable reference.

   Fault codes 2 or 4 indicate a problem with the synchronization arrangement.

6. Excessive misframes, major error rates, or minor error rates.

   Fault codes 5,7, or 8 indicate problems detected in processing the incoming DS-1 or PRI signal. These problems affect data services and may, depending on the severity, be noticeable on voice facilities. If the problems indicated by these fault codes worsen, the ability to provide service is lost and network alarms are experienced. Customers using the facility for data calls experience errors if a higher level protocol does not protect the data. The causes of the problem may include noise and crosstalk.

7. Compare the indicted facility to records and determine if there are excessive problems.

   There are a few sources of system records that you should examine to determine if the problem has occurred many times. The most reliable, but not necessarily the most complete source is the information displayed in Procedure 600, Test 3 (resolved alarms). Other sources of information are system technician records, initialization and administration system (INADS) records, and customer records.

NOTE Resolved alarms must not be cleared regularly (that is, daily) if the information is to be kept complete. Therefore, limit the use of Procedure 612, init 99, to perform a clear data, execute sequence. Also limit the use of Procedure 600, Test 3 (resolved alarms) to perform a clear data, execute sequence for unit types 68 or 75.

8. Record the indicted facility and manually resolve the alarm.

   If the records indicate that the problem is an isolated incident, the only action needed in addition to manually clearing the slam, is to update records. Update the trouble logs kept for the site, INADS trouble tickets, or customer-kept logs m accordance with standard practices. Information that you can obtain from the switch may be needed to properly update these records. Record the following information where updating records:

   - The SFCs for the alarmed facility
   - The present status of the facility, the Procedure 625 fault codes and the results of the tests used to determine the ability to provide service.

9. Perform an in-depth analysis (excessive slips or unusable references).

   If the records indicate that the facility with excessive slips or unusable references has been the source of numerous alarms or the alarm comes back after it is manually resolved, perform an in-depth analysis consisting of a review of all the data available. The results of your review may lead to further tests such as Procedure 620 Test 4, that you should schedule for after hours because they can disrupt service.

   Use the appropriate synchronization problem investigation presented in Figure 6-5, SCS Synchronization Problem Investigation, or presented in Figure 6-7, *External Stratum 3 Hardware Synchronization Problem Investigation* to determine the cause of the problem. Synchronization problem investigation uses administration and maintenance procedures to answer questions that indicate the repair action for you to take.

10. Perform an in-depth analysis (excessive misframes, major error rates, or minor error rates).

    If the records indicate that the facility with excessive misframes, major error rates, or minor error rates has been the source of numerous alarms or the alarm comes back after it is manually resolved, perform an in-depth analysis consisting of a review of all the data available. The results of your review may lead to further tests such as Procedure 620 Test 4, that you should schedule for after hours because they can disrupt service.

    Use the facility fault sectionalization presented in Figure 6-4, *Facility Fault Sectionalization,* to sectionalize the problem between on-site and off-site equipment In addition, use the section *Facility Fault Sectionalization* to isolate the problem among the on-site equipment.

    The facility fault sectionalization procedure determines the ability to operate with few or no errors at on-site access points where the DS-1 signal is looped around The performance measurements displayed in Procedure 625 are used as the pass or fail indication in the procedure for determining if the excessive misframes, major error rates, or minor error rates still exists.

11. Determine the present status of the facility — service is not supported.

    If service is not supported, immediate repair action is required. Execute Procedure 625, Test 1 to determine the status of the facility. If there are no faults (Field 10 equals 0), the problem is not a hardware problem with the DS-1 or PRI. The problem is the inability of the far-end switch to respond.

a For DS-1, determine the status of the far-end switch by contacting the responsible maintenance organizations for both the switch and any intervening transmission equipment.

b. For PRI, there are two cases to consider — non-facility associated signaling (NFAS) and non-NFAS.

- If NFAS is *not* provided, go to *Procedure 648 — ISDN Error Processing (Unit Type 76),* and use Procedure 648, Test 2 and Test 3 to investigate the problem.
- If NFAS is provided, you must determine if D channel switchovers are the cause of the problem. Note that more than one D channel switchover per day is excessive.

  Procedure 627 provides the display of switchover history. Examine data for the facility in question by using Procedures 600,620,625,627, and 648 to determine if the excessive switchovers have a common cause. That is— are most of the switchovers associated with demand requests, or are most of the switchovers associated with network alarms?

  — If the common cause is a demand request, try to find out the motivation for the requests. Then, inform those responsible for the demand requests of the potential loss of messages related to the switchover.

  — If the common cause is *not* demand request switchovers, that is — they are network alarms or switch related problems like unit type 81 bus errors, investigate the problem by using the appropriate repair strategy section associated with the network alarm or switch related problem.

  — If you cannot find a common cause, use Procedure 648 to investigate the problem.

Procedure 648, Tests 2 and 3 allow you to determine the layers of the protocol that can be established and guides you to the appropriate repair action.

12. Maintenance busy status.

The facility may be in a maintenance busy state for a number of reasons. After you have determined that it is no longer necessary to keep the facility from providing service (that is, because the installation or repair of associatedequipment is not complete), release the DS-1 or PRI facility from maintenance busy by using Procedure 620.

When you use Procedure 620 to release a busied out DS-1 or PRI facility, all circuits on the DS-1 or PRI circuit pack are released from busy.

- Releasing ISDN trunks (PRI circuit pack ANN35 or the combination of circuit packs TN555 and TN767) requires both switches (local and far end) to agree on releasing the ISDN trunks from busy out. If the far end does not agree, the ISDN trunks stay in T_Limbo (trunk is in a limbo state). If the far-end switch has the ISDN trunks in a maintenance busy state the ISDN trunks return to a busy out state at the far end, even though you type *rb* at the local switch.
- You can use Procedure 635 or Procedure 648 to ensure that the ISDN trunks are released from busy by checking the circuit status of the ISDN trunks. The circuit status of the ISDN trunks is independent of the busy out status or the busy out indication on the Manager II.

After you have removed the facility from maintenance busy, go back to step 3 and determine if the facility can support service.

13. Board processor sanity or board health status.

The board processor sanity and board health fault codes (1 and 6) indicate problems with the DS-1 or PRI circuit pack.

Use Procedure 260, Word 1 to set the DS-1 or PRI circuit pack for internal looparound (Field 11 equals o).

Execute test 4. If the test fails, replace the DS-1 or PRI circuit pack and repeat the test. If the test still fails, escalate the problem.

Inmost cases, replacing the circuit pack clears the problem. After the test passes, go back to step 3 and determine if the facility can support service.

14. Loss of signal or network alarm.

A loss of signal or network alarm exists when the following fault codes are observed in Procedure 625 Test 1:

- Fault code 3 — loss of signal
- Fault code 12 — local multiframe alarm (LMA)
- Fault code 13 — remote multiframe alarm (RMA)
- Fault code - red alarm
- Fault code 15 — yellow alarm.
- Fault code- blue alarm.

If you observe one of these fault codes, the service providing the signal between the DS-1 or PRI circuit pack and the other end of the facility has been absent in one or both directions for at least seven minutes.

Use the facility fault sectionalization presented in Figure 6-4, *Facility Fault Sectionalization* to sectionalize the problem between the on-site and off-site equipment. In addition, use the section *Facility Fault Sectionalization* to isolate the problem among the on-site equipment.

The facility fault sectionalization determines the facility's integrity to the on-site access points where the DS-1 signal is looped around. test 4 provides the pass or fail indication in the facility fault sectionalization for a loss of signal or network alarm fault code.

6.13.6.2 *Facility Fault Sectionalization*

DS-1 or PRI facility fault sectionalization is a general technique that involves looping around the DS-1 or PRI signal at on-site access points to determine if the problem is located in the equipment and wiring to the point of the looparound (through which the signal passes) or if the problem is in the equipment and wiring beyond the location of the looparound.

CAUTION

When you use the facility fault sectionalization technique, service is disrupted. When you perform looparound on a facility, the facility *must* not be the active synchronization reference or a system outage occurs.

In general, use this technique when it is referenced by other sections in this repair strategy.

The technique is applicable for a variety of DS-1 problems including those where service cannot be provided (one example is fault code 14 (red alarm) displayed in Field 10 of Procedure 625, Test 1) and those where service is degraded (examples are fault codes 7-11 (excessive errors) displayed in Field 10 of Procedure 625, Test 1).

When you apply this technique for problem investigation on facilities with multiplex or DACS equipment, the technique becomes cumbersome because all the 64 Kbps (B-channels) or subrate channels corresponding to the DS-1 facility need to be looped around.

Figure 6-3, *Providing Looparound to Support Facility Fault Sectionalization,* shows a number of units (1-n) that maybe connected as the on-site equipment. One typical example is the case where unit #1 is a channel terminating equipment and no other units are on-site. A more complex, less typical example might have unit #1 as a DACS, unit #2 as a protection switch, and unit #3 as a DS-1 level microwave radio system.

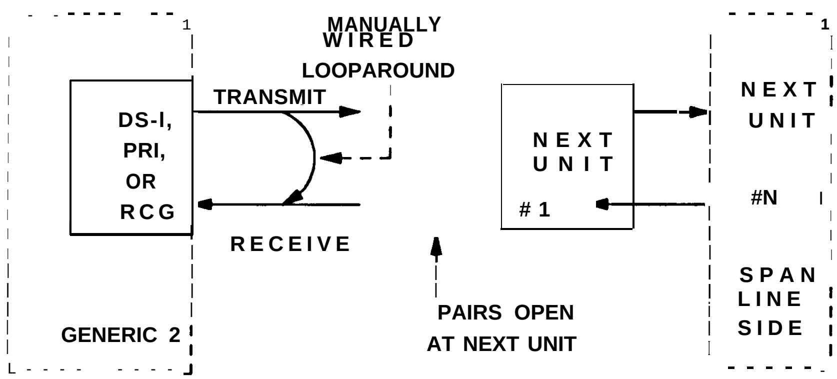


Figure 6-3. Providing Looparound to Support Facility Fault Sectionalization

Figure 6-4, Facility Fault Sectionalization, gives an overview of the facility fault sectionalization technique. It is important that you know the configuration and the wiring of the equipment for the facility with a problem in order to support the technique that is provided.

Since the technique is time consuming, first investigate the external equipment alarms generated by the equipment that is associated with the facility. The flowchart blocks include the text step number that further describes the actions that you need to perform to isolate the trouble. Note that many text step numbers cover more than one box in the flowchart Most of the steps that are listed hem require on-site actions to clear troubles. The remote access capabilities of some of the external equipment may allow you to perform diagnostics before dispatch.

1. Any external equipment alarms associated with the facility?

   The information you recorded in step 2 of the section *DS-1 or PRI Alarm Investigation,* identifies the external equipment (if any) initially suspected of failing. If no external equipment was recorded at the time the DS-1 or PRI problem was initially investigated, execute Procedure 618 to determine if any external equipment associated with the facility in question is now alarmed.

   - If no external equipment alarm was recorded in step 2 of the section *DS-1 or PRI Alarm Investigation* and no external equipment is now alarmed, go to step 2.
   - If an external equipment alarm was recorded in step 2, or one now exists, investigate the external equipment alarm associated with the facility in question by following the instructions in the respective service manual.
     - — If you can determine that the external equipment alarm is not causal by external equipment hardware but originate outside the external equipment unit (that is, facility alarm), go to Step 2.
     - — If the alarm is caused by external equipment hardware problems, do not continue until you have fixed the external equipment hardware trouble. Escalate the problem if you cannot fix the external equipment hardware trouble.

2. Administer the facility for external looparound and busy out DS-1 or PRI trunks.

   If the facility you are testing is an on-line reference, you *must* use Procedure 625, Test 2 or Procedure 260, Word 1 (Fields 1-4 equal the equipment location and Field 13 equals 1) to select another facility as a reference before you place the facility to be tested in looparound.

   Use Procedure 260, Word 1 (Field 11 equals 1) to administer the switch facility for external looparound. Then, use Procedure 620 to busy out the DS-1 or PRI trunks.

   When you use Procedure 620 to busy out a DS-1 or PRI trunk, all circuits on the circuit pack are busied out atone time.

   - Busy out of an ISDN trunk (PRI circuit pack ANN35 or the combination of circuit packs TN555 and TN767) takes a short period of time for the last few ISDN trunks to be made busied at the far end. (Busying out an ISDN circuit pack busies out more than one ISDN trunk).
   - Typing `bo` does not mean that both sides of the ISDN trunks are busied out. You can use Procedure 635 or Procedure 648 to ensure that ISDN trunks are busied out by checking the circuit status of the ISDN trunks. The circuit status of the ISDN trunks is independent of the busy out status indication on the Manager II.

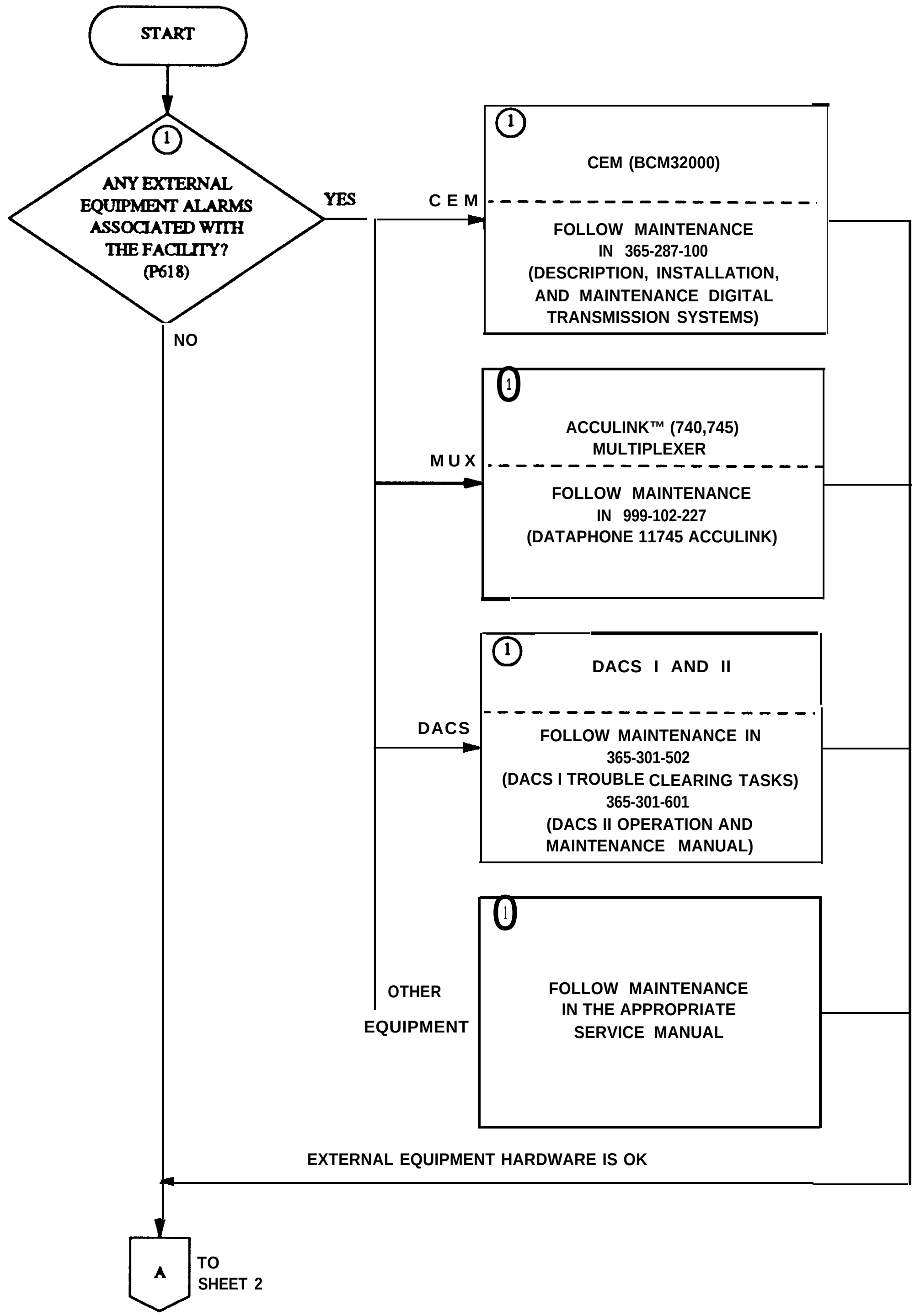
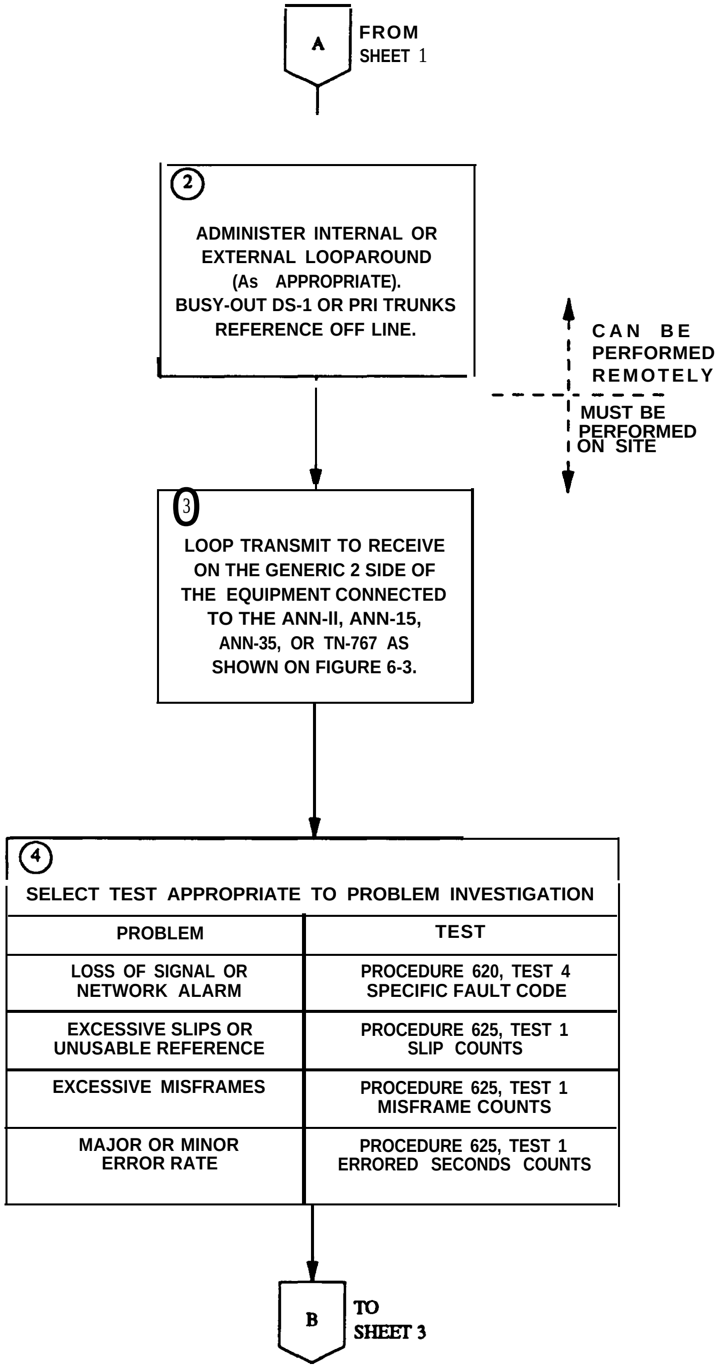


Figure 6-4. Facility Fault Sectionalization



PROBLEM	TEST
LOSS OF SIGNAL OR NETWORK ALARM	PROCEDURE 620, TEST 4 SPECIFIC FAULT CODE
EXCESSIVE SLIPS OR UNUSABLE REFERENCE	PROCEDURE 625, TEST 1 SLIP COUNTS
EXCESSIVE MISFRAMES	PROCEDURE 625, TEST 1 MISFRAME COUNTS
MAJOR OR MINOR ERROR RATE	PROCEDURE 625, TEST 1 ERRORED SECONDS COUNTS

Figure 6-4. Facility Fault Sectionalization

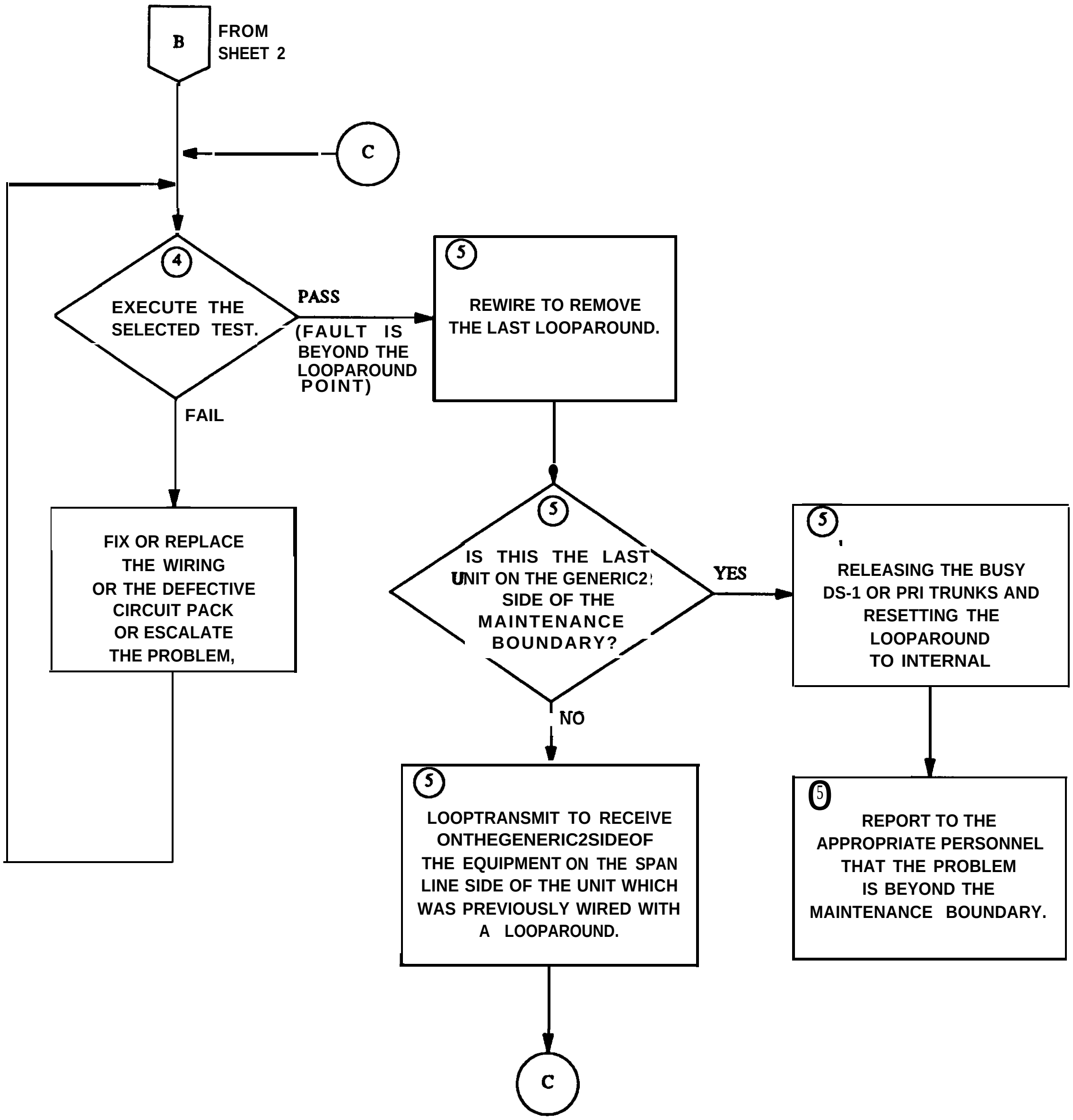


Figure 6-4. Facility Fault Sectionalization

In cases where DS-1 trunks are provided-units that do not automatically signal the far end that a trunk is being removed from service (that is, trunk conditioning is provided toward the far end, a network alarm is given to the far end), ask the far end to busy out the trunks.

3. Loop transmit to receive on the Generic 2 side.

   As illustrated in Figure 6-3, *Providing Looparound to Support Facility Fault Sectionalization*, remove the transmit signal from the DS-1 or PRI circuit pack inputs and outputs and loop it around to the receive signal going toward the DS-1 or PRI circuit pack at the first unit wired to the DS-1 or PRI circuit pack.

   The looparound signal may take different forms depending on the installation.

   - In some cases, the unit connected to the Generic 2 may provide a switch or a terminal interface to control the desired looparound. Make sure that the signal is looped toward the Generic 2.
   - In most cases, it may be necessary to temporarily rewire connections at the cross-connect fields to loop the signal back toward the switch.

   The point at which the signal is looped should be one at which physical access is easy and where the signal level is within the equalization range of the hardware connected. A few cases exist where access to the looparound cannot be easily provided at locations where the signal level is within the equalization range of the hardware.

   - For ANN circuit packs, change the equalization option switches on the circuit pack to reflect the distance from the circuit pack to the point of the looparound
   - For TN circuit packs, use Procedure 260, Word 1 to change the loop length (equalization options) in Field 18 to reflect the distance from the circuit pack to the point of the looparound.

4. Select and execute the appropriate test to determine if the problem being investigated exists.

   Figure 6-4, *Facility Fault Sectionalization* (Sheet 2 of 3), gives the procedure and, for performance degradations, the parameters to examine in determining the existence of the problem to the point of the looparound.

   When you investigate low-level or chronic problems, examine all of the parameters (slip counts, misframe counts, and so on) for the performance degradation since the performance parameters are inter-related, many being based on misframe instances and many being based on an embedded check code.

   In general, execute Procedure 620, Test 4 for a loss of signal or a network alarm and Procedure 625 for the performance measurement that displays the parameter for the problem you are investigating.

   For a loss of signal or a network alarm, the SFC displayed after Procedure 620, Test 4 is executed gives the current status. Record the SFC each time you execute procedure 620, Test 4. For performance degradations observation of the misframe counts or errored second counts over a period of time is necessary.

   When performance degradations are being investigate use Procedure 625 to determine that the facility is free from a loss of signal or a network alarm (since performance information is not collected) and then allow the facility to operate for a significant amount of time.

   - For a loss of signal or network- wait at least 15 seconds for firmware to raise or clear conditions.
   - For performance measurements, with the exception of the minor error rate performance degradation on D4 framed facilities, wait at least 15 minutes before making your first observation.

- In Investigating the minor error rate performance degradation on D4 framed facilities, it is necessary to wait about 45 minutes between observations.

In all cases, be certain that you are examining data collected for the time after the looparound was put in place. If you do not wait long enough between observations, the data you are examining may not be valid. If a loss of signal or a network alarm exists, go to the section *DS-1 or PRI Alarm Investigation,* to start over from the beginning with this problem.

The pass and fail criteria for the tests are:

- For loss of signal, network alarm, and unusable reference, the test passes only when these conditions are no longer observed.
- Any slips are cause for concern and two slips in a day cause the test to fail. On average, you should expect slip counts less than one a day if the overall synchronization plan is operating correctly.
- Misframes usually occur in bursts when the signal on the facility experiences an abnormality (that is, the facility is momentarily opened — an intermittent cross connect). With the looparound on site, you should observe no misframes. The test fails if two misframes occur after the facility has been looped around and given a few seconds to stabilize.
- Major and minor error rate alarms indicate long-term, lower-level problems that, if the conditions worsen, can cause loss of service. The test fails if the errored second counts obtained after the facility has been looped around and given a few seconds to stabilize, exceed 10 in any 15-minute period.

5. Is this the last unit on the Generic 2 side of the maintenance boundary?

   If the parameters observed indicate that the problem does not exist, the source of the problem is beyond the equipment-which the signal has been looped. Report to the appropriate personnel that the problem is beyond the Generic 2 maintenance boundary.

   Move the point at which the signal is looped and repeat the test in step 4 until you eliminate all on-site equipment as the cause of the problem or until you need assistance and must therefore escalate the problem.

   When you have tested all on-site equipment or the problem is fixed, restore service by:

   - Using Procedure 620 to release the DS-1 or PRI trunks from busy
   - Using Procedure 260, Word 1 (Field 11 equals 0) to reset the looparound to internal.

6. Fix or replace the wiring or the defective circuit pack or escalate the problem.

   If the parameters observed indicate that the problem exists, the source of the problem is in the equipment-which the signal was looped Take corrective action (fix or replace the wiring or the defective circuit pack) until the test specified passes or you need assistance and must therefore escalate the problem. Record the SFC each time you execute Procedure 620, Test 4.

Example of the Facility Fault Sectionalization Technique

Consider the case of a red alarm at the Generic 2 for a nonsynchronization reference facility shown in Figure 6-3, *Providing Looparound to Support Facility Fault Sectionalization,* where unit #1 is an NCTE and unit #2 is a DACS.

Using this technique would cause the following to occur:

- Procedure 620, Test 4 with internal loop- pass
- Procedure 260, set for external looparound and Procedure 620 used to busy out all DS-1 trunks
- Procedure 620, Test 4 with external loop wired at input to the NCTE — pass
- Procedure 620, Test 4 with external loop wired at input to the DACS — fail.

With the tests executed as above having the test results indicated, a problem exists with the NCTE or the wiring between the NCTE and the DACS.

Synchronization Problem Investigation — Systems With System Clock Synchronizer (SCS)

The synchronization plan for a network keeps the systems within the network transmitting data at approximately the same rate to avoid the situations where:

- One system transmits data at a rate faster than another system can receive the data (in which case data is lost)
- One system transmits data at a rate slower than another system expects to receive data (in which case

NOTE

You must have the synchronization plan for the network in which your switch resides to support the troubleshooting in this section.

Most Generic 2 systems use the stratum 4 clock — SCS and supporting hardware to provide synchronization and thereby avoid slips. Another method uses a stratum 3 clock — consisting of external hardware instead of the SCS to provide reference clocks to the system when derived facility reference signals are unusable.

Synchronization investigation is needed when excessive slips or an unusable reference fault code is observed in Procedure 625. Use this section and Figure 6-5, *SCS Synchronization Problem Investigation,* to investigate the synchronization problem with SCS. Note that many text step numbers cover more than one box in the flowchart.

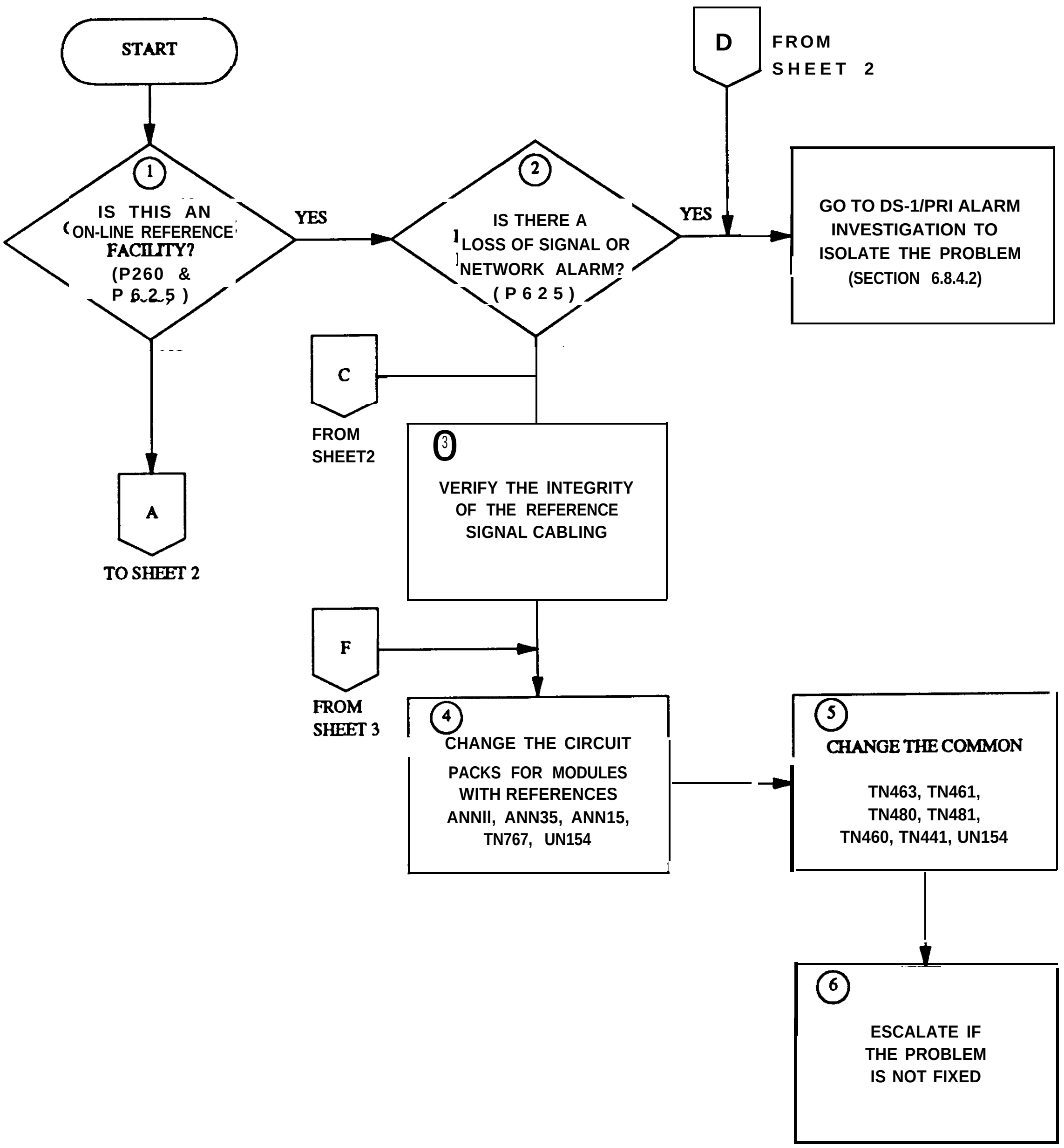


Figure 6-5. SCS Synchronization Problem Investigation (Sheet 1 of 3)

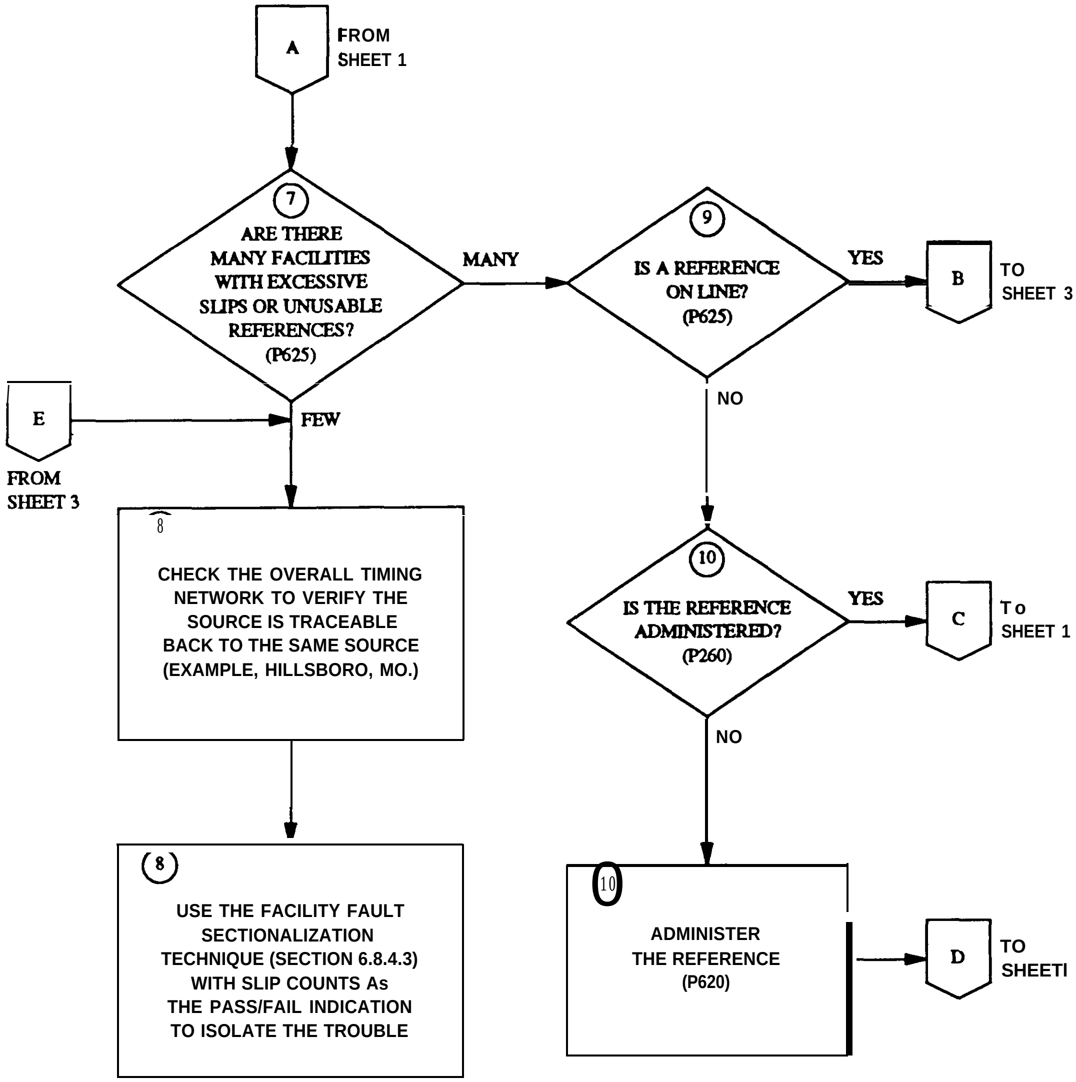


Figure 6-5 SCS Synchronization Problem Investigation

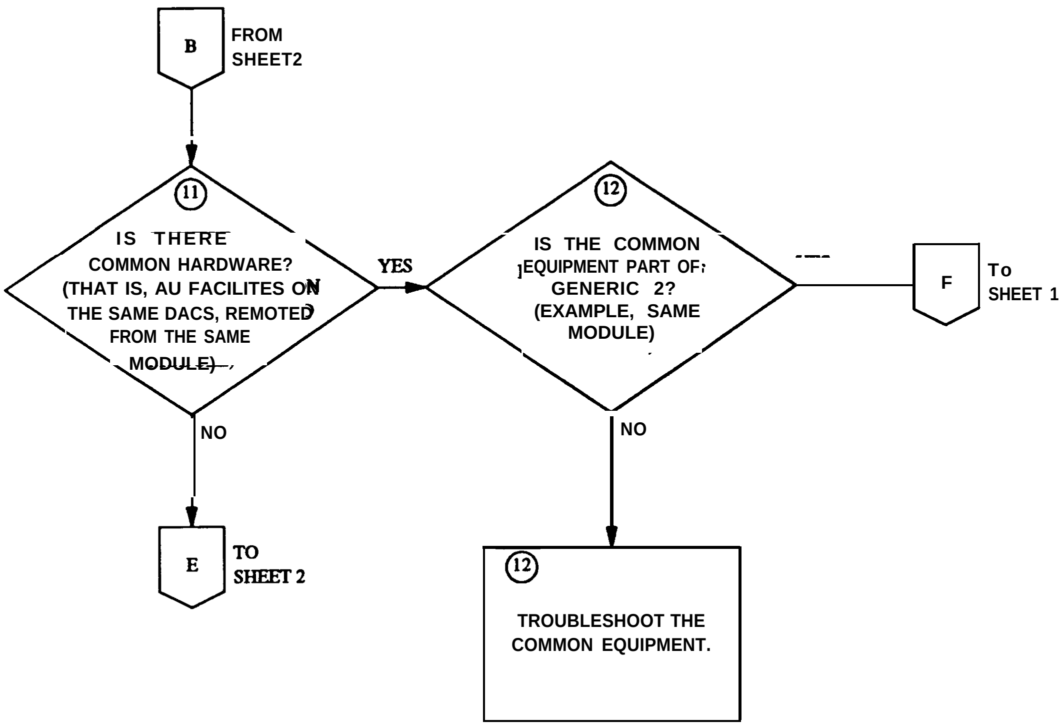


Figure 6-5 SCS Synchronization Problem Investigation

1. Is this an on-line reference facility?

   Use Procedure 260, Word 1 (Field 13 equals 1 or 2) to determine if the facility in question is administered as a synchronization reference source. If it is, use Procedure 625, Test 1 to determine if the facility is the on-line reference.

   - If the facility in question is an on-line reference facility, go to step 2.
   - If the facility in question is not an on-line reference facility, go to step 7.

2. Is there a loss of signal or network alarm for the on-line reference facility?

   Use Procedure 625, Test 1 to determine the status of the on-line reference facility.

   - If Procedure 625, Test 1 (Field 10) indicates that the on-line reference facility has a loss of signal (fault code equals 3) or a network alarm (fault code equals 12-15), go to the section *DS-I or PRI Alarm Investigation*, and use the steps there to investigate the problem.

- If there is no loss of signal or network alarm, go to Step 3.

3. Verify the integrity of the on-line reference facility signal cabling.

   An on-line reference facility that indicates that it is an unusable reference or that it has excessive slips usually points to a hardware problem. Verify the integrity of the reference signal cabling. Figure 6-6, *Typical Synchronization Cable Routing,* shows the wiring for both traditional and universal modules.

   - On-line reference in a traditional module

     The reference signal from the DS-1 or PRI circuit pack is routed by a reference signal cable to the SCS. The cable is connected to the backplane behind the DS-1 or PRI and to the backplane behind the SCS. Verify that the cable is installed on the correct pins and that the connectors are securely attached.

   - On-line reference in a universal module

     The reference signal from a DS-1 or PRI circuit pack is routed under software control to the Port-carrier backplanes. The signal is then extended to connectors that appear on the universal module-control carrier connector panel via the TDM/LAN cables, the module-control carrier, the universal-bus interface (UN154), and a short cable from the backplane to the module-control carrier I/O connector panel. Inspect the connections on the universal module-control connector panel, the TDM/LAN cables, and soon to verify that they are secure.

   Execute Procedure 625, Test 1 to verify that the repairs to the reference cabling are successful. The parameters you should examine are the unusable reference or excessive slips (as appropriate). You must wait approximately one hour to ensure that the data you examine is valid.

4. Change the circuit packs for modules with references.

   The circuit packs that provide, distribute, or receive and process the reference signal could be the cause of the problem. Change these circuit packs one at a time and execute Procedure 625, Test 1 to determine if the problem is fixed. The parameters you should examine are the unusable reference or excessive slips (as appropriate). You must wait approximately one hour to ensure that the data you examine is valid. The circuit packs to be replaced are the reference port ANN11, ANN35, ANN15, or TN767 and UN154.

   This is a time-consuming process that disrupts service. You should perform it after hours if the current service being provided by the system is acceptable (that is, the alternate reference is supporting service) as determined by checking with the customer.

5. Change the common circuit packs.

   The circuit packs that provide system clocks from the reference signal and the equipment that distributes clock signals back to the module in which the reference port resides are also in question. Change these circuit packs one at a time and execute Procedure 625, Test 1 to determine if the problem is fixed. The parameters you should examine are the unusable reference or excessive slips (as appropriate). You must wait approximately one hour to ensure that the data you examine is valid. The circuit packs to be replaced are the TN463, TN461, TN480, TN481, TN460, TN441, and UN154. Replace, as necessary, the electro-optical transducers and the 982-series devices associated with the circuit packs.

   This is a time-consuming process that disrupts service. You should perform it after hours if the current service being provided by the system is acceptable (that is, the alternate reference is supporting service) as determined by checking with the customer.

If this hardware is duplicated, it is important to note the system configuration when the problem exists (that is, the combination of which module processor and which TMS processors are on line). If the system has a duplicated module and TMS processors, use Procedure 621, Test 2 to soft switch the TMS and the module to determine the combinations of on-line equipment in which the problem exists.

If the problem is not observed in any of the four possible combinations, (example, TMS O, module O; TMS 0, module 1; TMS 1; module 0; and TMS 1, module 1), the common hardware is defective. If all four cases fail, the most likely suspect is the input to the SCS. Go back and repeat step 4.

When you change the circuit packs in a duplicated system first use Procedure 621, Test 2 to soft switch off line. Replace the circuit pack, then use Procedure 621, Test 2 to soft switch to the on-line side in order to test.

6. Escalate if the problem it is not fixed by the actions in Steps 3,4, and 5.

7. Are there many facilities with excessive slips or unusable references?

   Use Procedure 620, Test 2 to perform a range test on unit type 60 (DS-1) and unit type 75 (PRI) to determine if other DS-1 or PRI facilities are experiencing excessive slips (example, SFC equals 737) or are unusable references. See Appendix A, *Specific Fault Codes,* for a definition of each SFC that appears. Record each SFC for later use.

8. Check the overall timing.

   If a few facilities are experiencing excessive slips or are unusable references, the clock source for the facilities with slips or that are unusable is not traceable to the same ultimate source as the clock source for the on-line reference facility.

   Examine the overall timing network for the interconnected DS-1 or PRI to determine if the clock can be traced back to a single source and if the reference designations for each location in the distribution of the timing is supplied in accordance with the *synchronization plan* for the customer. Examine the capability of the external equipment to pass or provide timing.

   Verify the integrity of the on-site hardware at the customers location by using the section, *Facility Fault Sectionalization,* which loops the transmit signal to the receive signal and verifies that the excessive slips or the unusable reference are no longer observed.

   This is a time-consuming process that disrupts service. You should perform it after hours if the current service being provided by the system is acceptable as determined by checking with the customer.

9. Isa reference on line?

   If many facilities are experiencing excessive slips or unusable references, the most likely cause is that the on-line reference is not supplying a clock. Use Procedure 625, Test 1 to verify that a reference is on line.

   - If a reference is on line, go to step 11.
   - If a reference is not on line, go to step 10.

10. Is the reference administered?

    - If no reference is on-line but one is administered, go to steps above and examine the hardware for the reference, beginning with the integrity of the reference signal cabling.
    - If a reference is not administered, check the synchronization plan to determine the primary and secondary reference to administer and then administer them in Procedure 260 (Fields 1 through 4

equal the equipment location and Field 13 equals 1 for primary and 2 for secondary). Then, go to the section, *DS-1 or PRI Alarm Investigation,* to isolate the problem.

11. Is there common hardware?

When a reference is on line and many facilities are experiencing excessive slips or the references are unusable, investigate the possibility that the facilities share a common piece of hardware. You need to know the configuration of the DS-1 or PRI facilities in the customers network to answer questions about external hardware that is potentially common to many of the facilities experiencing excessive slips or unusable references. For example,

- Are many of the facilities in the same module?
- DO many of the facilities route-the same DACS?
- DO many of the facilities route-the same microwave radio system?
- Is there equipment external to the switch-which many of the facilities are routed?

If the answer to any of these questions is yes, the synchronization timing calamities and the administration of these capabilities need to be consistent with the overall timing plan. Go to step 12.

If the answer to all these questions is no, go to Step 8 above to isolate the trouble.

12. Is the common equipment part of Generic 2?

- If the common equipment is part of Generic 2, go to Step 4 above and examine the hardware for the reference, beginning with the circuit packs for modules with references.
- If the common equipment is not part of Generic 2, troubleshoot the common equipment of refer the trouble to the appropriate personnel.

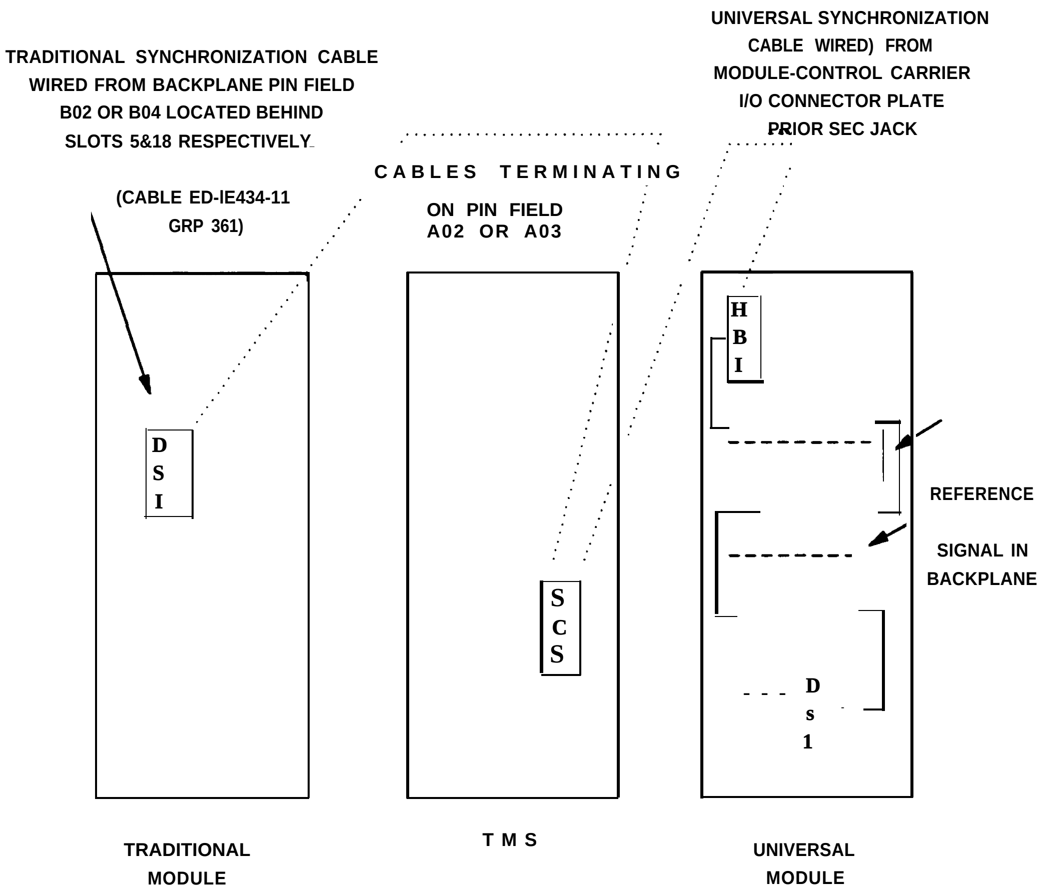


Figure 6-6. TypicaI Synchronization Cable Routing

Synchronization Problem Investigation — Systems with External Stratum 3 Synchronization Hardware

The repair actions discussed here apply when the external stratum 3 hardware is provided and excessive slips or unusable references= experienced. The approach to the problem is similar to systems with SCS discussed in the section *Synchronization Problem Investigation— Systems With SCS.* Use this section and Figure 6-7, *External Stratum 3 Hardware Synchronization Problem Investigation* to perform the synchronization problem investigation with an external stratum 3 clock. Note that many text step numbers cover more than one box in the flowchart.

NOTE

You must have the synchronization plan for the network in which your switch resides to support the troubleshooting in this section.

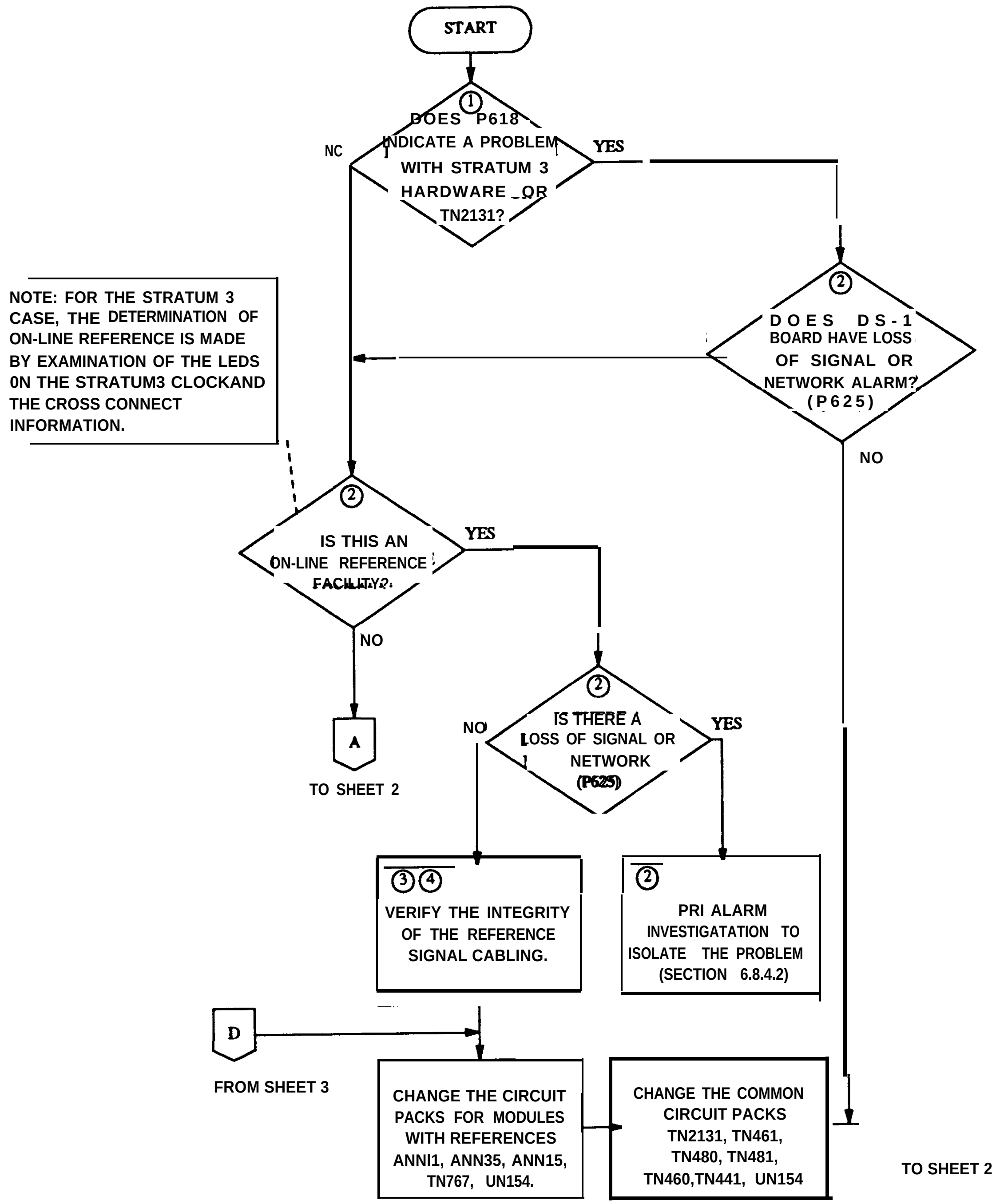


Figure 6-7. External Stratum 3 Hardware Synchronization Problem Investigation

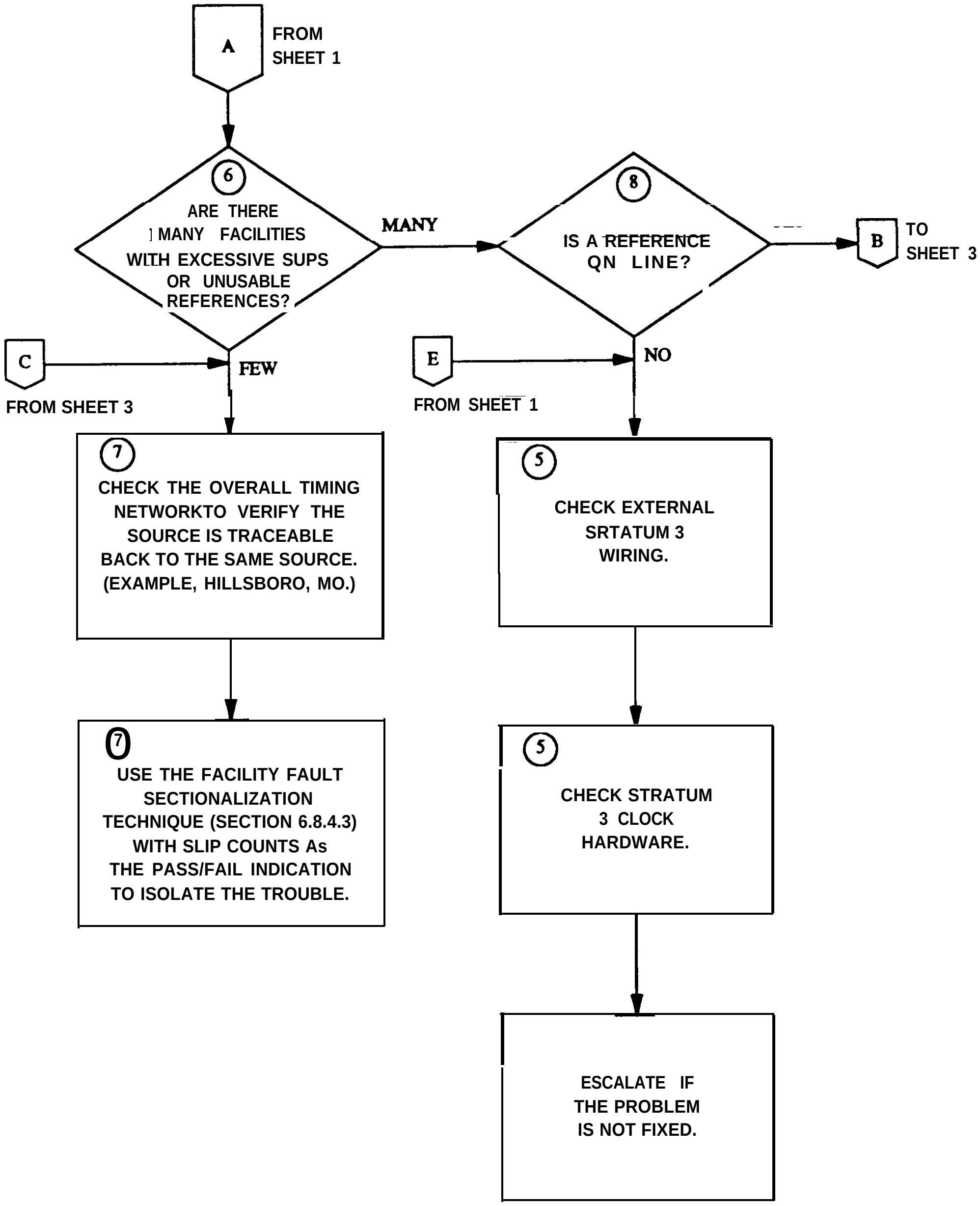


Figure 6-7 External Stratum 3 Hardware Synchronization Problem Investigation

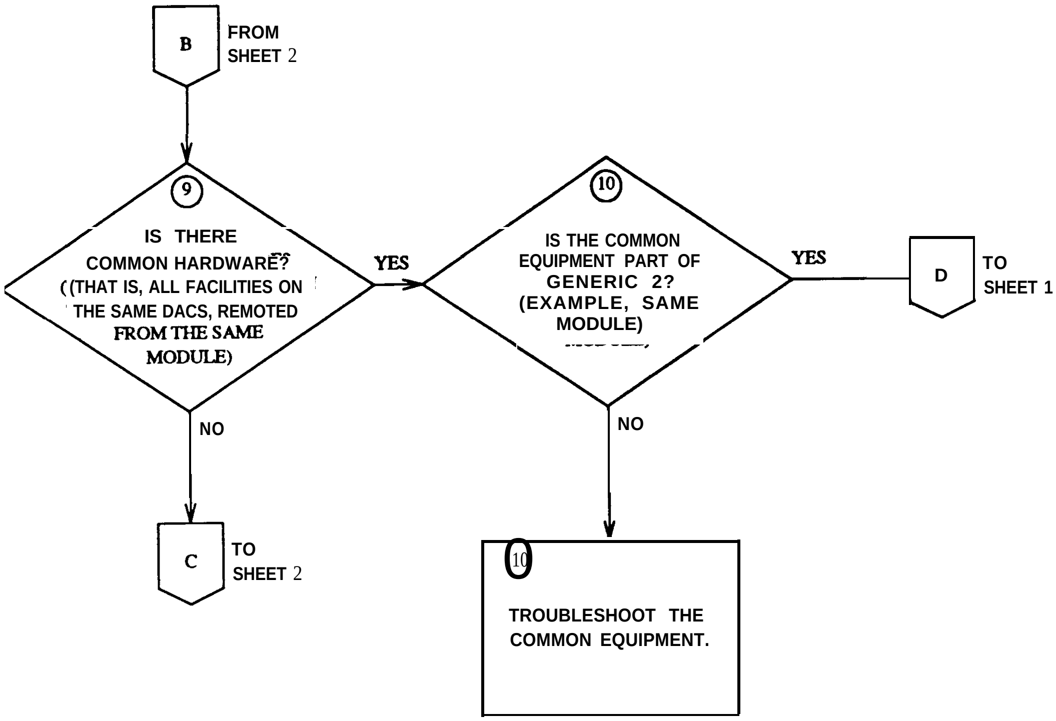


Figure 6-7 External Stratum 3 Hardware Synchronization Problem Investigation

1. Does Procedure 618 indicate a problem with the stratum 3 hardware or circuit pack TN2131?

When external synchronization is provided, 10 isolated contact closures are used to indicate problems in the synchronization hardware. The indications are connected to the Generic 2 remote interface unit to allow them to be displayed in Procedure 618. The indications are:

- Loss of input reference A to the stratum 3 clock.
- Loss of input reference B to the stratum 3 clock
- Loss of both input reference signals
- Loss of one clock unit
- Loss of both clock units
- Loss of one -48V supply
- Loss of both -48V supplies
- Loss of input A composite clock from the stratum 3 hardware
- Loss of input B composite clock from the stratum 3 hardware
- Loss of eight KHZ output from the TN2131 circuit pack to the system backplane.

Execute Procedure 618, Test 1 and determine, based on system wiring information and your local records for the facility, if there is an alarm in the external synchronization hardware by recording the unit number of the external equipment in Field 3 and the alarm status in Field 7. Field 4 is dashed for stratum 3 clock hardware.

The unit number in Field 3 and the alarm status in Field 7, in addition to how the external equipment alarm hardware associated with the stratum 3 clock is wired, provide the indications listed above.

An example of how the indications maybe wired follows:

- Unit type 25 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of input reference A to the stratum 3 clock.
- Unit type 26 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of input reference B to the stratum 3 clock.
- Unit type 27 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of both input reference signals.
- Unit type 28 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of one but not both clock units.
- Unit type 28 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of both clock units.
- Unit type 29 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of one but not both -48V supplies.
- Unit type 29 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of both -48V supplies.
- Unit type 30 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of input A composite clock from the stratum 3 hardware.
- Unit type 31 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of input B composite clock from the stratum 3 hardware.
- Unit type 32 displayed in Field 3 and an alarm status of minor displayed in Field 7 indicates a loss of eight KHz output from the TN2131 circuit pack to the system backplane.

Remember that this is just an example. Consult your local records for the correct wiring of the alarm indications.

If the information indicates a problem with both -48V supplies, both clocks, or the eight KHz output, you must fix the problem before proceeding. Troubleshoot these problems in accordance with the manual appropriate for the external synchronization hardware being used.

2. Reference facility with a loss of signal or a network alarm.

   To determine if the facility is a reference facility and to determine if it is on line, you must examine the cross-connect information for the DS-1 facilities used as inputs to the external stratum 3 clock and the LED indications on the external clock hardware.

   If the facility is the same one the external hardware is presently using as an input, it is a reference.

   Execute Procedure 625, Test 1 to determine if the facility has a loss of signal or a network alarm fault code (fault code 3 or fault codes 12 through 15, respectively) displayed in Field 10. If a loss of signal or a network alarm exists for the facility, you must investigate it first before proceeding. Go to the section, *DS-1 or PRI Alarm Investigation,* and use the steps them to investigate the problem.

3. On-line reference without a loss of signal or a network alarm but an external hardware loss of reference signal exists.

If the on-line reference indicates a loss of reference signal (Step 1 above), verify the integrity of the wiring from the facility to the input of the external hardware.

4. On-line reference without a loss of signal or a network alarm — no external synchronization alarms.

   If the facility is a reference but does not have a loss of signal or a network alarm and there are no external synchronization equipment alarms, troubleshoot the external synchronization hardware and the wiring from it to the Generic 2.

5. Reference facility with only excessive slips or unusable reference.

   In a system using external stratum III clock hardware, an unusable reference is not specifically indicated by a fault code in a procedure, but rather is determined by examining records kept both by and for the system. An unusable reference is one for which the DS-1/PRI interface has degraded performance, indicated by excessive misframes or a history of facility problems such as frequent red alarms. Use Procedures 600,620, and 625 to examine the history of errors on the facilities that are wired as inputs to the stratum III clock hardware.

   A reference facility indicating that it is an unusable reference or that it has excessive slips usually points to a hardware problem. Investigate the integrity of the reference signal wiring and the hardware used to provide the reference. The external hardware generates a clock signal from its input DS-1 or PRI and provides a clock signal from the TN2131 interface to the TMS clock oscillator (multimodule systems) or to the module clock (single module systems) via the TN2131 external clock interface. Check the cabling to the external hardware, the external hardware, the cabling from the external hardware to the backplane behind the TN2131 and the TN2131 circuit pack. Verify that the cable is installed on the correct pins and that the connectors are securely attached. Replace the TN2131 circuit pack.

   Execute Procedure 625, Test 1 to verify that the repairs to the reference cabling are successful. The parameters you should examine are the unusable reference or excessive slips, as appropriate. Slips should never occur for the reference facility. You must wait approximately one hour to ensure that the data you examine is valid.

   The circuits that provide system clocks from the reference signal and the equipment that distributes clock signals back to the module in which the reference port resides are also in question. Change these circuit packs one at a time and execute Procedure 625, Test 1 to determine if the problem is fixed. The parameters you should examine are the unusable reference or excessive slips, as appropriate. You must wait approximately one hour to ensure that the data you examine is valid. The circuit packs to be replaced are the TN2131, TN461, TN480, TN481, TN460, TN441, and UN154. Replace, as necessary, the electro-optical transducers and the 982-series devices associated with the circuit packs.

   This is a time-consuming process that disrupts service. You should perform it after hours if the current service being provided by the system is acceptable (that is, the alternate reference is supporting service) as determined by checking with the customer.

   If this hardware is duplicated, it is important to note the system configuration when the problem exists (that is, the combination of which module processor and which TMS processors are on line). If the system has a duplicated module and TMS processors, use Procedure 621, Test 2 to soft switch the TMS and the module to determine the combinations of on-line equipment in which the problem exists.

   If the problem is not observed in any of the four possible combinations, (example, TMS 0, module 0; TMS 0, module 1; TMS 1; module 0; and TMS 1, module 1), the common hardware is defective.

When you change the circuit packs in a duplicated system, first use procedure 621, Test 2 to soft switch off line. Replace the circuit pack, then use Procedure 621, Test 2 to soft switch to the on-line side in order to test.

Escalate the problem if it is not fixed by the actions m this step.

6. Are there many facilities with excessive slips or unusable references?

   Use Procedure 620, Test 2 to perform a range test on unit type 68 DS-1) and unit type 75 (PRI) to determine if other DS-1 or PRI facilities are experiencing excessive slips (example, SFC equals 737) or are unusable references. See Appendix A, *Specific Fault Codes,* for a definition of each SFC that is displayed. Record each SFC for later use.

7. Few facilities with excessive slips or unusable references.

   If a few facilities are experiencing excessive slips or are unusable references, the clock source for the facilities with slips or that are unusable is not traceable to the same ultimate source as the clock source for the on-line reference facility.

   Examine the overall timing network for the interconnected DS-1 or PRI to determine if the clock can be traced back to a single source and if the reference designations for each location in the distribution of the timing is supplied in accordance with the *synchronization plan* for the customer. Examine the capability of the external transmission equipment to pass or provide timing.

   Verify the integrity of the on-site hardware at the customers location by using the section Facility Fault Sectionalization, which loops the transmit signal to the receive signal and verifies that the excessive slips or the unusable reference are no longer observed.

   This is a time-measuring process that disrupts service. You should perform it after hours if the service being provided by the system is acceptable as determined by checking with the customer .

8. Many facilities with excessive slips or unusable references.

   If many facilities are experiencing excessive slips or unusable references, the most likely cause is that the on-line reference is not supplying a clock. Investigate the integrity of the external hardware that generates the clock.

9. Is there common hardware?

   When a reference is on line and many facilities are experiencing excessive slips or they are unusable references, investigate the possibility of the facilities sharing a common piece of hardware. You need to know the configuration of the DS-1 or PRI facilities in the customers network to answer questions about external hardware that is potentially common to many of the facilities experiencing excessive slips or unusable references. For example,

   - Are many of the facilities in the same module?
   - DO many of the facilities route through the same DACS?
   - Do many of the facilities route through the same microwave radio system?
   - Is there any equipment external to the switch through which many of the facilities are routed?

   If the answer to any of these questions is yes, the synchronization timing capabilities and the administration of these capabilities need to be consistent with the overall timing plan. Go to Step 10.

   If the answer to all of these questions is no, go to Step 7 above to isolate the trouble.

10. Is the common equipment part of Generic 2?

- If the common equipment is part of Generic 2, go to Step 5 above and examine the hardware for the reference.
- If the common equipment is not part of Generic 2, troubleshoot the common equipment or refer the trouble to the appropriate@personnel.

Additional DS-1 Troubleshooting Techniques

If extraordinary measures are needed for troubleshooting DS-1 failures such as infrequently occurring problems or during facility transmission-setting alignment and verification, it may be desirable to connect stand-alone test equipment to the facility.

The documents in the following list describe equipment that maybe applicable depending upon circumstances encountered.

- The AT&T 365 series of practices provide general information about DS- 1 facilities and specific guidance on the use of some of the test equipment
- The AT&T Practice 103-245-100 describes the J1C140A digital-access time-slot selector, a unit that allows access to two of the voice channels multiplexed on the facility.
- The AT&T Practice 103-4885 describes the J68435AH equipment used to measure errored seconds.
- The AT&T Practice 103-493-xxx through 103-494-xxx describe a number of units including outside suppliers' equipment with various capabilities.

Other equipment with varying capabilities is also available in the industry. TEKELEC model TE-820A and VENATOR model VENCATT-24 are two examples.

Hyperactivity Testing

Hyperactive signaling by any port can cause serious resource-contention problems within Generic 2. If the hyperactivity is severe or continues for very long, the switch suffers a severe degradation of smite.

Hyperactivity software detects, identifies, tracks, arrests the message flow, and indicts a port as being hyperactive. If the port is hyperactive, one, four, or eight ports on the DS-1 circuit pack are automatically busied out and SFC 337 is logged against the port in PMIDS. Every five minutes thereafter, the port (or set of ports) is conditionally released from busy. If the port is not hyperactive, the port (or set of ports) is automatically restored to full service.

The set of ports that are busied out on the DS-1 circuit pack depends on the hardware and on the translation of the DS-1 ports. In a traditional module, if the DS-1 circuit packs are translated as 24 lines, the ports are considered to be three groups of eight ports (to get 24 ports). If the ports are translated as trunks or as a mixture of trunks and lines, the ports are considered as six groups of four ports. If hyperactivity appears on one DS1 port in a traditional module, eight or four ports will be busied out. In a universal module, each DS-1 port is considered as a single port. If hyperactivity appears on one DS-1 port in a universal module only the hyperactive port is busied out. The display in Procedure 600 and Procedure 620, Test 1 shows a 1, 4, or 8.

If the hyperactivity is persistent, the circuit pack will be alarmed after about 25 minutes. Intermittent hyperactivity may take more than 25 minutes before an alarm appears. If a circuit pack is alarmed, the alarm is not automatically resolved.

The problem of hyperactivity maybe intermittent and has many causes. There is no demand test for you to perform to isolate hyperactive ports. The hyperactivity software prevents any signaling from the hyperactive port from being processed. Testing a hyperactive port using the demand tests in Procedure 620 (Tests 2-5) could lead to contradictory test results. Procedure 620, Test 1 displays SFC 337 if it is carried over from another procedure or test. If you carry the equipment location of a virtual slot from Procedure 600 to Procedure 620 Test 2, the real slot equipment location will appear. Executing Procedure 620, Tests 2 through 5 would display a SFC indicating that the test was receiving no signal from the device under test (the SFC displayed depends on the unit type being tested).

The demand tests do not run the hyperactivity software and can never report SFC 337 when you execute Tests 2-5. DS-1 facilities might test normal if the source of hyperactivity is not local, since local loopback testing would remove that source. Because some causes of hyperactivity are transitory and originate in distant-end equipment, the demand test could reveal no trouble found.

When a DS-1 facility becomes hyperactive, it generates on-hook and off-hook stimuli at a very high rate. In all cases of DS-1 hyperactivity, you should suspect that somewhere outside the boundaries of the Generic 2 equipment a piece of test equipment is connected that is causing the circuit or span to become hyperactive. The problem might also lie in faulty hardware outside the boundaries of the Generic 2 equipment.

Use the following repair steps to eliminate hyperactivity when SFC 337 is displayed in Procedure 620, Test 1 for unit type 68. You should ensure that the DS-1 facility displaying SFC 337 is not a clock reference. If the hyperactive DS-1 facility is a clock reference, take it off line before troubleshooting the hyperactivity.

1. Display the failing DS-1 circuit in Procedure 620, Test 1. Record the equipment location appearing in Fields 2 through 6.
2. Execute Procedure 625 Test 1, entering the equipment location recorded in Step 1.
3. Check the reference indication appearing in Field 7.
   - If the reference indication is a clock reference, go to Step 4.
   - If the reference indication is not a clock reference, go to step 7.
4. Enter Procedure 625, Test 2. Set Field 8 to 1. Ensure that the clock is locked off-line to prevent it from being automatically switched back, which could occur as quickly as 14 seconds.)
5. Execute Procedure 625, Test 2.
6. Execute Procedure 635, Test 2 to determine if all 23 or 24 channels have been maintenance busied.
   - If all channels are maintenance busied, go to Step 7.
   - If all channels are not maintenance busied, go to step 23.
7. At the channel service unit (CSU) associated with the DS-1 facility recorded in Step 1, loop the transmit and receive pair on the CSU.
8. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the DS-1 circuit recorded in Step 1.
9. Wait five minutes.
10. Execute Procedure 620, Test 1.

- If SFC 337 appears again for same DS-1 circuit, connect the transmit and receive pair at the CSU. hen, go to Step 11.
- If a different SFC is displayed, connect the transmit and receive pair at the CSU. Then, go to the section *PDS-I or PRI Alarm Investigation,* for further isolation techniques.
- If the same DS-1 circuit does not appear again, the cause of the hyperactivity is outside the boundaries of the Generic 2 equipment. At the CSU, connect the transmit and receive pair. Refer the problem to the appropriatepersonnel.

11. At the equipment location recorded in Step 1, replace the DS-1 circuit pack. Then, go to Step 12.
12. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the DS-1 circuit recorded in Step 1.
13. Wait five minutes.
14. Execute Procedure 620, Test 1.
    - If SFC 337 appears again for the same DS-1 circuit, go to Step 15.
    - If a different SFC is displayed go to The section *DS-I or PRI Alarm Investigation,* for further isolation techniques.
    - If the same DS-1 circuit does not appear again, corrective action is complete for this circuit.
15. Check the cabling between the DS-1 circuit pack and the CSU.
    - If the cabling is satisfactory, go to Step 19.
    - If the cabling is not satisfactory, repair or replace it. Then, go to Step 16.
16. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the DS-1 circuit recorded in step l.
17. Wait five minutes.
18. Execute Procedure 620, Test 1.
    - If SFC 337 appears again for the same DS-1 circuit, go to Step 19.
    - If a different SFC is displayed, go to The section DS-1 or PRI Alarm Investigation, for further isolation techniques.
    - If the same DS-1 circuit does not appear again, corrective action is complete for this circuit.
19. Replace or have the CSU replaced by the appropriate personnel. Then, go to Step 20.
20. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the DS-1 circuit recorded in Step l.
21. Wait five minutes.
22. Execute Procedure 620, Test 1.
    - If SFC 337 appears again for the same DS-1 circuit, escalate this failure.
    - If a different SFC is displayed, go to the section DS-1 or *PRI Alarm Investigation,* for further isolation techniques.
    - If the same DS-1 circuit does not appear again, corrective action is complete for this circuit.
23. Refer this problem to the organization responsible for the overall maintenance of the network. It is most likely that other transmission equipment (for example multiplexer) caused the hyperactivity. If

local hardware is suspected, however, follow steps 7-22 after normal business hours when taking down the entire DS-1 span is permitted.

Specific Fault Codes

In the unlikely event that problems are not solved by the techniques in the sections *DS-I or PRI Alarm Investigation* through *Hyperactivity Testing*, you should consider replacing hardware, depending on the SFC recorded. Appendix A, *Specific Fault Codes,* lists the SFCS in numerical sequence, the circuit packs or components that maybe causing the SFC to occur and a brief definition of each SFC.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes recorded in Test 1 and Test 4.
   - If al1 components have been replaced, escalate the failure.
   - If all components have not been replaced, go to Step 2.
2. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing circuit as the limiting factor on the range test.

   NOTE Refer to Table 6-3, *Procedure 620 — Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to Step 4.
   - If the range test fails, go to Step 3.
3. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to Step 4.
   - If Test 4 fails, repeat Steps 2 and 3 until all components are replaced. If Test 4 continues to fail, escalate the failure.
4. Execute Procedure 620, Test 4 on the failing circuit.
   - If Test 4 passes, corrective action for this circuit is complete.
   - If Test 4 fails, determine if any other component is to be replaced.
     — If no other component can be replaced, escalate the failure.
     — If other components can be replaced, repeat Steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — RMI (Unit Type 71)

Network Unit Type Unit Type 71 — Remote Module Interface (RMl)	
Diagnostic and verification test	Procedure 620, Test 4
Components tested	TN456 central or remote

Fault isolation of remote module interface (RMI) circuit failures depends on whether the RMI is the central (switch end) or the remote RMI.

The equipment location appearing in Fields 2-6 (Field 7 is dashed) of Procedure 620, Test 4 is *always* the central RMI equipment location.

Specific fault codes appearing in Field 12 help you determine whether the TN456 to be replaced is a central or remote RMI. Appendix A, *Specific Fault Codes,* lists the central or remote TN456 to replace, depending on whether it is the first, second, or third circuit pack to replace.

The LEDs on the RMI circuit pack may help you isolate problems with RMI failures.

- The red LED (LFAIL indicator) in position 11 of the RMI circuit pack (if lighted) indicates that the channel between the RMI central and remote RMI is not in communication.
- The green LED (FTA indicator) in position 14 of the RMI circuit pack (if lighted) indicates transmission to the remote RMI over the fiber.
- The green LED (FRA indicator) in position 16 of the RMI circuit pack (if lighted) indicates reception from the remote RMI over the fiber.

Fault Isolation

1. Display the failing circuit in Procedure 620, Test 1. Record the specific fault code displayed in Field 12.
2. Enter Procedure 620, Test 4.
3. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), go to step 4.

     The possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 appears in Field 10 before Test 4 is executed. For circuit packs in a universal module, a circuit status of 4 can also indicate that the circuit pack is in an insane state.
   - If Field 10 does not equal 4, go to step 5.

NOTE

If Field 10 equals 1 (on line and in use), Test 4 cannot be performed for the RMI circuit. Wait until the circuit is not in use or perform tests on other alarmed circuits.

4. Determine if Test 4 is being run remotely or locally.
   - If Test 4 is being run remotely, go to step 5.
   - If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
     - — If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to step 5.
     - — If the circuit pack is firmly plugged in, go to step 5.
5. Look at the circuit status appearing in Field 10.

CAUTION

Busying out a port circuit results in loss of customer calls when the port circuit is in use.

   - If Field 10 equals 1, you should not busy out the port circuit because it is on line and in use. Busying out in-use port circuits and performing tests results in loss of calls or data
   - If Field 10 equals 3 (maintenance busy), go to step 6.
   - If Field 10 does not equal 1 or 3, and you wish to test the circuit, type *bo*. Then, go to step 6.
6. Execute Procedure 620, Test 4.
7. Determine if special error code 81 (the message transmission to the module processor failed, try again) appears on the DEFINITY™ Manager II.
   - If special error code 81 appears, go to step 8.
   - If special error code 81 is not displayed, go to step 9.
8. Repeat Procedure 620, Test 4.
   - If special error code 81 does not appear again, go to step 9.
   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing x.
     - — If TN380, TN381, or TN580 fails, go to *Procedure 620 — Common-Control Carrier Unit Types,* for further fault isolation techniques on unit type 7.
     - — If TN380, TN381, or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Test 4),* and use Procedure 611, Test 2 to test the 4-MHz channels.
     - — If TN380, TN381, or TN580 passes, execute Procedure 620), Test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.
9. Determine the status of the circuit by checking the LEDs on the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

NOTE

The unit type and equipment location displayed in Fields 2-7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

- If the circuit passes, dashed are displayed in Fields 11-14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 10.
- If the circuit fails, indicated by a specific fault code displayed in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 12. Then, go to step ll.

10. Look at the circuit status appearing in Field 10.
    - If Field 10 equals 4 (unable to communicate or not plugged in), the problem is a faulty ID chip on the circuit pack or the circuit pack is in an insane state. Go to step 19.
    - If Field 10 does not equal 4, corrective action for this unit type 71 circuit is complete.
11. Look at the specific fault code appearing in Field 12.
    - If the specific fault code displayed in Field 12 is 396, replace the remote RMI circuit pack.
    - If the specific fault code displayed in Field 12 is not 396, replace the circuit pack at the equipment location displayed in Fields 2-6.
12. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Release the circuit from busy out if busied out in step 5. Corrective action for this unit type 71 circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to step 13.
13. Type nc to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack replacement is available if Fields 2-14 are dashed. Go to Step 23.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step 14.
14. Look at the specific fault code appearing in Field 12.
    - If the specific fault code displayed in Field 12 is 393, 394, or 397, replace the remote RMI circuit pack
    - If the specific fault code displayed in Field 12 is not 393, 394, or 397, replace the circuit pack at the equipment location displayed in Fields 2-6.
15. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate circuit pack, the circuit pack passed. Release the circuit from busy out if busied out in step 5. Corrective action for this unit type 71 circuit is complete.
    - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to Step 16.

16. Type nc to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack replacement is available if Fields 2-14 are dashed. Go to step 23.
    - The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 17.
17. Look at the specific fault code appearing in Field 12.
    - If the specific fault code displayed in Field 12 is 395, replace the remote RMI circuit pack.
    - If the specific fault code displayed in Field 12 is not 395, replace the circuit pack at the equipment location displayed in Fields 2-6.
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed. Release the circuit from busy out if busied out in step 5. Corrective action for this unit type 71 circuit is complete.
    - If the red LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack failed again. Go to step 23.
19. When a circuit status of 4 indicates a faulty ID chip or an insane state on the circuit pack, determine if the circuit pack was plugged in or installed in step 4.
    - If the circuit pack was plugged in or installed, go to step 21.
    - If the circuit pack was not plugged in or installed, go to step 20.
20. Determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go back to Step 5.
    - If the circuit pack is firmly plugged in, go to step 21.
21. Look at the specific fault code appearing in Field 12.
    - If the specific fault code displayed in Field 12 is 396, replace the remote RMI circuit pack.
    - If the specific fault code displayed in Field 12 is not 396, replace the circuit pack at the equipment location displayed in Fields 3-6.
22. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Release the circuit from busy out if busied out in step 5. Corrective action for this unit type 71 circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation.
23. Look at the red LED in position 11 of the RMI circuit pack.
    - If the red LED is not lighted, then communication between the central and remote RMIs is good. Go to step 24.
    - If the red LED is lighted, check the communication path between the central and remote RMIs. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation to ensure that

all circuit packs for the specific fault code recoded in step 1 (Test 1) or Step 9 (Test 4) have been replaced before checking the communication path.

24. Look at the green LEDs in positions 14 (transmit) and 16 (receive) of the RMI circuit pack.

    Perform corrective action based on whether transmission or reception is failing. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation to ensure that all circuit packs for the specific fault code recorded in step 1 (Test 1) or step 9 (Test 4) have been replaced before checking the transmission or reception.

Specific Fault Codes

Appendix A, *Specific Fault Codes*, lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes you recorded in Step 1 (Test 1) and step 9 (Test 4).
   - If all components have been replaced, escalate the failure.
   - If all components have not been replaced, go to step 2.
2. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing unit type 71 circuit as the limiting factor on the range test.

   NOTE: Refer to Table 6-3, *Procedure 620 — Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to step 4.
   - If the range test fails, go to step 3.
3. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to step 4.
   - If Test 4 fails, repeat steps 2 and 3 until all components are replaced. If Test 4 continues to fail, escalate the failure.
4. Execute Procedure 620, Test 4 on the failing unit type 71 circuit.
   - If Test 4 passes, corrective action for this unit type 71 circuit is complete.
   - If Test 4 fails, determine if any other component is to be replaced.
     - — If no other component can be replaced, escalate the failure.
     - — If there are other components to replace, repeat steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — Remote Carrier Group (Unit Type 74)

Network Unit Type Unit Type 74 — Remote Carrier Group (RCG)	
Diagnostic and verification tests	Procedure 620, Test 2 and Test 4
Components tested	ANN15, ANN16, remote carrier group ports (GPP, line, MFAT, EIA). RCG environmental components (DC-DC converter, -48 volt, AC rectifier, CDM, CEM, analog ringing generator, over temp, fan, battery holdover).
Tools and test equipment	Digital multimeter to measure AC rectifier voltages. Screwdriver to remove and replace RCG auxiliary cabinet components. Wrench to remove hex nuts when replacing the auxiliary cabinet rectifier.
Related procedures	● Administration Procedure 260, Word 1 to check the fiber option and the DS-1/T1 assignment. ● Procedure 611, Test 2 to test the 4-MHz channels. ● Procedure 625 to determine the health status of the RCG facility. ● Procedure 642 to make a test call on the RCG.
Other tests	ANN16 or port circuit pack insertion test when the port circuit pack is located at the remote carrier group.

You will need a digital multimeter and a digital voltmeter to measure AC rectifier voltages and output voltages at the DC-DC converter or 634WAAB1 power unit and a screwdriver and wrench to remove and replace auxiliary cabinet components when specific fault code 1625 (one or more environmental errors have been detected) appears on the DEFINITY™ Manager II for an RCG alarmed failure. When the failure is at the remote carrier group, perform the ANN16 or port insertion test.

When you are asked to perform administration procedures, you can refer to *DEFINITY™ Communications System Generic 2 Administration Procedures* (555-104-506) as necessary for the definition and operation of the administration procedure.

System-level fault isolation for remote carrier group (unit type 74) failures is defined as the isolation of faults among the various subsystems:

- Generic 2 remote carrier local (RCL) ANN15 circuit packs
- Remote carrier controller (RCC) ANN16 circuit packs located in the remote carrier group

- Port circuits located in the remote carrier group
- Remote carrier group environmental failures.

The first step is to determine the type of remote carrier group failure. If the failing circuit is a RCG circuit pack (unit type 74), determine the remote status appearing in Field 8.

1. If the remote status displayed in Field 8 equals O (local), go to fault isolation and repair procedure *Fault Isolation for RCL Failures* for further diagnosis of the failure.
2. If the remote status displayed in Field 8 equals 1 (remote Tl) or 2 (remote fiber), check the specific fault code appearing in Field 12.
   - If the specific fault code displayed in Field 12 is 1625 (one or more environmental errors have been detected), go to fault isolation and repair procedure *Fault Isolation for RCG Environmental Failures* for further diagnosis of the failure.
   - If the specific fault code displayed in Field 12 is *not* 1625, go to fault isolation and repair procedure *Fault Isolation for RCC and Remoted Port Failures* for further diagnosis of the failure.

If this chapter was referenced from procedure 614 for a remoted unit type 27 (GPP), unit type 29 (line circuit), unit type 69 (MFAT), or unit type 72 (EIA) circuit, go to fault isolation and repair procedure *Fault Isolation for RCC and Remoted Port Failures* for further diagnosis of the failure.

Fault Isolation for RCL Failures

1. Display the failing RCG circuit in Procedure 620, Test 1. Record the specific fault code displayed in Field 12.
2. Enter Procedure 620, Test 4.
3. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), go to Step 4.

     The possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 appears in Field 10 before Test 4 is executed.

     NOTE If Field 10 equals 1 (on line and in use), Test 4 cannot be performed for port circuits without busying them out. Wait until the circuit is not in use or perform tests on other circuits.

   - If Field 10 does not equal 4, go to step 5.
4. Determine if Test 4 is being run remotely or locally.
   - If Test 4 is being run remotely, go to step 5.
   - If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
     - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to step 5.
     - If the circuit pack is firmly plugged in, go to step 5.

5. Look at the circuit status appearing in Field 10.

CAUTION

Busying out an RCG circuit pack disrupts calls in progress on all 24 ports of the RCG circuit pack.

- If Field 10 equals 1, you should not busy out the RCG circuit as it is on line and in use. Busying out in-use port circuits and performing tests results in loss of calls or data.
- If Field 10 equals 3 (maintenance busy), go to step 6.
- If Field 10 does not equal 1 or 3, and you wish to test the circuit, type *bo*. Then, go to step 6.

6. Execute Procedure 620, Test 4.
7. Determine if special error code 81 (the message transmission to the module processor failed, try again) appears on the Manager II.
   - If special error code 81 appears, go to step 8.
   - If special error code 81 is not displayed, go to Step 9.
8. Repeat Procedure 620, Test 4.
   - If special error code 81 does not appear again, go to Step 9.
   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing *x*.
     - — If TN380, TN381, or TN580 fails, go to *Procedure 620 — Common-Control Carrier Unit Types*, for further fault isolation techniques on unit type 7.
     - — If TN380, TN381, or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Type 4)*, and use Procedure 611, Test 2 to test the 4-MHz channels.
     - — If TN380, TN381, or TN580 passes, execute Procedure 620, Test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.
9. Look at the specific fault code appearing in Field 12.
   - If specific fault code 785 (RCC or RCL is not maintenance busy) appears, go to step 10.
   - If specific fault code 1644 (fiber status register contents do not agree with administered values for fiber option) appears, go to step 11.
   - If a specific fault code other than 785 or 1644 appears, go to step 12.
10. Look at the circuit status appearing in Field 10.
    - If Field 10 equals 3 (maintenance busy), escalate this failure.
    - If Field 10 does not equal 3, go to Step 5 above and repeat this procedure. If the same Specific fault code (785) appears again, escalate this failure.
11. Use administration Procedure 260, Word 1 to determine if the RCC is administered for the fiber option.
    - If administration is correct, escalate this failure.
    - If administration is not correct administer the fiber option. Then go to step 1 above and repeat this procedure.

12. Determine the status of the circuit by checking the LEDs on the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

NOTE

The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

- If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 13.
- If the circuit fails, indicated by a specific fault code displayed in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code displayed in Field 12. Then, go to step 14.

13. Look at the circuit status appearing in Field 10.
    - If Field 10 equals 4 (unable to communicate or not plugged in), the problem is a faulty ID chip on the circuit pack. Go to step 25.
    - If Field 10 does not equal 4 and the circuit was alarmed in Procedure 620, Test 1 and then passes the diagnostic analysis test in Procedure 620, Test 4 run a continuous test of the circuit in Procedure 620, Test 3 to ensure that the failure is not intermittent. To do this, go to step 22.
14. At the equipment location displayed in Fields 2-6 replace the circuit pack.
15. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this unit type 74 circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. GO to Step 16.
16. Type `nc` to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. GO to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step 17.
17. At the equipment location displayed in Fields 3-6, replace the alternate circuit pack.
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lighted on the faceplate of the alternate circuit pack, the circuit pack passed. Corrective action for this unit type 74 circuit is complete.
    - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed again. Go to step 19.
19. Type `nc` to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. GO to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

- The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 20.

20. At the equipment location displayed in Fields 3-6, replace the second alternate circuit pack.
21. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed. Corrective action for this unit type 74 circuit is complete.
    - If the red LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack failed again. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
22. Execute Procedure 620, Test 3 on the unit type 74 circuit appearing in Procedure 620, Test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then types.
    - If the circuit passes Test 3, repeat Test 4 on the same circuit to turn off the **NETWORK SWITCH** or **PORT** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, record the specific fault code displayed in Field 12. Then, go to step 23.
23. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.
24. Repeat Procedure 620, Test 3. Allow Test 3 to execute for the same period of time (or longer). Then types.
    - If the circuit passes Test 3, repeat Test 4 to turn off the **NETWORK SWITCH** or **PORT** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
25. When a circuit status of 4 indicates a faulty ID chip on the circuit pack, determine if the circuit pack was plugged in or installed in step 4.
    - If the circuit pack was plugged in or installed, go to Step 27.
    - If the circuit pack was not plugged in or installed, go to step 26.
26. Determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go back to step 5.
    - If the circuit pack is firmly plugged in, go to step 27.
27. At the equipment location displayed in Fields 2-6, replace the circuit pack.
28. When the WAIT indication on *the* Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the Circuit pack passed. Corrective action for this unit type 74 circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed. Check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Fault Isolation for RCC and Remoted Port Failures

Fault isolation for RCC and remoted port failures is divided into two parts.

- Perform Part one at the customer's premises using the Manager II to verify the existence of a failure and to determine the alternate circuit packs (if any) required to correct the failure. When part one is completed, maintenance personnel *must be* dispatched to the remote carrier group with the required circuit packs and the equipment location of the failing circuit packs in order to correct the failure.
- Perform Part two at the remote carrier group using the remote-carrier-group circuit-pack insertion test by replacing circuit packs in the remote carrier group to correct the failure.

Part One — Verifying Failure

1. Display the failing unit type *74* (RCG), unit type 27 (GPP), unit type 29 (line circuit), unit type 69 (NEAT), or unit type 72 (EIA) circuit with a remote status of 1 (remote Tl) or 2 (remote fiber) displayed in Field 8 in Procedure 620, Test 1.
2. Enter Procedure 620, Test 4. Record the specific fault code displayed in Field 12.
3. If a GPP circuit (unit type 27) is the failing circuit, ensure that the translated peripheral is connected. If the terminal is powered by external sources (that is, commercial power), the power to the terminal *must* be turned on.

   NOTE
   Tests may fail with a specific fault code other than the expected specific fault code 351 (GPP DTL idle bit set) failure when the peripheral is disconnected or does not have power on when required.

4. Look at the circuit status appearing in Field 10.

   CAUTION
   Busying out a port circuit results in loss of customer calls when the port circuit is in use. Busying out an RCG circuit pack disrupts calls in progress on all 24 ports of the RCG circuit pack.

   - If Field 10 equals 1, you should not busy out the port circuit because it is on line and in use. Busying out in-use port circuits and performing tests results in loss of calls or data.
   - If Field 10 equals 3 (maintenance busy), go to step 5.
   - If Field 10 does not equal 1 or 3 and you wish to test the circuit, type *bo* . Then, go to Step 5.

5. Execute Procedure 620, Test 4.
6. Determine if special error code 81 (the message transmission to the module processor failed, try again) appears on the Manager II.
   - If special error code 81 appears, go to step 7.
   - If special error code 81 is not displayed, go to step 8.
7. Repeat Procedure 620, Test 4.
   - If special error code 81 does not appear again, go to step 8.

- If special error code 81 appears again, test TN380(module processor), *TN381* (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing x.
  - — *If TN380, TN381,* or *TN580* fails, go to *Procedure 620 — Common-Control Carrier Unit Types*, for further fault isolation techniques on unit type 7.
  - — If TN380, TN381, or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Type* 4), and use Procedure 611, Test *2 to* test the 4-MHz channels.
  - — If TN380, TN381, or TN580 passes, execute Procedure 620, Test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem.

8. Look at the specific fault code appearing in Field 12.
   - If specific fault code 785 (RCC or RCL is not maintenance busy) appears, go to step 9.
   - If specific fault code 1644 (fiber status register contents do not agree with administered values for fiber option) appears, go to step 10.
   - If a specific fault code other than 785 or 1644 appears, go to step 11.
9. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 3 (maintenance busy), escalate this failure.
   - If Field 10 does not equal 3, go to step 4 above and repeat this procedure. If the same specific fault code (785) appears again, escalate this failure.
10. Use administration Procedure 260, Word 1 to determine if the RCC is administered for the fiber option.
    - If administration is correct, escalate this failure.
    - If administration is not correct, administer the fiber option. Then go to step 1 above and repeat this procedure.
11. Determine if unit type 27 (GPP) is being tested.
    - If unit type 27 is being tested, look at the specific fault code appearing in Field 12.
      - — If specific fault code 351 appears in Field 12, it is probably the result of a disconnected or powered-down peripheral. Go to step *12*.
      - — If specific fault code 350, 352354, or 356 appears in Field 12, it may be the result of excessive backplane noise or noise coupled into the conductors to the peripheral. Go to step 12.
      - — If specific fault code 350,351, 352, 354, or 356 is *not* displayed in Field 12, go to step 13.
    - If unit type 27 is not being tested, go to step 13.
12. Verify that the peripheral is connected. If the terminal is powered by external sources (that is, commercial power), the power to the terminal *must* be turned on.
    - If the peripheral is not connected or powered up when required, connect or turn on the peripheral. Then, repeat the test from step 5.
    - If the peripheral is connected and has power on when required, go to Step *13*.
13. Determine the status of the circuit by looking at the specific fault code appearing in Field 12.

NOTE The unit type and equipment location displayed in Fields 2 through 7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

- If a specific fault code of 0 appears in Field 12, the circuit passed. If the circuit was alarmed in Procedure 620, Test 1 and then passes the diagnostic analysis test in Procedure 620, Test 4 run a continuous test of the circuit in Procedure 620, Test 3 to ensure that the failure is not intermittent. To do this, go to Step 16.
- If a specific fault code other than 0 appears in Field 12, the circuit failed.
  - — If specific fault code 1625 appears in Field 12 for unit type 74 (RCG), go to fault isolation and repair procedure *Fault Isolation for RCG Environmental Failures* for further diagnosis of the failure.
  - — If a specific fault code other than 1625 appears in Field 12, record the unit type, equipment location, and specific fault code of the failing circuit- Then, go to step 14.

14. Type `nc` to determine if an alternate circuit pack replacement is available.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. YOU are finished with verifying the failure. Go to *Part Two —Remote Carrier Group Circuit Pack Replacement.*
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Record the unit type and equipment location of the alternate circuit pack displayed in Fields 2-6.
15. Type `nc` to determine if another alternate circuit pack replacement is available.
    - No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. You are finished with verifying the failure. Go to *Part Two — Remote Carrier Group Circuit Pack Replacement.*
    - The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Record the unit type and equipment location of the second alternate circuit pack displayed in Fields 2-6. You are finished with verifying the failure. Go to *Part Two — Remote Carrier Group Circuit Pack Replacement.*
16. Execute Procedure 620, Test 3 on the unit type 74 circuit appearing in Procedure 620, Test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then types.
    - If the circuit passes Test 3, repeat Test 4 to turn off the **NETWORK SWITCH** or **PORT** fault indicator, assuming that no other alarm sources are active.
    - If the circuit fails Test 3, repeat the test from Step 1.

Part Two — Remote Carrier Group Circuit Pack Replacement: Circuit-pack replacement in the remote carrier group is dependent upon observation of the red and green LEDs on the circuit pack being replaced. There is no Manager II display to determine whether the circuit pack passes or fails the test.

The remote carrier group circuit pack insertion test consists of a hardware test and a software test. To perform the software test, you ***must*** ensure that the maintenance mode in the MODE display procedure *is not* active.

Indications on the progress and results of the hardware and software tests are given by lighting LEDs on the circuit pack inserted.

The remote-carrier-group circuit-pack insertion-test LED indications depend on which circuit pack is inserted — that is, the remote carrier controller (RCC) ANN16 circuit pack or a remote port circuit pack.

Replace the circuit packs recorded as failing in part one in the following order

- Replace the failing circuit pack
- Replace, as required, the first alternate circuit pack
- Replace, as required, the second alternate circuit pack.

If all the above steps (as appropriate) fail, go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

The equipment location recorded in part one for the failing circuit is not the true physical location in the remote carrier group of the circuit pack to be replaced. The remote carrier group contains a label (refer to Figure 6-8, *Remote Group Carrier Housing Unit Labels)* that shows the relationship of the Manager II display to the remote carrier group slot number to be replaced for the failing circuit pack.

When you replace the unit type 74 (RCG) ANN16 circuit pack, refer to *RCC* (ANN16) *Circuit Pack Insertion* below for the results of the test.

When you replace unit type 27 (GPP), unit type 29 (line circuit), unit type 69 (MFAT), or unit type 72 (EIA) port circuit packs, refer to *Port Circuit Pack Insertion* below for the results of the test.

NOTE

If you replace a unit type 27 (GPP) circuit pack in the remote carrier group, wait *at least 30 seconds* before installing the SN270 circuit pack. The auto reset may not take effect because the circuit pack is horizontally mounted unless the circuit pack is removed for at least 30 seconds.

RCC (ANN16) Circuit Pack Insertion: If you test a GPP circuit pack ensure that all translated peripherals are connected. If the terminals are powered by external sources (for example, commercial power), ensure that power to the terminals is turned on.

RGI-C (GROUP 1)	CENTRAL LOCATION	RGI-C (GROUP 2)
MODULE ______		MODULE ______
CABINET ______		CABINET ______
CARRIER ______		CARRIER ______
SLOT ______		SLOT ______

MANAGER II DISPLAY		REMOTE CARRIER SLOT GROUP 1	REMOTE CARRIER SLOT GROUP 2
RGI-C	0,5, 13 0R 18	—	—
RGI-R	1,6,14 0R 19	0	5
PORT 1	0,5,13 0R 18	1	4
PORT 2	1,6, 14 0R 19	2	7
PORT 3	2,7, 15 0R 20	3	8

Figure 6-8. Remote Group Carrier Housing Unit Labels

When the ANN16 (RCC) circuit pack is inserted in the remote carrier group, the following occurs automatically by control of the system software.

- The hardware test on the RCC (ANN16) is performed. The red LED on the RCC circuit pack turns on, then off. The green LED on the RCC circuit pack turns on, then off.
- If the RCC hardware test passes, both LEDs remain off. If the RCC hardware test fails, the red LED is lighted on the RCC circuit pack.

NOTE

The RCC circuit pack's green heartbeat LED indicates a fast heartbeat after the firmware test is performed

- Then the hardware test on all port boards is performed. The red LEDs are lighted on all port boards. Then the green LEDs are lighted on all port boards. The hardware test on the port boards is performed only if the hardware test on the RCC passed.
- If the port board hardware test passes, both LEDs remain off. If the port board hardware test fails, the red LED is lighted on the failing port circuit packs.
- After the hardware test on the RCC and all port boards is completed, communications with the switch is attempted. The hardware test on the RCC has to pass before communications with the switch is attempted. The RCC circuit pack's green heartbeat LED indicates a slow heartbeat and the RCC circuit pack's yellow LED is lighted, indicating that communication with the switch is established.
- If the hardware test on the RCC passes, the software test is executed on the RCC circuit pack. The green LED on the RCC circuit pack being tested is lighted during the software test No software testis executed for any port circuit packs.

- If the green LED is not lighted on the RCC circuit pack within five minutes after the hardware test is completed, the maintenance-mode bit is probably activated by another facility. You should contact the local or remote maintenance facility and ask them to release the maintenance-mode bit in the MODE display procedure.
- If the RCC circuit pack being tested passed the software test, both LEDs turn off. The red LED is lighted if the RCC circuit pack fails the software test.

If any of the circuit packs fail the hardware test or if the RCC circuit pack fails the software test, indicated by a red LED being lighted, replace the circuit pack. The software circuit pack insertion testis repeated.

NOTE If more than one of the circuit packs fail and one of the circuit packs is the RCC (ANN16), replace the RCC circuit pack first.

Port Circuit Pack Insertion: If you test a GPP circuit pack ensure that all translated peripherals are connected. If the terminals are powered by external sources (for example, commercial power), ensure that the power to the terminals is turned on.

When a port circuit pack is inserted in the remote carrier group, the following occurs automatically by control of the system software.

- The hardware test on the port circuit pack is performed. The red LED on the port circuit pack turns on, then off. The green LED on the port circuit pack turns on, then off.
- If the port circuit pack hardware test passes, both LEDs remain off.
- If the port circuit hardware test fails, the red LED is lighted on the port circuit pack.

If the port circuit pack fails the hardware test, indicated by a red LED being lighted, replace the circuit pack. The software port circuit pack insertion test is repeated.

Fault Isolation for RCG Environmental Failures

When specific fault code 1625 appears in Field 12 for unit type 74 (RCG), it indicates that the remote carrier group or the cabinet housing the remote carrier group has one or more environmental failures.

1. Type `nd.` Record the number displayed in Field 11 and the decimal value displayed in Field 12.
2. Type `nd.` Record the number displayed in Field 11 and the decimal value displayed in Field 12.
3. Refer to Table 6-4, *Remote Carrier Group Environmental Definitions,* to determine the type of environmental failure requiring corrective action.

   NOTE When Field 11 equals 3, there are seven possible alarm conditions. When multiple alarm conditions exist, they are independent of each other. Table 6-4 indicates in a note the repair priority for multiple alarm conditions.

   When the remote carrier group is *not* mounted in an auxiliary cabinet, some of the environmental encodes are not displayed in Field 12. Only those environmental encodes applicable to the remote carrier group are displayed when the RCG is a stand-alone unit (not mounted in an auxiliary cabinet).

4. Dispatch maintenance personnel to the remote carrier group location to perform one or more (if required) of the following fault isolation and repair procedures listed below, depending upon the type of environmental failure displayed in Field 12 and listed in Table 6-4.

TABLE 6-4. Remote Carrier Group Environmental Definitions

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
2	0	No environmental failures.
2	1	RCC power failure.
2	2	RCG converter alarm.
2	4	RCG low 48-volt alarm.
2	6	RCG converter alarm and RCG low 48-volt alarm.
3	0	No environmental failures.
3	1	Cabinet AC rectifier alarm.
3	2	Cabinet battery holdover alarm.
3	3	Cabinet AC rectifier alarm and cabinet battery holdover alarm.
3	4	RCG fan alarm.
3	5	Cabinet AC rectifier alarm and RCG fan alarm.
3	6	Cabinet battery holdover alarm and RCG fan alarm.
3	7	Cabinet AC rectifier- cabinet battery holdover alarm, and RCG fan alarm.

continued

TABLE 6-4 Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
3	8	RCG over temp alarm.
3	9	Cabinet AC rectifier alarm and RCG over temp alarm.
3	10	Cabinet battery holdover alarm and RCG over temp alarm.
3	11	Cabinet AC rectifier cabinet cabinet battery holdover alarm, and RCG over temp alarm.
3	12	RCG fan alarm and RCG over temp alarm.
3	13	Cabinet AC rectifier alarm, RCG fan alarm and RCG over temp alarm.
3	14	Cabinet battery holdover alarm, RCG fan alarm, and RCG over temp alarm.
3	15	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, and RCG over temp alarm.
3	16	RCG analog ringing generator alarm.
3	17	Cabinet AC rectifier alarm and RCG analog ringing generator alarm.
3	18	Cabinet battery holdover alarm and RCG analog ringing generator alarm.
3	19	Cabinet AC rectifier_ cabinet battery holdover alarm, and RCG analog ringing generator.
3	20	RCG fan alarm and RCG analog ringing generator alarm.
3	21	Cabinet AC rectifier alarm, RCG fan alarm, and RCG analog ringing generator alarm.
3	22	Cabinet battery holdover alarm, RCG fan alarm, and RCG analog ringing generator alarm.
3	23	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, and RCG analog ringing generator alarm.
3	24	RCG over temp alarm and RCG analog ringing generator alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	**Environmental Definition (See Note on last page of Table)**
3	25	Cabinet AC rectifier alarm, RCG over temp alarm, and RCG analog finging generator alarm.
3	26	Cabinet battery holdover alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	27	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	28	RCG fan alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	29	Cabinet AC rectifier alarm, RCG ran alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	30	Cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	31	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and RCG analog ringing generator alarm.
3	32	CDM alarm.
3	33	Cabinet AC rectifier alarm and CDM alarm.
3	34	Cabinet battery holdover alarm and CDM alarm.
3	35	Cabinet AC rectifier alarm, cabinet battery holdover_ and CDM alarm.
3	36	RCG fan alarm and CDM alarm.
3	37	Cabinet AC rectifier alarm, RCG fan alarm, and CDM alarm.
3	38	Cabinet battery holdover alarm, RCG fan alarm, and CDM alarm
3	39	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, and CDM alarm.
3	40	RCG over temp alarm and CDM alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
3	41	Cabinet AC rectifier alarm, RCG over temp alarm, and CDM alarm.
3	42	Cabinet battery holdover alarm, RCG over temp alarm, and CDM alarm.
3	43	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG over temp alarm, and CDM alarm.
3	44	RCG fan alarm, RCG over temp alarm, and CDM alarm.
3	45	Cabinet AC rectifier alarm, RCG fan alarm, RCG over temp alarm, and CDM alarm.
3	46	Cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and CDM alarm.
3	47	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and CDM alarm.
3	48	RCG analog ringing generator alarm and CDM alarm.
3	49	Cabinet AC rectifier alarm, RCG analog ringing generator alarm, and CDM alarm.
3	50	Cabinet battery holdover alarm, RCG analog ringing generator alarm, and CDM alarm.
3	51	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG analog ringing generator alarm, and CDM alarm.
3	52	RCG fan alarm, RCG analog ringing generator alarm, and CDM alarm.
3	53	Cabinet AC rectifier alarm, RCG fan alarm, RCG analog ringing generator alarm, and CDM alarm.
3	54	Cabinet battery holdover alarm, RCG fan alarm, RCG analog ringing generator alarm, and CDM alarm.
3	55	Cabinet AC rectifier alarm, cabinet battery holdover alarm RCG fan alarm, RCG analog ringing generator alarm, and CDM alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	**Environmental Definition (See Note on last page of Table)**
3	56	RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	57	Cabinet AC rectifier alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	58	Cabinet battery holdover alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	59	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	60	RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	61	Cabinet AC rectifier alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	62	Cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	63	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CDM alarm.
3	64	CEM alarm.
3	65	Cabinet AC rectifier alarm and CEM alarm.
3	66	Cabinet battery holdover alarm and CEM alarm.
3	67	Cabinet AC rectifier alarm, cabinet battery holdover alarm and CEM alarm.
3	68	RCG fan alarm and CEM alarm
3	69	Cabinet AC rectifier alarm, RCG fan alarm, and CEM alarm.
3	70	Cabinet battery holdover alarm, RCG fan alarm, and CEM alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
3	71	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, and CEM alarm.
3	72	RCG over temp alarm and CEM alarm.
3	73	Cabinet AC rectifier alarm, RCG over temp alarm, and CEM alarm.
3	74	Cabinet battery holdover alarm, RCG over temp alarm, and CEM alarm.
3	75	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG over temp alarm, and CEM alarm.
3	76	RCG fan alarm, RCG over temp alarm, and CEM alarm.
3	77	Cabinet AC rectifier alarm, RCG fan alarm, RCG over temp alarm, and CEM alarm.
3	78	Cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and CEM alarm.
3	79	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, and CEM alarm.
3	80	RCG analog ringing generator alarm and CEM alarm.
3	81	Cabinet AC rectifier alarm, RCG analog ringing generator alarm, and CEM alarm.
3	82	Cabinet battery holdover alarm, RCG analog ringing generator alarm, and CEM alarm.
3	83	Cabinet AC rectifier alarm, cabinet battery holdover alarm RCG analog ringing generator alarm, and CEM alarm.
3	84	RCG fan alarm, RCG analog ringing generator alarm, and CEM alarm.
3	85	Cabinet AC rectifier alarm, RCG fan alarm, RCG analog ringing generator alarm, and CEM alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
3	86	Cabinet battery holdover alarm, RCG fan alarm, RCG analog ringing generator alarm, and CEM alarm.
3	87	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG analog ringing generator alarm, and CEM alarm.
3	88	RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	*89*	Cabinet AC rectifier alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	90	Cabinet battery holdover alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	91	Cabinet AC rectifier alarm, cabinet battery holdoveralarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	92	RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	93	Cabinet AC rectifier alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	94	Cabinet battery holdover alarm, RCG fan alarm, RCG over term alarm, RCG analog ringing generator alarm, and CEM alarm.
3	95	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, and CEM alarm.
3	96	CDM alarm and CEM alarm.
3	97	Cabinet AC rectifier alarm, CDM alarm, and CEM alarm.
3	98	Cabinet battery holdover alarm, CDM alarm, and CEM alarm.
3	99	Cabinet AC rectifier alarm, cabinet battery holdover alarm, CDM alarm, and CEM alarm.

continued

TABLE 6-4 Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	**Environmental Definition (See Note on last page of Table)**
3	114	Cabinet battery holdover alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	115	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	116	RCG fan alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	117	Cabinet AC rectifier alarm, RCG fan alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	118	Cabinet battery holdover alarm, RCG fan alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	119	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	120	RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	121	Cabinet AC rectifier alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	122	Cabinet battery holdover alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	123	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	124	RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	125	Cabinet AC rectifier alarm, RCG fan alarm, RCG over temp alarm, RCG analog generator_ CDM alarm, and CEM alarm.

continued

TABLE 6-4. Remote Carrier Group Environmental Definitions *(continued)*

Field 11=	Field 12=	Environmental Definition (See Note on last page of Table)
3	126	Cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
3	127	Cabinet AC rectifier alarm, cabinet battery holdover alarm, RCG fan alarm, RCG over temp alarm, RCG analog ringing generator alarm, CDM alarm, and CEM alarm.
Note	When Field 11 equals 3, there are seven possible alarm conditions. When multiple alarm conditions exist, they are independent of each other. Each alarm condition has to be corrected separately. When multiple alarms exist, the repair priority is: 1 = Cabinet AC rectifier 2= CDM 3= CEM 4 = RCG analog ringing generator 5 = RCG over temp 6 = RCG fan 7 = Cabinet battery holdover.	

RCG Power Failure Environmental Alarm: The RCG power-failure alarm normally indicates that a circuit breaker is tripped, an AC cord is disconnected, or commercial power is not available.

1. At the remote carrier group location, determine if any circuit breakers are tripped.
   - If no circuit breakers are tripped, go to Step 3.
   - If any circuit breaker is tripped, go to step 2.
2. Reset the circuit breaker.
   - If the circuit breaker does not trip again, go to step 6.
   - If the circuit breaker trips again, the corrective action to be taken depends on the tripped circuit breaker. Replacing components associated with the circuit breaker maybe required. In addition, you should check the wiring or cabling associated with the circuit breaker.
3. At the remote carrier group location, check the power cord to the AC outlet.
   - If the power cord is connected, go to step 5.
   - If the power cord is not connected, go to step 4.
4. Connect the power cord to the AC outlet Then, go to step 6.
5. Determine if the commercial power at the remote carrier group is available.
   - If the commercial power is not available, report the problem to the customer.
   - If the commercial power is available, go to step 6.

6. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.

7. Execute Procedure 620, Test 1. Determine if the same entry and environmental cause for the unit type 74 failure appears.

   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the wiring and cabling associated with the circuit breaker, power cord, and commercial power at the remote carrier group location. If the wiring, cabling, power cord, and commercial power are satisfactory or you have replaced any of them and the failure still exists, escalate the failure.

RCG Converter Environmental Alarm: The faulty DC-DC converter or 634WAAB1 power unit is identified within the remote carrier group by its lighted red LED. If there is a protective shutdown, a reset toggle switch is located behind the front panel faceplate of the DC-DC converter or 634WAAB1 power unit.

1. At the remote carrier group location, check the circuit breaker associated with the DC-DC converter or 634WAAB1 power unit.
   - If the circuit breaker is tripped, go to Step 2.
   - If the circuit broker is not tripped, go to step 3.
2. Reset the circuit breaker.
   - If the circuit breaker does not trip, go to step 7.
   - If the circuit breaker trips again, check the wiring between the circuit breaker and the DC-DC converter or 634WAAB1 power unit. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
3. At the remote carrier group, measure the output voltage using a digital voltmeter (DVM) at the test points of the DC-DC converter or 634WAAB1 power unit.
   - If the voltage reading is greater than O, go to Step 4.
   - If the voltage reading is 0, perform steps 5 and 6.
4. Replace the DC-DC converter or 634WAAB1 power unit. Then, go to step 7.
5. Unseat all circuit packs in the remote carrier group associated with the DC-DC converter or 634WAAB1 power unit.

   CAUTION Ensure that the toggle switch is in the up position before reseating the handle.

   Activate the reset toggle switch by pulling the DC-DC converter or 634WAAB1 power unit handle halfway out without unseating the DC-DC or 634WAAB1 circuit board, and then reseating the handle.
6. Use a DVM to measure the output voltage at the DC-DC converter or 634WAAB1 power unit.

   a If the voltage reading is 0, reseat all circuit packs. Replace the DC-DC converter or 634WAAB1 power unit. Then, go to step 7.

b. If the voltage reading is greater than O, reseat the circuit packs one at a time. When t red LED lights on the DC-DC converter or 634WAAB1 power unit, proceed as follows:
   - Replace the faulty circuit pack.
   - Reseat any disconnected circuit packs.
   - Go to step 7.

7. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
8. Execute Procedure 620, Test 1. Determine if the same entry and environmental cause for the unit type 74 failure appears.
   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the backplane wiring for a short causing overcurrent shutdown and check the wiring associated with the faulty circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

RCG Low 48-Volt Environmental Alarm: Determine the type of power source installed in the remote carrier group.

- If a DC-DC converter or 634WAAB1 power unit is the power source, go to fault isolation and repair procedure *RCG Converter Environmental Alarm* above. Perform steps 3-8, as appropriate.
- If an external rectifier is the power source, go to fault isolation and repair procedure *Cabinet AC Rectifier Environmental Alarm below*. Perform steps 4-12, as appropriate.

Cabinet AC Rectifier Environmental Alarm: A green pilot LED located on the front panel of the rectifier is on when the rectifier is producing -48 volts on its output. The green pilot LED does not indicate that the output voltage is within regulation limits.

Appropriate test points are available on the front panel of the rectifier for measuring the output voltage and determining the rectifier performance.

1. At the rectifier, determine if the green pilot LED is on.
   - If the green pilot LED is not on, go to step 2.
   - If the green pilot LED is on, go to Step 7.
2. Determine if the circuit breaker associated with the rectifier is tripped.
   - If the circuit breaker is tripped, go to step 3.
   - If the circuit breaker is not tripped, go to step 4.
3. Reset the circuit breaker.
   - If the circuit breaker does not trip, go to step 10.
   - If the circuit breaker trips again, replace the rectifier.

NOTE Refer to Chapter 11, *Auxiliary Component Replacement*, for stepson replacing the rectifier.

— If the circuit breaker does not trip again after the rectifier is replaced, go to step 10.

— If the circuit breaker trips again after the rectifier is replaced, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

4. Measure the rectifier output voltages at the test points using a digital multimeter. At the auxiliary cabinet rectifier, voltage readings should be between -46 volts (minimum) and -52.6 volts (maximum), respectively.
   - If all voltages are within tolerance, go to step 10.
   - If the voltages are not within tolerance, go to Step 5.
5. Replace the rectifier.

   NOTE Refer to Chapter 11, *Auxiliary Component Replacement*, for steps on replacing the rectifier.

6. Measure the output voltages. At the auxiliary cabinet rectifier, voltage readings should be between -46 volts (minimum) and –52.6 volts (maximum), respectively.
   - If all voltages are within tolerance, go to step 10.
   - If voltages are not within tolerance, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
7. Determine if marginal or fluctuating voltages exist at the rectifier test points by measuring the output voltages using a digital multimeter. At the auxiliary cabinet rectifier, voltage readings should be between -48 volts (minimum) and –52.6 volts (maximum), respectively.
   - If all voltages are within tolerance without fluctuating, go to Step 10.
   - If the voltages are marginal or fluctuate, go to step 8.
8. Replace the rectifier.

   NOTE Refer to Chapter 11, *Auxiliary Component Replacement*, for steps on replacing the rectifier.

9. Measure the output voltages. At the auxiliary cabinet rectifier, voltage readings should be between -46 volts (minimum) and –52.6 volts (maximum), respectively.
   - If all voltages are within tolerance and do not fluctuate, go to step 10.
   - If voltages are not within tolerance or fluctuate, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

10. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
11. Execute Procedure 620, Test 1.
12. Determine if the same entry and environmental cause for the unit type 74 failure appears.
    - If the same unit type 74 failure is not displayed, you have fixed the problem.
    - If the same unit type 74 failure appears, check the wiring associated with the rectifier. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

CDM Environments/Alarm: Fault isolation techniques for CEM, CDM, and NCTE units are provided below.

Perform on-site isolation among the units that are provided between the RCG port and the span line interface by activating built-in tests on individual units and by using patch cords to provide external loop-around and to bypass equipment external to the RCG port.

Run on-site tests for the specific unit as needed in accordance with the maintenance documentation (or other vendor documentation) provided for the specific unit.

When CEMs are provided, a preferred looparound is on a patch field such as the ED-2C780 Jack Panel (X IN to X OUT or Y IN to Y OUT'). If a CDM is also provided, bypass the CDM by manually forcing it into loop-around.

NOTE The CEM switches looparound data back to the CEM. The switches do not loop data back towards the switch.

Procedure 620, Test 2 performs external loop-around on the RCG circuit pack to the first loop-around on the RCG link outside the switch.

1. At the local Manager II or remote maintenance facility (ii available), change Field 12 of administration Procedure 260, Word 1 to a 1.
2. Execute Procedure 620, Test 2 on the failing RCG circuit pack.
    - If Test 2 fails, go to step 3.
    - If Test 2 passes, go to step 5.
3. Replace the RCG circuit pack.
4. Repeat Procedure 620, Test 2.
    - If Test 2 passes, go to step 5.
    - If Test 2 still fails, check the wiring between the RCH circuit pack and the associated units. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Activate the CEM loop switches and check that no equipment alarm exists on the CEM.
6. If no alarms are observed, loop the data at the NCTE (X IN to X OUT patch cord) and remove the line Z loop on the CEM via the loop control switch.

7. Check that the CEM runs alarm free after pressing reset.
   - If the CEM displays alarms, trouble with the NCTE and the wiring to the NCTE probably exist. Refer the trouble to the appropriate personnel.
   - If the CEM does not display alarms, trouble with the facility probably exists. Refer the trouble to the appropriate personnel.

CEM Environments/ Alarm: The CEM maintenance procedures are specified in AT&T Practice 365-287-100.

- In general, the CEM circuit pack with the red LED lighted is the first choice for corrective action. If none are lighted, check the power at the test points on the power unit.
- Following the repair, depress the CEM reset button to clear the alarm condition.

After repairing the CEM, test the RCG circuit to clear the alarmed entry in PMIDS.

1. At the local Manager II or remote maintenance facility (if available), enter Procedure 625, Test 1. Check the health status of the RCG facility.

   CAUTION The RCG tests executed by Procedure 620, Tests *2-5 are* service affecting and should be executed only during periods of low traffic, during out-of-hours, or after a service outage has already occurred. Use Procedure 625, Test 1 whenever the current health of a RCG digital service is in question.

   - If the health status indicates that the RCG facility is presently operational, enter Procedure 620, Test 1. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the RCG alarmed circuit. Do not perform destructive testing on the RCG facility.
   - If the health status indicates that the RCG facility is not healthy or if you desire to verify that the RCG *facility is functioning*, make a terminal-to-trunk test call using Procedure 642 on the RCG before testing the RCG circuit.
     — If the test call is completed, corrective action for this unit type 74 circuit is complete.
     — If the test call is not complete&go to step 2.

   CAUTION Busying out a RCG circuit pack disrupts calls in progress on all 24 ports of the RCG circuit pack.

2. Enter Procedure 620, Test 4.
3. Busy out the RCG circuit pack.

   NOTE If the RCG circuit pack is not busied out, the test fails with a specific fault code of 13 (RCG in use) if any channel on the RCG is in use when the test is performed.

4. Perform steps 1-29 (as required) of fault isolation and repair procedure *Fault Isolation for RCL Failure to* test the RCG circuit, perform corrective action, and retire the cause of the alarm.

RCG Analog Ringing Generator Environmental Alarm

1. At the remote carrier group location, replace circuit pack CAL1.

   NOTE: Circuit pack CAL1 should only be replaced during low traffic if digital circuits are provided, and should be replaced immediately if analog circuits are provided.

2. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
3. Execute Procedure 620, Test 1.
4. Determine if the same entry and environmental cause for the unit type 74 failure appears.
   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the wiring associated with the CAL1 circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

RCG Over Temp Environmental Alarm: An over temp alarm cause signifies that a predetermined remote-carrier-group temperature is exceeded.

1. Determine if the fan in the remote carrier group is running.
   - If the fan is running, go to step 2.
   - If the fan is not running, go to step 3.
2. Determine if the fan is operating properly.
   - If the fan is operating properly, go to Step 4.
   - If the fan is not operating properly, replace the fan. Allow sufficient time for the remote carrier group interior to cool. Then, go to step 4.
3. Replace the fan. Allow sufficient time for the remote carrier group interior to cool. Then, go to step 4.
4. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
5. Execute Procedure 620, Test 1.
6. Determine if the same entry and environmental cause for the unit type 74 failure appears
   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the wiring associated with the fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

RCG Fan EnvironmentalAlarm

1. Determine if the fan in the remote carrier group is running.
   - If the fan is running, go to step 2.
   - If the fan is not running, go to step 3.

2. Determine if the fan is operating properly.
   - If the fan is operating properly, go to Step 4.
   - If the fan is not operating properly, replace the fan. Allow sufficient time for the remote carrier group interior to cool. Then, go to step 4.
3. Replace the fan. Allow sufficient time for the remote carrier group interior to cool. Then, go to step 4.
4. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
5. Execute Procedure 620, Test 1.
6. Determine if the same entry and environmental cause for the unit type 74 failure appears.
   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the wiring associated with the fan. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Cabinet Battery Holdover Environmental Alarm: Nominal or extended holdover is provided by a 312 power unit, a J87462A power unit (consisting of a charger and battery system), or a DC filter.

Except for the DC filter, the holdover alarm is detected by software when RSV FAIL or BTY ON LINE on the 312 power unit is active or when RSV ALM or BTY ON LINE on the J87462A power unit is active.

Except for the DC filter, LEDs on the 312 power unit or J87462A power unit indicate whether the switch failed or is drawing battery power because cabinet AC voltage is absent.

Appropriate test points are available on both the 312 power unit and the J87462A power unit for determining the power unit's performance.

1. Determine the type of holdover power unit installed in the cabinet housing the remote group carrier.
   - If a DC filter is the type of holdover power unit, replace the DC filter. Then, go to step 2.

     NOTE

     Refer to Chapter 9, *Switch Component Replacement*, for steps on replacement of the DC filter.

   - If a DC filter is not the type of holdover power unit, go to step 5.
2. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
3. Execute Procedure 620, Test 1.
4. Determine if the same entry and environmental cause for the unit type 74 failure appears.
   - If the same unit type 74 failure is not displayed, you have fixed the problem.
   - If the same unit type 74 failure appears, check the wiring associated with the DC filter. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

5. At the cabinet housing the remote carrier group, determinethe cause of the holdover alarm by checking the LEDs on the appropriate power unit (312 or J87462A).
   - If the BTY ON LINE LED is lighted, check the cabinet AC voltage (the cabinet is powered by the battery system in the appropriate power unit, that is, 312 or J87462A).
   - If the RSV or RSV ALM LED is lighted, use the test points on the appropriate power unit (312 or J87462A) to determine the cause of the problem.
6. Check for -48 volts using a digital voltmeter connected between test points -48V and GRD.

   Check for BTY (-48 volts) using a digital voltmeter connected between test points BTY and GRD.
   - If -48 volts is present but BTY is not, go to Step 7.
   - If -48 volts is absent, check the wiring between the appropriate power unit and the voltage source. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
7. Replace the CPl circuit pack (charger and alarm board) in the 312 power unit or the AMC-1 circuit pack (power board) in the J87462A power unit.

   NOTE If the AMC-1 circuit pack in the J87462A power unit has an AMD-l circuit pack (logic board) attached to it, replace both circuit packs as a set.

8. At the local Manager II or remote maintenance facility (if available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
9. Execute Procedure 620, Test 1.
10. Determine if the same entry and environmental cause for the unit type 74 failure appears.
    - If the same unit type 74 failure is not displayed, you have fixed the problem.
    - If the same unit type 74 failure appears, go to step 11.
11. Determine the type of nominal or extended holdover unit provided.
    - If the nominal or extended holdover is a 312B power unit or a J87462A List 5 power unit, go to step 12.
    - If the nominal or extended holdover is a 312A or 312C power unit, or a J87462A List 6 or List 7 power unit, repeat Steps 7-11 for the other CP1 or AMC-1 circuit pack. If both CP1 or AMC-1 circuit packs are replaced, go to step 12.
12. At the cabinet housing the remote carrier group, replace the 312 power unit or J87462A power unit (as appropriate).
13. At the local Manager II or remote maintenance facility (ii available), enter Procedure 620, Test 1 and clear the alarmed entry. Wait at least 10 minutes.
14. Execute Procedure 620, Test 1.
15. Determine if the same entry and environmental cause for the unit type 74 failure appears.
    - If the same unit type 74 failure is not displayed, you have fixed the problem.
    - If the same unit type 74 failure appears, check the wiring associated with the 312 power unit or J87462A power unit (as appropriate). If the wiring is satisfactory of you have replaced it and the

failure still exists, escalate the failure.

Specific Fault Codes

Appendix A, *Specific Fault Codes,* lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes recorded in step 1 (Test 1) and step 12 (Test 4), or step 22 (Test 3) of fault isolation and repair procedure *Fault Isolation for RCL Failures* or recorded in step 2 (Test 1) and step 13 (Test 4) of fault isolation and repair procedure *Fault Isolation for RCC and Remoted Port Failures.*
   - If all components have been replaced, escalate the failure.
   - If all components have not been replaced, go to step 2.
2. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing unit type 74 circuit as the limiting factor on the range test.

   NOTE

   Refer to Table 6-3, *Procedure 620 — Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to step 4.
   - If the range test fails, go to step 3.
3. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to step 4.
   - If Test 4 fails, repeat steps 2 and 3 until all components are replaced. If Test 4 continues to fail, escalate the failure.
4. Execute Procedure 620, Test 4 on the failing circuit.
   - If Test 4 passes, corrective action for this circuit is complete.
   - If Test 4 fails, determine if any other component is to be replaced.
     - — If no other component can be replaced, escalate the failure.
     - — If there are other components to replace, repeat steps 2 through 4 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 — UBI (Unit Type 80)

Network Unit Type Unit Type 80 — Universal Bus Interface (UBI)	
Diagnostic and verification test	Procedure 620, Test 4
Components tested	UN154
Other tests to be performed	• Procedure 628 (LAN bus test) if specific fault code 3066 is displayed for unit type 80 in Procedure 620, Test 1 and the failure is still indicated in procedure 620, Test 1 after passing Procedure 620, Test 4.

General Repair Steps

When specific fault code 3066 appears in Procedure 600, Test 1 for the universal bus interface and corrective action in this chapter does not correct the failure, go to *Procedure 628 — Universal Bus (Unit Type 81),* for further fault isolation and repair techniques.

Specific fault codes 402, 3056, 3057,3058, 3065, 3066, 3068, 3069, 3070, and 3071 for unit type 80 are recorded in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) program. These specific fault codes are displayed in Test 1 but are *not* displayed when executing the demand diagnostic test or verification test in Test 4.

Fault Isolation

1. Display the failing circuit in Procedure 620, Test 1. Record the specific fault code displayed in Field 12.
2. Enter Procedure 620, Test 4.
3. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in), go to Step 4.

     The possibility exists that the circuit pack is not plugged in or that a faulty ID chip on the circuit pack exists when a circuit status of 4 appears m Field 10 before Test 4 is executed. For circuit packs in a universal module, a circuit status of 4 can also indicate that the circuit pack is in an insane state.
   - If Field 10 does not equal 4, go to step 5.
4. Determine if Test 4 is being run remotely or locally.
   - If Test 4 is being run remotely, go to Step 5.

- If Test 4 is being run locally (or maintenance personnel are on the customer's premises), determine if the circuit pack is plugged in.
  - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go to step 5.
  - If the circuit pack is firmly plugged in, go to step 5.

5. Execute Procedure 620, Test 4.
6. Determine if special error code 81 (the message transmission the module processor failed, try again) appears on the DEFINITY™ Manager II.
   - If special error code 81 appears, go to step 7.
   - If special error code 81 is not displayed, go to step 8.
7. Repeat Procedure 620, Test 4.
   - If special error code 81 does not appear again, go to step 8.
   - If special error code 81 appears again, test TN380 (module processor), TN381 (TMS processor), or TN580 (universal module processor) by entering unit type 7 in Test 2 and typing x.
     - If TN380, TN381, or TN580 fails, go to *Procedure 620 — Common-Control Carrier Unit Types,* for further fault isolation techniques on unit type 7.
     - If TN380, TN381 or TN580 tests yield an error code 81, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611, Test 2 to test the 4-MHz channels.
     - If TN380, TN381, or TN580 passes, execute Procedure 620, Test 4 on the initially failing circuit. If error code 81 appears again, escalate the problem
8. Determine the status of the circuit by checking the LEDs on the faceplate of the circuit pack displayed in Fields 3-6 or by looking at Field 12.

   NOTE The unit type and equipment location displayed in Fields 2-7 may not be the circuit selected for testing. Test 4 performs a diagnostic analysis test that may isolate the problem to a circuit pack that interfaces with the circuit pack selected for testing.

   - If the circuit passes, dashes are displayed in Fields 11 through 14 and the green LED is lighted on the faceplate of the circuit pack. Go to step 9.
   - If the circuit fails, indicated by a specific fault code appearing in Field 12 and the red LED lighted on the faceplate of the circuit pack, record the specific fault code appearing in Field 12. Then, go to step 14.
9. Look at the circuit status appearing in Field 10.
   - If Field 10 equals 4 (unable to communicate or not plugged in) the problem is a faulty ID chip on the circuit pack or the circuit pack is in an insane state. Go to step 25.
   - If Field 10 does not equal 4, go to step 10.
10. Determine if specific fault code 402, 3056,3057, 3058,3065,3066, 3068,3069, 3070, or 3071 was recorded in step 1 for this circuit.
    - If any of these specific fault codes was recorded for this circuit, go to step 11.

- If none of these specific fault codes was recorded for this circuit and the circuit was alarmed in Procedure 620, Test 1 and then passes the diagnostic analysis test in Procedure 620, Test 4 run a continuous test of the circuit in Procedure 620, Test 3 to ensure that the failure is not intermittent. To do this, go to step 22.

11. Perform a clear data, execute sequence in Procedure 620, Test 1 by typing *cdx* for the unit type 80 universal bus interface circuit pack that delayed specific fault code 4023056, 3057, 3058, 3065, 3066,3068,3069,3070, or 3071.
12. Wait five minutes.
13. Execute Procedure 620, Test 1.
    - If specific fault code 402, 3056, 3057, 3058, 3065, 3068, 3069, 3070, or 3071 appears again for the same unit type 80 Universal bus interface circuit pack, escalate the failure.
    - If specific fault code 3066 appears again for the same unit type 80 Universal bus interface circuit pack, go to *Procedure 628 — Universal Bus (Unit Type 81),* for further fault isolation.
    - If a different specific fault code appears for the same unit type 80 universal bus interface circuit pack, go back to Step 1.
    - If there are no unit type 80 universal bus interface circuit pack failures, corrective action for this unit type 80 circuit is complete.
14. At the equipment location displayed in Fields 2-6, replace the circuit pack.
15. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.
    - If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this unit type 80 circuit is complete.
    - If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed again. Go to step 16.
16. Type nc to determine if an alternate circuit pack replacement is available.
    - If special error code 88 (see documentation) appears on the Manager II go to *Procedure 628 — Universal Bus (Unit Type 81),* for further fault isolation.
    - No alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.
    - The equipment location of the circuit pack appears in Fields 3-6 if an alternate circuit pack exists. Go to step 17.
17. At the equipment location displayed m Fields 3-6, replace the alternate circuit pack.
18. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the alternate circuit pack.
    - If the green LED is lightedon the faceplate of the alternate circuit pack, the circuit pack passed. Corrective action for this unit type 80 circuit is complete.
    - If the red LED is lighted on the faceplate of the alternate circuit pack, the circuit pack failed. again. Go to step 19.
19. Type nc to determine if another alternate circuit pack replacement is available.

- *If special error code 88 (see* documentation) appears on the Manager II, go to *Procedure 628 — Universal Bus (Unit Type 81),* for further fault isolation.
- No other alternate circuit pack is available for replacement if Fields 2-14 are dashed. Go to fault isolation and repair procedure Specific Fault Codes for further isolation techniques.
- The equipment location of the circuit pack appears in Fields 3-6 if another alternate circuit pack exists. Go to step 20.

20. At the equipment location displayed in Fields 3-6, replace the second alternate circuit pack.

21. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the second alternate circuit pack.
    - If the green LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack passed. Corrective action for this unit type 80 circuit is complete.
    - If the red LED is lighted on the faceplate of the second alternate circuit pack, the circuit pack failed again. Go to fault isolation and repair procedure *Specific Fault Codes* for further isolation.

22. Execute Procedure 620, Test 3 on the universal bus interface circuit pack appearing in Procedure 620, Test 4. Allow Test 3 to execute for a period of time (or until a failure is indicated in Field 14). Then types.
    - If the circuit passes Test 3, repeat Test 4 on the same circuit to turn off the **NETWORK SWITCH** or **PORT** fault indicator, assuming that no other alarm sources are active. Corrective action for this unit type 80 circuit is complete.
    - If the circuit fails Test 3, record the specific fault code appearing in Field 12. Then, go to step 23.

23. At the equipment location displayed in Fields 3 through 6, replace the circuit pack.

24. Repeat Procedure *620,* Test 3. Allow Test *3* to execute for the same period of time (or longer). Then types.
    - If the circuit passes Test 3, repeat Test 4 on the same circuit to turn off the **NETWORK SWITCH or PORT** fault indicator, assuming that no other alarm sources are active. Corrective action for this unit type 80 circuit is complete.
    - If the circuit fails Test 3, refer to fault isolation and repair procedure *Specific Fault Codes* for further isolation techniques.

25. When a circuit status of 4 indicates a faulty ID chip or an insane state on the circuit pack, determine if the circuit pack was plugged in or installed in step 4.
    - If the circuit pack was plugged in or installed, go to step 27.
    - If the circuit pack was not plugged in or installed, go to step 26.

26. Determine if the circuit pack is plugged in.
    - If the circuit pack is not plugged in or if the slot is empty, plug in or install the circuit pack. Then, go back to Step 5.
    - If the circuit pack is firmly plugged in, go to step *27.*

27. At the equipment location displayed in Fields 2-6, replace the circuit pack.

28. When the WAIT indication on the Manager II goes off, check the red and green LEDs on the faceplate of the circuit pack.

- If the green LED is lighted on the faceplate of the circuit pack, the circuit pack passed. Corrective action for this unit type 80 circuit is complete.
- If the red LED is lighted on the faceplate of the circuit pack, the circuit pack failed. Check the wiring associated with the circuit pack replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Specific Fault Codes

Appendix A, *Specific Fault Codes, lists the specific* fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Determine if specific fault code 3000,3001, or 3002 was recorded in step 1 (Test 1), step 8 (Test 4), or step 22 (Test 3).
   - If specific fault code 3000, 3001, or 3002 was recorded, go to *Procedure 628 — Universal Bus (Unit Type 81),* for further fault isolation. You have a LAN, TDM A, or TDM B bus problem.
   - If specific fault code 3000, 3001, or 3002 was not recorded, go to step 2.
2. Use Appendix A to determine if any additional corrective action can be performed (for example, there are other circuit packs to replace) based on the specific fault codes you recorded in step 1, Step 8, or step 22.
   - If all components gave been replaced, escalate the failure.
   - If all components have not been replace&go to step 3.
3. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number appearing in Field 2 of the failing unit type 80 circuit as the limiting factor on the range test.

   NOTE Refer to Table 6-3, *Procedure 620 — Network Unit Types, to* determine the unit type of the circuit pack you want to replace.

   - If the range test passes, go to step 5.
   - If the range test fails, go to step 4.
4. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.
   - If Test 4 passes, go to step 5.
   - If Test 4 fails, repeat steps 3 and 4 until all components are replaced. If Test 4 continues to fail after all components are replaced, escalate the failure.
5. Execute Procedure 620, Test 4 on the failing unit type 80 circuit.
   - If Test 4 passes, corrective action for this unit type 80 circuit is complete.
   - If Test 4 fails, determine if any other component is to be replaced.
     — If no other component can be replaced, escalate the failure.

— If there are other components to replace, repeat steps 3 through 5 (as appropriate) until all components are replaced or until Test 4 passes.

Procedure 620 —Multimodule Switch Alarms with More Than One Unit Type 13 (Port Data Store) with Specific Fault Code 70 and More Than One Unit Type 53 (Multiplexer) with Specific Fault Code 611 Failures Caused by Network Test Flag Faults

This repair strategy is based on your deciding that a failure pattern exists because Procedure 620, Test 1 displays more than one unit type 13 (port data store) alarmed failure with specific fault code 70 *and* more than one unit type 53 (multiplexer) alarmed failure with specific fault code 611.

Under some failure condition these alarmed failures appear only while the switch is processing calls. When the switch runs alarm free and passes all demand tests out of hours, there is a strong indication that the fault is in a port carrier.

- *If either of these conditions is not true, analyze the failures Using other fault isolation and repair steps listed in this chapter.*
- If both conditions are true, perform the following steps to determine the module that is the true source of the alarms.

1. Use Procedure 620, Test 2 to perform a range test on all unit type 57 light-guide interface (LGI) circuits in the switch.

   Expect many unit type 57 circuits to fail with specific fault code 611.

   Unit type 57 circuits that fail with a fault code other than 611 indicate the source of the network test flags.

2. Display a unit type 57 circuit with a fault code other than 611 in Procedure 620, Test 2.

3. Execute Procedure 620, Test 4 on the circuit displayed in Step 2.

   - If a unit type 54 (fan out) TN473 circuit pack, unit type 55 (module interface) TN480 circuit pack unit type 58 (fan in) UN150 circuit pack, or the unit type 57 (light-guide interface) TN481 circuit pack appears in Fields 2-7, it is the failing circuit pack.

     Go to *Procedure 620 — Module-Control Carrier Unit Types,* for further fault isolation techniques on unit type 57.

     Go to *Procedure 620 — TMS Carrier Unit Types,* for further fault isolation techniques on unit type 54, unit type 55, or unit type 58

   - If a unit type 54, unit type 55, unit type 58, or the unit type 57 circuit pack is *not* displayed, the failure is within the same module as the LGI being tested. Go to step 4.

4. Refer the problem to appropriate third-tier maintenance personnel. Provide the following information:

   Failures in a module control are generally diagnosed correctly and there should be few alarms in the failing module. If there are many alarms in the failing module, the fault is probably in a port carrier.

   Port carrier failures cause alarms no matter which module control is on line. Failures in the port carrier often require the presence of calls to raise alarms. Demand tests on port carriers executed out of hours often pass.

PROCEDURE 622 — EVEN-NUMBERED PORT PERIPHERALS (UNIT TYPE 30), ODD-NUMBERED PERIPHERALS (UNIT TYPE 48), OR BRI TERMINALS (UNIT TYPE 79)

In addition to Procedure 622, you may be required to perform one or mom of the following procedures when you are performing the repair steps in this procedure.

- Procedure 620, Test 4 to test the GPP or digital line circuit pack, the 72 series terminal circuit pack, the 73 series terminal circuit pack, the BRI circuit pack, or the universal module processor circuit pack.
- Procedure 625, Test 1 to determine the health status of the remote carrier local (RCL) and the remote carrier Controller (RCC).

You will need to test hyperactivity if specific fault code 337 (hyperactive port — receiving too many signals) is displayed in Procedure 622, Test 1 for a unit type 30 or unit type 48 failure. You perform hyperactivity testing instead of the demand diagnostic test when specific fault code 337 appears on the DEFINITY™ Manager II.

Specific fault codes 428, 435, 438, 439, 442, 443, and 461 are logged in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) software program. These specific fault codes are displayed in Test 1 but are *not* displayed when the demand test in Test 2 or the continuous test in Test 3 is executed.

It may not be possible for periodic or demand maintenance software to detect a defective 74 series terminal when it is connected to a powered-up personal computer that is in the PC mode.

Troubleshooting network peripheral failures is divided into two parts, Alarmed Failures Fault Isolation and Remoted Port Failures Fault Isolation.

Alarmed Failures Fault Isolation

When the **NETWORK PERIPH EQPT** and **MINOR** or **WARNING** alarm indicators on the alarm panel are lighted (indicating a network peripheral failure), or when Procedure 622 is referenced from Procedure 600 as a potential problem, perform the following steps to isolate and repair the faulty unit.

1. Execute Procedure 622, Test 1. Record the failure history, including the specific fault code.
2. Determine the failures that have an alarm status code of 2 or 3 (minor or warning).
3. Display the first alarmed failure in Test 1.
4. Look at the specific fault code appearing in Field 12.
   - If specific fault code 337 is displayed in Field 12, go to fault isolation and repair procedure *Hyperactivity Testing* for further isolation techniques.
   - If any other specific fault code is displayed in Field 12, go to Step 5.

5. Look at the equipment type appearing in Field 2.
   - If equipment type 27 (BRI terminals) is displayed in Field 2, go to fault isolation and repair procedure BRI *Terminal Failures Fault Isolation* for further isolation techniques.
   - If any other equipment type is displayed in Field 2, go to Step 6.
6. Look at the local/remote status appearing m Field 8.
   - If the remote status displayed in Field 8 equals Ø (local), go to Step 7.
   - If the remote status displayed in Field 8 equals 1 (remote port, T1 carrier) or 2 (remote port fiber), go to fault isolation and repair procedure *Remoted Port Failures Fault Isolation* for further diagnosis of the failure.
7. Determine if a 74 series terminal (2 displayed in Field 2) is the failing circuit.
   - If the failing circuit is not a 74 series terminal, go to Step 9.
   - If the failing circuit is a 74 series terminal, determine if the 74 series terminal is connected to a personal computer.
     - If the 74 series terminal is connected to a personal computer, go to Step 8.
     - If the 74 series terminal is not connected to a personal computer, go to Step 9.
8. Ask the customer to power down the personal computer or place the computer in the non-PC mode (off line) before testing the 74 series terminal. Then, go to Step 10.
9. When a translated peripheral is the failing circuit, determine if the peripheral is connected. If the peripheral is powered by external sources (for example, commercial power), ensure that the power to the peripheral is turned on or turn it on. Then, go to Step 10.

   NOTE: Tests may fail with a specific fault code other than the expected specific fault code when the peripheral is disconnected or does not have power on when it is required. In a traditional module, the expected specific fault code is 351. In a universal module, the expected specific fault code is 359.

10. Execute Procedure 622, Test 2.
    - If Test 2 passes, go to Step 11.
    - If Test 2 fails, display the first network peripheral failure on the Manager II. Then, go to Step 15.
11. Determine if OEP specific fault code 428,435,438,439,42,443, or 461 was recorded in Step 1 for this network peripheral.
    - If any of these specific fault codes was recorded for this network peripheral, go to Step 12.
    - If none of these specific fault codes was recorded for this network peripheral, go to Step 31.

NOTE When Test 2 passes and network peripheral failures are recorded in Test 1 with an alarm status of 2 or 3 (minor or warning), run a continuous test of the network peripheral in Procedure 622, Test 3 to ensure that the failure is not intermittent.

12. Perform a clear data, execute sequence in Procedure 622, Test 1 by typing *cdx* for the network peripheral that displayed the specific fault code recorded in Step 1.
13. Wait five minutes.
14. Execute Procedure 622, Test 1.
    - If the same specific fault code (Step 11 above) appears again for the same failing network peripheral, escalate the failure.
    - If a different specific fault code appears for the same failing network peripheral, go back to Step 4.
    - If the same network peripheral does not appear, again, corrective action is complete for this network peripheral.
15. Look at the specific fault code appearing in Field 12.
    - If specific fault code 353 (48 volt overload is displayed in Field 12, go to Step 16.
    - If specific fault code 351 9DTL link idle) or 359 (no response from the network peripheral) is displayed in Field 12, go to Step 29.
    - If specific fault code 660 (digital instrument has bad state of health) is displayed in Field 12, go to Step 26.
    - If any other specific fault code is displayed in Field 12, go to Step 35.
16. Determine the type of general purpose port (GPP) circuit pack installed at the equipment location displayed in Fields 3 through 6.
    - If SN270 is installed, go to Step 17.
    - If SN270B or TN754 is installed, go to Step 23.
17. At the modular jack:
    a. Disconnect the peripheral.
    b. Replace the blown fuse.
    c. Install SN270.
    d. Wait at least 30 seconds and then go to Step 18.
18. Repeat Procedure 622, Test 2.
    - If Test 2 passes, go to Step 19.
    - If Test 2 fails, check the wiring between SN270 and the modular jack. Go to fault isolation and repair procedure *Port Testing to* check the wiring.

19. Connect the peripheral to the modular jack.
20. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, replace the peripheral and the fuse. Wait at least 30 seconds and then go to Step 21.
21. Repeat Procedure 622, Test 2.
    - If Test 2 passes corrective action is complete.
    - If Test 2 fails, replace SN270.
22. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, check the wiring associated with the circuit pack. Go to fault isolation and repair procedure *Port Testing to* check the wiring.
23. At the modular jack, disconnect the peripheral. Wait at least 30 seconds and then go to Step 24.
24. Repeat Procedure 622, Test 2.
    - If Test 2 passes, go to Step 26.
    - If Test 2 fails, replace SN270B or TN754.
25. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, check the wiring between SN270B or TN754 and the module jack. Go to fault isolation and repair procedure *Port Testing* to check the wiring.
26. Connect the peripheral to the modular jack.
27. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, replace the peripheral.
28. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, check the wiring associated with the circuit pack. Go to fault isolation and repair procedure *Port Testing* to check the wiring.
29. Go to the location of the suspect network peripheral (displayed in Fields 3 through 7) and check the DTL cable. Repair the DTL cable as necessary. Then, go to Step 30.

30. At the location of the suspect network peripheral, check to see if phantom power is being supplied.
   - If no voltage can be measured, inspect and repair or replace (as appropriate) the DTL cable. Then, go to step 31.
   - If voltage is present, replace the network peripheral with a network peripheral of the same type. Then, go to step 31.
31. Execute Procedure 622, Test 3 in a nonservice-affecting test mode. Continuously test the suspect network peripheral to determine if it fails.
   - If Test 3 passes, go to Step 32.
   - If Test 3 fails, go to Step 35.
32. Look at the equipment type appearing in Field 2.
   - If the equipment type is 4 or 18, go to Step 33.
   - If the equipment type is not 4 or 18, corrective action is complete.
33. Look at the carrier location appearing in Field 5.
   - If the carrier is in a traditional cabinet, go to fault isolation and repair procedure *Test 4 Fault Isolation.*
   - If the carrier is in a universal cabinet, go to Step 34.

CAUTION Performing Test 3 in a service-affecting test mode disrupts service on the network peripheral being tested.

34. Execute Procedure 622, Test 3 in a service-affecting test mode. Continuously test the suspect network peripheral to determine if it fails.
   - If Test 3 passes, corrective action is complete.
   - If Test 3 fails, go to Step 35.
35. Use Procedure 620, Test 4 (Unit Type 27,28, or 69) to test the GPP or digital line, 72 series terminal circuit pack or 73 series terminal circuit pack associated with the failing network peripheral displayed in Fields 3 through 7.
   - If Test 4 initially fails, take the appropriate corrective action until Test 4 passes. Then, go to Step 36.
   - If Test 4 initially passes, go to Step 37.
36. When Procedure 620, Test 4 passes (after you have taken corrective action), repeat Procedure 622, Test 2 to ensure that the failure is corrected.
   - If Test 2 passes, corrective action is complete for this network peripheral.
   - If Test 2 fails, escalate this failure.

37. Replace the faulty network peripheral.

38. Repeat Procedure 622, Test 3.

    - If Test 3 passes, go to fault isolation and repair procedure *Test 4 Fault Isolation*.
    - If Test 3 fails, check the wiring associated with the port equipment circuit pack and the network peripheral. Go to fault isolation and repair procedure *Port Testing to* check the wiring.

39. Repeat Steps 1 through 38 (as appropriate) for each failing network peripheral with an alarm status of 2 or 3 in order to resolve the alarmed entries and off the NETWORK PERIPH EQPT fault indicator.

Test 4 Fault Isolation

It maybe the case that all network peripherals pass Procedure 622, Test 2 or Test 3, but occasional errors are still recorded in PMIDS or a customer reports occasionally garbled data.

These problems may be caused by noise on the DTL lies.

Procedure 622 Test 4, tests only the transmission of the DTL lines. Test 4 detects single-bit errors and provides a sensitive indicator of noise on the DTL lines.

The equipment location entered for Test 4 is the port circuit connected to the suspect DTL lines. Test only one equipment location at a time because Test 4 is a service-affecting test.

CAUTION Performing Test 4 in a service-affecting test mode disrupts service on the network peripheral being tested.

1. Execute Procedure 622, Test 4 for the port circuit connected to the suspect DTL lines. Then, go to step 2.
2. Operate large electrical appliances (for example, arc welders, jet engines, fusion reactors, laser space weapons systems, and soon) and the network peripheral in the vicinity of the DTL lines to determine if they influence the noise on the DTL link. Then, go to Step 3.
3. Relocate or reorient the DTL lines or network peripheral or both if ambient electrical noise is the problem.

BRI Terminal Failures Fault Isolation

1. Execute Procedure 622, Test 2 on the failing equipment type 27 circuit displayed in Test 1.
    - If Test 2 passes, go to Step 12.
    - If Test 2 fails, go to Step 2.

2. Check to see if the terminal is plugged in.
   - If the terminal is not plugged in, plug it in. Then, go to Step 3.
   - If the terminal **is** plugged in, go to Step 4.
3. Repeat Procedure 622, Test 2 on the same failing BRI terminal.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, go to Step 4.
4. Execute Procedure 628, Test 2.
   - If the test fails, check the LAN bus.
   - If the test passes, go to Step 5.
5. Replace the BRI terminal.
6. Repeat Procedure 622, Test 2 on the same failing BRI termina1.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, go to Step 7.
7. Go to *Procedure 620 — Port Carrier Unit Types,* and use Procedure 620, Test 4 (unit type 78) to test the BRI port circuit pack (TN556) associated with the failing BRI terminal displayed in Fields 3 through 7.
   - If Test 4 fails, take the appropriate corrective action listed in *Procedure 620 — Port Carrier Unit Types* until Test 4 passes. Then, go to Step 8.
   - If Test 4 passes, go to Step 9.
8. Repeat Procedure 622, Test 2 on the same failing BRI terminal.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, go to Step 9.
9. Go to *Procedure 620 — Common-Control Carrier Unit Types,* and use Procedure 620, Test 4 (unit type 7) to test the universal module processor circuit pack (TN580).
   - If Test 4 fails, take the appropriate corrective action listed in *Procedure 620 — Common-Control Carrier Unit Types* until Test 4 passes. Then, go to Step 10.
   - If Test 4 passes, go to Step 11.
10. Repeat Procedure 622, Test 2 on the same failing BRI terminal.
    - If Test 2 passes, corrective action is complete.
    - If Test 2 fails, go to Step 11.
11. Go to fault isolation and repair procedure *Port Testing to* check the wiring between the BRI terminal and BRI port circuit pack. When the wiring is checked, repaired, or replaced, go to Step 12.
12. Repeat Procedure 622, Test 2.
    - If Test 2 passes, corrective action is complete.
    - If test 2 fails, escalate this failure.

13. Execute Procedure 622, Test 3 in a nonservice-affecting test mode. Continuously test the BRI terminal to determine if it fails.
    - If Test 3 passes, corrective action is complete.
    - If Test 3 fails, perform Steps 2 through 12 above until the BRI terminal works.
14. Repeat Steps 1 through 13 (as appropriate) for each failing BRI terminal with an alarm status of 2 or 3 in order to resolve the alarmed entries and turn off the NETWORK PERIPH EQPT fault indicator.

Port Testing

The port tester Issue 2 (comcode 105138424) verifies the continuity of station wiring (analog, hybrid, or digital) at various locations of a DEFINITY™ Communications System Generic 2 installation. (See Figure 6-9, *Port Tester.)*

The port tester detects the presence of voltage from equipment ports for analog, DCP, MFET, MFAT, and BRI configurations. The port tester is designed to indicate the status of the wire at:

- The purple field in the equipment mom
- The white fields in the closets.
- The wall jack.

The port tester is used with 110-type hardware and two 8-pin modular jacks, one for BRI and the second for other wiring configurations. The 3-pair plug attached to the port tester's cord tests at the cross-connect points of an installation.

You must use a D8W line cord (not furnished) when using the port tester at a wall jack.

The port tester displays the status of the equipment port leads by lighting the LEDs that correspond to those leads. Table 6-7, LED *Indications for Tested Ports, lists the correct LED* indications for the port tested. In the table, G means green, R means red, N means not lighted, and NA means not applicable to the port tested. If adjunct power is present, the Adjunct Power if Present indicator is lighted green.

WARNING The port tester overheats if it is plugged into an active circuit for more than 20 seconds.

Use the port tester to isolate wiring problems to a terminal, to a port, or to a segment of wiring between them. The wall jack is the primary testing point for the port tester because the test from the wall jack verifies the total wire path. To use the port tester at the wall field, attach the three one-pair patch cords according to the instructions on the port tester. These cords are color-coded blue for pair one, orange for pair two, and green for pair three.

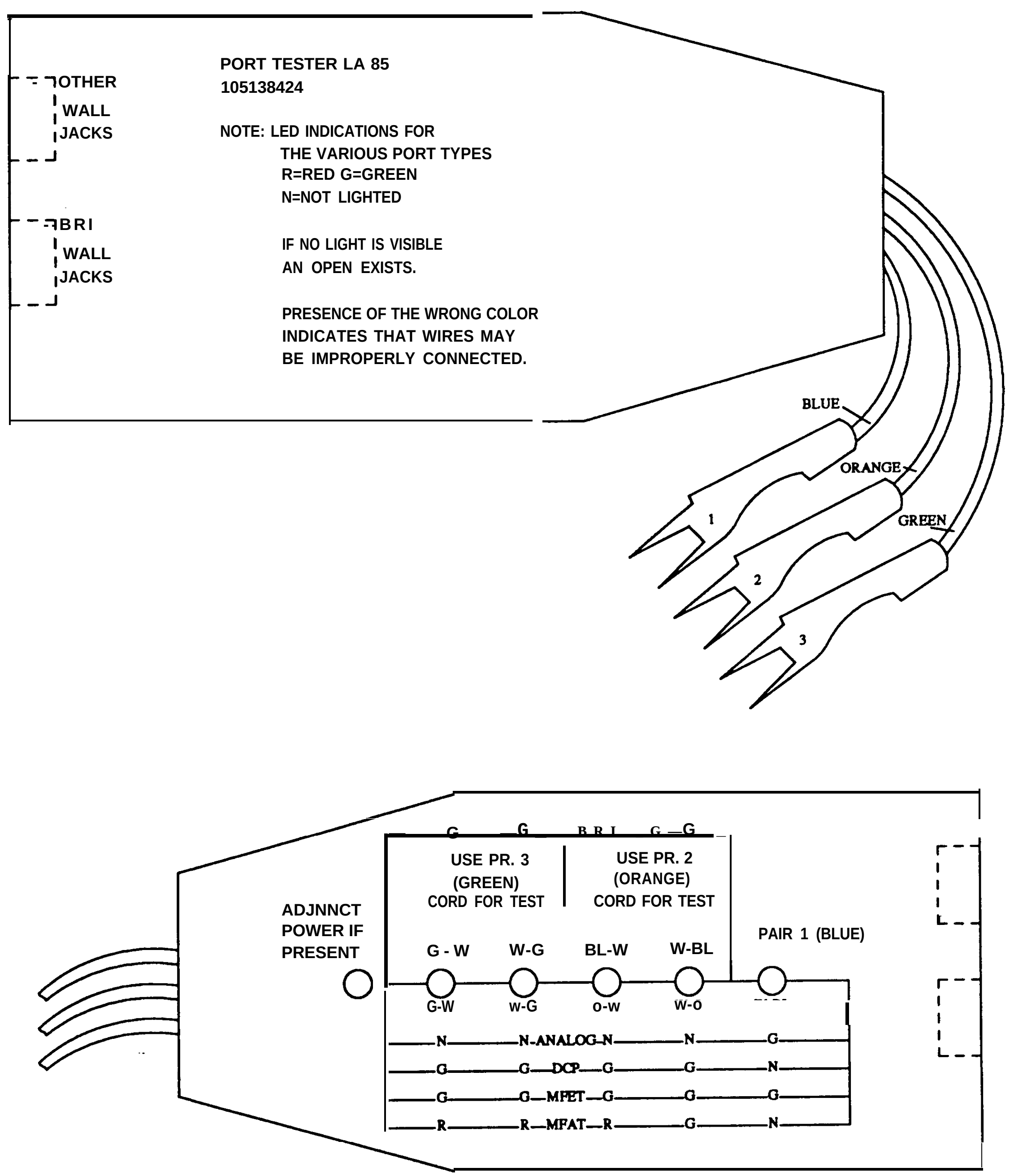


Figure 6-9. Port Tester

TABLE 6-5. LED Indications for Tested Ports

Port	W-BL BL-W	W-O	0-W	W-G	G-W	BL-W	W-BL
Analog	G	N	N	N	N	NA	NA
DCP	N	G	G	G	G	NA	NA
MFET	G	G	G	G	G	NA	NA
MFAT	N	R	R	R	G	NA	NA
BRI	NA	NA	NA	G	G	G	G

When the port tester is used, there is a wiring problem in the following situations:

- When the LED indication is an incorrect color.

  The leads maybe switched or the leads maybe interchanged between pairs.

- If the LED is not lighted and a signal is expected.

  An open connection between the port and the location of the test may exist.

Plug the port tester into the wall jack. If all the port signals are present and are the right color at the wall jack, check the terminal. If an expected signal is missing, there is an open between the port and the point of test. If the signal is present but the color is wrong, there is a wiring problem between the port and the point . of test. Move to the white field (closet) or the purple field (equipment room) to isolate the problem.

Remoted Port Failures Fault Isolation

Fault isolation for remoted port failures is divided into two parts.

Part one is performed at the customer's premises using the Manager II to verify the existence of a failure and to determine the alternate circuit packs (if any) required to correct the failure.

Part two is performed at the remote carrier group and involves replacing circuit packs in the remote carrier group using the remote carrier group circuit pack insertion test to correct the failure.

Part One — Verifying Failure

Once you have verified the failure, you must go to the remote carrier group with the required circuit packs and peripherals to complete the isolation of the failure. The equipment locations of the failing circuit packs and peripherals are recorded in Steps 6 through 10 below.

1. Display the failing circuit with a remote status of 1 (remote port, T1 carrier) or 2 (remote port, fiber) displayed in Field 8 of Procedure 622, Test 1.
2. Determine if a 74 series terminal (2 displayed in Field 2) is the failing circuit.
   - If the failing circuit is not a 74 series terminal, go to Step 4.
   - If the failing circuit is a 74 series terminal, determine if the 74 series terminal is connected to a personal computer.
     — If the 74 series terminal is connected to a personal computer, go to Step 3.
     — If the 74 series terminal is not connected to a personal computer, go to Step 4.
3. Ask the customer to power down the personal computer or place the computer in the non-PC mode (off Line) before testing the 74 series terminal. Then, go to Step 5.
4. When a translated peripheral is the failing circuit, determine if the peripheral is connected. If the peripheral is powered by external sources (for example, commercial power), ensure that the power to the peripheral is turned on or turn it on. Then, go to Step 5.

NOTE Tests may fail with a specific fault code other than the expected specific fault code when the peripheral is disconnected or does not have power on when it is required. In a traditional module, the expected specific fault code is 351. In a universal module, the expected specific fault code is 359.

5. Execute Procedure 622, Test 2.
6. Determine the status of the circuit by checking the display in Field 14.
   - If the circuit passes, a O is displayed in Field 14. Record the equipment type and equipment location of the circuit tested displayed in Fields 2 through 7. When the circuit was alarmed in Procedure 622, Test 1 and passes the diagnostic analysis test in Procedure 622, Test 2, perform a continuous test of the circuit using Procedure 622, Test 3 to ensure that the failure is not intermittent. Go to Step 7.
   - If the circuit fails (indicated by a 1 displayed in Field 14), record the equipment type and equipment location of the failing circuit displayed in Fields 2 through 7. Then, go to Step 8.
7. Execute Procedure 622, Test 3. Allow Test 3 to execute for a period of time (or until a 1 is displayed in Field 14) before stopping the test.
   - If the circuit passes Test 3 (indicated by a 0 displayed in Field 14), repeat Test 2 to turn off the **NETWORK PERIPH EQPT** fault indicator.
   - If the circuit fails Test 3 (indicated by a 1 displayed in Field 14), record the equipment type and equipment location displayed in Fields 2 through 7. Then, go to Step 8.
8. Use Procedure 620, Test 4 to test the circuit displayed in Fields 3 through 7 of Procedure 622, Test 2 or Test 3.
   - If Test 4 passes, replace the peripheral at the remote carrier group associated with the equipment location recorded in Step 6 or Step 7.
   - If Test 4 fails, go to Step 9.

9. Use Procedure 625, Test 1 to determine the health status of the RCL and the RCC.
   - If the health status of the RCL or RCC is not good, perform fault isolation and repair procedure *Procedure 620 —Remote Carrier Group (Unit Type 74)* for RCL or RCC failures.
   - If the health status for both the RCL and RCC is good, replace the circuit pack at the remote carrier group associated with the equipment location recorded in Step 6 or Step 7. Then, go to step 10.
10. If the port circuit pack insertion test fails, replace the peripheral associated with the equipment location recorded in Step 6 or Step 7.

1. Display the failing circuit with a remote status of 1 (remote port T1 carrier) or 2 (remote port fiber) displayed in Field 8 of Procedure 622, Test 1.
2. Determine if a 74 series terminal (2 displayed in Field 2) is the failing circuit.
   - If the failing circuit is not a 74 series terminal, go to Step 4.
   - If the failing circuit is a 74 series terminal, determine if the 74 series terminal is connected to a personal computer.
     — If the 74 series terminal is connected to a personal computer, go to Step 3.
     — If the 74 series terminal is not connected to a personal computer, go to Step 4.
3. Ask the customer to power down the personal computer or place the computer in the non-PC mode (off line) before testing the 74 series terminal. Then, go to Step 5.
4. When a translated peripheral is the failing circuit, determine if the peripheral is connected. If the peripheral is powered by external sources (for example, commercial power), ensure that the power to the peripheral is turned on or turn it on. Then, go to Step 5.

NOTE Tests may fail with a specific fault code other than the expected specific fault code when the peripheral is disconnected or does not have power on when it is required. In a traditional module, the expected specific fault code is 351. In a universal module, the expected specific fault code is 359.

5. Execute Procedure 622, Test 2.
6. Determine the status of the circuit by checking the display m Field 14.
   - If the circuit passes, a 0 is displayed in Field 14. Record the equipment type and equipment location of the circuit tested displayed in Fields 2 through 7. When the circuit was alarmed in Procedure 622, Test 1 and passes the diagnostic analysis test in Procedure 622, Test 2, perform a continuous test of the circuit using Procedure 622, Test 3 to ensure that the failure is not intermittent. Go to Step 7.
   - If the circuit fails (indicated by a 1 displayed in Field 14), record the equipment type and equipment location of the failing circuit displayed in Fields 2 through 7. Then, go to Step 8.
7. Execute Procedure 622, Test 3. Allow Test 3 to execute for a period of time (or until a 1 is displayed in Field 14) before stopping the test.
   - If the circuit passes Test 3 (indicated by a 0 displayed in Field 14), repeat Test 2 to turn off the **NETWORK PERIPH EQPT** fault indicator.
   - If the circuit fails Test 3 (indicated by a 1 displayed in Field 14), record the equipment type and equipment location displayed in Fields 2 through 7. Then, go to Step 8.

8. Use Procedure 620, Test 4 to test the circuit displayed in Fields 3 through 7 of Procedure 622, Test 2 or Test 3.
   - If Test 4 passes, replace the peripheral at the remote carrier group associated with the equipment location recorded in Step 6 or Step 7.
   - If Test 4 fails, go to Step 9.

9. Use Procedure 625, Test 1 to determine the health status of the RCL and the RCC.
   - If the health status of the RCL or RCC is not good,perform fault isolation and repair procedure *Procedure 620 — Remote Carrier Group (Unit Type 74)* for RCL or RCC failures.
   - If the health status for both the RCL and RCC is good, replace the circuit pack at the remote carrier group associated with the equipment location recorded in Step 6 or Step 7. Then, go to step 10.
10. If the port circuit pack insertion test fails, replace the peripheral associated with the equipment location recorded in Step 6 or Step 7.

Part Two — Replacing Remote Carrier Group Port Circuit Packs

When you replace circuit packs in the remote carrier group, you must depend on the red and green LEDs on the port circuit pack being replaced to determine whether the port circuit pack passes or fails the test. The reason for this is because there may be no Manager II display to help you determine the status of the test.

The remote carrier group port circuit pack insertion test consists of a hardware test. Indications on the progress and results of the hardware test are provided by lighting LEDs on the port circuit pack inserted.

The equipment location recorded in part one for the failing circuit is not the true physical location in the remote carrier group of the circuit pack to be replaced.

The remote carrier group has a label (see Figure 6-10, *Remote Group Carrier Housing Unit Labels) that* shows the relationship between the Manager II display and the remote carrier group slot number to be replaced for the failing circuit pack.

When replacing a GPP circuit pack, refer to *Port Circuit Pack Insertion* below for the results of the test-

When a GPP circuit pack is replaced in the remote carrier group, wait *at least* 30 *seconds* before installing the SN270B or TN754 circuit pack. The auto reset may not take effect unless the circuit pack is removed from the slot for at least 30 seconds.

Port Circuit Pack Insertion

When a GPP circuit pack is tested, ensure that all translated peripherals are connected. If the terminals are powered by external sources (for example, commercial power), ensure that the power to the terminals is turned on or turn them on.

When a port circuit pack is inserted in the remote carrier group, the following occurs.

- The hardware test on the port circuit pack is performed. The red LED on the port circuit pack is turned on, then off. The green LED on the port circuit pack is turned on, then off.
- If the port circuit pack hardware test passes, both LEDs remain off.
- If the port circuit hardware test fails, the red LED is lighted on the port circuit pack.

If the port circuit pack fails the hardware test indicated by a red LED being lighted, replace the circuit pack. The port circuit pack insertion test is repeated.

RGI-C (GROUP 1)	CENTRAL LOCATION	RGI-C (GROUP 2)
MODULE ________		MODULE ________
CABINET ________		CABINET ________
CARRIER ________		CARRIER ________
SLOT ________		SLOT ________

MANAGER II DISPLAY		REMOTE CARRIER SLOT GROUP 1	REMOTE CARRIER SLOT GROUP 2
RGI-C	0,5,13 0R 18	—	—
RGI-R	1,6, 14 0R 19	0	5
PORT 1	0,5, 13 0R 18	1	4
FORT 2	1,6, 14 0R 19	2	7
FORT 3	2,7,15 OR 20	3	8

Figure 6-10. Remote Group Carrier Housing Unit Labels

Hyperactivity Testing

Hyperactive signaling by any network peripheral can cause serious resource contention problems within DEFINITY Communications System Generic 2. If the hyperactivity is severe or continues for very long, the switch suffers a severe degradation of service.

Hyperactivity software detects, identifies, tracks, arrests the message flow, and indicts a network peripheral as being hyperactive. Once the network peripheral is considered hyperactive it is busied out and specific fault code 337 (hyperactive port — receiving too many signals) is logged against the network peripheral in the software error log (PMIDS). Every five minutes thereafter, the port is conditionally released from busy. If the hyperactivity is no longer present at that time, the port is restored to full service and the hyperactivity alarm is resolved.

During the arrested message flow, the customer observes that his terminal's lamps and ringers work in the normal mode, but do not respond to an off-hook or button pushes. An incoming call causes his terminal to ring and the line appearance to flash, but the incoming call cannot be answered. If the hyperactivity persists and the terminal is maintenance busied (network peripheral indicted as being hyperactive) by the hyperactivity software, the terminal set goes dark and does not respond to user actions.

The problem of hyperactivity maybe intermittent and may have many causes. There is no demand test for you to perform to isolate hyperactive network peripherals. The hyperactivity software prevents any signaling from the hyperactive network peripheral from being processed. Testing a hyperactive network peripheral using Procedure 622 demand tests (Tests 2 through 4) could lead to contradictory test results. Executing Procedure 622, Test 1 displays specific fault code 337. Procedure 622, Tests 2 through 4 displays a specific fault code indicating that the test was receiving no signal from the device under test. The demand tests do not run the hyperactivity software and can never report specific fait code 337 in Tests 2 through 4.

Use the following repair steps to eliminate hyperactive ports when specific fault code 337 is displayed in Procedure 622.

1. Display the failing network peripheral in Procedure 622, Test 1. Record the equipment type and equipment location appearing in Fields 2 through 7.
2. Determine if the end user has used the buttons on the terminal abnormally,
   - If the end user has used the buttons abnormally, go to Step 3.
   - If the end user has not used the buttons abnormally, go to Step 6.
3. Perform a clear data, execute sequence in Procedure *622,* Test 1 by typing *cdx* for the network peripheral recorded in Step 1.
4. Wait five minutes.
5. Execute Procedure 622, Test 1.
   - If specific fault code 337 appears again for the same network peripheral, go to Step 6.
   - If a different specific fault code is displayed, go to Step 5 of fault isolation and repair procedure . *Alarmed Failures Fault Isolation* for further isolation techniques.
   - If the same network peripheral does not appear again, corrective action is complete for this network peripheral.
6. Replace the data module or terminal connected to the equipment location recorded in Step 1. Then, go to step 7.
7. Verify correct operation of the terminal by performing a terminal dial-up test.
   - If the dial-up test passes, go to Step 8.
   - If the dial-up test fails, go to Step 12.
8. Execute Procedure *622,* Test l2 on the equipment location recorded in Step 1 and its associated network peripheral replaced in Step 6.
   - If Test 2 passes, go to Step 9.
   - If Test 2 fails after taking all corrective action, escalate this failure.
9. Perform a clear data, execute sequence in Procedure *622,* Test 1 by typing *cdx* for the network peripheral recorded in Step 1.
10. Wait five minutes.

11. Execute procedure 622, Test 1.
    - If specific fault code 337 appears again for the same network peripheral, go to Step 12.
    - If a different specific fault code is displayed, go to Step 5 of fault isolation and repair procedure *Alarmed Failures Fault Isolation* for further isolation techniques.
    - If the same network peripheral does not appear again, corrective action is complete for this network peripheral.
12. At the equipment location recorded in Step 1, replace the circuit pack.
13. Perform a clear data, execute sequence in Procedure 622, Test 1 by typing *cdx* for the network peripheral recorded in Step 1.
14. Wait five minutes.
15. Execute Procedure 622, Test 1.
    - If specific fault code 337 appears again for the same network peripheral, go to Step 16.
    - If a different specific fault code is displayed, go to step 5 of fault isolation and repair procedure *Alarmed Failures Fault Isolation* for further isolation techniques.
    - If the same network peripheral does not appear again, corrective action is complete.
16. Use the port tester to check the wiring between the circuit pack and the terminal.
    - If the wiring is satisfactory, escalate this failure.
    - If the wiring is not satisfactory, repair or replace it.
17. Perform a clear data, execute sequence in Procedure 622, Test 1 by typing *cdx* for the circuit recorded in Step 1.
18. Wait five minutes.
19. Execute Procedure 622, Test 1.
    - If specific fault code 337 appears again for the same circuit, escalate this failure.
    - If a different specific fault code is displayed, go to Step 5 of fault isolation and repair procedure *Alarmed Failures Fault Isolation* for further isolation techniques.
    - If the same network peripheral does not appear again, corrective action is complete for this network peripheral.

PROCEDURE 623 — ANI (UNIT TYPE 21)

Unit Type 21 — Automatic Number Identification (ANI)	
Diagnostic and verification test	Procedure *623*, Test *2*
Components tested	SN244
Tools and test equipment	J59204AJ ANI Data Link Test Set when performing Test 2 to verify the 4-digit trunk and station number assignment.
Related procedures	• Procedure 620, Test 3 to check the module-control channel when failure code 1 appears in Procedure 623.

General Repair Steps

If there is an ANI trunk circuit failure, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 623. Use the following steps to isolate and repair the failure.

1. Execute Procedure 623, Test 1.

   Record the failure history.

2. Start test 2.
3. Select the ANI trunk circuit you want to test.
4. At the cross-connect field, disconnect the T and R leads of the ANI trunk circuit you selected.
5. Connect the ANI test set to the trunk circuit pack (SN244) containing the trunk circuit you selected.
6. At the test cable, set the **CHANNEL** switch to the setting that corresponds to the circuit number appearing in Field 7.
   - If circuit 0 appears, set the **CHANNEL** switch to 9.
   - If circuit 1 appears, set the **CHANNEL** switch to 8.
7. Execute test 2.

   Record the results.

   - If there are no failures, go to Step 11.
   - If there are any failures, replace circuit pack SN244.
8. Repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, go to step 10.

NOTE

When you repeat Test 2 after removing and replacing a circuit pack, Test 2 may fail because the circuit pack is not initialized properly.

9. Repeat test 2 before assuming the corrective action taken did not fixed the problem.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again, check the failure code appearing in Field 8.
     - — If field 8 contains a 1, go to *Procedure 620 — Common-Control Carrier Unit Types,* to test the TN401 (module-control channel) circuit pack.
     - — If field 8 contains any other failure code, check the wiring to the SN244 circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
10. Connect the T and R leads you disconnected.
11. Repeat steps 3-10 for each ANI trunk circuits.

PROCEDURE 628 — UNIVERSAL BUS (UNIT TYPE 81)

Unit Type 81 — Universal Bus	
Diagnostic and verification tests	Procedure 628, Test 2 and Test 3
Components tested	LAN bus and TDM A/B buses
Related procedures	• Administration Procedure 000, Word 1 to administer three port type ones (on-premises line). • Administration Procedure 150, Word 1 to determine if a tone detector circuit pack is administered. • Administration Procedure 290, Word 1 to determine if at least three LAN bus interface circuit packs are administered. • Procedure 620, Test 2 to perform a range test on unit type 23, unit type 24, unit type 66, or unit type 80. • Procedure 621, Test 2 to soft switch to the off-line universal module-control carrier. • Procedure 622, Test 2 to perform a range test on all basic rate interface (BRI) circuits in a module. • Procedure 648, Test 2 to perform a range test on all ISDN circuits.

General Repair Steps

Some of the following fault isolation and repair steps affect service. You, the system technician, *must* determine the type of service that you have when an alarmed bus failure is indicated.

You can determine the type of service that is available by trying to make calls in the universal module or carrier that is affected. The universal module for the alarmed TDM or LAN bus appears in Field 2 of Procedure 628.

After deciding the type of service that is available, you and the customer can determine when the fault isolation and repair procedures are to be performed. — That is, during normal out-of-hours when service is not affected as much, or immediately because the failure is impacting service to such an extent that immediate repair is required.

In addition, Procedure 628, Test 4 allows you to switch service for a bus (ii-service or out-of-service); to switch the control channel on or off a TDM bus; to switch tones on or off a TDM bus; and to maintenance busy or release busy all time slots on a bus. Some of these capabilities may help you to determine when and how to perform fault isolation and repair procedures.

Specific fault codes 3059,3060,3061, 3062, 3063,3064, and 3067 are logged in the periodic maintenance information data structure (PMIDS) by the operational error processing (OEP) software program. These specific fault codes are displayed in Test 1 but are not displayed by the demand diagnostic test in Test 2 or the continuous test in Test 3.

If there is a universal bus (time division multiplexed (TDM) or local area network (LAN)) failure, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 628. Use the following steps to isolate and repair the failure.

1. Execute Procedure 628, Test 1.

   Record each alarmed bus and all specific fault codes.

2. Execute test 2 for the first alarmed bus displayed in Test 1.

   - If Test 2 passes, indicated by a 0 displayed in Field 14 and a 0 displayed in Field 12, go to step 5 to test for intermittent failures.
   - If Test 2 fails, indicated by a 1 displayed in Field 14, record the specific fault code displayed in Field 12. Then, go to step 4.

3. Look at the specific fault code appearing in Field 12.

   - If specific fault code 3008, 3009, or 3037 appears, go to fault isolation and repair procedure *Check for Clock and Power to Port Boards.*
   - If specific fault code 3010 appears, use administration Procedure 150, Word 1 to determine if a tone detector board is translated but not installed at the equipment location displayed in Fields 1-4.

     — If a tone detector board is translated but not installed at the equipment location displayed in Fields 14, either install the circuit pack or remove the translation. Then go back to step 3. If specific fault code 3010 is display again for the same equipment location, escalate the failure.

     — If a tone detector bead is translated and is installed at the equipment location displayed in Fields 1-4, escalate the failure.

- If specific fault code 3035 appears, go to fault isolation and repair procedure *Level 2 Protocol Failure.*
- If specific fault code 3036 appears, go to fault isolation and repair procedure *Level 2 Protocol, No Test.*
- If specific fault code *3100,3101, 3120, 3121, 3122, 3123,3124,3125,3126, 3127, 3128,* or 3129 appears, go to fault isolation and repair procedure *TDM Bus Faulty.*
- If specific fault code 3102, 3103, 3104, 3105, 3106, or 3107 appears, go to fault isolation and repair procedure *TDM Bus Control Channel Faulty to Some Carrier.*
- If specific fault code 3108, 3109, 3110, 3111, 3112, or 3113 appears, go to fault isolation and repair procedure TDM *Bus Control Channel Faulty to a Sparsely Populated Carrier.*
- If specific fault code 3114, 3315, 3116, 3117, 3118, or 3119 appears, go to fault isolation and repair procedure *TDM Bus Control Channel Faulty to an Unpopulated Carrier.*

4. When the bus was alarmed in test 1 and passes test 2, perform further analysis of the problem by executing test 3 on the same failing bus displayed in step 3 to ensure that the failure is not intermittent. Allow Test 3 to execute for a period of time (or until a specific fault code appears in Field 12).
   - If the bus passes Test 3, go to Step 6.
   - If the bus fails Test 3, record the specific fault code displayed in Field 12. Then, go back to step 4.
5. Determine if specific fault code 3059,3060,3061,30623063, 3064, or 3067 was recorded in step 2.
   - If specific fault code 3059, 3060, 3061, 3062, 3063,3064, or 3067 was recorded, go to step 7.
   - If specific fault code 3059, 3060, 3061, 3062, 3063, 3064, or 3067 was not recorded, go to step 10.
6. Perform a clear data execute sequence in test 1 by typing *cdx* for the bus that displayed specific fault code 3059,3060,3061,3062, 3063,3064, or 3067.

7. Wait five minutes
8. Execute test 1.
   - If specific fault code 3061, 3062, 3063, or 3064 appears again for the same failing bus, escalate the failure.
   - If specific fault code 3059 or 3060 appears again for the same failing bus, go to fault isolation and repair procedure *Time Division Multiplexed (TDM) Bus Control Channel Faulty but Problem May Lie in Universal Bus Interface (UBI).*
   - If specific fault code 3067 appears again for the same same failing bus, go to fault isolation and repair procedure *LAN Receives Parity Error.*
   - If a different specific fault code appears for the same failing bus or another bus is alarmed, go back to Step *3.*
   - If there are no alarmed buses in Test 1, corrective action is complete.
9. Execute test 2 for each alarmed TDM/LAN bus failure recorded in test 1. Repeat steps 3-9 (as appropriate) for each recorded alarmed TIM/IAN bus failure.

If all alarmed TDM/LAN bus failures pass Test 2, perform the clear data, execute sequence in test 1 to resolve the alarmed buses and to turn off the **OTHER FAILS** fault indicator (assuming no other alarm sources affecting the fault indicator are active).

Check for Clock and Power to Port Boards

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Look at Field 12 and determine if specific fault code *3008* or 3009 appears.
   - If specific fault code 3008 or 3009 appears, go to step 3.
   - If specific fault code 3008 or 3009 is not displayed, go to step 5.

3. Look at Field 4 and determine if the bus in Field 3 is the control channel bus.
   - If the bus in Field 3 is the control channel bus, go to step 4.
   - If the bus in Field 3 is not the control channel bus, go to step 5.
4. Use test 4 to switch the control channel. Then, go to step 5.
5. At the universal network module displayed in Field 2, reseat any port circuit pack as near to Slot 1 of Carrier C as possible.
6. Determine the status of the red LED.
   - If the red LED lights steady, go to step 1 of fault isolation and repair procedure *TDM Bus with No Clock*.
   - If the red LED does not light at al1, go to step 1 of fault isolation and repair procedure *TDM Bus with No Power*.
   - If the red LED lights up then goes out, go to step 1 of fault isolation and repair procedure *TDM Bus Checks OK, LAN Bus Faulty*.

TDM Bus with No Clock

1. At the universal network module recorded in step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards,* check the power supplies (631DA1 or 644A1 and 631DB1 or 645B1) in the on-line module control carrier.
   - If the red LED is not lighted on any of the power supplies, go to Step 3.
   - If any red LED is lighted, replace the power supply with the red LED lighted. Then, go to step 2.
2. Execute test 2 on the same failing bus.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, escalate the failure.
3. At the rear of the universal module control carrier, visually check the TDM and LAN cabling and terminators.
   - If the cables and terminators look good, go to step 5.
   - If the cables and terminators do not look good, connect the problem. Then, go to step 4.
4. Repeat test 2.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, escalate the failure.

5. Use Procedure 620, Test 2 to perform a range test on unit type *80* (UBI circuit pack (UN154)). Use the module number displayed in Field 2 of Procedure 628 as the limiting factor on the range test.
   - If the range test passes, go to step 7.
   - If the range test fails, go to step 6.
6. Enter Procedure 620, Test 4. Replace the UN154 circuit pack that failed the range test.
   - If Procedure 620, Test 4 passes, go to step 7.
   - If Procedure G20, Test 4 fails after replacing the UN154 circuit pack, go to step 8.
7. Execute test 2 on the same failing bus.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.
8. At the universal network module displayed in Field 2, determine if the module-control carrier is duplicated.
   - If the module-control carrier is duplicated, unseat the off-line UBI circuit pack (UN154). Then go to step *9*.
   - If the module-control carrier is unduplicated go to step 9.
9. At the universal network module displayed in Field *2*, unseat all port network circuit packs in Carriers C, D, and E.
10. Reseat the first port network circuit pack in Carrier C.
    - If the red LED on the circuit pack lights up then goes out, the problem is in one Of, Or combination of, the circuit packs unseated in step 9. *Go* to step 11.
    - If the red LED on the circuit pack lights steady, there is no port network circuit pack problem. Reseat the off-line UBI circuit pack (UN154) in the off-line module-control carrier if unseated in step 8. Reseat all network circuit packs in Carriers C, D, and E. Then, go to step 12.
11. Replace the port network circuit pack reseated in step 10. Record the equipment location of the port network circuit pack replaced. Reseat all other port network circuit packs and the off-line UBI circuit pack (UN154) in the off-line module-control carrier if unseated in step 8. Then, go to step 12.
12. Repeat test 2.
    - If Test 2 passes, you have fixed the problem for this failing bus.
    - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.

- If Test 2 fails again with the same specific fault code, repeat steps 8-12 until all port network circuit packs in Carriers C, D, and E in the network module displayed in Field 2 have been reseated or replaced. If the red LED continues to light and then goes out after all port network circuits have been reseated or replaced, escalate the failure.

13. At the rear of the universal network module displayed in Field 2, examine the entire length of the LAN bus and TDM bus cables and termination. There maybe a problem with bent pins, bad solder connections, bad terminator cards, opens, or shorts.
    - If there is no problem with the LAN bus and TDM bus cables or terminators, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.
    - If there is a problem with the LAN bus and TDM bus cables or terminator correct the problem. Then, go to step 14.
14. Repeat test 2.
    - If Test 2 passes, go to step 15.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.
15. Execute test 3 on the same failing bus. Allow Test 3 to execute for a period of time (or until a specific fault code appears in Field 12).
    - If Test 3passes, you have fixed the problem for this failing bus.
    - If Test 3 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 3 fails again with the same specific fault code, escalate the failure. YOU have an intermittent carrier failure.

TDM Bus with No Power

1. At the universal network module recorded in step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards,* check the power supplies (631DA1 or 644A1 and 63lDB1 or 645B1) in port Carriers C, D, and E.
    - If the red LED is not lighted on any of the power supplies, go to step 2.
    - If any red LED is lighted, replace the power supply with the red LED lighted. Then, go to step 2.

2. Execute test 2 on the same failing bus.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.

TDM Bus Checks OK, LAN Bus Faulty

1. Use Procedure 620, Test 2 to perform a range test on unit type 80 (UBI circuit pack (UN154)). Use the module number recorded in step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* as the limiting factor on the range test.
   - If the range test passes, go to step 3.
   - If the range test fails, go to step 2.
2. Enter Procedure 620, Test 4. Replace the UN154 circuit pack that failed the range test.
   - If Procedure 620, Test 4 passes, go to Step 3.
   - If Procedure 620, Test 4 fails after replacing the UN154 circuit pack, go to Step 4.
3. Execute test 2 on the same failing bus.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.
4. At the rear of the universal network module displayed in Field 2, remove the LAN and TDM bus cables from Carrier A.
5. Use Procedure 620, Test 2 to perform a range test on unit type 80 (UBI circuit pack (UN154)). Use the module number displayed in Field 2 of Procedure 628 as the limiting factor on the range test.
   - If the range test passes, go to step 6.
   - If the range test fails, go to step 8.
6. Enter test 2. Display the module number and bus number of the failing bus in Fields 2 and 3.

7. At the universal network module displayed in Field 2, determine if the module-control carrier is duplicated.
   - If the module-control carrier is duplicated, unseat the off-line UBI circuit pack (UN154). Then, go to step 9 of fault isolation and repair procedure *TDM Bus With No Clock.*
   - If the module-control carrier is unduplicated, go to Step 9 of fault isolation and repair procedure *TDM Bus with No Clock.*
8. Replace the Carrier ALAN and TDM bus cables removed in Step 4.
9. Check for problems in the reserve slots (no circuit packs installed) of Carrier A, the UBI circuit pack (UN154) slot, and the TDM/LAN bus connector cable fields.

   NOTE

   The slot number for UN154 in the module-control carrier is slot 7. The cable fields are the TDM/LAN cables that connect to the backplane pins with a connector to the pin field.

   - If there is no problem with the reserve slots, the UBI slot, or the TDM/LAN bus connector cable fields, replace Carrier A. Then, go to step 10.
   - If there is a problem with the reserve slots, the UBI slot, or the TDM/LAN bus connector, correct the problem. Then, go to step 10.
10. Execute test 2 on the same failing bus.
    - If Test 2 passes, you have fixed the problem for this failing bus.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.

Level 2 Protocol Failure

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Use Procedure 648, Test 2 to perform a range test on all integrated services digital network (ISDN PRI) circuits in the switch.
   - If any facility within the range passes, go to step 4.
   - If the range test fails, go to Step 3.
3. Perform corrective action as listed in *Procedure 648 — ISDN Error Processing (Unit Type 76),* until all ISDN circuits pass Procedure 648, Test 2. hen, go to step 4.

4. Use Procedure 622, Test 2 to perform a range test on all BRI circuits in a module. Use the module number recorded in step 1 as the limiting factor on the range test.
   - If any terminals within the range pass, go to step 6.
   - If the range test fails, go to step 5.
5. Perform corrective action as listed in *Procedure 622 — Network Peripherals (Unit Type 30, Unit Type 48, or Unit Type 79),* until all BRI circuits pass Procedure 622, Test 2. Then, go to step 6.
6. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.

Level 2 Protocol, No Test

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Use administration Procedure 290, Word 1 to determine if at least three LAN bus interface circuit packs are administered. LAN bus interface circuit packs are PRI (TN555) and BRI (TN556). When using Procedure 290, Word 1 enter the port type (25 for the PRI, 27 for the BRI) and the module number recorded in step 1.
   - If three or more LAN bus interface circuit packs are administered, go to step 4.
   - If fewer than three LAN bus interface circuit packs are administered, go to step 3.
3. Administer at least three LAN bus interface circuit packs. Refer to *DEFINITY™ Communications System Generic 2 Administration of Features and Hardware* (555-104-507), ISDN (PRI/BRI) administration to determine how to administer the LAN bus interface circuit packs.
4. Use Procedure 648, Test 2 to perform a range test on all ISDN circuits in the switch.
   - If the range test passes, go to step 6.
   - If the range test fails, go to step 5.
5. Perform corrective action as listed in, *Procedure 648 — ISDN Error Processing (Unit Type 76), until* all ISDN circuits pass Test 2 of Procedure 648.
6. Use Procedure 622, Test 2 to perform a range test on all BRI circuits in a module. Use the module number recorded in step 1 as the limiting factor on the range test.
   - If the range test passes, go to step 8.
   - If the range test fails, go to step 7.

7. Perform corrective action as listed in, *Procedure 622 — Network Peripherals (Unit Type 30, Unit Type 48, or Unit Type 79),* until all BRI circuits pass Procedure 622, Test 2.
8. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again, with the same specific fault code, escalate the failure.

TDM Bus Faulty

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. At the universal network module displayed in Field 2, determine if the module-control carrier is duplicated.
   - If the module-control carrier is duplicated, go to Step 3.
   - If the module-control carrier is unduplicated, go to Step 8.
3. Use Procedure 621, Test 2 to soft switch to the off-line universal module-control carrier.
4. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, go to step 5.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to Step 8.
5. Replace the off-line UN154 UBI circuit pack in the off-line universal module-control carrier.
6. Use Procedure 621, Test 2 to soft switch to the off-line universal module-control carrier.
7. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 8.
8. Use Procedure 620, Test 2 to perform a range test on unit type 24 (tone detector circuit pack (TN748)). Use the module number displayed in Field 2 of Procedure 628 as the limiting factor on the range test.
   - If the range test passes, go to step 10.
   - If the range test fails, go to Step 9.

9. Enter Procedure 620, Test 4. Replace the TN748 circuit pack that failed the range test.
   - If Procedure 620, Test 4 passes, go to step 15.
   - If Procedure 620, Test 4 fails after replacing the UN154 circuit pack, go to step 16.
10. Use Procedure 620, Test 2 to perform a range test on unit type 66 (tone detector circuit pack (TN748)). Use the module number displayed in Field 2 of Procedure 628 as the limiting factor on the range test.
    - If the range test passes, go to step 12.
    - If the range test fails, go to Step 11.
11. Enter Procedure 620, Test 4. Replace the TN748 circuit pack that failed the range test.
    - If Procedure 620, Test 4 passes, go to Step 15.
    - If Procedure 620, Test 4 fails after replacing the UN154 circuit pack, go to step 16.
12. Use Procedure 620, Test 3 to perform a continuous range test on the same module number and unit type as in step 8 above. Allow the test to run for 20 minutes or until a failure is detected.
    - If the range test passes, go to step 13.
    - If the range test fails, go to step 14.
13. Use Procedure 620, Test 3 to perform a continuous range test on the same module number and unit type as in step 10 above. Allow the test to run for 20 minutes or until a failure is detected.
    - If the range test passes, go to step 15.
    - If the range test fails, go to Step 14.
14. Enter Procedure 620, Test 4. Replace the TN748 circuit pack that failed the range test.
    - If Procedure 620, Test 4 passes, go to step 15.
    - If Procedure 620, Test 4 fails after replacing the UN154 circuit pack, go to step 16.
15. Execute test 2 on the module and bus recorded in step 1.
    - If Test 2 passes, you have fixed the problem for this failing bus.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to step 16.
16. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier C.
17. Repeat test 2.
    - If Test 2 passes, replace the port circuit pack. hen, go to step 25.
    - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to step 18.

18. Determine if all circuit packs have been unseated in Carrier C.
    - If all circuit packs have not been unseated, repeat step 16, unseating one port circuit pack at a time until all port circuit packs in Carrier C have been unseated.
    - If all circuit packs have been unseated, go to step 19.
19. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier D.
20. Repeat test 2.
    - If Test 2 passes, replace the port circuit pack. Then, go to step 25.
    - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to step 21.
21. Determine if all circuit packs have been unseated in Carrier D.
    - If all circuit packs have not been unseated, repeat step 19, unseating one port circuit pack at a time until all port circuit packs in Carrier D have been unseated.
    - If all circuit packs have been unseated, go to step 22.
22. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier E.
23. Repeat test 2.
    - If Test 2 passes, replace the port circuit pack. Then, go to step 25.
    - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to Step 24.
24. Determine if all circuit packs have been unseated in Carrier E.
    - If all circuit packs have not been unseated, repeat step 22, unseating one port circuit pack at a time until all port circuit packs in Carrier E have been unseated.
    - If all circuit packs have been unseated, go to step 26.
25. Repeat test 2.
    - If Test 2 passes, you have fixed the problem for this failing bus.
    - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, escalate the failure.
26. Go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.

TDM Bus Control Channel Faulty to Some Carrier

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Look at Field 12 and determine which specific fault code is displayed.
   - If specific fault code 3102 or 3103 appears, carrier C is suspect.
   - If specific fault code 3103 or 3104 appears, carrier D is suspect.
   - If specific fault code 3106 or 3107 appears, carrier E is suspect.
3. At the universal network module displayed in Field 2, check the LEDs on the circuit packs in the suspect carrier as determined in step 2.
   - If the carrier has circuit packs plugged in with no LEDs lighted, go to step 4.
   - If the carrier has circuit packs plugged in with LEDs lighted, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.
4. At the universal network module displayed in Field 2, check the power supplies (63lDA1 or 644A1 and 63lDB1 or 645Bl) in the suspect carrier as determined in step 2.
   - If the red LED is not lighted on any of the power supplies, go to step 6.
   - If any red LED is lighted, replace the power supply with the red LED lighted. Then, go to Step 5.
5. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, escalate the failure.
6. At the rear of the suspect carrier, check the bus cabling and the backplane.
   - If there is no problem with the bus cabling and backplane, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.
   - If there is a problem with the bus cabling or backplane, correct the problem. Then, go to Step 7.
7. Repeat test 2.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Specific Fault Codes* for further fault isolation.

TDM Bus Control Channel Faulty to a Sparsely Populated Carrier

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Look at Field 12 and determine which specific fault code is displayed.
   - If specific fault code 3108 or 3109 appears, go to step 3.
   - If specific fault code 3110 or 3111 appears, go to step 7.
   - If specific fault code 3112 or 3113 appears, go to step 11.
3. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier C.
4. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, replace the port circuit pack. Then, go to step 6.
   - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to step 5.
5. Determine if all circuit packs have been unseated in Carrier C.
   - If all circuit packs have not been unseated, repeat step 3, unseating one port circuit pack at a time until all port circuit packs in Carrier C have been unseated.
   - If all circuit packs have been unseated, go to step 15.
6. Repeat test 2.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards.*
7. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier D.
8. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, replace the port circuit pack. Then, go to step 10.
   - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to step 9.
9. Determine if all circuit packs have been unseated in Carrier D.
   - If al1 circuit packs have not been unseated, repeat step 7, unseating one port circuit pack at a time until all port circuit packs in Carrier D have been unseated.
   - If all circuit packs have been unseated, go to step 15.

10. Repeat test 2.
    - If Test 2 passes, you have fixed the problem for this fading bus.
    - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.
11. At the universal network module displayed in Field 2, unseat the first port circuit pack in Carrier E.
12. Execute test 2 on the module and bus recorded in step 1.
    - If Test 2 passes, replace the port circuit pack. Then, go to step 14.
    - If Test 2 fails again with a different specific fault code, reseat the circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, reseat the circuit pack. Then, go to step 13.
13. Determine if all circuit packs have been unseated in Carrier E.
    - If all circuit packs have not been unseated, repeat **step** 11, unseating one port circuit pack at a time until all port circuit packs in Carrier E have been unseated.
    - If all circuit packs have been unseated, go to step 15.
14. Repeat test 2.
    - If Test 2 passes, you have fixed the problem for this failing bus.
    - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.
15. Go to step 1 of fault isolation and repair procedure *Check for Clock and Power to Port Boards* for further fault isolation.

TDM Bus Control Channel Faulty to an Unpopulated Carrier

1. Record the module number and bus number displayed in Fields 2 and 3 of test 2.
2. Look at Field 12 and determine which specific fault code is displayed.
    - If specific fault code 3114 or 3115 appears, carrier C is suspect.
    - If specific fault code 3116 or 3117 appears, carrier D is suspect.
    - If specific fault code 3118 or 3119 appears, carrier E is suspect.

3. Use administration Procedure 290, Word 1 to determine if at least three circuit packs on the suspect carrier are administered. When using Procedure 290, Word 1 enter the module number recorded in step 1, cabinet number 0, the suspect carrier (from step 2), and Slot 0.
   - If three or more circuit packs on the suspect Carrier are administered, escalate the failure.
   - If fewer than three circuit packs on the suspect carrier are administered, go to step 4.
4. Use administration Procedure 000, Word 1 to administer three port type 1s (on-premises line). Ensure that the appropriate hardware is installed in the suspect carrier.
5. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure General *Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, escalate the failure.

TDM Bus Control Channel Faulty but Problem May Lie in UBI

1. Record the module and bus numbers displayed in Fields 2 and 3 of test 1.
2. At the universal network module recorded in step 1, determine if the module-control carrier is duplicated.
   - If the module-control carrier is duplicated, unseat the off-line UBI circuit pack (UN154). Then. go to step 3.
   - If the module-control carrier is unduplicated, go to Step 9 of fault isolation and repair procedure *TDM Bus with No Clock* for further fault isolation.
3. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, go to step 4.
   - If Test 2 fails again with a different specific fault code, reseat the off-line UBI circuit pack. Then, go to step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, reseat the off-line UBI circuit pack. Then, go to step ll.
4. At the module number recorded in step 1, replace the off-line UBI circuit pack.
5. Execute test 2.
   - If Test 2 passes, go to step 20.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to Step 6.

6. Use Procedure 620, Test 2 to perform a range test on unit type 23 (duplication channel circuit pack (TN541)). Use the module number recorded in step 1 as the limiting factor on the range test.
   - If the range test passes, go to step 9.
   - If the range test fails, go to step 7.
7. Enter Procedure 620, Test 4. Replace the TN541 circuit pack that failed the range test.
   - If Procedure 620, Test 4 passes, go to Step 8.
   - If Procedure 620, Test 4 fails, take additional corrective action until Test 4 passes. Then, go to Step 8.
8. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, go to step 20.
   - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, go to step 9.
9. Check for carrier backplane problems in the off-line module-control carrier.
   - If there is no problem with the carrier backplane, escalate the failure.
   - If there is a problem with the carrier backplane, correct the problem. Then, go to Step 10.
10. Repeat test 2.
    - If Test 2 passes, go to step 20.
    - If Test 2 fails again with a different specific fault code, go to step 4 of fault isolation and repair procedure *General Repair Steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, escalate the failure.
11. Use Procedure 621, Test 2 to soft switch to the off-line universal module-control carrier.
12. Execute test 2 on the module and bus recorded in step 1.
    - If Test 2 passes, go to step 13.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure General *Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, unseat the off-line UN 154 UBI circuit pack in the off-line universal module-control carrier. Then, go to step 9 of fault isolation and repair procedure *TDM Bus With No Clock* for further fault isolation.
13. Replace the off-line UN154 UBI circuit pack in the off-line universal module-control carrier.
14. Use Procedure 621, Test 2 to soft switch to the off-line universal module-control carrier.

15. Execute test 2 on the module and bus recorded in step 1.
    - If Test 2 passes, go to step 20.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, go to Step 16.
16. Check the on-line and off-line UBI circuit pack UN154 slot pins. Reseat both the on-line and off-line UN154 circuit packs. Then, go to step 17.
17. Repeat test 2.
    - If Test 2 passes, go to step 20.
    - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If Test 2 fails again with the same specific fault code, escalate the failure.
18. Perform a clear data, execute sequence in test 1 by typing *cdx* for the bus that displayed specific fault code 3059 or 3060.
19. Wait five minutes.
20. Execute test 1.
    - If specific fault code 3059 or 3060 appears again for the same failing bus, escalate the failure.
    - If a different specific fault code appears for the same failing bus or another bus is alarmed, go to step *3* of fault isolation and repair procedure *General Repair steps* for further fault isolation.
    - If there are no alarmed buses in Test 1, corrective action is complete.

LAN Receives Parity Error

1. Record the module number and bus number displayed in Fields 2 and 3 of test 1.
2. Use Procedure *622,* Test 2 to perform a range test on all BRI circuits in the a module. Use the module number recorded in step 1 as the limiting factor on the range test.
    - If the range test passes, escalate the failure.
    - If the range test fails, go to Step 3.
3. Look at Fields 13 and 14 of Procedure 622 to determine if all tested BRI circuits failed.
    - If all tested BRI circuits failed, go to step 5 of fault isolation and repair procedure *TDM Bus with No Clock.*
    - If some, but not all tested BRI circuits failed, go to Step 4.

4. Perform corrective action as listed in *Procedure 622 — Even-Numbered Port Peripherals (Unit Type 30), Odd-Numbered Peripherals (Unit Type 48), or External Processor (Unit Type 64),* until all BRI circuits pass Procedure 622, Test 2. Then, go to step *5.*

5. Execute test 2 on the module and bus recorded in step 1.
   - If Test 2 passes, go to step 6.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.

6. Perform a clear data, execute sequence in test 1 by typing *cdx* for the module and bus that displayed specific fault code 3067.

7. Wait five minutes.

8. Execute test 1.
   - If specific fault code 3067 appears again for the same failing module and bus, escalate the failure.
   - If a different specific fault code appears for the same failing bus or another bus is alarmed, go to step 3 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If there are no alarmed buses in Test 1, corrective action is complete.

Specific Fault Codes

Appendix A, *Specific Fault Codes,* lists the specific fault codes in numerical sequence with the circuit packs or components that maybe causing the specific fault code to occur.

Further isolation of a failure is accomplished as follows:

1. Analyze the specific fault codes recorded in Test 1 and Test 2 of Procedure 628.

2. Determine from the specific fault codes recorded, using Appendix A, if any additional corrective action can be performed (for example, other circuit packs to replace).
   - If all components have been replaced, escalate the failure.
   - If all components have not been replaced, go to Step 3.

3. Use Procedure 620, Test 2 to perform a range test on the unit type of the circuit pack you want to replace. Use the module number displayed in Field 2 of Procedure 628 as the limiting factor on the range test.

NOTE

Refer to Table 6-3, *Procedure 620 — Network Unit Types,* to determine the unit type of the circuit pack you want to replace.

- If the range test passes, go to step 5.
- If the range test fails, go to step 4.

4. Enter Procedure 620, Test 4. Replace the circuit pack that failed the range test.
   - If Procedure 620, Test 4 passes, go to step 5.
   - If Procedure 620, Test 4 fails, take additional corrective action until Test 4 passes. Then, go to step 5.
5. Execute test 2 on the same failing module and bus.
   - If Test 2 passes, you have fixed the problem for this failing bus.
   - If Test 2 fails again with a different specific fault code, go to Step 4 of fault isolation and repair procedure *General Repair steps* for further fault isolation.
   - If Test 2 fails again with the same specific fault code, repeat step 2.

PROCEDURE 640 — TRUNK (UNIT TYPE 41)

Unit Type 41 — Trunk

- Failure history and monitoring of trunk activity
  - — Procedure 640, Test 1 and Test 2
- Components tested
  - — Trunk activity
- Tools and test equipment
  - — A 249A adapter
  - — Telephone set or hand test set when performing outgoing calls using Procedure 642, Test 2. Procedure 642, Test 2 cannot be used on universal trunk circuits.
- Related procedures
  - — Administration Procedure 100, Word 3 to check:
    - The trunk error thresholding for electronic tandem network (ETN) trunks
    - The limited set of ETN trunk types
    - The permanent incoming seizure treatment.
  - — Administration Procedure 106, Word 6 to determine the percentage of trunks in a trunk group that can be placed in maintenance busy out.
  - — Administration Procedure 107, Word 6 to determine the number of trunks that can be placed in maintenance busy out.
  - — Administration Procedures 116, 150, or 178 to determine how the trunk is used.
  - — Trunk alarms can be administered in administration Procedure 275, Word 4, Field 6.
  - — Administration Procedure 275, Word 4 to check if unit type 41 alarms for all trunks are disabled.
  - — Administration Procedure 350, Word 2 to obtain the trunk verification by voice terminal (TVVT) dial access code (for feature code 44).
  - — Procedure 620, Test 4 to test the hardware associated with the failing trunk.
  - — Procedure 642, Test 2 to make outgoing calls on the suspected failing trunk (outgoing trunks only).
  - — Procedure 646 to test unit type 65 modem pooling trunks.
  - — Procedure 647 to make automatic transmission measurements (ATMS -- unit type 70) trunks.
  - — Procedure 648 to test the integrated services digital network (ISDN -- unit type 76) circuit pack providing service for ISDN trunks.
- Other tests
  - — Interpretation and appropriate corrective action by higher level system technicians on the trunk data displayed in Procedure 640, Test 2.

General Repair Steps

If there is a trunk failure, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 640.

Procedure 640 shows failures detected by trunk supervisory signaling and associated call processing. These failures can occur when the trunk is in-use or is available for normal service and are not generally caused by hardware failures.

To interpret the data in Procedure 640, you should have some call processing knowledge. Use test 1 to examine the failure history and use test 2 to monitor call progress on a trunk.

Refer to *DEFINITY™ Communications System Generic 2 Maintenance Procedures (555-104-117)* for a more detailed description of procedure 640, Test 1 and Test 2.

General

Trunk failures may be difficult to isolate and repair because they occur in the interface between the local switch and the distant equipment. Trunk failure data is provided for CO, TIE, DID DS-1 trunks, CO, TIE, DID, AUX analog trunks, ISDN trunks, and modem pooling trunks. These trunks can be in a traditional or universal module. There are more failure codes for universal trunks than for traditional trunks.

The trunk failure data and repair procedures in this section help you to determine whether the failure is in the local switch or in equipment that is external to the local switch. Table 6-6, Circuit Pack Codes For Trunk Failures, lists the type of circuit pack in a traditional or universal module for each type of trunk.

TABLE 6-6. Circuit Pack Codes For Trunk Failures

Circuit Pack Code	Traditional Module	Universal Module
CO	SN230	TN747
DID	SN232	TN753
TIE	SN233	TN760
AUX	SN231	TN763
DS-1	ANNl1	TN767
ISDN	ANN35	TN767 with TN555 (DS-l with a packet adjunct)
Modem pooling — analog	SN243 or SN238	TN746 or TN742 or TN726
Modem pooling — digital	SN270	TN754

Trunk failures generally occur when one end signals (for example, going from busy to idle) and the other end does not respond properly within the allocated time. Failure to respond properly is usually marked with failure code 2. Failure code 2 is a generic failure code used when more specific information is not available at the time of failure. Failure code 2 covers trunk failures while in a signaling sequence or other functions of call processing.

Trunk alarms are normally investigated after investigating trunk circuit pack failures. Procedure 600, Test 1, shows trunk failures after alarmed circuit pack failures for with trunk circuits appear. (This even includes DS-1 and ISDN circuit pack failures and their associated trunk failures.)

PMIDS can only contain 60 trunk failures If more than 60 trunks fail, any new failure information is lost. Any resolved trunk failures in PMIDS will, however, be overwritten. The oldest non-alarmed trunk circuit failures will also be overwritten with new trunk circuit failure information.

How Trunk Failures are Handled in DEFINITY Generic 2

If there is a trunk failure, connections on the trunk are dropped and a request is sent to the far end to drop the connection. If the trunk goes idle, as determined from the near end and the far end scan data, the trunk is generally returned to its idle queue to be available for future service. This is an example of a trunk failure that usually cannot be reproduced because it has been returned to its idle queue. If, however, a trunk continually fails and is then returned to the idle queue, you should investigate the trunk. Exceptions for DS-1 and ISDN trunks are described later.

General Steps for Handling Trunk Failures

If the trunk does not go idle, then the near end, far end, the trunk is placed in a call processing state called trunk limbo.

Note that trunk limbo is a transient call processing state that makes malfunctioning trunks unavailable to call processing.

- This state is used for failed analog trunks that should not be put in their idle queue when aborted from a call because the scan data is not idle.

  When the scan data for an analog trunk in limbo goes idle, the trunk is removed from limbo and put in its idle queue.

- DS-1 and ISDN trunks can be kept in limbo when the span between the DS-1 boards has failed.
  - When the scan data for a DS-1 trunk in limbo goes idle and the transient or alarmed indication of a bad span has been removed, the trunks in the span are removed from the limbo state and put in their idle queue.
  - When an ISDN trunk in limbo is sent to trunk error processing recovery, the trunks in the span are removed from the limbo state and put in their idle queues.

For trunks that do not have administered failure thresholds, a drop command message (except for ISDN trunks) is sent to the trunk every minute for 15 minutes. This message continues to be sent for universal DS1 trunks that are in limbo. If the trunk is not idle after 15 minutes, a warning alarm is set, unless trunk alarming is turned off. Whenever the trunk goes idle, it is removed from the limbo state and returned to its idle queue.

Handling of Trunk Failures — Exceptional Cases

One exception is trunk error thresholding that can be administered by trunk group for ETN trunks in administration Procedure 100, Word 3. (The limited set of ETN trunk types is also listed in Procedure 100, Word 3.) If the threshold is greater than 0 and the trunk fails on an outgoing call, then failure code 8 — ETN automatic maintenance busy out is logged. The trunk is returned to service until the failure rate exceeds the threshold for two consecutive five minute windows. If the number of trunks that can be placed in maintenance busy out (administered in administration Procedure 107, Word 6, Field 13) is not exceeded, the trunk is busied out. If the allowed number of busied out trunks is exceeded, the trunk is returned to service.

Another exception is permanent incoming seizure treatment that can be administered by administration Procedure 100, Word 3, Field 6. When a permanent incoming seizure is recognized and the administered treatment is active, the call progresses to a transient state to wait for a distant end disconnect and no alarm is raised. If the administered treatment is not active, the call progresses-regular trunk failure processing, and eventually raises an alarm.

Procedure 640 Failure Codes

The following failure codes apply to universal trunks. Failure codes 2, 8, and 9 also apply to traditional trunks. They can be observed in Procedure 640, Test 1, Field 9.

Failure Code	
2	This failure is detected in the call processing software and generally occurs when one end signals (for example, going from busy to idle) and the other end does not respond properly within the allocated time.
8	A trunk is placed in maintenance busy out because the administered failure threshold condition was exceeded.
9 20	This failure identifies a permanent incoming seizure (far end is not idle) when the trunk is administered to alarm this failure.
21	
22	
23	
24	
30	
31	
32	
33	
34	
35	
36	
40	
41	
42	
43	
99	Failure code 99 covers message codes that are not used for identifying trunk failures and requires further investigation of the supplementary trunk failure data in Procedure 640.

Repair Procedure for Trunk Failures (Traditional and Universal Trunks)

The strategy for repairing a trunk failure depends on the type of trunk and how it is administered.

1. Determine the kind of trunk that failed.

   When you display a trunk failure in Procedure 640, Test 1, a few key items of translation data are provided if you select data type 1 for Field 12.

   The trunk group that appears in Field 14 when data type 1 is selected in Field 12 and index O appears in Field 13 for the failed trunk allows easy access to the administration procedures to determine how the trunk is used. That is, if you use the trunk group displayed in Field 14 in administration procedures 150, 178, or 116 you can determine how the trunk is used.

   Additional translation data including signaling type, identification of DS-1 or analog, and identification of traditional or universal module may allow you to chose your repair strategy more quickly without trying to access the administration procedures.

2. Determine if the trunk has recovered.

   After you display the trunk failure in Procedure 640, Test 1, select and execute Test 2 to observe the default data type 3 in Field 12.

   Enter `nd` to advance the index to 1 in Field 13 to determine if the trunk state is in limbo (octal 116 in r2v5 issue 01 .00). Then, enter `nd` to advance the index to 7 in Field 13 to determine if the scan data (low digit) is idle.

   If the trunk state is idle and the scan data is idle, the trunk has most likely recovered from the failure and is available for service.

3. Enter `bo` and then enter `rb`.

   CAUTION You may drop an active call if the call progress state is other than idle (0), or limbo (octal 116 in r2v5 issue 01.00).

   Busying out then release busying the failing trunk is an attempt to place the trunk back in the idle queue. This does not usually work if the far end is busy (value of 2 displayed in Field 14 when monitoring the trunk in Procedure 640, Test 2 with a data type of 3 and an index of 7).

4. Test the hardware associated with the failing trunk using Procedure 620, Test 4. Most trunk failures are external to the trunk circuit pack and the fault may have disappeared before you can attempt to isolate the problem. However, in many cases, you will want to use Procedure 620, Test 4 to test the port hardware to confirm or eliminate it as the fault.

   Go to Procedure 620 — *Port Carrier Unit Types,* and enter the equipment location that appears in Fields 2-6 of Procedure 640, Test 1 in Fields 3-7 of Procedure 620, Test 4. Perform the test and corrective action (if any) listed in *Procedure* 620 — *Port Carrier Unit Types.*

5. Use the TVVT feature to check the trunk.

   If the trunk is administered for TVVT, you can place a call to the trunk by dialing the dial code for feature 44 plus the dial access code (DAC) and the trunk member index. The trunk DAC can be obtained from data type 1, index 1, and the trunk member index from data type 1, index 2. The TVVT dial access code can be obtained from administration Procedure 350, Word 2.

Use Procedure 640, Test 2, to monitor scan data at index 7 or trunk progress marks at index 1 (both data type 2) to determine more about the usability of the trunk while attempting to make incoming and outgoing calls.

You may also be able to perform trunk verification from an attendant console if trunk verification is administered to the attendant console.

6. You can use a 1013 type handset to monitor the analog trunk signaling leads while making incoming and outgoing calls on the trunk.
7. A 1013 type hand set can be used to make calls on some trunk types while monitoring with Procedure 640, Test 2.
8. You may want to open the signaling leads at the cross-connect field while monitoring the scan data with Procedure 620 test 2, and also attempt to make an incoming call using a 1013 type handset to determine if the problem is at the local end.
9. Perform other procedures that may help isolate the problem.
   - Use Procedure 620 — Port Carrier Unit Types, to test CO) (unit type 32), DID (unit type 33), TIE (unit type 34), and AUX (unit type 45) trunks.
   - Use *Procedure 620 — DS-1 or PRI,* to test DS-1 (unit type 68) or PRI (unit type 75) trunks.
   - Use *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling,* to test unit type 65 modem pooling trunks.
   - Use *Procedure 647 — ATMS (Unit Type 70),* to make automatic transmission measurements.
   - Use *Procedure 648 — ISDN Error Processing (Unit Type 76),* to test the ISDN circuit pack providing the trunk service.

Additional Troubleshooting Techniques for Universal Trunks

The following information is provided when a failure code is displayed in Field 9 and the trunk is in a universal module. All of the failures described in this section are detected by the firmware on the universal port boards and reported as in-line errors to the common control. Repair strategy is provided for the following types of universal trunks:

- Auxiliary trunk
- Central office (CO)trunk
- Direct inward dial (DID) trunk
- TIE trunk.

Universal Auxiliary Trunk

The TN763 auxiliary trunk maybe used to provide for the following type of features:

- Music on hold
- Loudspeaker paging (voice and coded chimes)

- Dictation
- Automated wake up with Audichron recorder/announcer
- Recorded announcement
- Malicious call trace

An auxiliary trunk circuit pack contains four ports. A different hardware interface between the switch and the auxiliary equipment is used for the four types of signaling that the auxiliary trunk circuit pack supports.

Failure codes 24 and 40 can be displayed for a universal auxiliary trunk.

- Failure code 24 for an auxiliary trunk indicates a port fault. Use an empty port if one is available until the circuit pack can be replaced. This type of failure should only occur with loudspeaker paging.

  Corrective action for failure code 24 is to go to *Procedure* 620 *— Port Carrier Unit Types, and use the* equipment location displayed in Fields 2-6 of procedure 640, Test 1 and unit type 45 to test the auxiliary trunk. Perform corrective action in *Procedure 620— Port Carrier Unit Types as* required.

- Failure code 40 for an auxiliary trunk indicates a fault on the signaling lead which is an off-board error.

  Perform the following corrective action for failure code 40.

  — If the trunk is being used for an application other than loudspeaker paging, check that the administration is correct. This type of failure should only occur with loudspeaker paging.

  — If the trunk is being used for loudspeaker paging, the problem is probably in the wiring, paging adapter (278A) or control unit (89A).

  — This error could be in the circuit pack, but is not detected by Procedure 620, so replacing the circuit pack may repair the problem.

Universal CO Trunk

CO trunks are 2-wire analog lines to the central office that support both incoming and outgoing calls. The CO trunk circuit pack provides eight ports.

A DS-1 TN747 CO trunk provides a communications channel between the system and a central office switch-a 1.544 Mbps DS-1 link. A DS-1 link consists of 24 digital DS-1 CO trunks. A DS-1 CO trunk can be used for both voice and data communications.

Trunk signaling for an analog CO trunk is as follows. An idle state indicates that the tip lead is open and the ring lead equals CO battery.

Outgoing call:

1. PBX off hook (seize message): places ground on ring.
   a. CO response: places ground on tip.
   b. PBX response: close the loop (removes ground on ring).
   c. CO response: provide loop current.
   d. PBX response: dial out digits.

2. PBX on hook first (drop message): open the tip-ring loop, no loop current.

   CO response: open circuit on tip.

3. CO on hook first (disconnect): open circuit on tip, no loop current.

   PBX response: open tip-ring loop.

Incoming call:

1. CO off hook (seizure): CO applies ground on tip.

   PBX response: make trunk busy for outgoing calls.

2. CO ringing: CO applies ringing voltage.

   PBX response: detect ringing, ring destination.

3. PBX off hook (answer message): close loop.

   CO response: trip ringing, provide loop current.

4. PBX on hook first (drop message): open the tip-ring loop, no loop current.

   CO response: open circuit on tip.

5. CO on hook first (disconnect): open circuit on tip, no loop current-

Failure codes 20,21,30,31,32,33,34, 35, and 36 can be displayed for a universal CO trunk.

In-line testing is performed while a call is in progress. Thus, in-line errors may occur during operation. Use Procedure 640, Test 1 to determine if any of these errors are recorded.

Problems detected during signaling may be caused by faults off board (in the CO switch or the connections).

A trouble on CO trunks, which reports no errors or alarms, occurs when the CO busies out the port (disconnects the port). This situation occurs when the CO thinks there are problems with the CO port. In this case, no incoming (nor outgoing) calls are possible-this port (however, an outgoing call failure would logged as call processing failure 2). In addition to complaints received from outside callers trying unsuccessfully to call in, this problem can be diagnosed by monitoring each trunk in the group and attempting to force calls to determine if one or more trunks are not selected. If a particular port is detected as not in use, a call to the CO is necessary to get the connection back in service.

Before a maintenance test can be run on a port, the port is required to be idle. If an incoming call seizes the port that is being tested by maintenance, results maybe misleading; that is, the test may fail, even if the circuit pack is good. Procedure 640 can be used to observe the current scan data for the trunk.

- Failure code 20 for a CO trunk indicates that the CO is not releasing after a call is dropped from the PBX end. This condition occurs when the PBX end drops first and the CO does not release the trunk within 20 minutes.

  Perform the following corrective action for failure code 20:

  — Examine the current scan data and call progress state with Procedure 640, Test 2. If this condition is persisting with the far end busy (value of 2) and if the trunk is in the limbo state, the problem is most likely toward or at the CO.

— If the trunk is no longer in the limbo state, the problem has disappeared or has been corrected, but you can attempt to verify the interface to the network by making incoming and outgoing calls.

- Failure code 21 for a CO trunk indicates a late CO trunk release. The CO released the trunk more than 20 minutes after the PBX dropped the call. This indication means that failure code 20 has been canceled.

  Corrective action for failure code 21 is to verify that failure code 20 does not occur again.

- Failure code 30 for a CO trunk indicates a single polarity ringing current error. This error results from abnormal ringing current, but does not prevent the incoming call from being accepted. One cause could be that the reverse current detector associated with the port is failing. The other cause could be that normal current is not detected. In this case, neither incoming nor outgoing calls can be completed.

  This error could be in the circuit pack, but is not detected by Procedure 620, so replacing the circuit pack may repair the problem.

  You can verify the repair by making an incoming call and monitoring the call with Procedure 640 Test 2. Also check Test 1 for the absence of failure code 30.

- Failure code 31 for a CO trunk indicates ringing without ground. This error is detected on an incoming call on a ground-start CO trunk. The CO trunk circuit pack has not detected a tip ground before ringing current is detected. This may indicate that the ground detector is not working. However, the call is accepted.

  Perform the following corrective action for failure code 31:

  — Go to *Procedure 620 — Port Carrier Unit Types,* and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action in as required.

  — If users continue to report troubles, make an incoming call and monitor with Procedure 640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset.

- Failure code 32 for a CO trunk indicates a ground but no ringing error. This error occurs on an incoming call on a ground-start trunk. If ringing is not detected within five seconds of the tip being grounded, the call is still accepted. If the CO is of the number 5-ESS type, ringing delays of more than five seconds during heavy traffic are fairly common.

  Perform the following corrective action for failure code 32:

  — Make an incoming call and monitor with Procedure (640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset.

  — Go to *Procedure 620 — Port Carrier Unit Types,* and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk Perform corrective action in as required.

- Failure code 33 for a CO trunk indicates the ground detector is stuck active. This failure code is logged when the condition that caused failure code 32 continued for more than 20 minutes.

  Perform the following corrective action for failure code 33:

  — Make an incoming call and monitor with Procedure 640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset.

— Go to *Procedure 620 — Port Carrier Unit Types*, and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action as required.

- Failure code 34 for a CO trunk indicates no loop current on an incoming call error. The incoming destination has already answered and no loop current has been detected. If this is a solid fault all outgoing calls also fail.

  Perform the following corrective action for failure code 34:

  — Make an incoming call and monitor with Procedure 640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset

  — This step has a low probability of detecting the fault. Go to *Procedure 620 — Port Carrier Unit Types*, and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action as required.

  — This error could be in the circuit pack, and not be detected by Procedure 620, so replacing the circuit pack may repair the problem.

- Failure code 35 for a CO trunk indicates no tip ground detected on an outgoing call. This error occurs when an attempt is made to seize a ground-start CO trunk for an outgoing call and tip ground is not detected or the caller hangs up before tip ground is detected.

  Perform the following corrective action for failure code 35:

  — Go to *Procedure 620 — Port Carrier Unit Types*, and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action as required.

  — If users continue to report troubles, check for other errors and make an outgoing call and monitor with Procedure (640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset. The outgoing call can be made using trunk verification by attendant or trunk verification by voice terminal.

  — This error could be in the circuit pack, and not be detected by Procedure 620, so replacing the circuit pack may repair the problem.

- Failure code 36 for a CO trunk indicates no loop current on an outgoing call. This error occurs on an attempt to seize a ground-start trunk for an outgoing call. An error occurs if loop current is not detected or if the caller hangs up before the loop current is detected.

  Perform the following corrective action for failure code 36:

  — Make an outgoing call and monitor with Procedure 640 Test 2 to determine whether the problem should be escalated or the problem should be referred to the CO. The port can also be monitored with a 1013 type handset. The outgoing call can be made using trunk verification by attendant or trunk verification by voice terminal.

  — This step has a low probability of detecting the fault. Go to *Procedure 620 — Port Carrier Unit Types*, and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action as required.

  — This error could be in the circuit pack, and not be detected by Procedure 620, so replacing the circuit pack may repair the problem.

Universal DID Trunk

DID trunks, coming from the CO, allow outside parties to call directly to an extension in the system. The DID trunk circuit pack supports eight, incoming only, ports. Each port provides an interface between the two-wire analog line from the CO and the Generic 2 internal network.

The DID DS-1 TN747 trunk provides a digital DID trunk from the CO switch into the system-a DS-1 link. ADS- 1 link can support up to 24 DID-DS-1 trunk calls simultaneously. A DID-DS-1 trunk can be used for both voice and data communications.

For each call, the CO switch signals the system by opening and closing individual DID loops (one of the eight ports) and causing the starting or stopping of loop current.

A DID trunk operation involves three significant aspects:

1. Transmission — deals with the interface requirements regarding all AC signals. Transmission includes gain, analog to digital encoding, and digital to analog decoding.
2. Signaling — involves interpretation of DC signals appearing on tip and ring to and from the CO. These signals include off hook, on hook, and dial pulse detection.
3. Switch connection — involves the connection between the trunk circuitry and the TDM bus of the universal module. It operates the time slot connection to the TDM bus.

In-line testing is performed while a call is in progress. Thus, in-line errors may occur during operation. Use Procedure 640, Test 1 to determine if any of these errors are recorded.

problems detected during signaling may be caused by faults off board (in the CO switch or the connections).

A common trouble on DID trunks, which reports no errors or alarms, occurs when the CO busies out the port (disconnects the port). This situation occurs when the CO thinks there are problems with the DID port. In this case, no incoming calls are possible-this port. In addition to complaints received from outside callers trying unsuccessfully to call in, this problem can be diagnosed by monitoring each trunk in the group and attempting to force calls to determine if one or more trunks are not selected. If a particular port is detected as not in use, a call to the CO is necessary to get the connection back in service.

Before a maintenance test can be run on a port, the port is required to be idle. If an incoming call seizes the port that is being tested by maintenance, results maybe misleading; that is, the test may fail, even if the circuit pack is good. Procedure 640 can be used to observe the current scan data for the trunk.

Failure codes 20,21,22,23, and 41 can be displayed for a universal DID trunk

- Failure code 20 for a DID trunk indicates a loop current active error. The CO is not releasing the trunk after the PBX disconnects. This condition occurs when the PBX end drops first and the CO does not release the trunk within 20 minutes.

  Perform the following corrective action for failure code 20:

  — Examine the current scan data and call progress state with Procedure 640, Test 2. If this condition is persisting with the far end busy (value of 2) and if the trunk is in the limbo state, the problem is most likely toward or at the CO.

— If the trunk is no longer in the limbo state, the problem has disappeared or has been corrected, but you can attempt to verify the interface to the network by monitoring incoming calls or verify the interface to the network with a 1013 type hand set.

— You can also open the signaling leads to determine if the problem is in the local end.

- Failure code 21 for a CO trunk indicates a late CO trunk release. The CO released the trunk more than 20 minutes after the PBX dropped the call. This indication means that failure code 20 has been canceled.

  Corrective action for failure code 21 is to verify that failure code 20 does not occur again.

- Failure code 22 for a DID trunk indicates a rotary dial before wink error. This condition occurs when the CO starts dialing before the PBX sends wink on a wink-start trunk

  Perform the following corrective action for failure code 22:

  — Verify the trunk administered wink/immediate-start parameter.

  — Refer the problem to the CO.

- Failure code 23 for a DID trunk indicates a rotary dial is too early error. This condition occurs when the CO starts dialing too soon after seizure on a immediate-start trunk.

  Perform the following corrective action for failure code 23:

  — Verify the trunk administered wink/immediate-start parameter.

  — Refer the problem to the CO.

- Failure code 41 for a DID trunk indicates a rotary dial pulse during wink error. This condition occurs when the CO sends rotary dial digits too soon after seizure on a wink-start trunk.

  Perform the following corrective action for failure code 41:

  — Verify the trunk administered wink/immediate-start parameter.

  — Refer the problem to the CO.

- Failure code 42 for a DID trunk indicates a fault in TIP or RING. This condition occurs when the off-hook sensor detects a signal, even though it shut down the battery.

  Perform the following corrective action for failure code 42:

  — Make an incoming call and monitor with Procedure 640 Test 2. The port can also be monitored with a 1013 type handset-

  — This step has a low probability of detecting the fault. Go to *Procedure 620 — Port Carrier Unit Types,* and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 32 to test the CO trunk. Perform corrective action in as required.

  — This error could be in the circuit pack, and not be detected by Procedure 620, so replacing the circuit pack may repair the problem.

  — You may want to open the signaling leads at the cross-connect field while monitoring the scan data with Procedure 620 test 2, and also attempt to make an incoming call using a 1013 type hand set to determine if the problem is at the local end.

Universal TIE Trunk

The TN760 tie trunk circuit pack contains four trunk circuits. Each of these circuits interface a digital PBX to an analog tie trunk going to another PBX, across one-way or two-way dedicated circuits. Each tie trunk has a four-wire audio connection and may have two signal leads (E and M).

The DS-1 TN747 tie trunk provides both voice and data inter-PBX communication. A DS-1 circuit pack can support up to 24 digital tie trunks through a 1.544 Mbps DS-1 link.

In-line testing is performed while a call is in progress. Thus, in-line errors may occur during operation. These errors maybe reproduced by using the trunk (making a call), and checking their occurrence in Procedure 640, Test 1.

Before a maintenance test can be run on a port, the port is required to be idle. If an incoming call seizes the port that is being tested by maintenance, results maybe misleading; that is, the test may fail, even if the circuit pack is good. Procedure 640 can be used to observe the current scan data for the trunk.

Failure codes 20,21,22,23,24 and 43 can be displayed for a universal TIE trunk.

- Failure code 20 for a TIE trunk indicates that the trunk is still seized with an incoming call. The far-end PBX is not releasing the trunk after the call was dropped. This failure is reported about 20 minutes after the trunk has been put into the limbo state.

  Perform the following corrective action for failure code 20:

  — Examine the current scan data and call progress state with Procedure 640, Test 2. If this condition is persisting with the far end busy (value of 2) and if the trunk is in the limbo state, check the far-end PBX for problems. Also check the far-end PBX to insure that translation matches at both ends.

  — If the trunk is no longer in the limbo state, the problem has disappeared or has been corrected, but you can attempt to verify the interface to the far-end PBX by making outgoing and incoming calls.

  — You can also open the E signaling lead to determine if the problem is in the local end.

- Failure code 21 for a TIE trunk indicates a belated far-end PBX release. his indication means that failure code 20 has been canceled.

  Corrective action for failure code 21 is to verify that failure code 20 does not occur again.

- Failure code 22 for a TIE trunk indicates a rotary dial before wink error. This occurs when the far-end PBX starts dialing before the PBX sends the wink on a wink-start or delay-dial trunk

  Corrective action for failure code 22 is to check the far-end PBX to ensure that translation matches at both ends.

- Failure code 23 for a TIE trunk indicates a rotary dial too early error. This occurs when the far-end PBX starts dialing too soon (approximately 50 ms) after seizure on a wink start or delay dial line.

  Corrective action for failure code 23 is to check the far-end PBX to ensure that translation matches at both ends.

- Failure code 24 for an tie trunk indicates a port fault.

  Corrective action for failure code 24 is to go to *Procedure 620 — Port Carrier Unit Types,* and use the equipment location displayed in Fields 2-6 of Procedure 640, Test 1 and unit type 34 to test the tie trunk. Perform corrective action as required.

- Failure code 43 for a TIE trunk indicates the wink time was too short (less than 80 ms) for a valid signal on an outgoing wink-start or delay-dial trunk.

  Corrective action for failure code 43 is to check the far-end PBX to ensure that translation matches at both ends.

PROCEDURE 646 — DIGITAL TRUNK, DIGITAL USER PROBLEM, OR MODEM POOLING (UNIT TYPE 35, UNIT TYPE 36, OR UNIT TYPE 65)

Unit Type 35— Digital Trunk, Unit Type 36 — Digital User Problem, or Unit Type 65 — Modem Pooling	
Diagnostic and verification test	Procedure 646, Test 1 for ADFTC, Procedure 646, Test 3 for modem pool members and digital facilities.
Components tested	SN238/TN726, SN243/TN742, SN261/TN771B, SN270/TN754, modems, TDM/2
Related procedures	• Procedure 620, Test 4 to test unit type 7 (module processor) • Procedure 620, Test 4 to test unit type 12 (IOBI) • Procedure 620, Test 4 to test unit type 13 (PDI) • Procedure 620, Test 4 to test unit type 14 (PCI) • Procedure 620, Test 4 to test unit type 62 (ADFTC or MTCP)

General Repair Steps

If there is a failure in an analog digital facility test circuit (ADFTC or MTCP), modem pool member (MPM), or digital facility, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 646. Use the following steps to isolate and repair the failure.

1. Execute Procedure 600, Test 1.

   To determine the type of modem pooling circuits (ADFTC or MTCP, MPM, or digital facility) that are alarmed, the severity of the alarms, and the order in which the modem pooling circuits are displayed.

   Record the failing modem pooling circuits.

   Look for a pattern (from the modem pooling circuits recorded) that would help to find what corrective action is required.

3. If only ADFTC or MTCP failures are recorded, go to *ADFTC or MTCP Alarmed Failures.*

4. If only MPM or digital facility failures are recorded, go to *MPM or Digital Facility Alarmed Failures.*

5. When both ADFTC or MTCP and MPM or digital facility failures are recorded, repair ADFTC or MTCP failures before repairing MPM or digital facility failures.

ADFTC or MTCP Alarmed Failures

1. Display the failing ADFTC or MTCP circuit in Procedure 600, Test 1.
2. Enter Procedure 646, Test 1.
3. Enter 0 in Field 2.

4. Execute Procedure 646, Test 1.
   - *If* the ADFTC or MTCP circuit passes (field 12 contains a 0), go to step 8.
   - If the ADFTC or MTCP circuit fails (field 12 contains a 1), go to Step 5.
5. Enter `nc.` Record the specific fault code displayed in Field 14 (data).
6. Replace the CKT1 component or follow the repair steps in Table 6-7, *Component Replacements,* for the specific fault code displayed in Field 14.
7. Repeat Procedure 646, Test 1.
   - If the ADFTC or MTCP passes Test 1, go to step 10.
   - If the ADFTC or MTCP fails Test 1, replace CKT2 or follow the repair steps listed in Table 6-7, *Component Replacements,* for the specific fault code recorded.
   - If there are no repair steps in Table 6-7, *Component* Replacements,check the wiring to the circuit packs or components replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
8. If alarmed ADFTC or MTCP circuits pass Test 1, and you have not done anything to repair the problem, go to *Procedure 620 — Port Carrier Unit Types,* and using Procedure *620,* Test 4 to test unit type 62 (ADFTC or MTCP).
   - If Procedure 620, Test 4 passes, check the backplane wiring to the ADFTC or MTCP circuit pack. Then, go to step 9.
   - If Procedure 620, Test 4 fails, repair the problem following the repair steps in Procedure 620, Port Carrier. When Procedure 620, Test 4 passes after taking corrective action, go to step 9.
9. Repeat Procedure 646, Test 1 on the same failing ADFTC or MTCP circuit displayed in step 1.
   - If Test 1 passes, go to step 10.
   - If Test 1 fails, check the wiring to the circuit packs or components you replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
10. You must run Procedure 646, Test 1 for each alarmed ADFTC or MTCP circuit recorded in Procedure 600, Test 1.
    a. Use the change field sequence to enter the next recorded ADFTC or MTCP failure in Fields 7-11 (equipment location).
    b. Repeat steps 3-9 (as appropriate).

If all alarmed ADFTC or MTCP circuits pass Test 1, the **OTHER FAILS** fault indicator is automatically turned off if no other sources (including MPM or digital facility failures) are affecting the fault indicator.

TABLE 6-7. Component Replacements

Fault Code	Component Replacement or Corrective Action				
	CKT 1	**CKT 2**	**CKT 3**	**CKT 4**	**CKT 5**
12	Repeat test when switch is less busy. If failure continues with a fault code of 12, use Procedure 620 to test time slots (that is, range on PDIs).				
218	Run Procedure 620 on module processor (unit type 7).				
454	Run Procedure 646, Test 1.				
455-458	Run Procedure 646 Test 1 and Procedure 620 GPP test by specifying ADFTC or MTCP unit type 62.				
1000	Run Procedure 620 on module processor (unit type 7).				
1001	Run Procedure 646 on unit.				
1002	Run Procedure 646 on trunk group.				
1003	TDM/2	SN270 or TN754			
1004	MODEM	SN243 or TN742B			
1005-1025	SN261 or TN771B				
1026-1029	SN261 or TN771B	Run Procedure 620 on IOBI (unit type 12) and PCI (unit type 14).			
1030, 1038, 1045, 1052,1059,1066 1073, 1080, 1087, 1094,1101,1108, 1115, 1122, 1129, 1136,1143, 1150, 1157, 1164, 1171, 1178,1185, 1192, 1199, 1207, 1214, 1221,1228,1235, 1242, 1249, 1256, 1263,1270,1277	MODEM	TDM/2	SN261 TN771B		
1031, 1039, 1046, 1053,1060,1067, 1074, 1081, 1088, 1095,1102, 1109, 1116, 1123, 1130, 1137,1144, 1151, 1158, 1165, 1172, 1179, 1186, 1193, 1200, 1208, 1215, 1222, 1229,1236, 1243, 1250, 1257, 1264, 1271, 1278	MODEM	TDM/2	SN261 or TN771B		

continued

TABLE 6-7. Component Replacements *(continued)*

Fault Code	Component Replacement or Corrective Action				
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5
1032, 1040, 1047, 1054,1061,1068 1075, 1082, 1089, 1096,1103,1110, 1117, 1124, 1131, 1138,1145,1152, 1159, 1166, 1173, 1180,1187,1194, 1201, 1209, 1216, 1223,1230,1237, 1244, 1251, 1258, 1265,1272,1279	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN771B
1034, 1041, 1048, 1055,1062, 1069, 1076, 1083, 1090, 1097, 1104, 1111, 1118, 1125, 1132, 1139,1146,1153, 1160, 1167, 1174, 1181,1188,1195, 1202, 1210, 1217, 1224,1231,1238, 1245, 1252, 1259, 1266,1273,1280	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN771B
1035, 1042, 1049, 1056, 1063,1070, 1077, 1084, 1091, 1098, 1105, 1112, 1119, 1126, 1133, 1140, 1147,1154, 1161, 1168, 1175, 1182, 1189,1196, 1203, 1211, 1218, 1225,1232, 1239, 1246, 1253, 1260, 1267,1274,1281	TDM/2	SN270 or TN754	SN261 or TN77lB		
1036, 1043, 1050, 1057,1064,1071, 1078, 1085, 1092, 1099,1106,1113, 1120, 1127, 1134, 1141, 1148, 1155, 1162, 1169, 1176, 1183, 1190,1197, 1204, 1212, 1219, 1226, 1233,1240, 1247, 1254, 1261, 1268,1275, 1282	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN771B
1037, 1044, 1051, 1058,1065,1072, 1079, 1086, 1093, 1100, 1107, 1114, 1121, 1128, 1135, 1142, 1149, 1156, 1163, 1170, 1177, 1184,1191, 1198, 1206, 1213, 1220, 1227, 1234, 1241, 1248, 1255, 1262, 1269,1276,1283	SN261 TN771B				
1284	TDM/2	SN270 or TN754	SN261 or TN771B		
1285	TDM/2	SN270 or TN754	SN261 or TN771B		

continued

TABLE 6-7. Component Replacements *(continued)*

Fault Code	Component Replacement or Corrective Action				
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5
1286,1293,1300,1307,1314,1321, 1328,1335,1342,1349,1356,1363, 1370,1377,1384,1391,1398,1405, 1412	MODEM	TDM/2	SN261 or TN77lB		
1287,1294,1301,1308,1315,1322, 1329,1336,1343,1350,1357,1364, 1371,1378,1385,1392,1399,1406, 1413	MODEM	TDM/2	SN261 or TN771B		
1288, 1295,13021309,1316,1323, 1330,1337,1344,1351,1358,1365, 1372,1379,1386,1393,1400,1407, 1414	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN77lB
1289,1296,1303,1310,1317,1324, 1331,1338,1345,1352,1359,1366, 1373,1380,1387,1394,1401,1408, 1415	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN77lB
1290,1297,1304,1311,1318,1325, 1332,1339,1346,1353,1360,1367, 1374,1381,1388,1395,1402,1409, 1416	TDM/2	SN270 or TN754	SN261 or TN771B		
1291,1298,1305,1312,1319,1326, 1333,1340,1347,1354,1361,1368, 1375,1382,1389,1396,1403,1410, 1417	MODEM	TDM/2	SN270 or TN754	SN243 or TN742B	SN261 or TN771B
1292, 1299, 1361313,1320,1327, 1334,1341,1348,1355,1362,1369, 1376,1383,1390,1397,1404,1411, 1418	SN261 or T771B				
1419-1421	If the call can be dropped, type `bo,` then type `rb,` and retest.				
1422 and 1423	Type `bo,` then type `rb` and retest.				

continued

TABLE 6-7. Component Replacements *(continued)*

Fault Code	Component Replacement or Corrective Action				
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5
1424	Wait for member to become available or type *bo* (busy out), then type *rb* to drop the customer call on a busy member.				
1425 and 1426	SN261 or TN77lB				
1427	Ensure the ADFTC or MTCP is administered.				
1428	Type bo, then type rb if the call using the ADFTC or MTCP can be dropped.				
1429	Type rb and retest.				
1430	MODEM	SN243 or TN742B			
1431	TDM/2	SN270 or TN754			

MPM or Digital Facility Alarmed Failures

Component replacements for the specific fault code displayed in Field 14 are listed in Table 6-7, *Component Replacements. The data port* for traditional modules is SN243; for universal modules the data port is TN742B. The GPP port for traditional modules is SN270; for universal modules the GPP port is TN754. The EIA port (when used) for traditional modules is SN238; for universal modules the EIA port is TN726.

For modem pooling, the priority order of component replacement is listed in Table 6-8, Test 3 *Failure Groups for Modem Pooling.*

For digital facilities, the priority order of component replacement is listed in Table 6-9, Test 3 *Failure Groups for Digital Facilities.*

The order of component replacement depends on the first test type failed (displayed in Field 2) and the type of facility tested.

1. Display the failing MPM or digital facility in Procedure 600, Test 1.

2. Enter Procedure 646, Test 3.
3. Record the specific fault code displayed in Field 14 (data).
4. Enter `0` in Field 2.
5. Enter the test length in Field 12 or type; (enter) for a default test length. The MPM or digital facility can be tested from 1 to 4 minutes for each test type selected by entering the time (in minutes) in Field 12.

   NOTE: The test length executed for each test type selected is determined by whether the test for the test type passes or fails. If the test passes, either the default test length or the time entered in Field 12 is used for the test performed. If the test fails, the time of the test is the default test length no matter what time is entered in Field 12.

6. Enter the data rate in Field 14 or type; (enter) for a default data rate.
7. Execute Procedure 646, Test 3.
   - If the MPM or digital facility passes (indicated by a 0 in Field 12), go to step 15.
   - If the MPM or digital facility fails (indicated by a 1 in Field 12), go to step 8.
8. Type `nc` and record the test type (first test type failed) displayed in Field 2, the equipment location displayed in Fields 7-11, and the specific fault code displayed in Field 14 (data).
9. Determine from the specific fault code, the first test type failed, and the facility tested, which component to replace first based on Table 6-7, *Component Replacements,* and Table 6-8, *Test 3 Failure Groups for Modem Pooling,* or Table 6-9, *Test 3 Failure Groups for Digital Facilities.*
10. Replace the component.
11. Repeat Procedure (646, Test 3.
    - If the facility passes Test 3, go to step 19.
    - If the facility fails Test 3, replace the next component listed in Table 6-7, *Component Replacements* and Table 6-8, *Test 3 Failure Groups for Modem Pooling* or Table 6-9, *Test 3 Failure Groups for Digital Facilities,* based on the specific fault code and the type of facility tested.
12. Type `nd` to display in Field 6 (type) the member A GPP, member A data port, member B GPP, and member B data port equipment locations in Fields 7-11.

    NOTE: The equipment location displayed in Fields 7 through 11 for data ports determines the location of the modem to be replaced for modem pooling failures. The equipment location displayed in Fields 7-11 for member A GPP determines the location of the digital facility to be replaced for digital facility failures.

TABLE 6-8. Test 3 Failure Groups for Modem Pooling

First Test Type Failed	Failure Group for Failing Member Identified (in Priority Order)		
	Member A	**Member B [2]**	**ADFTC or MTCP**
4or5 [1]	Modem B [2]; modem A; ***SN243*** or TN742B member A, SN243 or TN742B member B [2]; TDM/2 member A, TDM/2 member B [2]; SN270 or TN754 member A, SN261 or TN771B.	Modem B [2]; TDM/2 member B [2]; SN270 or TN754 member B [2]; SN261 or TN771B.	SN261 o r TN771B
3	Modem A; TDM/2 member A; SN270 or TN754 member A; SN261 or TN771B.		SN261 or TN771B
2	TDM member A; SN270 or TN754 member A; SN261 or TN771B.		SN261 or TN771B

[1] This failure group is also applicable with members that cannot use test types 4 or 5, but pass test types 2 and 3 in Test 3 and fail test type 0 in Test 2.

[2] For originating and terminating modem pool members only.

[3] Run Procedure 620 on individual SN27/TDM/2 or TN754/TDM/2 SN243 or TN742B, or ADFTC or MTCP if further isolation of trouble is required.

13. Repeat steps 11-13 until all components listed in Table &7, *Component Replacements,* and Table 6-8, *Test 3 Failure Groups for Modem Pooling,* or Table *6-9, Test 3 Failure Groups for Digital Facilities,* based on the specific fault code and the type of facility, have been replaced or the problem has been corrected.

14. If the facility still fails after all components are replaced, check the wiring associated with the circuit packs and/or components replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

15. When alarmed MPM or digital facilities pass Test 3 without corrective action being performed (for example, replacing a circuit pack), perform further analysis of the problem by changing the length of the test and repeating Test 3 to ensure that the alarmed failure is not intermittent. Four minutes is recommended for the length of the test to ensure no intermittent failures exist. Change the length of the test by performing a change field sequence and entering the new *length* in Field 12. Then, go to step 16.

16. Execute Procedure 646, Test 3.
    - If the MPM or digital facility passes (indicated by a 0 in Field 12), go to step 17.
    - If the MPM or digital facility fails (indicated by a 1 in Field 12), perform steps 8-14 (as appropriate).
17. You must run Procedure 646, Test 3 for each alarmed MPM or digital facility recorded in Procedure 600, Test 1.
    a. Use the change field sequence to enter the next recorded MPM or digital facility failure in Fields 6-11 (equipment type and equipment location).
    b. Repeat steps 4-17 (as appropriate).
18. If all alarmed failures pass Test 3, perform Procedure 646, Test 2 to turn off the **OTHER FAILS** fault indicator.

TABLE 6-9. Test 3 Failure Groups for Digital Facilities

First Test Type Failed	Failure Group for Failing Member Identified (in Priority Order)	
	Member A [1] [2]	**ADFTC [2]**
4	Digital facility; TIE/DSU/private line modem; TDM/2; SN270 or TN754, SN261 or TN771B.	SN261 or TN771B
3	TIE/DSU/private line modem, TDM/2; SN270 or TN754; SN261 or TN771B.	SN261 or TN771B
2	[3] TDM/2 or PDM; SN270 or TN754; SN261 or TN771B	SN261 or TN771B

[1] Components included in a particular failure group depend on the specific application.

[2] Run Procedure 620 on individual SN270/TDM/2 or TN754/TDM/2 or SN261 or TN771B if further isolation of the trouble is required.

[3] When the digital facility uses an EIA port, replace SN238 or TN726 instead of TDM/2 or PDM and SN270 or TN754.

PROCEDURE 647 — ATMS (UNIT TYPE 70)

Unit Type 70 — Automatic Transmission Measurement System (ATMS)	
Diagnostic and verification test	Procedure 647, Test 2
Components tested	Trunk circuit, translation, far end
Related procedures	• Administration Procedure 000 and Procedure 010 to check the translation assignment of the OTL. • Administration Procedure 100, Word 1, Procedure 175, Procedure 010 Word 3, and Procedure 350, Words 1 and 2 to check the translation of the trunk type, trunk group translations and restrictions. • Administration Procedure 107 to correct translation. • Administration Procedure 254 to determine if originating registers are assigned. • Administration Procedure 350 Word 2, Procedure 285, and Procedure 103 to check the translation of the dial code assignment and trunk type for the trunk verification voice terminal (TVVT) feature. • Administration Procedure 350, Word 2 to check the translation of the dial access code assignment for the TVVT. • Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) to test the ADFTC circuit pack. • Procedure 642, Test 2 to test the failing circuit with a terminal-to-trunk test call.

General Repair Steps

If a trunk circuit fails ATMS scheduled tests, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 647. Use the following steps to isolate and repair the failure.

To isolate an alarmed trunk circuit failing ATMS scheduled tests displayed in Procedure 647, Test 1, execute Procedure 647, Test 2 to determine the extent of the trouble.

1. Execute Procedure 647, Test 1.

   Record the alarmed circuits.

2. Execute test 2 for the first alarmed circuit recorded in test 1.

- If Test 2 passes, go to step 7.
- If Test 2 fails, enter *nc* and go to Step 4.

3. Record the test state displayed in Field 10 and the fault code displayed in Field 12.
   - If Field 13 contains a 1, go to step S.
   - If Field 13 diplays more than 1, enter *nf* repeatedly to display the remain fault Codes for the failing circuit. Record each test state and all fault codes.
4. Refer to the table below for a list of the test state, fault codes, and definitions associated with each test state and fault code.
5. Perform the corrective action listed below associated with the test state and fault code displayed in Fields 10 and 12 for the failing circuit.
6. Execute Test 2 for each alarmed circuit failure recorded in test 1. (Repeat steps 3-7 for each recorded alarmed circuit failure.)
7. If all alarmed circuit failures pass Test 2, perform the clear data, execute sequence in test 1 for each alarmed circuit to resolve the alarmed circuits and to turn off the **OTHER FAILS** indicator, if there are no other reasons for it to be on.

Field 10 Test State	Field 12 Fault Code	Definition
2	1 2 3	ADFTC in use. ADFTC not available. ADFTC maintenance busied
3	4 5 6	No terminating test line administered Trunk in use Cannot release busy the trunk
4	1 67 68	ADFTC in use (after Test state 2) No test tone returned from far end (105 type only) Originating test line (OTL) not assigned as rotary

continued

continued

Field 10 Test State	Field 12 Fault Code	Definition
4	69	ADFTC received stop message
	70	ADFTC self-test fails
	71	Bad I/O to or from OTL
	72	Cannot seize originating register
	73	Dialing of Trunk Verification by Voice Terminal (TVVT) feature failed.
	74	Code dialed did not match TVVT feature access
	75	Trunk group dial access code inappropriate
	76	Software record incorrect
	77	ADFTC and trunk cannot be connected.
	78	Intercept tone detected
	79	Reorder tone detected
	80	Other unexpected tone detected
	81	Ring no answer from far end
	82	Unidentifiable interrupted tone detected
	83	Busy from far end
	84	Far end release
	85	No response from far end
	86	No data returned from far end
	87	Steady unidentifiable tone detected
	88	Broadband energy from far end (noise, voice, or recorded announcement)
	89	Far end test line unavailable, timeout after waiting for test progress tone removal.

continued

continued

Field 10 Test State	Field 12 Fault Code	Definition
5 and 6	42	Failed near end C message with tone threshold
	43	Failed far end C message with tone threshold
	51	Failed near end singing return loss low threshold
	52	Failed near end echo return loss threshold
	53	Failed near end singing return loss high threshold
	61	Failed far end singing return loss low threshold
	62	Failed far end echo return loss threshold
	63	Failed far end singing return loss high threshold

Test State 2 — Fault Codes 1 and 2

Repeat test 2 on the same circuit.

Test State 2 — Fault Code 3

1. Go to *Procedure 646 — Digital Trunk Digital User Problem, or Modem Pooling, and Procedure 620 — Port Carrier Unit Types*, and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC.
   - If the ADFTC passes both tests, release the ADFTC from maintenance busy.
   - If the ADFTC fails either test, perform corrective action. Then, release the ADFTC from maintenance busy.
2. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.

Test State 3 — Fault Code 4

Administer the TTL.

Test State 3 — Fault Code 5

Repeat test 2 to camp-on the circuit until the circuit is available for testing.

Test State 3 — Fault Code 6

1. Perform Procedure 620, Test 4 to test the busy circuit
   - If Test 4 passes, release the circuit from maintenance busy.
   - If Test 4 fails, take corrective action as appropriate. Then, release the circuit from maintenance busy.
2. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.

Test State 4 — Fault Code 1

Repeat test 2 on the same circuit.

Test State 4 — Fault Codes 67, 78-82*, and 85-88*

1. Perform Procedure 620, Test 4 to test the failing circuit.
   - If Test 4 passes, go to step 2.
   - If Test 4 fails, take corrective action as appropriate. Then, go to step 4.
2. Use Procedure 642, Test 2 (Terminal-to-Trunk test call) to test the failing circuit.
3. Analyze how far the call went to the far end.
   - If the test call completely passes, repeat Procedure 647, Test 2 on the same circuit that was failing to determine the status of the circuit. Then, go to step 5.
   - If the test call is stuck at state 2, go to step 7.
   - If the test call fails (test call aborted — state 6), take corrective action as appropriate. Then, repeat test 2 on the same circuit that was failing to determine the status of the circuit. Then, go to step 5.
   - If the test call is answered by someone other than the intended party (for example, recorded announcement), go to step 7.
4. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.
   - If Test 2 fails again with the same test state and fault code (test state 4, fault code 67, 78-82, or 85-88), go to Step 5.
   - If Test 2 fails again with a different test state or fault code, perfom corrective action as listed for the test state and fault code.

5. Go to *Procedure 646 — Digital Trunk Digital User Problem, or Modem Pooling, and Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC.
   - If the ADFTC passes both tests, go to step 6.
   - If the ADFTC fails either test , perform corrective action as listed. Then, go to step 6.
6. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.
   - If Test 2 fails again with the same test state and fault code (test state 4, fault code 67, 78-82, or 85-88), go to step 7.
   - If Test 2 fails again with a different test state or fault code, perform corrective action as listed for the test state and fault code.
7. Use Procedure 107 to correct the trouble or refer the trouble to the far end maintenance organization for further diagnosis.

   Either some type of translation trouble is indicated or a trouble with the far end terminating test line is indicated.

Test State 4 — Fault Codes 68 and 72-75

When fault codes 68 and 72-75 are recorded with a test state of 4, some type of translation trouble is indicated. Proceed as follows:

Fault Code 68:

1. For fault code 68 (OTL not assigned as rotary), use Procedure 000 and Procedure 010 to check the translation assignment of the OTL.
   - If translation is correct, refer the trouble to switch engineers for further diagnosis.
   - If translation is not correct. administer the OTL.
2. Repeat test 2 on the same circuit to determine the status of the circuit.

Fault Code 72:

1. For fault code 72 (cannot seize originating register), use Procedure 254 to determine if originating registers are assigned.
   - If originating registers are assigned, refer the trouble to switch engineers for further diagnosis. Note that additional originating registers may be required.
   - If originating registers are not assigned, administer the originating registers (as necessary).
2. Repeat test 2 on the same circuit to determine the status of the circuit.

Fault Code 73:

1. For fault code 73 (dialing of TVVT feature failed), repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different test state or fault code, perform corrective actin as listed for the test state and fault code.

- If Test 2 fails again with the same test state and fault code (test state 4, fault COde 73), use Procedure 350, Word 2, Procedure 285, and Procedure 103 to check the translation of the dial code assignment and trunk type for the TVVT feature.
  - — If translation is correct, refer the trouble to switch engineers for further diagnosis.
  - — If translation is not correct, administer the dial code assignment of the TVVT feature.

2. Repeat test 2 on the same circuit to determine the status of the circuit.

Fault Code 74:

1. For fault code 74 (code dialed did not match TVVT feature), repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different test state or fault code, perform corrective action as listed for the test state and fault code.
   - If Test 2 fails again with the same test state and fault code (test state 4, fault code 74), use Procedure 350, Word 2 to check the translation of the dial access code assignment for the TVVT.
     - — If translation is correct, refer the trouble to switch engineers for further diagnosis.
     - — If translation is not correct, administer the dial access code assignment of the TVVT feature.
2. Repeat test 2 on the same circuit to determine the status of the circuit.

Fault Code 75:

1. For fault code 75 (trunk group dial access code inappropriate), use Procedure 100 Word 1, Procedure 175, Procedure 010 Word 3, and Procedure 350, Words 1 and 2 to check the translation of the trunk type, trunk group translations and restrictions.
   - If translation is correct, refer the trouble to switch engineers for further diagnosis.
   - If translation is not correct, administer the trunk group dial access code.
2. Repeat test 2 on the same circuit to determine the status of the circuit.

Test State 4 — Fault Code 69

1. Repeat test 2 on the same circuit.
2. Determine the status of the circuit tested.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with the same test state and fault code (test state 4, fault code 69), escalate the failure.

     NOTE The trouble can be associated with the near end or far end.

   - If Test 2 fails again with a different test state or fault code, perform corrective action as listed for the test state and fault code.

Test State 4 — Fault Codes 70, 71, and 90

1. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling,* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC.
   - If the ADFTC passes both tests, go to step 2.
   - If the ADFTC fails either test, perform corrective action as listed. Then, go to step 2.
2. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.

Test State 4 — Fault Codes 76 and 77

1. Record the information displayed in Fields 2 through 15 for each circuit with a fault code of 76 or 77.
2. When you notice that there are excessive entries (based on your experience), refer the trouble to the switch engineers for further diagnosis.

Test State 4 — Fault Codes 83 and 89

1. Record the information displayed in Fields 2 through 15 for each circuit with a fault code of 83 or 89.

2. When you notice that there are excessive entries (based on your experience), refer the trouble to the far-end maintenance organization for further diagnosis.

NOTE

If fault codes 83 (busy from far end) and 89 (far end test line unavailable) occur often enough, more equipment may be needed to perform transmission measurements between the near end and far end.

Test State 4 — Fault Codes 64, and 91-99

Refer the trouble to the far-end maintenance organization for further diagnosis.

Test State 5 or 6 — Fault Codes 11-63

1. Perform Procedure 620, Test 4 to test the failing circuit.
   - If Test 4 passes, refer the trouble to the organization responsible for connections between the near and far end.
   - If Test 4 fails, take corrective action as appropriate. Then, go to Step 2.
2. Repeat test 2 on the same circuit that was failing to determine the status of the circuit.

Transmission Measurements

Measurement results include contributions from three sources:

- The DEFINITY™ Generic 2 (near end)
- The trunk circuit
- The switch at the location of the terminating test line (far end).

Table 6-10, *Measurement Conversion Factors,* provides the contributions of DIMENSION PBXs and DEFINITY Generic 2s used as OTL or TTL to the measurement results.

For example, for a CO trunk measurement, you can determine facility loss by adding the measured loss on the DEFINITY™ Manager II display to the OTL conversion factor listed in Table 6-10 plus the CO gain. For example, you might add the following:

- The measured loss on the Manager II display.
- Table 6-10 OTL listing.
- CO gain (determined from the far end switch), which is the location of the far end

TABLE 6-10. Measurement Conversion Factors

System Type	Test Circuit Connected	Trunk Type	Measurement Type		
			Loss	Noise	Return Loss
DEFINITY Generic 2 (Near end)	ADFTC OTL (SN-261)	CO F-N CO N-F TT F-N TT N-F D F-N D N-F	-0.125 -0.125 -1.875 -1.875 -6.0 o	0 + 0.125 0 + 1.875 0 + 6.0	0 -0.25 0 -3.75 0 -6.0
DIMENSION (Far end)	Any TTL (ZLC-12) (56A) (LC-145)	CO F-N CO N-F TT F-N TT N-F D F-N D N-F	-0.3 -0.3 -2.3 -2.3 -2.3 -2.3	+ 0.3 0 + 2.3 0 + 2.3 0	-0.6 0 -4.6 0 -4.6 0
DEFINITY Generic 2 (Far end)	ADFTC TTL (SN-261)	CO F-N CO N-F TT F-N TT N-F D F-N D N-F	-0.125 -0.125 - 1.875 - 1.875 o -6.0	+ 0.125 0 + 1.875 o + 6.0 0	-0.25 0 -3.75 0 -6.0 0
System 85 (Far end)	FTC TTL (SN-260)	CO F-N CO N-F TT F-N TT N-F D F-N D N-F	-0.125 -0.125 -1.875 - 1.875 0 -6.0	NA 0 NA 0 NA 0	NA 0 NA 0 NA 0

Abbreviations:

CO — Analog central office trunk circuit pack

D — DS-1 interface circuit pack

F-N — Far-to-near end measurement for loss where OTL end (Manager II display) is the near end OR
— Far end measurement for noise and return loss where OTL end Manager II display) is the near end

N-F — Near-to-far end measurement for loss where OTL end (Manager II display) is the near end OR
— Near-end measurement for noise and return loss where OTL end (Manager II display) is the near end

NA — Not applicable

OTL — Originating test line

TT — Analog tie trunk circuit pack

TTL — Terminating test line.

PROCEDURE 648 — ISDN ERROR PROCESSING (UNIT TYPE 76)

Unit Type 76 — Integrated Services Digital Network (ISDN) Error Processing

- Diagnostic and verification tests
  - — Procedure 648, Test 2 and Test 3
- Components tested
  - — ANN35
  - — TN767
  - — TN555
  - — Translation
  - — Far end
- Related procedures
  - — Administration procedures 000 and 010 to find the assignment of the OTL.
  - — Administration Procedure 010, Word 1, Procedure 010, Word 3, Procedure 051, Word 1, Procedure 052, Word 1 to find if the ADFTC or MTCP is administered.
  - — Administration Procedure 010, Word 3 to find that the origination restriction is not set.
  - — Administration Procedure 051 to find if keyboard dialing is administered.
  - — Administration Procedure 100, Word 1 to find the ISDN trunk type for the near end
  - — Administration Procedure 100, Word 1, Procedure 175, Procedure 010, Word 3, and Procedure 350, Words 1 and 2 to find the trunk type, trunk group administrations, and restrictions.
  - — Administration Procedure 108 to administer the TTL.
  - — Administration Procedure 254 to find if originating registers are assigned
  - — Administration Procedure 262, Field 6 to find the level that is enabled.
  - — Administration Procedure 275, Word 4 to find if the ISDN feature is activated.
  - — Administration Procedure 350, Word 2 to find the dial access code assigned to TVS.
  - — *Administration Procedure 350 Word 2, Procedure 285, and Procedure 103 to find the dial code assignment and trunk type of the TVVT feature.*
  - — Administration procedure 350, Word 2, Procedure 285, and procedure 103 to find the dial code assignment and trunk type of the TVS feature.
  - — Procedure 600, Test 1 and Test 2 to find if any alarms or recorded errors could be contributing to the ISDN error processing failure.
  - — Procedure 611, Test 2 to test the I/O channels.
  - — Procedure 620, Test 4 to test the failing PRI circuit.
  - — Procedure 635 to perform a busy out, release busy sequence.
  - — Procedure 646, Test 1 and Procedure 620, Test 4 to test the ADFTC or MTCP.

- Other tests
  - Repair procedure in Unit Type 68 — DS-1 Interface and Unit Type 75 — PRI to test the failing circuit.

Specific fault codes 2000,2001,2002,2003, and 2004 are logged in the periodic maintenance data structure (PMIDS) by the operational error processing (ISOEP) software program. These specific fault codes are displayed in Procedure 648, Test 1 but are *not* displayed in Procedure 648, Test 2 or Test 3.

The definition and meaning of the specific fault codes are as follows:

- Specific fault code 2000 — far end (facility or far-end PRI) cannot enter into multiple frame mode. The local primary rate interface (PRI) sends a SAMBE attempting to bring up the D channel in Modulo 128, multi-frame acknowledge operation mode. The far end normally responds with a retransmission. This is a guarantee that data will get across the link. A specific fault code of 2000 means that the far end is unable to enter into the requested mode and has responded with a DM (disconnect mode).
- Specific fault code 2001 — SAMBE transmitted N200 (an administered value for the number of retries; default is three) eight times with no response. A specific fault code of 2001 means that the far end will not talk to the near-end PRI.
- Specific fault code 2002 — DISC transmitted N200 times with no response. A specific fault code of 2002 means that the far end did not respond to a near-end disconnect request with a valid response.
- Specific fault code 2003 — miscellaneous PRI board level errors. A specific fault code of 2003 means that many LAPD errors are warring. This could be due to a number of things including hits on the line (lightning and soon) and protocol incompatibilities.
- Specific fault code 2004 — closed channel. A specific fault code of 2004 generally means that the near-end interface has not been administered correctly (SAPI and TEI not assigned).

When you are asked to perform administration procedures, you can refer to *DEFINITY™ Communications System Generic 2 Administration Procedures* (555-104-506) as necessary for the definition and operation of the administration procedure.

General Repair steps

When a trunk circuit failing ISDN scheduled tests is indicated (Procedure 648 referenced from Procedure 600) as the cause for the **OTHER FAILS** fault indicator being lighted, perform the following steps to isolate and repair the faulty unit. The repair steps are divided into general repair steps and repair steps based on fault codes.

The starting point for isolation and repair of alarmed trunk circuit packs failing ISDN scheduled tests is Procedure 648, Test 1. To isolate an alarmed trunk circuit pack that has failed ISDN scheduled tests displayed in Procedure 648, Test 1, execute Procedure 648, Test 2 and Procedure 648, Test 3 to find the extent of the failure.

1. Execute Procedure 648, Test 1 to find which entries are alarmed (indicated by a 1 (major), 2 (minor), or 3 (warning) displayed in the alarm status field).
2. Record each alarmed entry and associated specific fault code displayed in Test 1.

Table 6-11, *Traditional PRI Channel Versus Equipment Location,* provides information on the traditional PRI (ANN35) channel and trunk assignments. Table 6-12, *Universal PRI Channel Versus Equipment Location,* provides information on the universal PRI (TN767/TN555) channel and trunk assignments.

3. Execute test 2 for the first alarmed entry displayed in test 1.
   - If Test 2 passes, as indicated by a 0 displayed in Field 12 and a 0 displayed in Field 14, go to step 4 to analyze bit and error rates.
   - If Test 2 fails, as indicated by a 1 displayed in Field 12 and a fault code displayed in Field 14, record the fault code. hen, go to step 12.
4. Enter test 3.

TABLE 6-11. Traditional PRI (ANN35) Channel Versus Equipment Location

Channel	Slot/Circuit	Channel	Slot/Circuit
1	5/0 or 18/0	13	0/0 or 13/0
2	6/0 or 19/0	14	1/0 or 14/0
3	7/0 or 20/0	15	2/0 or 15/0
4	5/1 or 18/1	16	0/1 or 13/1
5	6/1 or 19/1	17	1/1 or 14/1
6	7/1 or 20/1	18	2/l or 15/1
7	5/2 or 18/2	19	0/2 or 13/2
8	6/2 or 19/2	20	1/2 or 14/2
9	712 or 20/2	21	2/2 or 15/2
10	5/3 or 18/3	22	0/3 or 13/3
11	6/3 or 19/3	23	1/3 or 14/3
12	7/3 or 20/3	24	2/3 or 15/3
Note: Channel 24 is the D channel.			

5. Type `nc` to display the first B channel on the alarmed entry.

6. Look at the circuit status appearing in Field 9.

‘The circuit status definitions are: O equals idle; 1 equals in use; 2 equals in use, far-end test call; 3 equals demand maintenance busied; 4 equals automatic maintenance busied; 5 equals far-end maintenance busied; 6 equals trunk records invalid or in a transitory state.

CAUTION If the circuit status equals 1 or 2, typing *bo* aborts any calls, data, or test call in progress.

- If the circuit status equals 0, 3, or 4, go to step 7.
- If the circuit status equals 1 (in use), go to step 7.

NOTE

If the circuit is still in use when Test 3 is executed, the circuit is not tested. If the circuit has to be tested immediately, typing bo aborts any calls or data in progress and the circuit is tested as soon as x is typed. An alternative way of testing the circuit is to execute Test 3. An in-use fault code appears for the in-use circuit. Executing Test 3 again for the in-use circuit initiates a camp-on procedure until the circuit goes idle. When the circuit becomes idle, it will be tested. Do not perform a camp-on procedure for dedicated switch connections.

- If the circuit status equals 2 or 5, do not test. The far end is either in use (by a test call) or maintenance busied.
- If the circuit status equals 6, wait 2 minutes.
  - Then, type *rb*. If the circuit status is now 0, go to step 7.
  - If the circuit status is still 6, type *bo*. Then, go to step 7.

7. Enter the length of the test for the ISDN circuit to be tested m Field 14 or specify the default test length.
   - You can specify the default test length (8 seconds) for test execution by leaving the dash in Field 14.
   - You can enter the length of the test for test execution by using the change field sequence and entering the number (in minutes) in Field 14.

NOTE

A 0 entered in Field 14 sends one block of data for the circuit selected for testing. A number between 1 and 126 entered in Field 14 indicates the number of minutes that the circuit selected for testing is tested.

8. Execute test 3.
   - If Test 3 passes, type *nd* to obtain the bit error rate/bits sent and the block error rate/blocks sent. Record the bit and block error rates. Then, go to step 14.
   - If Test 3 fails, type *nc*. Field 14 displays a fault code. Then, type *nd*. Record the bit and block error rates. Then, go to step 9.
9. Record the test state displayed in Field 10 and the fault code displayed in Field 14.
   - If a test state of 2 appears in Field 10 and a fault code of 8 appears in Field 14, go to step 10. The circuit selected for testing is in use and has *not* been tested.
   - If a test state 2 and a fault code of 8 are *not* displayed in Field 14, go to step 12.

CAUTION

Do not perform a camp-on procedure for dedicated switch connections.

TABLE 6-12. Universal PRI (TN767/TN555) Channel Versus Equipment Location

Channel	Slot/Circuit	Channel	Slot/Circuit
1	*/O	13	*+ 1/0
2	*/l	14	*+ 1/1
3	*/2	15	*+1/2
4	*/3	16	*+ 1/3
5	*/4	17	*+ 1/4
6	*/5	18	*+1/5
7	*/6	19	*+1/6
8	*/7	20	*+1/7
9	*/8	21	*+ 1/8
10	*/g	22	* + 1 / 9
11	*/10	2 3	*+1/l0
12	*/11	24	*+1/1 1

Notes:
1. * equals any slot for TN767 except slot one in the universal port carrier.
2. *+1 equals the next slot to TN767 for TN555.
3. Channel 24 is the D channel.

10. Execute test 3. If the circuit is still in use *and* Field 14 (fault code) displays an 8 indicating a prior in use failure, a camp-on procedure is begun. Field 10 (test state) remains in state 2 (seizing trunk) until the circuit becomes available.
11. When the in-use circuit has completed testing, use *nc* and *nd* as appropriate to find the status of the circuit and the bit and block error rates.
    - If the in-use circuit passes, type *nd* to obtain the bit error rate/bits sent and the block error rate/blocks sent. Then, go to step 14.
    - If the in-use circuit fails, perform corrective action beginning with step 8.
12. Refer to the table of fault code definitions in procedure 647 for the test state, fault codes, and definition associated with each fault code.
13. Perform the corrective action listed under *Repair steps Based on Fault Codes* associated with the fault code displayed in Field 14 for the failing ISDN circuit.

14. Determine if specific fault code 2000, 2001, 2002, 2003, or 2004 was recorded in step 2 for this alarmed entry.
    - If any of these specific fault codes was recorded for this alarmed entry, go to Step 15.
    - If none of these Specific fault codes was recorded for this alarmed entry, go to step 18.
15. Perform a clear data, execute sequence in test 1 by typing *cdx* for the alarmed entry that displayed the specific fault code in step 2.
16. Wait five minutes.
17. Execute test 1.
    - If the same specific fault code (Step 14 above) appears again for the same alarmed entry, escalate the failure.
    - If a different specific fault code appears for the same alarmed entry, go back to step 2 and repeat the procedure.
    - If the same alarmed entry does not appear again, corrective action is complete for this type of alarmed entry. Go to step 18.
18. Execute test 2 and Test 3 for each ISDN alarmed entry recorded in test 1.
19. Release the circuit from busy out, if it is busy, by typing *rb*.

NOTE Look at the circuit status appearing in Field 9 to ensure that both sides (local and far end) of the ISDN trunk are released from busy.

20. Repeat steps 4-19 (as appropriate) for each recorded alarmed entry.
21. Enter test 2.
22. Based on the range as findd by the alarmed entries recorded in step 2, execute a range test on a specific PRI circuit pack or all ISDN circuit packs in the switch. If any circuit packs fail record the fault code. Then, go back to step 12.
23. Enter test 3.
24. Execute a range test for the same alarmed entries as in step 22, using 0 (one block of data) for the test length. If any circuit packs fail, perform steps 9-18 as appropriate.
25. If all alarmed entries pass Test 2 and Test 3, perform the clear data execute sequence in test 1 for each ISDN alarmed entry or all ISDN alarmed entries to resolve the alarmed entries and to turn off the **OTHER FAILS** fault indicator (assuming that no other alarm sources affecting the fault indicator are active).

Repair steps Based on Fault Codes

Most fault codes are displayed when you perform Test 3. Fault codes 22,23,34,35, and 36 are displayed only in Test 2.

When possible, additional information is provided when the failure is escalated. Perform all corrective action at the local switch before indicting the far end switch and escalating the trouble.

Fault Code 1

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 1) and the trouble is persistent, go to step 2.
2. Use the following administration procedures to find if the ADFTC or MTCP is administered:
   - Procedure 010, Word 1 for the class of service (Field 15 equals 0)
   - Procedure 010, Word 3 for data protection (Field 15 equals 1)
   - Procedure 051, Word 1 for the equipment location (Field 6 equals 5)
   - Procedure 052, Word 1 for assignment of the extension number to the equipment location.
3. If administration is correct, escalate the failure.
4. If administration is not correct, administer the ADFTC or MTCP. Then, repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 2

Repeat test 3 on the same circuit.

NOTE

If this is a constant fault, escalate the failure.

Fault Code 3

1. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.

- If the ADFTC or MTCP passes both tests, go to step 2.
- If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 2 when the ADFTC or MTCP passes both tests.

2. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 4

1. Use administration Procedure 262, Field 6 to find if Test 3 (level 3) of Procedure 648 is enabled.
   - If administration is correct, escalate the failure.
   - If administration is not correct, enable Test 3 (level 3). Then, go to step 2.
2. Repeat test 2 or Test 3 (as applicable) on the same circuit that was failing, to find its status.

Fault Code 5

1. Use administration Procedure 275, Word 4 Field 14 to find if ISDN is activated.
   - If administration is correct, escalate the failure.
   - If administration is not correct, activate ISDN. Then, go to step 2.
2. Repeat test 3 on the same circuit that was failing, to find its status.

NOTE

High switch occupancy may be causing high primitive queue occupancy.

Fault Code 6

1. Type `bo.` Then, type *rb*.
2. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 6), escalate the failure.

     Provide as additional information in the escalation process the specific fault code that was recorded for this failing circuit in Step 2 of *General Repair steps.*

Fault Code 7

1. Look at the circuit status appearing in Field 9.

CAUTION If the circuit status equals 1, typing *bo* aborts any calls, data or test call in progress.

- If the circuit status equals 0 or 1, go to step 2.
- If the circuit status equals 3 or 4, go to step 3.
- If the circuit status equals 5, go to step 5.
- If the circuit status equals 6, go to step 6.

2. Repeat test 3 on the same circuit that was failing, to find its status. If the circuit status is 1, a camp-on procedure takes place and tests the circuit when it is idle.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 7), escalate the failure.

   Provide as additional information in the escalation process any specific fault code recorded in step 2 of *General Repair steps.*

3. Type `rb.`
4. Look at the circuit status appearing in Field 9.
   - If the circuit status changed, go to step 1 and take the appropriate action depending on the displayed circuit status.
   - If the circuit status did not change, go to Step 8.
5. The far end is maintenance busied. If you must test, contact the other end to find if the far end is maintenance busied from their side.
6. Wait two minutes, then check the circuit status appearing in Field 9.
   - If the circuit status changed, go to step 1 and take the appropriate action depending on the displayed circuit status.
   - If the circuit status did not change, type *bo.* Then, go to step 7.
7. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 7), go to step 8.
8. Escalate the failure.

   Provide as additional information in the escalation process that level 3 is suspected of being broken.

   The far end should check the status of the trunk on their end, including administration.

Fault Code 8

Repeat Test 3 to camp-on the circuit until the circuit is available for testing.

Fault Code 9

Administer the TTL using administration procedure 108.

Fault Code 10

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 10), go to step 2.
2. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 3.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 3 when the ADFTC or MTCP passes both tests.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 10), replace the ADFTC or MTCP circuit pack (SN261 or TN771B) if it has not already been replaced in step 2.

Fault Code 11

1. Use administration Procedure 000 and procedure 010 to find the assignment of the OTL.
   - If administration is correct, escalate the failure.
   - If administration is not correct, administer the OTL. Then, go to step 2.
2. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 12

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.

- If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
- If Test 3 fails again with the same fault code (Fault Code 12), go to step 2.

2. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65), and Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to Step 3.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 3 when the ADFTC or MTCP passes both tests.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 12), replace the ADFTC or MTCP circuit pack (SN261C or TN771B) if it has not already been replaced in step 2.

Fault Code 13

1. Perform Procedure 620, Test 2 to test the failing circuit.
   - If Test 2 passes, go to step 2.
   - If Test 2 fails, take corrective action until the test passes, then go to step 2.
2. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 13), go to Step 3.
3. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC of MTCP passes both tests, go to step 4.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 4 when the ADFTC or MTCP passes both tests.
4. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 13), escalate the failure.

Fault Code 14

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 14), go to step 2.
2. Use the following administration procedures to find if the features are administered correctly.
   - Procedure 350, Word 2, Procedure 285, and Procedure 103 to find the dial code assignment and trunk type of the TVS feature
   - Procedure 051 for keyboard dialing (Field 13 equals 1)
   - Procedure 010, Word 3 for class of service (Field 18 is not set for origination restriction).
3. If administration is correct, escalate the failure.
4. If administration is not correct, administer (as appropriate) the dial code assignment of the TVS feature, keyboard dialing, or class of service.
5. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 15

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
2. If Test 3 fails again with the same fault code (Fault Code 15), use administration Procedure 350, Word 2 to find the dial access code assigned to TVS by entering TVS feature code 44.
   - If administration is correct, escalate the failure.
   - If administration is not correct, administer the dial access code assignment of the TVS feature. Then, go to step 3.
3. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 16

1. Use administration Procedure 100 Word 1, Procedure 175, Procedure 010 Word 3, and Procedure 350 Words 1 and 2 to find the trunk type, trunk group administrations, and restrictions.
   - If administration is correct, escalate the failure.
   - If administration is not correct, administer the trunk group dial access code. Then, go to step 2.
2. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 17

1. Record the information displayed in Fields 2 through 14 for each circuit with a fault code of 17.
2. When you note that there are excessive entries (based on your own experience), refer the trouble to the switch engineers for further diagnosis.

Fault Code 18

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 18), go to Step 2.
2. Go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 18) go to step 6.
4. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to Step 5.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to Step 5 when the ADFTC or MTCP passes both tests.
5. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 18) go to step 6.
6. Use administration Procedure 100, Word 1 to find the ISDN trunk type for the near end.

   NOTE — Fault code 18 can occur when the ISDN trunk type is not translated correctly for the near-end switch or the far-end switch.

   - If administration is correct (outgoing trunk type), the far-end ISDN trunk type may be the source of the trouble. Refer the trouble to the far-end maintenance organization for further diagnosis. Ask the far-end maintenance organization to check the administration of the ISDN trunk type at their end and the administration of their terminating test line (108 type).

- If administration is not correct, administer the correct trunk type. Then, go to Step 7.

7. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 18), escalate the failure.

Fault Code 19

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails againwith a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 19), go to step 2.
2. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 3.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 3 when the ADFTC or MTCP passes both tests.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 19), replace the ADFTC or MTCP circuit pack (SN261 or TN77lB) if it has not already been replaced in step 2.

Fault Code 20

1. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 2.
   - If the ADFTC or MTCP passes both tests, go to step 2 when the ADFTC or MTCP passes both tests.
2. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 21

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform collective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 21), go to step 2.
2. Repeat step 1 several times. If fault code 21 is still displayed, go to step 3.
3. Use Procedure 635 to perform a *bo* and *rb* sequence on the ADFTC or MTCP circuit.
4. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 21), go to Step 5.
5. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 6.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step **6** when the ADFTC or MTCP passes both tests.
6. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 21), go to step 7.
7. Use administration Procedure 254 to find if originating registers are assigned.
   - If originating registers are assigned, escalate the failure. Provide as additional information in the escalation process that more originating registers may be required.
   - If originating registers are not assigned, administer the originating registers (as necessary). Then, go to Step 8.
8. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 22

If you are on site, the LEDs on the traditional PRI circuit pack (ANN35) indicate framing information and signaling channel activity. The green LED in position 7 indicates local framing status. If it is lighted, the local primary rate port is framing properly. The green LED in position 8 indicates remote framing status. If it is lighted, both the local primary rate port and the remote end are framing properly. The yellow LED in position 9 indicates that the signaling channel is active. The yellow LED flashes at a rate of 100 milliseconds (ins) when on board diagnostics are failing. The universal PRI circuit packs (TN767/TN555) do not have the same type of LEDs to indicate framing information and signaling channel activity.

1. Determine if you are on site or at a remote maintenance facility.
   - If you are on site, go to step 2.
   - If you are at a remote maintenance facility, go to step 3.
2. Check the yellow LED on the PRI circuit pack (ANN35).
   - If the yellow LED is lighted steady, go to step 3.
   - If the yellow LED is flashing at a rate of 100 ms, replace the PRI circuit pack (ANN35). Then, go to step 3.
3. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 22), go to step 4.
4. Check the near-end transmit cable to ensure that it is connected to the far-end receive cable.
   - If the near-end transmit cable is connected to the far-end receive cable, go to step 6.
   - If the near-end transmit cable is not connected to the far-end receive cable, connect the cables properly. Then, go to step 5.
5. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 22), go to step 6.
6. Check all interconnecting cables. Then, go to *Procedure 620 — DS-1 Interface (Unit Type 68)* or *PRI (Unit Type 75)*, and follow the repair steps provided
7. When you are satisfied that the ISDN trunk is performing correctly, repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 22), go to step 8.
8. Escalate the failure.

NOTE

Provide as additional information in the escalation process that the far-end primary rate interface may not be equipped or could be inoperative. In addition, request that the far-end transmit cable be checked to ensure that it is connected to the near-end receive cable.

Fault Code 23

1. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 23), go to step 2.
2. Check that the PRI circuit packs (ANN35 or TN767/TN555) are plugged into the correct slot, — slots 5 or 18 as applicable in the DS-1 carrier or any slot except slot one in the common port carrier.
   - If the circuit packs are in the correct slots, go to step 4.
   - If the circuit packs are not in the correct slots, place the ANN35 or TN767/TN555 circuit packs in the correct slots. Then, go to step 3.
3. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform Corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 23), go to Step 4.
4. Go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps provided.
5. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 23), go to Step 6.
6. Determine if the PRI circuit pack is administered correctly.

   NOTE Refer to *DEFINITY™ Generic 2 Administration of Features and Hardware* (555-104-507) to find how to administer the ISDN feature.

   - If administration is correct, go to step 8.
   - If administration is not correct, administer the ISDN feature. Then go to step 7.
7. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 23), go to Step 8.
8. Before escalating the failure, investigate Procedure 600, Test 1 and Test 2 to find if any alarms or recorded errors could be contributing to this failure. Use Procedure 620 to test these type of circuit

packs.

NOTE

Fault Code 23 is most likely a near end (local to switch) fault. However, it can also mean that ISDN level 1 (the physical DS-1 level) was never brought up. This can mean the problem is anywhere from the near end to the far end Any circuit involved with the PRI circuit pack's clock signal can cause Fault Code 23. Some of these circuit packs are the system clock synchronizer (SCS) TN463, the port data store (PDS) TN440, and the port data interface (PDI) TN454.

Fault Code 24

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code, (Fault COde 24), go to step 2.
2. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to Step 3.
   - If the ADFTC or MTCP fails either test,perform corrective action as listed. Then, go to Step 3 when the ADFTC or MTCP passes both tests.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 24), replace the ADFTC or MTCP circuit pack (SN261 or TN77lB) if it has not already been replaced in step 2.

Fault Code 25, Fault Code 26, or Fault Code 27

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 25,26, or 27), go to step 2.
2. Check all interconnecting cables. Then, go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps provided
3. When you are satisfied that the ISDN trunk is performing correctly, repeat test 3 on the same circuit that was failing, to find its status.

- If Test 3 passes, you have fixed the problem.
- If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
- If Test 3 fails again with the same fault code (Fault COde 25, 26, or 27), go to step 4.

4. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65), and Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 5.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to Step 5 when the ADFTC or MTCP passes both tests.
5. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If fault code 25 or 26 appears again, go to Step 6.
   - If fault code 27 appears again, go to step 8.
6. Use administration Procedure 100, Word 1 to find the ISDN trunk type for the near end.

   NOTE Fault code 25 or 26 can be displayed when the ISDN trunk type is not translated correctly for the near end or far end, especially if the near end is translated as an outgoing or two-way trunk type and the far end is translated as an auto-in trunk type.

   - If the ISDN trunk type is an outgoing or two-way trunk type, trouble with the far-end ISDN trunk type may be indicated. Refer the trouble to the far-end maintenance organization for further diagnosis.
   - If the ISDN trunk type is not an outgoing or two-way trunk type, administer the correct trunk type. Then, go to step 7.
7. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 25 or 26), go to step 8.
8. Escalate the failure.

   Anything in the test connection can cause Fault Code 25 (error overflow detected by ADFTC or MTCP), Fault Code 26 (no data received by ADFTC or MTCP), or Fault Code 27 (data transmission to ADFTC or MTCP interrupted) to occur.

   Advise the far end that cabling, the far-end PRI, and the TTL should be checked.

Fault Code 28, Fault Code 29, or Fault Code 30

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 28,29, or 30), go to step 2.
2. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 3.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 3 when the ADFTC or MTCP passes both tests.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 28, 29, or 30), replace the ADFTC or MTCP circuit pack (SN261 or TN771B) if it has not already been replaced in step 2.

Fault Code 31 or Fault Code 32

1. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 31 or 32), go to step 2.
2. Check all interconnecting cables. Then, go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps provided
3. When you are satisfied that the ISDN trunk is performing correctly, repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 31 or 32), go to step 4.
4. Go to *Procedure 646 — Digital Trunk Digital User Problem or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 5.

- If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 5 when the ADFTC or MTCP passes both tests.

5. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 31 or 32), go to step 6.
6. Escalate the failure.

   Anything in the test connection can cause Fault Code 31 (bit error rate threshold exceeded) or Fault Code 32 (block error rate threshold exceeded) to occur.

   Advise the far end that cabling, the far-end PRI, and the TTL should be checked.

Fault Code 33

1. Go to *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* and *Procedure 620 — Port Carrier Unit Types,* and use Procedure 646, Test 1 and Procedure 620, Test 4 (unit type 62) respectively to test the ADFTC or MTCP.
   - If the ADFTC or MTCP passes both tests, go to step 2.
   - If the ADFTC or MTCP fails either test, perform corrective action as listed. Then, go to step 2 when the ADFTC or MTCP passes both tests.
2. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If fault code 33 appears again, type *bo*. Then, type *rb*. Go to step 3.
3. Repeat test 3 on the same circuit that was failing, to find its status.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 3 fails again with the same fault code (Fault Code 33), reseat the ADFTC or MTCP circuit pack (SN261 or TN771B). Then, go to step 4.

   NOTE

   A lighted yellow LED on circuit pack SN261 or TN771B indicates that the ADFTC or MTCP is busy (off-hook state).
4. Repeat test 3 on the same circuit that was failing, to find its status.

Fault Code 34

1. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test *2* fails again with the same fault code (Fault Code 34), go to step 2.
2. Go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps provided.
3. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 34), escalate the failure.

     Provide as additional information in the escalation process the specific fault code that was recorded for this failing circuit in Step 2 of *General Repair steps.*

Fault Code 35

If you are on site, the LEDs on the traditional PRI circuit pack (ANN35) indicate framing information and signaling channel activity. The green LED in position 7 indicates local framing status. If lighted, the 1ocal . primary rate port is framing properly. The green LED in position 8 indicates remote framing status. If lighted, both the local primary rate port and the remote end are framing properly. The yellow LED in position 9 indicates that the signaling channel is active. The yellow LED is flashing at a rate of 100 ms when on-board diagnostics are failing. The universal PRI circuit packs (TN767/TN555) do not have the same type of LEDs to indicate framing information and signaling channel activity.

1. Determine if you are on site or at a remote maintenance facility.
   - If you are on site, go to step 2.
   - If you are at a remote maintenance facility, go to step 3.
2. Check the yellow LED on the PRI circuit pack (ANN35).
   - If the yellow LED is lighted steady, go to step 3.
   - If the yellow LED is flashing at a rate of 100 ms, replace the PRI circuit pack (ANN35). Then, go to step 3.
3. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 45), go to step 4.
4. Check the near-end transmit cable to ensure that it is connected to the far-end receive cable.

- If the near-end transmit cable is connected to the far-end receive cable, go to step 6.
- If the near-end transmit cable is not connected to the far-end receive cable, connect the cables properly. Then go to step 5.

5. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform Corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 35), go to step 6.
6. Check all interconnecting cables. Then, go to *Procedure 620 — DS-1 Interface (Unit Type 68) or PRI (Unit Type 75),* and follow the repair steps provided.
7. When you are satisfied that the ISDN trunk is performing correctly, repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - IF Test 2 fails again with the same fault code (Fault Code 35), go to step 8.
8. Escalate the failure.

NOTE

Provide as additional information in the escalation process that the far-end primary rate interface may not be equipped or could be inoperative. In addition, request that the far-end transmit cable be checked to ensure that it is connected to the near-end receive cable.

Fault Code 36

1. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 36), go to step 2.
2. Check that the PRI circuit packs (ANN35 or TN767/TN555) are plugged into the correct slot, — slots 5 or 18 as applicable in the DS-1 carrier or any slot except slot one in the common port carrier.
   - If the circuit packs are in the correct slots, go to Step 4.
   - If the circuit packs are not in the correct slots, place the ANN35 or TN767/TN555 circuit packs in the correct slots. Then, go to step 4.
3. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.

- If Test 2 fails again with the same fault code (Fault Code 36), go to Step 4.

4. Go to *Procedure 620 — DS-1 Interface* (Unit *Type* 68) *or PRI (Unit Type 75),* and follow the repair steps provided.

5. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 36), go to Step 6.

6. Determine if the PRI circuit pack is administered correctly.

   NOTE

   Refer to *DEFINITY Generic 2 Administration of Features and Hardware* (555 -104-507) to find how to administer the ISDN feature.

   - If administration is correct, go to step 8.
   - If administration is not correct, administer the ISDN feature. Then, go to step 7.

7. Repeat test 2 on the same circuit that was failing, to find its status.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails again with a different fault code, perform corrective action as listed for the fault code.
   - If Test 2 fails again with the same fault code (Fault Code 36), go to Step 8.

8. Before escalating the failure, investigate Procedure 600, Test 1 and Test 2 to find if any alarms or recorded errors could be contributing to this failure. Use procedure 620 to test these type of circuit packs.

   NOTE

   Fault Code 36 is most likely a near end (local to switch) fault. However, it can also mean that ISDN level 1 (the physical DS-1 level) was never brought up. This can mean the problem is anywhere from the near end to the far end. Any circuit involved with the PRI circuit pack's clock signal can cause Fault Code 36 Some of these circuit packs are the system clock synchronizer (SCS) TN463, the port data store (PDS) TN440, and the port data interface (PDI) TN454.

PROCEDURE 650 — DCIU (UNIT TYPE 19)

Unit Type 19 — Data Communications Interface Unit (DClU)	
Diagnostic and verification test	Procedure 650, Test 2
Components tested	TN405, TN406, UN156
Related procedures required	● Procedure 614 (fault code 15) to isolate the cause of a memory read/memory match problem.
Other tests	You may have to initialize the DCIU. Loop-around testing when required. Internal loop-around test is used to test the data link interface hardware. External loop-around testing is used to test the data link cabling between the backplane and the connector; and between the connector and the data set.

General Repair Steps

If there is a DCIU failure, the switch lights **APPL PROCR AP INTER** and **MAJOR, MINOR,** or **WARNING** fault indicators on the common-control alarm panel and Procedure 600 references Procedure 650. Use the following steps to isolate and repair the failure.

1. Execute Procedure 650, Test 1.

   Record the equipment location and fault codes for each failure.

   NOTE: If a specific DCIU circuit pack cannot be identified for the fault code infield 12, fields 5 and 6 are dashed

2. Execute test 2.

   If all circuits pass Test 2, the switch turns off **APPL PROCR AP INTER** on the common-control alarm panel. The switch turns on the green LED on each DCIU circuit pack (TN406, TN405, and UN156) if there are no failures.

3. Go to *Loop-Around Testing* and test each alarm from test 1 with a fault code of 6 or 31-34 to ensure that no intermittent problems exist with data links.

4. If there are any failures, display the first failure on your screen.

   Record the equipment location and the fault code.

NOTE The switch lights the red LED on the circuit pack that fails.

- If field 12 does not contain fault codes 20-35, go to step 5.
- If field 12 contains fault codes 20-35, repeat test 2.

NOTE Fault codes 20-35 may not be failures since the accumulated count may need to be cleared.

— If field 12 still contains fault code 20-35, go to step 5.

— If any other fault code appears in Field l2, go to step 5.

5. Go to *Loop-Around Testing* and test each alarm from test 1 with a fault code of 6 or 31-34 to ensure that no intermittent problems exist with data links.
6. At the equipment location on your screen, replace the circuit pack with the red LED lighted.

CAUTION When you replace TN406 without using the GO/HALT switch, you will cause a partial reload. Replace TN406 in the common-control carrier as detailed in Chapter 9, ***Switch*** *Component Replacement — Circuit Pack Replacements.*

7. Repeat test 2.

When test 2 passes, the switch turns off **APPL PROCR AP INTER** on the common-control alarm panel and the DCIU alarmed circuit is marked resolved.

The problem is fixed.

NOTE You may have to initialize the DCIU. To initialize the DCIU, you must first busy it out and then release it from busy.

8. If Test 2 fails, step through each failure.

— If a different failure exists, display the failure on your screen. Record the equipment location and the fault code. Then, go back to step 3 above.

— If the same failure exists, display the failure on your screen.

9. Enter `nc` to see each alternate circuit pack to replace.
   - If all fields except fields 1 and 9 are dashed, there is no alternate circuit pack to replace. Go to step 15.
   - Fields 2-5 show the equipment location of the alternate circuit pack. Record the equipment location and the fault code.

NOTE The switch turns off the red LED on the original circuit pack and turns on the red LED on the alternate circuit pack.

- At the equipment location displayed in Fields 2-5, replace the alternate circuit pack.

CAUTION When you replace TN406 without using the GO/HALT switch, you will cause a partial reload. Replace TN406 m the common-control carrier as detailed in Chapter 9, *Switch Component Replacement — Circuit Pack Replacements.*

- Repeat test 2.
  - If a different failure exists, display the failure on your screen.

    Record the equipment location and the fault code. Then, go back to step 3 above.
  - If the same failure exists, display the failure on your screen.

  When Test 2 passes, the switch turns off **APPL PROCR AP INTER** indicator. The switch marks the DCIU alarmed circuit entries resolved. The problem is fixed.

NOTE You may have to initialize the DCIU. To initialize the DCIU, you must first busy it out and then release it from busy.

10. Enter nc to see if an alternate circuit pack replacement is available.
    - If all fields except Fields 1 and 9 are dashed, no alternate circuit pack is available for replacement. Go to step 15.
    - If there is an alternate circuit pack to replace, fields 2-5 show the equipment location of the alternate circuit pack.
11. Record the equipment location and the fault code.

NOTE The switch turns off the red LED on the original circuit pack and turns on the red LED on the alternate circuit pack.

12. At the equipment location displayed in Fields 2-5, replace the second alternate circuit pack.

CAUTION When you replace TN406 without using the GO/HALT switch, you will cause a partial reload. Replace TN406 in the common-control carrier as detailed in Chapter 9, *Switch Component Replacement — Circuit Pack Replacements.*

13. Repeat test 2.

- If Test 2 passes, the switch turns off **APPL PROCR AP INTER** indicator and marks the DCIU alarmed circuit entries resolved. The problem is fixed.

NOTE

You may have to do initialize the DCIU. To initialize the DCIU, you must first busy it out and then release it from busy.

- If Test 2 fails, step through the failures to determine if the same failure exists.
  - — If a different failure exists, display the failure on your screen. Record the equipment location and the fault code. Then, go back to step 3 above.
  - — If the same failure exists, display the failure on your screen.

14.

- If fault code 15 appears, go to *Procedure 614 — Main Memory (Unit Type 5) or Cache Memory (Unit Type 18),* to isolate the cause of the problem.
- If fault code 6, or 31-35 appears, perform fault isolation and repair procedure *Loop-Around Testing External Manual* (below) to isolate the cause of the problem.
- If fault codes 6,15, or 31-35 is not displayed, go to step 16.

15. Check the wiring for the circuit packs replaced. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Loop-Around Testing

The two types of loop-around testing currently available are internal, and external manual.

- Internal loop-around testing tests the data link interface hardware (UN156 circuit pack).
- External manual loop-around testing tests the data link cabling between the backplane and the connector; and between the connector and the data set.

If test 1 contains failures by test 2 passes (and you have done nothing yet to fix the problem), do loop-around testing on each alarm with a fault code of 6,or 31-34.

Do the internal loop-around test first; and if required, you should perform the external loop-around tests when it is necessary to further isolate a problem with the HDLC.

You can only do an internal loop-around test on the off-line DCIU data link.

It takes about 15 minutes (and at least 100,000 bits) to completely test the DCIU. It takes only about 30 seconds (and at least 4000 bits), to do an abbreviated test using a local loop-back plug to determine the DCIU hardware integrity *only* up to the local end.

If you are doing test 3 in the off-line common control you should monitor about 2.5 hours (and at least 1 million bits).

If there are no failures after about 10,000 bits, (field 14 contains a 10), the switch turns on the green LED on UN156. If a failure is detected, (before or after 10,000 bits are sent), the switch turns on the red LED on UN156. If the green turns on and the LED is lit, the switch turns it off.

Internal Loop-Around Test

Use the following steps to do an internal loop-around test in the on-line or off-line DCIU data link.

1. Enter test 3 and select the data link to be tested

   Internal loop-back testing encode 0 appears by default in Field 7.

2. Busy out the data link to be tested by typing *bo* twice.

3. Execute test 3. Test 3 monitors loop-around testing at a rate of about 10,000 bits sent per 90 seconds. (Field 14 displays multiples of 10.)

   During execution of Test 3, the following fields are incremented: Field 13 — failures per thousands of bits sent and Field 14 — thousands of bits sent.

4. Determine the time of the testing interval and end the test by typing *s*.

5. When you stop Test 3, the results of the loop-around test are displayed in Fields 13 and 14 and the red or green LED is lighted on UN156.

   - If the failure rate displayed in Field 13 is more than 1 per 100,000 bits sent (that is, 100 displayed in Field 14), the data link failed the loop-around test.
   - If the red LED on UN156 is lighted, at least one failure occurred. If the threshold is not exceeded (indicated by Fields 13 and 14), Test 3 passed. If the threshold is exceeded, Test 3 failed.

   NOTE: The failure rate (Field 13) should be less than 1 per 100,000 bits sent (that is, 100 displayed in Field 14). If Field 14 is less than 1000, results are not conclusive if Field 13 is less than 10.

6. Determine the status of Test 3.

   - If Test 3 passes and a data link problem is still suspected perform fault isolation and repair procedure *External Manual Loop-Around Testing* (below) to isolate the trouble.
   - If Test 3 passes and no data link problem is suspected, release the data link from busy out.

     then, perform test 2 to resolve the alarm cause and to turn off the **APPL PROCR AP INTER** fault indicator.
   - If Test 3 fails, replace UN156. Then, go to step 7.

7. Repeat test 3.

   - If Test 3 passes, release the data link from busy out. Then, perform test 2 to resolve the alarm cause and to turn off the **APPL PROCR AP INTER** fault indicator.
   - If Test 3 fails again and a data link problem is still suspected, perform fault isolation and repair procedure *External Manual Loop-Around Testing* (below) to isolate the trouble.
   - If Test 3 fails again and a data link problem is not suspected, go to step 8.

8. Check the wiring associated with the replaced UN156 circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

External Manual Loop-Around Testing

When you perform the external manual loop-around test to isolate an interface problem between the DCIU and the AP, message handling is suspended for the data link being tested.

You initiate the external manual loop-around test by pressing the AL key (or local loop-back button) on a data set, or by connecting an ED1E422-10 Group 6 loop-back plug to the back of the common control. Both methods are presented below.

An abbreviated external manual loop-around test can be performed to determine the DCIU hardware integrity *only up* to the local end. You *must* use the local loop-back plug (ED1E422-10 Group 6) for this abbreviated test. When 4000 bits have been sent, end the abbreviated test by typing *s*.

Perform the external manual loop-around testing of an *on-line only* DCIU data link as follows:

1. Enter test 3 and select the data link to be tested
2. Busy out the data link to be tested by typing *bo* twice.
3. Determine if a data set is the interface between the AP and the DCIU data link.
   - If a data set is the interface, depress the **AL** key (or local loop-back button) on the data set. Then, go to step 4.
     - When the **AL** key is depressed, the **MB, TR, MR** and **TM LEDs** on the data set are turned . on.
     - The **TR** LED indicates that the data set detects the terminal ready signal from the switch.
   - If a data set is not the interface, disconnect the cable form the common-control connector (F*) at the rear of the common-control cabinet corresponding to the UN156 slot and data link that is failing.

     Cable designations are: F1 — F8 equals data link 1 — 8 (for example, F4 equals data link 4).

     Connect the ED1E422-10 Group 6 loop-back plug to the F*connector corresponding to the UN156 slot and data link that is failing. Then, go to step 4.
4. Perform the external manual loop-around test by setting Field 7 to 1 in test 3.
5. Execute test 3.

   Test 3 monitors loop-around testing at a rate of about 10,000 bits sent per 90 seconds. (Field 14 displays multiples of 10.)

   During execution of Test 3, the following fields are incremented: Field 13 — failures per thousands of bits sent and Field 14 — thousands of bits sent.
6. Determine the time of the testing interval and end the test by typings.
7. When you stop Test 3, the results of the loop-around test are displayed in Fields 13 and 14 and the red or green LED is lighted on UN156.
   - If the failure rate displayed in Field 13 is more than 1 per l00,000 bits sent (that is, 100 displayed in Field 14), the data link failed the loop-around test.

- If the red LED on UN156 is lighted, at least one failure occurred. If the threshold is not exceeded (indicated by Fields 13 and 14), Test 3 passed. If the threshold is exceeded, Test 3 failed.

NOTE

The failure rate (Field 13) should be less than 1 per 100,000 bits sent (that is, 100 displayed in Field 14). If Field 14 is less than 1000, results are not conclusive if Field 13 is less than 10. If an abbreviated external manual loop-around test was performed, the failure rate (Field 13) should be 1 or less per 4000 bits sent (4 displayed in Field 14).

8. Determine the status of Test 3.
   - If Test 3 passes, determine which method of external manual loop-around testing was performed. Release the **AL** key (or local loop-back button) or connect the cable top the connector on the back of the common-control carrier as appropriate. When Test 3 is completed for the data link being tested, release the data link from busy out.
     - — If the **AL** key (or local loop-back button) was depressed, repeat Test 2 to resolve the alarm cause and to turn off the APPL PROCR AP INTER fault indicator.
     - — If an ED1M22-10 Group 6 loop-back plug was used, refer the data set problem to the appropriate personnel.
   - If Test 3 fails, determine which method of external manual loop-around testing was performed.
     - — If the AL key (or local loop-back button) was depressed, disconnect the cable from the common-control connector (F*) at the rear of the common-control cabinet corresponding to the UN156 slot and data link that is failing.

       Cable designations are: F1 — F8 equals data link 1— 8 (for example, F4 equals data link 4).

       Connect the ED1E422-10 Group 6 loop-back plug to the F* connector corresponding to the UN156 slot and data link that is failing.

       Repeat steps 4-8 using the ED1E422-10 Group 6 loop-back plug. Then, go to step 9.
     - — If an ED1E422-10 Group 6 loop-back plug was used, escalate the failure.
9. If Test 3 now passes using the ED1E422-10 Group 6 loop-back plug, refer the data set problem to the appropriate personnel. Release the **AL** key (or local loop-back button) or connect the cable to the connector on the back of the common-control carrier as appropriate. When Test 3 is completed for the data link being tested, release the data link from busy out.
10. If Test 3 fails again, escalate the failure.

PROCEDURE 651 — PCC (UNIT TYPE 77)

Unit Type 77 — Processor Communication Circuit (PCC)	
Diagnostic and verification test	Procedure 651, Test 2 and Test 3
Components tested	TN474 and link to the 3B2 LSU peripheral
Tools and test equipment	• An EDlE422-Group 10, Group 11, or Group 12 loop-back plug • A one-pair five-foot patch cord (comcode 103908349 or equivalent) • An ED1E422-Group 7, RS232 loop-back plug • A 2012D transformer (comcode 1-517) • A 400B adapter (comcode 104152558) • A 248B adapter (comcode 102802113) • A seven-foot six-terminal D6AP-87 power cord (comcode 102938620) • A seven-foot eight-pin modular cord (comcode 102872512) to perform the end-to-end loop test.
other tests	End-to-end loop-around Test

General Repair steps

If there is a PCC failure, the switch lights **OTHER FAILS** and Procedure 600 references Procedure 651. Use the following steps to isolate and repair the failure.

1. Execute Procedure 651, Test 1.

   Record each alarmed PCC circuit.

2. Display the alarmed circuit in test 1.
3. Enter test 2.
4. If field 7 contains a 1, go to step 7.
5. If field 7 contains a 2, enter `bo` to busy out the alarmed circuit. Field 7 changes to 1 after you busy out the circuit.

NOTE You cannot do test 2 if field 7 contains a 0,3, or 4.

6. Execute test 2.
   - If Test 2 passes, go to fault isolation and repair procedure *Continuous Testing* for further diagnosis of the alarmed failure.
   - If Test 2 fails, go to step 8.

   The switch lights the red LED on circuit pack TN474.
7. At the equipment location displayed in Fields 2-4, replace circuit pack TN474.
8. Repeat test 2.
   - If Test 2 passes, go to fault isolation and repair procedure *Continuous Testing* for further diagnosis of the alarmed failure.

   NOTE You must run test 2 and test 3 for each alarmed FCC circuit recorded in test 1 to ensure that TN474 is working properly and to check the link between the switch and the peripheral.

   - If Test 2 fails, check the warning to the TN474. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

When all alarmed PCC circuits pass test 2, the switch turns off **OTHER FAILS** if there is no other reason for it to be on.

Continuous Testing

If a PCC circuit was alarmed in test 1 and passes test 2 (before you do anything to repair it), use test 3 to ensure that the failure is not intermittent and that the link between the switch and the peripheral is functioning.

1. Display the alarmed circuit in test 1.
2. Enter test 3.
   - If field 7 contains a 1, go to step 5.
   - If field 7 contains a 2, busy out the circuit.

   Field 7 contains a 1 after you busy it out.

NOTE

You cannot do test 3 if field 7 contains a 0,3, or 4.

3. Set Field 5 to 1.
4. Execute test 3.
5. After about 100 messages (field 11 contains a 100), enters to stop the test.

   Fields 10 and 11 show the test results.

   - If field 10 contains a 0, the problem is fixed. Go to Step 8.
   - If there were any failures (field 10 contains a number other than o), go to fault isolation and repair procedure *End-to-End Loop-Around Test* for further isolation techniques.
6. Before you quit Procedure 651, display the PCC circuit on your screen release the PCC circuits from busy.

NOTE

If you busy out a PCC circuit in test 3, you cannot use Procedure 635 to release the circuit from busy.

7. Execute test 2 and test 3 for each alarmed PCC circuit you recorded in test 1 to ensure that TN474 is working properly and to check the link between the switch and the peripheral.

   a.. Go to *General Repair Steps* fault isolation techniques and begin with step 3 to display the next alarmed PCC circuit.

   b. Perform all steps listed under *General Repair steps, Continuous Testing,* and *End-to-End Loop-Around Test* (as appropriate) for each alarmed PCC circuit recorded in test 1.

End-to-End Loop-Around Test

Use the end-to-end loop-around test to isolate failures between the PCC circuit pack and the 3B2 LSU peripheral.

CAUTION

Do the end-to-end loop-around test when it will not interrupt service in the switch

1. At the back of the common-control carrier, disconnect the cable from the D connector to the slot number displayed in Field 3.
2. Connect the correct loop-back plug to the D connector you just removed (see Table 6-13).

TABLE 6-13. Loop-back Plug Types

LOOP-BACK PLUG TYPE	SLOT NUMBER
EDlE422-Group 10	24 (Dl)
EDlE422-Group11	slot 25 (D2);
EDlE422-Group 12	26 (D4).

3. Execute test 3.
   - If Test 3 passes, go to step 5.
   - If Test 3 fails, replace the TN474.
4. Repeat test 3.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails, check the wiring between the backplane and the D connector. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
5. Disconnect the loop-back plug.
6. Connect the cable you disconnected in step 1 to the correct slot (D connector).
7. At the cross-connect field, disconnect the send and receive wires for the circuit displayed in Field 3 going toward the peripheral.

   NOTE — Circuit 0 send and receive wires end in 0 (for example, S10, R10, and so on). Circuit 1 send and receive wires end in 1 (for example, S 11, R11, and so on).

   Refer to Table 6-14, *Port Wiring Connections,* to determine the correct wires to disconnect.

   NOTE — Only send and receive wires S10, S20, R10, R20 (for circuit 0) or S11, S21, R11, R21 (for circuit 1) need to be disconnected.

8. Connect a one-pair, five-foot patch cord between S10 to R10 and S20 to R20 for circuit O or between S11 to Rll and S21 to R21 for circuit 1.
9. Repeat test 3.
   - If Test 3 passes, go to step 9.
   - If Test 3 fails, check the wiring between the cross-connect field and the backplane and replace as necessary. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
10. At the cross-connect field disconnect the patch cord. Reconnect the wires disconnected in step 6.
11. At the far end (peripheral), disconnect Z3A4 from the 2750-C10 male modem connector (comcode 2322125005).

12. Connect an EDlE422-Group 7, RS232 loop-back plug to the Z3A4.
13. Connect a 2012D transformer to the Z3A4 using the following steps.
    a. Disconnect the Z3A4 from the wall jack.
    b. Disconnect the eight-terminal modular cable from the WALL JACK input of the Z3A4.
    c. Plug the eight-terminal male plug of the 400B adapter into the wall jack.
    d. Connect the 248B adapter to the 2012D transformer terminals.
    e. Connect the 248B adapter to the six-terminal POWER input of the 400B adapter using a six-terminal seven-foot D6AP-87 power cord.
    f. Connect the PHONE jack of the 400B adapter to the WALL JACK input of the Z3A4 using a seven-foot eight-pin modular cord.
14. Plug the transformer into a 117V AC outlet.
15. Repeat test 3.
    - If Test 3 passes, go to step 15.
    - If Test 3 fails, check the Z3A4 and/or the wiring between the cross-connect field, wall jack, and the Z3A4. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
16. Disconnect the equipment connected in steps 12c, 12d, 12e, and 12f.
17. Connect a replacement eight-terminal modular cable to the WALL JACK input of the Z3A4.
18. Connect the Z3A4 to the wall jack
19. Repeat test 3.
    - If Test 3 passes, you have fixed the problem.
    - If Test 3 fails, the problem is either the 3B2 LSU peripheral or the 3B2 serial port. Refer the problem to the appropriate far end (peripheral) maintenance personnel.

TABLE 6-14. Port Wiring Connections

On-Line Common-Control Signal	D Connector and Pin Number by Slot		
	Slot 24	Slot 25	Slot 26
Send Leads Sl0	D1/34	D2/42	D4/26
S20	D1/09	D2/17	D4/01
S30	D1/36	D2/44	D4/28
S40	D1/11	D2/19	D4/03
Sll	Dl/38	D2/46	D4/30
S21	D1/13	D2/21	D4/05
S31	D1/40	D2/48	D4132
S41	D1/15	D2/23	D4/07
Receive Leads R10	D1/35	D2/43	D4/27
R20	D1/10	D2/18	D4/02
R30	D1/37	D2/45	D4/29
R40	D1/12	D2/20	D4/04
R1l	D1/39	D2/47	D4/31
R21	D1/14	D2/22	D4/06
R31	D1/41	D2/49	D4/33
R41	D1/16	D2/24	D4/08

PROCEDURE 652 — TIME-OF-DAY CLOCK SYNCHRONIZER (UNIT TYPE 38)

Unit Type 38 — Time-of-day Clock Synchronizer	
Diagnostic and verification test	Procedure 652, Test 2
Components tested	TN492

General Repair Steps

If there is a time-of-day clock synchronizer failure, the switch lights **OTHER FAILS** on the common control alarm panel and Procedure 600 references Procedure 652. Use the following steps to isolate and repair the failure.

1. Execute Procedure 652, Test 1.

   Record the equipment location, and all failure codes for each alarm.

2. Execute test 2.

   Record all failure codes for each alarm.

   When test 2 passes, the switch marks time-of-day clock synchronizer alarms resolved. The switch turns off **OTHER FAILS** if there are no other reasons for it to be on.

   NOTE

   If an alarmed circuit was busied out, it is released from the busy-out state.

3. If there were any failures in test 2, refer to Table 6-15, *Time-of-day Clock Synchronizer Failure codes,* and follow the repair steps there.

   If there was more than one failure code, repair the first failure code with an alarm-sent indication (encode 2 or 3 in Field 4).

4.

   NOTE

   Before you replace circuit pack TN492C, make sure that the battery is connected on the back of the circuit pack.

   To replace the battery, use the following steps.

   a. Mark the date of the next battery replacement (month and year) on the date label that is attached to the battery.

      To get the next battery replacement date, add five years to the installation date TN492C circuit pack. Example: TN492C circuit pack replaced July 1989; date to be written on the label is July 1994.

b. Affix the date label to the faceplate of the TN492C circuit pack

If the yellow LED is lighted, after you replace the circuit pack, the battery is not connected or wired correctly.

5. If you have replaced circuit pack TN492C, execute Procedure 652, Test 3 to set the time-of-day clock to the correct time. Then, repeat test 2.

- If Test 2 passes, you have fixed the problem.
- If a failure is still indicated, analyze the failure codes and perform any additional corrective action as required.

  Repeat test *3 as* appropriate, and then repeat test *2*.

6. If all corrective action has been taken and the hardware time-of-day clock still fails, check the wiring associated with the replaced circuit pack. If the wiring is satisfactory or you have replaced it, and the failure still exists, escalate the failure.

TABLE 6-15. Time-of-day Clock Synchronizer Failure Codes

Failure Code	Meaning and Corrective Action
1	No response. Replace TN492C.
2	Reserved for future use.
3	Reserved for future use.
4	The hardware clock is not running. Replace TN492C.
5	The software clock has been updated after initialization from a power up. This is not an alarmable condition and, therefore, does not require repair activity.
6	Due to small differences in the software and hardware clocks, the software clock was updated by the hardware clock.
6 (contd)	Some counts are expected and do not indicate a fault condition. If Field 4 indicates that an alarm has been sent, replace TN492C.
7	Due to large differences in the software and hardware clocks, the hardware clock has been updated by the software clock. Replace TN492C.
8	Invalid time values have been received from hardware. Replace TN492C.
9	Invalid time values have been received from the software. This **is a** software problem that cannot be corrected by changing hardware.
10	Clock set failure. Replace TN492C.

PROCEDURE 653— ATTENDANT CONSOLE (UNIT TYPE 17)

Unit Type 17 — Attendant Console	
Diagnostic and verification test	Procedure 653, Test 2
Components tested	Local and remote consoles
Tools and test equipment	• Screwdriver to remove and replace console components. • Digital multimeter to measure the voltages on the console power supply circuit pack MW-4.
Related procedures	• Procedure 620, Test 4 to test the SN233 attendant interface circuit pack. • Procedure 611, Test 2 or Test 3 to determine if an I/O failures exists or to test the data channel associated with a remote console.

General Repair Steps

If there is an attendant console failure, the switch lights **OTHER FAILS** on the common control alarm panel and procedure 600 references procedure 653. Use the following steps to isolate and repair the failure.

Fault Isolation

1. Verify that the handsets or headsets are plugged into the attendant consoles.

   NOTE: If the handsets or headsets are not plugged into the attendant consoles, the console *will* fail Procedure 653, Test 2.

2. Execute Procedure 653, Test 1.

   Record the failure history.

3. Execute test 2.

   - If Test 2 passes and you suspect a console failure, go to fault isolation and repair procedure *Intermittent Failures* to check for intermittent failures.
   - If Test 2 passes and you do not suspect a console failure, you have fixed the problem.

- If Test 2 fails, record the failing console number (Field 5), the associated dual-speed data channel equipment location (Fields 2-4), and the remote status (Field 6) for each failing console. Then, go to step 4.

4. Go to *Procedure 620 — Port Carrier Unit Types, to* test the attendant interface circuit pack (SN233) associated with the failing console by entering unit type 44. Take appropriate corrective action listed.

5. After passing Procedure *620* Test 4, execute Procedure 653, Test 2.

   - If Test 2 passes, the console alarm cause is resolved and the **OTHER FAILS** fault indicator turns off if no other alarmed causes exist.

- If the same console fails Test 2 again, determine the remote status appearing in Field 6.
  - — If the remote status equals 0 (local), perform fault isolation and repair procedure *Local Console Failures.*
  - — If the remote status equals 1 (remote), perform fault isolation and repair procedure Remote *Console Failures*.
- If a different console fails Test 2, repeat steps 4 and 5 as appropriate.

Local Console Failures

1. Use a digital multimeter to check the voltages on the console power supply circuit pack MW-4 in the attendant console indicated in Field 5.
   - If the voltages are correct, replace console circuit pack AEE1. Then go to step 2.

     NOTE

     Refer to Chapter 9, *Switch Component Replacement,* for stepson replacing console circuit pack AEE1 .

   - If the voltages are incorrect, replace console circuit pack MW-4. Then, go to step 2.

     NOTE

     Refer to Chapter 9, *Switch Component Replacement,* for stepson replacing console circuit pack MW-4.

2. Repeat test 2.
   - If no consoles fail, you have fixed the problem.
   - If a different console fails, perform steps 4 and 5 (as appropriate) of fault isolation and repair procedure *Fault Isolation to* further isolate the trouble.
   - If the same console fails Test 2 again, replace the console indicated in Field 5. Then, go to step 3.
3. Repeat test 2.
   - If no consoles fail, you have fixed the problem.
   - If a different console fails, perfom steps 4 and 5 (as appropriate) of fault isolation and repair procedure Fault Isolation to further isolate the trouble.
   - If the same console fails Test 2 again,repalce the console indicated in Field 5. Then, go to step 4.

4. Repeat test 2.
   - If no consoles fail, you have fixed the problem.
   - If a different console fails, perform steps 4 and 5 (as appropriate) of fault isolation and repair procedure *Fault Isolation* to further isolate the trouble.
   - *If the same console* fails Test 2 again, go to Chapter *Procedure 611 — Common Control I/O (Unit Type 4)*, and use Procedure 611 Test 3, entering the equipment location appearing in Fields 2-4 to determine if an I/O failure exists. Take appropriate corrective action listed. Then, go to step 5.
5. After passing Procedure 611 Test 3, execute Procedure 653, Test 2.
   - If no consoles fail, you have fixed the problem.
   - If a different console fails, perform steps 4 and 5 (as appropriate) of fault isolation and repair procedure *Fault Isolation* to further isolate the trouble.
   - If the same console fails Test 2 again, check the wiring associated with the failing console and the attendant interface circuit. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Remote Console Failures

No diagnostic testing of the interfaces to a remote console exists at this time. The interfaces include the dual-speed data channel (TN403) and the optically remoted peripheral interface (ORPI) at the 501CC common-control end; the fiber-optic cable between the lightguide cable interconnection terminals (LCIT) - that interface with the ORPIs at both ends; an ORPI and console at the remote module with cabling, wiring, and power provided by the remote module to the remote ORPI; and the remote attendant consoles.

For remote console failures, perform the following steps to isolate and repair the faulty unit.

1. Go to *Procedure 611 — Common Control I/O (Unit Type 4)*, and use Procedure 611, Test 3 to test the data channel appearing in Fields 2-4 associated with the remote console.
   - If Test 3 passes, go to step 3.
   - If Test 3 fails, take corrective action listed. Repeat Procedure 611, Test 3. Then, go to step 2.
2. After Procedure 611, Test 3 passes, execute test 2 for the remote console.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, go to step 3.

3. Check the cable connections from TN403 to the ORPI (local end) at the 501CC common-control carrier.
   - If the cable connections are good, go to step 5.
   - If the cable connections are loose or unplugged, correct the trouble. Then, go to step 4.
4. Repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test *2* fails, go to step 5.
5. Check the two LEDs on the ORPI (local end) connected to the TN403 dual-speed data channel associated with the remote failing console.
   - If both LEDs are off, go to step7.
   - If the fiber receive failure (FRF) red LED is lighted and the fiber transmit failure (FTF) red LED is off, the problem is either the remote ORPI or the fiber. Go to step 7.
   - If the FTF red LED is lighted, or both the FRF and FTF LEDs are lighted, replace the local ORPI connected to the TN403 dual-speed data channel. Then, go to step 6.
6. Repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, check the wiring between the ORPI and the dual-speed data channel. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
7. At the remote module, check the cable connections.
   - If the cable connections are good, go to step 9.
   - If the cable connections are loose or unplugged, correct the trouble. Then, go to step 8.
8. Repeat test 2.
   - If Test *2* passes, you have fixed the problem.
   - If Test 2 fails, go to step 9.
9. Check the two LEDs on the ORPI at the remote module associated with the remote failing console.
   - If both LEDs are off, go to step ll.
   - If the FTR red LED is lighted and the FTF red LED is not lighted (off), refer to document *DEFINITY™ Communications System Generic 2 and System 85 Installation* (555-104-104) for instructions on isolation of the fiber problem.
   - If the FTF red LED is lighted, or both the FRF and FTF LEDs are lighted, replace the remote ORPI. Then, go to step 10.

10. Repeat test *2.*
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, check the wiring between the remote ORPI and the remote console. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.
11. Replace the remote console with a known good console.
12. Repeat test 2.
   - If Test 2 passes, go to step 15.
   - If Test 2 fails, replace the remote ORPI. Then, go to step 13.
13. Repeat test 2.
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, replace the local ORPI at the 501CC common control. Then, go to step 14.
14. Repeat test *2.*
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, escalate the problem to higher-level maintenance.
15. Replace the known good console with the bad console removed in step 11.
16. Use a digital multimeter to check the voltages on the console power supply circuit pack MW-4 in the bad console.
   - If the voltages are correct, replace console circuit pack AEE1. Then, go to step 17.

     NOTE

     Refer to Chapter 9, *Switch Component Replacement,* for stepson replacing console circuit pack AEE1 .

   - If the voltages are incorrect, replace console circuit pack MW-4. The, go to step 17.

     NOTE

     Refer to Chapter 9, *Switch Component Replacement,* for stepson replacing console circuit pack MW-4.

17. Repeat test *20*
   - If Test 2 passes, you have fixed the problem.
   - If Test 2 fails, reinstall the known good console. Return the bad console to higher-level maintenance.

Intermittent Failures

When intermittent console failures or wiring problems are suspected, perform the following steps to isolate and repair the faulty unit.

1. Execute test *3* to continuously test the suspect console.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails, check the remote status appearing in Field 6.
     - For a remote status of O (local) displayed in Field 6, perform corrective action listed in fault isolation and repair procedure *Local Console Failures.* Repeat test *3* after performing each corrective action.
     - For a remote status of 1 (remote) displayed in Field 6, perform corrective action listed in fault isolation and repair procedure *Remote Console Failures.* Repeat test 3 after performing each corrective action.
2. If Test *3* passes after *you* have taken corrective action, execute test *2* to resolve the console alarm cause.
3. If Test 3 fails after you have taken all corrective action, check the wiring associated with the failing console and the attendant interface circuit for a local console failure.

   For a remote console failure, check the wiring between all interfaces — that is, console, attendant interface circuit, dual-speed data channel, and both ORPIs. In addition, check the fibers linking the ORPI at both ends.

   If the wiring or fibers are satisfactory or you have replaced it and the failure still exists, escalate the failure.

PROCEDURE 654 — DISPLAY TERMINALS (UNIT TYPE 37 OR UNIT TYPE 39)

Unit Type 37 — Calling Number Display and Unit Type 39 — Force Administration Display System (FADS)	
Diagnostic and verification test	Procedure 654, Test *2*
Components tested	102D, 102F, 102G terminal and 211A power unit
Related procedures	• Procedure 611 Test 3 to determine if an I/O failure exists on the dual-speed channel connected to the display channel.

General Repair Steps

If there is a display terminal failure, the switch lights **OTHER FAILS** on the common control alarm panel and procedure 600 references procedure 654. Use the following steps to isolate and repair the failure.

1. Execute Procedure 654, Test 1.

   Record the failure history.

2. Execute test 2 and record the results.
   - If Test 2 passes but you suspect that the display terminal is bad, go to *Intermittent Failures.*

     When Test *2* passes, the switch marks the alarm resolved and turns off **OTHER FAILS** if there is no other reason for it to be on.
   - If Test 2 fails, follow the repair steps in Table 6-16, *Display Terminals Failure Codes.*

TABLE 6-16. Display Terminals Failure Codes

Failure Code	Corrective Action
0 (Test 3 only)	Bad data displayed on 102D, 102F, or 102G terminal: Replace the 102D, 102F, or 102G terminal. Then, replace the 211A power unit for the 102D, 102F, or 102G terminal.
1-7	Replace the 102D, 102F, or 102G terminal. Check the 211A Power Unit for the 102D, 102F, or 102G terminal. Then, go to Procedure 611 Test 3 to isolate dual-speed data channel failures.

- Go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611 Test 3, entering the equipment location displayed in Fields 4-6 to determine if an I/O failure exists.
  - If Procedure 611, Test 3 passes, check the wiring associated with the cabling between the 211A power unit, 102D, 102F, or 102G terminal, and the switch. Then, go to step 7.
  - If Procedure 611, Test 3 fails, take the appropriate corrective action listed. When Procedure 611, Test *3* passes, *go* to step 6.
- Execute Test 2.
  - If Test 2 passes, the display terminal alarm cause is resolved and the **OTHER FAILS** fault indicator turns off if no other alarm causes exist.
  - If the same display terminal fails Test 2 again, check the wiring associated with the cabling between the 211A power unit, 102D, 102F, or 102G terminal, and the switch. Then, go to step 7.
- If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Intermittent Failures

1. If you suspect intermittent failures or wiring problems run test 3.
   - If test 3 fails, do steps 2-7 above.
   - If field 8 contains a 0, continue to run test 3 while you look at the display terminal screen.
2. If bad data appears on the terminal, Table 6-16, *Display Terminals Failure Codes,* and perform the corrective action indicated.
3. If bad data is not displayed, you have fixed the problem.
4. Repeat test *3.*
   - If test 3 passes, execute test 2 to resolve the display terminal alarm cause.
   - If Test 3 fails, go to step 11.
5. Determine if all corrective action listed in Table 6-16 has been performed.
   - If al1 corrective action has been performed, check the wiring associated with the cabling between the 211A power unit, 102D, 102F, or 102G terminal, and the switch. Then, go to step 12.
   - If all corrective action has not been performed, perform the next corrective action listed in Table 6-16. Then, go back to step 10 above.
6. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

PROCEDURE 655 — SMDR (UNIT TYPE 20)

Unit Type 20 — Station Message Detail Recording (SMDR)	
Diagnostic and verification test	Procedure *655*, Tests 2-5
Components tested	SMDR carrier, formatter, and tape drive
Tools and test equipment	HP-H05-10525T logic probe to check components of the SMDR circuit pack. Screwdriver to remove and replace SMDR circuit packs and components. A card extender, test panel, and oscilloscope for making adjustments on tape drive circuit packs 3645, 3844,4139, and 4306 if you replace them.
Related procedures	• Procedure 611, Test 2 or Test 3 to check for l/O failures between the dual-speed data channel and the SMDR.

General Repair Steps

If there is a SMDR failure the switch lights **OTHER FAILS** on the common control alarm panel, and " procedure 600 references procedure 655. Use the following steps to isolate and repair the failure.

You can use Procedure 655, Test 3 to determine if failures are intermittent or when using the logic probe at test points on the SMDR equipment to trace wiring problems.

You can use Procedure 655, Test 5 to transmit a single data word repeatedly (by typing *x* repeatedly) and to change the single data word transmitted to help isolate failures in the SMDR equipment.

If you suspect I/O failures between the dual-speed data channel and the SMDR equipment, go to *Procedure 611 — Common Control I/O (Unit Type 4),* and use Procedure 611 Test 3, entering the equipment location appearing in Fields 4-6 to test the I/O channel.

1. Execute Procedure 655, Test 1.

   Step through the failure history and record the results.

2. Execute test 2.

   - If Test 2 passes, go to step 3.
   - If Test 2 fails, record the failure codes. Then, go to step 3.

3. Execute test 4 for the direct-output SMDR version or the 9-track magnetic tape SMDR version.

   Record the failure codes.

   - If the 9-track magnetic tape SMDR version is being tested, dump the memory so that, when Test 4 is executed again, the 16-message test completely fills one memory buffer and the

- Repeat Test 4 for the alternate memory buffer for 9-track SMDR testing.

4. Based on the results of Tests 2 and 4, perform the corrective action indicated in the following fault

   - *Repair Procedure for Direct Output SMDR.*
   - *Repair Procedure for 9-Track SMDR.*

5. Execute test 3 to ensure that no intermittent failures exist.
   - If Test 3 passes, you have fixed the problem.
   - If Test 3 fails, go back to step 4 above and select the repair procedure to be performed.

Note that when call records are displayed on either the Type I or Type II displays, non-numeric characters, colons, and dashes are omitted and numeric digits are displayed in the "condition code" field.

Repair Procedure for Direct-Output SMDR

Use the following steps to repair a printer or paper tape punch SMDR.

1. Perform the corrective action listed for the failure code recorded as a result of Test *2* and the type of message error or incorrect operation as a result of Test 4 (if appropriate).
2. Execute test *3* for each corrective action taken until the final repair is made.
3. Execute test 4 to verify correct operation of the SMDR equipment.

Refer to Chapter *9, Switch Component Replacement* for steps on replacement of common-control circuit packs.

Refer to Chapter 10, *SMDR Component Replacement* for stepson:

- Replacement of SMDR carrier circuit packs
- Replacement of SMDR clock/calendar display.

Failure Code 0 — Time or Date Is Incorrectly Displayed

At the SMDR carrier:

1. Replace LC66 (time).
2. Replace LC67 (date).
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have . replaced it and the failure still exists, replace the SMDR clock assembly.

Failure Code 0 — No Printout Message

1. Determine if the HP-H05-10525T logic probe is provided or available:
   - If the logic probe is available, go to Step 2.
   - If the logic probe is not available, go to step 3.
2. Connect the logic probe to the SMDR carrier.
   a. At the SMDR carrier, insert the logic probe into test point TP8 of circuit pack LC63 or LC374 for at least 5 seconds.
   b. Execute test 4.
      - If the logic probe is not flashing, go to step 2c.
      - If the logic probe is flashing, go to step 2d.
   c. At the SMDR carrier, insert the logic probe into test point TP1 of circuit pack LC62.
      - If the logic probe is not flashing, replace LC62 at the SMDR carrier.
      - If the logic probe is flashing, replace LC63 or LC374 at the SMDR carrier.

d. If the logic probe is flashing and no characters are being sent to the printer:

- If the date is not printed, replace LC65 at the SMDR carrier.
- If the date is printed, replace LC64 at the SMDR carrier.

3. If you do not have a logic probe, proceed as follows:

a. At the SMDR carrier, replace LC62.

b. At the SMDR carrier, replace LC63 or LC374.

c. Execute test 4.

d. If no characters are being sent to the printer:

- If the date is not printed, replace LC65 at the SMDR carrier.
- If the date is printed, replace LC64 at the SMDR carrier.

Failure Code 0 — Invalid Printout Message

At the SMDR carrier:

1. Replace LC63 or LC374.
2. Replace LC39.
3. Replace LC64.

Failure Code 1,3,5, 7, or 8

1. At the equipment location displayed in Fields 4-6 of Procedure *655*, replace TN403.
2. At the SMDR carrier, replace LC62.
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Failure Code 2

1. At the equipment location displayed in Fields 4-6, be sure that the TN403 circuit pack is set for high-speed data.
2. At the SMDR carrier, replace LC62.
3. At the equipment location displayed in Fields 4-6 of Procedure 655, replace TN403.
4. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Failure Code 4

1. At the SMDR carrier, replace LC62.
2. At the equipment location displayed in Fields 4-6 of Procedure 655, replace TN403.
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Failure Code 6

1. At the SMDR carrier, check for a blown fuse and replace as necessary.
2. At the SMDR carrier, replace LC62.
3. At the equipment location displayed in Fields 4-6 of Procedure 655, replace TN403.
4. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Repair Procedure for 9-Track SMDR

Use the following steps to repair magnetic-tape SMDR equipment.

1. Perform the corrective action listed for the failure code recorded as a result of test 2.
2. Perform the corrective action listed for the error message or incorrect operation resulting from test 4 (if appropriate).
3. Execute test 2 or Test 4 for each corrective action taken until the final repair is made.
4. Execute test 4 to verify correct operation of the SMDR equipment.

Refer to Chapter 9, *Switch Component Replacement* for steps on replacement of common-control circuit packs.

Refer to Chapter 10, *SMDR Component Replacement* for stepson:

- Replacement of SMDR carrier circuit packs
- Replacement of SMDR formatter circuit packs
- Replacement of SMDR tape drive circuit packs
- Photosensor adjustment
- Tape-speed and ramp-time adjustments
- Capstan servo zero and tension-arm travel adjustments

- Replacement of SMDR clock/calendar display
- Replacement of SMDR formatter
- Replacement of SMDR tape drive.

Failure Code 0 — Time or Date Failure

At the SMDR carrier:

1. Replace LC66 (time).
2. Replace LC67 (date).
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, replace the SMDR clock assembly.

Failure Code 0 — Data Not Recorded on Tape

1. Determine if the HP-H05-10525T logic probe is provided or available:
   - If the logic probe is available, go to step 2.
   - If the logic probe is not available, go to step 3.
2. Connect the logic probe to the SMDR carrier.
   a. Load a spare 9-track tape. Ensure that the write-enable ring is installed on the tape and verify that the tape is threaded correctly.
   b. Connect the logic probe to test point **TP1** on circuit pack LC178 and execute test 4 twice.
   c. Determine the status of the logic probe.
      - If the logic probe is not flashing, go to step 2d.
      - If the logic probe is flashing, go to step 2e.
   d. If the logic probe is not flashing, perform the following at the SMDR carrier
      (1) Check for a blown fuse and replace as necessary.
      (2) Replace LC177.
      (3) Replace LC68.
      (4) Replace LC175.
      (5) Replace LC178.
      (6) Replace LC63 or LC374.
      (7) Replace LC40.

(8) Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

e. When the logic probe is flashing, proceed as follows:

(1) At the SMDR carrier:

(a) Replace LC175.

(b) Replace LC176.

(c) Replace LC177.

(2) At the SMDR formatter

(a) Replace circuit pack 4062.

(b) Replace circuit pack 4257.

(3) At the SMDR tape drive:

(a) Replace circuit pack 3842.

(b) Replace circuit pack 4843.

(c) Replace circuit pack 4207.

(d) Replace circuit pack 4188.

(e) Replace circuit pack 4209.

(f) Replace circuit pack 3844 and adjust the photosensors.

(4) Check the cabling between the formatter, tape drive, and SMDR carrier, and the wiring associated with the rep laced SMDR circuit packs. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 2e. (5).

(5) Replace the SMDR formatter.

(6) Replace the SMDR tape drive.

3. If you do not have a logic probe, proceed as follows:

a. At the SMDR carrier:

(1) Check for a blown fuse and replace as necessary.

(2) Replace LC177.

(3) Replace LC68.

(4) Replace LC175.

(5) Replace LC178.

(6) Replace LC63 or LC374.

(7) Replace LC40.

(8) Replace LC176.

b. At the SMDR formatter

(1) Replace circuit pack 4062.

(2) Replace circuit pack 4257.

c. At the SMDR tape drive

(1) Replace circuit pack 3842.

(2) Replace circuit pack 4843.

(3) Replace circuit pack 4207.

(4) Replace circuit pack 4188.

(5) Replace circuit pack 4209.

(6) Replace circuit pack 3844 and adjust the photosensors.

d. Check the cabling between the formatter, tape drive, and SMDR carrier, and the wiring associated with the replaced SMDR circuit packs. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 3e.

e. Replace the SMDR formatter.

f. Replace the SMDR tape drive.

Failure Code O — Data Not Displayed at System Control Panel

1. Determine if the HP-H05-10525T logic probe is provided or available:
   - If the logic probe is available, go to step 2.
   - If the logic probe is not available, go to step 3.
2. Connect the logic probe to the SMDR carrier.

a. Ensure that the write-enable ring is on the tape.

b. Connect the logic probe to test point **TP1** on the LC178 circuit pack.

c. Execute test 4 twice.

d. Determine the status of the logic probe.

- If the logic probe is not flashing, go to step 2e.
- If the logic probe is flashing, go to step 2f.

e. If the logic probe is not flashing, proceed as follows:

(1) At the SMDR carrier

(a) Check for a blown fuse and replace as necessary.

(b) Check output voltages on the 207B power supply.

(2) At the SMDR carrier, replace the first circuit pack listed below. If the logic probe still does not flash, replace the next circuit pack and retest; and soon.

(a) LC177

(b) LC68

(c) LC175

(d) LC178

(e) LC63 or LC374

(f) LC40

(3) Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

f. If the logic probe is flashing, proceed as follows:

(1) At the SMDR carrier:

(a) Replace LC175.

(b) Replace LC176.

(c) Replace LC177.

(2) At the SMDR formatter:

(a) Replace circuit pack 4062.

(b) Replace circuit pack 4257.

(3) At the SMDR tape drive:

(a) Replace circuit pack 3842.

(b) Replace circuit pack 4843.

(c) Replace circuit pack 4207.

(d) Replace circuit pack 4188.

(e) Replace circuit pack 4209.

(f) Replace circuit pack 3844 and adjust the photosensors.

(4) Check the cabling between the formatter, tape drive, and SMDR carrier, and the wiring associated with the replaced SMDR circuit packs.

(5) If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, proceed as follows:

(a) Replace the SMDR formatter.

(b) Replace the SMDR tape drive.

3. If you do not have a logic probe, proceed as follows:
   a. At the SMDR carrier:
      (1) Check for a blown fuse and replace as necessary.
      (2) Replace LC177.
      (3) Replace LC68.
      (4) Replace LC175.
      (5) Replace LC178.
      (6) Replace LC63 or LC374.
      (7) Replace LC40.
      (8) Replace LC176.
   b. At the SMDR formatter:
      (1) Replace circuit pack 4062.
      (2) Replace circuit pack 4257.
   c. At the SMDR tape drive
      (1) Replace circuit pack 3842.
      (2) Replace circuit pack 4843.
      (3) Replace circuit pack 4207.
      (4) Replace circuit pack 4188.
      (5) Replace circuit pack 4209.
      (6) Replace circuit pack 3844 and adjust the photosensors.
   d. Check the cabling between the formatter, tape drive, and SMDR carrier, and the wiring associated with the replaced SMDR circuit packs. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 3e.
   e. Replace the SMDR formatter.
   f. Replace the SMDR tape drive.

Failure Code 0— Incorrect Data Display at System Control Panel

1. At the SMDR carrier:
   a. Replace LC68.
   b. Replace LC63 or LC374.
   c. Replace LC175.

d. Replace LC176.

e. Replace LC177.

f. Replace LC178.

2. Check for trouble in the DEFINITY™ Communications System Generic 2 software. Escalate as necessary.

Failure Code O — Tape Fails to Load

1. Ensure that the write-enable ring is installed.

   The write-enable lamp lights if installed.

2. If the tape does not advance to the load point, then, at the tape drive, proceed as follows
   a. Adjust the photosensors on circuit pack 3844.
   b. Replace circuit pack 3844.
   c. Replace circuit pack 4843.
   d. Replace circuit pack 3645 and adjust the tape speed and ramp time.
   e. Replace circuit pack 4306 and adjust the capstan servo zero and tension-arm travel.
   f. Replace the SMDR tape drive.

3. If the tape does not stop at the load point, then, at the tape drive, proceed as follows:
   a. Adjust the photosensors on circuit pack 3844 at the tape drive.
   b. Replace circuit pack 3844 and adjust the photosensors at the tape drive.
   c. Replace circuit pack 4062 at the formatter.
   d. Check the cabling between the tape drive and formatter. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists,go to step 3e.
   e. Replace the SMDR formatter.
   f. Replace the SMDR tape drive.
   g. If the **ON LINE** lamp on the tape drive does not light, perform *Failure Code 0 — ON LINE Lamp Does not Light at the Tape Drive.*

Failure Code 0 — Tape Fails to Rewind

1. Verify that the tape is threaded correctly.
2. Adjust the photosensors on circuit pack 3844 at the tape drive.

3. If the tape fails to rewind completely onto the supply reel, proceed as follows:
   a. Replace circuit pack 4843 at the tape drive.
   b. Replace circuit pack 3645 at the tape drive and adjust the tape speed and ramp time.
   c. Replace the SMDR tape drive.
4. If the tape fails to rewind to the load point, proceed as follows:
   a. At the SMDR carrier, replace LC177.
   b. If the **UNLOAD** lamp on LC177 does not light when the **TAPE UNLOAD** button is depressed check the wiring between LC177 and the **TAPE UNLOAD** button. If the wiring is satisfactory or you have replaced it and the failure still exist&go to step 4c.
   c. At the SMDR carrier, replace LC175.
   d. At the SMDR formatter, replace circuit pack 4062.
   e. At the SMDR tape drive:
      (1) Replace circuit pack 3842.
      (2) Replace circuit pack 4843.
      (3) Replace circuit pack 3645 and adjust the tape speed and ramp time.
      (4) Replace circuit pack 4306 and adjust the capstan servo zero and tension-rum travel.
   f. Check the wiring associated with the replaced circuit packs and the cabling between the SMDR carrier, formatter, and tape drive. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 4g.
   g. Replace the SMDR formatter.
   h. Replace the SMDR tape drive.

Failure Code O — Tape Fails to Move When DUMP MEMORY Button Is Depressed

1. Determine if the HP-H05-10525T logic probe is provided or available
   - If the logic probe is available, go to step 2.
   - If the logic probe is not available, go to step 3.
2. Connect the logic probe to the SMDR carrier.
   a. Connect the logic probe to test point **TP10** on the LC177 circuit pack.
   b. Depress **DUMP MEMORY** and observe the logic probe.
      - If the logic probe is not flashing, go to step 2c.
      - If the logic probe is flashing, go to step 2d.

c. If the logic probe is not flashing, proceed as follows:

(1) At the SMDR carrier, replace LC68.

(2) Depress **DUMP MEMORY.**

(3) If the logic probe still does not flash, replace LC177 at the SMDR carrier.

(4) Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

d. If the logic probe is flashing, proceed as follows:

(1) Verify that the tape is threaded correctly.

(2) At the SMDR carrier, replace LC177.

(3) At the SMDR formatter, replace circuit pack 4062.

(4) At the SMDR tape drive:

(a) Replace circuit pack 3842.

(b) Replace circuit pack 4843.

(5) Check the wiring between LC177 and the formatter and the cabling between the formatter and tape drive. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 2d (6).

(6) Replace the SMDR formatter.

(7) Replace the SMDR tape drive.

3. If you do not have a logic probe, proceed as follows:

a. Verify that the tape is threaded correctly.

b. At the SMDR carrier:

(1) Replace LC68.

(2) Replace LC177.

c. At the SMDR formatter, replace circuit pack 4062.

d. At the SMDR tape drive:

(1) Replace circuit pack 3842.

(2) Replace circuit pack 4843.

e. Check the wiring between LC177 and the formatter and the cabling between the formatter and the tape drive. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, go to step 3f.

f. Replace the SMDR formatter.

g. Replace the SMDR tape drive.

Failure Code 0 — ONLINE Lamp Does Not Light at the Tape Drive

1. At the SMDR tape drive, replace circuit pack 4843.
2. Check the cabling between the tape drive and the formatter. If the cabling and wiring are satisfactory or you have replaced them and the failure still exists, replace the SMDR tape drive.

Failure Code 1,3,5, 7, or 8

1. At the equipment location displayed in Fields 4-6 of procedure 655, replace TN403.
2. At the SMDR carrier, replace LC62.
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Failure Code 2, 4, or 6

1. At the SMDR carrier, replace LC62.
2. At the equipment location displayed in Fields 4-6 of Procedure 655, replace TN403.
3. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

Failure Code 9

1. Determine if the HP-H05-10525T logic probe is provided or available
   - If the logic probe is available, go to step 2.
   - If the logic probe is not available, go to step 3.
2. Connect the logic probe to the SMDR carrier.
   a. Connect the logic probe to test point **TP8** on the LC68 circuit pack.
   b. Determine the status of the logic probe.
      - If the logic probe is not flashing, go to step 2c.
      - If the logic probe is flashing, go to step 2e.
   c. At the SMDR carrier, replace LC62.
   d. Check the wiring associated with the replaced circuit pack. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

e. At the SMDR carrier:

(1) Replace LC62.

(2) Replace LC68.

(3) Replace LC63 or LC374.

(4) Replace LC40.

(5) Replace LC177.

(6) Replace LC178.

f. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

3. If you do not have a logic probe, proceed as follows:

a. At the SMDR carrier:

(1) Replace LC62.

(2) Replace LC68.

(3) Replace LC63 or LC374.

(4) Replace LC40.

(5) Replace LC177.

(6) Replace LC178.

b. Check the wiring associated with the replaced circuit packs. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

7. USER-REPORTED TROUBLES

User-reported troubles covered in this document are the result of troubles encountered and reported by the user and usually concern a single instrument or a service. Some examples of user-reported troubles are loss of dial tone, disconnect, no ringing, or poor transmission. The user-reported trouble maybe caused by an inadvertent translation change, or maybe an intermittent problem.

In this document, user-reported troubles are divided into five types:

- Terminals
- Data modules
- Features
- Attendant console
- Modem pooling.

You can use several methods to determine the cause of the user-reported trouble:

- Determining if errors are recorded against the suspect circuit by using Procedure 600, Test 2 (alarm causes/error log). The circuit may have errors recorded against it in Test 2 that do not exceed the threshold to raise an alarm.
- Using the appropriate maintenance procedure for the suspect circuit and testing the circuit on a continuous basis to determine if the reported trouble is intermittent.
- Performing a functional test of the user's reported trouble. hat is, call the terminal's extension (if possible).
- Checking translation to determine if the suspect circuit is properly administered.
- Using the following maintenance procedures at the users premises to determine the usability of the equipment
  - Procedure 642 (Terminal-to-trunk test call)
  - Procedure 643 (Terminal-to-tone test call)
  - Procedure 644 (Terminal-to-auxiliary tone test call).
- Performing self tests (if available) for the suspect equipment.
- Using the port tester to perform a continuity test of terminal wiring.

The rest of this chapter covers some of the troubles that may be reported by the user. In addition, this chapter provides supporting information (such as the terminal dial-up test, self tests, test calls, and so on) that may be needed to clear the user-reported trouble.

TERMINALS

Terminals covered in this section are the 72, 73, 74 series terminals and the basic rate interface (BRI) terminals. Before testing terminals, ensure that the associated port and wiring are good.

72,73, and 74 Series Terminals

When troubles with the 72,73, and 74 series terminals are reported by the user, perform the following steps as appropriate.

No Dial Tone

1. Run a self test on the terminal.
   - If the self test passes, go to Step 2.
   - If the self test fails, replace the terminal.
2. Use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use Procedure 622, Test 3 to run a continuous test on the terminal.

No Dial Tone and Lamps Do Not Light

1. Check that translations are correct.
2. Check that the terminal is plugged in.
   - If the terminal is plugged in, go to Step 3.
   - If the terminal is not plugged in, connect it.
3. Use the port tester to check the terminal wiring.

Cannot Dial

1. Use administration Procedure 000 and Procedure 010 to check the class of service.
   - If the class of service is correct, go to Step 2.
   - If the class of service is incorrect, administer the class of service as necessary.
2. Replace the terminal.

Cannot Receive Calls

1. Run a self test on the terminal.
   - If the self test passes, go to Step 2.

- If the self test fails, replace the terminal.

2. Use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use procedure 622, Test 3 to run a continuous test on the terminal.

Does Not Ring

1. Run a self test on the terminal.
   - If the self test passes, go to step 2.
   - If the self test fails, replace the terminal.
2. Perform the old-up test (checking the ringer).
   - If the dial-up test passes, escalate the problem.
   - If the dial-up test fails, replace the terminal. Then, go to step 3.
3. Report the old-up test (checking the ringer).
   - If the dial-up test passes, corrective action is complete.
   - If the dial-up test fails, go to step 4.
4. Use Procedure 620, Test 4 to test the associated port circuit.
   - If the port circuit passes, use the port tester to check the terminal wiring.
   - If the port circuit fails, replace it.

Indicator Does Not Light

1. Determine if the terminal is an MFAT or MFDT terminal.
   - If the terminal is an MFAT or MFDT, go to Step 2.
   - If the terminal is not an MFAT or MFDT, go to Step 3.
2. Run a self test on the MFAT or MFDT terminal.
   - If the self test passes, go to step 3.
   - If the self test fails, replace the terminal.
3. Perform the dial-up test (checking the indicator).
   - If the dial-up test passes, escalate the problem.
   - If the dial-up test fails, replace the terminal.

Buttons Do Not Work

1. Perform the old-up test (checking the buttons).
   - If the dial-up test passes, go to step 2.
   - If the dial-up test fails, replace the terminal.

2. Check the translation of the buttons assigned to the terminal.
   - If the translation of the buttons is correct, escalate the trouble.
   - If the translation of the buttons is incorrect, administer the buttons as necessary.

Cannot Hear

Replace the handset or terminal.

Cannot Be Heard

Replace the handset or terminal.

Intermittent Troubles

If intermittent troubles are suspected or reported by the user, perform the following steps:

1. Use Procedure 600, Test 2 to determine if errors are recorded against the suspect circuit. The circuit may have errors recorded against it in Test 2 that do not exceed the threshold to raise an alarm.
   - If the circuit does not have errors recorded against it, go to Step 2.
   - If the circuit does have errors recorded against it, use the appropriate maintenance procedure for the suspect circuit and test the circuit on a continuous basis. Take corrective action as necessary.
2. Use the following maintenance procedures to determine the usability of the equipment:
   - Procedure 642 (Terminal-to-trunk test call)
   - Procedure 643 (Terminal-to-tone test call)
   - Procedure 644 (Terminal-to-auxiliary tone test call).

74 Series Terminals Connected to a Personal Computer

When troubles with 74 series terminals connected to a personal computer are reported by the user, you should tell the user to power down the personal computer.

NOTE

It may not be possible for periodic or demand maintenance software to detect a defective 74 series terminal when it is connected to a powered-up personal computer.

A personal computer can be an AT&T PC6300, an AT&T PC7300, an IBM personal computer, or an equivalent. The personal computer is connected to a DCPI interface card that provides the interface to the switch.

The signaling channels S 1 and S2 from a GPP port are connected to the DCPI interface card and then to the 74 series terminal.

Since the DCPI interface card interprets and responds to S-channel messages, even if the 74 series terminal is not connected, maintenance of the terminal is impossible from switch software when the personal computer is powered up.

Request that the user power down the personal computer before you repeat maintenance on the defective 74 series telephone. You can use Procedure 622, Test 2 to test the 74 series terminal that is connected to a personal computer as soon as the user powers down the personal computer.

BRI Terminals

When troubles with the 7505,7506, or 7507 BRI terminals are reported by the user, perform the following steps as appropriate.

No Dial Tone, No Dial Tone and Lamps Do Not Light, or Cannot Dial

1. Check that translations are correct and that you have a port that is known to be good.
2. Check the wiring from the switch to the phone closet by connecting a terminal with the correct service SPID in the phone closet or test with a port tester.

   NOTE: The service SPID number is administered in Procedure 51 Word 2, and the service SPID feature is turned on in Procedure 275, Word 3.

   - If the BRI terminal works correctly in the phone closet or if the port tester does not indicate any problems, then the wiring to the closet is comet. Go to Step 3.
   - If the BRI terminal with the service SPID does not work or if the port tester indicates wiring problems, repair the wiring to the phone closet.
3. Check the wiring from the phone closet to the wall jack by connecting a terminal with the correct service SPID to the wall jack or test with a port tester.
   - If the BRI terminal works correctly at the wall jack or if the port tester does not indicate any problems, then the wiring to the wall jack is correct. Go to step 4.
   - If the BRI terminal with the service SPID does not work or if the port tester indicates wiring problems, repair the wiring to the wall jack.
4. If there are no wiring problems, connect the original terminal and run a self test on the terminal.
   - If the self test passes, use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use Procedure 622, Test 3 to run a continuous test on the terminal.
   - If the self test fails, replace the terminal.

Cannot Receive Calls, Cannot Originate Data Calls, Cannot Receive Data Calls, or Intermittent Troubles

1. Use the port tester or check the wiring by connecting a terminal with the correct service SPID to check the terminal wiring.
   - If the wiring is correct, go to Step 2.
   - If the wiring is not correct, fix it.
2. Run a self test on the terminal.
   - If the self test passes, use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use Procedure 622, Test 2 to test the terminal and Procedure 622, Test 3 to run a continuous test on the terminal.
   - If the self test fails, replace the terminal.

Indicator Does Not Light or Buttons Do Not Work

1. Run a self test on the terminal.
   - If the self test passes, corrective action is complete.
   - If the self test fails, replace the terminal.
2. Verify that service new exists.

7303S and 7305S Terminal Self Test

The 7303S and 7305S terminal self test lets you test the lamps, ringer, and link to the switch using the terminal self-test switch.

1. Press the self-test switch.
   - If the analog terminal link (ATL) to the switch is functioning, the ringer sounds and all the lamps flash, alternating red and green.
   - If the ATL is not functioning, the ringer sounds and either the red or green lamp comes on and stays on.

     This means that the terminal is receiving power from the switch, but is not communicating with the switch. The problem may be in the terminal, in the wiring between the terminal and the switch, or in the port circuit pack.
2. Release the self-test switch.

   The ringer and lamps return to their previous state updated by messages received during the test.

7403D and 7405D Terminal Self Test

The 7403D and 7405D terminal self test lets you test the lamps and ringer using the terminal self-test switch.

1. Push the self-test switch toward the back of the terminal to check the operation of the ringer and the lamps.

   The ringer sounds and all the I-use and status lamps on the terminal come on and stay on. If the 7405D terminal has the optional call coverage module and the optional display module, all the I-use and status lamps on the terminal and the optional modules come on and stay on. All the elements in the display also come on.

2. Release the self-test switch.

   The I-use, status, and message waiting lamps go out, and all the single lamps on the 7405D terminal and the optional module come on for four seconds and then go out. After the lamps go out, they return to their previous state.

7404D Terminal Self Test

The 7404D terminal self test lets you test the lamps, ringer, and data part of the terminal using the terminal self-test switch.

CAUTION If a data call is active, it is dropped by the self test and the terminal returns to the LOCAL mode idle condition. If a voice call is active, it is not dropped by the self test.

1. Push the self-test switch toward the back of the terminal to check the operation of the ringer and the lamps.

   The ringer sounds and all the I-use and status lamps come on. The message waiting and data-call-in-progress lamps also come on.

2. Release the self-test switch.

   - If the attached EIA display terminal is off when you release the switch, the terminal lamps go out.
   - If the display terminal is on when you release the switch, the terminal lamps go out and a test passed or failed message appears on the terminal display.

     The message may vary if option cartridges are inserted in the 7404D terminal.

7406D Terminal Self Test

The 7406D terminal without the optional data stand has no built-in self tests. If the 7406D terminal has the data stand (Z703A-L1 DSU), the data stand provides self-test capability to test the lamps, the ringer, and the data stand.

1. Press the recessed self-test switch on the data stand with a pointed object such as a pen.

   All the lamps come on and the ringer sounds.

2. Release the self-test switch and the lamps and the ringer go off.

   The screen displays RAM TEST PASSED or RAM TEST FAILED.

3. Test the data standby simultaneously pressing z<Control> and <T> on the DTE keyboard.

   The screen on the attached EIA terminal displays RAM TEST PASSED or RAM TEST FAILED.

7407D Terminal Self Test

The 7407D terminal self test lets you test the lamps and ringer using the terminal self-test switch.

1. Push the self-test switch on the bottom edge of the telephone.

   The ringer sounds and the I-use and status lamps on the ten call-appearance or feature buttons come on and stay on. All the characters in the display (40 on each line) come on and stay on.

2. Release the self-test switch.

   The ringer stops, the ten I-use and status lamps and the display go out, and all the remaining single status lamps and the message waiting lamp come on for four seconds and then go out.

If the self test passes, perform the following data stand test (if you have this option). The data stand self test lets you test the lamps and the data circuit, Ensure that the EIA display terminal is turned on before doing this test.

Press the TEST/DISC button on the data stand and hold it until the TEST RESULTS lamp comes on.

- If the TEST RESULTS lamp blinks, the data circuit failed.
- If the TEST RESULTS lamp comes on and stays on, the data circuit passed.

Terminal Dial-Up Test

The terminal dial-up test lets you test the buttons, lamps, ringer, display, and link to the switch using the dial-up test access code. There is no terminal dial-up test for the BRI terminals.

1. Lift your handset and dial the dial-up test access code. Listen for the continuous tone.

   The message waiting lamp comes on and stays on during the test and all other lamps go out.

2. Press each of the call appearance and feature buttons in turn to check that the lamps, ringer, tone, and display functions operate.

   As you press the buttons, check that the lamps light and listen to the ringer. For the buttons without lamps, listen for the confirmation tone (three beeps) in the handset receiver. Press the button again to turn off the function, or press the next button. The previous function turns off when another button is pressed.

   You can adjust the volume of the ringer with the volume control, but you cannot turn the ringer completely off.

3. Hangup the handset when you have completed the dial-up test.

   All the lamps that were on when you started the test (except the message waiting and data lamps) come on again after several seconds. The message waiting lamp may take longer to come on. If the data lamp is lighted when you start the test, it does not come back on.

BRI Terminals Self Tests

You can perform three tests on your BRI terminals if they are data modules 7505D, 7506D, or 7507D. The three tests are a local loop-back test, a remote loop-back test, and a self test. If your BRI terminals are voice terminals only (7505V, 7506V, or 7507V), you can only perform a self test.

Local Loop-Back Test

The local loop-back test ensures that there are no data transmission errors in the local part of the data transfer circuit (between the data terminal and the ADM). When you perform the local loop-back test, data travels from the data terminal to the ADM, where it is looped back to the data terminal. You can perform the local loop-back test when the set is idle and when it is engaged in a data call.

1. Type test local on your data terminal.

   The following is displayed on the terminal.

   LOCAL LOOPBACK TEST

   ENTER ATTENTION SEQUENCE TO END TEST.

2. Type some characters on your terminal keyboard.

   The characters are echoed on your screen. If there are no errors, the set passed the test.

3. Type the attention sequence to end the test.

Remote Loop-Back Test

The remote loop-back test ensures that any problems with data transmission are not occurring in the part of the data transfer circuit that includes the data terminal, the data module on your end, and the device on the far end of the connection. When you perform the remote loop-back test, data is transmitted from the data terminal through your data module and the ISDN network to the data module at the far end, where it is looped back to your data module.

You must established a data call before you begin a remote loop-back test.

1. Establish a data call.
2. Type the attention sequence.
3. Type test remote

   The following is displayed on the terminal.

   REMOTE LOOPBACK TEST

ENTER ATTENTION SEQUENCE TO END TEST.

4. Type some characters on your terminal keyboard and check to see that they are echoed as typed.

   If there are no errors, the set passed the test.

5. Type the attention sequence to end the test-

   Ending the test does not end the call. You will be in the local data mode.

6. Type continue to return to the data mode and transmit data.

NOTE Remote loop-back may not work to non-AT&T endpoints.

7505 and 7506 Terminal Self Test

The 7505 and 7506 terminal self test lets you test the terminal's memory, buttons, and lamps.

CAUTION Performing a self test terminates any call in progress. You will not receive any calls while the terminal is doing its self test.

1. Press the *Shift Select* button.
2. Press the *Drop Test* button.
   - The self test begins.
   - The following occurs if the testis proceeding correctly.
     — Periodic tones are heard.
     — The green Message lamp comes on.
   - Go to Step 3 if the self test passes at this point.
3. Press each button that has a lamp.
4. Lift the handset and press each button on the dial pad.

   You will hear tones in the headset as each dial pad button is pressed

5. After you have pressed the last button, press the *Shift Select* button, then the *Drop Test* button to exit the self test and return to the calling mode.
6. Hang up the handset.

NOTE

If you do *not* press the *Shift Select* and *Drop Test* buttons, the terminal automatically exits the self test 30 seconds after the last button is pressed.

7507 Terminal Self Test

The 7507 terminal self test lets you test the terminal's memory, buttons, and lamps.

CAUTION

Performing a self test terminates any call in progress. You will *not* receive any calls while the terminal is doing its self test.

1. Press the *Select* button.
2. Press the *Drop Test* button.
   - The self test begins.
   - The following occurs if the test is proceeding correctly.
     — Periodic tones are heard.
     — The green *Message* lamp comes on.
   - Go to Step *3 if the* self test passes at this point.
3. Press each button that has a lamp.
4. Lift the handset and press each button on the dial pad.

   You will hear tones in the headset as each dial pad button is pressed.
5. After you have pressed the last button, press the *Select* button, then the *Drop Test* button to exit the self test and return to the calling mode.
6. Hang up the handset.

NOTE

If you do *not* press the *Select* and *Drop Test* buttons, the terminal automatically exits the self test 30 seconds after the last button is pressed.

Terminal Dial-Up Test

The terminal dial-up test lets you test the buttons, lamps, ringer, display, and link to the switch using the dial-up test access code. There is no terminal dial-up test for the BRI terminals.

1. Lift your handset and dial the dial-up test access code. Listen for the continuous tone.

The message waiting lamp comes on and stays on during the test and all other lamps go out.

2. Press each of the call appearance and feature buttons in turn to check that the lamps, ringer, tone, and display functions operate.

   As you press the buttons, check that the lamps light and listen to the ringer. For the buttons without lamps, listen for the confirmation tone (three beeps) in the handset receiver. Press the button again to turn off the function, or press the next button. The previous function turns off when another button is pressed.

   You can adjust the volume of the ringer with the volume control, but you cannot turn the ringer completely off.

3. Hang up the handset when you have completed the dial-up test.

   All the lamps that were on when you started the test (except the message waiting and data lamps) come on again after several seconds. The message waiting lamp may take longer to come on. If the data lamp is lighted when you start the test, it does not come back on.

Port Testing

The port tester Issue 2 (comcode 105138424) verifies the continuity of station wiring (analog, hybrid, or digital) at various locations of a DEFINITY™ Communications System Generic 2 installation. (See Figure 7-1, *Port Tester.)*

The port tester detects the presence of voltage from equipment ports for analog, DCP, MFET, MFAT, and BRI configurations. The port tester is designed to indicate the status of the wire at:

- The purple field in the equipment room
- The white fields in the closets
- The wall jack.

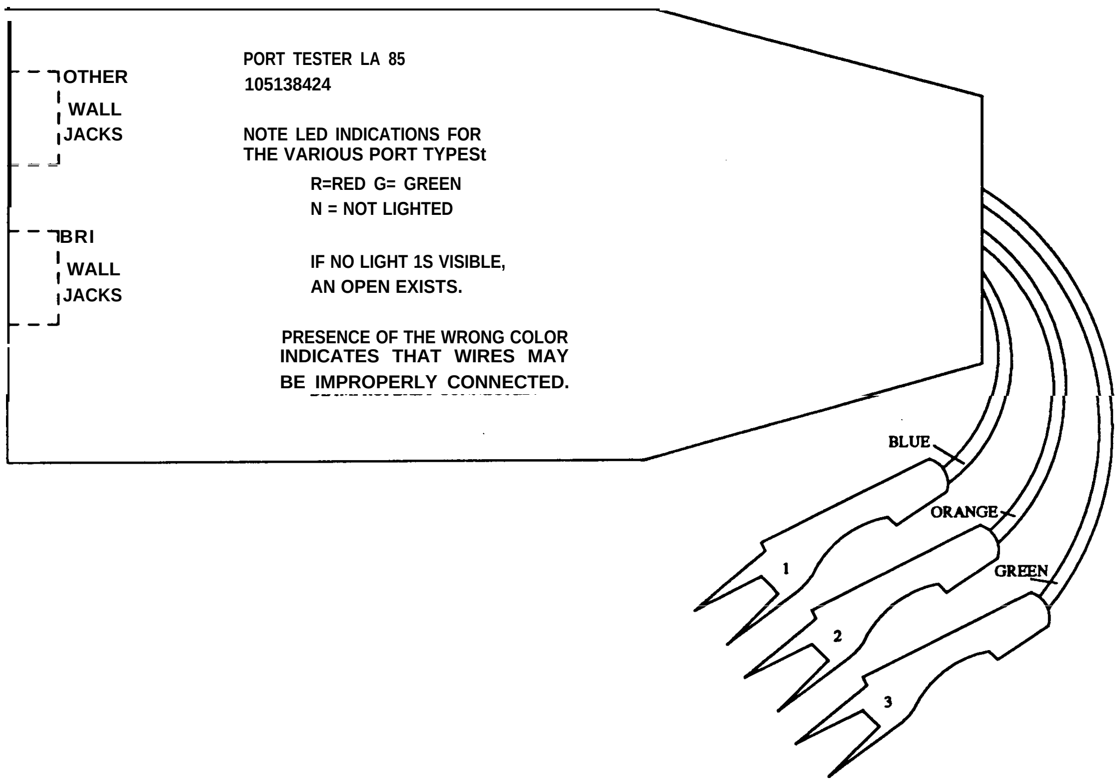
The port tester is used with 1 lo-type hardware and two 8-pin modular jacks, one for BRI and the second for other wiring configurations. The 3-pair plug attached to the port tester's cord tests at the cross-connect points of an installation.

You must use a D8W line cord (not furnished) when using the port tester at a wall jack

The port tester displays the status of the equipment port leads by lighting the LEDs that correspond to those leads. Table 7-1, *LED Indications for Tested Ports,* lists the correct LED indications for the port tested. In the table, G means green, R means red, N means not lighted, and NA means not applicable to the port tested. If adjunct power is present, the Adjunct Power if Present indicator is lighted green.

WARNING

The port tester overheats if it is plugged into an active circuit for more than 20 seconds.



You can test only the active tone plant in a universal module using the terminal-to-tone test call or the terminal-to-auxiliary tone test call. If you need to test the inactive tone plant in a universal module, you *must* switch the inactive tone plant on line.

Terminal-to-Trunk Test Call

1. Determine from the user-reported trouble if a particular dial access code or trunk group is the potential cause of the trouble.

   a. For dial access code problems, perform the following:

      - Execute Procedure 642, Test 1 for all trunks associated with the dial access code, or until a failure is detected. (See Step *2* below for the steps to test a trunk.)
      - Based on the test results of Test 1, use Procedure 642, Test 2 to further test failing circuits. (See Step *2 below* for the steps to test a trunk.)

   b. For trunk group problems, perform the following:

      - Execute Procedure 642, Test 3 for all trunks in the specified trunk group, or until a failure is detected. (SW Step *2 below* for the steps to test a trunk)
      - Based on the results of Test 3, use Procedure 642, Test 2 to further test failing circuits. (See Step 2 below for the steps to test a trunk.)

2. To test a trunk, proceed as follows:

a Connect a telephone set or hand test set to the test line equipment location.

b. Type x (execute).

c. Go off hook and dial the displayed trunk dial access code.

d. Dial the appropriate number of digits to complete the call.

If a single trunk fails (Field 17 equals 6), replace the associated circuit pack.

e. Go to Step 3.

3. Repeat Procedure 642, Test 2.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, use Procedure 620, to further isolate the trouble.
     - If Procedure 620 corrects the problem, corrective action is complete.
     - If Procedure 620 cannot correct the problem, check the wiring associated with the replaced circuit pack. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

A test call stuck at state 2 indicates a possible failure for CO, FX, and WATS trunks. A test call can also be stuck at state 2 for valid common control switching arrangement (CCSA)/advanced private line termination (APLT) and TIE trunks.

1. Listen to the test call to determine whether it is completed successfully.
   - If the call is completed, corrective action is complete.
   - If the call cannot be completed, replace the associated circuit pack.
2. Repeat Procedure 642, Test 2.
   - If Test 2 passes, corrective action is complete.
   - If Test 2 fails, use Procedure 620, to further isolate the trouble.
     - If Procedure 620 corrects the problem, corrective action is complete.
     - If Procedure 620 cannot comet the problem, check the wiring associated with the replaced circuit pack. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

Terminal-to-Tone Test Call

1. Connect a telephone set or hand test set to the test line equipment location.
2. Execute Procedure 643, Test 1 for the first tone plant displayed upon entering Procedure 643 and listen to each tone by going off hook at the test line.
   - If the tone plant passes, execute Test 1 for all tone plants in the switch, using next circuit to select the next tone plant for testing.

     If no tone plants fail, check the wiring between the terminal equipment experiencing the trouble and the associatedconnections to the switch. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

- If a tone plant fails, determine the tones that are defective and execute Procedure 643, Test 2 to inhibit the transmission of the fault-free tones to verify the status of the tones suspected of being defective by listening to the selected tones at the test line.

3. Replace SN250 or TN768 (as appropriate).
4. Repeat Procedure 643, Test 1.
   - If Test 1 passes, corrective action is complete.
   - If Test 1 fails, use Procedure 620, Test 4 (unit type 16) to further isolate the trouble.
     — If Procedure 620, Test 4 corrects the problem, corrective action is complete.
     — If Procedure 620, Test 4 cannot correct the problem, check the wiring associated with the defective tones isolated in Step 1. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

Terminal-to-Auxiliary Test Call

1. Connect a telephone set or hand test set to the test line equipment location.
2. Execute Procedure 644, Test 1 for the first auxiliary tone plant displayed upon entering Procedure 644, and listen to each tone by going off hook at the test line.
   - If the auxiliary tone plant passes, execute Procedure 644, Test 1 for all auxiliary tone plants in the switch, using next circuit to select the next auxiliary tone plant for testing.

     If no auxiliary tone plants fail, check the wiring between the terminal equipment experiencing the trouble and the associated connections to the switch. If the wiring is satisfactory or you have . replaced it and the trouble still exists, escalate the trouble.
   - If an auxiliary tone plant fails, determine the tones that are defective and execute Procedure 644, Test 2 to inhibit the transmission of the fault-he tones to verify the status of the tones suspected of being defective by listening to the selected tones at the test line.
3. Replace *SN253* or TN768 as appropriate.
4. Repeat Procedure 644, Test 1.
   - If Test 1 passes, corrective action is complete.
   - If Test 1 fails, use Procedure 620, Test 4 (unit type 31) to further isolate the trouble. .
     — If Procedure 620, Test 4 corrects the problem, corrective action is complete.
     — If Procedure 620, Test 4 cannot correct the problem, check the wiring associated with the defective tones isolated in Step 1. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

DATA MODULES

The data modules covered in this section are the modular processor data module (MPDM), the modular trunk data module (MTDM), the digital terminal data module (DTDM), and the 3270 data modules.

When troubles with data modules are reported by the user, perform the following steps as appropriate.

Cannot Originate Calls

1. Check that the data module is plugged in.
   - If the data module is plugged in, go to Step 2.
   - If the data module is not plugged in, connect it.
2. Use the port tester to check the data module wiring to the switch.
   - If the data module wiring is correct, go to Step 3.
   - If the data module wiring is not correct, correct it.
3. Run a self test on the data module and 74 series terminal (if DTDM).
   - If the self test passes, use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use Procedure 622, Test 3 to run a continuous test on the terminal.
   - If the self test fails, replace the data module or 74 series terminal.

Cannot Receive Calls

1. Run a self test on the data module and 74 series terminal (if DTDM).
   - If the self test passes, go to Step 2.
   - If the self test fails, replace the data module or 74 series terminal.
2. Use Procedure 622, Test 1 to check for errors recorded against the terminal. Then, use Procedure 622, Test 3 to run a continuous test on the terminal.

Data Call Is Apparently Set Up, but No Data Can Be Sent or Received

1. Run a self test on the data module.
   - If the self test passes, go to Step 2.
   - If the self test fails, replace the data module.
2. Run a local loop-back test on the data module.
   - If the local loop-back test passes, go to Step 3.
   - If the local loop-back test fails, there is a problem between the user's terminal equipment and the data module.

     If the data module is optioned for terminal dialing, try to set up a data call. If dialed characters are echoed, the connection is good between the data module and the terminal.
3. Run a remote loop back or remote loop back and self test combined by performing the following:

   If a remote loop-back test using the user's terminal equipment can be performed, it is the preferred test.

a. Setup a connection to the remote data terminal and operate the remote loop-back button.

NOTE

For DCP mode 0 and 1 operation, you *must* operate the remote loop-back button before the call is setup.

b. Perform a remote loop-back test or operate the self-test button.

If the test fails, the trouble could be in either data module or in any of the circuits between the data modules.

Intermittent Troubles

If intermittent troubles are suspected or reported by the user, perform the following steps:

1. Use Procedure 600, Test 2 to determine if errors are recorded against the suspect data module. The data module may have errors recorded against it in Test 2 that do not exceed the threshold to raise an alarm.
2. Use the maintenance procedure referenced in Procedure 600, Test 2 (Field 15) to test the circuit on a continuous basis.
   - If the test passes, escalate the trouble.
   - If the test fails, the corrective action as described in Chapter 6 of this manual for the maintenance procedure.

MPDM or MTDM Self Tests

The MPDM is a DCE-type device used to transmit and receive serial data over a 4-wire DTL link in the DEFINITY Generic 2. It provides an interconnection (without a voice terminal) between the system and customer-provided data terminal equipment.

The MTDM serves as a data terminal equipment (DTE) to interface the DEFINITY Generic 2 data capabilities to a private line data channel via a data set or a data service unit using an RS-232C interface.

Perform self tests on the MPDM (see Figure 7-2, *Modular Processor Data Module (MPDM))* or the MDTM (see Figure 7-3, *Modular Trunk Data Module (MTDM))* as follows.

CAUTION

Operating the SELF TEST switch without operating the REMOTE LOOP BACK switch terminates a call in progress.

Self Test

With the self test, you can check the integrity of the data module from the EIA interface drivers to the interface to the DCP link.

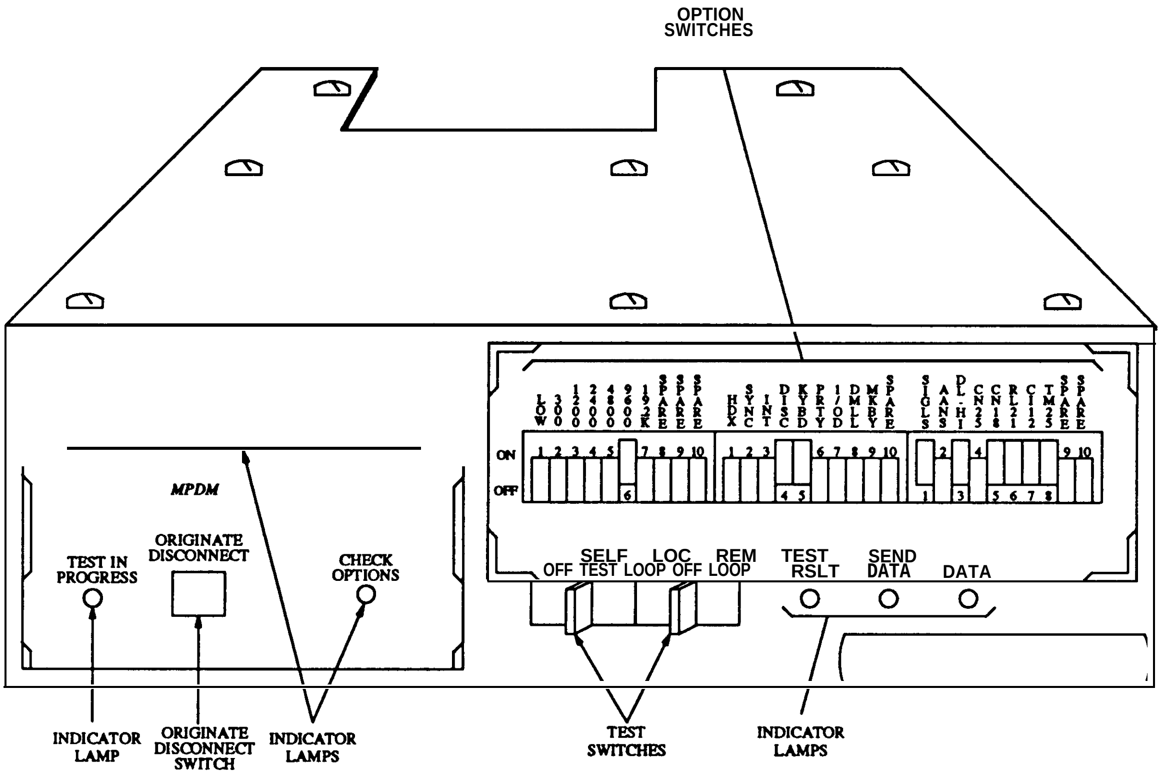


Figure 7-1. Modular Processor Data Module (MPDM)

1. Place the self-test switch in the SELF TEST position.

   The TEST IN PROGRESS indicator comes on. If the test passes, the TEST RSLT indicator comes on and stays on. If the test fails, the TEST RSLT indicator flashes continuously.

   If the test passes the internal circuits test, a known bit sequence is looped through the internal data path and checked for errors. Any bit error causes the TEST RSLT indicator to flutter momentarily. If no bit errors occur, the TEST RSLT indicator comes on and stays on.

2. Return the self-test switch to the OFF position.

   The TEST IN PROGRESS and TEST RSLT indicators go off.

Local Loop Test

With the local loop test, you can check that data received on the EIA interface is looped back to the EIA interface.

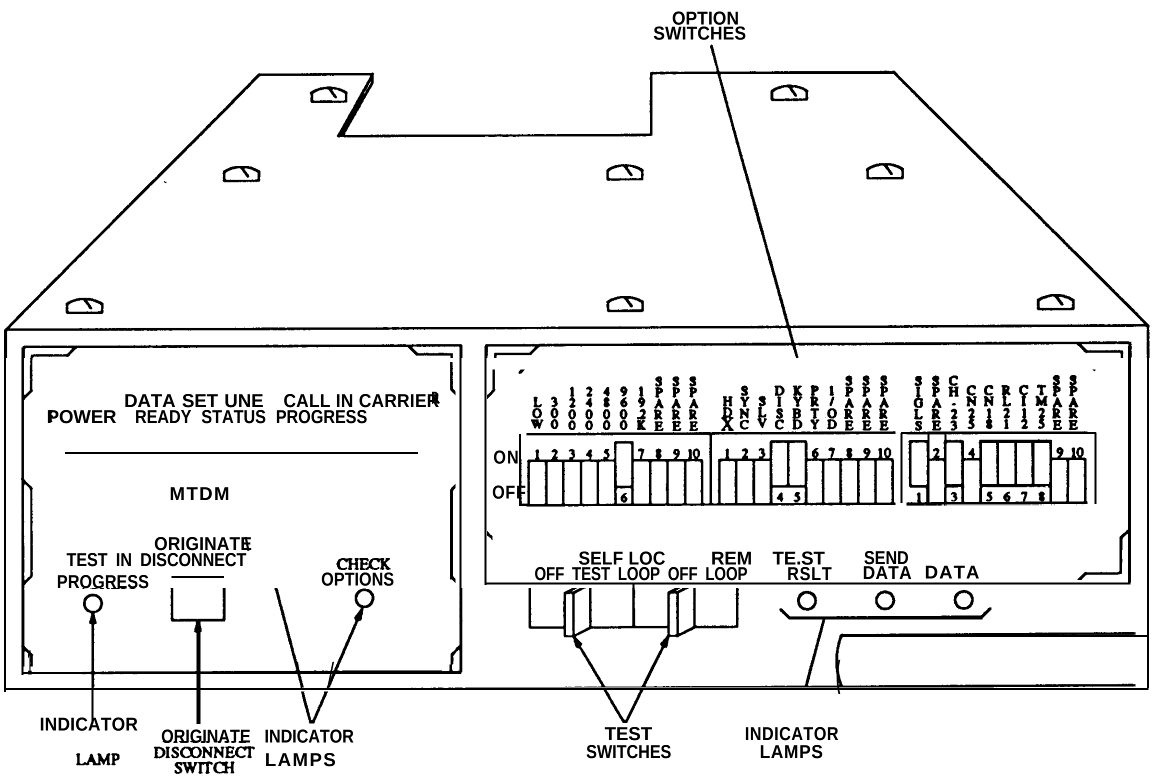


Figure 7-2. Modular Trunk Data Module (MTDM)

CAUTION If an MPDM or MTDM is placed in a local loop-back mode while a call is in progress, the call is terminated.

A DTE is required for MPDM testing that provides an internal loop back prior to the DTL link interface. A data terminal and a data set or data service unit is required for MTDM testing that provides an internal loop back prior to the DTL link interface.

1. Place the LOC LOOP/REM LOOP switch in the LOC LOOP position.

   The TEST IN PROGRESS indicator comes on.

2. Type several characters on the data terminal keyboard.
3. Check the data transmitted against the data displayed on the DTE.

   The test passes if no errors are found.

4. After completing the test, plain the LOC LOOP/REM LOOP switch in the OFF position.

   The TEST IN PROGRESS indicator goes off.

Remote Loop Test

The remote loop test lets you check the data path from one data module to another.

1. Place a call to another data module.
2. Place the LOC LOOP/REM LOOP switch in the REM LOOP position.

   The TEST IN PROGRESS indicators on both the local and remote modules are lighted and the remote module is disabled for data transmission and reception.

3. Type several characters on the data terminal keyboard.
4. Check the data transmitted against the data displayed on the DTE.

   The test passes if no errors are found.

   The remote module, if necessary, terminates the call by turning the CD interface lead (data terminal ready) to OFF.

5. After completing the test, place the LOC LOOP/REM LOOP switch in the OFF position.

   CAUTION The call is terminated if the switch is placed in the LOC LOOP position.

   The TEST IN PROGRESS indicator goes off.

Remote Loop-Back/Self Test

With the remote loop-back self test, you can check the performance of the data module and the data transmission channel. The data module generates a test message and transmits it to the remote data module where it is looped back to the data module. The data module compares the received message with the transmitted message.

1. Place a call to another data module.
2. Place the LOC LOOP/REM LOOP switch in the REM LOOP position after a call is set up to put the remote module into remote loop.
3. Place the self-test switch in the SELF TEST position.

   The module generates a known bit sequence and transmits it to the remote module where the data is looped back prior to the EIA interface of the remote module.

   The local module, upon receiving the bit sequence, checks it with the transmitted bit sequence for errors.

   Any errors detected cause the TEST RSLT indicator to flutter momentarily. If no errors are detected, the TEST RSLT indicator comes on and stays on.

   CAUTION: If the REM LOOP switch is placed in the OFF position before the SELF TEST switch is placed in the OFF position, any call is terminated.

4. After test completion, place the self-test switch in the OFF position. Then, place the REM LOOP switch in the OFF position.

   The TEST RSLT and TEST IN PROGRESS indicators go off.

DTDM Self Tests

The DTDM (see Figure 7-4, *Voice Terminal with a Digital Terminal Data Module (DTDM))* is a data communications equipment (DCE) type device used to transmit and receive serial customer data from an EIA RS-232C interface over a four-wire DTL link in the DEFINITY Generic 2.

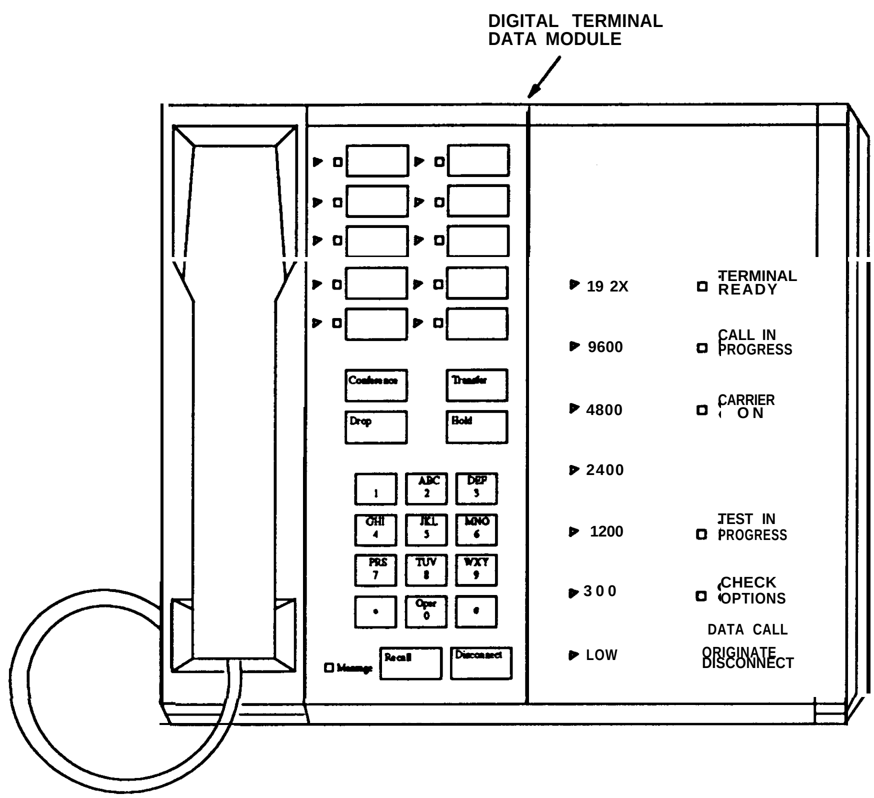


Figure 7-3. Voice Terminal with a Digital Terminal Data Module (DTDM)

The DTDM provides an interconnection between the DEFINITY Generic 2 and customer-provided DTE. The DTDM serves as an adjunct module to a digital voice terminal.

The digital voice terminal provides the interconnect function to the DTL link interface. The digital voice terminal and the DTDM integrate both voice and data communications on the same link, allowing simultaneous transmission.

Incoming calls or call-origination requests are not accepted while switches are in the test position. The DTDM TEST IN PROGRESS indicator remains on for the duration of each test.

CAUTION Established calls are disconnected when test switches are moved from their OFF position.

Perform self tests on DTDM data modules (see Figure 7-5, *Digital Terminal Data Module (DTDM) with Side Door Open) as* follows.

NOTE Placing the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position does not disconnect an established call.

Self Test

The self test lets you check the integrity of the data module from the EIA interface drivers to the interface to the DCP link.

1. Place the self-test switch in the SELF TEST position.

   The TEST IN PROGRESS indicator comes on. If the test passes, the TEST RESULTS indicator comes on and stays on. If the test fails, the TEST RESULTS indicator flashes continuously.

   If the test passes, the self test continues. A known bit sequence is looped through the internal data path and checks for errors.

   If an error is detected, the TEST RESULTS indicator flutters momentarily. If no errors are detected, the TEST RESULTS indicator comes on and stays on.

2. Place the self-test switch in the OFF position.

   The TEST IN PROGRESS and TEST RESULTS indicators go off.

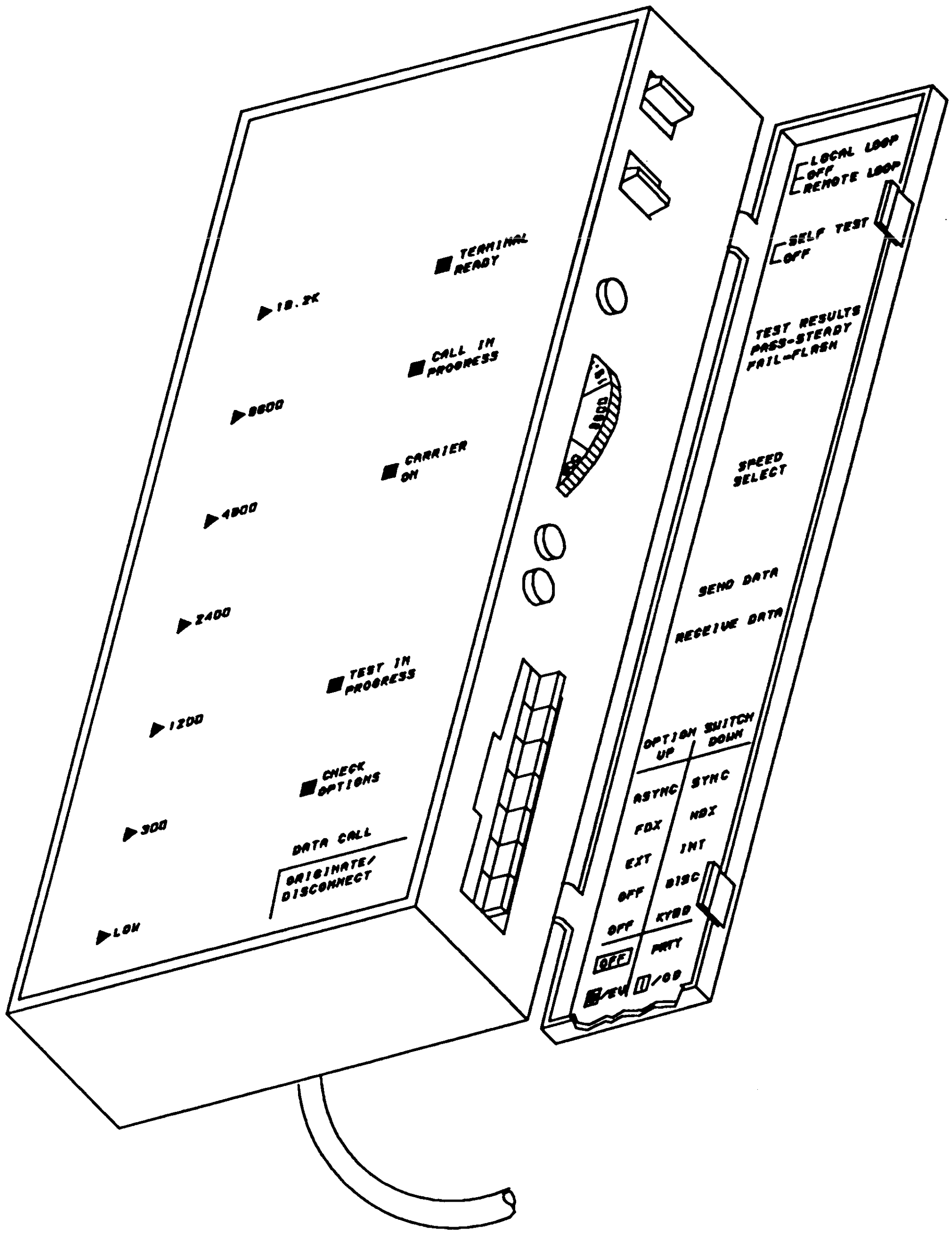


Figure 7-4. Digital Terminal Data Module (DTDM) with Slide Door Open

Local Loop Test

The local loop test lets you check that data received on the EIA interface are looped back to the EIA interface.

1. Place the LOCAL LOOP/REMOTE LOOP switch in the LOCAL LOOP position.
2. Type several DTE keyboard characters.

   If the same characters are displayed the test passed.

3. When the testis complete, place the LOCAL LOOP/REMOTE LOOP switch in the OFF position.

   The TEST IN PROGRESS indicator goes off.

Remote Loop Test

The remote loop test lets you check the data path from one data module to another.

1. Place a call to another data module.
2. Place the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position.

   The TEST IN PROGRESS indicator comes on.

3. Type several DTE keyboard characters.

   If the same characters are displayed, the test passed.

4. When the test is complete, return the LOCAL LOOP/REMOTE LOOP switch in the OFF position.

Remote Loop/Self Test

The remote loop self test lets you check the performance of the data module and the data transmission channel. The data module generates a test message and transmits it to the remote data module where it is looped back to the data module. The data module compares the received message with the transmitted message.

1. Place a call to another data module.
2. Place the LOCAL LOOP/REMOTE LOOP switch in the REMOTE LOOP position.

   The TEST IN PROGRESS indicator comes on.

3. Place the self-test switch in the SELF TEST position.

   A known bit sequence is looped through the data path from the DTDM to the EIA interface of the called module and checks for errors.

   Any errors detected cause the TEST RESULTS indicator to momentarily flutter. If no errors are detected, the TEST RESULTS indicator comes on and stays on.

CAUTION The self test switch must be returned to the OFF position before the REMOTE LOOP switch is returned to the OFF position or the call is terminated.

4. Place the self-test switch in the OFF position. Then, place the LOCAL LOOP/REMOTE LOOP switch in the OFF position.

   The TEST RESULTS and TEST IN PROGRESS indicators go off.

3270 Data Modules Self Test and Switch Connection Test

The 3270 data module consists of a family of protocol converters that allow 3270-type terminals to communicate with a host computer through the switch using standard twisted-pair building wiring instead of coaxial cable.

The complete family of 3270 data modules consists of the 3270A (asynchronous) data module or 3270T (terminal) data module (see Figure 7-6, *3270A and 3270T Data Module (Protocol Converter)),* located at the terminal end of the switch, and the 3270C (controller) data module (see Figure 7-7, *3270C Data Module (Protocol Converter)),* located at the cluster controller end.

The 3270A data module (see Figure 7-6) allows a 3270-type terminal to appear as an asynchronous ASCII terminal to an ASCII endpoint. In ASCII emulation mode, the 3270A data module does not require a 3270 data module at the other end of the switch.

The 3270T data module (see Figure 7-6) appears as a cluster controller to the terminal. The terminal sends messages for the cluster controller in coaxial cable category A protocol, that the data module coverts to DCP protocol.

Data and messages are then sent through the switch to the 3270C data module (see Figure 7-7), at the cluster controller side of the switch. The 3270C data module decodes the DCP information back to coaxial cable protocol and sends it to the cluster controller.

The protocol conversion sequence is reversed for cluster controller messages to the terminal.

NOTE This method of communicating with a-host computer is transparent to the computer system.

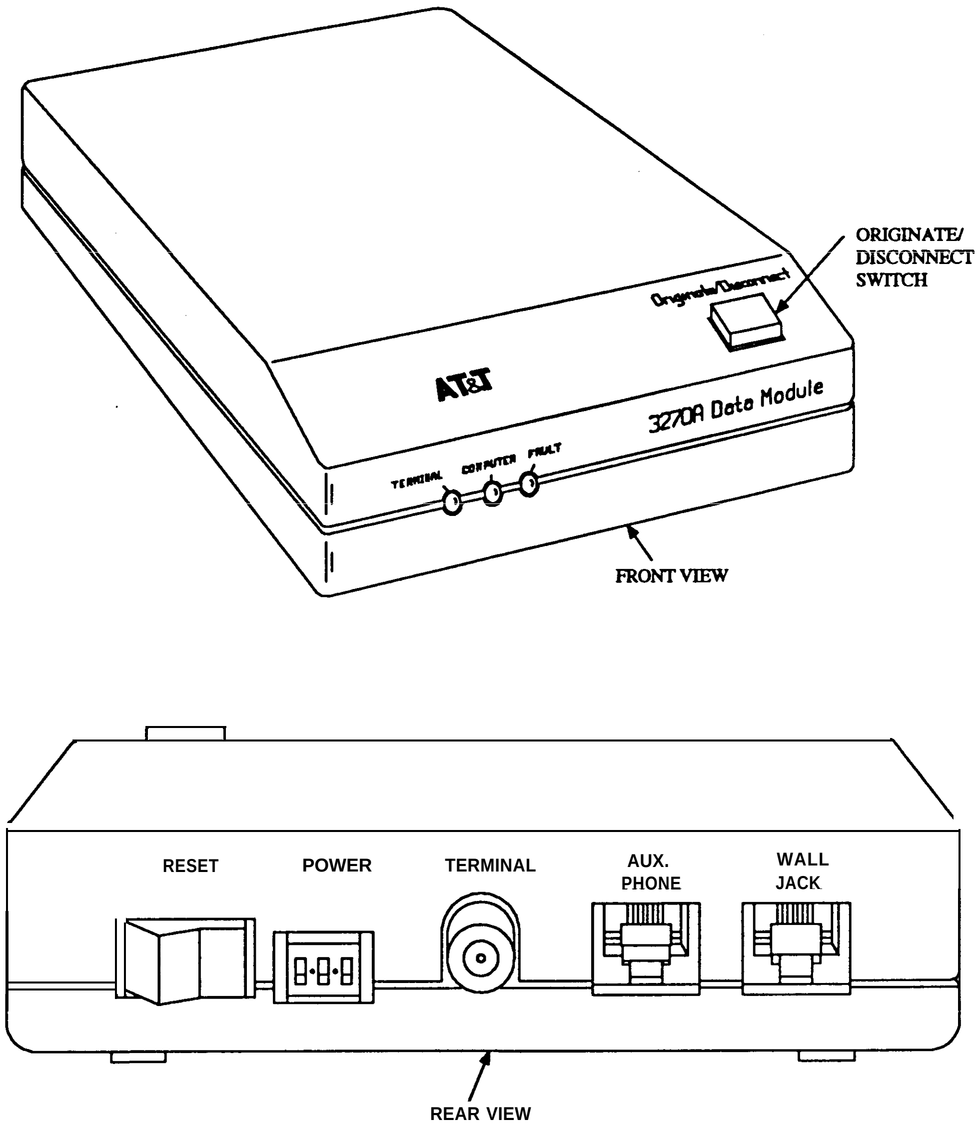


Figure 7-5. 3270A and 3270T Data Module (Protocol Converter)

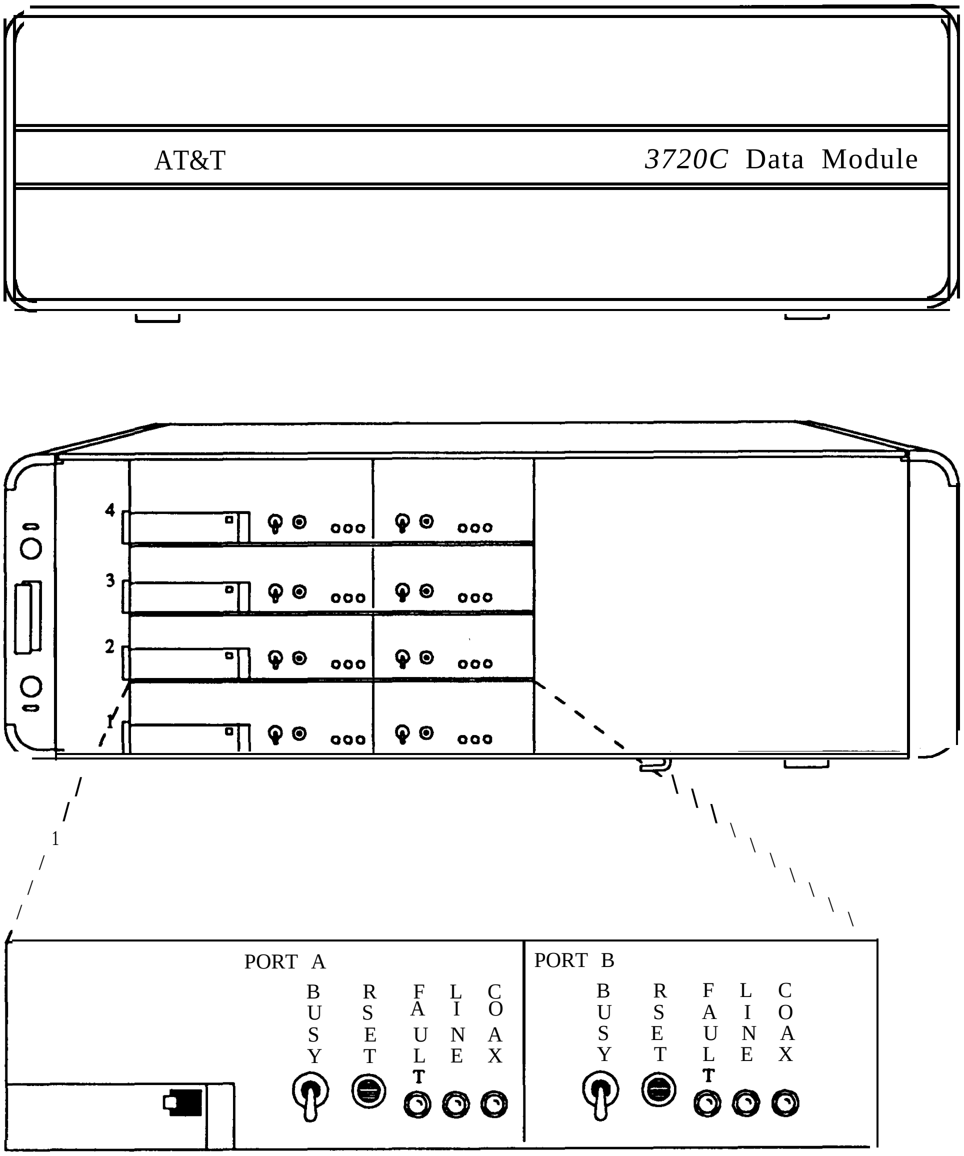


Figure 7-6. 3270C Data Module (Protocol Converter)

3270 Data Modules Self Test

The self test runs automatically whenever the data module is on. You may also run it manually by pressing the RESET switch on the 3270A or 3270T data module or by pressing the RESET button on the 3270C data module.

The self test is actually a series of tests designed to check the health of the data module hardware. The tests are initiated by the data module's microprocessor. Self tests include:

- Reading and writing to the random access memory (RAM)
- Performing a timer check
- Performing a checksum of the erasable programmable read-only memory (EPROM)
- Looping test words around the advanced data link control (ADLC) interface to check the DCP S (signaling) and I (data) channel receiver and transmitter
- Looping test words around the asynchronous receiver transmitter and variable addressable RAM controller (ARTVARC) to check the coaxial cable interface.

During the self test, the coaxial cable interface is disabled and the switch digital line interface (DLI) is ignored. You may run the self test without a connection to a terminal, a cluster controller, or the switch.

If coaxial cable or switch connections are not in place, the green or yellow LEDs will not light. The self test fails if the red LED remains lit.

If the data module's microprocessor or any of its immediate logic is faulty, the self test may not detect an error or may fail to light the red LED. If a data module appears to be causing problems even though its red LED fails to light, exchange it with a known good data module to verify whether the problem is corrected.

CAUTION Running the self test disconnects any call that may be in progress. Because the self test momentarily interrupts power to the data module, S channel errors may be recorded by the switch and 3270A data module ASCII emulation options are erased. You should run the self test only when it is necessary to do so.

3270A and 3270T Data Module Self Test

To run the self test on the 3270A or 3270T data module (see Figure 7-6), perform the following steps:

1. If a terminal is attached to the data module, turn the power on and make sure that the TEST/NORMAL switch is in the NORMAL position.
2. Toggle the RESET switch at the rear of the data module.

   All three LEDs on the front panel should light briefly, then the red LED should light for about one second as the data module performs the self test. If one of the LEDs fails to light, replace the data module.

   The red LED should go out and the green LED should light, indicating a good coaxial connection to the terminal.

NOTE

If the terminal is not connected or if the TEST/NORMAL switch is in the TEST position, the green LED will not light.

If the red LED remains lighted, the data module has detected an error. Replace the data module.

3270C Data Module Self Test

To run the self test on the *3270C* data module (see Figure 7-7), perform the following steps:

1. Open the front cover of the *3270C* data module assembly to gain access to the LEDs and switches. Turn the screw on the springlock latch on the right of the label strip counterclockwise to unlock the cover. Pull the right side of the cover toward you to release the latching mechanism.
2. Depress the RESET button on the front panel of the port to be tested.

   All three LEDs on the front panel should light briefly, then the red LED should light for about four seconds as the port performs the self test. If one of the LEDs fails to light, replace the circuit pack.

   The red LED should go out and the green LED should light, indicating a good coaxial connection to the cluster controller.

   NOTE

   If the 3270C data module is not connected with coaxial cable to the cluster controller, the green LED will not light.

3. If the red LED remains lighted, the self test has detected an error. Replace the circuit pack.
4. In the event of an error, toggle the BUSY switch on the front panel to the up (make-busy) position to prevent the 3270A or 3270T data modules from attempting to access the faulty port until you can replace the circuit pack.
5. After running the self test, place the BUSY toggle in the up (make-busy) position a couple of times for each port to synchronize the data module with the switch. The yellow LED should light for about 10 seconds when the data module is synchronized.

   NOTE

   The toggling action sends an off-hook message to the switch. The switch then sends the equivalent of a DIAL: prompt (the yellow LED lights). Returning the BUSY switch in the normal position ensures the switch knows the data module is back on hook.

6. After tests on all ports are run, close the front cover of the 3270C data module by positioning the cover over the hook on the left, lining up the cover with the front of the assembly, and turning the screw on the springlock latch.

3270 Data Modules Switch Connection Test

The switch connection test tests the connection from the data module through the building wiring to a port on the switch. This test can detect faulty wiring from the 3270 data module to the switch or improper translation of the port board on the switch.

You must run the switch connection test without the coaxial cable for a terminal or cluster controller attached to the data module. You must also ensure that the port board on the switch is correctly administered and translated&fore you can run this test.

3270A and 3270T Data Module Switch Connection Test

The 3270A or 3270T data module must be on and attached to the switch through the wall jack to perform the switch connection test.

To run the switch connection test on the 3270A or 3270T data module, perform the following steps:

1. If a terminal is attached to the data module, set the TEST/NORMAL switch on the terminal in the TEST position and leave it there. (This disconnects the coax.)

   You may also physically disconnect the coaxial cable from the TERMINAL connector to run this test.

2. Depress the ORIGINATE/DISCONNECT button.

   This action sends an OFF HOOK message on the DCP S (signaling) channel to the switch port board.

   The yellow LED should light for about 10 seconds, indicating a good connection to the switch.

   If the yellow LED does not light, depress the ORIGINATE/DISCONNECT button several times, waiting about 5 seconds between depressions. One of the depressions should cause the yellow LED to light.

   NOTE

   This action is equivalent to the switch sending a DIAL: prompt to a terminal. If no dialing action is taken, the switch times out in 10 seconds.

   If the yellow LED still does not light, the switch interface in the data module may be faulty, the wiring to the switch maybe faulty, or the port boards maybe incorrectly translated. See your system administrator if you believe the port boards are the problem.

3. When the test is complete, reattach the coaxial cable to the data module (if the cable was disconnected), or set the TEST/NORMAL switch in the NORMAL position.

3270C Data Module Switch Connection Test

The 3270C data module must be on and the DCP connector must be attached to the cross-connect field to perform the switch connection test.

To run the switch connection test on the 3270C data module, perform the following steps:

1. If a cluster controller is attached to the data module, disconnect the coaxial cables from the ports on the back of the 3270C data module assembly.

   The green LEDs may take a moment to go out.

2. Open the front cover of the 3270C data module assembly to gain access to the LEDs and switches. Turn the screw on the springlock latch on the right of the label strip counterclockwise to unlock the cover. Pull the right side of the cover toward you to release the latching mechanism.

3. Toggle the BUSY switch in the up (make-busy) position.

   This action sends an OFF HOOK message on the DCP S (signaling) channel to the switch port board.

   The yellow LED should light for about 10 seconds, indicating a good connection to the switch.

4. If the yellow LED does not light, move the toggle to and from the make-busy position several times, waiting about five seconds between toggles. One of the toggling actions should cause the yellow LED to light.

   NOTE This action is equivalent to the switch sending a DIAL: prompt to a terminal. If no action is taken, the switch times out in 10 seconds.

   If the yellow LED still does not light, the switch interface in the data module may be faulty, the wiring to the switch maybe faulty, or the port boards may be incorrectly translated. See your system administration if you believe the port boards are the problem.

5. When the test is complete, reattach the coaxial cables to the data module connectors.

6. Replace the front cover by positioning it over the hook on the left, lining it up with the front of the assembly, and turning the screw on the latch.

MADU/ADU EIA Port Board (SN238) Loop-Around Test

The multiple asynchronous data unit (MADU) provides an RS-232C compatible, full duplex, asynchronous data access to host computers.

The MADU accepts information from the host computer and passes it through its ports to a switch port that converts the data to digital communications protocol (DCP). The digital information is then transferred through the switch to another port that accepts DCP data.

The second port could attach to a variety of data devices, including an MPDM, digital terminal, computer, Z3A asynchronous data unit (ADU), or an MTDM leading to a modem.

Z3A ADUs interface directly with switch EIA port boards that contain a built-in ADU at each port. EIA port boards enable an RS-232C device to access the switch without going through a modem or a data module.

The Z3A ADU is roughly equivalent in function to one of the ports on the MADU board. It can translate the ADU protocol generated by the MADU back to RS-232C protocol required by the attached terminal.

When a user reports trouble with a terminal connected to an ADU or MADU that cannot access the switch, receives no dial prompt or disconnect prompt, and Procedure 620 or Procedure 622 cannot isolate the problem, perform a loop-around test on the EIA (SN238) port board.

MADU EIA Port Board (SN238) Loop-Around Test

The following test may be performed on an MADU that is attached to an SN238 EIA port board on the switch. The loop-around test checks the MADU port and the wiring between the MADU and the EIA port board. The loop-around test may be performed even if the EIA port board is not translated. The loop-around test requires an ASCII terminal.

1. Adjust the option switches on the EIA port board, if needed, to activate keyboard dialing.

   NOTE The switches KYBD0 to KYBD3 activate keyboard dialing for the four EIA ports when they are set down, in other words, away from the label.

2. Attach an ASCII terminal to one of the RS-232C connectors on the octopus cable leading to the MADU port you wish to test.

   Disable parity on the ASCII terminal if it is enabled.

3. Depress the BREAK key on the terminal. If auto-baud is enabled, follow the BREAK key with a carriage return.

   - If the EIA port board is translated and not busy, a DIAL: prompt appears on the terminal screen.
   - If the EIA port board is not translated or is busy, no response is received.

4. Type L or `CONTROL-G` (bell) to activate the loop-around feature

   NOTE The command varies on different boards.

   If you typed `CONTROL-G,` the tone indicates that you are in a loop-around mode.

5. Begin typing characters on the ASCII terminal's keyboard. The characters should be looped back to the screen exactly as they were typed.

   If characters do not appear or if errors occur, a problem may exist in the building wiring, the MADU port or the EIA port board.

   Occasional character errors indicate a parity problem. Make sure parity is disabled for this test.

6. To end the loop-around test, depress the BREAK key on the terminal for two seconds.

   A DISCONNECTED message appears on the screen.

7. Reattach the octopus cable to the correct computer port.

   Hook up the next octopus connector to be tested and repeat the test.

8. When testing is complete, return the option switches on the EIA port board to their original settings (if they were adjusted for this test) and reactivate parity on the terminal if desired.

ADU EIA Port Board (SN238) Loop-Around Test

The following test may be performed on an ADU that is attached to an SN238 EIA port board on the switch. ‘The loop-around test checks the wiring between the ADU and the port board. The loop-around test may be performed even if the EIA port board is not translated. The loop-around test requires an ASCII terminal.

1. Adjust the option switches on the EIA port board, if needed, to activate keyboard dialing.

   NOTE The switches KYBD0 to KYBD3 activate keyboard dialing for the four EIA ports when they are set down, in other words, away from the label.

2. Make sure the ADU is attached to the RS-232C connector on the ASCII terminal.

   Disable parity on the ASCII terminal if enabled.

3. Depress the BREAK key on the terminal or the ORIGINATE/DISCONNECT switch. If auto-baud is enabled, follow the BREAK key with a carriage return.

   - If the EIA port board is translated and not busy, a DIAL: prompt appears on the terminal screen.
   - If the EIA port board is not translated or is busy, no response is received.

4. Type L or CONTROL-G (bell) to activate the loop-around feature.

   NOTE The command varies on different boards.

   If you typed CONTROL-G, the tone indicates that you are in a loop-around mode.

5. Begin typing characters on the ASCII terminal’s keyboard.

   The characters should be looped back to the screen exactly as they were typed.

   If characters do not appear or if errors occur, a problem may exist in the building wiring, the ADU, or the EIA port board.

   Occasional character errors indicate a parity problem. Make sure parity is disabled for this test.

6. To end the loop-around test, depress the BREAK key on the terminal or the ORIGINATE/DISCONNECT switch for two seconds.

   A DISCONNECTED message appears on the screen.

7. Return the option switches on the EIA port board to their original settings (ii they were adjusted for this test) and reactivate parity on the terminal if desired.

FEATURES

- If the feature trouble is experienced by all terminals, go to Step 2.

2. Check the customer order document to determine if the feature is supposed to be activated for the customer.
   - If the feature should not be activated, check with customer assistance or notify the user.
   - If the feature should be activated, check the switch translation and administer as necessary.
3. Check the switch translation for the terminal experiencing the trouble.
   - Administer the feature as necessary.
   - If the feature is administered, determine from the user if the trouble is intermittent.
     - — If the trouble is not intermittent, replace the terminal.
     - — If the trouble is intermittent, go to Step 4.
4. Use Procedure 600, Test 2 to determine if errors are recorded against the suspect circuit. The circuit may have errors recorded against it in Test 2 that do not exceed the threshold to raise an alarm.

   Use the appropriate maintenance procedure for the suspect circuit and test the circuit on a continuous basis. Take corrective action as necessary.

ATTENDANT CONSOLE

When a continuous audible tone at the attendant console is reported by the user (caused by a system power interruption or by the attendant console headset being plugged in), perform the following.

Operate the test switch on the left side of the attendant console to remove the tone.

The test switch is located on the front panel of the storage area containing the card for attendant use.

MODEM POOLING

Isolation of user-reported modem pooling troubles consist of:

- General isolation techniques
- Isolation of a suspected failing trunk group
- Isolation of an unknown modem pool path.

General Isolation Techniques

Typical user information that may help to isolate the failing trunk group includes data rate, mode (asynchronous or synchronous), and the dial tone used.

- For example, if the user dialed 9 and then a remote computer port, the PDM used was set at 1200 bps, asynchronous, full duplex. A modem pool trunk group with matching characteristics would be suspect.
- On the other hand, if a user dialed a local host computer, then a host access type of trunk group with that dial code is suspect.
- Incoming calls may also choose a specific trunk group.

You can use administration Procedure 070 and administration Procedure 100 to determine the data rate on a data module associated with a modem.

When user troubles associated with modem pooling members are reported, perform the following steps (as appropriate):

1. Examine Procedure 600, Test 1 to determine if any alarmed entries exist for unit type 62 (ADFTC), unit type 65 (modem pooling), and unit type 35 (digital facilities).

   If any alarmed entries exist, go to Chapter 6.13, *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65), to* isolate the alarmed failure

2. Examine Procedure 600, Test 2 to determine if any entries with recorded entries exist for unit type 62 (ADFTC), unit type 65 (modem pooling), or unit type 35 (digital facilities). If any entries with recorded errors exist, go to Chapter 6.13, *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65),* to isolate the alarmed failure.

Isolation of a Suspected Failing Trunk Group

1. Determine from the user the type of modem, data rate, and dial access code used to initiate the call.
   - Modem types consist of 103J, 113C, 113D, 202S, 201C, 208B, and 212A.
   - Characteristics (that is, modem type, loop-back control, and so on) of digital trunks used in modem pooling are provided in administration Procedure 100, Words 1 and 2.
2. Perform Procedure 646, Test 2 on the trunk group suspected of failing by entering the trunk group number in Field 3.

   NOTE If the trunk group has a data rate of 300 or 1200 bps, set the test length to one minute to identify severe problems quickly.

   - If any members of the trunk group fail, go to Chapter 6.13, *Procedure 646 — Digital Trunk, Digital User Problem, or Modem Pooling (Unit Type 35, Unit Type 36, or Unit Type 65), to* isolate the alarmed failure.

- If no members of the trunk group fail, type *nf* (next fault) to determine the bit and block error rate for each member of the trunk group.

  The bit and block error rate is determined by multiplying the first digit (leftmost side) in Field 14 by 10 raised to the negative power of the second digit in Field 14.

  The number of bits or blocks sent is determined by multiplying the third digit in Field 14 by 10 raised to the power of the fourth digit in Field 14.

  The threshold for bit and block error rates is 1 times 10 to minus 5 (or 15 displayed in the first two digits of Field 14).

3. Determine the member of the trunk group that has the poorest bit and block error rate.
4. Type nd (next data) and record the equipment location of the GPPs and data ports used in the testing of the MPM with the poorest bit and block error rate.

NOTE

Field 6 = 1, Fields 7 through 11 displays the equipment location of member A GPP; Field 6 = 2, Fields 7 through 11 displays the equipment location of member A data port; Field 6 = 3, Fields 7 through 11 displays the equipment location of member B GPP; Field 6 = 4, Fields 7 through 11 displays the equipment location of member B data pelt

5. Display the member A GPP equipment location in Fields 7 through 11 of Procedure 646, Test 2.
6. Use Procedure 620, Test 4 to test the member A GPP.
   - If Procedure 620, Test 4 fails, take the appropriate corrective action until the test passes. Then, go to Step 8.

   NOTE

   Some failures detected by the GPP test in Procedure 620 are fixed by replacing the associated TDM/2 or PDM.

   - If Procedure 620, Test 4 passes, go to Step 7.
7. Repeat Procedure 620, Test 4 for the member A data port, member B GPP, and member B data port using the change field sequence to enter the equipment locations recorded in Step 4 above.
   - If Procedure 620, Test 4 fails, take tha appropriate corrective action until the test passes. Then, go to step 8.
   - If Procedure 620, Test 4 passes for all circuits tested (member A GPP; member A data port; member B GPP; member B data port), go to Step 10.
8. Repeat Procedure 646, Test 2 to ensure that the failure is corrected.
9. Check the bit and block error rate as described in Step 2.
   - If the bit and block error rate is acceptable, no further corrective action is required.
   - If the bit and block error rate is the same or worse, check the wiring associated with the ADFTC, MPM or digital facility, modem, and data module. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.
10. Enter Procedure 646, Test 2 and display the member of the trunk group with the poorest bit and block error rate.

11. Replace the modem associated with the member with the poorest bit and block error rate. Then, repeat Procedure 646, Test 2.
12. Check the bit and block error rate as described in Step 2.
    - If the bit and block error rate is acceptable, no further corrective action is required.
    - If the bit and block error rate is the same or worse, replace the data moduIe associated with the member with the poorest bit and block error rate.
13. Repeat Procedure 646, Test 2.
14. Check the bit and block error rate as described in Step 2.
    - If the bit and block error rate is acceptable no further corrective action is required.
    - If the bit and block error rate is the same or worse, check the wiring associated with the ADFTC, MPM or digital facility, modem, and data module. If the wiring is satisfactory or you have replaced it and the trouble still exists, escalate the trouble.

Isolation of an Unknown Modem Pool Path

When a modem pooling trouble is reported by the user that *cannot* be isolated using Procedure 646 *and* no entries (alarmed or error) are displayed in Procedure 600, Tests 1 and 2 that correspond to the reported trouble, the problem is probably an intermittent trouble that cannot be isolated utilizing the normal techniques.

If this type of trouble persists for the user, you must determine the specific modem pool path for the . troublesome connection and you must use the Trunk Verification feature to isolate the faulty component.

NOTE

When this type of trouble occurs again, the user must not hang up. The modem pool path is disconnected when the user hangs up and no further action can be accomplished. Inform the user that, on the next occurrence of this type of trouble, they should maintain the connection and notify the technician that this trouble has occurred again.

Determining Modem Pool Connection Path

The specific modem pool connection path for the troublesome connection can be determined only while the connection is still up (see Figure 7-8, *Modem Pooling Connection Path)* as follows:

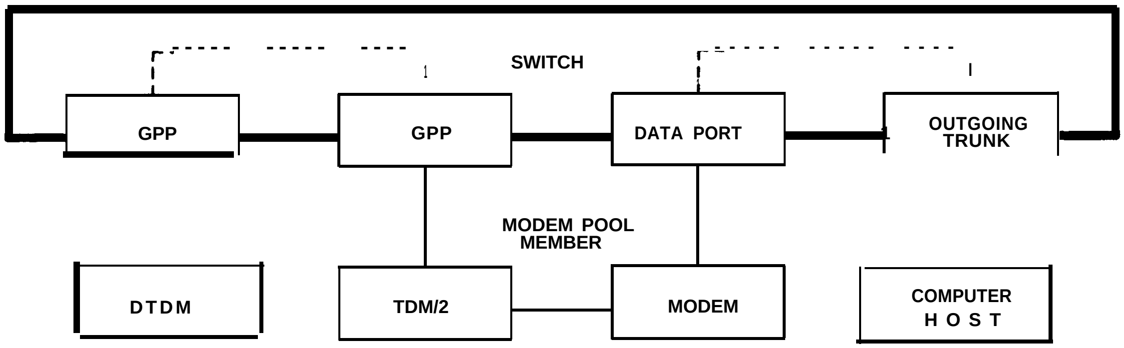


Figure 7-7. Modem Pooling Connection Path

1. Use Procedure 962, Test 3 to enter the initiating circuit equipment location of the DTDM in Fields 2 through 6 and type *x* (execute).

   The corresponding TDM facility equipment location is displayed in Fields 11 through 15.

2. Use administration Procedure 178 to enter the TDM equipment location displayed in Step 1 and display the corresponding TDM trunk group and trunk number in the group.

3. Use administration procedure 180 to enter the TDM trunk group number displayed m Step 2. hen, type *nd* (next data) to search for the TDM digital equipment location.

   When the TDM equipment location is displayed, the corresponding modem analog equipment “ location is also displayed.

4. Use Procedure 962, Test 2 to enter the modem initiating circuit equipment location (in Fields 2 through 6) displayed in Step 3 and type *x* (execute).

   The corresponding outgoing’ trunk facility equipment location is displayed in Fields 11 through 15.

5. Use administration Procedure 178 to enter the outgoing trunk equipment location displayed in Step 4 and display the corresponding outgoing trunk group and trunk number in the group.

6. Notify the user to go on hook.

   The connection is no longer needed since the connection path has been established.

Isolating Faulty Component

To isolate the faulty component (if any), use the trunk verification by voice terminal (TVVT) feature to reproduce the same troublesome connection path, using the trunk group and trunk numbers obtained above for the TDM and the outgoing trunk.

An extension and data button must be administered on a multifunction telephone set and this extension must be administered for trunk verification in Procedure 285 (Field 8).

NOTE

You should perform the isolation of the faulty component at a convenient time for the user, optionally out-of-hours.

1. Using administration Procedure 350, Word 2, enter TVVT feature 44 and depress *x* (execute).

   The TVVT dial access code is displayed.

2. Using the TVVT-administered extension, dial the TVVT dial access code. Then, wait for dial tone.

3. Dial the TDM trunk group and trunk number as two consecutive three-digit numbers.

   NOTE

   For example, for trunk number 1 in trunk group 80, dial 080001.

   Then, wait for dial tone.

4. Dial the TVVT dial access code again. Then, wait for dial tone.

5. Dial the outgoing trunk group and trunk number as two consecutive three-digit numbers the same way as in Step 3. Then, wait for dial tone.

6. Dial the 7-or 10-digit number of the computer host.

   The troublesome connection path is now active.

7. Determine the type of reception.

   - If the reception is good, go to Step 8.
   - If the reception is not good, go to Step 9.

8. Repeat steps 1 through 6 using the DTDM the user reported as a problem.

   - If the reception is good, suspect the computer host as the problem.
   - If the reception is not good, replace the DTDM.

9. Substitute the DTDM, TDM/modem, or outgoing trunk in the connection path by using the TVVT feature to determine the component that is faulty. Substitution is performed as follows.

   - Trunk — Repeat Steps 1 through 6 using a different number in Step 5.
   - TDM/modem — Repeat Steps 1 through 6 using a different number in Step 3.
   - DTDM — Administer a new DTDM and perform Steps 1 through 6 using the same numbers.

10. When the reception is good, replace the component that was substituted.

8. NONALARMED FAILURES

Failures in this chapter include failures that are not alarmed in Procedure 600, Test 1 and that are not normally reported by the user.

These failures include unit types 42, 61, 67, and 73 that are logged in Procedure 600, Test 2 but are not alarmed, or other switch-related nonalarmed failures suspected because of equipment not functioning correctly. These failures may include, for example, the alarm panel, contact interface, or the network control operations support system (NCOSS).

When you are asked to perform administration procedures, you can refer to *DEFINITY™ Communications System Generic 2 Administration Procedures* (555-104-506) as necessary for the definition and operation of the administration procedure.

The following paragraphs provide fault isolation and repair techniques for these types of failures.

UNIT TYPES 42,61,67, AND 73 — UNALARMED FAILURES

Procedure 600 displays a dash in Field 15 for several unit type entries. A dash in Field 15 indicates that a maintenance procedure is not available to diagnose and isolate these failures. Unit types 42,61,67, and 73 are the only unit types that display a dash in Field 15.

Unit type 42 (Calls Aborted), unit type 61 (Configuration Audits), unit type 67 (Undefined Exception FIFO Code), and unit type 73 (Dedicated Switch Connection) do not raise an alarm or reference a maintenance procedure. Entries for these unit types are displayed in Procedure 600, Test 2 and Field 15 is dashed.

Perform the following corrective action when entries in unit types 42, 61, 67, and 73 are displayed by Procedure 600, Test 2.

Unit Type 42 (Calls Aborted)

1. Record the information displayed in Fields 2-14 of each unit type 42 entry displayed in Procedure 600, Test 2.

   NOTE Most of the entries in unit type 42 (calls aborted) also have an associated entry in unit type 41 (trunk failures). The entries in unit type 42 can be compared to the entries in unit type 41 only by the time stamps *not* by the equipment location.

2. Clear (zero out) the unit type (42) from the periodic maintenance information data structure (PMIDS).
3. When you note excessive entries (based on your experience) for unit type 42, refer the problem to switch software engineers for further diagnosis.

Unit Type 61 (Configuration Audits)

1. Record the configuration audit fault code displayed in Field 3 and the related information displayed in Fields 9-14 of each unit type 61 entry displayed in Procedure 600, Test 2.
2. Clear (zero out) the unit type (61) from PMIDS.

   Table 8-1, *Configuration Audit Fault Codes*, provides a definition for each configuration audit fault code presently being used.
3. Refer these types of software errors to the switch software engineers for further diagnosis.

NOTE The remainder of the fault signature data for each configuration audit entry is not displayed in Procedure 600.

TABLE 8-1. Configuration Audit Fault Codes

Fault Code	Definition
1	Control register on memory board 0
2	Control register on memory board 1
3	Control register on memory board 2
4	Control register on memory board 3
5	Control register on memory board 4
6	Control register on memory board 5
7	Control register on memory board 6
8	Control register on memory board 7
17	501CC write protect
18	scamper write protect
19	Duplicate controller write protect
23	Fetch protect boundary
24	Double write select register
25	Double write enable register (control register)

Unit Type 67 (Undefined Exception FIFO Code)

1. Record the module number displayed in Field 3, the undefined exception FIFO encode displayed in Field 6, and the related information displayed in Fields 9-14 of each unit type 67 entry displayed in Procedure 600, Test 2.
2. Clear (zero out) the unit type (67) from PMIDS.

   Table 8-2, *Exception FIFO Encodes,* provides a definition for each exception FIFO encode presently being used.
3. Refer these types of software errors to the switch software engineers for further diagnosis.

NOTE The remainder of the fault signature data for each undefined exception FIFO entry is not displayed in Procedure 600.

TABLE 8-2. Exception FIFO Encodes

Encode	Definition
1	Port type incompatible with error code
2	Error code not defined
3	Touch-tone digit send error
4	Network order error
5	Digit collecting on for an inappropriate board type
6	Ringing is on for an inappropriate board type
7	Invalid module interface number reported
8	Error code not defined
9	Illegal connection
10	Illegal busy out
11	Administration error
12	Network order error

Unit Type 73 (Dedicated Switch Connection)

1. Record the dedicated connection number displayed in Fields 3-5, the fault code displayed in Field 7, and the related information displayed in Fields 9-14 of each unit type 73 entry displayed in Procedure 600, Test 2.
2. Clear (zero out) the unit type (73) from PMIDS.

   Table 8-3, *Dedicated Switch Connection Fault Codes,* provides a definition for each fault code presently being used.

3. If an excessive amount of fault code 1s are recorded, perform administrative Procedure 360 as follows:

   a. Enter the dedicated switch connection number in Field 2. Then, type *dx* (display, execute).

   b. Record the port equipment locations displayed in Fields 3 through 8 and 10-15 of administrative Procedure 360.

4. Use Procedure 620, Test 4 to test both port equipment locations (recorded in step 3b), using the appropriate unit type.

   - If the port equipment locations fail, take the appropriate corrective action.
   - If the port equipment locations pass, go to step 5.

5. Refer these types of software errors to the switch software engineers for further diagnosis.

NOTE

The remainder of the fault signature data for each dedicated switch connection entry is not displayed in Procedure 600.

TABLE 8-3. Dedicated Switch Connection Fault Codes

Fault Code	Definition
1	Fatal error (connection broken). Repair attempt failed.
2	Nonfatal error (connection intact). Repair attempt failed.
3	Fatal error (connection broken). Repaired by system audit.
4	Nonfatal error (connection intact). Repaired by system audit.

ALARM PANEL UNALARMED FAILURE

When you suspect an alarm panel malfunction, perform the following steps to isolate the faulty component.

1. Execute Procedure 616, Test 1 to determine whether all the indicators respond to on/off control.

2. If you suspect interaction between two or more indicators, execute Procedure 616, Test 2. Observe their individual operation.

3. If failures are observed, replace TN490. Then, repeat the appropriate tests.

   - If the tests pass, corrective action is complete.
   - If the tests still fail, go to step 4.

CAUTION Replacement of the alarm panel takes the entire switch down.

4. Tag the appropriate indicators. Then, replace the alarm panel when traffic permits.

NOTE Refer to Chapter 9, *Switch Component Replacement* for steps on replacement of the alarm panel.

5. Repeat the appropriate tests.
   - If the tests pass, corrective action is complete.
   - If the tests fail, check the wiring between TN490 and the alarm panel.
6. If the wiring is satisfactory or you have replaced it and a failure still exists, escalate the failure.

When you execute Test 1, or test the ack and external ack fault indicators in Test 2, check the **ACK** indicator on the attendant console.

1. If the **ACK** indicator is not lighted, replace TN490. Repeat the appropriate tests.
   - If the tests pass, corrective action is complete.
   - If the tests fail, replace console component lamp control and carrier.

NOTE Refer to chapter 9, *Switch Component Replacement* for steps on replacement of console components.

2. Repeat the appropriate tests.
   - If the tests pass, corrective action is complete.
   - If the tests fail, replace the console.
3. Repeat the appropriate tests.
   - If the tests pass, corrective action is complete.
   - If the tests fail, check the wiring between TN490 and the console.
4. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure. --

CONTACT INTERFACE UNALARMED FAILURE

The contact interface circuit pack ll1742B in the universal module is not tested by Procedure 624. If an attempt is made to test TN742B in Procedure 624, a special error code of 80 (Universal analog line board — Test via Procedure 620) appears on the DEFINITY™ Manager II.

When faulty operation of a SN241 contact interface circuit pack is indicated, perform the following steps to isolate the faulty component.

1. Replace SN241.
2. Rerun Procedure 624, Tests 1 and 2.
   - If the tests pass, corrective action is complete.
   - If the tests fail, check the operation of the associated remote equipment (for example, the SSI).
     - If the associated remote equipment is not in working order, refer the problem to the proper personnel.
     - If the associated remote equipment is in working order, check the wiring between SN241 and the remote equipment.
3. If the wiring is satisfactory or you have replaced it and the failure still exists, escalate the failure.

NETWORK CONTROL OPERATIONS SUPPORT SYSTEM (NCOSS) NONALARMED FAILURE

You can use Procedure 656, Test 2 to determine if failures are intermittent or to trace wiring problems.

You can use Procedure 656, Test 4 to transmit a single data word repeatedly (by typing *x* (execute) repeatedly) to help isolate failures in the NCOSS or 3B2 CDRU equipment. You can change the data word to be transmitted by typing *nd* (next data) repeatedly. See Figure 8-1, *List of Operation Codes and Data Words Available by Typing nd (next data) in Test 4,* to select the data word to be transmitted.

When you suspect I/O failures between the dual-speed data channel and the NCOSS or 3B2 CDRU equipment, perform Procedure 611 Test 3, entering the equipment location displayed in Fields 4-6 of Procedure 656.

When an NCOSS/3B2 call detail recording unit (CDRU) failure is reported or suspected, perform the following steps to isolate the faulty component.

Field 2
OP Code

Field3
Data

```
 3.2525 - No operation op code with 01 pattern
 3.5252 - No operation op code with 10 pattern
14.2525 - Retransmission, end of message with 01 pattern
14.5252 - Retransmission, end of message with 10 pattern
 4.2525 - Retransmission with 01 pattern
 4.5252 - Retransmission with 10 pattern
10.2525 - End of message op code with 01 pattern
10.5252 - End of message op code with 10 pattern
 0.2525 - Normal data word op code with 01 pattern
 0.5252 - Normal data word op code with 10 pattern
```

Figure 8-1. List of Operation Codes and Data Words Available by Typing next data in Test 4

1. Execute Procedure 656,Test l and record the results.
2. Execute Procedure 656, Test 3 and record the results. Look at the printout. Refer to Figure 8-2, *HexadecimalDump for Test 3 Test Call (18-Word Format),* to compare the printout.
   - If Test 3 passes and the printout is correct, corrective action is complete.
   - If Test3 fails or the printout is not correct, the NCOSS or 3B2 CDRU equipment is faulty. Refer the problem to the appropriate personnel.
3. Repeat steps l and 2 for each NCOSS/3B2 CDRU failure.

Processor communication circuits associated with the 3B2 CDRU are tested in Procedure 651.

```
                                                          WORD NUMBER

                                                          4555 IS RETRANSMITTED
                                                          MIDDLE WORD
                                                          E999 IS RETRANSMITTED
                                                          LAST WORD

          1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18
     •***    FILE  0001     RECORD  00005     LENGTH = 001024       •***
 1   l4l72O122355O67829ABOCDEOl22345670891O1112EFOO123245627890 ABC0DEF2012A345
 2   l4l7Ol23045627890ABC2DEF2Ol2O345O67829A222220F0l22340567O89A2BCD2EF04558456
 3   l4l7O2340557289AOBCD2EFO2l23045607892AB323330Ol22345O67809AB2CDE2FOlO234C999
 4   l4l72345265809AB2CDEOFOlO2342567289AOBC404442l23045627892ABC0DEF00l22345A678
 5   l4l7O45607592ABCODEF2Ol22345067809AB2CD52550234256708 9AOWD2EFO2l2304568789
 6   l4l72567285AOBCD2EFOOl23045627892AXODE60666234506782 9AB2CDEOFOlO2342567A89A
 7   l4l72678295BOCDE2FOlO2340567289A2BCDOEF70777245607892MC2DEFOOl2O3452678A9AB
 8   l4l7O789OA5C2DEFOOl22345O678O9WOCDE2FOfi28fiO567289AOKDOWO2l23245607898ABC
 9   l4l7O89AOB5D2EFOOl23245627890AXODEF2Ol92999067829ABOCDEOFOl22342567O89A8WD
10   l4l729m2C5EOFOl22340567O89A2BCD2EFOOl2AOAAA27890ABC2DEF2Ol2O345O67829AmCDE
11   l4l72AX2D5FOOl22345O678O9m2CDE2FOlO23BOBBB289AOBCD2EFO2l23045607892ABCADEF
12   l4l7OBCDOE5O2l23045627892ABCODEFOOl2234C2CCCO9AB2CDEOFOlO2342567289AOWD8EFO
13   l4l72CDE2F5lO2342567O89AOBCD2EFO2l23045DODDD2mCODEF2Ol22345O678O9AB2CDmFOl
14   l4l7ODEFOO522345O67829N2CDEOFOlO234256E2EEEOBCD2EFOOl23045627892MCODEF8Ol2
15   l4l7OEFOOl53245607892ABC2DmOOl2O345267F2FFFOCDE2FOlO2340567289A2KDOEFO8l23
16   l4l72FOl2254O567289AOBCDOEFO2l2324560780000 02DEFOOl22345267809ABOCDE2FOlA234

NORMAL             CONDITION                         CALLING
WORD OP            CODE                              STATION
CODE
```

NOTE:Bit 2 of the Op Code(parity bit) may be incorrect in this table.

Figure 8-2. Hexadecimal Dump for Test 3 Test Call (18-Word Format)

9. SWITCH COMPONENT REPLACEMENT

This chapter provides instructions for replacing the following switch components. The switch component to be replaced is determined by the repair strategies that detected the problem. Do not replace the component unless you are directed to do so.

You will need a screwdriver to remove the switch components and a lifting device to support and lift the 309A/310A power supply. This chapter describes how to remove and replace or upgrade:

- Circuit packs for:
  - Unduplicated common-control carrier
  - Duplicated common-control carrier
  - Module control, TMS, or RMI carrier
  - Port or DS-1/MFAT carrier
  - Unduplicated common-control DC/DC converter unit or duplicated common-control power carrier
  - Remote carrier group (RCG).
- Disk tape system (DTS)
- 309A or 310A power supply
- 63lDA1 and 631DB1 power supplies
- 644A1 and 645B1 power supplies
- 397B battery charger
- Bulk on-line switcher (OLS) power supply
- 3965-2 battery charger
- Frequency generator (traditional and universal cabinet)
- DC fan and fan assembly (traditional cabinet)
- DC fan and fan controller (universal cabinet)
- TMS/RMI cabinet AC distribution unit
- Universal module AC and DC power distribution units
- Traditional module control or port cabinet AC distribution unit
- Universal cabinet AC power distribution unit batteries
- DC filter
- Console components
- Alarm panel
- AEH4 alarm board.

Other subjects covered in this chapter are:

- Circuit pack switch option settings
- Cleaning the DTS tape head and capstan.

PRECAUTIONS

When you are performing removal and installation steps on the DEFINITY™ Communications System Generic 2 equipment, you *must* observe cautions, warnings, and danger statements that appear in this document to prevent loss of service, possible equipment damage, and possible personnel injury.

In addition, you *must* observe the following precautions regarding electromagnetic interference and static electricity.

- *Electromagnetic Interference:* This equipment generates, uses, and can radiate radio-frequency energy. Electromagnetic fields radiating from the switch may cause noise to be introduced into the customer's equipment. If the equipment is not installed and used in accordance with the instruction document, interference to radio communications may result.

  WARNING To maintain the electromagnetic interference (EMI) integrity of the DEFINITY Generic 2, you must ensure that all cabinet panels, covers, and the like are firmly secured in place before leaving the customer's premises.

- *Static Electricity* To prevent or reduce electrostatic discharge, you *must* always attach electromagnetic compatibility (EMC) wrist grounding straps before working on switch components or handling circuit packs.

  WARNING Electrostatic discharge can damage or destroy circuit packs containing integrated circuits (ICs).

The EMC wrist grounding strap and cable assembly (cc900698226) are in the bottom of the module-control cabinet in a polyurethane bag (cc900492372) next to the AC distribution unit.

This EMC wrist grounding strap is to be used whenever you troubleshoot or perform maintenance or handle any circuit packs associated with the DEFINITY Generic 2. Use the EMC wrist ground strap assembly in the following manner.

1. Attach the wrist strap to one of your wrists.
2. Connect the alligator clip to the cabinet frame to make a good ground connection.

A good ground connection for the alligator clip is:

- In equipment-coded cabinets that have removable sides, attach the alligator clip to any convenient screw head that fastens the hinges to the cabinet or to the screws that fasten the door latch to the frame.

- In equipment-coded cabinets that have integrated sides, attach the alligator clip to any of the front or rear cabinet-formed faces (in other words, the front door area or back area when viewed in an open position) that are coated with a conductive paint.

In either case, select an area close to the vertical center of the cabinet for the alligator clip, allowing a more central position from which to operate.

You should follow certain precautions when you replace circuit packs in the switch carrier to ensure that the DEFINITY Generic 2 recovers from circuit pack replacement. These precautions include busying out circuits, using the **GO/HALT** switch, and so on. These precautions are described in the sections discussing circuit pack replacements for each type of switch carrier.

CIRCUIT PACK REPLACEMENTS

When you replace circuit packs in the switch, you must maintain switch integrity and identify the correct circuit pack, vintage, and series to be replaced. Switch integrity is maintained by taking the appropriate steps when you replace circuit packs in the switch carriers.

- Use Procedure 290, Word 2 to identify the circuit packs in the digita1 network.
- Use Procedure 290, Word 2 to search for all circuit packs installed in the module control and port carriers.

  Procedure 290, Word 2 displays the prefix, number, suffix, vintage series, and vintage update of each circuit pack.

When you replace circuit packs, replace them with circuit packs of the same suffix or later. (For example, replace SN270 with SN270 or SN270B.)

Check the option settings on appropriate circuit packs before replacing them in any of the switch carriers to determine if the correct option setting is being used for the application required. Refer to *Circuit Puck Switch Option Settings* in this chapter for circuit packs with option settings.

When you replace a circuit pack and it does not fix the problem, return the customer's original circuit pack to the slot that it came from. Return the replacement circuit pack to stock.

Unduplicated Common-Control Carrier Circuit Pack Replacement

You must use the **GO/HALT** switch when you replace circuit packs in an unduplicated common-control carrier. When you place the **GO/HALT** switch in the **HALT** position before you remove any circuit pack in the common-control carrier, you stop any interactions with memory when you remove or replace circuit packs.

CAUTION If you replace circuit pack TN406 (DCIU processor memory) in Slot 16 of the unduplicated common-control carrier without using the GO/HALT switch, you will cause a partial reload

Perform the following steps at the alarm panel and at the common-control carrier when you replace circuit packs in an unduplicated common-control carrier.

1. Determine if the switch is in the emergency transfer mode.
   - If the switch is in the emergency transfer mode, set the **EMERGENCY TRANSFER** switch to **ACT.** Then, go to Step 2.
   - If the switch is not in the emergency transfer mode, set the **EMERGENCY TRANSFER** switch to **INHIB** and notify the user that no new calls can be processed. hen, go to Step 2.
2. Set the **GO/HALT** switch to **HALT.**
3. Remove the circuit pack to be replaced

   NOTE Before replacing circuit pack TN492, ensure that the battery (comcode 844665836) is connected to the backside of the circuit pack.

   a Mark the date of the next battery replacement (month and year) on the date label that is attached to the battery.

   Determine the battery replacement date by adding five years to the date of installation of the TN492 circuit pack and associated battery. Example: TN492 circuit pack replaced July 1989; ‘ date to be written on the label is July 1994.

   b. Affix the date label to the faceplate of the TN492 circuit pack.

   NOTE If the yellow LED is lighted after you replace the circuit pack, the battery is *not* connected or the battery is wired incorrectly.

4. Verify that the option settings on the replacement circuit pack are correct (inapplicable).
5. Replace the circuit pack.
6. Determine the position of the **EMERGENCY TRANSFER** switch.
   - If the **EMERGENCY TRANSFER** switch is in the **INHIB** position, go to Step 7.
   - If the **EMERGENCY TRANSFER** switch is in the **ACT** position, go to Step 9.

   CAUTION In the following step, you must set the GO/HALT switch to GO within 5 seconds after depressing RESET to avoid a major alarm indication.

7. Depress **RESET,** and set the **GO/HALT** switch to **GO.**

8. Set the **EMERGENCY TRANSFER** switch to **OFF.**

   Replacement of the circuit pack is complete.

9. Set the **GO/HALT** switch to **GO.**
   - If the system appears to be functioning normally, set the **EMERGENCY TRANSFER** stitch to **OFF.** Then, go to Step 10.
   - If the switch does not appear to be functioning normally, investigate other possible problem areas using Procedure 600, Procedure 612, and microdiagnostic testing.

10. Notify the customer that emergency transfer service will be interrupted.

11. Depress **RESET.**

    Replacement of the circuit pack is complete.

Duplicated Common-Control Carrier Circuit Pack Replacement

You must use the **GO/HALT** switch when you replace circuit packs in both the on-line and off-line sides of a duplicated common-control carrier. When you place the **GO/HALT** switch in the **HALT** position before you remove any circuit pack in the common-control carrier, you stop any interactions with memory when you remove or replace circuit packs.

CAUTION If you replace circuit pack TN406 (DCIU processor memory) in Slot 16 of the duplicated common-control carrier without using the **GO/HALT** switch, you will cause a partial reload

Perform the following steps at the alarm panel and at the common-control carrier when you replace circuit packs in a duplicated common-control carrier.

1. Determine if the circuit pack to be replaced is in the on-line or off-line side of the duplicated common-control.
   - If the circuit pack to be replaced is in the on-line side of the duplicated common-control, go to step 2.
   - If the circuit pack to be replaced is in the off-line side of the duplicated common-control, go to Step 8.
2. Use Procedure 613, Test 3 to soft switch the on-line common-control to the off-line side.
   - If the soft switch was successful, go to Step 8.
   - If the soft switch failed, indicated by a 1 displayed in Field 2 and a failure code of 95 displayed in Field 12 of procedure 613, Test 3 or special error code 80 (illegal switch attempt) appears on the DEFINITY™ Manager II, go to Step 3.
3. After the off-line common-control has reloaded (as a result of a switch failure), execute Procedure 613, Test 2.
4. Determine the health of the off-line processor displayed in Fields 6 through 8.
   - If the soft switch cannot be performed because the off-line common-control is unhealthy, replace circuit pack(s) in the on-line side using the steps for *Unduplicated Common-Control Carrier*

Circuit Pack Replacement above.

- If the off-line common-control is healthy, use the MODE display procedure to ensure that the remote ports and the run tape agent are not active.

5. Type MODE
6. Examine Fields 9 through 13 of the MODE display procedure to determine if encodes 0 through 4 are displayed.
   - If encode 0 is displayed, it should be the local Manager II's current port that you are using.
   - If encode 3 or 4 is displayed, determine from Fields 6 and 7 if the agent encode displayed is 10 (run tape).
7. If any encodes are displayed in Fields 9 through 13, obtain full release of all remote ports and the pseudo port performing a run tape by contacting the appropriate users.

   NOTE After the soft switch is completed and the necessary repair action is performed, notify the previous users that you have completed your task in order for them to perform their tasks.

   After obtaining full release of all remote ports, go to Step 8.
8. Set the **LOCK ON LINE** switch to the active (on-line) CC position — that is, **CC0** or **CC1.**
9. At the off-line common control, set the **GO/HALT** switch to **HALT.**
10. At the off-line common control, remove the circuit pack to be replaced.

    NOTE Before replacing circuit pack TN492, ensure that the battery (comcode 844665836) is connected to the back side of the circuit pack.

    a. Mark the date of the next battery replacement (month and year) on the date label that is attached to the battery.

       Determine the battery replacement date by adding five years to the date of installation of the TN492 circuit pack and associated battery. Example TN492 circuit pack replaced July 1989; date to be written on the label is July 1994.

    b. Affix the date label to the faceplate of the TN492 circuit pack.

       NOTE If the yellow LED is lighted after you replace the circuit pack, the battery is nut connected or wired correctly.

11. Verify that the option settings on the replacement circuit pack are correct (if applicable).
12. At the off-line common control, replace the circuit pack.
13. At the off-line common control, set the **GO/HALT** switch to **GO.**

14. Set the **LOCK ON LINE** switch to **OFF.**

    Replacement of the circuit pack is complete.

15. Use Procedure 613, Test 3 to soft switch the off-line common control to the on-line side (if required) for further testing to determine if replacing the circuit pack corrected the problem.

NOTE If you can perform further testing in the off-line common control, do not soft switch until the appropriate tests complete with a pass indication.

Module Control, TMS, or RMI Carrier Circuit Pack Replacement

Perform the following steps when you replace circuit packs in the module control, TMS, or RMI carrier.

1. Determine if the module control, RMI, or TMS carrier is duplicated.
   - If the module control, RMI, or TMS carrier is duplicated, go to Step 2.
   - If the module control RMI, or TMS carrier is unduplicated, go to Step 7.
2. Determine if the circuit pack to be replaced is in the on-line or off-line side of the module control, TMS, or RMI carrier.
   - If the circuit pack to be replaced is in the on-line side of the module control, TMS, or RMI carrier, go to Step 3.
   - If the circuit pack to be replaced is in the off-lime side of the module control, TMS, or RMI carrier, go to Step 6.
3. Use Procedure 621, Test 2 to soft switch the on-line module control or TMS to the off-line side.
   - If the soft switch cannot be performed, go to Step 4.
   - If the soft switch was successful, go to Step 6.
4. Use Procedure 621, Test 2 to soft lock the off-line module control or TMS off-line.
5. Repair the off-line module control or TMS using the information in section 6.8.1. Then go to Step 1.
6. Use Procedure 621, Test 2 to soft lock the of-line module control or TMS off-line.
7. Remove the circuit pack to be replaced.
8. Verify that the option settings on the replacement circuit pack are correct (if applicable).

CAUTION Do not toggle the DC/DC converter handle when you replace circuit packs in the traditional module control, TMS, or RMI carriers. If the 494GA power unit in Slot 00B of the traditional module-control carrier is reset (toggled), a loop-back condition in the fiber link of a duplicated TMS is forced. If that TMS was on line, it is forced off lie. Until the loop back is cleared, the newly forced off-line TMS is not available for backup in event of another failure.

9. Replace the circuit pack and test it using Procedure 620, Test 4.

Replacement of the circuit pack is complete.

10. If the carrier was duplicated use Procedure 621 to release the soft lock condition.
11. If the module control or TMS carrier is duplicated and a soft switch was performed, use Procedure 621, Test 2 to soft switch the off-line module control or TMS to the on-line side (if required) for further testing to determine if replacement of the circuit pack corrected the problem.

NOTE

If you can perform further testing in the off-line module control or TMS, do not soft switch until the appropriate tests complete with a pass indication.

Port or DS-1/MFAT Carrier Circuit Pack Replacement

When you replace circuit packs in a port or DS-1/MFAT carrier, busy out all circuits associated with the circuit pack to be replaced.

CAUTION

Busying out port circuits that are in use (indicated by a yellow LED on the circuit pack's edge) results in the connections being dropped.

- *Port Circuit Packs:* When you replace a port circuit pack (line or trunk), all circuits on the circuit pack should be idle, if possible, before removal.
- *PDI or PCI Circuit Packs:* When you replace a port data interface (PDI) or a port control interface (PCI) circuit pack, busy out all port circuits served by the PDI (left or right side of the port or DS-1/MFAT carrier) or PCI. When you busy out the circuits associated with a PDI, you prevent any interaction to the circuits if the PDI comes up in loop around. When you busy out the circuits associated with a PCI, you prevent the circuits from changing to unpredictable states when you remove or replace the PCI.
- *DS-1, PRI, RCL, or RCC Circuit Packs:* When you replace a DS-1. primary rate interface (PRI), remote carrier local (RCL), or remote carrier controller (RCC) circuit pack, busy out all 24 ports of the DS-1, PRI, RCL or RCC circuit pack.

Perform the following steps when you replace circuit packs in a port or DS-1/MFAT carrier.

Busy out all circuits associated with the port, PDI PCI, DS-1, PRI, RCL, or RCC circuit pack you are replacing before removing the circuit pack from the port or DS-1/MFAT carrier.

CAUTION

Busying out a circuit when the circuit is in use (lighted yellow LED on the circuit pack) results in the connection being dropped. Busying out a DS-1, PRI, RCL, or RCC circuit pack disrupts calls in progress on all 24 ports of the DS-1, PRI, RCL, or RCC circuit pack.

It should be noted that when you remove port circuit packs in a common port carrier, a port board insertion test is performed by maintenance software to busy out all translated circuits on the circuit pack removed. his is true even if you busy out or do not busy out the circuits on the common port circuit pack you want to remove.

NOTE It may take software a while to busy out all the translated circuits on the circuit pack. The circuit status may not be in a valid state.

When you replace the circuit pack that you removed in a common port carrier, all circuits busied out are released from busy by the port board insertion test software. If you want to keep a circuit *in* a busy state you *must* record the circuit that you wish to keep busy and then busy out the circuit again after the circuit pack is replaced.

If a circuit pack is removed and replaced quickly enough in a common port carrier, the port board insertion software may not be able to respond quickly enough to busy out, then release busy the circuits on the common port carrier circuit pack.

1. Use Procedure 635 Test 1 to busy out the circuits affected by the circuit pack to be replaced.
   a. To busy out port circuits, display the circuit or circuit pack in Procedure 635, Test 1 and type *bo* (busy out).
   b. Repeat the sequence until all circuits affected by the port circuit pack to be replaced are busied out.
      — Typing bo (busy out) for a PRI circuit pack does not mean that all the IDSN ports are busied out.

        Busy out of a PRI circuit pack takes a short period of time for the last few ISDN ports to be made busied at the far end.
      — Use Procedure 635 or Procedure 648 to ensure that all ISDN ports are busied out by checking the circuit status of the ISDN ports.

        The circuit status of the ISDN ports are independent of the busy-out status or the busy-out lamp indication on the Manager II.

CAUTION Removing a circuit pack when any circuit on the circuit pack is in use (indicated by a lighted yellow LED on the circuit pack's edge) drops connections.

2. Remove the circuit pack to be replaced.
3. Verify that the option settings on the replacement circuit pack are correct (if applicable).
4. Replace the circuit pack.

   After you have replaced the circuit pack, release the port circuits associated with the port, PDI, PCI, DS-1, PRI, RCL, or RCC circuit pack from busy out.- his may not be necessary if you replaced a circuit pack in a common port carrier.
5. Use Procedure 635, Test 1 to release from busy the circuits busied out in Step 1.
   a. To release from busy port circuits, display the circuit or circuit pack in Procedure 635, Test 1 and type *rb* (release busy).

Typing `rb` does *not* mean the trunks are available for use.

— If the far-end switch has the trunks in a maintenance busy state, the trunks return to a busy-out state at the far end, even though *rb* is typed at the local switch.

— You can use Procedure 635 or Procedure 648 to ensure that the trunks are released from busy by checking the circuit status of the ISDN trunks.

The circuit status of the ISDN trunks is independent of the busy-out status or the busy-out lamp indication on the Manager II.

b. Repeat the sequence until all circuits busied out in Step 1 are released from busy.

Unduplicated Common-Control DC/DC Converter Unit or Duplicated Common-Control Power Carrier Circuit Pack Replacement

Perform the following steps when you replace circuit packs in the unduplicated common-control DC/DC converter unit or duplicated common-control power carrier.

1. Set the circuit breaker associated with the circuit pack to be replaced to OFF.
2. Remove the circuit pack by releasing the lever and pulling outward.

   Do not pull out the circuit pack by using the lever.
3. Install the replacement circuit pack by sliding inward and then pushing the lever forward.
4. Set the circuit breaker associated with the circuit pack replaced to ON.

Remote Carrier Group Circuit Pack Replacement

There is no Manager II at the remote carrier group location to provide indications on the status of circuit packs being replaced.

Circuit packs in the remote carrier group are mounted horizontally. Remove the circuit packs just as you do the circuit packs in the network cabinets.

NOTE

If you replace circuit pack CAL1B, power down the remote carrier group housing unit. You should replace circuit pack CAL1B only in periods of low traffic, if possible.

Perform the following steps when you replace circuit packs in the remote carrier group.

CAUTION

Removing a circuit pack when any circuit on the circuit pack is in use (indicated by a lighted yellow LED on the circuit pack's edge) drops connections. The yellow LED on the general-purpose port (SN270 or SN271) circuit pack in the remote carrier group is not used by the system software.

1. Remove the circuit pack to be replaced.

2. Verify that the option settings on the replacement circuit pack are correct (if applicable).
3. Replace the circuit pack.

CIRCUIT PACK OPTION SETTINGS

Check the option settings on appropriate circuit packs before you replace circuit packs in any of the switch carriers to determine if the correct option setting is being used for the application required.

Option settings using rocker-type switches follow these conventions:

- D — Down (switch contacts are closed)
- U — Up (switch contacts are open)
- X — Don't care (switch contacts are not used and maybe set in either position).

NOTE

Switches are set down (closed) when the rocker end adjacent to the number is depressed and up (open) when the rocker end away from the number is depressed.

The following paragraphs list the circuit packs that have option settings in the switch carriers.

Common-Control Carrier Circuit Pack Option Settings

The following circuit packs in the common-control carrier have circuit pack option settings. Use the referenced figure to determine if the option setting is correct for the application being used.

- TN513 — Figure 9-1
- TN403 — Figure 9-2.

Traditional Module Control or RMI Carrier Circuit Pack Option Settings

The following circuit pack in the traditional module control or RMI carrier has option settings. Use the referenced figure to determine if the option setting is correct for the application being used.

- TN456 — Figure 9-3.

Common Port Carrier Circuit Pack Option Settings

The following circuit pack in the common port carrier has option settings. Use the referenced figure to determine if the option setting is correct for the application being used.

- TN760C — Figure 9-4.

Traditional Port Carrier, DS-1/MFAT Carrier, or Remote Carrier Group Circuit Pack Option Settings

The following circuit packs in the traditional port carrier, DS-1/MFAT carrier, or remote carrier group have circuit pack option settings. Use the referenced figure to determine if the option setting is correct for the application being used. Carrier positions 00 through 03, 05 through 08, 13 through 16, and 18 through 21 in the traditional port or DS-1/MFAT carriers are universal port positions that can accept any port circuit pack.

- ANN11B or ANNllC (DS-1/MFAT carrier only) — Figure 9-5
- ANN1lD or ANNllE —Figure 9-6
- ANN15 — Figure 9-7
- ANN16 (Remote Carrier Group) - Figure 9-8
- ANN35 — Figure 9-9
- CAL1B (Remote Carrier Group) — Figure 9-10
- SN224B — Figure 9-11
- SN228 and SN228B — Figure 9-12
- SN230 and SN230B — Figure 9-13
- SN231, Vintage 4 and earlier — Figure 9-14
- SN231, Vintage 5 and later — Figure 9-15
- SN232B — Figure 9-16
- SN233C — Figure 9-18
- SN238 — Figure 9-19
- SN243B — Figure 9-20
- SN253B — Figure 9-21
- SN270 — Figure 9-22

TN513 Option Settings

Two switch packages with seven switch sections allow configuration of the serial port hardware. Switch S1 is used to configure channel O USART and switch S2 is used to configure channel 1 USART.

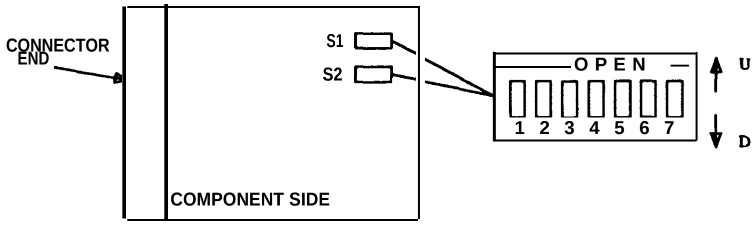


Figure 9-1. TN513 DCIU Test Support Option Settings

The following table indicates the S 1 and S2 switch section positions required for each option provided. U indicates that the rocker switch is depressed at the upper end and D indicates that the switch is depressed at the lower end.

TABLE 9-1. TN513 DCIU Test Support Option Settings

Function	Switch	Switch Section	Position
RX/TX Direct mode	l or 2	1,4	D
		2,3	U
RX/TX Null mode	l or 2	2,3	D
		1,4	U
Short CTS/RTS	l or 2	5	D
Short DTR/DSR	l or 2	6	D
Logically (and) CHO and CH1 USART interrupts	1	7	D
	2	7	U
Independent CH0 and CH1 US ART interrupts	1	7	U
	2	7	D
Disable CH1 USART Interrupts	1	7	U
	2	7	U

TN403 Option Settings

Switch S1 controls the data transmission rate for circuit pack channels 14 and 15.

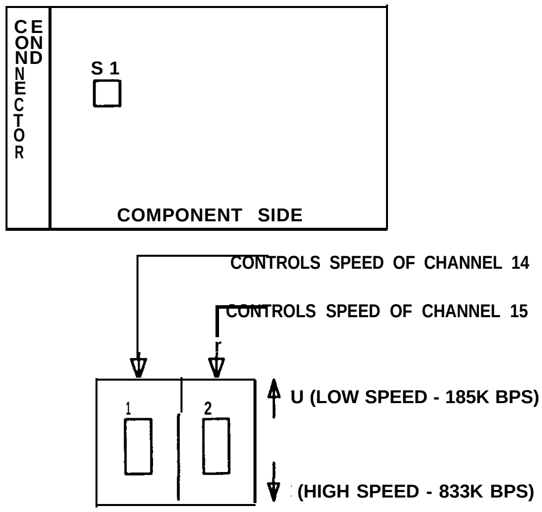


Figure 9-2. TN403 Dual-Speed Data Channel Option Settings

The following table indicates the switch positions required for low and high speed options. U indicates that the rocker switch is depressed at the upper end and D indicates that the rocker switch is depressed at the lower end.

TABLE 9-2. TN403 Dual-Speed Data Channel Option Settings

Carrier slot Numbers	Channel Numbers	TN403 Channel Number	Switch Section	Switch Position
23	00-15	15	2	D
		14	1	D
24	16-31	15	2	U
		14	1	U
25	32-47	15	2	U
		14	1	U
26	46-63	15	2	U
		14	1	U
Channels 0-13 are not speed optionable. They only operate at low speed (185 Kbps).				

TN456 Option Settings

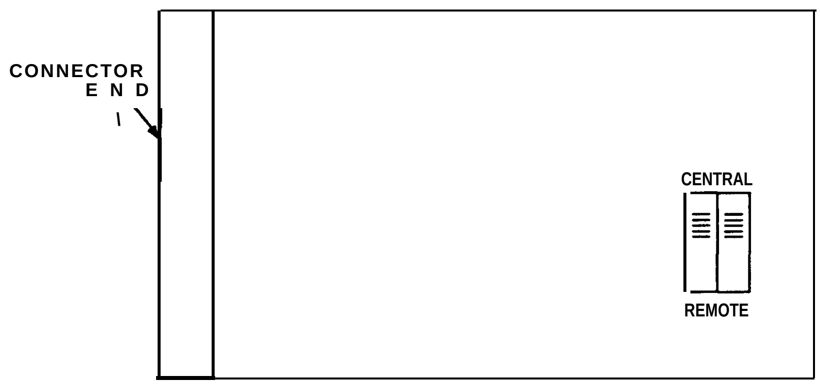


Figure 9-3. TN456 Remote Module Interface Option Settings

The switch position on TN456 depends on the option required. For central location operation (common-control complex end of the link), set both switches in the up position. For remote location operation (module at the far end of the link from the common-control complex), set both switches in the down position.

TN760C Option Settings

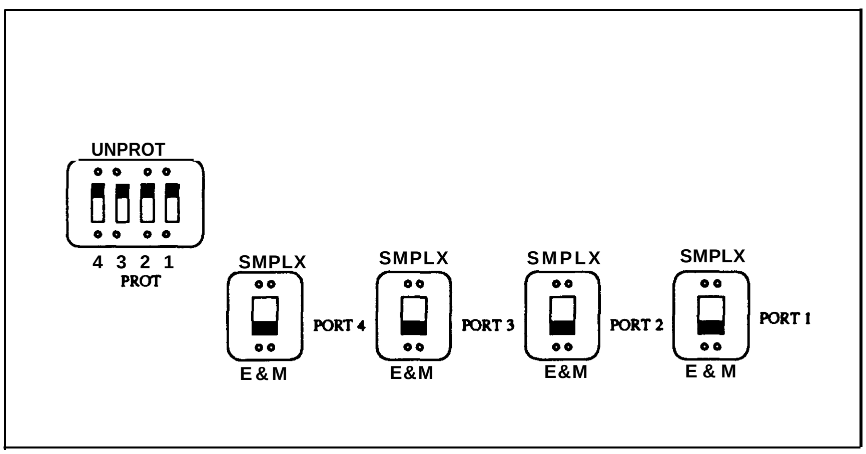


Figure 9-4. TN760C Tie Trunk Option Settings

TABLE 9-3. TN760C Tie Trunk Option Settings

DEFINITY Generic 2 Installation Situation		Preferred Signaling Format		Set E&M/SMPLX Option Switch	Set Protected/ Unprotected Option Switch
Circumstance	**To**	**Generic 2**	**Far-End**		
Colocated	Generic 2	Simplex Type V	Simplex Type V	SMPLX	Either
Interbuilding	Generic 2	Simplex Type V	Simplex Type V	SMPLX	Either
Colocated	Generic 1	Simplex Type V	Simplex Type V	SMPLX	Either
Interbuilding	Generic 1	Simplex Type V	Simplex Type V	SMPLX	Either
Colocated	DIMENSION	E&M Type 1 compatible	E&M Type 1 standard	E&M	Unprotected
Interbuilding	DIMENSION	Protected. Type 1 compatible	Protected. Type 1 standard	E&M	Protected
Colocated	Other	E&M Type 1 compatible	E&M Type l standard	E&M	Unprotected
Interbuilding	Other	Protected. Type 1 compatible	Protected. Type 1 standard plus protection unit	E&M	Protected

ANN11B and ANN11C Option Settings

One switch package (S 1) containing three rocker switch sections is positioned on the circuit pack as shown in the following diagram.

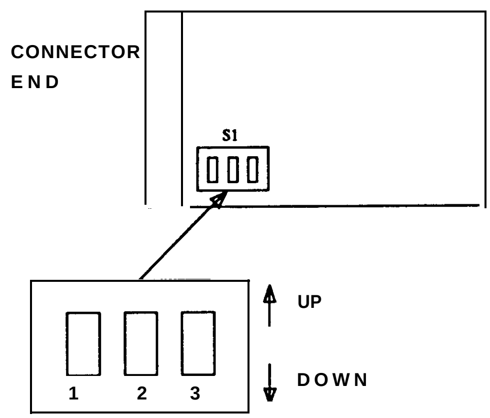


Figure 9-5. ANN11B and ANN11C DS-1 Interface Option Settings

To select one of five transmit equalizer settings, set the switch sections as shown in the following table. In the table, U indicates that the switch is fully depressed at the upper end and D indicates that the switch is fully depressed at the lower end.

TABLE 9-4. ANNllB and ANNllC DS-1 Interface Option Settings

Distance to Specified Point	Switch Section		
	1	2	3
0 to 133 feet	D	D	U
133 to 266 feet	D	U	D
266 to 399 feet	D	U	U
399 to 533 feet	U	D	D
533 to 655 feet	U	D	U

The equalizer setting required is based on the distance along the 606 type cable connection from the Generic 2 DS-1 connector to a specified point. The equalizers provide preconditioning of the transmit signal so that the DS-1 pulse shape falls within defined boundaries at a common specified point.

ANN11D and ANN11E Option Settings

One switch package (S 1) containing three rocker switch sections is positioned on the circuit pack as shown in the following diagram.

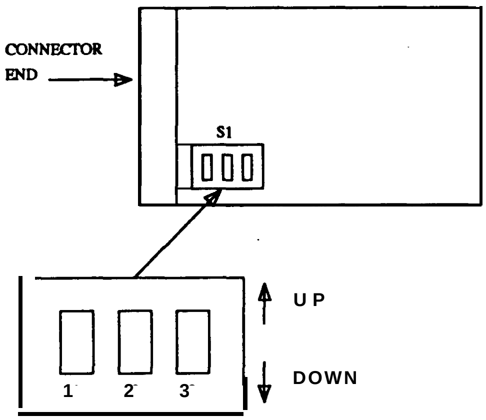


Figure 9-6. ANN11D and ANN11E DS-1 Interface Option Settings

To select one of five transmit equalizer settings, set the switch sections as shown in the following table. In the table, U indicates that the switch is fully depressed at the upper end and D indicates that the switch is fully depressed at the lower end.

TABLE 9-5. ANN11D and ANNl lE DS-1 Interface Option Settings

Distance to Specified Point	Switch Section		
	1	2	3
0 to 133 feet	D	D	u
133to266feet	D	U	D
266to399feet	D	U	U
399to533feet	U	D	D
533to655feet	U	D	U

The equalizer setting required is based on the distance along the 606 type cable connection from the Generic 2 DS-1 connector to a specified point. The equalizers provide preconditioning of the transmit signal so that the DS-1 pulse shape falls within defined boundaries at a common specified point.

ANN15 Option Settings

One switch package (S 1) containing three rocker switch sections is positioned on the circuit pack as shown in the following diagram.

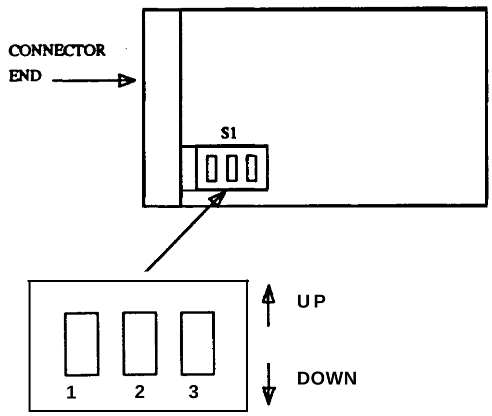


Figure 9-7. ANN15 Remote Carrier Local (RCL) Option Settings

To select one of five transmit equalizer settings, set the switch sections as shown in the following table. In the table, U indicates that the switch is fully depressed at the upper end and D indicates that the switch is

TABLE 9-6. ANN15 Remote Carrier Local (RCL) Option Settings

Distance to Specified Point	Switch Section		
	1	2	3
0 to 133 feet	D	D	U
133 to 266 feet	D	U	D
266to399feet	D	U	D
399to533feet	U	D	D
533 to 655 feet	U	D	U

The equalizer setting required is based on the distance along the 606 type cable connection from the Generic 2 DS-1 connector to a specified point. The equalizers provide preconditioning of the transmit signal so that the DS-1 pulse shape falls within defined boundaries at a common specified point.

ANN16 Option Settings

One switch package (S 1) containing three rocker switch sections is positioned on the circuit pack as shown in the following diagram.

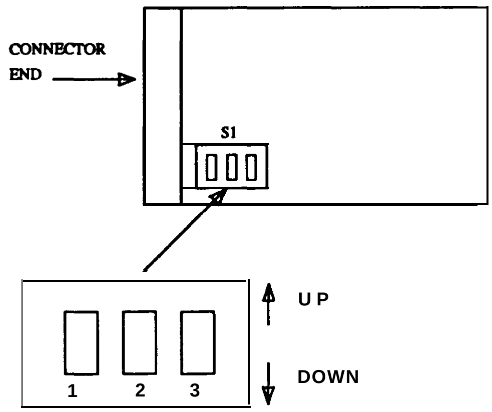


Figure 9-8. ANN16 Remote Carrier Controller (RCL) Option Settings

Set the switch sections based on the length of the DS-1 cable between the cabinet and the DSX-1 cross-connect point using the following table. In the table, U indicates that the switch is fully depressed at the upper end and D indicates that the switch is fully depressed at the lower end.

TABLE 9-7. ANN16 Remote Carrier Controller (RCL) Option Settings

Cable Length	**Switch Section**		
	1	**2**	**3**
0 to 133 feet	D	D	U
133 to 266 feet	D	U	D
266 to 399 feet	D	U	U
399 to 533 feet	U	D	D
533 to 655 feet	U	D	U

The DSX-1 cross-connect point is normally at the inputs to a CSU, CDM, or CEM interface facility.

ANN35 Option Settings

One switch package (S 1) containing three rocker switch sections is positioned on the circuit pack as shown in the following diagram.

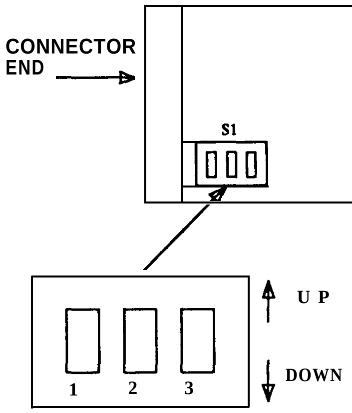


Figure 9-9. ANN35 ISDN Primary Rate Port Option Settings

To select one of five transmit equalizer settings, set the switch sections as shown in the following table. In the table, U indicates that the switch is fully depressed at the upper end and D indicates that the switch is fully depressed at the lower end.

TABLE 9-8. ANN35 ISDN Primary Rate Port Option Settings

Distance to Specified Point	Switch Section		
	1	2	3
0 to 133 feet	D	D	U
133 to 266 feet	D	U	D
266 to 399 feet	D	U	U
399 to 533 feet	U	D	D
533 to 655 feet	U	D	U

The equalizer setting required is based on the distance along the 606 type cable connection from the Generic 2 primary rate port connector to a specified point. The equalizers provide preconditioning of the transmit signal so that the primary rate port pulse shape falls within defined boundaries at a common specified point.

CAL1B Option Settings

One switch package (S 1) containing eight rocker switch sections is positioned on the circuit pack as shown in the following diagram.

A switch section is closed when the rocker arm is depressed toward the switch section pole number. As shown, switch sections 2 and 8 are closed.

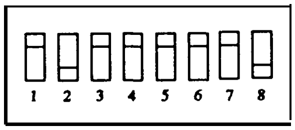


Figure 9-10. CAL1B Frequency Generator/Alarm Option Settings

Set the switch sections based on the type of power unit using the following table.

TABLE 9-9. CAL1B Frequency Generator/Alarm Option Settings

Power Unit	Switch Sections							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
OLS or OBS	o	1	0	0	0	0	0	1
DC Converter	o	1	0	0	0	1	1	0

0 indicates that switch section open.
1 indicates that switch section closed.

SN224B Option Settings

A single shorting plug is provided to adapt the port circuits to interface with either multifunction electronic telephone (MFET) or multibutton electronic telephone (MET) terminals. All four ports are altered by the single plug. For MET terminals, the shorting plug is placed over terminals El and E2. For MFET terminals, the shorting plug is placed over terminal El only.

SN224B Fuses

The -48V power supplied to station apparatus from each of the four ports on this circuit pack is fused at each port- The fuses, coded 70H(0.75 AMP), are located on the circuit pack as shown in the following diagram.

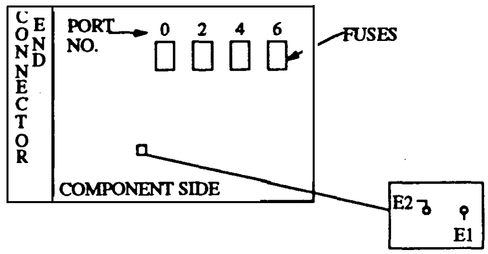


Figure 9-11. SN224B MFET Line Port Option Settings and Fuses

When maintenance procedures indicate that a fuse may need replacement, all ports on the circuit pack should be made maintenance busy before the circuit pack is removed from the carrier. Procedure 635 can be used to make the ports maintenance busy.

SN228 and SN228B Option Settings

Eight switch packages, S1-S8, each containing two rocker switch sections, are positioned on the circuit pack as shown in the following diagram. Each switch package serves one of the eight port circuits provided on the circuit pack. A single switch package is also shown to identify the two switch sections (1, 2) in the package.

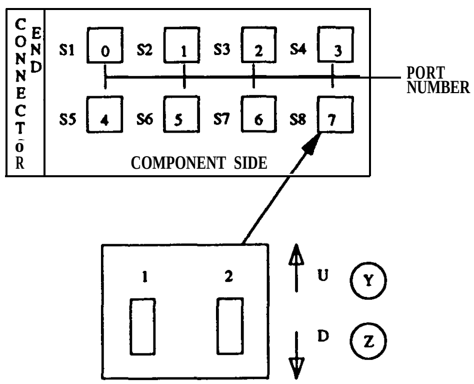


Figure 9-12. SN228 and SN228B Off-Premises Station (OPS) Option Settings

When SN228B is optioned for RC network, the message waiting feature may result in a flashing YELLOW LED on the SN228B when message waiting is applied.

To select the required option for a port circuit, refer to the following table. First, identify the switch package (S1-S8) associated with the port circuit. Then, set the switch section for that port as shown in the table. U indicates that the switch section is fully depressed at the upper end and D indicates that the switch section is fully depressed at the lower end.

TABLE 9-10. SN228 and SN228B Off-Premises Station (OPS) Option Settings

Option	Description	Switch Section	
		1	2
z	Low codec gain	D	x
Y	High codec gain	u	x
z	600 ohms	x	D
Y	RC network	x	u

Use 600-ohm and low-gain options when the loop length is less than 3500 feet. Use RC-network and high-gain options when the loop length is greater than 3500 feet.

SN230 and SN230B Option Settings

Four switch packages, each containing four rocker switch sections, are positioned on the circuit pack as shown in the following diagram. Each switch package is assigned to a single port circuit as identified in the diagram. A single switch package is also shown to identify the two switch sections (1,2) in the package.

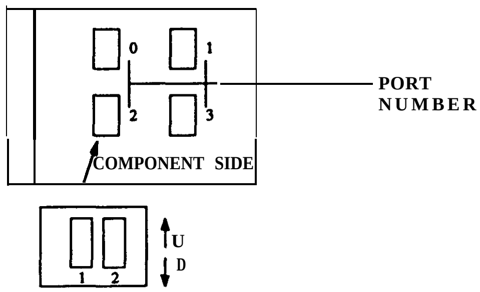


Figure 9-13. SN230 and SN230B Central Office (CO) Trunk Option Settings

To select the required transmission option for a port circuit, identify the associated switch package from the circuit pack diagram. Then set the switch sections for that port as shown in the table.

In the table, U indicates that the switch is fully depressed at the upper end, and D indicates that the switch is fully depressed at the lower end. Note that switch section 2 is not used, as indicated by X, and the position of this switch has no effect on circuit operation.

Use the 600-ohm option when the loop length is less than 3500 feet. Use the RC-Network option for a loop length greater than 3500 feet.

TABLE 9-11. SN230 and SN230B Central Office (CO) Trunk Option Settings

Option	Transmission	Switch Section	
		1	2
w	RC Balance network	u	x
x	600 ohms	D	x

SN231 (Vintage 4 Circuit Packs and Earlier) Option Settings

Four switch packages, each containing four rocker switch sections, are positioned on the circuit pack and assigned to a single port circuit as identified in the following diagram. A single switch package is also shown to identify the four switch sections in the package.

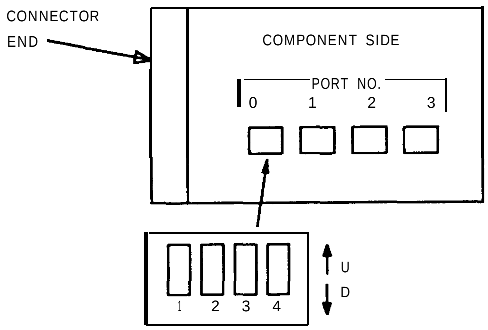


Figure 9-14. SN231 Auxiliary Trunk Option Settings (Vintage 4 Circuit Packs and Earlier)

To select the required transmission option for a port circuit, identify the associated switch package from the circuit pack diagram. Set the switch sections for that port as shown in the following table.

TABLE 9-12. SN231 Auxiliary Trunk Option Settings (Vintage 4 Circuit Packs and Earlier)

Option	Transmission	Switch Section			
		1	2	3	4
S	One-way incoming	X	D	U	X
R	One-way outgoing	X	U	D	X
Q	Two-way	X	D	D	X
ZA	Two-wire signaling	D	X	X	X
ZB	Four-wire signaling	U	X	X	X

In the table U indicates that the switch is fully depressed at the upper end, and D indicates that the switch is fully depressed at the lower end. X indicates that the position of these sections has no effect on circuit operation.

SN231 (Vintage 5 Circuit Packs and Later) Option Settings

Four switch packages, each containing four rocker switch sections, are positioned on the circuit pack and assigned to a single port circuit as identified in the following diagram. A single switch package is also shown to identify the three switch sections in the package.

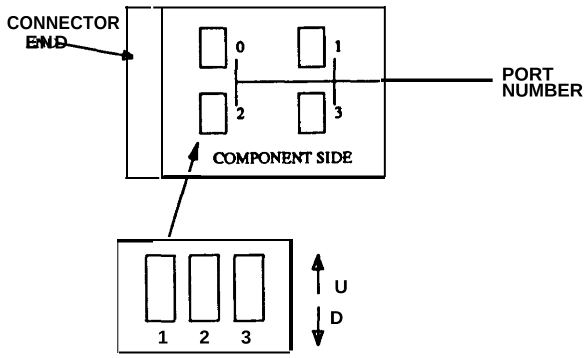


Figure 9-15. SN231 Auxiliary Trunk Option Settings (Vintage 5 Circuit Packs and Later)

To select the required transmission option for a port circuit, identify the associated switch package from the circuit pack diagram. Set the switch sections for that port as shown in the following table.

TABLE 9-13. SN231 Auxiliary Trunk Option Settings (Vintage 5 Circuit Packs and Later)

		Switch Section		
Option	**Transmission**	1	2	3
S	One-way incoming	X	D	U
R	One-way outgoing	X	U	D
Q	Two-way	X	D	D
Z/A	Two-wire signaling	**D**	X	X
Z/B	Four-wire signaling	U	X	X

In the table, U indicates that the switch is fully depressed at the upper end, and D indicates that the switch is fully depressed at the lower end. X indicates that the position of these sections has no effect on circuit operation.

SN232B Option Settings

Two switch packages, S 1 and S2, each containing two rocker switch sections, are positional on the circuit pack as shown in the following diagram. Each switch package serves two port circuits.

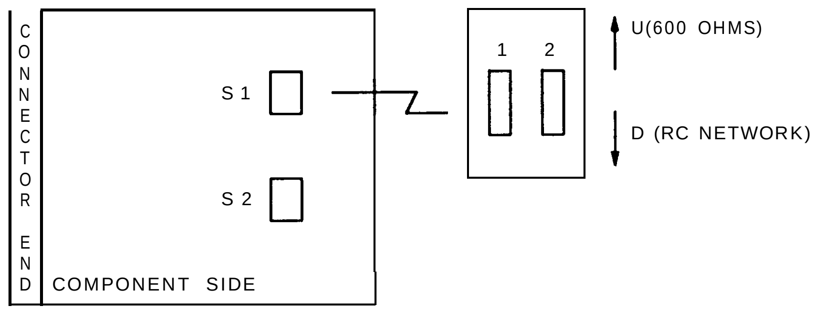


Figure 9-16. SN232B Direct Inward Dialing (DID) Trunk Option Settings

The following table indicates the switch package and section associated with each port circuit. A switch section is fully depressed at the upper end (U) to provide the 600-ohm option and fully depressed at the lower end (D) for the RC-Network option.

TABLE 9-14. SN232B Direct Inward Dialing (DID) Trunk Option Settings

Port	Switch	Section
0	S1	1
1		2
2	S2	1
3		2

Use the 600-ohm option when the loop length is less than 3500 feet. Use the RC-Network option for a loop length greater than 3500 feet.

SN233C Option Settings

SN233C *Jack Functions:* Access to both transmit and receive transmission channels and to the E and M signaling leads for each port is provided by jacks on the front of the circuit pack. The jack assignment is shown below. Plug insertion half way into the transmit or receive channel jack allows monitoring of the signals. Full insertion of the jack accesses the local end and opens the channel toward the distant end. Plug insertion into the signaling lead jack allows monitoring of the E and M leads. The E and M leads cannot be opened by use of this jack.

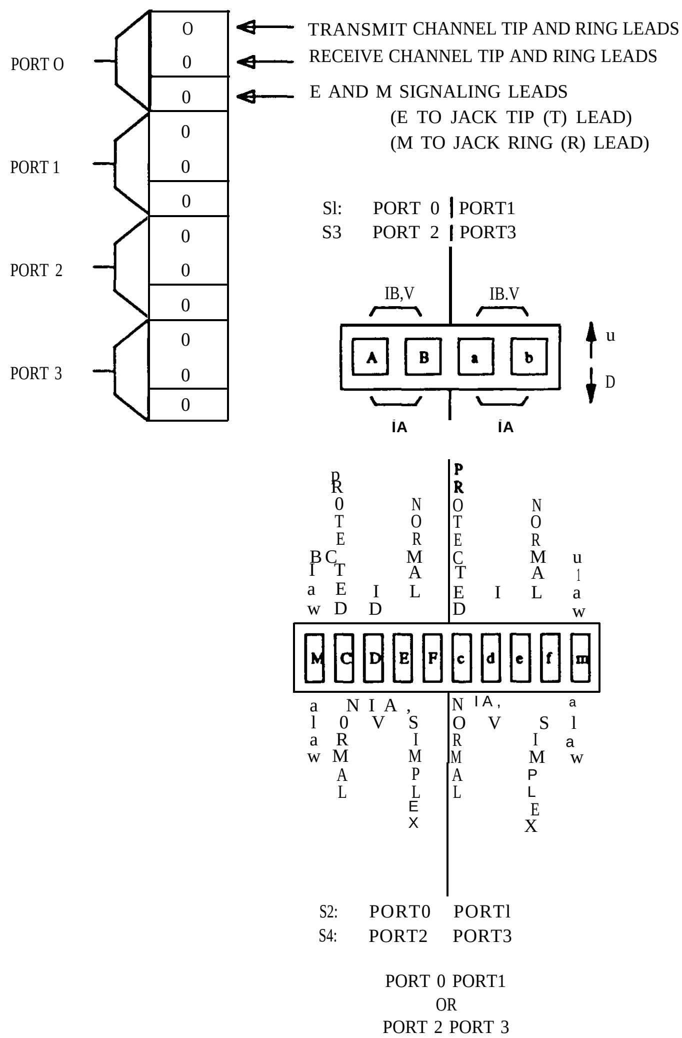


Figure 9-17. SN233C Tie Trunk/Attendant Interface Jack Functions

Switch Assignment: The type of signaling used on the port is set by the option switches described below. Four switch circuit packages, S 1 through S4, are located as shown on the pack diagram. S 1 contains four rocker switch sections that are shared between Port O and Port 1. S3 contains four rocker switch sections that are shared between Port 2 and Port 3. S2 contains ten rocker switch sections that are shared between Port O and Port 1. S4 contains ten rocker switch sections that are shared between Port 2 and Port 3. The switch settings determine the type and method of signaling used for the port and the codec conversion mode. The table below shows the switch settings for the various signaling types for any port.

TABLE 9-15. SN233C Tie Trunk/Attendant Interface Option Settings

Switch Section	A a	B b	C c	D d	E e	F f
Standard E&M type IA	D	D	D	D	u	u
IB	u	u	D	u	u	u
V	u	u	D	D	u	u
Protected type IA	D	D	u	D	u	U
(Note 1) IB	u	u	u	u	u	u
V	u	u	u	D	u	u
Simplex type IA	D	D	u	D	D	D
IB	u	u	u	u	D	D
V	u	u	u	D	D	D

Capital letters A through F = Port O and Port 2
Small letters a through f = Port 1 and Port 3
Set Switch M for appropriate conversion mode:
µlaw (Domestic)= U
alaw (International)= D
NOTE: Some international countries use µlaw.

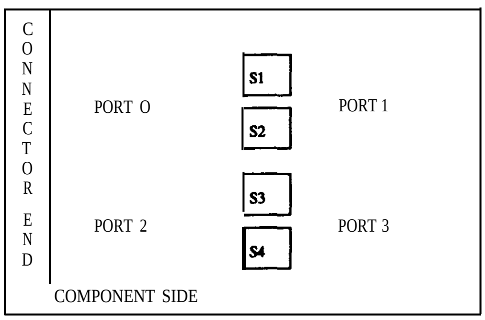


Figure 9-18. SN233C Tie Trunk/Attendant Interface Option Settings

SN238 Option Settings

Two switch packages, S1 and S2, containing eight switch sections are positioned on the circuit pack as shown in the following diagram. Switch S 1 is used to select odd or even parity, enable or disable parity, and to select a baud (data) rate. Switch S2 is used to enable or disable auto baud and auto parity for ports 0-3. S2 is also used to enable or disable keyboard dialing for Ports 0-3.

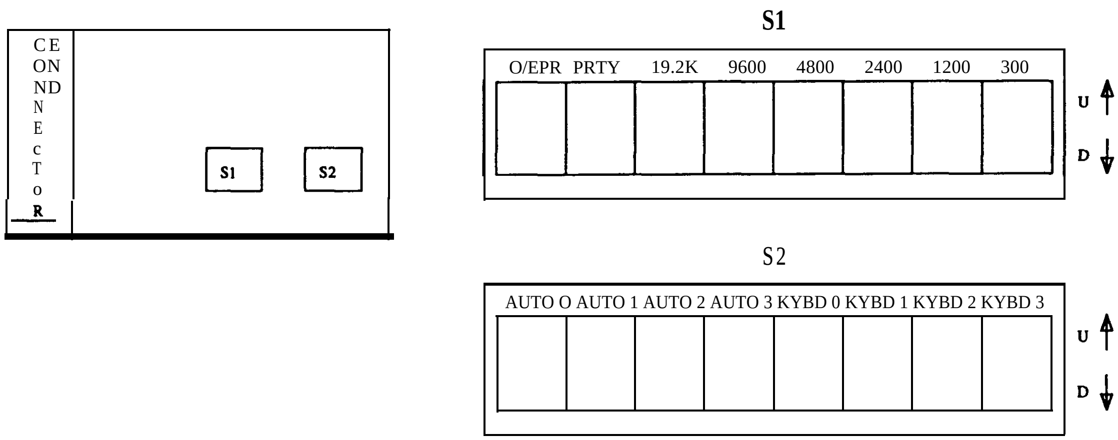


Figure 9-19. SN238 EIA Interface Option Settings

S1 Option Setting

If more than one baud rate is selected, the port board determines the highest common baud rate with the distant end. When a call is disconnected or not initiated, the port board follows the highest baud rate selected on S 1.

TABLE 9-16. SN238 EIA Interface S Option Settings

Switch	Setting	Function
O/EPR	D	Odd parity
	U	Even parity
PRTY	D	Parity enabled
	U	Parity disabled
19.2K	D	19.2K baud
	U	Switch disabled
9600	D	9600 baud
	U	Switch disabled
4800	D	4800 baud
	U	Switch disabled
2400	D	2400 baud
	U	Switch disabled
1200	D	1200 baud
	U	Switch disabled
300	D	300 baud
	U	Switch disabled

S2 Option Settings

TABLE 9-17. SN238 EIA Interface S2 Option Settings

Switch	Setting	Function
AUTO O	D	Enables auto baud and auto parity for Port O
	U	Disables auto baud and auto parity for Port 0
AUTO 1	D	Enables auto baud and auto parity for Port 1
	U	Disables auto baud and auto parity for Port 1
AUTO 2	D	Enables auto baud and auto parity for Port 2
	U	Disables auto baud and auto parity for Port 2
AUTO 3	D	Enables auto baud and auto parity for Port 3
	U	Disables auto baud and auto parity for Port 3
KYBD 0	D	Enables keyboard dialing for Port O
	U	Disables keyboard dialing for Port O
KYBD 1	D	Enables keyboard dialing for Port 1
	U	Disables keyboard dialing for Port 1
KYBD 2	D	Enables keyboard dialing for Port 2
	U	Disables keyboard dialing for Port 2
KYBD 3	D	Enables keyboard dialing for Port 3
	U	Disables keyboard dialing for Port 3
NOTE: If auto baud and auto parity are enabled with S2, the option settings on S 1 are ignored. If auto baud and auto parity are enabled for a port, keyboard dialing for the same port must be enabled.		

SN243B Option Settings

Two switch packages, S 1 and S2, each containing two rocker switch sections, are located on the circuit pack as shown below. Each switch package seines two port circuits.

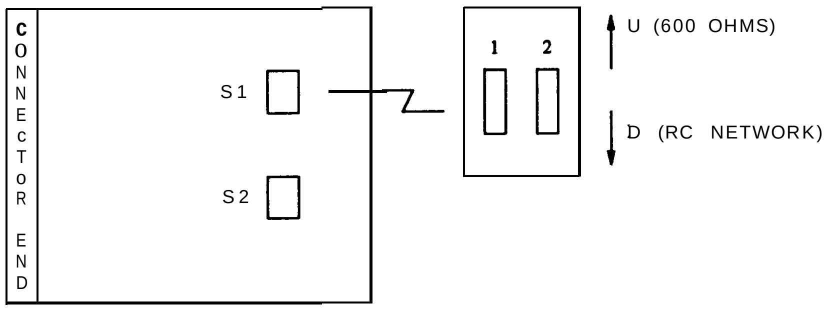


Figure 9-20. SN243B Data Port Option Settings

The following table indicates the switch package and section associated with each port circuit- A switch section is fully depressed at the upper end (U) to provide the 600-ohm option and fully depressed at the lower end (D) to provide the RC-network option.

TABLE 9-18. SN243B Data Port Option Settings

Port	Switch	Section
0	S1	1
1		2
2	S2	1
3		2

Use the 600-ohm option when the loop length is less than 3500 feet. Use the RC-network option for a loop length greater than 3500 feet.

SN253B Option Settings

A switch package containing two rocker switch sections is located on the circuit pack in the upper left comer (component side, connector to the left) and shown in the diagram below.

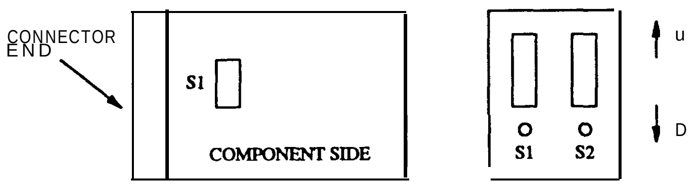


Figure 9-21. SN253B Auxiliary Tones Option Settings

The following table indicates the switch section positions required for each option provided. In the table, U indicates that the rocker switch is depressed at the upper end and D indicates that the rocker switch is depressed at the lower end.

TABLE 9-19. SN253B Auxiliary Tones Option Settings

Function		Option	Switch	
			S1	S2
Internal system chime only (0.5 sec period)		K	U	U
External chime period (sec)*	0.50	J	D	U
	1.00	G	U	D
	2.00	F	D	D

• Internal chime also operates at the same rate chosen for the external chime.

SN270 Fuses

The -48V power supplied to station apparatus from each of the four ports on this circuit pack is fused at each port. The fuses, coded 70G (0.5A), are located on the circuit pack as shown in the following diagram.

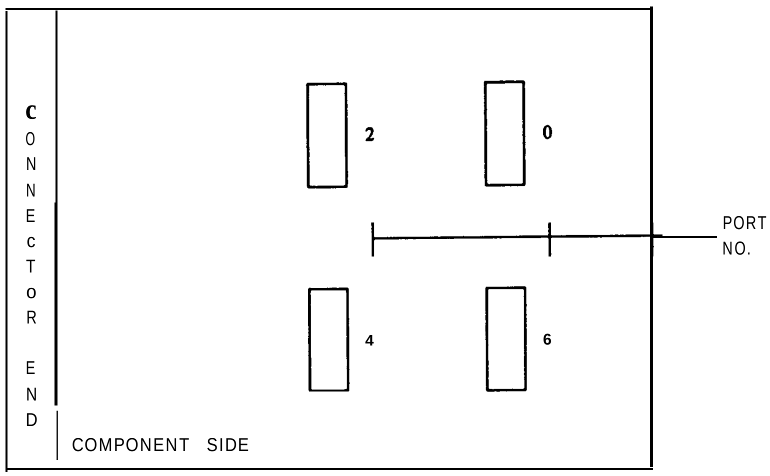


Figure 9-22. SN270 General-Purpose Port (GPP) Fuses

When maintenance procedures indicate that a fuse may need replacement, all ports on the circuit pack should be made maintenance busy before the circuit pack is removed from the carrier. Procedure 635 can be used to make the ports maintenance busy.

All Cabinets Alarm Board (AEH4) Option Settings

Alarm board AEH4, located behind the fan assembly in each traditional cabinet, can affect the alarm strategy. Use Figure 9-23, *Alarm Board AEH4 Option Settings,* to determine if the option setting is correct for the application being used.

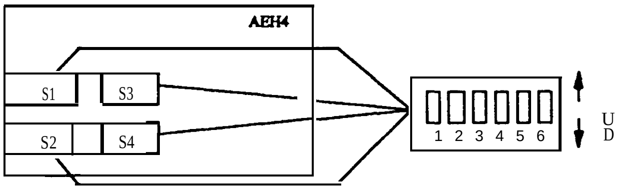


Figure 9-23. Alarm Board AEH4 Option Settings

Four switch packages with six switch sections allow configuration of the alarm board The following table indicates the four switch packages positions required for each option provided U indicates that the rocker switch is depressed at the upper end and D indicates that the rocker switch is depressed at the lower end.

TABLE 9-20. Alarm Board AEH4 Option Settings

	Air Flow			Over Temp			Hold Over						Rectifier						DC Fan Fuses					
AEH4 Located in This Type of Cabinet	**Switch S1 Section**						**Switch S2 Section**						**Switch S3 Section**						**Section**					
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
Unduplicated common control (501 CC) (contains port circuits)	U	D	D	U	U	D	D	U	U	U	U	U	U	U	U	U	U	U	D	D	U	U	U	D
Duplicated common control (501 CC) (does not contain port circuits)	U	D	D	U	U	D	D	U	U	U	U	D	U	U	U	D	D	U	U	U	U	D	U	D
Module control with 309A/310A unduplicated 501CC system	D	U	U	D	D	U	U	D	D	D	D	U	U	U	U	U	U	U	U	U	U	U	D	U
Module control with 309A/310A duplicated 501CC system	D	U	U	D	D	U	U	D	D	D	D	U	U	U	D	U	U	D	D	D	U	U	D	U
Port cabinet with 309A/310A	D	U	U	D	D	U	U	D	D	D	D	U	U	U	D	U	U	D	D	D	U	U	D	U
Port cabinet without 309A/310A	D	U	U	D	D	U	U	D	U	U	U	U	U	U	U	U	U	U	U	U	U	U	D	U
Unduplicated TMS for up to 31 modules	D	U	U	D	D	U	U	D	D	D	D	D	D	D	D	U	U	D	D	D	D	U	D	U
Duplicated TMS - one cabinet for up to 15 modules	D	U	U	D	D	U	U	D	D	D	D	D	D	D	D	U	U	D	D	D	D	U	D	U
Duplicated TMS - two cabinets for 16-3 I modules	D	U	U	D	D	U	U	D	D	D	D	D	D	D	D	U	U	D	D	D	D	U	D	U
Auxiliary cabinet with DC fan assembly	U	D	D	U	U	D	D	U	U	U	U	U	U	U	U	U	U	U	U	U	D	U	D	D
Duplicated Module control cabinet with two bulk OLS power supplies	D	U	U	D	D	U	U	D	D	D	D	D	U	U	U	U	U	D	U	D	U	D	D	D

DISK TAPE SYSTEM (DTS)

The disk tape system drives a tape cartridge that contains a copy of the programs, parameters, translations, and maintenance software used by the switch common control. The disk tape system reloads the switch memory when power to the switch is interrupted or when memory is lost for other reasons.

Cleaning the DTS Tape Head

Perform the following steps to clean the DTS tape head.

1. Remove the tape cartridge.
2. Dock the head assembly to gain access to the read/write head for cleaning by doing the following:
    a. Press inward on the tape carriage plate (black in color) where the cartridge is normally inserted.
    b. Stop pushing when the travel is restricted and the latching mechanism releases. The carriage plate automatically slides out approximately 3/8 inches.

    At this point, the head is docked.
3. Clean the DTS tape head using a lint-free polyurethane swab soaked with head cleaning solution or freon TF. Be sure that you clean the tape cleaner blades on each side of the head as well.
4. Return the head to the load-tape position by pushing the carriage plate inward until its motion is restricted from any further travel.
5. Insert the tape cartridge.

Cleaning the DTS Capstan

Clean the capstan by using a cotton swab soaked with water only.

CAUTION

Never clean the capstan with the head-cleaning solution, alcohol, or freon TF because severe damage to the capstan may result.

Perform the following steps to clean the DTS capstan.

1. Remove the tape cartridge.
2. Wipe the wet cotton swab around the entire circumference of the capstan until the debris is removed from the capstan.
3. Allow the capstan to dry completely before inserting a tape cartridge.
4. Insert the tape cartridge.

DTS Replacement

To replace the DTS, perform the following removal and installation steps. (See Figure 9-24, *Disk Tape System.)*

Removal steps:

1. At the common-control carrier, set the DTSU/HCMR circuit breaker (CB3) to the off position.
2. Determine the mounting position of the DTS in the cabinet.
   - If the DTS is mounted on a shelf, remove the front mounting screw from the mounting bracket that secures the DTS to the cabinet.
   - If the DTS is mounted on the base of the cabinet, remove the two screws on the front bracket that secures the DTS to the cabinet.
3. At the rear of the DTS, remove the SCSI cable, alarm cable, ADU cable, power cable, and the ground strap if it is installed.
4. At the front of the DTS, remove the ADU connector if it is installed.
5. Remove the DTS from the front of the cabinet by sliding it forward.

Installation steps:

1. Slide the replacement DTS in the cabinet, making sure that the DTS aligns up with the two pins on the rear bracket of the cabinet.
2. Secure the DTS to the cabinet mounting bracket using the screws (one or two removed in Step 2 of the removal steps).
3. At the front of the DTS, replace the ADU connector if it was removed.
4. At the rear of the DTS, replace the SCSI cable, alarm cable, ADU cable, power cable, and the ground strap if it was removed.
5. At the common-control carrier, set the DTSU/HCMR circuit breaker (CB3) to the on position.

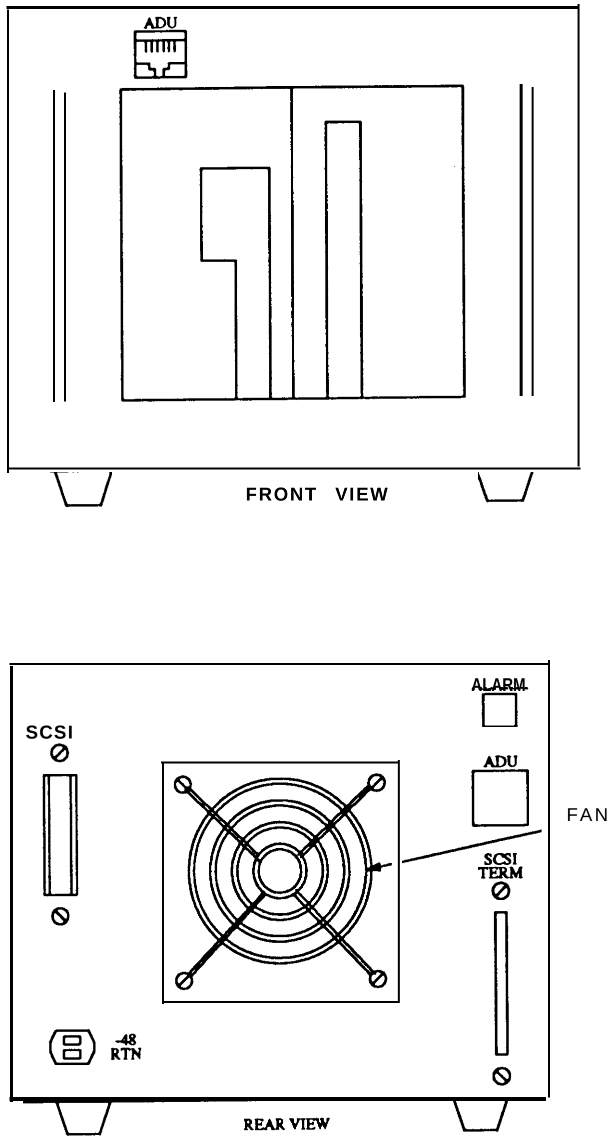


Figure 9-24. Disk Tape System (DTS)

309A OR 310A POWER SUPPLY REPLACEMENT

To replace the 309A or 310A power supply, perform the following steps.

1. Set the circuit breaker on/off switch on the 309A power supply to **OFF.**
2. Wait one minute and set the BATT switch on the 310A power supply to **OFF.**
3. Remove the AC input power to the power supply.
4. Tag and disconnect the cables from the power supply.
5. Remove the mounting screws securing the power supply to the cabinet.

DANGER

Use an adequate lifting device to support and lift the power supply to prevent personnel injury.

6. Remove the power supply from the cabinet.
7. Set the switches on the replacement power supply to **OFF.**
8. Install the replacement power supply in the cabinet.
9. Secure the power supply to the cabinet using the mounting screws.
10. Connect the cables to the replacement power supply.
11. Apply AC input power to the replacement power supply.
12. Set the BATT switch on the 310A power supply to **ON.**
13. Set the circuit breaker on/off switch on the 309A power supply to **ON.**

After replacing the 309A or 310A power supply, perform voltage tests on the 310A power supply as appropriate.

631DAI AND 631DB1 POWER SUPPLIES

To replace the 631DA1 and 63lDB1 power supplies, perform the following removal and installation steps.

Removal steps:

1. Remove the AC power cord from the front of the unit.
2. Delay removing the power supply until the LEDs are dim.
3. Slide the power supply out of the carrier.

Installation steps:

1. Slide the replacement power supply into the carrier.
2. Carefully seat the backplane pins in the supply connector using the lever at the front of the unit.

3. Connect the AC power cord at the front of the power unit.

644A1 and 645B1 POWER SUPPLIES

To replace the 644A1 and 645B1 power supplies, perform the following removal and installation steps.

1. Set the power supply on/off switch to **OFF.**
2. Remove the input power cord from the front of the unit.
3. Slide the power supply out of the carrier.

Installation steps:

1. Slide the replacement power supply into the carrier.
2. Carefully seat the backplane pins in the supply connector using the lever at the front of the unit.
3. Connect the input power cord at the front of the power unit.
4. Set the power supply on/off switch to **ON.**

397B BATTERY CHARGER REPLACEMENT

To replace the 397B battery charger, perform the following removal and installation steps.

CAUTION

Ensure that the batteries are plugged in and that the correct polarity is observed before performing the following removal and installation steps. Do not turn on the 397B battery charger until you ensure that the batteries are plugged in and the correct polarity is observed.

Removal steps:

1. Set the 397B battery charger on/off switch to **OFF.**
2. Remove the AC power cord from the front of the unit.
3. Remove the screw securing the bracket to the 397B battery charger.
4. Move the 397B battery charger slightly to the right in order to disengage the pins from the AC distribution unit.
5. Slide the 397B battery charger forward out of the cabinet.
6. Remove the data/control connector from the rear of the 397B battery charger.
7. Remove the 397B battery charger from the cabinet.

Installation steps:

1. Set the on/off switch on the replacement 397B battery charger to **OFF.**
2. Install the replacement 397B battery charger partway in the cabinet.
3. Insert the data/control connector from the AC distribution unit into the mating connector on the rear of the 397B battery charger.
4. Slide the 397B battery charger all the way in the cabinet.
5. **Secure the 397B battery charger to the cabinet with the screw and bracket removed in Step 3 of the** removal steps.
6. Insert the AC power cord plug in the receptacle on the front of the power unit.

DANGER

If the 397B battery charger is turned on with batteries disconnected or reverse connected, the 397Bbattery charger will be damaged and may cause injury to you.

7. Set the 397B battery charger On/off switch to **ON.**

BULK ON-LINE SWITCHER (OLS) POWER SUPPLY REPLACEMENT

To replace the OLS power supply (see Figure 9-25, Bulk On-Line Switcher (OLS) Power Supply), perform the following removal and installation steps.

Removal steps:

1. At the front of the OLS power supply:
   a. Set the on/off switch to **OFF.**
   b. Disconnect the AC cord from the AC distribution unit.

      The AC cord runs beneath the alarm leads to the front of the AC distribution unit.

   c. Remove the two screws connecting the OLS power supply to the front mounting plate.
2. At the rear of the OLS power supply:
   a. Remove the lower back cover from the cabinet by removing the attaching screws (approximately 12 screws).
   b. Disconnect the -48V and ground connectors.
   c. Disconnect the alarm connector.
   d. Remove the two screws connecting the OLS power supply to the rear mounting plate.
3. At the front of the OLS power supply:
   a. Lift up the OLS power supply to clear the front mounting plate.
   b. Remove the OLS power supply from the cabinet by sliding it forward.

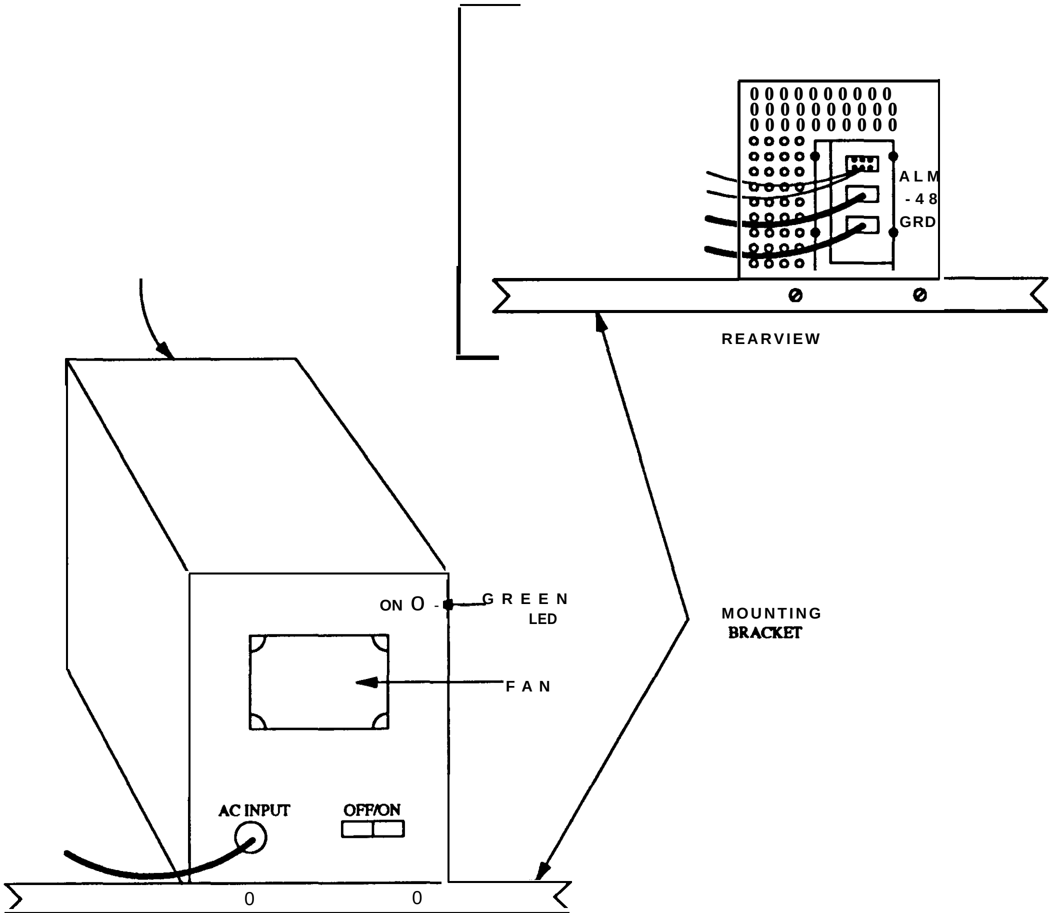


Figure 9-25. Bulk On-Line Switcher (OLS) Power Supply

Installation steps:

1. Set the on/off switch on the replacement power supply to **OFF.**
2. At the front of the OLS power supply:
   a. Lift up the OLS power supply to clear the front mounting plate.
   b. Install the replacement power supply in the cabinet by sliding it toward the rear.
3. At the rear of the OLS power supply:
   a Connect the -48V and ground connectors.
   b. Connect the alarm connector.
   c. Secure the OLS power supply to the rear mounting plate using the two screws.
   d. Replace the lower back cover to the cabinet using the attaching screws (approximately 12 screws).
4. At the front of the OLS power supply:
   a Connect the AC cord to the AC distribution unit.
   The AC cord runs beneath the alarm leads to the front of the AC distribution unit.
   b. Secure the OLS power supply to the front mounting plate using the two screws.
   c. Turn the on/off switch to **ON.**

After replacing the OLS power supply, perform voltage tests on the OLS power supply as appropriate.

3965-2 BATTERY CHARGER REPLACEMENT

To replace the 3965-2 battery charger (see Figure 9-26, *3965-2 Battery Charger),* perform the following removal and installation steps.

Removal steps:

1. At the front of the 3965-2 battery charger:
   a Set the on/off switch to **OFF.**
   b. Remove the two screws connecting the 3965-2 battery charger to the front mounting plate.
2. At the rear of the 3965-2 battery charger:
   a Remove the lower back cover from the cabinet by removing the attaching screws (approximately 12 screws).
   b. Disconnect the ALM, -48V and GRD connectors.
   c. Remove the two screws connecting the 3965-2 battery charger to the rear mounting plate.
3. At the front of the 3965-2 battery charger:
   a Lift up the 3965-2 battery charger to clear the front mounting plate.
   b. Remove the 3965-2 battery charger from the cabinet by sliding it forward.

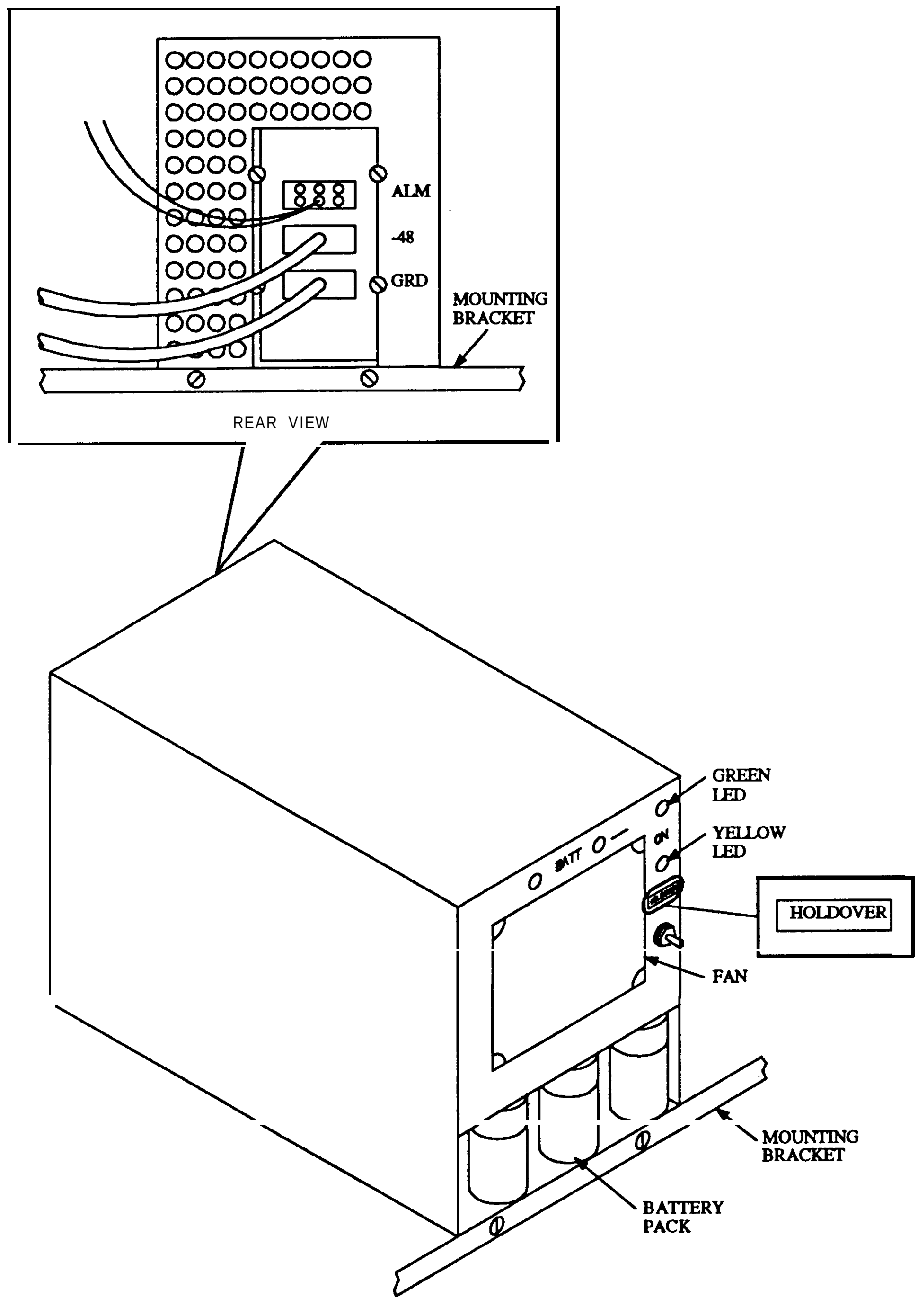


Figure 9-26. 3965-2 Battery Charger

Installation steps:

1. Set the on/off switch on the replacement battery charger to **OFF.**
2. At the front of the 3965-2 battery charger:
   a. Lift up the 3965-2 battery charger to clear the front mounting plate.
   b. Install the replacement battery charger in the cabinet by sliding it toward the rear.
3. At the rear of the 3965-2 battery charger
   a. Connect the ALM, -48V and GRD connectors.
   b. Secure the 3965-2 battery charger to the rear mounting plate using the two screws.
   c. Replace the lower back cover to the cabinet using the attaching screws (approximately 12 screws).
4. At the front of the 3965-2 battery charger
   a. Secure the 3965-2 battery charger to the front mounting plate using the two screws.
   b. Turn the on/off switch to **ON.**

After replacing the 3965-2 battery charger, perform voltage tests on the 3965-2 battery charger as appropriate.

TRADITIONAL CABINET FREQUENCY GENERATOR REPLACEMENT

To replace the 124B, 124B1, or 124B2 frequency generator in a traditional cabinet (see Figure 9-27, 124B *Frequency Generator,* or Figure 9-28, *124B1 or 124B2 Frequency Generator),* perform the following removal and installation steps.

Removal steps:

1. Remove the -48V fuse associated with the frequency generator.
2. Disconnect the connectors from **PFG IN** and **PFG OUT** (124B frequency generator) or from **OUTPUT** and **INPUT** (124B1 or 124B2 frequency generator).
3. Remove the four mounting screws (two from each side) securing the frequency generator to the fan assembly.
4. Remove the frequency generator from the fan assembly.

Installation steps:

1. Mount the replacement frequency generator on the fan assembly and secure with the four mounting screws.
2. Ensure that the AC power cord (if applicable) is secured by the cable clamp.

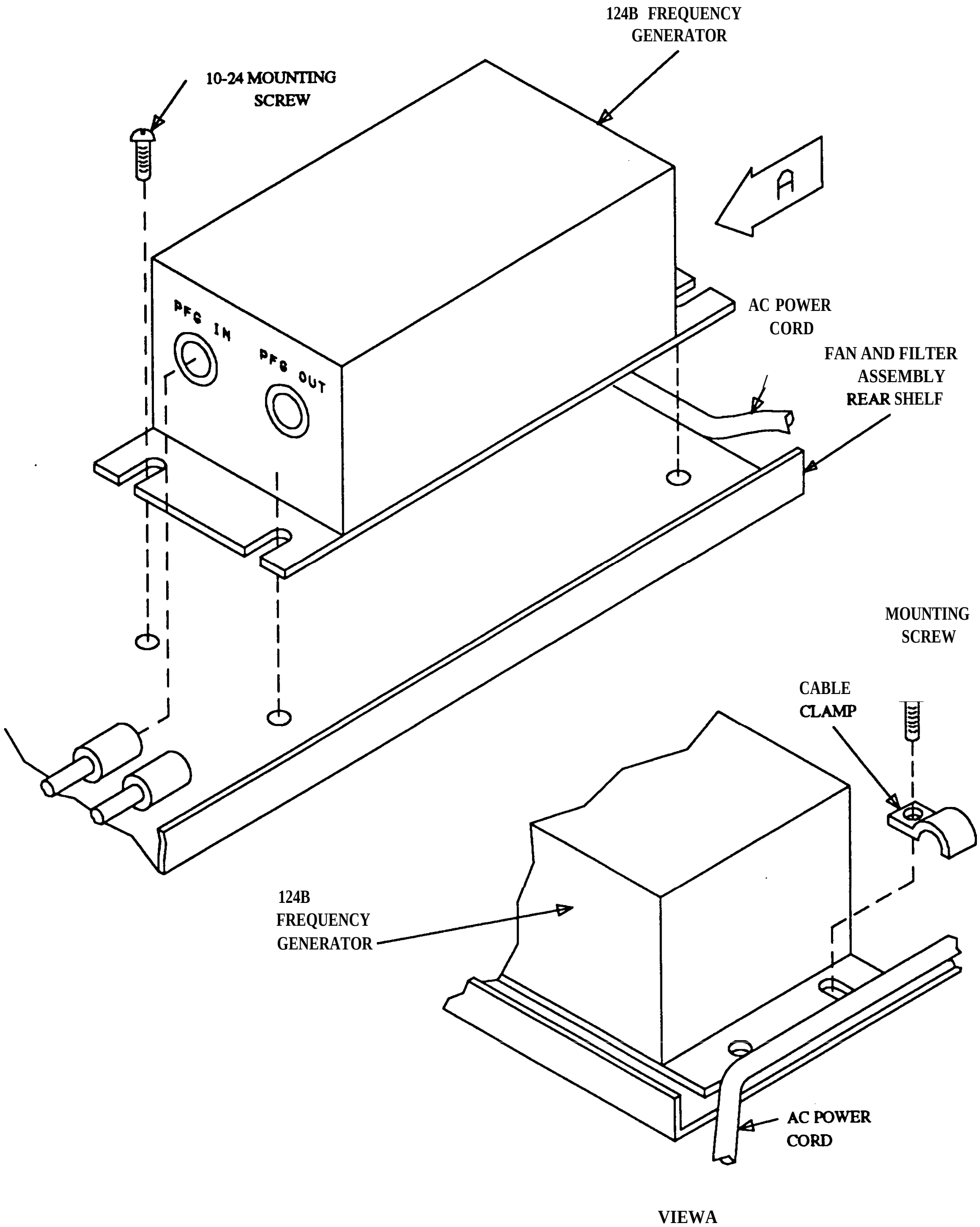


Figure 9-27. 124B Frequency Generator

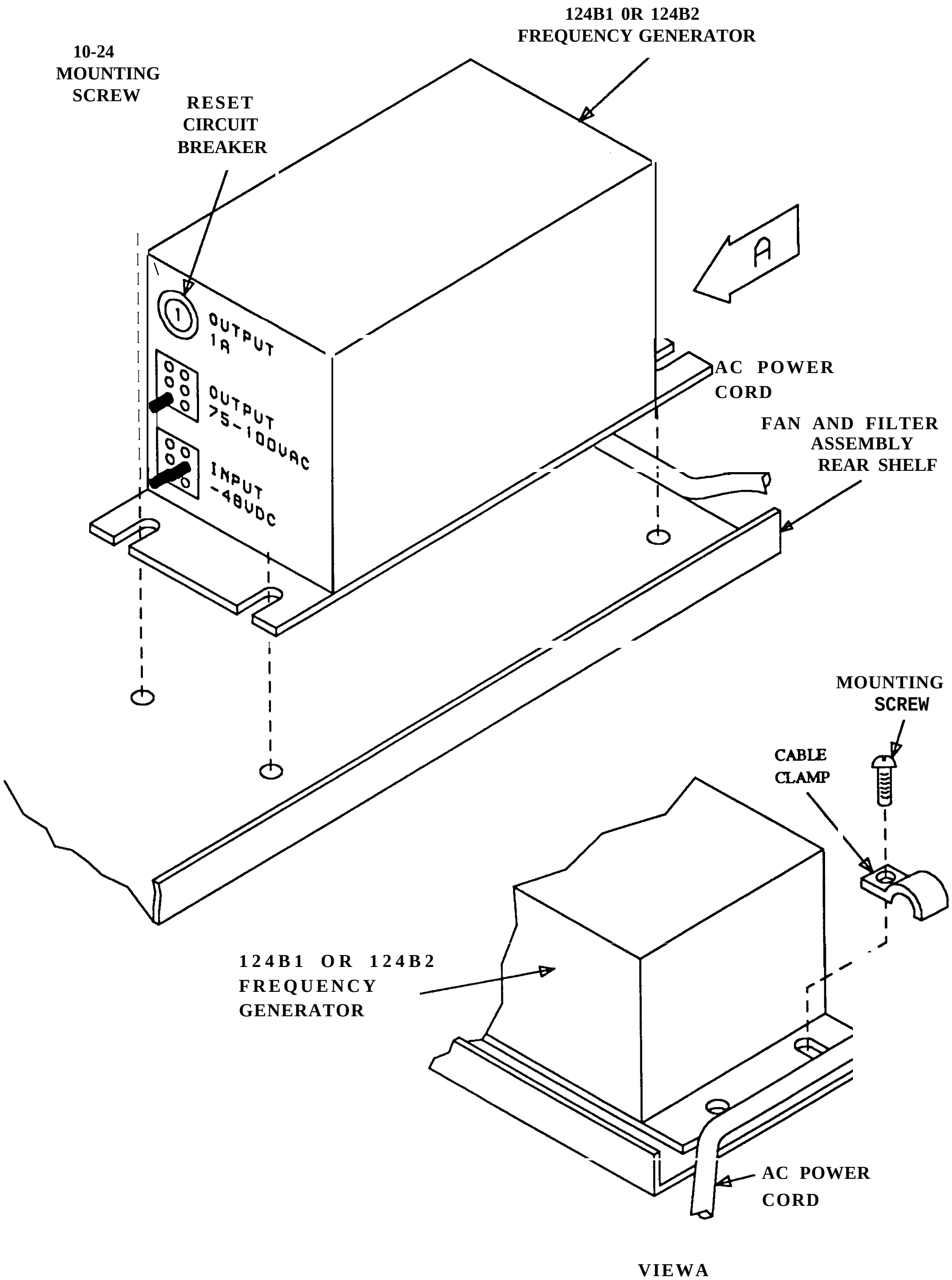


Figure 9-28. 124B1 or 124B2 Frequency Generator

3. Connect the connectors to **PFG IN** and **PFG OUT** (124B frequency generator) or to **OUTPUT** and **INPUT** (124B1 or 124B2 frequency generator).
4. Replace the -48V fuse associated with the frequency generator.

UNIVERSAL CABINET FREQUENCY GENERATOR REPLACEMENT

To replace the 124B2 frequency generator in the universal cabinet, perform the following removal and installation steps.

Removal steps:

1. Remove the -48V fuse associated with the frequency generator.
2. Disconnect the connectors from **OUTPUT** and **INPUT.**
3. Remove the two mounting screws securing the frequency generator to the AC or DC distribution unit.
4. Remove the frequency generator from the AC or DC distribution unit.

Installation steps:

1. Mount the replacement frequency generator on the AC or DC distribution unit and secure it with the two mounting screws.
2. Connect the connectors to **OUTPUT** and **INPUT.**
3. Replace the -48V fuse associated with the frequency generator.

TRADITIONAL CABINET DC FAN AND FAN ASSEMBLY REPLACEMENT

The fan assembly in the traditional cabinet provides three fans to maintain interior cabinet temperature within the acceptable operating limit. The fans are mounted vertically side by side. They are designed to run continuously at variable speed and operate on DC power.

Traditional Cabinet DC Fan Replacement

To replace a DC fan in the traditional cabinet (see Figure 9-29, *DC Fans),* perform the following removal and installation steps.

Removal steps:

1. Remove the fuse (F1 or F2) associated with the fan to be replaced.

   Fuse F1 controls all the fans in the upper fan assembly and Fuse F2 controls all the fans in the lower fan assembly.

2. Disconnect the plug from the fan to be replaced.

3. Remove the two mounting screws.
4. Remove the fan from the fan assembly.

Installation steps:

1. Mount the replacement fan on the fan assembly and secure with the two mounting screws.
2. Connect the fan plug to the replacement fan.
3. Install the fuse (F1 or F2) associated with the fan replaced.

Traditional Cabinet DC Fan Wire Replacement

To replace a fan wire in a traditional cabinet, perform the following removal and installation steps.

Removal steps:

1. Remove the fuse (F1 or F2) associated with the fan wire to be replaced.

   Fuse F1 controls all the fans in the upper fan assembly and Fuse F2 controls all the fans in the lower fan assembly.
2. Disconnect the plug from the fan.
3. Thread the fan wire through the fan assembly toward the rear.
4. Disconnect the fan wire from **TB1** at the rear of the fan assembly.
5. Remove the fan wire from the fan assembly.

Installation steps:

1. Connect the replacement fan wire to **TBl** at the rear of the fan assembly.
2. Thread the fan wire through the fan assembly toward the front.
3. Connect the plug on the replacement fan wire to the appropriate fan.
4. Replace the fuse (F1 or F2) associated with the fan wire replaced.

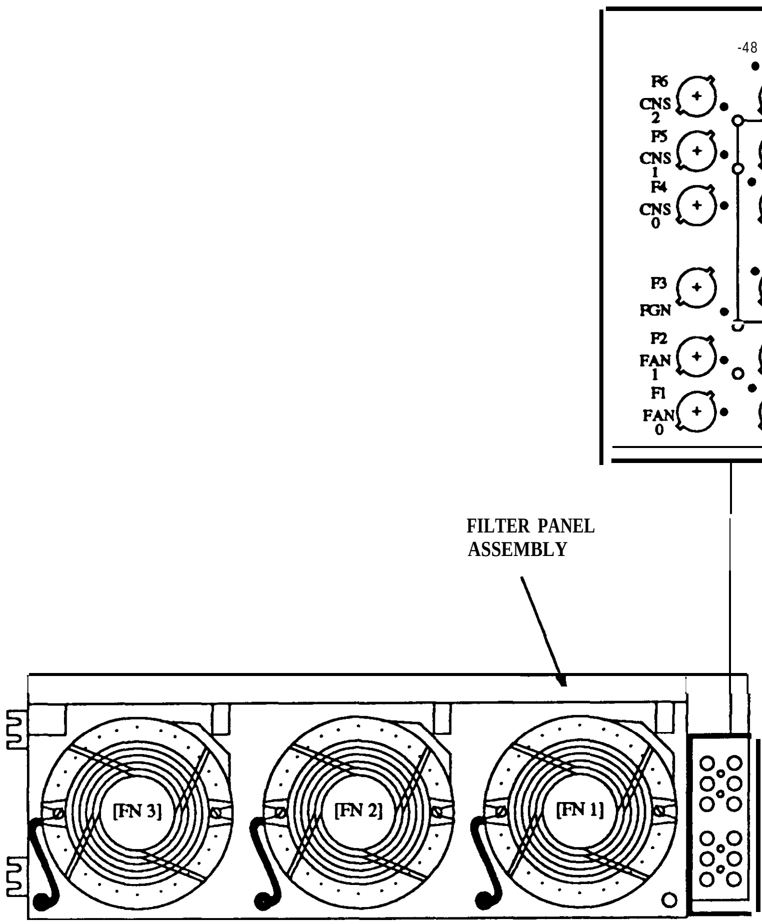


Figure 9-29. DC Fans

Traditional Cabinet DC Fan Assembly Replacement

To replace the DC fan assembly in a traditional cabinet, perform the following removal and installation steps.

Removal steps:

1. At the rear of the fan assembly:
   a. Remove the fuses associated with the fan assembly to be removed.
   b. Disconnect the four ground straps at the top of the fan assembly.
   c. Tag and disconnect the alarm leads from AEH4.
   d. Disconnect the two bus bar ground cables.

e. Disconnect the JTMP connectors in two places.

2. At the front of the fan assembly:

   a. Remove the four mounting screws (two on the left and right sides) securing the fan assembly to the cabinet.

   b. Remove the fan assembly from the cabinet.

Installation steps:

NOTE When the DC fan assembly is shipped loose, attach 900658329 vinyl plastic tape (approximately 60 inches) to the top and bottom edges of the unit before installing the DC fan assembly in the cabinet.

1. At the front of the cabinet, mount the replacement fan assembly.
2. Secure the replacement fan assembly to the cabinet with the four mounting screws.
3. At the rear of the fan assembly:
   a. Connect the JTMP connectors in two places.
   b. Connect the two bus bar ground cables.
   c. Connect the alarm leads to AEH4.
   d. Connect the four ground straps at the top of the fan assembly.
   e. Replace the fuses associated with the installed fan assembly.

UNIVERSAL CABINET FAN AND FAN CONTROLLER REPLACEMENT

The fan assembly in the universal cabinet includes six fans that maintain interior cabinet temperature within the acceptable operating limit. The fans are mounted vertically, side by side, three in the front of the cabinet and three in the rear of the cabinet. They are designed to run continuously at variable speed and operate on DC power.

Universal Cabinet DC Fan Replacement

To replace a DC fan in a universal cabinet, perform the following removal and installation steps.

Removal steps:

1. Determine if the fan to be replaced is in the front or at the rear of the cabinet.
   - If the fan to be replaced is in the front of the cabinet, remove the fan assembly cover by pulling the cover outward. Then, go to Step 2.
   - If the fan to be replaced is at the rear of the cabinet, go to Step 2.
2. Loosen and remove the retaining screw nearest the power plug on the defective fan.

DANGER 48-volt power is present on the fan plug.

3. Disconnect the power plug from the defective fan.
4. Loosen and remove the other retaining screw on the fan.
5. Remove the fan from the fan assembly.

Installation steps:

1. Position the replacement fan on the fan assembly.
2. Reconnect the fan power plug.
3. Insert and tighten the retaining screws.
4. Replace the fan assembly cover if it was removed in Step 1 of the removal steps.

Universal Cabinet DC Fan Controller Replacement

To replace the DC fan controller in a universal cabinet, perform the following removal and installation steps.

Removal steps:

1. At the front of the cabinet, remove the fan assembly cover by pulling the cover outward.
2. Loosen and remove the retaining screw nearest the power plug on the leftmost fan.

DANGER 48-volt power is present on the fan plug.

3. Disconnect the power plug from the leftmost fan.
4. Loosen and remove the other retaining screw on the leftmost fan.
5. Remove the fan from the fan assembly.

DANGER Resistors on the circuit pack are hot. Do *not* touch.

6. Lift the latch on the ADH1 fan controller circuit pack.
7. Using the latch as a handle, pull the circuit pack up and out of its holder.

Installation steps:

1. Insert a replacement ADH1 circuit pack, ensuring that the circuit pack is firmly seated. Then, push down on the latch until the latch snaps in place.
2. Position the fan on the fan assembly.
3. Reconnect the fan power plug.
4. Insert and tighten the retaining screws.
5. Replace the fan assembly cover.

TMS/RMI CABINET AC DISTRIBUTION UNIT REPLACEMENT

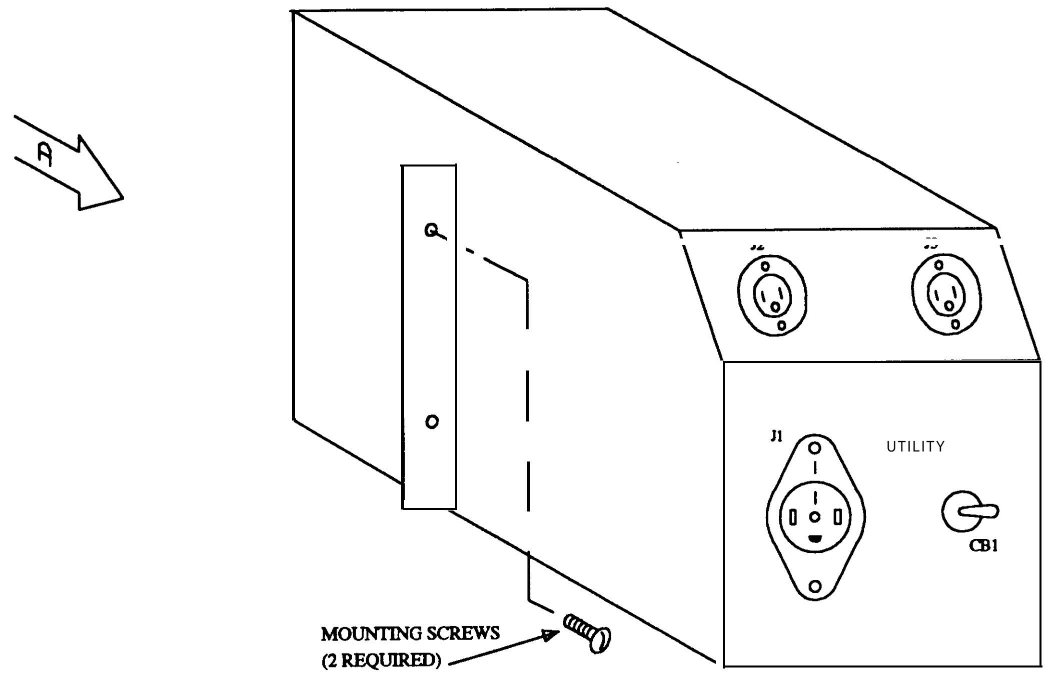
To replace the TMS/RMI cabinet AC distribution unit (see Figure 9-30, *TMS/RMI Cabinet AC Distribution Unit)*, perform the following removal and installation steps.

Removal steps:

1. Set the circuit breaker on the TMS/RMI cabinet AC distribution unit to **OFF.**
2. At the front of the TMS/RMI cabinet AC distribution unit, disconnect the cables from **J1** through **J3** as appropriate.
3. At the rear of the TMS/RMI cabinet AC distribution unit, disconnect the cables from **P4** and **P5** as appropriate.
4. Remove the two mounting screws and remove the TMS/RMI cabinet AC distribution unit from the cabinet.

Installation steps:

1. Set the circuit broker on the replacement AC distribution unit to **OFF.**
2. Install the replacement AC distribution unit in the TMS/RMI cabinet and secure the unit to the cabinet using the two mounting screws.
3. At the rear of the TMS/RMI cabinet AC distribution unit, connect the cables to **P4** and **P5** as appropriate.
4. At the front of the TMS/RMI cabinet AC distribution unit, connect the cables to **J1** through **J3** as appropriate.
5. Set the circuit breaker on the replacement AC distribution unit to **ON.**



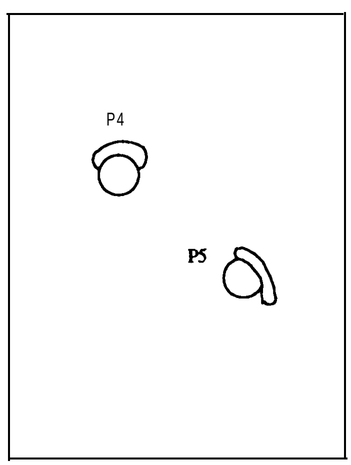


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Figure 9-30. TMS/RMI Cabinet AC Distribution Unit

TRADITIONAL MODULE CONTROL OR PORT CABINET AC DISTRIBUTION UNIT REPLACEMENT

To replace the module control or port cabinet AC distribution unit (see Figure 9-31, *Traditional Module Control or Port Cabinet AC Distribution Unit),* perform the following removal and installation steps.

Removal steps:

1. Set the circuit breaker on/off switch at the 309A power supply to **OFF.**
2. Wait one minute and set the BATT switch on the 310A power supply to **OFF.**
3. Set the three circuit breakers on the AC distribution unit to be replaced to **OFF.**
4. Disconnect **J1** from the 309A/310A power supply.
5. Disconnect the power cord from the **AC INPUT** connector.
6. Tag and disconnect the remaining cables from the AC distribution unit to be replaced.
7. Remove the three mounting screws and remove the AC distribution unit from the cabinet.

Installation steps:

1. Set the three circuit breakers on the replacement AC distribution unit to OFF.
2. Install the replacement AC distribution unit in the cabinet and secure the unit to the cabinet using the three mounting screws.
3. Connect the cables (disconnected in Step 6 of the removal steps) to the replacement AC distribution unit.
4. Connect the power cord of the replacement AC distribution unit to the **AC** INPUT connector.
5. Connect **J1** to the 309A/310A power supply.
6. Set the three circuit breakers on the replacement AC distribution unit to **ON.**
7. Set the BATT switch on the 310A power supply to **ON.**
8. Set the circuit breaker on/off switch at the 309A power supply to **ON.**

UNIVERSAL CABINET AC POWER DISTRIBUTION UNIT BATTERY REPLACEMENT

To replace the batteries in the universal cabinet AC power distribution unit, perform the following steps.

1. Set the on/off switch at the 397B battery charger to **OFF.**
2. Remove the screws at the top left and top right of the battery cover and open the cover to access the batteries.
3. Remove the batteries to be replaced.

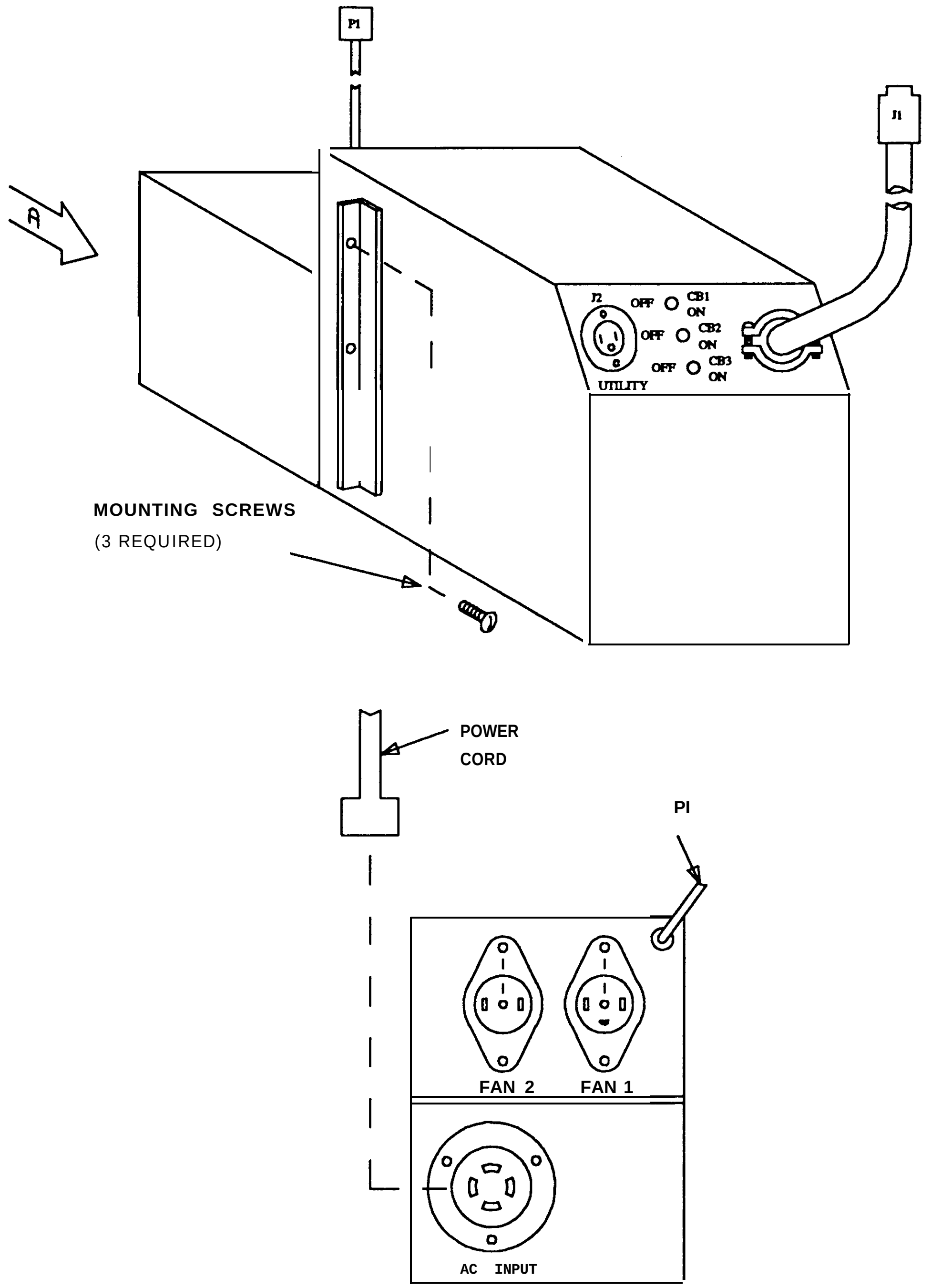

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Figure 9-31. Traditional Module Control or Port Cabinet AC Distribution Unit

4. Replace the batteries.

   Batteries are ordered in sets of three and you should replace the batteries as a set.

5. Close the cover and secure it with the two screws.
6. Turn the on/off switch on the 397B battery charger to **ON.**

DC FILTER REPLACEMENT

To replace the DC filter (see Figure 9-32, *DC Filter)*, perform the following steps.

1. At the front of the DC filter, set the **-48V** circuit breaker to **OFF.**
2. At the top of the DC filter, disconnect the alarm leads by pressing the clasps on both sides and lifting up.
3. At the rear of the DC filter, tag and disconnect the leads on both terminal strips.
4. Remove the mounting screws securing the DC filter to the cabinet.
5. Remove the DC filter from the cabinet.
6. Install the replacement DC filter in the cabinet ensuring that the **-48V** circuit breaker is set to **OFF.**
7. Secure the DC filter to the cabinet using the mounting screws.
8. At the rear of the DC filter, connect the leads to both terminal strips on the replacement DC filter.
9. At the top of the replacement DC filter, connect the alarm leads.
10. At the front of the replacement DC filter, set the **-48V** circuit breaker to **ON.**

CONSOLE COMPONENT REPLACEMENT

Prior to replacing console components, disconnect the console power cord and move the console to a convenient work area for disassembly. Disconnect the handset from the console.

The console components that are identified as replaceable are:

- Power supply
- DSS and BLF carrier or button units
- Timing control and speech or alphanumeric control
- Alphanumeric display, lamp control and carrier, or dial key pad.

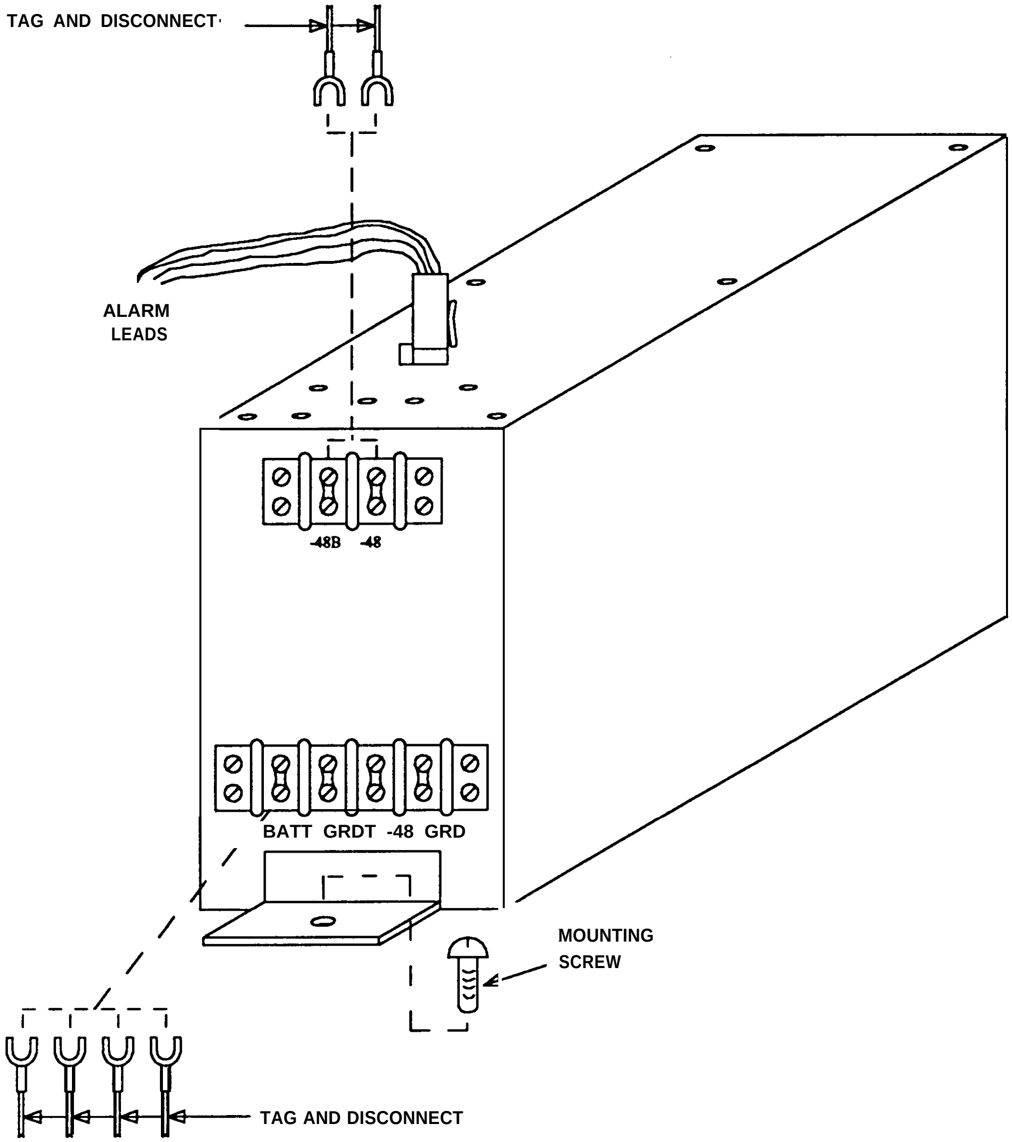


Figure 9-32. DC Filter

Console Power Supply Replacement

To replace the console power supply (see Figure 9-33, *Console Power Supply),* perform the following steps.

1. Tilt the console to access the bottom of the console.
2. Remove the four screws to remove the power supply cover.
3. Remove the screw in the center of the power supply.
4. Lift the power supply up and out to remove the power supply from inside the console.
5. Disconnect the two connectors from the power supply.
6. Connect the two connectors to the replacement power supply.
7. Install the power supply inside the console.
8. Secure the power supply to the console by mounting the screw in the center of the power supply.
9. Secure the power supply cover with the four screws.

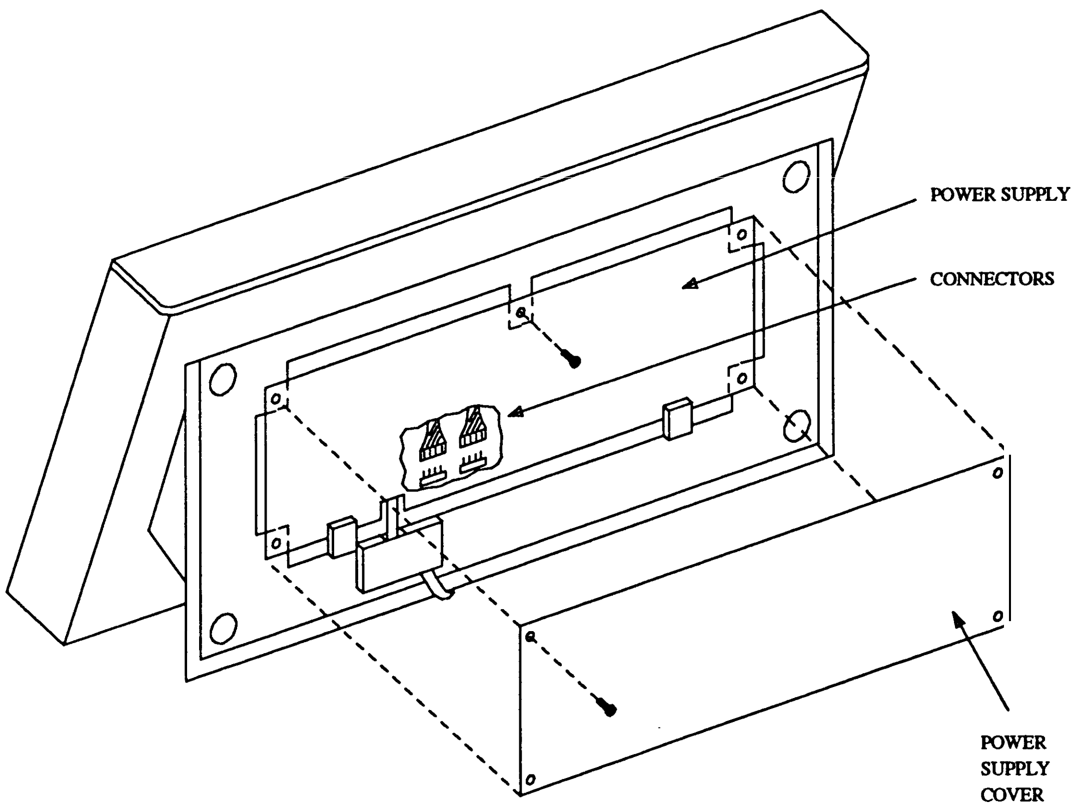


Figure 9-33. Console Power Supply

Console DSS and BLF Carrier or Button Units Replacement

To replace the console DSS and BLF carrier or button units (see Figure 9-34, *Console DSS and BLF Carrier or Button Units),* perform the following steps.

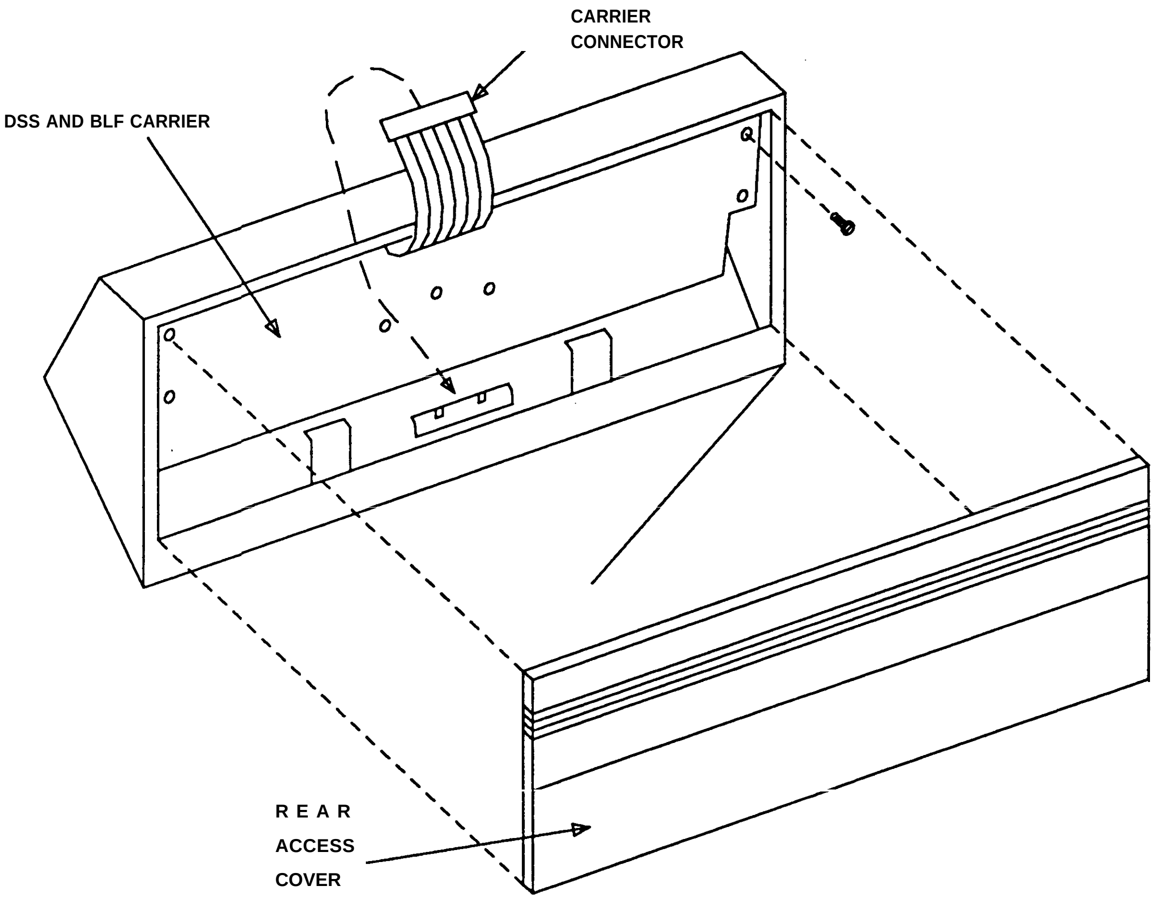


Figure 9-34. Console DSS and BLF Carrier or Button Units

1. Lift up and pull out to remove the rear access cover.
2. Disconnect the carrier connector.
3. Remove the seven flat head screws to remove the DSS and BLF carrier.
4. Push the DSS and BLF carrier from the front and remove the carrier from the console.
5. Unplug the key/lamp unit from the DSS and BLF carrier.
6. Plug the key/lamp unit into the replacement DSS and BLF carrier or plug the replacement key/lamp unit into the original DSS and BLF carrier.
7. Install the DSS and BLF carrier inside the console.

8. Secure the DSS and BLF carrier to the console using the seven flat head screws.
9. Connect the carrier connector.
10. Replace the rear access cover.

Console Timing Control and Speech or Alphanumeric Control Replacement

To replace the timing control and speech or alphanumeric control (see Figure 9-35, *Console Front Access Panel*, and Figure 9-36, *Console Timing Control and Speech or Alphanumeric Control)*, perform the following steps.

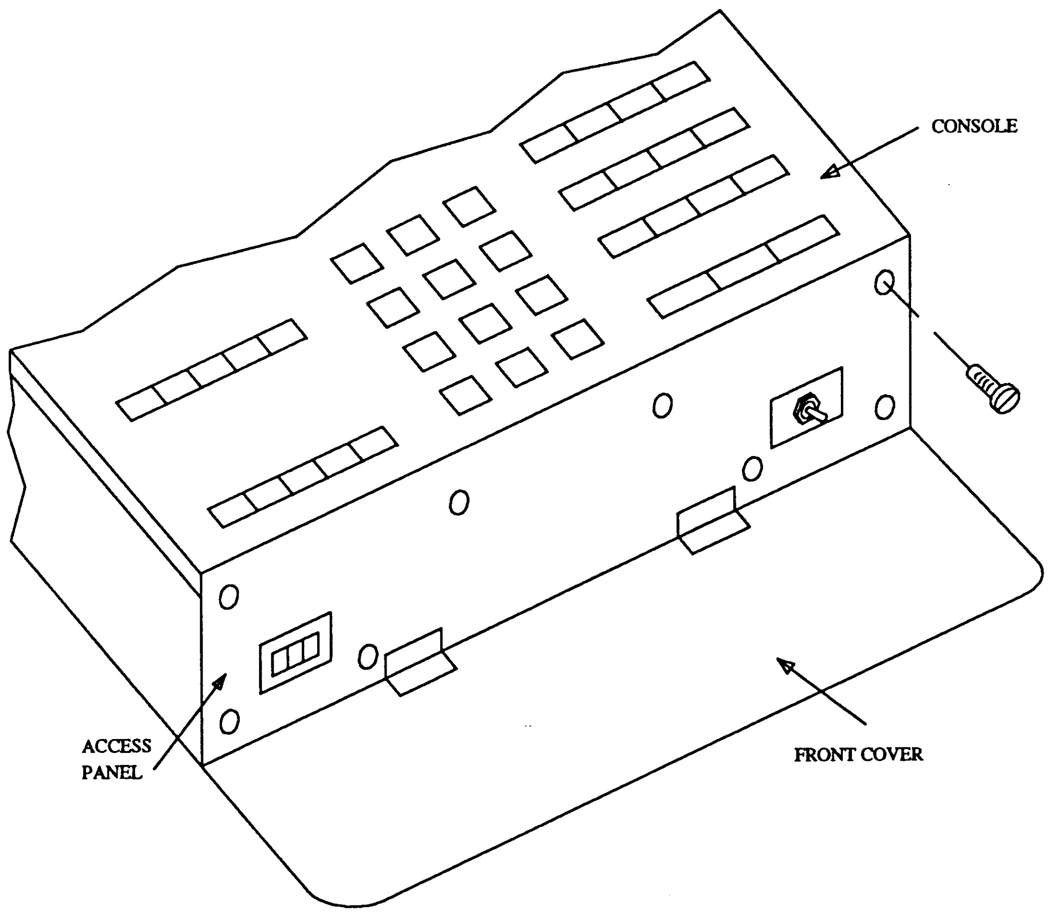


Figure 9-35. Console Front Access Panel

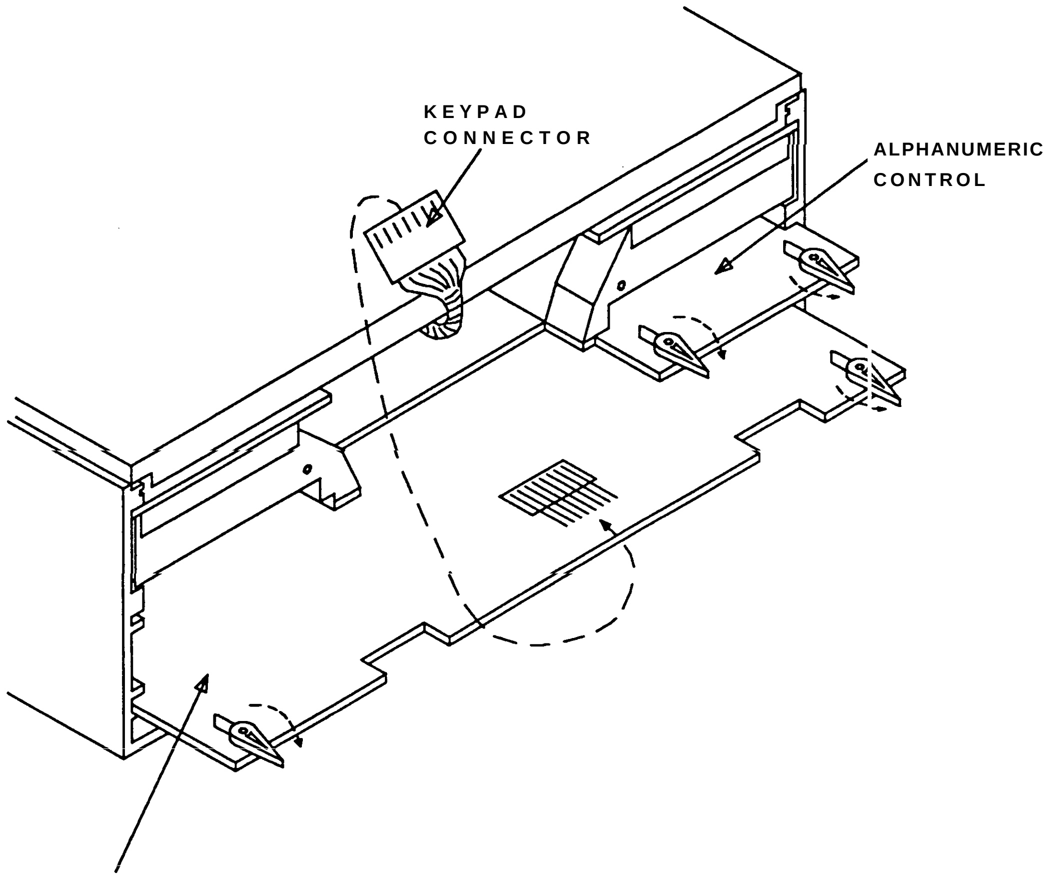


Figure 9-36. Console Timing Control and Speech or Alphanumeric Control

1. Lean the console toward the rear and rest the console on the rear of the DSS faceplate.
2. Remove the front cover and access panel (see Figure 9-35) by opening the front cover and removing the eight screws from the access panel.
   - To replace the alphanumeric control, rotate both latches and remove the alphanumeric control.

     Install the alphanumeric control and rotate both latches counterclockwise. Then, go to Step 5.
   - To replace the timing control and speech, pull the keypad connector forward and disconnect it from the timing control and speech board. Then, go to Step 3.
3. Release both latches and remove the timing control and speech board.
4. Install the replacement timing control and speech board.
   a. Secure both latches by rotating them counterclockwise.

b. Plug the keypad connector into the connector on the front of the timing control and speech board.

c. Go to step 5.

5. Install the access panel and the front cover using the eight screws.
6. Pull the console toward the front and place it in the normal position.

Console Alphanumeric Display, Lamp Control, or Dial Keypad Replacement

To replace the console alphanumeric display, lamp control carrier, or dial keypad (see Figure 9-37, *Console Alphanumeric Display, Lamp Control Carrier, or Dial Key Pad),* perform the following steps.

1. Lean the console toward the rear and rest the console on the rear of the DSS faceplate.
2. Remove the front cover and access panel (see Figure 9-35) by opening the front cover and removing eight screws from the access panel.
3. Pull out, then pull up to remove the console faceplate.
   - To replace the alphanumeric display, go to Step 4.
   - To replace the dial keypad or lamp control and carrier, go to Step 6.
4. Pull up to remove the alphanumeric display.
5. Install the replacement alphanumeric display. Then, go to Step 15.
6. Disconnect the dial keypad connector.
7. Remove the four screws to remove the dial keypad.
   - To replace the dial keypad, go to Step 8.
   - To replace the lamp control and carrier, go to Step 9.
8. Install the replacement dial keypad. Then, go to Step 14.
9. Rotate both locks outward to remove the lamp control and carrier.
10. Install the replacement lamp control and carrier.
11. Secure the lamp control and carrier by rotating both locks counterclockwise.
12. Install the dial keypad.
13. Secure the dial keypad to the console using the four screws.
14. Connect the dial keypad connector.
15. Install the console faceplate.
16. Install the access panel and front cover using the eight screws.
17. Pull the console toward the front and place it in the normal position.

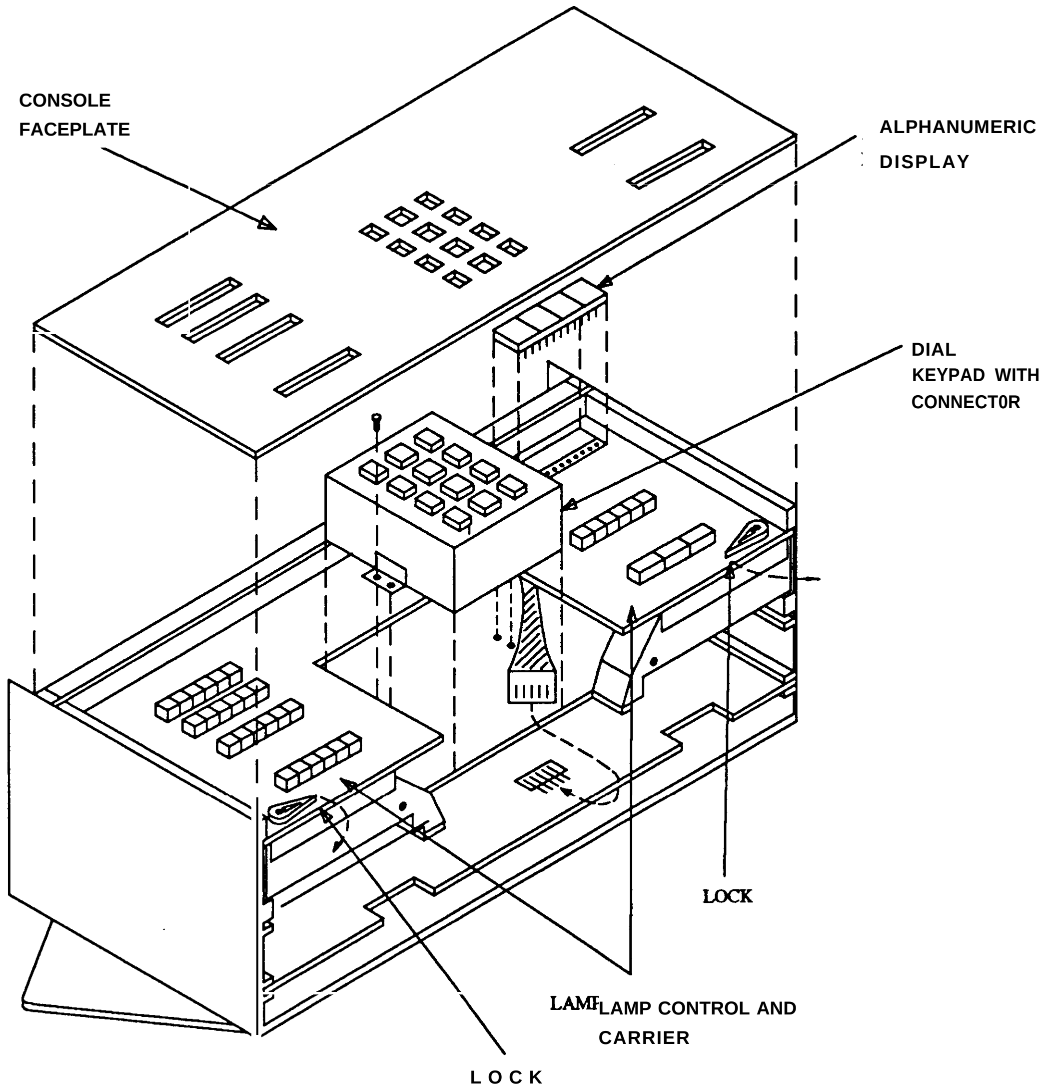
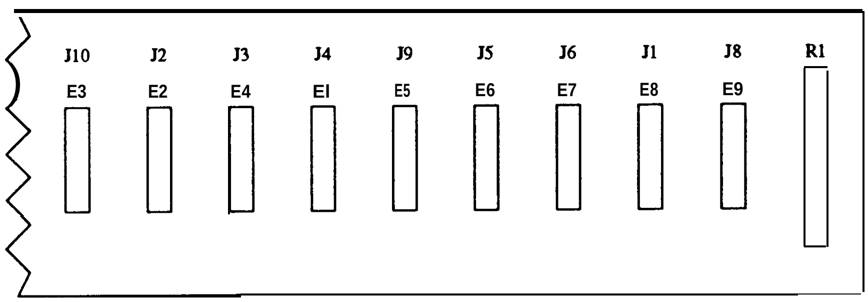


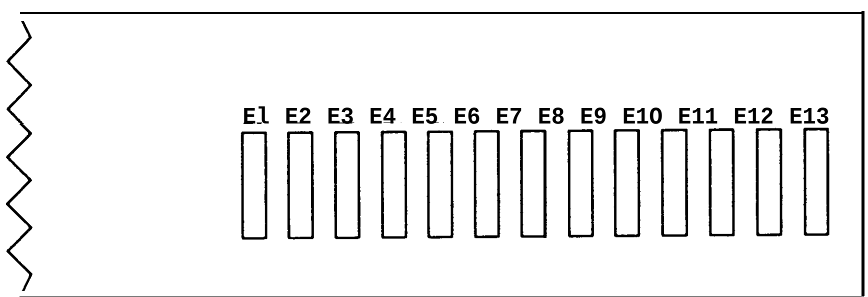
Figure 9-37. Console Alphanumeric Display, Lamp Control Carrier, or Dial Key Pad

ALARM PANEL REPLACEMENT

1. Set the **GO/HALT** switches on the alarm panel to **HALT.**
2. Remove the tape cartridges from the DTSs.
3. At the rear of the alarm panel (right side), disconnect and tag the cables from the E* connectors.
4. At the rear of the alarm panel (left side), disconnect and tag the wires (five for an unduplicated alarm panel and 10 for a duplicated alarm panel).
5. Slide the alarm panel out the front of the common-control cabinet.



PARTIAL REAR VIEW UNDUPLICATED ALARM PANEL



PARTIAL REAR VIEW DUPLICATED ALARM PANEL

Figure 9-38. Alarm Panel

Installation steps:

1. On the replacement alarm panel, set the switches **GO/HALT** to **HALT, TEST SELECT** to **15, EMERGENCY TRANSFER** to **OFF,** and **LOCK ON LINE** (when provided) to **OFF.**
2. Slide the replacement alarm panel in the common-control cabinet.
3. At the rear of the alarm panel (left side), connect the wires removed in Step 4 of the removal steps.
4. At the rear of the alarm panel (right side), connect the cables removed in Step 3 of the removal steps to the E* connectors.
5. Insert the tape cartridges in the DTSs.
6. At the front of the replacement alarm panel, set the **GO/HALT** switch on CC0 to **GO** and depress **RESET, ENABLE.**

NOTE

If the alarm panel is duplicated, set the **GO/HALT** switch on CC1 to **GO** and depress **RESET, ENABLE** on CC1 after the tape is loaded in CC0.

AEH4 ALARM BOARD REPLACEMENT

To replace the AEH4 alarm board, perform the following steps.

1. At the rear of the fan assembly, remove the four ribbon cables from the AEH4 alarm board.

   All four ribbon cables may not be connected. Record the ribbon cables that are connected and the location to which they are connected.
2. Remove the eight clip-on fasteners from the AEH4 slam board plugs labeled **JTMP, JMISC, JFAN, JALM, JBKR0, JBKR1, JRSV0,** and **JRSVl.**

   All eight fasteners may not be connected. Record the clip-on fasteners that are connected and the location to which they are connected.
3. Remove the two screws mounting the AEH4 alarm board to the fan assembly shelf.
4. Remove the AEH4 alarm board.
5. Record the option settings of the four switch packages on the AEH4 alarm board.
6. Set the four switch packages on the replacement AEH4 alarm board to the option settings as recorded in Step 5.
7. Install the replacement AEH4 alarm board on the fan assembly shelf and secure the AEH4 alarm board with the two mounting screws.
8. Connect the eight clip-on fasteners (if appropriate) as recorded in Step 2.
9. Connect the four ribbon cables (if appropriate) as recorded in Step 1.

AC DISTRIBUTION UNIT

To replace the AC distribution unit, perform the following removal and installation steps.

1. At the battery load center, throw the main breaker for the battery supply to the cabinet.
2. From the front of the cabinet, set the main breaker on/off switch on the AC distribution unit to **OFF.**
3. Disconnect the three battery connectors on the front of the AC distribution unit.
4. Remove the battery charger, using the steps described in *397B BATTERY CHARGER REPLACEMENT.*
5. Unplug the cabinet main power supply cord.
6. From the back of the cabinet, remove connectors P3 and P4 that connect the AC distribution unit to the carrier (note that there is one on each side).
7. Disconnect the plug (on right) to the alarm circuitry.
8. If this a 220 VAC version use the following steps to disconnect the transformer.
   - Remove the AC distribution unit cover.
   - Disconnect the tagged leads.
9. Loosen the two screws that hold the AC distribution unit to the cabinet bottom.
10. At the front of the cabinet, remove the two screws the hold the AC distribution unit to the cabinet bottom.
11. Slide the AC distribution unit out from the front of the cabinet.

Installation Steps:

1. Slide the AC distribution unit in from the front of the cabinet.
2. At the front of the cabinet, install the two screws that hold the AC distribution unit to the cabinet bottom.
3. From the back of the cabinet install the two screws that secure the AC distribution unit to the cabinet bottom.
4. If this a 220 VAC version use the following steps to connect the transformer.
   - Connect the tagged leads.
   - Install the AC distribution unit cover.
5. Connect the plug (on right) to the alarm circuitry.
6. Attach connectors P3 and P4 that connect the AC distribution unit to the carrier.
7. Install the battery charger, using the steps described in *397B BATTERY CHARGER REPLACEMENT.*
8. Connect the three battery connectors on the front of the AC distribution unit.
9. Plug the cabinet main power supply cord.
10. At the load center, set the main circuit breaker to **ON**
11. From the front of the cabinet, set the main breaker on/off switch on the AC distribution unit to ON.

12. Set the 379B battery charger circuit breaker to **ON.**

DC DISTRIBUTION UNIT

1. At the battery load center, throw the main breaker for the battery supply to the cabinet.
2. At the front of the cabinet, set the main breaker on/off switch on the DC distribution unit to **OFF.**
3. At the back of the cabinet, use the following steps to remove the input power to the power supply.
   a. Remove the two screws on the input terminal cover.
   b. Disconnect the -48VDC supply at the input terminal.
   c. Tag the input terminal wire for reassembly.
   d. Disconnect the -48VDC return at copper block.
4. Disconnect the plug (on right) to the alarm circuitry.
5. Disconnect P3 and P4 connector (one on each side) that connects the DC distribution unit to the carriers.
6. Disconnect the cabinet ground at the copper block.
7. Loosen the two screws that hold the DC distribution unit to the cabinet bottom.
8. At the front of the cabinet, remove the two screws the hold the DC distribution unit to the cabinet bottom.
9. Slide the DC distribution unit out from the front of the cabinet.

Installation Steps:

1. Slide the replacement DC distribution unit into the cabinet..
2. At the front of the cabinet, install the two screws the hold the DC distribution unit to the cabinet bottom.
3. At the back of the cabinet, tighten the two screws that hold the DC distribution unit to the cabinet bottom.
4. Use the following steps to install input power to the power supply.
   a. Connect the -48VDC return at copper block.
   b. Connect the -48VDC supply at the input terminal.
   c. Install the two screws on the input terminal cover.
5. Connect the plug (on right) to the alarm circuitry.
6. Connect P3 and P4.
7. Connect the cabinet ground at the copper block.

8. At the battery load center, turn the main breaker for the battery supply to the cabinet to **ON.**
9. At the front of the cabinet, set the main breaker on/off switch on the DC distribution unit to **ON.**
10. At the back of the cabinet, set all branch breakers to **ON.**

10. SMDR COMPONENT REPLACEMENT

This chapter provides instructions for replacing the following station message detail recording (SMDR) components. The SMDR component to be replaced is determined by the repair strategies that detected the problem. The components should not be replaced unless you are directed to do so.

- SMDR carrier circuit packs
- SMDR formatter circuit packs
- SMDR tape drive circuit packs
- SMDR power supply
- SMDR formatter
- SMDR tape drive
- SMDR clock/calendar display unit.

You will need a screwdriver to replace circuit packs and other components in the SMDR cabinet. If you are directed to replace circuit packs 3645, 3844,4139, *or* 4306 in the tape drive you will need an oscilloscope, a card extender, and a test panel to make the necessary adjustments.

SMDR CARRIER CIRCUIT-PACK REPLACEMENT

To replace circuit packs in the SMDR carrier (see Figure 10-1, *SMDR Carrier),* proceed as follows.

1. At the SMDR power supply, set the power switch to **OFF.**
2. At the SMDR carrier, replace the circuit pack.
3. At the SMDR power supply, set the power switch to **ON.**
4. At the SMDR control panel, depress the system **ON LINE** button.
5. If the **ON LINE** lamp on the tape drive is not lighted, depress the tape drive **ON LINE** button.

SMDR FORMATTER CIRCUIT-PACK REPLACEMENT

To replace circuit packs in the SMDR formatter (see Figure 10-2 *SMDR Formatter Circuit Packs),* proceed as follows.

1. Remove the two screws from the front of the SMDR formatter to remove the front cover.
2. At the SMDR formatter, replace the circuit pack.

3. Replace the front cover on the SMDR formatter using the two screws you removed in step 1.
4. At the SMDR control panel, depress the system **ON LINE** button.
5. If the **ON LINE** lamp on the tape drive is not lighted, depress the tape drive **ON LINE** button.

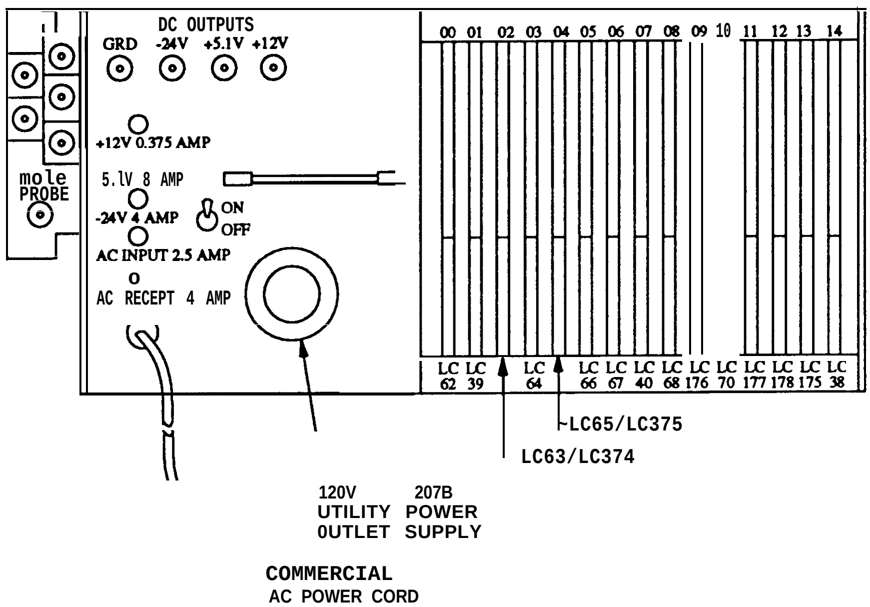


Figure 10-1. SMDR Carrier

SMDR TAPE DRIVE CIRCUIT-PACK REPLACEMENT AND ADJUSTMENTS

When circuit packs 3645, 3844, 4139, or 4306 in the SMDR tape drive are replaced, adjustments are required to ensure that the circuit packs perform as required. Table 10-1, *Tape Drive Adjustments,* lists the adjustments that are required for circuit packs 3645,3844,4139, and 4306.

Circuit Pack Replacement

To replace circuit packs in the SMDR tape drive (see Figure 10-3, *SMDR Tape Drive Circuit Packs),* proceed as follows.

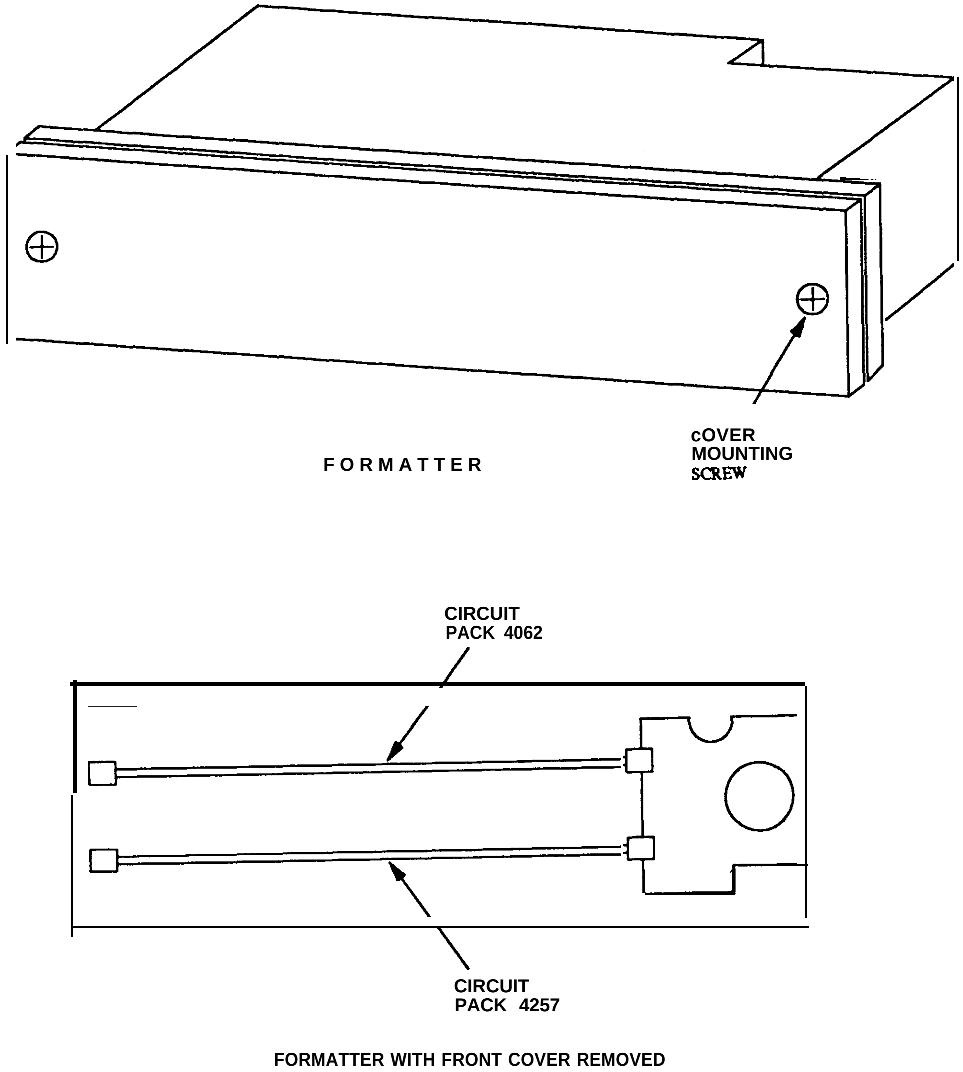
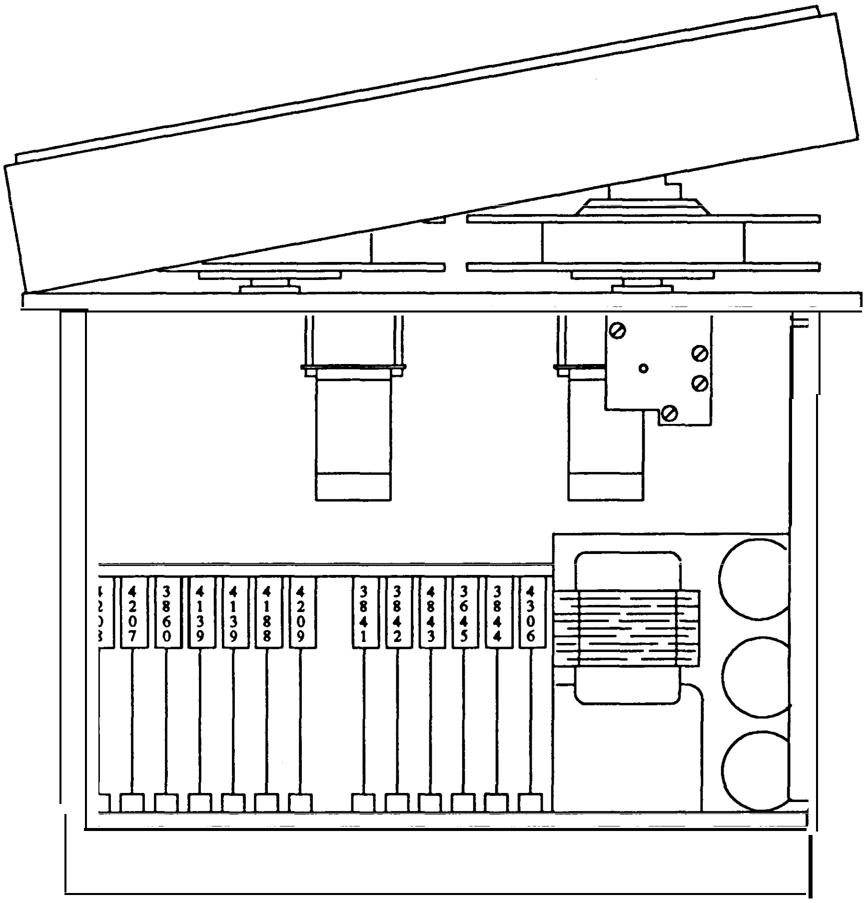


Figure 10-2. SMDR Formatter Circuit Packs

1. At the SMDR tape drive (behind the dust cover), set the power on/off switch to **OFF.**
2. At the top rear of the SMDR tape drive, replace the circuit pack.
   - If circuit pack 3645, 3844, 4139, or 4306 is replaced, go to Table 10-1, *Tape Drive Adjustments,* to determine the adjustments to be performed. Perform the adjustments, then go to step 3.
   - If circuit pack 3645, 3844,4139, or 4306 is not replaced, go to step 3.
3. At the SMDR tape drive, set the power on/off switch to **ON.**

4. At the SMDR control panel, depress the **SYSTEM ON LINE** button.
5. If the **ON LINE** lamp on the tape drive is not lighted, depress the tape drive **ON LINE** button.



TOP VIEW

Figure 10-3. SMDR Tape-Drive Circuit Packs

Circuit Pack Adjustments

When you replace tape drive circuit pack 3645,3844,4139, or 4306, you must make certain adjustments to ensure that the circuit pack operates correctly. The adjustments to be performed for each circuit pack are listed in Table 10-1, *Tape Drive Adjustments.*

TABLE 10-1. Tape Drive Adjustments

Circuit Pack Code	Circuit Pack Positions	Required Adjustments
3645	11	Tape speed
		Ramp time
3844	12	Photosensor
4139	4 and 5	Read skew
4306	13	Capstan zero offset
		Buffer arm travel

Tape Speed Adjustment

Perform this adjustment on the SMDR tape drive ramp generator circuit pack 3645 as follows.

1. At the SMDR tape drive (behind the dust cover), set the power on/off switch to **OFF.**
2. Remove circuit pack 4139 from position 4, (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments)* and insert a Kennedy card extender in its place.
3. Insert circuit pack 4139 into the card extender.
4. At the SMDR tape drive, set the power on/off switch to **ON.**
5. Load the master skew tape.
6. Connect the test panel to the test connector on circuit pack 4843 (see Figure 10-5, *Test Panel Connection to Circuit Pack 4843).*
7. At the test panel, depress the **STOP** button.
8. At the test panel, depress the **TEST MODE** button.
9. At the test panel, depress the **FORWARD RUN** button to advance the tape beyond the load point and then depress the **STOP** button.
10. Connect an oscilloscope to pin H on the extender card.
11. At the test panel, depress the **FORWARD RUN** button while observing the signal on the oscilloscope.

12. If necessary, adjust potentiometer R14 on circuit pack 3645 (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments)* for a signal with a period (T) of 100 microseconds as displayed on the oscilloscope (see Figure 10-6, *Waveform for Tape Speed Adjustment).*

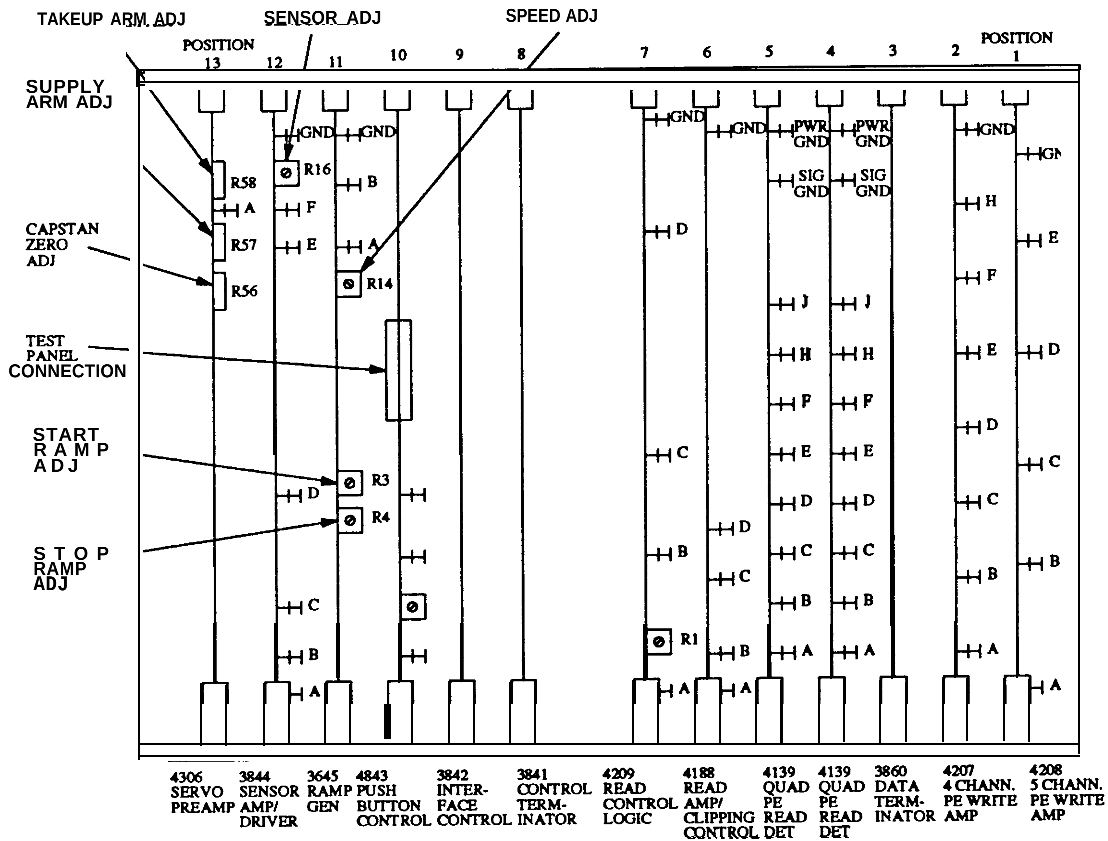
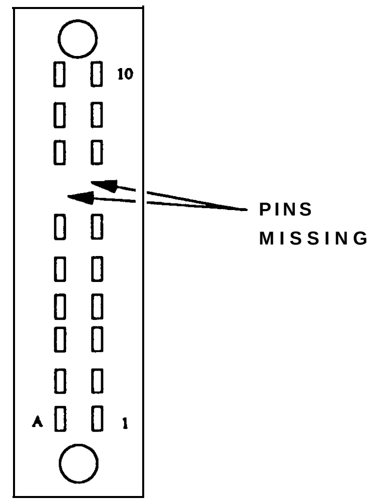
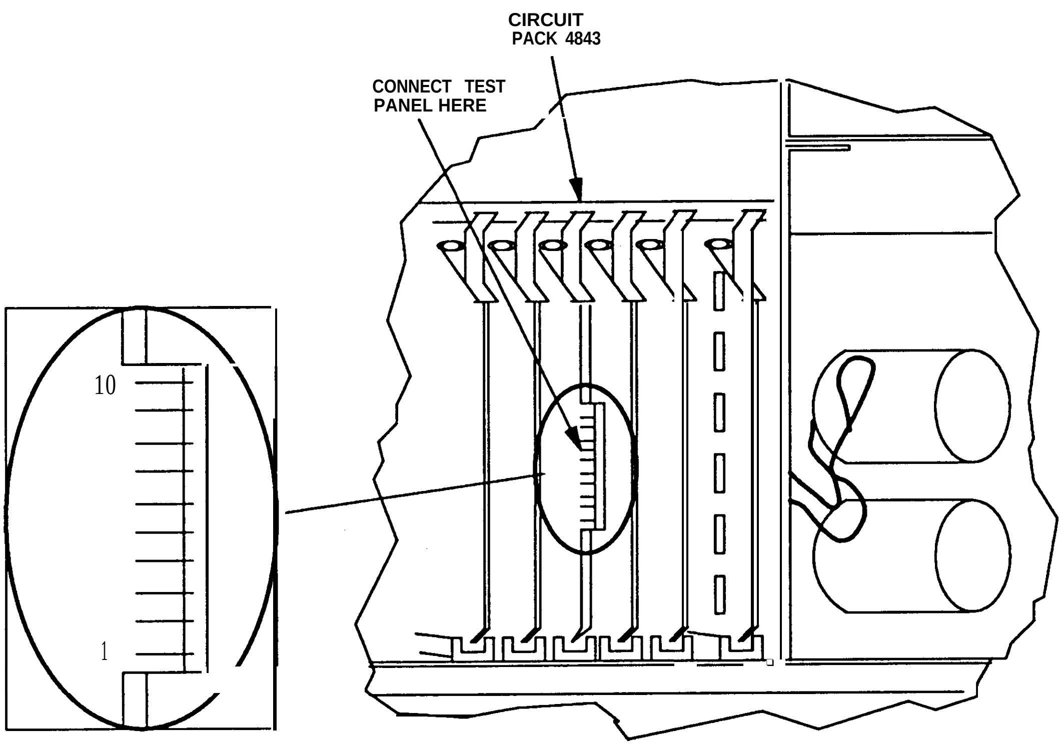


Figure 10-4. SMDR Tape Drive Test Points and Adjustments



TEST PANEL CONNECTOR



TOP OF TAPE DRIVE VIEWED FROM REAR

Figure 10-5. Test Panel Connection to Circuit Pack 4843

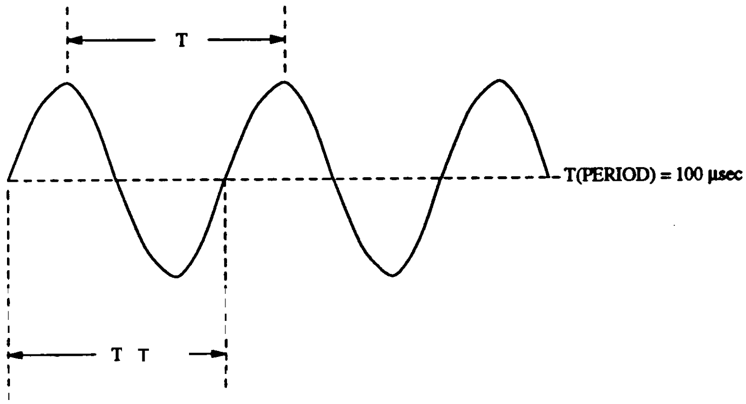


Figure 10-6. Waveform for Tape Speed Adjustment

Ramp Time Adjustment

Perform this adjustment on the ramp generator circuit pack. With the test conditions as in step 12 of *Tape Speed Adjustment* above, proceed as follows.

1. Connect a test lead from pin Y on the card extender to the external trigger input on the oscilloscope.
2. Condition the oscilloscope to trigger on a high-going external signal.
3. Connect the oscilloscope probe to point A on circuit pack 3645 (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments).*
4. At the test panel, depress the **FORWARD RUN** button and observe the trace of the ramp-up signal (see Figure 10-7, *Ramp-Up Signal).*

   This signal appears each time the tape starts to run forward.

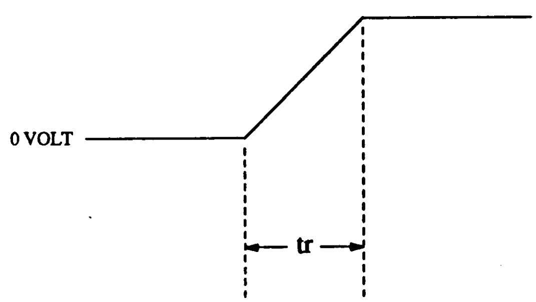


Figure 10-7. Ramp-Up Signal

5. Alternately depress the **FORWARD RUN** and **STOP** buttons to cause the signal to repeat.

6. Adjust the start ramp potentiometer R3 on circuit pack 3645 (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments),* if necessary, for a ramp-up time (tr) of 15 milliseconds (see Figure 10-7, *Ramp-Up Signal).*
7. Condition the oscilloscope to trigger on a low-going external signal.
8. At the test panel, alternately depress the **FORWARD RUN** and **STOP** buttons while observing the ramp-down signal (see Figure 10-8, *Ramp-Down Signal)* on the oscilloscope.
9. If necessary, adjust the stop ramp potentiometer R4 on circuit pack 3645 for a ramp-down time (tr) of 15 ms (see Figure 10-8, *Ramp-Down Signal).*

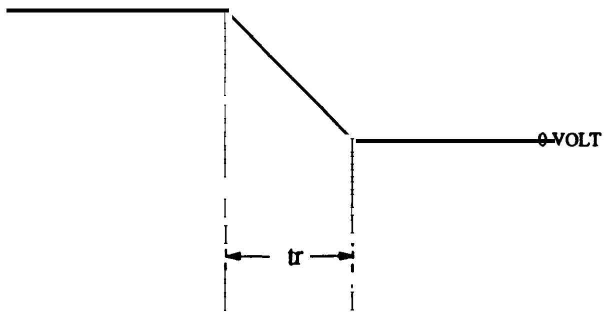


Figure 10-8. Ramp-Down Signal

10. At the SMDR tape drive, set the power on/off switch to **OFF.**
11. Remove the test panel from circuit pack 4843.
12. Remove circuit pack 3645 from the card extender.
13. Remove the card extender and insert circuit pack 3645 in its place.
14. Disconnect the oscilloscope probe and test cable.
15. At the SMDR tape drive, set the power on/off switch to **ON.**
16. Unload the master skew tape, and load the original nine-track tape.

Photosensor Adjustment

Perform this adjustment on the sensor amplifier driver circuit pack 3844 as follows.

1. Load the master skew tape (or standard nine-track tape) and advance the tape to the load point.
2. Connect the test panel to the test connector on circuit pack 4843 (see Figure 10-5, *Test Panel Connection to Circuit Pack 4843).*
3. At the test panel, depress the **STOP** button.
4. At the test panel, depress the **TEST MODE** button.

NOTE Do not operate the **FAST FORWARD** or **FAST REVERSE** buttons on the test panel when using a master skew tape.

5. Connect a voltmeter *between* test points E and F on circuit pack 3844 (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments)* and adjust potentiometer R16 to 0 volts on the voltmeter.
6. Disconnect the voltmeter and test panel.
7. Unload the master skew tape and load the original nine-track tape.

Read Skew Adjustment

Perform this adjustment on the quadphase-encoded read-detector circuit pack 4139 as follows.

1. Be sure that the tape drive is off line.
2. Load the master skew tape on the tape drive and advance the tape to the load point.
3. Connect the test panel to the test connector on circuit pack 4843 (see Figure 10-5, *Test Panel Connection to Circuit Pack 4843).*
4. At the test panel, depress the **STOP** button.
5. At the test panel, depress the **TEST MODE** button.
6. At the test panel, depress the **FORWARD RUN** button.
7. When the tape reaches the end-of-tape marker, depress the **REVERSE RUN** button and observe the ‘ SKEW indicator lamp on the test panel. The **SKEW** lamp, when illuminated, indicates excessive skew.
8. If the **SKEW** lamp lights while the tape is running forward, adjust the skew-adjusting screw (see Figure 10-9, *Read Skew Adjustment)* until the **SKEW** lamp is extinguished.
9. Disconnect the test panel from circuit pack 4843.
10. Unload the master skew tape and load the original nine-track tape.

Capstan Servo Zero-Offset Adjustment

Perform this adjustment on the servo preamplifier circuit pack 4306 as follows.

1. Be sure that the tape is loaded.
2. At the SMDR tape drive (behind the dust cover), set the power on/off switch to **OFF.**

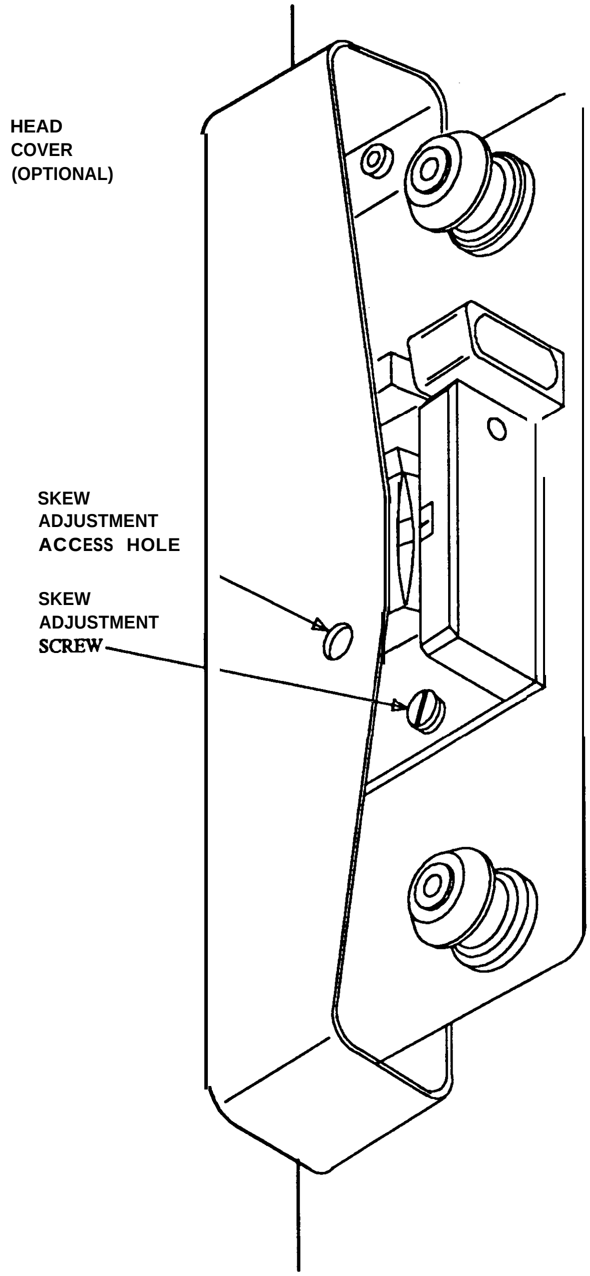


Figure 10-9. Read Skew Adjustment

3. Remove circuit pack 4306 and insert the card extender in its place.
4. Insert circuit pack 4306 into the card extender.
5. At the SMDR tape drive, set the power on/off switch to **ON.**
6. Connect a voltmeter to test point A on circuit pack 4306 to observe the voltage output of the capstan servo amplifier stage.
7. With the tape at the load point, adjust potentiometer R56 to 0 volts on the voltmeter.
8. Observe that the capstan does not rotate.

Buffer Arm Travel Adjustment

Perform this adjustment on the servo preamplifier circuit pack 4306 to prevent excessive travel of the supply and take-up buffer arms during ramp ups and ramp downs. With the test conditions as in step 6 of *Capstan Zero-Offset Adjustment* above, proceed as follows.

1. Connect the test panel to the test connector on circuit pack 4316 (see Figure 10-4, *SMDR Tape Drive Test Points and Adjustments).*
2. With the tape drive off line, depress the **STOP** button on the test panel.
3. At the test panel, depress the **TEST MODE** button.
4. At the test panel, alternately depress the **FORWARD RUN** and **REVERSE RUN** buttons while observing the supply buffer arm travel.
5. Adjust R57 on circuit pack 4306 for minimum travel of the supply buffer arm during ramp ups and ramp downs.
6. Adjust R58 on circuit pack 4306 for minimum travel of the take-up buffer arm during ramp-ups and ramp downs.
7. At the SMDR tape drive, set the power on/off switch to **OFF.**
8. Remove circuit pack 4306 from the card extender.
9. Remove the card extender from the tape drive and install circuit pack 4306 in its place.
10. At the SMDR tape drive, set the power on/off switch to **ON.**
11. Remove the test panel from circuit pack 4843.

SMDR 207B POWER SUPPLY REPLACEMENT

To replace the SMDR 207B power supply (see Figure 10-10, *SMDR 207B Power Supply)*, perform the following removal and installation steps.

Removal steps:

1. Set the switch on the SMDR power supply to **OFF.**
2. Disconnect the SMDR power cord from the AC receptacle.
3. Tag and disconnect the leads from the rear of the power supply.
4. Remove the four mounting screws securing the power supply to the cabinet.
5. Remove the power supply from the cabinet.

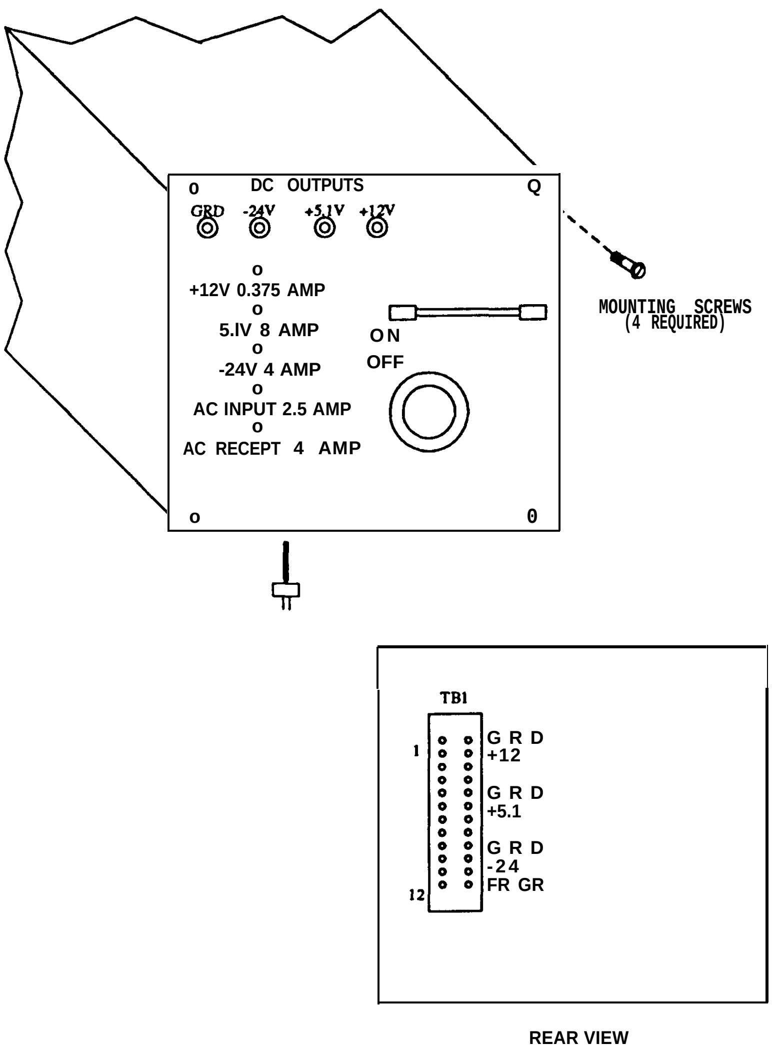


Figure 10-10. SMDR 207B Power Supply

Installation steps:

1. Install the replacement power supply into the cabinet.
2. Secure the power supply to the cabinet with the four mounting screws.
3. Connect the leads (disconnected in step 3 of the removal steps) to the rear of the replacement power supply.
4. Connect the SMDR power cord to the AC receptacle.
5. Set the switch on the power supply to **ON.**

SMDR FORMATTER REPLACEMENT

To replace the SMDR formatter (see Figure 10-11, SMDR Formatter), perform the following removal and installation steps.

Removal steps:

1. At the rear of the SMDR cabinet, disconnect the formatter power cord.
2. Tag and disconnect the cables at the rear of the formatter.
3. Remove the two mounting screws from the formatter front cover and remove the front cover.
4. Remove the four mounting screws securing the formatter to the brackets.
5. Remove the formatter from the cabinet.

Installation steps:

1. Remove the two mounting screws from the front cover on the replacement formatter.
2. Remove the front cover.
3. Install the replacement formatter into the cabinet.
4. Secure the formatter to the cabinet with the four mounting screws.
5. Secure the front cover on the replacement formatter using the two mounting screws.
6. Connect the cables (disconnected in step 2 of the removal steps) to the rear of the replacement formatter.
7. Connect the formatter power cord.
8. At the rear of the replacement formatter, set the voltage switch to 115 volts.
9. At the SMDR control panel, depress the **SYSTEM ON LINE** button.
10. If the **ON LINE** lamp on the tape drive is not lighted, depress the **ON LINE** button.

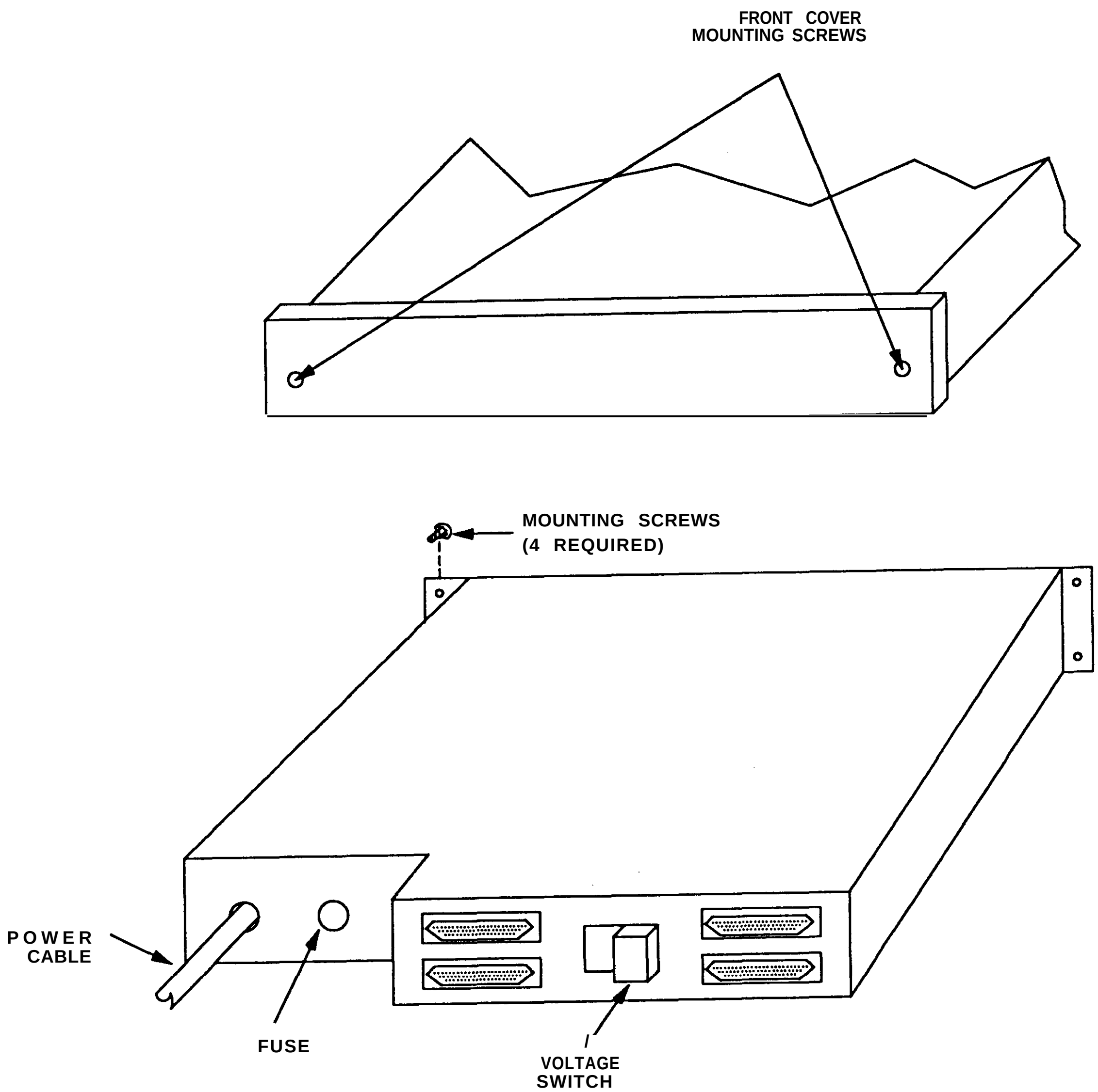


Figure 10-11. SMDR Formatter

SMDR TAPE-DRIVE REPLACEMENT

To replace the SMDR tape drive (see Figure 10-12, *SMDR Tape Drive*, Sheets 1 and 2), perform the following removal and installation steps.

Removal steps:

1. At the SMDR control, depress the **TAPE UNLOAD** button.

2. Rewind the tape onto the supply reel either manually or by depressing the **ON LINE** and **REWIND** buttons on the tape drive.
3. Remove the supply reel from the tape drive.
4. Set the tape drive power switch to **OFF.**
5. Disconnect the power cord from the AC voltage source.
6. Tag and disconnect the cables at the rear of the tape drive.
7. Remove the eight mounting screws at the front of the tape drive.
8. At the rear of the tape drive, remove the two mounting screws securing the bracket to the tape drive.
9. Remove the tape drive from the control panel.

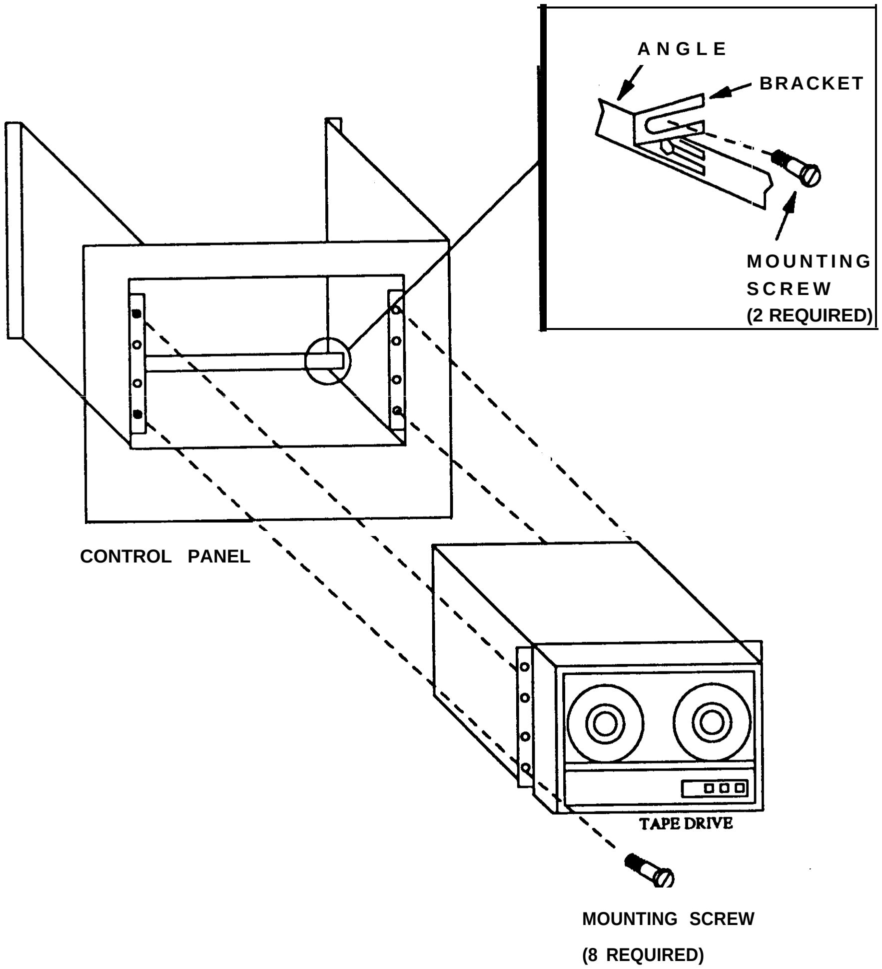


Figure 10-12. SMDR Tape Drive

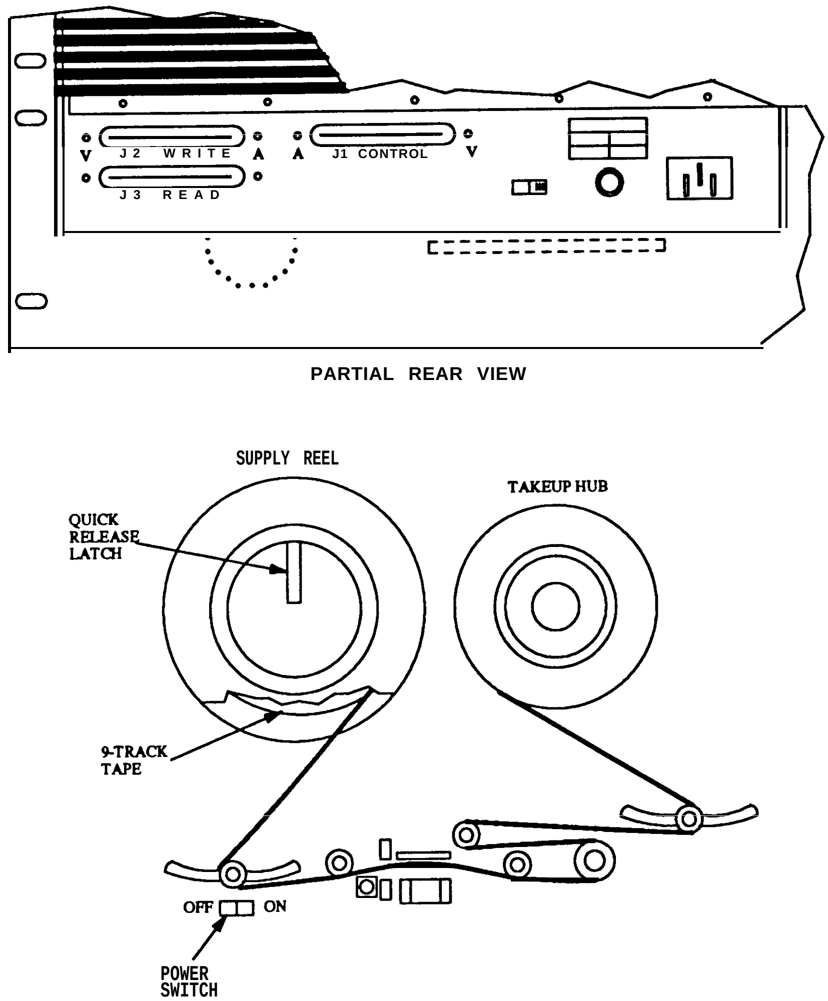


Figure 10-12. SMDR Tape Drive

Installation steps:

1. Install the replacement tape drive into the control panel.
2. Secure the tape drive to the control panel using the eight mounting screws.
3. Secure the bracket to the tape drive using the two mounting screws.
4. Ensure the voltage switch at the rear of the tape drive is set to 115 volts.
5. Connect the cables (disconnected in step 6 of the removal steps) to the rear of the tape drive.
6. Connect the power cord to the AC voltage source.
7. At the tape drive, raise the quick-release latch.
8. Install the supply reel on the supply hub with the write-enable ring side next to the tape transport deck.
9. Hold the supply reel flush against the butt flange and secure the supply reel by depressing the quick-release latch.
10. Thread the tape and wind a few turns clockwise around the take-up reel until the slack in the tape is removed.
11. Set the tape drive power switch to **ON.**
12. Close the dust cover and depress the **LOAD BUTTON.**
13. At the SMDR control panel, depress the **SYSTEM ON LINE** button.
14. At the SMDR tape drive, depress the **ON LINE** button.
15. At the SMDR control panel, depress the **DUMP MEMORY** button.

SMDR CLOCK/CALENDAR DISPLAY REPLACEMENT

To replace the SMDR clock/calendar display (see Figure 10-13, *SMDR Clock/Calendar Display)*, perform the following removal and installation steps.

Removal steps:

1. At the rear of the SMDR cabinet, disconnect the connector **CLK1** from the **CD01** jack on the SMDR carrier.
2. At the inside front door of the SMDR cabinet, remove the four screws securing the clock/calendar display assembly.
3. Remove the clock/calendar display assembly from the door.

Installation steps:

1. Install the replacement clock/calendar display assembly into the inside front door of the SMDR cabinet, and secure the clock/calendar display assembly to the door using the four screws.

2. At the rear of the SMDR cabinet, connect the connector **CLK1** to the **CD01** jack on the SMDR carrier.
3. At the clock/calendar display, set the display switch to **TIME.**
4. Depress the **TIME SET HRS** button until the correct hours digit appears.
5. Depress the **TIME SET MIN** button until the correct minutes digit appears.
6. Set the display switch to **DATE.**
7. Depress the **DATE SET** button until the correct date appears.
8. Depress the **DATE PRINT** button.

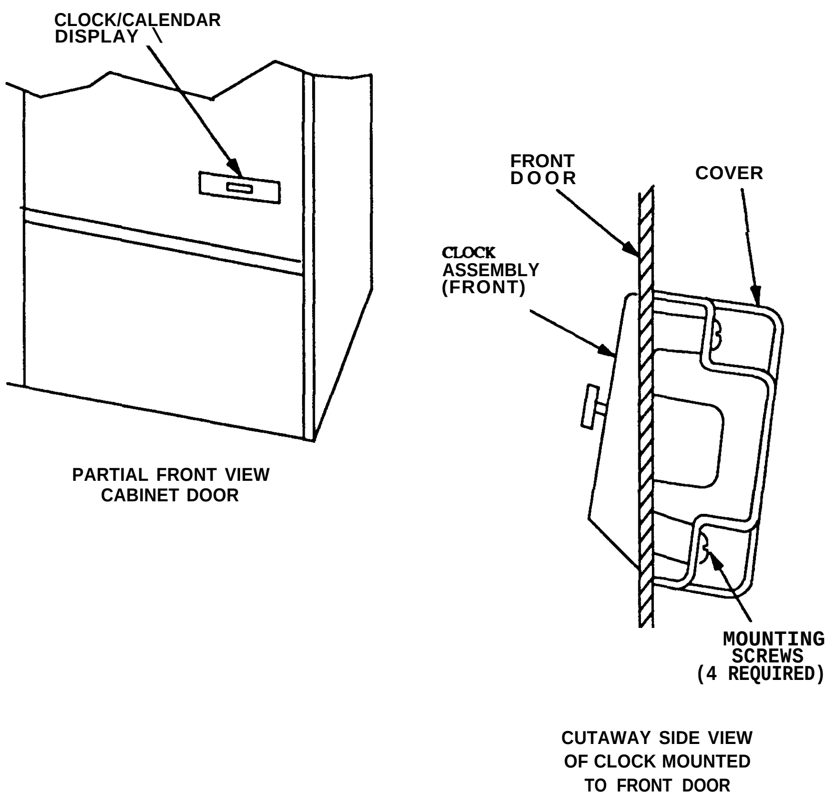


Figure 10-13. SMDR Clock/Calendar Display

11. AUXILIARY CABINET COMPONENT REPLACEMENT

This chapter provides instructions for replacing the following auxiliary cabinet components. The auxiliary cabinet component to be replaced is determined by the repair strategies that detected the problem. The components should not be replaced unless you are directed to do so.

- Frequency generator
- DC fan and fan assembly
- AC distribution unit
- Rectifier.

You will need a screwdriver and a wrench to remove components in the auxiliary cabinet.

124B, 124B1, or 124B2 FREQUENCY GENERATOR REPLACEMENT

To replace the 124B, 124B1, or 124B2 frequency generator (see Figure 11-1, *Auxiliary Cabinet 124B Frequency Generator*, or Figure 11-2, *Auxiliary Cabinet* 124B1 *or 124B2 Frequency Generator)* in the auxiliary cabinet, perform the following removal and installation steps.

Removal steps:

1. Remove the -48V fuse associated with the frequency generator.
2. Disconnect the connectors from **PFG IN** and **PFG OUT** (124B frequency generator) or from **OUTPUT** and **INPUT** (124B1 or 124B2 frequency generator).
3. Remove the four mounting screws (two from each side) that secure the frequency generator to the front panel of the auxiliary cabinet.
4. Remove the frequency generator.

Installation steps:

1. Install the replacement frequency generator into the auxiliary cabinet.
2. Secure the frequency generator to the front panel using the four mounting screws.
3. connect the connectors to **PFG IN** and **PFG OUT** (124B frequency generator) or to **OUTPUT** and **INPUT** (124B1 or 124B2 frequency generator).
4. Replace the -48V fuse associated with the frequency generator.

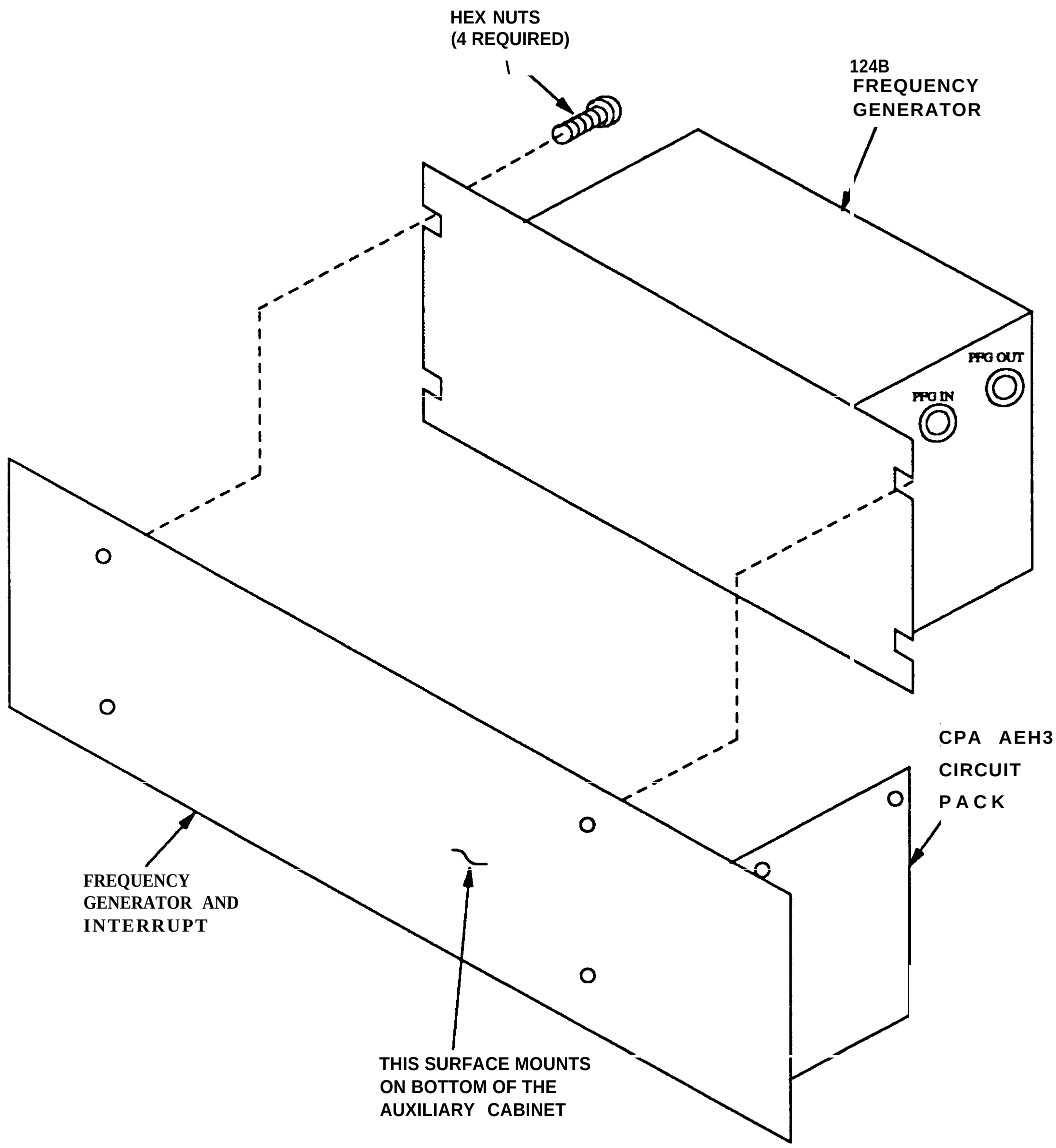


Figure 11-1. Auxiliary Cabinet 124B Frequency Generator

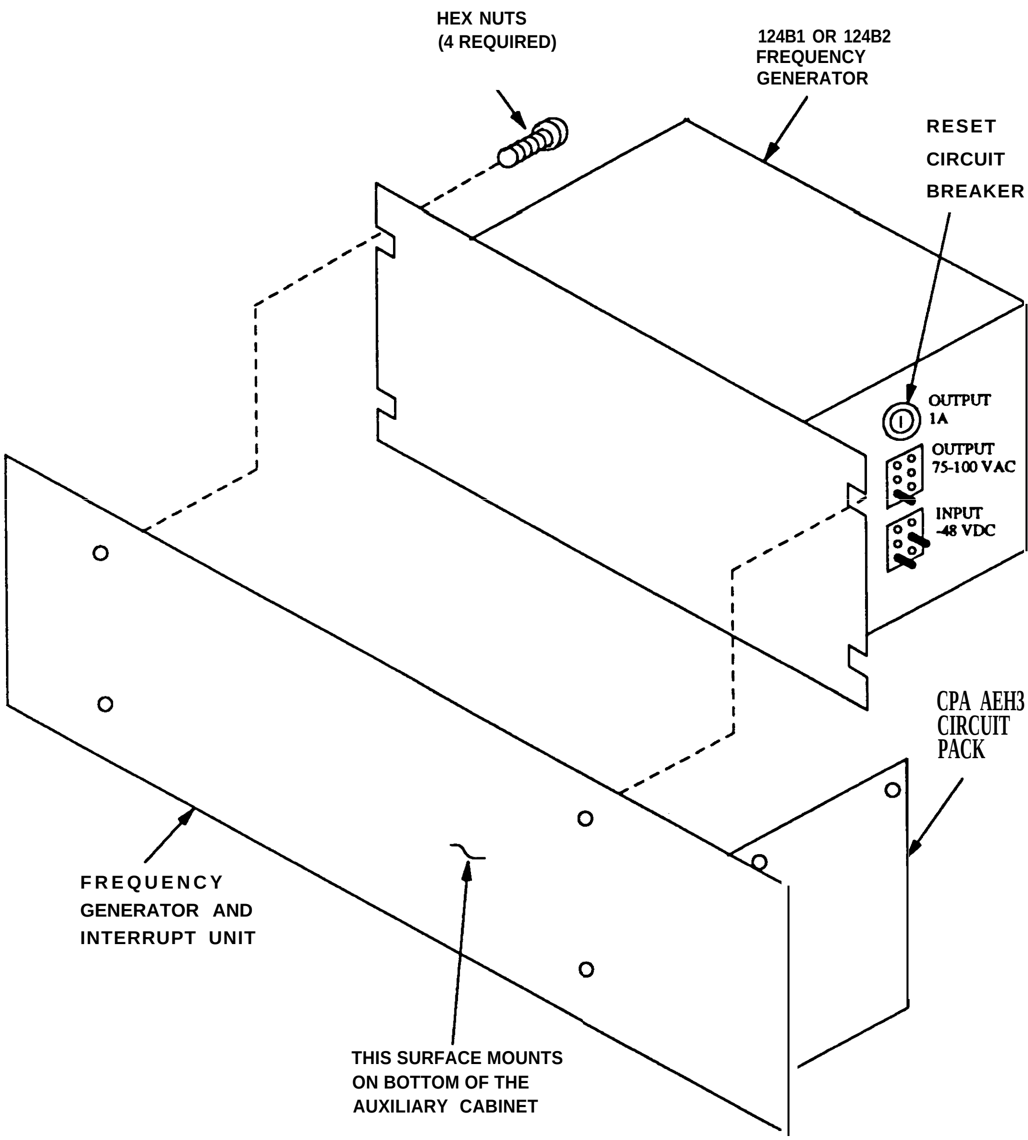


Figure 11-2. Auxiliary Cabinet 124B1 or 124B2 Frequency Generator

DC FAN AND FAN ASSEMBLY REPLACEMENT

Three fan components in the auxiliary cabinet can be replaced. The three components are the DC fan, the DC fan wire, and the DC fan assembly. The component to be replaced is determined by the repair strategy that detected the problem. The component should not be replaced unless you are directed to do so.

DC Fan Replacement

To replace a DC fan (see Figure 11-3, *Auxiliary Cabinet DC Fans)* in the auxiliary cabinet, perform the following removal and installation steps.

Removal steps:

1. Remove the fuse (F1 or F2) associated with the fan to be replaced.

   NOTE Fuse F1 controls all the fans in the upper fan assembly and Fuse F2 controls all the fans in the lower fan assembly.

2. Disconnect the plug from the fan to be replaced.
3. Remove the two mounting screws.
4. Remove the fan from the fan assembly.

Installation steps:

1. Mount the replacement fan on the fan assembly.
2. Secure the fan to the fan assembly with the two mounting screws.
3. Connect the fan plug to the replacement fan.
4. Install the fuse (F1 or F2) associated with the fan replaced.

DC Fan Wire Replacement

To replace a fan wire suspected of failing in the auxiliary cabinet, perform the following removal and installation steps.

Removal steps:

1. Remove the fuse (F1 or F2) associated with the fan wire to be replaced.

NOTE

Fuse F1 controls all the fans in the upper fan assembly and Fuse F2 controls all the fans in the lower fan assembly.

2. Disconnect the plug from the fan.
3. Thread the fan wire-the fan assembly toward the rear.
4. Disconnect the fan wire from **TB1** at the rear of the fan assembly.
5. Remove the fan wire from the fan assembly.

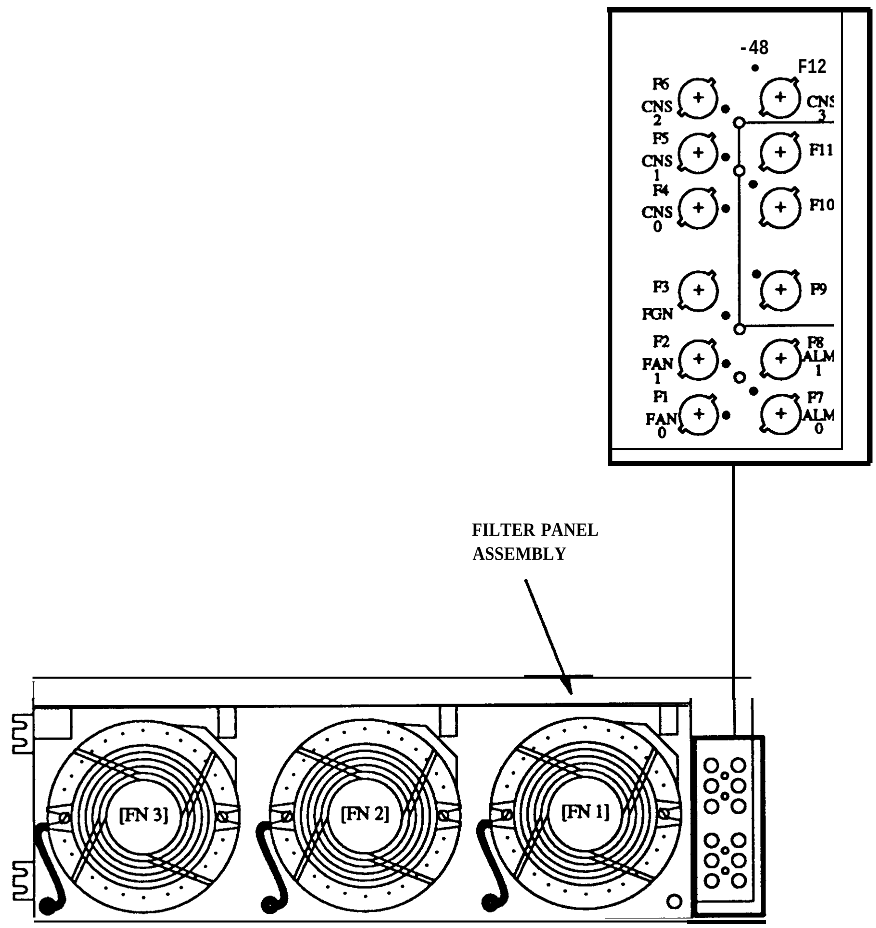


Figure 11-3. Auxiliary Cabinet DC Fans

Installation steps:

1. Connect the replacement fan wire to **TB1** at the rear of the fan assembly.
2. Thread the fan wire-the fan assembly toward the front.
3. Connect the plug on the replacement fan wire to the appropriate fan.
4. Replace the fuse (F1 or F2) associated with the fan wire replaced.

DC Fan Assembly Replacement

To replace the DC fan assembly in the auxiliary cabinet, perform the following removal and installation steps.

Removal steps:

1. At the rear of the fan assembly:
   a. Disconnect the four ground straps at the top of the fan assembly.
   b. Tag and disconnect the alarm leads from AEH4.
   c. Disconnect the two bus bar ground cables.
   d. Disconnect the JTMP connectors in two places.
2. At the front of the fan assembly
   a. Remove the four mounting screws (two on the left side and two on the right side) that secure the fan assembly to the cabinet.
   b. Remove the fan assembly from the cabinet.

Installation steps:

NOTE

When the DC fan assembly is shipped loose, attach 900658329 vinyl plastic tape (approximately 60 inches) to the top and bottom edges of the unit before installing the DC fan assembly into the cabinet.

1. At the front of the cabinet, mount the replacement fan assembly.
2. Secure the replacement fan assembly to the cabinet with the four mounting screws.
3. At the rear of the fan assembly:
   a. Connect the JTMP connectors in two places.
   b. Connect the two bus bar ground cables.
   c. Connect the alarm leads to AEH4.
   d. Connect the four ground straps at the top of the fan assembly.

AC DISTRIBUTION UNIT REPLACEMENT

To replace the AC distribution unit (see Figure 11-4 *Auxiliary Cabinet AC Distribution Unit)* in the auxiliary cabinet, perform the following removal and installation steps.

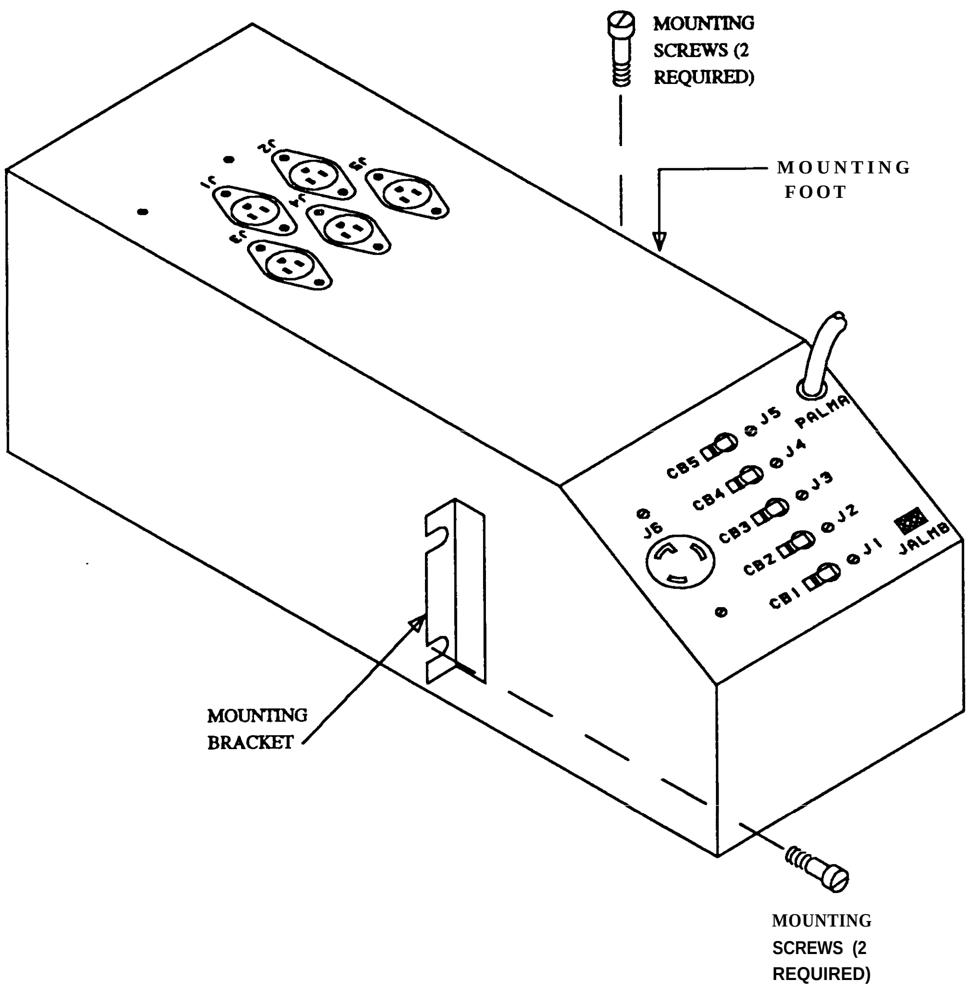


Figure 11-4. Auxiliary Cabinet AC Distribution Unit

Removal steps:

1. Set circuit breakers **CB1** through **CBS** on the AC distribution unit to be replaced to OFF.
2. Disconnect the power cord from the AC source.
3. Tag and disconnect the two wires from the grounding block on the left rear side.

   One wire is connected to the rectifier, and the other wire is connected to terminal TS1.
4. Tag and disconnect the remaining cables from the AC distribution unit to be replaced.
5. At the rear of the auxiliary cabinet, remove the two screws from the mounting foot at the left side of the AC distribution unit.
6. At the front of the auxiliary cabinet, remove the two screws from the mounting bracket.
7. Remove the AC distribution unit from the auxiliary cabinet.

Installation steps:

1. Set circuit breakers **CB1** through **CB5** on the replacement AC distribution unit to **OFF.**
2. Install the replacement AC distribution unit into the auxiliary cabinet and secure the unit to the cabinet using four mounting screws (two in the mounting bracket and two in the mounting foot).
3. Connect the cables (disconnected in step 4 of the removal steps) to the replacement AC distribution unit.
4. Connect the two wires (disconnected in step 3 of the removal steps) to the replacement AC distribution unit grounding block.
5. Connect the power cord of the replacement AC distribution unit to the AC source.
6. Set circuit breakers **CB1** through **CBS** on the replacement AC distribution unit to **ON.**

RECTIFIER REPLACEMENT

To replace the rectifier (see Figure 11-5, Auxiliary Cabinet Rectifier) in the auxiliary cabinet, perform the following removal and installation steps.

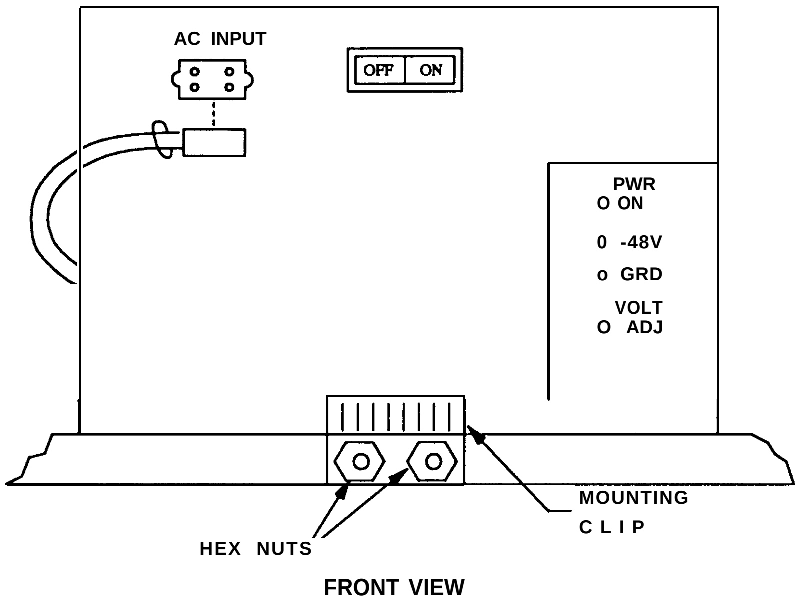
Removal steps:

1. At the front of the rectifier:
   a. Set the on/off switch to **OFF.**
   b. Remove the connector from the AC input jack.
2. At the rear of the rectifier, remove the connectors from the **ALARMS** and **OUTPUT** jacks.

3. At the front of the auxiliary cabinet:
   a. Remove the two hex nuts securing the mounting clip to the shelf.
   b. Remove the mounting clip from the shelf.
4. Slide the rectifier forward and remove it from the auxiliary cabinet.

Installation steps:

1. At the front of the replacement rectifier, set the on/off switch to **OFF.**
2. Install the replacement rectifier into the auxiliary cabinet.
3. At the front of the auxiliary cabinet, replace the mounting clip to the shelf and secure with the two hex nuts.
4. At the rear of the replacement rectifier, connect the two connectors to the **ALARMS** and **OUTPUT** jacks.
5. At the front of the replacement rectifier:
   a. Connect the connector to the **AC** input jack.
   b. Set the on/off switch to **ON.**



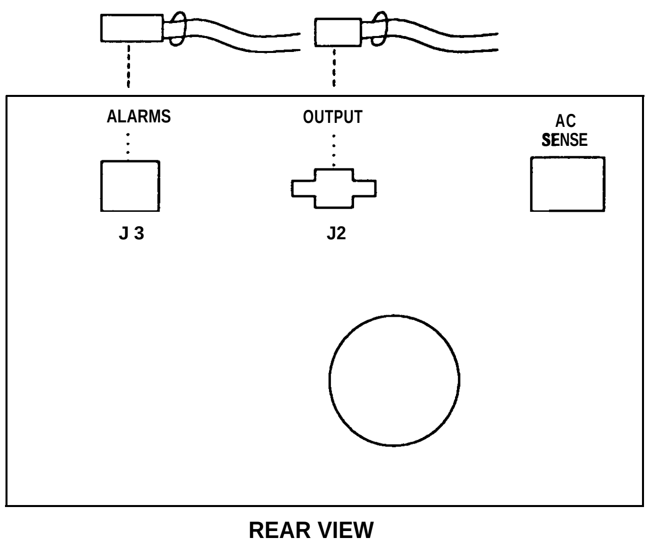


Figure 11-5. Auxiliary Cabinet Rectifier

A. SPECIFIC FAULT CODES

Switch maintenance uses built-in maintenance capabilities, error logging software programs, and stored diagnostic maintenance procedures.

The self-diagnostic capabilities and the various fault-handling capabilities programmed into switch software are the basis for the analysis and trouble-clearing processes presented in this document.

Faults, errors, and failures are detected and identified automatically by the switch software when they occur.

- A fault is a physical defect in the switch hardware that causes improper circuit operation. Some faults are intermittent because they have no predictable or regular frequency of occurrence. Others are considered solid. Possible causes of intermittent faults are noise, deterioration, and critical timing.
- An error is a single occurrence of an incorrect event or response and can be either hardware or software in nature. An error is the result of a fault, noise, software bug, or other irregularity.
- A failure occurs when the number of detected errors exceeds a predetermined threshold. The signal that this threshold is exceeded is an alarm. The level of the alarm shows the effect of the failure on the quality of service.

Tests are used by switch software to detect faults, errors, and failures and to diagnose them as well. A test is a sequence of stimuli applied to a circuit, a group of circuits, or a software function, and its output or results.

A detection test determines the existence of a fault or an abnormal software condition; that is, it indicates whether or not the circuit or function appears to operate comedy.

A diagnostic test analyzes the nature of detected errors and isolates the source of each. here are two subsets of diagnostic tests: identification and analytical.

- Identification tests provide information for the error log when an error is detected: for example, circuit identity and error code.
- Analytical tests perform higher level analysis of recorded errors — that is they perform patterning, manually initiated testing, and repair analysis.

Error Detection

Error detection routines determine whether or not specific circuits or system functions are operating correctly. Detection of errors can occur during an integrity check, an operational check, or a demand test.

- An integrity check is a test that is scheduled to be executed on either a periodic or time-available basis in order to verify the integrity of the system.
- An operational check is performed when the switch carries out one of its assigned operations. The check can be done by hardware (for example, a parity check), by firmware (for example, in-line tests that are built into each common port circuit pack), or by software (for example, verification of data consistency by the call-processing routines).
- A demand testis executed upon demand via a maintenance procedure. Demand tests include the tests that are used for integrity checks.

Once an error is detected, a diagnostic routine maybe used by software to analyze the nature of the error and to determine its source. The error is then recorded in the error log by software and, if necessary, appropriate recovery action is initiated by software.

Detection tests check the switch's hardware components and some of the software functions on an on-going basis. These tests are scheduled by software either as periodic or time-available tasks and are designed to detect both hardware and software errors.

Selected portions of the switch can be verified by running corresponding demand tests. Integrity checks, as well as operational checks, record errors in the periodic maintenance information data structure (PMIDS) while demand tests record errors in the demand maintenance information data structure (DMIDS).

Operational checks are made to detect abnormal conditions or correct results that might arise during switch operation. Detection of these errors is provided by special hardware, firmware, and software.

- For hardware-detectable errors, circuitry on the circuit packs is used to find faults such as parity or data errors. Most of the errors cause a bit to be set in a special error register that is polled every second by the network (TMS or module) processor.

  A one-second periodic task in the common-control processor requests the error information from the network (TMS or module) processor and takes appropriate action. Other faults cause an interrupt to be sent to the module processor for immediate processing.
- Firmware on each common port circuit pack contains two types of self tests. The first type of self test detects failures of components such as RAM and ROM. The second type of self test detects in-line errors. These errors are generally failures of signaling, such as a failure of the central office to release a trunk properly.

Error Logging

To allow for automatic detection of defective circuits, and to provide information that might be required in the analysis and repair of switch problems especially intermittent ones, each occurrence of a detected circuit malfunction is recorded by software in the switch error log. This error log is maintained in a portion of the common-control memory called PMIDS.

When a periodic or time-available test detects an error in the operation of a circuit or functional area, an entry describing the presence and nature of the detected malfunction is made in PMIDS to record that fact. Data stored in PMIDS is used by the alarm-thresholding algorithms to flag switch failures.

PMIDS

PMIDS is composed of a set of eight tables containing particular types of information about an error entry. The eight tables collectively characterize the malfunction of a particular circuit or function. The eight tables for each function or circuit type are:

- Circuit identification
- Error rate and duration
- Time count
- Specific fault code
- Beginning time stamp
- Alarm time stamp
- Ending/resolved time stamp
- Error count.

Entries in PMIDS are categorized as new, active, alarmed, or resolved.

- New entries are those for which no entry for the circuit exists in PMIDS.
- Active entries are those for which errors have been recently detected.
- Alarmed entries are those for which a circuit failure is detected and an alarm sent.
- Resolved entries are those for which circuits were alarmed but have been repaired or for which the alarm has been manually turned off.

In a system with duplicated processors, there are two distinct PMIDS. This allows detection and identification of processor-dependent problems. Most periodic tasks that update PMIDS do not run on the off-line processor. However, the addition of time stamps to PMIDS permanently establishes the time of errors, even in the off-line processor.

DMIDS

DMIDS is used by software when demand tests are active. DMIDS records detailed information (in a temporary buffer) concerning the nature of errors when associated maintenance procedures are performed by maintenance personnel.

Demand tests do not update or in any way alter the contents of PMIDS except for resolving alarmed entries for circuits that pass the demand test.

The information recorded by DMIDS for failing circuits may consist of a unit type, circuit identification, specific fault code, and circuit pack indictments (first, second, and third as appropriate).

Specific Fault Codes

A specific fault code contains information that uniquely identifies the point in the software decision algorithm at which the diagnosis was completed (diagnosis stopped because of a failure).

A specific fault code is a number used by the software developer to select a description that provides more detail about the failure associated with a circuit. This failure is directly observed at a hardware sensor point or is the result of processing data observed at several hardware sensor points.

Specific fault codes are recorded in PMIDS during periodic or time-available testing. Specific fault codes are recorded in DMIDS during demand testing.

Both the PMIDS and DMIDS specific fault codes are available for subsequent display during testing by the appropriate maintenance procedure. Except for the specific fault codes recorded by the periodic operational and universal error processing, the specific fault codes recorded in PMIDS and DMIDS are normally the same.

Specific Fault Code Table

Table A-1 provides a list of the specific fault codes in numerical sequence and by unit type. The table provides circuit pack indictments (up to three) and a brief description of the specific fault code.

Specific fault codes are displayed in the following maintenance procedures:

- Procedure 610 — tape tests.
- Procedure 611 — common control tests.
- Procedure 613 — duplicate processor control and tests.
- Procedure 618 — diagnostic processor/remote interface/alarm interface test.
- Procedure 620 — network procedure.
- Procedure 622 — network peripherals.
- Procedure 628 — universal bus testing.
- Procedure 646 — modem pooling and facility testing.
- Procedure 648 (Test 1 only) — ISDN facilities testing.
- Procedure 651 — processor communications circuit (PCC) tests.

No other maintenance procedure displays a specific fault code.

TABLE A-1. Specific Fault Codes

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
0					No failure.
1	4	TN402	TN404	UN153	SIO error from a maintenance routine.
2	7	TN380 TN381 TN580	TN401 TN588	TN402	TPIO error from a maintenance routine.
3	7	TN380 TN381 TN580	TN401 TN588	TN444 TN482	No response to an end of message from a maintenance routine.
4	8	TN444 TN482	TN380 TN381 TN580		Data parity error on a maintenance or module (or TMS) processor bus write.
5	8	TN444 TN482	TN380 TN381 TN580		Other non-SYSIO error on a maintenance or module (or TMS) processor bus write.
6	11	TN445	TN380		No positive acknowledge using QUI port, INIT TSI, or module processor bus write.
7	15	TN454	TN452	TN400	Distribute data after byte incorrect to a PDI.
8	14	TN452	TN400		Distribute data after byte incorrect to a PCI.
9	33	SN232	TN452	TN400	Distribute data after byte incorrect to a port.
10	53	TN470	TN381		No positive acknowledge after maintenance order to TMSP.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
11	6	TN401 TN588	TN444	TN400	Bus problem caused module (or TMS) processor shutdown — all TN400 boards in carrier, TN530, TN445, and TN380 (TN381 or TN580) are also suspect.
12	16	SN250			Time slot unavailable.
	24	SN252			
	25	SN251			
	29	SN221 SN222			
	62	SN261 TN771B			
13	24	SN252			Circuit in use by call processing.
	25	SN251			
	27	TN754			
	28	SN224 TN735			
	29	SN221 SN222 or TN742 TN746			
	31	SN253			
	32	SN230 TN747			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
13 (contd)	33	SN232 or TN753			Circuit in use by call processing.
	34	SN233 or TN760			
	44	SN233			
	45	SN231 or TN763			
	46	SN254			
	68	TN767			
	69	ANN17 or SN243 or TN762			
	72	SN238 or TN726			
	75	TN555 or TN767			
	78	TN556			
14	--	Board			ID chip failure.
15	7	TN380 or TN381 or TN580	TN401 or TN588	TN444 or TN482	Major module (or TMS) processor failure — no switch required.

continued

TABLE A-1. Specific Fault Codes *(continued)*

specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
16	6	TN401 or TN588	TN530	TN380 or TN381 or TN580	Major failure found in module (or TMS) processor test.
17	23	TN530	TN401 or TN588	TN380 or TN381 or TN580	Major duplication/update failure in module (or TMS) processor test.
18	7	TN380 or TN381 or TN580	TN401 or TN588	TN444 or TN482	Major module (or TMS) processor failure.
19	7	TN380 or TN381 or TN580	TN401 or TN588	TN530	Minor module (or TMS) processor failure.
21	6	TN401 or TN588	TN380 or TN381 or TN580		Bad MCC/module (or TMS) processor communications.
22	7	TN380 or TN381 or TN580	TN401 or TN588		Module (or TMS) processor address parity failure.
23	6	TN401 or TN588			Cannot manipulate MCC status register bits.
24	6	TN401 or TN588			Critical MCC circuit failure.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
27	6	TN401 or TN588	AEH4		Cannot manipulate MCC status register bits or AEH4 alarm distribution and airflow monitor.
28	6	TN401 or TN588	TN444 or TN482	TN400	Bus problem caused module (or TMS) processor shutdown — all TN400 boards in carrier, TN530, TN445, and TN380 (TN381 or TN580) are also suspect.
29	6	TN401 or TN588	TN380 or TN381 TN580		Circuit pack pulled or 4 MHz cable disconnected.
30	56	TN441 or TN460	TN444		Incorrect clock output sequence (incorrect SAC).
31	56	TN441 or TN460	TN444		Maintenance interface failure cause incorrect SAC readout.
32	9	TN460	TN444		GPP data clock lost momentarily (incorrect DCE readout).
	56	TN441	TN444		
33	9	TN460	TN444		Maintenance interface failure cause incorrect DCE readout).
	56	TN441	TN444		
34	9	TN460	TN463	TN444	Clock out of lock with reference clock, module on line (simplex with SCS).
	56	TN441	TN463 or TN481	TN444	
	56	TN441	TN463 or TN481	TN462	Clock out of lock with reference clock, module on line (duplex with SCS).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
34 (contd)	9	TN460	TN444		Clock out of lock with reference clock, module on line (simplex, no SCS).
	56	TN441	TN444		
	9	TN460	TN460		Clock out of lock with reference clock, module on line (duplex, no SCS).
	56	TN441	TN441		
35	9	TN460	TN463	TN444	Clock out of lock with reference clock, module off line (simplex with SCS).
	56	TN441	TN463 or TN481	TN444	
	56	TN441	TN463 or TN481	TN462	Clock out of lock with reference clock, module off line (duplex with SCS).
	9	TN460	TN444		Clock out of lock with reference clock, module off line (simplex, no SCS).
	56	TN441	TN444		
	9	TN460	TN460		Clock out of lock with reference clock, module off line (duplex, no SCS).
	56	TN441	TN441		
36	9	TN460	TN444		MIF failure caused incorrect OOL readout, module on line.
	56	TN441	TN444		
37	9	TN460	TN444		MIF failure caused incorrect OOL readout, module off line.
	56	TN441	TN444		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
38	9	TN460	TN444		Clock frequency generator failed.
	56	TN441	TN444		
39	9	TN460	TN444		MIF failure caused incorrect DCE OOL readout
	56	TN441	TN444		
40	9	TN460	TN444	TN530	Off-line clock appears as master with no SCS/LGI present.
	56	TN441	TN444	TN530	
41	9	TN460	TN444		MIF failure caused off-line clock to appear as master with no SCS/LGI present.
	56	TN441	TN444		
42	9	TN460	TN463	TN444	Clock appears as master with SCS/LGI present.
	56	TN441	TN463 **or** TN481	TN444	
43	9	TN460	TN444		MIF failure caused clock to appear as master with SCS/LGI present.
	56	T4441	TN444		
44	9	TN460	TN444		On-line clock appears as slave with no SCS/LGl present.
	56	TN441	TN444		
45	9	TN460	TN444		MIF failure caused maintenance interface appearance of on-line clock as slave with no SCS/LGI present.
	56	TN441	TN444		
50					TSI PSTORE resources not available.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
51	24	SN252			Port resources not available.
	25	SN251			
	28	SN224			
	29	SN221 or SN222			
	31	SN253			
	32	SN230			
	33	SN232			
	34	SN233 or SN243			
	44	SN233			
	45	SN231			
	46	SN254			
	69	ANN17			
52	11	TN445	TN444	TN440	TSI PSTORE intermittently reports invalid network test activity.
53	11	TN445	TN444		A zero value cannot be read over the PST maintenance bus path.
54	11	TN445	TN446	TN440	Intermittent addressing fault within the TSI.
55	11	TN445	TN444		A non-zero value cannot be read over the PST maintenance bus path.
56	13	TN440	TN446		At least one PDS is receiving PCM data from a double connect.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
57	9	TN460			IDS or module clock out of lock caused TSI test failure.
	56	TN441			
58	8	TN444	TN441 or TN460		Test vector 128 to 255 output from MIF incorrect. (Bad test vectors caused by power failure are restored after reporting this specific fault code).
59	13	TN440	TN446	TN444	UBI data or addressing incorrect, or PDS data or addressing in output store incorrect.
	80	UN154	TN446	TN444	
60	15	TN454	TN440	TN452	PDI addressing or control incorrect.
61	13	TN440	TN454	TN446	ALU receives incorrect data from UB1 or PDS.
	80	UN154	TN446		
62	15	TN454	TN440		PDI output data incorrect.
63	13	TN440	TN446		Intermittent fault in PCM data path.
	80	UN154	TN446		
64	15	TN454	TN452		Intermittent PDI read error over port command bus.
65	10	TN446	TN444		Intermittent ALU read error over maintenance bus path.
66	13	TN440	TN444		Intermittent UBI or PDS read error over maintenance bus path.
	80	UN154	TN444		
67	11	TN445			PST erroneously reports network test activity.
68	8	TN444			MIF outputs test vectors when shutoff.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
69	13	TN440	TN446		UBI or PDS output store generates network test flags.
	80	UN154	TN446		
70	13	TN440	TN454	TN446	PDS input store generates network test flags.
71	15	TN454	TN440		PDI generates network test flags.
72	10	TN446	TN445		ALU accumulator to destination SPN O addressing fault.
73	8	TN444	TN441 TN460		MIF test vector circuitry faulty.
74	8	TN444			MIF TVB contents incorrect (bad test vectors caused by power failure are restored after reporting this specific fault code).
75	11	TN445	TN444		Bad PST memory parity.
76	11	TN445	TN441 TN460	TN444	PST not cycling.
77	13	TN440	TN444		Intermittent PDS read error over maintenance bus path.
78	10	TN446	TN445		ALU address processing suspected.
79	80	UN154	TN446		UBI or PDS address processing suspected.
79	13	TN440	TN446		UBI or PDS address processing suspected.
80	15	TN454	TN440	TN452	PDI looparound or data failure.
81	13	TN440	TN446	TN454	PDS input store addressing or data failure.
82	11	TN445	TN444		PST instruction addressing fault-
83	13	TN440	TN446		UBI or PDS internal addressing fault.
	80	UN154	TN446		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
84	11	TN445	TN444		PST address or memory fault (also causal by illegal connection to port).
85	11	TN445			PST memory or output fault.
86	10	TN446	TN445		ALU address processing fault.
87	10	TN446	TN445		ALU PCM data fault.
88	10	TN446	TN445		ALU data fault (also caused by faulty interface on PCM bus by TN440 PDS or TN441 IDS).
89	11	TN445	TN444		TSI PSTORE has multiple parity errors.
90	23	TN530	TN400	TN380 or TN381 or TN580	Failed the module (or TMS) processor based DUP TST.
92	23	TN530	TN530	TN380 or TN381 or TN580	Duplication board status bits would not set or clear.
93	23	TN530	TN530	TN380 or TN381 or TN580	On-line TN530 error flag was set.
94	23	TN530	TN445	TN380 or TN381 or TN580	Off-line TN530 error flag was set.
95	23	TN530	TN530	TN400	State of health comparator test failed.
96	23	TN530	TN530	TN400	Double write control test failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
97	23	TN530	TN530	TN380 or TN381 or TN580	Double write with bad parity test failed.
98	23	TN530	TN530	TN380 or TN381 or TN580	Duplication channel did not detect bad parity.
99	23	TN530	TN530		Detected double writes off and turned them on.
100	29	SN221 or SN222	TN452	TN400	Non-zero idle port control register.
	32	SN230	TN452	TN400	
	33	SN233	TN452	TN400	
	34	SN233 or SN243	TN452	TN400	
	44	SN233	TN452	TN400	
	45	SN231	TN452	TN400	
	66	SN255	TN452	TN400	
101	29	SN221 or SN222	TN452	TN400	Defective gate array A.
	32	SN230	TN452	TN400	
	45	SN231	TN452	TN400	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
102	29	SN221 SN222	TN452	TN400	Defective gate array B.
	45	SN231	TN452	TN400	
103	32	SN230	TN452	TN400	Defective gate may C.
104	29	SN221 SN222	TN452	TN400	Faulty port select in gate array A.
	32	SN230	TN452	TN400	
	45	SN231	TN452	TN400	
105	29	SN221 SN222	TN452	TN400	Faulty port select in gate array B.
	45	SN231	TN452	TN400	
106	32	SN230	TN452	TN400	Faulty port select in gate array C.
109	28	SN224	TN452	TN400	Faulty set of LA flip flop.
	34	SN233	TN452	TN400	
	44	SN233	TN452	TN400	
	69	ANN17	TN452	TN400	
110	28	SN224	TN452	TN400	Faulty set of CPU flip flop.
	34	SN233	TN452	TN400	
	44	SN233	TN452	TN400	
	69	ANN17	TN452	TN400	
118	28	SN224	TN452	TN400	Faulty clear of LA flip flop.
	69	ANN17	TN452	TN400	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
120	66	SN255	TN452	TN400	Valid tone present bit stuck active in summary board scan.
121	66	SN255	TN454	SN250 or SN253	Valid tone present not indicated in summary board scan (reorder or data answer tone used).
122	66	SN255	TN454	SN250 or SN253	Valid tone present not indicated in tone register (reorder or data answer tone used).
123	66	SN255	TN454	SN250 or SN253	Tone not detected in tone register (reorder or data answer tone used).
124	28	SN224	TN452	TN400	Faulty clear of CPU flip flop.
	34	SN233	TN452	TN400	
	44	SN233	TN452	TN400	
	69	ANN17	TN452	TN400	
125	28	SN224	TN452	TN400	Off-hook error, possibly from attached station.
	29	SN221 or SN222	TN452	TN400	
	34	SN243	TN452	TN400	
	69	ANN17	TN452	TN400	
126	29	SN221 or SN222	TN452	TN400	Off-hook error from bad LA clear or attached station.
	34	SN243	TN452	TN400	
128	32	SN230	TN452	TN400	Ring detection error possibly from attached co.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
129	32	SN230	TN452	TN400	Ground detection error possibly from external circuit signaling.
	45	SN231	TN452	TN400	
130	31	SN253	TN452	TN400	Active SEZD* error, possibly from busy code call circuit.
131	28	SN224	TN452	TN400	Terminated line failed to indicate off hook.
	29	SN221 or SN222	TN452	TN400	
	33	SN232	TN452	TN400	
	34	SN243	TN452	TN400	
	69	ANN17	TN452	TN400	
133	29	SN221 or SN222	TN452	TN400	Off-hook status failed to latch.
	34	SN243	TN452	TN400	
134	16	SN250	TN454	TN452	CPT reflection detector failed to stabilize.
135	16	SN250	TN454	TN452	CPT tone test detection failed to stabilize.
136	16	SN250	TN454	TN452	CPT reflection data ready flag stuck active.
137	16	SN250	TN454	TN452	CPT tone test data ready flag stuck active.
138	32	SN230	TN452	TN400	Normal current detector stuck active.
139	32	SN230	TN452	TN400	Ground detector failed to detect ground.
140	32	SN230	TN452	TN400	GS relay stuck operated.
141	32	SN230	TN452	TN400	Reverse current detector stuck active.
	45	SN231	TN452	TN400	
142	16	SN250	TN454	TN452	CPT tone test detection failed to stabilize.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
143	31	SN253	TN452	TN400	Code call digit DONE* improperly active.
144	31	SN253	TN452	TN400	Code call digit DONE* improperly inactive.
145	31	SN253	TN452	TN400	Faulty code call chime period.
146	31	SN253	TN452	TN400	Faulty digital signal processor.
	66	SN255	TN452	TN400	
147	31	SN253	TN452	TN400	Code call SEZD* improperly inactive.
149	28	SN224	TN454	SN250	Insufficient 440 Hz on-hook reflection.
	29	SN221 or SN222	TN454	SN250	
	32	SN230	TN454	SN250	
	33	SN232	TN454	SN250	
	34	SN233 or SN243	TN454	SN250	
	44	SN233	TN454	SN250	
	69	ANN17	TN454	SN250	
150	28	SN224	TN454	SN250	Excessive 440 Hz on-hook reflection.
	29	SN221 or SN222	TN454	SN250	
	33	SN232	TN454	SN250	
	34	SN233 or SN243	TN454	SN250	
	44	SN233	TN454	SN250	
	69	ANN17	TN454	SN250	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
151	33	SN232	TN454	SN250	Insufficient 440 Hz off-hook reflection.
152	28	SN224	TN454	SN250	Excessive 440 Hz off-hook reflection.
	29	SN221 or SN222	TN454	SN250	
	33	SN232	TN454	SN250	
	34	SN243	TN454	SN250	
	69	ANN17	TN454	SN250	
153	29	SN221 or SN222	TN454	SN250	Excessive signal at other than 440 Hz.
	32	SN230	TN454	SN250	
	33	SN232	TN454	SN250	
	34	SN233 or SN243	TN454	SN250	
	44	SN233	TN454	SN250	
	45	SN231	TN454	SN250	
	46	SN254	TN454	SN250	
	69	ANN17	TN454	SN250	
154	28	SN224	TN454	SN250	On-hook status failed to power down codec.
	29	SN221 or SN222	TN454	SN250	
	33	SN232	TN454	SN250	
	34	SN243	TN454	SN250	
	69	ANN17	TN454	SN250	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
155	32	SN230	TN454	SN250	Codec power up stuck active.
156	16	SN250	TN454		Faulty first tone test frequency idle indication.
157	16	SN250	TN454		Faulty second tone test frequency idle indication.
158	16	SN250	TN454		Faulty first tone test quiet time idle indication.
159	16	SN250	TN454		Faulty second tone test quiet time idle indication.
160	29	SN221 or SN222	TN454	SN250	Faulty 440 Hz frequency.
161	16	SN250	TN454		Faulty dial tone first tone frequency or tone test non-idle indication.
162	16	SN250	TN454		Faulty dial tone second tone frequency or tone test non-idle indication.
163	16	SN250	TN454		Faulty first tone test quiet time non-idle indication.
164	16	SN250	TN454		Faulty second tone test quiet time non-idle indication.
165	16	SN250	TN454		Faulty interrupted dial tone first tone frequency.
166	16	SN250	TN454		Faulty interrupted dial tone second tone frequency.
167	16	SN250	TN454		Faulty interrupted dial tone first tone quiet time.
168	16	SN250	TN454		Faulty interrupted dial tone second tone quiet time.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
169	16	SN250	TN454		Faulty audible ring first tone frequency.
	34	SN243	TN454	SN250	
170	16	SN250	TN454		Faulty audible ring second tone frequency.
	34	SN243	TN454	SN250	
171	16	SN250	TN454		Faulty audible ring first tone quiet time.
	34	SN243	TN454	SN250	
172	16	SN250	TN454		Faulty audible ring second tone quiet time.
	34	SN243	TN454	SN250	
173	16	SN250	TN454		Faulty special audible ring first tone frequency.
174	16	SN250	TN454		Faulty special audible ring second tone frequency.
175	16	SN250	TN454		Faulty special audible ring first tone quiet time.
176	16	SN250	TN454		Faulty special audible ring second tone quiet time.
177	16	SN250	TN454		Faulty intercept first tone frequency.
178	16	SN250	TN454		Faulty intercept second tone frequency.
179	16	SN250	TN454		Faulty intercept first tone quiet time.
180	16	SN250	TN454		Faulty intercept second tone quiet time.
181	16	SN250	TN454		Faulty busy first tone frequency.
182	16	SN250	TN454		Faulty busy second tone frequency.
183	16	SN250	TN454		Faulty busy first tone quiet time.
184	16	SN250	TN454		Faulty busy second tone quiet time.
185	16	SN250	TN454		Faulty reorder first tone frequency.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
186	16	SN250	TN454		Faulty reorder second tone frequency.
187	16	SN250	TN454		Faulty reorder first tone quiet time.
188	16	SN250	TN454		Faulty reorder second tone quiet time.
189	16	SN250	TN454		Faulty 440 Hz reflection detector idle indication.
190	16	SN250	TN454		Faulty broad band reflection detector idle indication.
191	16	SN250	TN454		Faulty 440 Hz reflection detector non-idle indication.
192	16	SN250	TN454		Faulty broad band reflection detector non-idle indication.
193	31	SN253	TN454	SN250	Faulty reception of auxiliary immediate ringback tone.
194	33	SN232	TN452	TN400	Battery feed reversal stuck active or idle circuit indicates loop closure.
196	33	SN232	TN452	TN400	Battery field reversal stuck inactive.
197	16	SN250	TN454		Faulty dial tone first tone frequency or tone test non-idle indication.
198	16	SN250	TN454		Faulty dial tone second tone frequency or tone test non-idle indication.
199	16	SN250			Busy out failed.
	24	SN252			
	25	SN251			
	27	SN270/1 or TN754			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
199 (contd)	28	SN224 or TN735			Busy out failed.
	29	SN221 or SN222 or SN228 or SN229 or TN742 or TN746			
	31	SN253			
	32	SN230 or TN747			
	33	SN232 or TN753			
	34	SN233 or SN243 or TN760			
	33	SN232 or TN753			
	44	SN233			
	45	SN231 or TN763			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
199 (contd)	46	SN254			Busy out failed.
	62	SN261 or TN771B			
	68	ANNll or TN767			
	69	ANN17 or TN762			
	72	SN238 or TN726			
	75	TN555 or TN767			
	78	TN556			
200	24	SN252			Cannot test: this is the only available facility.
	25	SN251			
	32	SN230 or TN747			
	33	SN232 or TN753			
	34	SN233 or SN243 or TN760			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
200 (contd)	45	SN231 or TN763			Cannot test this is the only available facility.
201	33	SN232	TN452	TN4OO	Defective gate array D.
	34	SN233 or SN243	TN452	TN400	
	44	SN233	TN452	TN400	
202	33	SN232	TN452	TN400	Faulty port select in gate array D.
	34	SN233 or SN243	TN452	TN400	
	44	SN233	TN452	TN400	
203	34	SN233	TN454	SN250	E or M signal indicator stuck active.
	44	SN233	TN454	SN250	
204	34	SN233	TN454	SN250	Failure of OP set.
	44	SN233	TN454	SN250	
205	34	SN233	TN452	TN400	M signal sent indicator stuck inactive.
	44	SN233	TN452	TN400	
206	34	SN233	TN454	SN250	Possible external circuit signaling.
	44	SN233	TN454	SN250	
208	34	SN233	TN454	SN250	Clearing looparound fails to remove 440 Hz signal.
	44	SN233	TN454	SN250	
211	34	SN233	TN454	SN250	Off-hook status (ground signal detector) fails to power up the codec.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
214	34	SN233	TN452	TN400	Failure of gate array or E-signal receiver.
	44	SN233	TN452	TN400	
215	34	SN233	TN452	TN400	Failure of OP flip flop.
	44	SN233	TN452	TIWOO	
216	34	SN233	TN452	TN4Q0	Incorrect encode in tie-trunk ID chip.
	44	SN233	TN452	TN400	
218	16	SN250			Network order failed.
	24	SN251			
	27	TN754			
	28	TN735			
	29	SN221 or SN222 or TN742 or TN746			
	32	TN747			
	33	TN753			
	34	TN760			
	35	SN270/1			
	45	TN763			
	62	SN261 or TN771B			
	65	SN270/1			
	68	TN767			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
218 (contd)	69	TN762			Network order failed.
	72	TN726			
	75	TN555 **or** TN767			
	78	TN556			
219	16	SN250			Release busy out failed.
	24	SN252			
	25	SN251			
	27	SN270/1 or TN754			
	28	SN224 **or** TN735			
	29	SN221 **or** SN222 **or** SN228 **or** SN229 **or** TN742 **or** TN746			
	31	SN253			
	32	SN230 **or** TN747			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
219 (contd)	33	SN232 **or** TN753			Release busy out failed.
	34	SN243 **or** TN760			
	44	SN233			
	45	SN231 **or** TN763			
	46	SN254			
	62	SN261 or TN771B			
	68	ANNl1 **or** TN767			
	69	ANN17 **or** TN762			
	72	SN238 or TN726			
	75	TN555 **or** TN767			
	78	TN556			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
220	31	SN253	TN452	TN400	DSP checksum stuck active.
222	47	SN260	TN452	TN400	FTC port 0 stuck off-hook
223	47	SN260	TN452	TN400	FTC port 1 stuck off-hook
227	47	SN260	TN452	TN400	FTC port 0 stuck on-hook
228	47	SN260	TN452	TN400	FTC port 1 stuck on-hook
230	47	SN260	TN454	SN250	NO transmission from ftc port 1 to port 0
231	47	SN260	TN454	SN250	Improper output energy at ftc port 0
232	47	SN260	TN454	SN250	Improper transmission from FTC port 0 to port l
233	47	SN260	TN454	SN250	Improper output energy at FTC port l
235	46	SN254	TN454	SN250	440 Hz transmission failure between two ports.
236	46	SN254	TN454	SN250	Excessive signal at other than 440 Hz at send port.

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
237	46	SN254	TN454	SN250	Improper 440 Hz transmission from receive input to send output on the same port-
239	8	TN444	TN460 or TN44l		Test vector zero to 127 output from MIF incorrect.
240	10	TN446	TN444		Maintenance bus to TSI ALU is bad.
241	10	TN446	TN445		TSI ALU lossing/lines.rizing fault.
242	10	TN446	TN445		TSI ALU opcode failure.
243	10	TN446	TN445		TSI ALU accumulator failure.
244	10	TN446	TN445		TSI ALU accumulator addressing fault.
245	8	TN444	TN446		ALU/MIF interface error.
246	8	TN444			Idle code generator failure.
247	10	TN446			TSI accumulator resources not available.
250	1		MCC		AC power/cabinet rectifier alarm
251	1		MCC		Low 48-volt de cabinet power alarm
252	1		MCC		Cabinet circuit breaker alarm

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
253	1		MCC		Cabinet dc-dc converter alarm
254	1		MCC		Cabinet frequency (ringing) generation alarm
255	1		MCC		Insufficient cabinet airflow alarm
256	1		MCC		Cabinet overtemperature alarm
257	1		MCC		Cabinet holdover battery/charger alarm
258	1		MCC		Left-half module control carrier power fail alarm
259	1		MCC		Right-half module control carrier power fail alarm
264	12	TN400			port command bus — bad test register value from IOBI.
265	14	TN451 **or** TN452	TN400	TN451	port command bus — bad test register value from PCI.
266	15	TN454	TN451 **or** TN452	TN451	port command bus — bad test register value from PDI.
267	–	Board	TN451	TN451	port command bus — bad test register value from port.
268	8	TN444			Maintenance bus — bad test register value from MIF.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
269	6	TN401 **or** TN588	TN444		Maintenance bus — bad test register value from target board.
	7	TN380	TN444		
	8	TN444	TN444		
	9	TN441 **or** TN460	TN444		
	10	TN446	TN444		
	11	TN445	TN444		
	12	TN400	TN444		
	13	TN440	TN444		
	23	TN530	TN444		
	52	TN463	TN444		
270	12	TN400			port command bus — bad SAC value from IOBI.
271	14	TN451 **or** TN452	TN400	TN451	Port command bus — bad SAC value from PCI.
272	12	TN400			port command bus — end of message timeout.
273	8	TN444	TN400	TN380	Port command bus — bad clock on MIF (TN444).
274	12	TN400			Port command bus — IOBI did not flag bad parity.
275	14	TN451 **or** TN452	TN440	TN380	Port command bus — bad (on/off) line control.
276	13	TN440	TN380	Cable	port command bus — bad control complex signal to TN454 and TN452.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
277	8	TN444			Maintenance interface bus — bad SAC value.
278	8	TN444			Maintenance bus — MIF did not flag bad parity.
280	28	SN224	TN452	TN400	MLP controller fault.
	69	ANN17	TN452	TN400	
281	28	SN224	TN452	TN400	MLP 48V overload.
	69	ANN17	TN452	TN400	
282	28	SN224	TN401 or TN588		MLP driver circuitry failure.
	69	ANN17	TN401 or TN588		
283	28	SN224	TN452	TN400	MLP failed to return ID request.
	69	ANN17	TN452	TN400	
284	69	ANN17	TN452	TN400	MLP responded to off-hook test with something besides on, off, or no response.
285	24	SN252	TN452	TN400	Idle sender sum scan indicates dial tone detected.
	25	SN251	SN252	TN452	
286	24	SN252	TN452	TN400	Idle sender status register indicates port busy.
	25	SN251	SN252	TN452	
287	24	SN252	TN452	TN400	Idle sender status register indicates digit queue full.
	25	SN251	SN252	TN452	
288	24	SN252	TN452	TN400	Idle sender status register indicates test tone not sent.
	25	SN251	SN252	TN452	
289	24	SN252	TN452	TN400	Sender circuit sum check failure.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
290	24	SN252	SN250	TN452	Sender not busy while test tone being sent.
291	24	SN252	SN250	TN452	Sender status register indicates test tone complete while sending.
292	24	SN252	SN250	TN454	Sender fails to send 440 Hz test tone.
293	24	SN252			No idle receiver found for sender retest.
294	24	SN252	SN251	TN452	Sender not busy while sending valid tone.
295	24	SN252	SN251	TN452	Sender status register indicates touch-tone signal done while being sent.
296	24	SN252	SN251	TN454	Sender fails to send a valid touch tone.
297	24	SN252	SN251	TN454	No touch-tone digit received at receiver.
	25	SN251	SN252	TN454	
298	24	SN252	TN454	TN400	Sender fails to detect dial tone.
299	24	SN252	TN454	TN400	Sender detects dial tone after dial tone removed.
300	25	SN251	SN250	TN454	No transmission through receiver, low path to high path.
301	25	SN251	SN250	TN454	No transmission through receiver, high path to low path.
302	25	SN251			No idle sender found for receiver retest.
303	25	SN251	SN252	TN452	Idle receiver summary scan indicates reception of touch tone.
304	25	SN251	SN252	TN452	Idle receiver port control register indicates reception of valid touch tone.
305	25	SN251	SN252	TN454	Receiver fails to receive low level digit.
306	25	SN251	SN252	TN454	Receiver fails to recognize touch tone.
307	25	SN251	SN252	TN454	Receiver fails to recognize low level digit.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
308	25	SN251	SN252	TN454	Receiver receives false tone.
309	24	SN252	TN452	TN400	Sender circuit sum check failure.
310	24	SN252	SN251	TN452	Sender not busy while sending valid tone.
311	24	SN252	SN251	TN452	Sender status register indicates touch-tone signal done while being sent.
312	24	SN252	SN251	TN454	Expected valid touch-tone digit not found in receiver digit register. Failure could not be isolated to either sender or receiver, so pegged against both.
	25	SN251	SN252	TN454	
313	24	SN252	SN251	TN454	No touch-tone digit received at receiver. Failure could not be isolated to either sender or receiver, so pegged against both.
	25	SN251	SN252	TN454	
314	25	TN748			Released communication contention from off_line mcc contended for 15 sec
315	33	SN232			Loop closure detection may be due to CO attempting seize.
316	45	SN231	TN454	SN250	Insufficient 600 ohm termination reflection possibly caused by open transmission option switch.
317	45	SN231	TN454	SN250	Excessive 600 ohm termination reflection.
318	45	SN231	TN454	SN250	Insufficient short circuit termination reflection.
319	45	SN231	TN454	SN250	Excessive short circuit termination reflection.
330	11	TN445			TSI PSTORE instruction parity checking circuitry failed.
331	10	TN446			TSI ALU data parity checking circuitry failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
334	15	TN454	TN446		UBI or PDI data parity checking circuitry failed.
	80	UN154	TN446		
337	27	SN270/1			Hyperactive port (receiving too many signals).
	29	SN221 SN222 SN228 SN229			
	30	DTI			
	32	SN230			
	33	SN232			
	34	SN243			
	44	SN233			
	45	SN231			
	48	DTI			
	62	SN261 or TN771B			
	68	Facility	ANNl1		
	72	SN238			
338	27	SN270/1			Data module does not respond to a query.
340	9	TN441 TN460	TN440	TN454	All GPP ports under this unit type failed the data clock test. Other indictments are SN270/1 GPP boards or unplugged digital instruments in the same half carrier as a failing unit type 15, TN454 PDI.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
340 (contd)	13	TN440	TN454	TN441 or TN460	All GPP ports under this unit type failed the data clock test. Other indictments are SN270/1 GPP boards or unplugged digital instruments in the same half carrier as a failing unit type 15, TN454 PDI.
	15	TN454	TN440	TN441 or TN460	
344	69	ANN17	TN454	SN250	Insufficient touch tone signal reflection.
345	69	ANN17	TN454	SN250	Excessive touch tone signal reflection.
350	27	SN270/1	TN452	TN400	GPP DTL fault (non-remoted board).
	27	SN270/1	ANN16		GPP DTL fault (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP digital self test fault.
351	27	SN270/1	TN452	TN400	GPP DTL idle bit set (non-remoted board).
	27	SN270/1	ANN16		GPP DTL idle bit set (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP DTL idle bit set.
352	27	SN270/1	TN452	TN400	GPP DTLI and DTLF together (non-remoted board
	27	SN270/1	ANN16		GPP DTLI and DTLF together (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP digital self test and DTLI together.
353	27	SN270/1	TN452	TN400	GPP 48V overload bit set (current overload) (non-remoted board).
	27	SN270/1	ANN16		GPP 48V overload bit set (current overload) (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP analog self test fault.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
354	27	SN270/1	TN452	TN400	GPP 48V overload and DTLF bits set (non-remoted board).
	27	SN270/1	ANN16		GPP 48V overload and DTLF bits set (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP analog and digital self test fault together.
355	27	SN270/1	TN452	TN400	GPP 48V overload and DTLI bits set (non-remoted board).
	27	SN270/1	ANN16		GPP 48V overload and DTLI bits set (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP analog self test and DTLI together.
356	27	SN270/1	TN452	TN400	GPP 48V overload, DTLI, and DTLF bits set (non-remoted board).
	27	SN270/1	ANN16		GPP 48V overload, DTLI, and DTLF bits set (remoted board).
	62	SN261 or TN77lB	TN452	TN400	ADFTC or MTCP analog, digital self test fault and DTLI together.
357	27	SN270/1	TN452	TN400	One S channel retransmission to the port has occurred (non-remoted board).
	27	SN270/1	ANN16		One S channel retransmission to the port has occurred (remoted board).
	62	SN261 or TN77lB	TN452	TN400	One S channel retransmission to the port has occurred.
	72	SN238	TN452	TN400	One S channel retransmission to the port has occurred (non-remoted board).
	72	SN238	ANN16		One S channel retransmission to the port has occurred (remoted board).
358	27	SN270/1	TN452	TN400	More than one S channel retransmission to the port has occurred (non-remoted board).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
358 (contd)	27	SN270/1	ANN16		More than one S channel retransmission to the port has occurred (remoted board).
	62	SN261 or TN77lB	TN452	TN400	More than one S channel retransmission to the port has occurred.
	72	SN238	TN452	TN400	More than one S channel retransmission to the port has occurred (non-remoted board).
	72	SN238	ANN16		More than one S channel retransmission to the port has occurred (remoted board).
359	30	DTI			GPP test received no response from associated digital instrument after an ID request (non-remoted board).
	30	DTI	ANN16		GPP test received no response from associated digital instrument after an ID request (remoted board).
	48	DTI			GPP test received no response from associated digital instrument after an ID request (non-remoted board).
	48	DTI	ANN16		GPP test received no response from associated digital instrument after an ID request (remoted board).
	62	SN261 or TN77lB			GPP test received no response from ADFTC or MTCP after an ID request.
	72	SN238			GPP test received no response from associated digital instrument after an ID request (non-remoted board).
	72	SN238	ANN16		GPP test received no response from associated digital instrument after an ID request (remoted board).
360	30	DTI			GPP test found state of health bit set for associated digital instrument (non-remoted board).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
360 (contd)	30	DTI	ANN16		GPP test found state of health bit set for associated digital instrument (remoted board).
	48	DTI			GPP test found state of health bit set for associated digital instrument (non-remoted board).
	48	DTI	ANN16		GPP test found state of health bit set for associated digital instrument (remoted board).
	62	SN261 or TN771B			GPP test found state of health bit set for ADFTC or MTCP.
	72	SN238			GPP test found state of health bit set for associated digital instrument (non-remoted board).
	72	SN238	ANN16		GPP test found state of health bit set for associated digital instrument (remoted board).
361	27	SN270/1	TN452	TN400	Failure of port BLA set (non-remoted board).
	27	SN270/1	ANN16		Failure of port BLA set (remet.ed board).
	62	SN261 or TN77lB	TN452	TN400	Failure of port BLA set (non-remoted board).
362	27	SN270/1	TN454		SAC failed to clear in port DTL looparound test.
	62	SN261 or TN77lB	TN454		
363	27	SN270/1	TN454		Invalid SAC signature in port DTL looparound test.
	62	SN261 or TN77lB	TN454		
364	27	SN270/1	TN454		Error in TDR m port DTL looparound test (non-remoted board).
	27	SN270/1	ANN16		Error in TDR m port DTL looparound test (remoted board).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
364 (contd)	62	SN261 or TN77lB	TN454		Error in TDR in port DTL looparound test (non-remoted board).
	68	ANNl1			Error in TDR in port DTL looparound test.
	74	ANN15			Error in TDR in port DTL looparound test.
	75	ANN35			Error in TDR in port DTL looparound test.
365	23	TN530	TN380 or TN381 or TN580	TN401 or TN588	Soft switch failed.
366	23	TN530	TN380 or TN381 or TN580	TN401 or TN588	Hard switch failed.
367	7	TN380 or TN381 or TN580	TN401 or TN588	TN444	On-line initialization failed. All boards in the upper half carrier are suspect. The 4 MHz cable is also suspect.
368	7	TN380 or TN381 or TN580	TN401 or TN588	TN444	Off-line initialization failed. All boards in the upper half carrier are suspect. The 4 MHz cable is also suspect.
369	7	TN380 or TN381 or TN580	TN401 or TN588		Unable to read module health status during initialization.
370	6	TN401 or TN588	TN402	Cable	Unable to write to load signal register during initialization.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
371	12	TN400	TN444	TN380	Negative acknowledge from initialize IOBI order — all TN400 boards in the carrier are suspect.
372	7	TN380 **or** TN381 or TN580	TN401 **or** TN588	TN444	Off-line module (or TMS) processor initialized.
373	72	SN238			Port processor fault.
374	72	SN238			Signaling processor fault.
375	72	SN238			Port processor and signaling processor fault.
376	72	SN238			Loss of data fault and port processor fault.
377	'72	SN238			Loss of data, port processor, and signaling processor faults.
378	72	SN238			Signaling processor fault, initialization successful.
379	72	SN238			Signaling and port processor faults, initialization successful.
380	72	SN238			Loss of data, signaling and port processor faults, initialization successful.
381	72	SN238			Signaling processor fault, initialization failed.
382	72	SN238			Signaling and port processor faults, initialization failed.
383	72	SN238			Loss of data, signaling and port processor faults, initialization failed.
384	72	SN238			Port processor fault, reset successful.
385	72	SN238			Loss of data fault, reset successful.
386	72	SN238			Port processor fault, reset failed.
387	72	SN238			Loss of data fault, reset failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
391	71	TN456/c	TN452	TN400	Unable to read RMI status.
392	71	TN456/c	TN452	TN400	Unable to write RMI control.
393	71	TN456/c	TN456/r	Fiber	RMI LFAIL bit found set, expected to be cleared.
394	71	TN456/c	TN456/r	Fiber	RMI FRMERR bit found set, expected to be cleared.
395	71	TN401 **or** TN588	Cable	TN456/r	4 MHz channel error on the remote end RMI.
396	71	TN456/r	TN456/c	Fiber	Remote RMI failure.
397	71	Fiber	TN456/r	TN456/c	RMI fiber link or remote RMI power failure.
398	71	TN402	Cable	TN456/c	4 MHz channel to central RMI failure (RMI status normal).
399	71	TN456/c	TN452	TN400	Central RMI failure (4 MHz loopback failed and RMI status failed).
400	7	TN380 **or** TN381 **or** TN580			Unknown FIFO 14 error code.
401	11	TN445			TSI shutdown.
402	6	TN401 **or** TN588			Module processor interface error.
	8	TN444			
	11	TN445			
	12	TN400			
	23	TN530			
	80	UN154			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
403	9	TN460			Module clock error.
404	56	TN441	TN461		IDS error.
405	52	TN463			Module system clock synchronizer error.
406	11	TN445			TSI PSTORE memory parity error.
407	8	TN444			TSI PCM data parity error.
	10	TN446			
	13	TN440			
	56	TN441			
	80	UN154			
408	15	TN454			PDI PCM data parity error.
409	57	TN481			Light guide interface error.
410	7	TN380 or TN381 or TN580			Error FIFO data out of synchronization.
411	50	TN461			TCO error (OOL bit set).
412	50	TN461			TCO error (other).
413	50	TN461			TCO after initialization error (MFP bit set).
414	50	TN461			TCO after initialization error (other).
415	51	TN462			LCT error (error bit set).
416	51	TN462			LCT error (other).
417	51	TN462			LCT after initialization error (MFP or ACT bit set).
418	51	TN462			LCT after initialization error (other).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
419	55	TN480			MI error.
420	53	TN470			Failed MPX RAM.
421	53	TN470			MPX RAM parity error recovery failure.
422	53	TN470			MPX initialization error.
423	53	TN470			MPX initialization alarm.
424	53	TN470			MPX RAM parity error.
425	11	TN445			TSI running, but indicates it is shutdown.
426	15	TN454			Ring trip circuit failure.
427	25	SN251			Control/summary-scan register read error.
	29	SN221 SN222			
	66	SN255			
428	30	DTI			Network peripheral protocol error.
	48	DTI			
429	16	SN250			Port digital signal processor error.
	31	SN253			
430	59	TN482			TMIF PFAIL/late make alarm.
432	11	TN445			Burst of TSI PSTORE parity errors.
433	15	TN454			Multiple PCM data parity errors from PDI.
434	27	SN270/1			All ports of DVDP board bad.
435	30	DTI			DVDP indicates peripheral disconnected.
436	28	SN224			MLP controller fault, initialization failed.
	69	ANN17			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
437	13	TN440			DCLOCK signal does not get through PDS. Fault may reside elsewhere along DCLOCK signal path (IDS/module clock, PDS, PDI, GPP).
438	30	DTI			48V fault on DVDP peripheral.
439	30	DTI			Touch-tone digits sent on MFDT S channel.
	48	DTI			
440	36	DTI			Data module handshake error.
441	28	SN224			MLP controller fault, initialization successful.
	69	ANN17			
442	30	DTI			MLP port reports MET set fault.
	48	DTI			
443	30	DTI			48V fault on MLP peripheral.
	48	DTI			
444	11	TN445			TSI PSTORE write failure.
445	8	TN444			MIF write failure.
446	12	TN400			IOBI write failure.
447	59	TN482			TMIF write failure.
449	53	TN470			Initialization TMS MPX RAM test error.
450	53	TN470			Initialization TMS MPX RAM parity checker error.
451	12	TN400			TMS interface error.
	59	TN482			
452	53	TN470			Illegal MPX RAM entry error.
453	52	TN463			TMS system clock synchronizer error.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
454	62	SN261 or TN77lB			DTLF fault on ADFTC or MTCP (digital self test).
455	62	SN261 or TN771B			48V overload fault on ADFTC or MTCP (analog self test).
456	62	SN261 or TN77 B			48V overload and DTLF faults together on the ADFTC or MTCP.
45-7	62	SN261 or TN77lB			Protocol error on the ADFTC or MTCP.
458	62	SN261 or TN771B			DTL idle on ADFTC or MTCP.
459	27	SN270/1			BLA bit on port control register failed to clear or set.
460	27	SN270/1			DTLF fault on DVDP.
461	30	DTI			Peripheral causing DTLF — frame error.
462	72	SN238			Protocol error on the EIA.
463	72	SN238			EIA signaling processor fault, initialization successful.
464	72	SN238			EIA signaling processor fault, initialization failed.
465	72	SN238			EIA port fault, reset successful.
466	72	SN238			EIA port fault, reset failed.
467	72	SN238			EIA loss of data, reset successful.
468	72	SN238			EIA loss of data, reset failed.
469	55	TN480			MI out of frame error.
500	50	TN461	Cable		TCO MFP failure.
501	51	TN462	Cable	TN461	One LCT MFP failure with more than one circuit installed.
502	51	Cable	TN462	TN461	Two LCT MFP failures with more than two LCT circuits installed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
503	51	Cable	TN462	TN461	Three LCT MFP failures with mom than three LCT circuits installed.
504	*50*	TN461	Cable		All LCT circuits have MFP failures — more than one LCT circuit installed
505	51	TN462	Cable	TN461	One LCT MFP failure — one LCT circuit installed.
506	50	TN461	Cable		TCO maintenance circuit has MFP fault.
507	51	TN462	Cable		LCT maintenance circuit has MFP fault.
508	50	TN461	Cable		TCO state determination and duplication control incorrect.
509	59	TN482	TN461		Maintenance interface failure caused TCO failure.
510	50	TN461	TN461		TCO OOL error (off-line TCO first choice).
511	50	TN461			TCO PFL error.
512	50	TN461			Cannot complete TCO force error sequence.
513	51	TN462			LCT PFL error.
514	12	TN400	TN462		IOBI bus error caused LCT failure.
515	51	TN462			LCT error bit set — reset worked.
516	51	TN462			LCT error bit set — cannot reset.
517	51	TN462	TN461		LCT ACT failure.
518	51	TN462	TN461	Cable	Cannot complete LCT force error sequence.
520	12	TN400			TMS IOBI bus — bad test register value from IOBI.
521	14	TN452	TN400		TMS IOBI bus — bad test register value from UPCI.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
522	51	TN462	TN452		TMS IOBI bus — bad test register value from IOBI space board.
	53	TN470	TN452		
	54	TN473	TN452		
	55	TN480	TN452		
	58	UN150	TN452		
	59	TN482	TN452		
523	14	TN452	TN400		TMS IOBI bus — bad SAC value from UPCI.
524	12	TN400			TMS IOBI bus — bad SAC value from IOBI.
525	12	TN400			TMS IOBI bus — end of message timeout.
526	59	TN482	TN400	TN381	TMS IOBI bus — bad clock on TMIF.
527	12	TN400			TMS IOBI bus — IOBI did not flag bad parity.
528	59	TN482			TMS maintenance bus — bad test register value from TMIF.
529	6	TN401 TN588	TN482		TMS maintenance bus — bad test register value from target IOBI board.
	7	TN381	TN482		
	12	TN400	TN482		
	23	TN530	TN482		
	50	TN461	TN482		
	52	TN463	TN482		
	59	TN482	TN482		
530	59	TN482			TMS maintenance bus — bad SAC value.
531	59	TN482			TMS maintenance bus — TMIF did not flag bad parity.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
550	57	TN481	TN480		TMS LGI parity checking circuit failed to detect a bad parity word
551	55	TN480	TN481		TMS MI parity checking circuit failed to detect a bad parity word.
552	55	TN480	TN481	TN441	TMS MI time slot integrity circuit failed to detect a buffer error.
553	53	TN470			TMS MPX parity checking circuit failed to detect a bad parity word
554	50	TN461			TMS TCO MFP checking circuit failed to detect a missing frame pulse.
555	51	TN462			TMS LCT ACT checking circuit failed to detect no activity error.
556	51	TN462			TMS LCT ERR checking circuit failed to detect a clock error.
557	51	TN462			TMS LCT MFP checking circuit failed to detect a missing frame pulse.
558	57	TN481	TN441		TMS LGI out of frame circuit failed to detect a framing error.
559	55	TN480	TN470		TMS MI out of frame circuit failed to detect a framing error.
566	57	TN481	TN480		TMS LGI parity error cannot be cleared.
567	55	TN480	TN481	TN441	TMS MI parity error cannot be cleared.
568	55	TN480	TN481	TN441	TMS MI time slot integrity error cannot be cleared.
569	53	TN470			TMS MPX parity error cannot be cleared.
570	50	TN461			TMS TCO MFP error cannot be cleared.
571	51	TN462			TMS LCT ACT error cannot be cleared.
572	51	TN462			TMS LCT ERR error cannot be cleared.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
573	51	TN462			TMS LCT MFP error cannot be cleared.
574	57	TN481	TN441		TMS LGI out of frame error cannot be cleared.
575	55	TN480	TN470		TMS MI out of frame error cannot be cleared.
576	51	TN462	TN452	TN400	TMS abbreviated IOBI bus test failure.
	53	TN470	TN452	TN400	
	55	TN480	TN452	TN400	
577	50	TN461	TN482		TMS abbreviated maintenance bus test failure.
	57	TN481	TN444		
582	53	TN470			TMS MPX RAM has 32 or more busied out time slots.
584	53	TN470			TMS MPX RAM parity error recovery failure corrected.
585	53	TN470			TMS MPX RAM parity error recovery failure not corrected.
586	53	TN470			TMS MPX RAM initialization test error corrected.
587	53	TN470			TMS MPX RAM initialization test error not corrected.
588	53	TN470			TMS MPX failed RAM corrected.
589	53	TN470			TMS MPX failed RAM not corrected.
600	55	TN480	TN481		Undiagnosed MI buffer error from OEP (periodic only).
601	56	TN441			Undiagnosed MI buffer error from OEP (periodic only).
602	56	TN441	TN481	TN446	IDS input store generates network test flags.
604	10	TN446	TN445	TN444	ALU generates network test flags.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
605	59	TN482			TMIF generates test vectors when shut off.
606	56	TN441	TN446		IDS output store generates network test flags.
607	55	TN481	TN480	TN441	LGL to MI suspected of generating network test flags.
608	56	TN441			IDS transmits network test flags to TMS.
609	54	TN473	TN480 or TN482		FO generates network test flags.
610	58	UN150	TN473		FI generates network test flags.
611	53	TN470	TN480 or TN482	UN150	MPX generates network test flags.
612	57	TN481	TN480	TN441	LGL to LGI suspected of generating network test flags.
613	57	TN481			LGI transmits network test flags to modules.
614	57	TN481	TN441		LGI output to TMS generates network test flags.
615	57	TN481	TN441		LGI input from TMS generates network test flags.
616	55	TN480	TN481		LGL TO MI generates network test flags.
617	57	TN481	TN480		LGL TO LGI generates network test flags.
618	55	TN480	TN482		MI output generates network test flags.
619	55	TN480	TN482	TN470	MI input generates network test flags.
620	10	TN446	TN444		ALU read error.
621	59	TN482			TMIF read error.
623	55	TN480	TN452	TN4OO	MI read error.
624	57	TN481	TN441	TN480	LGI cross-coupling failure.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
625	56	TN441	TN481	TN446	IDS cross-coupling failure.
626	10	TN446	TN445	TN444	ALU addressing error.
627	59	TN482			TMIF test vector output incorrect.
628	56	TN441	TN444		IDS read error.
629	56	TN441	TN446		IDS output store fault.
630	55	TN481	TN480	TN441	Fault suspected in LGL to MI.
631	56	TN441			IDS transmit to TMS fault.
632	54	TN473	TN452	TN400	FO read error.
633	54	TN473	TN480 TN482		FO PCM error.
634	58	UN150	TN452	TN400	FI read error.
635	58	UN150	TN473		FI PCM error.
636	53	TN470	TN480 TN482	UN150	MPX PCM error.
637	57	TN481	TN444		LGI read error.
638	57	TN481	TN480	TN441	Fault suspected in LGL to LGI.
639	56	TN441	TN481	TN446	IDS input store failure.
640	57	TN481			LGI PCM transmit to module fault.
641	57	TN481	TN441		LGI output to TMS fault.
642	57	TN481	TN441		LGI input from TMS fault.
643	55	TN480	TN481		LGL to MI fault.
644	57	TN481	TN480		LGL to LGI fault.
645	55	TN480	TN482	TN470	MI input fault.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
646	55	TN480	TN482		MI output fault.
647	23	TN530	TN530	TN441	IDS PSTORE connection not double written.
648	23	TN530	TN530	TN470	TMS connection not double written.
649	7	TN381	TN470		TMS processor did not build connection.
650	53	TN470	TN381		MPX RAM contents incorrect for connection.
651	7	TN381			TMS processor did not write connection into MPX RAM.
701	52	TN463			High accuracy clock — temporary loss of signal.
702	52	TN463			Main phase locked loop — temporary loss of signal.
703	52	TN463			Main phase locked loop — temporary out of lock.
704	52	TN463			High accuracy clock loss of signal — build out control enabled — main phase locked loop operating correctly.
705	52	TN463			High accuracy clock loss of signal — build out control had to be re-enabled — main phase locked loop operating correctly.
706	52	TN463			Main phase locked loop loss of signal — simplex system.
707	52	TN463			Main phase locked loop out of lock and the system is on the high accuracy clock — simplex system.
708	52	TN463			Main phase locked loop out of lock and going to the high accuracy clock fixed the main phase locked loop — simplex system.
709	52	TN463			Main phase locked loop out of lock and going to the high accuracy clock did not fix the main phase locked loop — simplex system.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
710	52	TN463			High accuracy clock loss of signal — main phase locked loop OK — duplex system.
711	52	TN463			Main phase locked loop loss of signal — duplex system.
712	52	TN463			Main phase locked loop out of lock — duplex system.
713	68	Facility	ANNl1	TN463	Primary reference temporary loss of signal.
714	52	TN463	ANNl1	ANN11	All translated references temporary loss of signal.
715	68	Facility	ANNl1	TN463	Secondary reference temporary loss of signal.
716	68	Facility	ANNl1	TN463	Secondary reference steady loss of signal — P-reference healthy.
717	68	Facility	ANNll	TN463	Primary reference steady loss of signal — secondary reference healthy.
718	52	TN463	ANNll	ANNll	All translated references steady loss of signal.
719	68	Facility	ANNll	TN463	Secondary reference temporarily out of lock.
720	52	TN463	ANNll	ANNl1	All translated references out of lock.
721	68	Facility	ANNll	TN463	Secondary reference steady out of lock.
722	68	Facility	ANNl1	TN463	Primary reference temporarily out of lock.
723	68	Facility	ANNl1	TN463	Primary reference steady out of lock — secondary reference healthy.
724	52	TN463	ANNll	ANNll	All translated references steady out of lock.
725	7	TN380			Invalid data in DS-1 data facility error FIFO.
726	52	TN463			DSyl to SCS cables disconnected.
727	68	ANNl1			Board processor sanity.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
728	52	TN463	ANNl1		Unusable reference reported by SCS.
729	68	Facility	ANNl1		Loss of signal at DS-1.
730	68	Facility	ANNl1		Yellow alarm received.
731	68	ANNl1			Board health.
732	68	Facility	ANNl1		Major error rate.
733	68	Facility	ANNl1		Minor error rate.
734	68	Facility	ANNl1		Red alarm detected.
736	68	Facility	ANNl1		Slip rate exceeded — references switched.
737	68	Facility	ANNl1	TN380	Slip rate threshold exceeded.
738	68	Facility	ANNl1	TN380	Misframe threshold exceeded.
739	68	Facility	ANNl1	TN380	Misframe threshold exceeded — significant slips also occurring.
740	68	Facility	ANNl1	TN380	Misframe threshold exceeded — secondary reference available.
741	52	TN463			Reference source selection hardware does not agree with status memory — high accuracy clock online.
742	52	TN463			Reference source selection hardware does not agree with status memory — references are reversed — references switched.
743	52	TN463			Reference source selection hardware does not agree with status memory — references are reversed — switch of references cannot be made.
744	52	TN463			TMS status bit not consistent with translation.
745	52	TN463			Both SCS on-line bits set or cleared.
746	52	TN463			Both SCS on-line bits backwards.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
747	52	TN463			Build out control bit had to be reset.
748	52	TN463			Build out control bit set and cannot be cleared.
749	52	TN463			Reference source selection does not agree with status memory — bus test failed.
750	68	Facility	ANNll	TN380	Misframe threshold exceeded on primary and secondary references.
751	52	TN463			SCS circuit pack pulled or on-line bit stuck.
752	52	TN463			On-line SCS OK — off-line SCS has out of lock condition.
753	52	TN463			SCS cross-coupling signal incorrect.
754	52	TN463			SCS loss of signal detection circuitry faulty.
755	52	TN463			SCS primary/secondary loss of signal detection circuitry faulty.
758	68	Facility	ANNl1		Loss of signal between both DS-1 interfaces before global initialization.
	74	Facility	ANN15 or ANN16		
759	68	Facility	ANNll		Loss of multiframe alignment on the signaling channel before global initialization (OOF on the signaling channel).
760	68	Facility	ANNll		Loss of multiframe alignment on the signaling channel after global initialization (OOF).
761	68	Facility	ANNl1		Remote multiframe alarm on the signaling channel before global initialization (OOF at far end).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
762	68	Facility	ANNl1		Red alarm raised after global initialization (out of frame).
	74	Facility	ANN15 or ANN16		
763	68	Facility	ANNl1		Remote multiframe alarm on the signaling channel after global initialization (OOF at far end).
764	68	Facility	ANNl1		Blue alarm before global initialization (non-local out of service DS-1 facility).
765	68	ANN11			Loss of processor sanity after global initialization.
	74	ANN15 or ANN16			
766	68	ANNl1			Interface cannot be globally initialized.
	74	ANN15 or ANN16			
767	68				DS-1 synchronization reference just tested cannot be switched on line.
768	52	TN463			HAC could not be switched on line.
769	68	ANNl1			Background firmware test failure before global init (r2v2 only).
770	68	Reference Cable	TN463	ANNl1	Loss of signal from the DS-1 to the SCS.
771	68	Facility	ANNl1		Daily limit exceeded for slips before global initialization.
	74	Facility	ANN15 or ANN16		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
772	68	Facility	ANNl1		Daily limit exceeded for misframes before global initialization.
	74	Facility	ANN15 or ANN16		
773	68	Facility	ANNll		Red alarm raised, out of frame before global initialization.
	74	Facility	ANN15 or ANN16		
774	68	Facility	ANNll		Major alarm from error rate before global initialization.
	74	Facility	ANN15 or ANN16		
775	68	Facility	ANNl1		Minor alarm from error rate before global initialization.
	74	Facility	ANN15 or ANN16		
776	68	Facility	ANNl1		Blue alarm after global initialization (non-local out of service DS-1 facility).
777	68	ANNll			Maintenance control register is defective.
	74	ANN15 or ANN16			
778	68	ANNll			Option control register is defective.
779	68	ANNll			Scan mode control register is defective.
780	68	ANNll			Disable signaling control register is defective.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
781	68	ANNll			Port control register is defective.
782	74	Facility	ANN16	ANN15	No communication from far end before global initialization.
783	68	ANNll			Summary scan register is defective.
784	68	ANNll			Status reset control register is defective.
	74	ANN15 or ANN16			
785	68				DS-1 interface is not. maintenance busy. Warning: if this interface is a reference, then busying out the circuit and testing it maybe service affecting to other digital facilities because the capability to communicate at a digital rate would be lost for the duration of the test.
	74				RCC or RCL interface is not maintenance busy.
788	14	TN451	ANNl1 or ANN15 or ANN16		I/O bus failure.
789	14	TN451	ANNl1 or ANN15 or ANN16		Maintenance bus failure.
791	2	SN443	SN445	SN442	Tape failed to open
792	2	TN563			Waiting for read directory following new tape insertion.
793	2	Cartridge			Tape cartridge not fully inserted.
794	2	TN563			Diagnose opcode timed out, no response.

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
795	2	TN563			INIT_TAP opcode timed out, did not initialize.
796	2	TN563			TN563 mailbox not initialized.
797	2	TN563			Write with good parity failed.
798	2	TN563			CMD with bad parity on high byte failed.
799	2	TN563			CMD with bad parity on low byte failed.
800	2	TN563			Access to TN563 failed over maintenance bus.
801	2	TN563			Access to TN563 failed over system bus.
802	2	TN563			Access denied to tape monitor.
803	2	TN563			Tape subsystem is shutdown.
804	2	TN563			Tape subsystem recovery in progress.
805	2	TN563			Initialization failed.
806	2	TN563			INIT_TAP opcode not preceded by reset.
807	2	TN430			Write protect check failed in init.
808	2	TN430			Parity check failed in init-
809	2	TN430			Mailbox test failed in init.
810	2	TN430			Memory mapper failed in init.
811	2	TN563			TN563 bit set in maintenance register.
812	2	TN563			PPG port problems.
813	2	DTS			Tape drive problems.
814	2	DTS			Overtemp alarm from DTS assembly.
815	2	DTS			Disk drive problems.
816	2	DTS Cable			DTS cable problems.
817	2	Cartridge			Tape cartridge problems.
818	2	TN563			Maintenance register copies do not match.
819	2	TN430			No reply from HCMR from diagnose opcode.
820	2	TN563			Error in DTS, from diagnose opcode.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
821	60	TN491			The diagnostic processor interface RAM output buffer is always busy.
822	49	MAAP			I/O to the MAAP failed.
823	60	TN491			The diagnostic processor interface RAM test failed for test request command.
824	60	TN491			The diagnostic processor interface RAM complement test failed for the complement test request command.
825	60	TN491			The automatic alarm origination function cannot be enabled.
826	4	TN402 or TN403			Invalid software generated fault.
827	4	TN402 or TN403			Cannot set board test status for good data test with looparound.
828	4	TN402 or TN403			Cannot clear board test status for good data test with looparound.
829	4	TN402 or TN403			Cannot write test vector for good data test with looparound.
830	4	TN402 or TN403			Echo check failure for good data test with looparound.
831	4	TN402 or TN403			Cannot read status register for good data test with looparound.
832	4	TN402 or TN403			Read failed from data not ready for good data test with looparound.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
833	4	TN402 or TN403			Read failed from unknown cause for good data test with looparound, however, the data echo check was good.
834	*4*	TN402 or TN403			Read failed from unknown cause for good data test with looparound and the data echo check was bad.
835	4	TN402 or TN403			Read failed from serial parity error for good data test with looparound, however, the data echo check was good.
836	*4*	*TN402* or TN403			Read failed from serial parity error for good data test with looparound and the data echo check was bad.
837	4	TN402 or TN403			Cannot set board test status for serial data channel parity test with looparound.
838	4	TN402 or TN403			Cannot clear board test status for seria1 data channel parity test with looparound.
839	4	TN402 or TN403			Cannot write test vector for serial data channel parity test with looparound.
840	4	TN402 or TN403			Read did not fail for serial data channel parity test with looparound.
841	4	TN402 or TN403			Cannot read status register for serial data channel parity test with looparound.
842	4	TN402 or TN403			Read failed from data not ready for serial data channel parity test with looparound.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
843	4	TN402 or TN403			Read failed from unknown cause for serial data channel parity test with looparound, however, the data echo check was good.
844	4	TN402 or TN403			Read failed from unknown cause for serial data channel parity test with looparound and the data echo check was bad.
845	4	TN402 or TN403			Echo check failed for serial data channel parity test with looparound.
846	4	TN402			Cannot set board test status for serial data channel parity test with no looparound.
847	4	TN402			Cannot clear board test status for serial data channel parity test with no looparound.
848	4	TN402			Cannot write test vector for serial data channel parity test with no looparound.
849	4	TN402			Cannot read status register for serial data channel parity test with no looparound.
850	4	TN402			Read did not fail for serial data channel parity test with no looparound.
851	4	TN402			Read failed from data not ready for serial data channel parity test with no looparound.
852	4	TN402			Read failed from unknown cause for serial data channel parity test with no looparound, however, the data echo check was good.
853	4	TN402			Read failed from unknown cause for serial data channel parity test with no looparound and the data echo check was bad.
854	4	TN402			Echo check failed for serial data channel parity test with no looparound.
855	4	TN402			Cannot set board test status for good data test with no looparound.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
856	4	TN402			Cannot clear board test status for good data test with no looparound.
857	4	TN402			Cannot write test vector for good data test with no looparound.
858	4	TN402			Echo check failure for good data test with no looparound.
859	4	TN402			Cannot read status register for good data test with no looparound.
860	4	TN402			Read failed from data not ready good data test with no looparound.
861	4	TN402			Read failed from unknown cause for good data test with no looparound, however, the data echo check was good.
862	4	TN402			Read failed from unknown cause for good data test with no looparound and the data echo check was bad
863	4	TN402			Read failed from serial parity error for good data test with no looparound, however, the data echo check was good.
864	4	TN402			Read failed from serial parity error for good data test with no looparound and the data echo check was bad.
865	4	TN402 or TN403			Cannot set board test status for buffered bus parity check test with looparound
866	4	TN402 or TN403			Cannot clear board test status for buffered bus parity check test with looparound.
867	4	TN402 or TN403			Buffered bus low byte error not detected.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
868	4	TN402 or TN403			Buffered bus high byte error not detected.
869	4	TN402 or TN403			Buffered bus both bytes in error not detected.
870	60	TN491			The diagnostic processor interface RAM input buffer is unavailable.
871	60	TN491			The command in the diagnostic processor interface RAM input buffer was not accepted by the diagnostic processor.
872	60	TN491			The diagnostic processor interface RAM output buffer gives no response.
873	60	TN491			The diagnostic processor interface RAM output buffer contains improper command response.
874	64	UN_NB			The external processor minor alarm is active.
875	64	UN_NB			The external processor major alarm is active.
876	63	UN_NB			The external equipment minor alarm is active.
877	63	UN_NB			The external equipment major alarm is active.
878	63	UN_NB			The auxiliary cabinet battery holdover circuit alarm is active.
879	63	UN_NB			The auxiliary cabinet temperature limit sensor alarm is active.
880	63	UN_NB			The auxiliary cabinet fan power alarm is active.
881	63	UN_NB			The auxiliary cabinet circuit breaker/fuse alarm is active.
882	63	UN_NB			The auxiliary cabinet frequency generator alarm is active.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
883	63	UN_NB			The auxiliary cabinet rectifier alarm is active.
884	60	TN491			At least one background test of the diagnostic processor's ROM CRC test or internal RAM test has failed
885	60	slot			One ID chip test on the maintenance bus has failed.
886	60	TN491	M_BUS		More than one ID chip test on the maintenance bus has failed.
887	60	TN492	TN491		At least one background test of the integrated modems has failed.
888	60	TN490	TN491		At least one background test of the alarm interface circuit has failed.
889	60	TN492	TN491		Validated and rewritten information RAM CRC check failure.
890	60	TN492	TN491		Two or more invalid messages that the diagnostic processor detected on port O while in the direct mode.
891	60	TN492	TN491		Two or more invalid messages that the diagnostic processor detected on port 1 while in the direct mode.
892	60	TN492	TN491		The diagnostic processor originated a call to RMATS but was not successful in reporting the alarm.
893	60	TN492	TN491		There was an unsuccessful initial data exchange on a call into the CS500 remote interface circuit.
894	60	slot			An attempt was made to run the ID chip test on a board whose presence cannot be detected.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
895	63	UN_NB			Only the external alarm unit number is discernible.
896	63	ER_TP			Only the external alarm error type is discernible.
897	63	UN_NB			An external alarm has occured, however, the type and unit number are not discernible because several alarms exist at once.
898	4	TN404			Common control carrier I/O buffer board failure.
899	22	UN158			Unable to switch common controls.
900	4	TN402 or TN403			Control status register read failure for good data test with looparound.
901	4	TN402 or TN403			Control status register echo check failure for good data test with looparound.
902	4	TN402 or TN403			Control status register read failure for serial data channel parity test with looparound.
903	4	TN402 or TN403			Control status register echo check failure for serial data channel parity test with looparound.
904	4	TN402			Control status register read failure for serial data channel parity test with no looparound
905	4	TN402			Control status register echo check failure for serial data channel parity test with no looparound
906	4	TN402			Control status register read failure for good data test with no looparound.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
907	4	TN402 or TN403			Control status register echo check failure for good data test with no looparound.
908	4	TN402 or TN403			Control status register read failure for buffered bus test.
909	4	TN402 or TN403			Control status register echo check failure for buffered bus test.
910	4	TN402 or TN403			Buffered bus low byte echo failure.
911	4	TN402 or TN403			Buffered bus high byte echo failure.
912	4	TN402 or TN403			Buffered bus both bytes echo failure.
913	60	TN491			The diagnostic processor interface RAM input buffer flag is not setable.
914	60	212A	Cable	TN492C	Modem 0 twice failed the analog looparound test run by the diagnostic processor.
915	22				Off-line common control is not equipped identically to the on-line common control.
916	60	212A	Cable	TN492C	Modem 1 twice failed the analog looparound test run by the diagnostic processor.
917	60	212A	Cable	TN492C	Analog looparound test could not be run on modem O.
918	60	TN491	TN490	UN158	SFC_DFOFFL processor has failed or gone insane
920	2	TN563			Monitor detected error in TN563 while processing tape request.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
921	2	TN563			Monitor I/O failure, timeout, or too many resets attempted.
922	2	DTS			Monitor detected error in DTS while processing tape request.
923	2	Cartridge			Monitor detected error with tape cartridge while processing tape request.
924	2	TN563			Patch run tape failed.
925	2	TN563			Run tape failed (on or offline).
934	22	UN158			Periodic switch of common control failed.
940	2				Tape vendor identification.
941	2				Disk vendor identification.
942	2				SCSI test unit ready failure.
943	2				SCSI rewind failure.
944	2				SCSI read failure.
945	2				SCSI write failure.
946	2				SCSI write file mark failure.
947	2				SCSI space failure.
948	2	CART			Uncorrectable data error on tape.
949	2				SCSI copy failure.
950	2				SCSI read extended failure.
951	2				SCSI write extended failure.
952	2				SCSI read capacity failure.
953	2				SCSI send diagnostic failure.
954	2				SCSI reassign block failure.
955	2				SCSI read defect data failure.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
956	2				SCSI recovered error sense key.
957	2				SCSI not ready sense key.
958	2				SCSI medium error sense key.
959	2				SCSI hardware error sense key.
960	2				SCSI unit attention sense key.
961	2				SCSI data protect sense key.
962	2				SCSI blank check sense key.
963	2				SCSI copy abort sense key.
964	2				SCSI aborted command sense key.
965	2				SCSI volume overflow sense key.
966	2				CP send error.
967	2				CP receive error.
968	2				SCSI protocol error.
969	2				System read or write error.
970	2	SN446	TN430		HCMR power up failures, problem may not be in tape subsystem
972	60	212A	Cable	TN492C	Analog looparound test could not be run on modem 1.
973	22	UN158/F			RWD CF failure because the off-line system bus was busy.
974	22	UN158			Attempt to switch because of I/O failures failed.
975	22	UN158/F	UN158/N	Cable	UN158 double write failure error flag found by the maintenance periodic test.
976	22	UN158/F	UN158/N	Cable	UN158 instruct far processor failure or read double word failure error flag found by the maintenance periodic test.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
977	22	UN158/F	UN158/N	Cable	UN158 near-end failure error flag found by the maintenance periodic test.
978	22	UN158/F	UN158/N	Cable	UN158 double write failure error flag set by the maintenance periodic test.
979	22	UN158/F	UN158/N	Cable	UN158 instruct far processor failure or read double word failure error flag set by the maintenance periodic test.
980	22	UN158/F	UN158/N	Cable	UN158 near-end failure error flag set by the maintenance periodic test.
981	22	UN158/N			Unable to set double write capability.
982	22	UN158/N	UN158/F	Cable	Read double word instruction failed by returning a condition flag of zero.
983	22	UN158/F	UN158/N	Cable	Read double word instruction failed to execute properly, setting the read double word failure error flag.
984	22	UN158/F	UN158/N	Cable	Double written test vector failed the echo check.
985	22	UN158/N			Unable to clear the status register.
986	22	UN158/N			UN158 control register and status register disagree as to double write status.
987	22	UN158/N			Unable to read the UN158 double write select register.
988	22	UN158/N			Unable to write to the UN158 double write select register.
995	72	SN238			Use Procedure 646 to complete tests on this circuit.
996	23				Duplication board must be tested in other on-line — off-line mode to pass verification

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
997	23				Module soft lock failed or module already locked.
998	27	SN270/1 TN754			Cannot test untranslated port.
	28	SN224			
	69	ANN17			
	72	SN238			
999	28	SN224			Requested test not provided for this unit.
	69	ANN17			
1000	35	MPM			Could not send an S message.
	62	SN261 or TN77lB			
	65	MPM			
1001	35	MPM			Facility not tested for more than X cycles.
	62	SN261 or TN77lB			
	65	MPM			
1002	35	MPM			Trunk group not tested for more than X cycles.
	65	MPM			
1003	65	MPM			Did not receive an off hook from the MPM (DTIM/2).
1004	65	SN243			Did not receive A "data set ready" from the MPM (modem).
1005	62	SN261 or TN771B			No bits received on a one port ADFTC or MTCP self test.
1006	62	SN261 or TN771B			Data transmission interrupted: one port ADFTC or MTCP self test.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1007	62	SN261 or TN77lB			Bit error rate exceeded for one port ADFTC or MTCP self test.
1008	62	SN261 or TN77lB			Block error rate exceeded for one port ADFTC or MTCP self test.
1009	62	SN261 or TN77lB			EIA update failure during a one port self test.
1010	62	SN261 or TN77lB			Error overflow during a one port self test.
1011	62	SN261 or TN77lB			Undefined error during a one port ADFTC or MTCP self test.
1012	62	SN261 or TN77lB			No bits received on a two port normal ADFTC or MTCP self test.
1013	62	SN261 or TN77lB			Data transmission interrupted: two port normal ADFTC or MTCP self test.
1014	62	SN261 or TN77lB			Bit error rate exceeded for two port normal ADFTC or MTCP self test.
1015	62	SN261 or TN77lB			Block error rate exceeded for two port normal ADFTC or MTCP self test.
1016	62	SN261 or TN77lB			EIA update failure during a two port normal self test.
1017	62	SN261 or TN77lB			Error overflow during a two port normal self test.
1018	62	SN261 or TN771B			Undefined error during a two port normal ADFTC or MTCP self test.
1019	62	SN261 or TN77lB			No bits received on a two port reverse ADFTC or MTCP self test.
1020	62	SN261 or TN771B			Data transmission interrupted: two port reverse ADFTC or MTCP self test.
1021	62	SN261 or TN77lB			Bit error rate exceeded for two port reverse ADFTC or MTCP self test.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1022	62	SN261 or TN77lB			Block error rate exceeded for two port reverse ADFTC or MTCP self test.
1023	62	SN261 or TN77lB			EIA update failure during a two port reverse self test.
1024	62	SN261 or TN77lB			Error overflow during a two port reverse self test.
1025	62	SN261 or TN77lB			Undefined error during a two port reverse ADFTC or MTCP self test.
1026	62	SN261 or TN77lB			Unset stop message received by ADFTC or MTCP.
1027	62	SN261 or TN77lB			Did not receive expected: test aborted S message.
1028	62	SN261 or TN77lB			Did not receive expected: test completed S message.
1029	62	SN261 or TN77lB			The bit and/or block error rates were not received.
1030	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, normal mode.
1031	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted half duplex test in originating, normal mode.
1032	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, normal mode.
1034	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode.
1035	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating normal mode test.
1036	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test.
1037	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, normal mode.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1038	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, normal mode at 300 baud.
1039	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, normal mode at 300 baud.
1040	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 300 baud.
1041	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 300 baud.
1042	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 300 baud.
1043	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 300 baud.
1044	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, normal mode at 300 baud.
1045	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, normal mode at 1200 baud.
1046	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted half duplex test in originating, normal mode at 1200 baud.
1047	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 1200 baud.
1048	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 1200 baud.
1049	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 1200 baud.
1050	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 1200 baud.
1051	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, normal mode at 1200 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1052	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, normal mode at 2400 baud.
1053	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted half duplex test in originating, normal mode at 2400 baud.
1054	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 2400 baud.
1055	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 2400 baud.
1056	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating normal mode test at 2400 baud.
1057	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 2400 baud.
1058	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, normal mode at 2400 baud.
1059	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, normal mode at 4800 baud.
1060	65	MPM	SN261 or TN771B	MPM	Data transmission interrupt: half duplex test in originating, normal mode at 4800 baud.
1061	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 4800 baud.
1062	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 4800 baud.
1063	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 4800 baud.
1064	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 4800 baud.
1065	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, normal mode at 4800 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1066	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, normal mode at 9600 baud.
1067	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, normal mode at 9600 baud.
1068	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 9600 baud.
1069	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 9600 baud.
1070	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 9600 baud.
1071	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 9600 baud.
1072	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, normal mode at 9600 baud.
1073	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, normal mode at 19.2 kilobaud.
1074	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, normal mode at 19.2 kilobaud.
1075	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 19.2 kilobaud.
1076	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 19.2 kilobaud.
1077	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 19.2 kilobaud.
1078	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 19.2 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1079	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, normal mode at 19.2 kilobaud.
1080	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, normal mode at 56 kilobaud.
1081	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in originating, normal mode at 56 kilobaud.
1082	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 56 kilobaud.
1083	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 56 kilobaud.
1084	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating normal mode test at 56 kilobaud.
1085	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating normal mode test at 56 kilobaud.
1086	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, normal mode at 56 kilobaud.
1087	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, normal mode at 64 kilobaud.
1088	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted half duplex test in originating, normal mode at 64 kilobaud.
1089	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, normal mode at 64 kilobaud.
1090	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, normal mode at 64 kilobaud.
1091	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating normal mode test at 64 kilobaud
1092	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating normal mode test at 64 kilobaud.
1093	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, normal mode at 64 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1094	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode.
1095	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in originating, reverse mode.
1096	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode.
1097	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, reverse mode.
1098	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating reverse mode test.
1099	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating reverse mode test.
1100	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, reverse mode.
1101	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode at 300 baud.
1102	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 300 baud.
1103	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 300 baud.
1104	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 300 baud.
1105	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating reverse mode test at 300 baud.
1106	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating reverse mode test at 300 baud.
1107	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, reverse mode at 300 baud.

continued

TABLE A-l. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1108	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, reverse mode AT 1200 baud.
1109	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 1200 baud.
1110	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 1200 baud.
1111	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 1200 baud.
1112	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating reverse mode test at 1200 baud.
1113	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating reverse mode test at 1200 baud.
1114	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, reverse mode at 1200 baud
1115	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode at 2400 baud
1116	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 2400 baud.
1117	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 2400 baud.
1118	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 2400 baud.
1119	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating reverse mode test at 2400 baud.
1120	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating reverse mode test at 2400 baud.
1121	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, reverse mode at 2400 baud

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1122	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, reverse mode at 4800 baud
1123	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 4800 baud.
1124	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 4800 baud.
1125	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 4800 baud.
1126	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating reverse mode test at 4800 baud.
1127	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating reverse mode test at 4800 baud.
1128	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, reverse mode at 4800 baud.
1129	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode at 9600 baud
1130	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 9600 baud.
1131	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 9600 baud.
1132	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 9600 baud.
1133	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating reverse mode test at 9600 baud.
1134	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating reverse mode test at 9600 baud.
1135	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, reverse mode at 9600 baud

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1136	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in originating, reverse mode at 19.2 kilobaud.
1137	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 19.2 kilobaud.
1138	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 19.2 kilobaud.
1139	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 19.2 kilobaud.
1140	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex originating reverse mode test at 19.2 kilobaud.
1141	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating reverse mode test at 19.2 kilobaud.
1142	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in originating, reverse mode at 19.2 kilobaud.
1143	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode at 56 kilobaud.
1144	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in originating, reverse mode at 56 kilobaud.
1145	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 56 kilobaud.
1146	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 56 kilobaud.
1147	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating reverse mode test at 56 kilobaud.
1148	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex originating reverse mode test at 56 kilobaud.
1149	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, reverse mode at 56 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1150	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in originating, reverse mode at 64 kilobaud.
1151	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted half duplex test in originating, reverse mode at 64 kilobaud.
1152	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in originating, reverse mode at 64 kilobaud.
1153	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in originating, reverse mode at 64 kilobaud.
1154	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex originating reverse mode test at 64 kilobaud.
1155	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex originating reverse mode test at 64 kilobaud.
1156	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in originating, reverse mode at 64 kilobaud.
1157	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, normal mode.
1158	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, normal mode.
1159	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode.
1160	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in terminating, normal mode.
1161	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating normal mode test.
1162	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating normal mode test.
1163	65	MPM	SN261 or TN71B	MPM	Undefined error during a half duplex test in terminating, normal mode.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1164	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, normal mode at 300 baud.
1165	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 300 baud.
1166	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 300 baud
1167	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 300 baud
1168	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 300 baud.
1169	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating normal mode test at 300 baud.
1170	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, normal mode at 300 baud.
1171	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, normal mode at 1200 baud
1172	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 1200 baud.
1173	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 1200 baud.
1174	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 1200 baud.
1175	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 1200 baud.
1176	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating normal mode test at 1200 baud.
1177	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, normal mode at 1200 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1178	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, normal mode at 2400 baud
1179	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test m terminating, normal mode at 2400 baud.
1180	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 2400 baud.
1181	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 2400 baud.
1182	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating normal mode test at 2400 baud.
1183	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating normal mode test at 2400 baud.
1184	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, normal mode at 2400 baud
1185	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, normal mode at 4800 baud
1186	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 4800 baud.
1187	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 4800 baud.
1188	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 4800 baud.
1189	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 4800 baud.
1190	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating normal mode test at 4800 baud.
1191	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, normal mode at 4800 baud

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1192	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, normal mode at 9600 baud
1193	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 9600 baud.
1194	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 9600 baud.
1195	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 9600 baud
1196	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 9600 baud.
1197	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating normal mode test at 9600 baud.
1198	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, normal mode at 9600 baud
1199	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, normal mode at 19.2 kilobaud.
1200	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 19.2 kilobaud.
1201	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating,normal mode at 19.2 kilobaud.
1202	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 19.2 kilobaud.
1203	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 19.2 kilobaud.
1204	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating normal mode test at 19.2 kilobaud
1206	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, normal mode at 19.2 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1207	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, normal mode at 56 kilobaud.
1208	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 56 kilobaud.
1209	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 56 kilobaud.
1210	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 56 kilobaud.
1211	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating normal mode test at 56 kilobaud.
1212	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating normal mode test at 56 kilobaud.
1213	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, normal mode at 56 kilobaud.
1214	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, normal mode at 64 kilobaud.
1215	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, normal mode at 64 kilobaud.
1216	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, normal mode at 64 kilobaud.
1217	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, normal mode at 64 kilobaud.
1218	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating normal mode test at 64 kilobaud.
1219	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating normal mode test at 64 kilobaud.
1220	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, normal mode at 64 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1221	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, reverse mode.
1222	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode.
1223	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test interminating, reverse mode.
1224	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode.
1225	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test.
1226	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating reverse mode test.
1227	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode.
1228	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, reverse mode at 300 baud.
1229	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 300 baud.
1230	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test interminating, reverse mode at 300 baud.
1231	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test interminating, reverse mode at 300 baud.
1232	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test at 300 baud.
1233	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating reverse mode test at 300 baud.
1234	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 300 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1235	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, reverse mode at 1200 baud.
1236	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 1200 baud.
1237	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 1200 baud.
1238	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 1200 baud.
1239	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating reverse mode test at 1200 baud.
1240	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating reverse mode test at 1200 baud.
1241	65	MPM	SN261 or TN77lB	MPM	Undefined error during a half duplex test in terminating, reverse mode at 1200 baud.
1242	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, reverse mode at 2400 baud.
1243	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 2400 baud.
1244	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 2400 baud.
1245	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 2400 baud.
1246	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating reverse mode test at 2400 baud.
1247	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating reverse mode test at 2400 baud.
1248	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 2400 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1249	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, reverse mode at 4800 baud.
1250	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 4800 baud.
1251	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 4800 baud.
1252	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 4800 baud.
1253	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test at 4800 baud.
1254	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating reverse mode test at 4800 baud.
1255	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 4800 baud.
1256	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, reverse mode at 9600 baud.
1257	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 9600 baud.
1258	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 9600 baud.
1259	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 9600 baud.
1260	65	MPM	SN261 or TN771B	MPM	EIA update failure during a half duplex terminating reverse mode test at 9600 baud.
1261	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating reverse mode test at 9600 baud.
1262	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 9600 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1263	65	MPM	SN261 or TN771B	MPM	No bits received on a half duplex test in terminating, reverse mode at 19.2 kilobaud.
1264	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 19.2 kilobaud.
1265	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 19.2 kilobaud.
1266	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverie mode at 19.2 kilobaud.
1267	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test at 19.2 kilobaud.
1268	65	MPM	SN261 or TN771B	MPM	Error overflow during a half duplex terminating reverse mode test at 19.2 kilobaud.
1269	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 19.2 kilobaud.
1270	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, reverse mode at 56 kilobaud.
1271	65	MPM	SN261 or TN77lB	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 56 kilobaud.
1272	65	MPM	SN261 or TN771B	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 56 kilobaud.
1273	65	MPM	SN261 or TN771B	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 56 kilobaud.
1274	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test at 56 kilobaud.
1275	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating reverse mode test at 56 kilobaud.
1276	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 56 kilobaud

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1277	65	MPM	SN261 or TN77lB	MPM	No bits received on a half duplex test in terminating, reverse mode at 64 kilobaud.
1278	65	MPM	SN261 or TN771B	MPM	Data transmission interrupted: half duplex test in terminating, reverse mode at 64 kilobaud.
1279	65	MPM	SN261 or TN77lB	MPM	Bit error rate exceeded for half duplex test in terminating, reverse mode at 64 kilobaud.
1280	65	MPM	SN261 or TN77lB	MPM	Block error rate exceeded for half duplex test in terminating, reverse mode at 64 kilobaud.
1281	65	MPM	SN261 or TN77lB	MPM	EIA update failure during a half duplex terminating reverse mode test at 64 kilobaud.
1282	65	MPM	SN261 or TN77lB	MPM	Error overflow during a half duplex terminating reverse mode test at 64 kilobaud.
1283	65	MPM	SN261 or TN771B	MPM	Undefined error during a half duplex test in terminating, reverse mode at 64 kilobaud
1284	65	MPM	SN261 or TN77lB	MPM	Did not receive a handshake message.
1285	65	MPM	SN261 or TN771B	MPM	Handshake failure message received.
1286	35 or 65	MPM	SN261 or TN77lB		No bits received on a full duplex test.
1287	35 or 65	MPM	SN261 or TN77lB		Data transmission interrupted: full duplex test.
1288	35 or 65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test.
1289	35 or 65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test.
1290	35 or 65	MPM	SN261 or TN77lB		EIA update failure during a full duplex test.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1291	35 or 65	MPM	SN261 or TN77lB		Error overflow during a full duplex test.
1292	35 or 65	MPM	SN261 or TN771B		Undefined error during a full duplex test.
1293	65	MPM	SN261 or TN771B		No bits received on a fill duplex test in originating mode.
1294	65	MPM	SN261 or TN77lB		Data transmission interrupted: full duplex test in originating mode.
1295	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode.
1296	65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test in originating mode.
1297	65	MPM	SN261 or TN77lB		EIA update failure during a full duplex test in originating mode.
1298	65	MPM	SN261 or TN77lB		Error overflow during a fuIl duplex test in originating mode.
1299	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode.
1300	65	MPM	SN261 or TN77lB		No bits received on a full duplex test in originating mode at 300 baud.
1301	65	MPM	SN261 or TN77lB		Data transmission interrupted full duplex test in originating mode at 300 baud.
1302	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 300 baud.
1303	65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test in originating mode at 300 baud.
1304	65	MPM	SN261 or TN77IB		EIA update failure during a full duplex test in originating mode at 300 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1305	65	MPM	SN261 or TN77lB		Error overflow during a full duplex test in originating mode at 300 baud.
1306	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode at 300 baud.
1307	65	MPM	SN261 or TN77lB		No bits received on a full duplex test in originating mode at 1200 baud.
1308	65	MPM	SN261 or TN77lB		Data transmission interrupted: full duplex test in originating mode at 1200 baud.
1309	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 1200 baud.
1310	65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test in originating mode at 1200 baud.
1311	65	MPM	SN261 or TN77lB		EIA update failure during a full duplex test in originating mode at 1200 baud.
1312	65	MPM	SN261 or TN77lB		Error overflow during a full duplex test in originating mode at 1200 baud.
1313	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode at 1200 baud.
1314	65	MPM	SN261 or TN77lB		No bits received on a full duplex test in originating mode at 2400 baud.
1315	65	MPM	SN261 or TN77lB		Data transmission interrupted: full duplex test in originating mode at 2400 baud.
1316	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 2400 baud.
1317	65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test in originating mode at 2400 baud.
1318	65	MPM	SN261 or TN77lB		EIA update failure during a full duplex test in originating mode at 2400 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1319	65	MPM	SN261 or TN77lB		Error overflow during a full duplex test in originating mode at 2400 baud.
1320	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode at 2400 baud.
1321	65	MPM	SN261 or TN771B		No bits received on a full duplex test in originating mode at 4800 baud.
1322	65	MPM	SN261 or TN771B		Data transmission interrupted: full duplex test in originating mode at 4800 baud.
1323	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 4800 baud.
1324	65	MPM	SN261 or TN77lB		Block error rate exceeded for full duplex test in originating mode at 4800 baud.
1325	65	MPM	SN261 or TN77lB		EIA update failure during a full duplex test in originating mode at 4800 baud.
1326	65	MPM	SN261 or TN77lB		Error overflow during a full duplex test in originating mode at 4800 baud.
1327	65	MPM	SN261 or TN77lB		Undefined error during a fulI duplex test in originating mode at 4800 baud.
1328	65	MPM	SN261 or TN77lB		No bits received on a full duplex test in originating mode at 9600 baud.
1329	65	MPM	SN261 or TN77lB		Data transmission interrupted full duplex test in originating mode at 9600 baud.
1330	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 9600 baud.
1331	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in originating mode at 9600 baud.
1332	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in originating mode at 9600 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1333	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in originating mode at 9600 baud.
1334	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode at 9600 baud.
1335	65	MPM	SN261 or TN771B		No bits received on a full duplex test in originating mode at 19.2 kilobaud.
1336	65	MPM	SN261 or TN771B		Data transmission interrupted full duplex test in originating mode at 19.2 kilobaud.
1337	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 19.2 kilobaud.
1338	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in originating mode at 19.2 kilobaud.
1339	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in originating mode at 19.2 kilobaud.
1340	65	MPM	SN261 or TN77lB		Error overflow during a full duplex test in originating mode at 19.2 kilobaud.
1341	65	MPM	SN261 or TN77lB		Undefined error during a full duplex test in originating mode at 19.2 kilobaud.
1342	65	MPM	SN261 or TN771B		No bits received on a full duplex test in originating mode at 56 kilobaud.
1343	65	MPM	SN261 or TN77lB		Data transmission interrupted: full duplex test in originating mode at 56 kilobaud.
1344	65	MPM	SN261 or TN77lB		Bit error rate exceeded for full duplex test in originating mode at 56 kilobaud.
1345	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in originating mode at 56 kilobaud.
1346	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in originating mode at 56 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1347	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in originating mode at 56 kilobaud.
1348	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in originating mode at 56 kilobaud.
1349	65	MPM	SN261 or TN771B		No bits received on a full duplex test in originating mode at 64 kilobaud.
1350	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in originating mode at 64 kilobaud.
1351	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in originating mode at 64 kilobaud
1352	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in originating mode at 64 kilobaud.
1353	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in originating mode at 64 kilobaud
1354	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in originating mode at 64 kilobaud.
1355	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in originating mode at 64 kilobaud.
1356	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode.
1357	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode.
1358	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode.
1359	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode.
1360	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1361	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode.
1362	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode.
1363	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 300 baud.
1364	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 300 baud.
1365	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 300 baud.
1366	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 300 baud.
1367	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 300 baud.
1368	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 300 baud.
1369	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 300 baud.
1370	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 1200 baud.
1371	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 1200 baud.
1372	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 1200 baud.
1373	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 1200 baud.
1374	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 1200 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1375	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 1200 baud.
1376	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 1200 baud.
1377	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 2400 baud.
1378	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 2400 baud.
1379	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 2400 baud.
1380	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 2400 baud.
1381	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 2400 baud.
1382	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 2400 baud.
1383	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 2400 baud.
1384	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 4800 baud.
1385	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 4800 baud.
1386	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 4800 baud.
1387	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 4800 baud.
1388	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 4800 baud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1389	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 4800 baud.
1390	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 4800 baud.
1391	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 9600 baud.
1392	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 9600 baud.
1393	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 9600 baud.
1394	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 9600 baud.
1395	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 9600 baud.
1396	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 9600 baud.
1397	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 9600 baud.
1398	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 19.2 kilobaud.
1399	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 19.2 kilobaud.
1400	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 19.2 kilobaud.
1401	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 19.2 kilobaud.
1402	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 19.2 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1403	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 19.2 kilobaud.
1404	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 19.2 kilobaud.
1405	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 56 kilobaud.
1406	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 56 kilobaud.
1407	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 56 kilobaud.
1408	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 56 kilobaud.
1409	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 56 kilobaud.
1410	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at 56 kilobaud.
1411	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at 56 kilobaud.
1412	65	MPM	SN261 or TN771B		No bits received on a full duplex test in terminating mode at 64 kilobaud.
1413	65	MPM	SN261 or TN771B		Data transmission interrupted — full duplex test in terminating mode at 64 kilobaud.
1414	65	MPM	SN261 or TN771B		Bit error rate exceeded for full duplex test in terminating mode at 64 kilobaud.
1415	65	MPM	SN261 or TN771B		Block error rate exceeded for full duplex test in terminating mode at 64 kilobaud.
1416	65	MPM	SN261 or TN771B		EIA update failure during a full duplex test in terminating mode at 64 kilobaud.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1417	65	MPM	SN261 or TN771B		Error overflow during a full duplex test in terminating mode at@ kilobaud.
1418	65	MPM	SN261 or TN771B		Undefined error during a full duplex test in terminating mode at@ kilobaud.
1419					Member A in use.
1420					Member Bin use.
1421					Member A and B in use.
1422					Member A could not be seized.
1423					Member B could not be seized
1424					No member available for testing.
1425	62	SN261 or TN77lB			ADFTC or MTCP did not return a setup (handshake) result message.
1426	62	SN261 or TN77lB			ADFTC or MTCP did not receive a set test (start handshake) message.
1427					No ADFTC or MTCP available for testing.
1428					ADFTC or MTCP in use.
1429					ADFTC or MTUP maintenance busy.
1430	65	SN270/1			Noon hook received from modem.
1431	65	SN270/1			TDM/2 did not goon hook after test was completed.
1600	68	ANNl1			Background firmware test failure after global init (R2V2 only).
1601	68	Facility	ANNl1		Yellow alarm received before global initialization.
	74	Facility	ANN15 or ANN16		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1602	68	Facility	ANN11		Yellow alarm received after global initialization.
	74	Facility	ANN15 or ANN16		
1604	74	Facility	ANN15		Loss of signal and no communication from the far end after global initialization.
1606	74	Facility	ANN15		No communication from the far end after global initialization.
1607	74	ANN15			Failures in 1 or 2 of the three NIB chips.
1608	74	ANN15			Option control register and administered value mismatch.
1612	74	ANN15 or ANN16			Processor sanity and health error.
1613	74	ANN15			Processor sanity and control path and health error.
1614	74	ANN15			Processor sanity and NIB and health error.
1615	74	ANN15 or ANN16			Processor sanity and RAM and health error.
1616	74	ANN15 or ANN16			Processor sanity and ROM and health error.
1619	27	SN270/1	ANN16		Failure on remote port board 1 before global initialization.
	28	SN224	ANN16		
	29	SN228 or SN229	ANN16		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1619 (contd)	69	ANN17	ANN16		Failure on remote port board 1 before global initialization.
	72	SN238	ANN16		
1620	27	SN270/1	ANN16		Failure on remote port board 1 after global initialization.
	28	SN224	ANN16		
	29	SN228 **or** SN229	ANN16		
	69	ANN17	ANN16		
	72	SN238	ANN16		
1621	27	SN270/1	ANN16		Failure on remote port board 2 before global initialization.
	28	SN224	ANN16		
	29	SN228 **or** SN229	ANN16		
	69	ANN17	ANN16		
	72	SN238	ANN16		
1622	27	SN270/1	ANN16		Failure on remote port board 2 after global initialization.
	28	SN224	ANN16		
	29	SN228 **or** SN229	ANN16		
	69	ANN17	ANN16		
	72	SN238	ANN16		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1623	27	SN270	ANN16		Failure on remote port board 3 before global initialization.
	28	SN224	ANN16		
	29	SN228 **or** SN229	ANN16		
	69	ANN17	ANN16		
	72	SN238	ANN16		
1624	27	SN270/1	ANN16		Failure on remote port board 3 after global initialization.
	28	SN224	ANN16		
	29	SN228 **or** SN229	ANN16		
	69	ANN17	ANN16		
	72	SN238	ANN16		
1625	74				One or more environmental errors have been detected.
1626	74	ANN16	Link		Reflected signal is above the high threshold.
1627	74	ANN16	Link		Reflected signal is below the low threshold.
1628	16	SN250	TN454	TN451	No valid reflected signal was received.
1629	74	ANN16			Sanity and health and IO failure.
1630	29	SN228 **or** SN229			Port failure on remote analog board.
1631	74	ANN16	Link		RCC interface has error bits set.
1632	74	ANN15	Link		RCL interface has error bits set.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1633	72	SN238			Port failure on remote EIA board.
1634	74	ANN16			Firmware error on RCC interface.
1635	74	ANN15			Firmware error on RCL interface.
1636	27	SN270/1			Port failure on remote GPP board.
1637	74	Link	ANN16		Major alarm from error rate on RCC interface.
1638	74	Link	ANN15		Major alarm from error rate on RCL interface.
1639	74	Link	ANN16		Minor alarm from error rate on RCC interface.
1640	74	Link	ANN15		Minor alarm from error rate on RCL interface.
1641	69	ANN17			Port failure on remote MFAT board.
1642	28	SN224			Port failure on remote MFET board.
1643	74	ANN16			Processor sanity and health and per time slot PCM failure.
1644	74				Fiber status register contents do not agree with administered value for the RCL T1/fiber option.
1647	74	Link			No response from firmware test 1 request.
1648	74	ANN15			Loss of signal between fiber termination point and DS-1 chip set on the RCL.
1649	74	Link	ANN15		Loss of signal between RCL and RCC with a fiber connection.
1651	74	ANN16			Error reported in processor status register.
1652	74	ANN16			Error reported in fiber status register.
1653	74	ANN16			Other error reported but no error found.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1850	68	ANNl1			Board processor sanity.
	74	ANN15 or ANN16			
	75	ANN35			
1851	68	ANNl1			Error reported in processor status register.
	74	ANN15 or ANN16			
	75	ANN35			
1852	68	ANNl1			Error reported in environment registers.
	74	ANN15 or ANN16			
	75	ANN35			
1853	68	ANNl1			Loss of signal reported by SCS board.
	75	ANN35			
1854	68	ANNl1			Error reported in fiber status register.
	74	ANN15 or ANN16			
	75	ANN35			
1855	68	Facility	ANNl1		Loss of signal reported by DS-1 board.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1856	68	Facility	ANN11		Excessive slips.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1857	68	Facility	ANN11		Excessive misframes.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1858	68	Facility	ANN11		Loss of framing reported by far end (yellow alarm).
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1859	68	Facility	ANN11		Board health error.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1860	68	Facility	ANN11		Major error rate alarm.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKTl	CKT2	CKT3	Definition
1861	68	Facility	ANNll		Minor error rate alarm.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1862	68	Facility	ANNll		Loss of framing report (red alarm).
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1863	68	Facility	ANNll		Loss of multiframe alignment.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1864	68	Facility	ANNll		Loss of multiframe alignment reported by the far end.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1865	68	Facility	ANNll		Far end in looparound (blue alarm).
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1866	68	Facility	ANN11		Other error reported — no errors found.
	74	Facility	ANN15 or ANN16		
	75	Facility	ANN35		
1900	75	ANN35			Dual port RAM addressing failure.
1901	75				Blue alarm detected before global initialization.
1902	75				Blue alarm detected after global initialization.
1903	75	Facility	ANN35		Loss of signal between PRIs before global initialization.
1904	75	ANN35			DS-1 chip set and health error.
1905	75	ANN35			Dual port and health error.
1906	75				Fiber status register contents do not agree with administered value for the PRI T1/fiber option.
1907	75	ANN35			FIFO and health error.
1908	75	Facility	ANN35		Loss of signal between PRIs with a fiber connection.
1909	75	TN463			High accuracy clock cannot be switched on line.
1910	75	ANN35			Health bit of selected PRI is set before global initialization indicating that a firmware test failed.
1911	75	ANN35			Health bit of selected PRI is set after global initialization indicating that a firmware test failed.
1912	75	ANN35			PRI cannot be globally initialized.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1913	'75	TN451	ANN35		I/O bus is defective.
1914	75	ANN35			K default register defective.
1915	75	ANN35			D channel looparound and health error.
1916	75	Facility	ANN35		Major alarm from error rate before global initialization.
1917	75	TN451	ANN35		Maintenance bus is defective.
1918	75	Facility	ANN35		Minor alarm from error rate before global initialization.
1919	75	Facility	ANN35		Daily limit exceeded for misframes before global initialization.
1920	75	ANN35			N200 default register defective.
1921	75				PRI is not maintenance busy. Warning: If this interface is a reference, then busying out the circuit and testing it maybe service affecting to other digital facilities because the capability to communicate at a digital rate would be lost for the duration of the test.
1922	75	ANN35			Option control register defective.
1923	75	ANN35			RAM and health error.
1924	75	Facility	ANN35		Out of frame detected (red alarm) before global initialization.
1925	75	Facility	ANN35		Out of frame detected (red alarm) after global initialization.
1927	75	ANN35			ROM and health error.
1928	75	ANN35			Loss of PRI processor sanity after global initialization.
1929	75	Facility	ANN35		Daily limit exceeded for slips before global initialization.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
1930	75	Reference Cable	TN463	ANN35	Loss of signal from the PRI to the SCS.
1931	75	ANN35			T200 default register defective.
1932	75	ANN35			T203 default register defective.
1933	75	ANN35			TEI default register defective.
1934	75	Facility	ANN35		Out of frame at far end (yellow alarm) detected before global initialization.
1935	75	Facility	ANN35		Out of frame at far end (yellow alarm) detected after global initialization.
1936	75	ANN35			Control register defective.
1937	75	ANN35			Other and health error.
1938	75	ANN35			Register and health error.
2000	76	ANN35			Far end cannot enter multiple frame mode (Level 2 protocol error.)
	79	BRI Terminal	TN556		
2001	76	ANN35			SABME transmitted N200 times with no response (Level 2 protocol error.)
	79	BRI Terminal	TN556		
2002	76	ANN35			DISC transmitted N200 times with no response (Level 2 protocol error.)
	79	BRI Terminal	TN556		
2003	76	ANN35			Miscellaneous ISDN level 2 errors (Level 2 protocol error.)
	79	BRI Terminal	TN556		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
2004	76	ANN35			Closed D channel (Level 2 protocol error.)
	79	BRI Terminal	TN556		
2005	7	TN380			Bad packet checksum (Level 2 protocol error)
2006	7	TN380			Maintenance busy out failed, I/O failure.
2007	7	TN380			Release maintenance busy out failed, I/O failure.
2112	77	TN474			Attempted read operation of incoming FIFO failed.
2113	77	TN474			Attempted read operation of dual port RAM address failed.
2114	77	TN474			Attempted read operation of dual port RAM data failed.
2115	77	TN474			Attempted read operation of status register failed.
2116	77	TN474			Attempted read operation of identification chip failed.
2117	77	TN474			Attempted read operation of incoming FIFO underflowed.
2119	77	TN474			Receive halted due to an excessive number of errors during a receive.
2120	77	TN474			Transmit halted due to an excessive number of errors during a transmit.
2121	77	TN474			Attempted write operation to outgoing FIFO failed.
2123	77	TN474			Attempted write operation to dual port RAM address failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
2124	7 7	TN474			Attempted write operation to dual port RAM data failed.
2125	7 7	TN474			Attempted write operation to status register failed.
2126	7 7	TN474			Attempted write operation to identification chip failed.
2127	7 7	TN474			Attempted write operation to outgoing FIFO overflowed.
2128	77	TN474			I/O failure.
2131	77	TN474			Message protocol error — outgoing block check code error.
2132	77	TN474			Message protocol error — outgoing message sequence number error.
2133	77	TN474			Message protocol error — outgoing message length error.
2134	77	TN474			Message protocol error — outgoing 3 NAK error.
2135	7 7	TN474			Message protocol error — outgoing 3 (enquiry) error.
2136	7 7	TN474			Message protocol error — incoming block check code error.
2137	7 7	TN474			Message protocol error — incoming message sequence number error.
2138	7 7	TN474			Message protocol error — incoming message length error.
2139	7 7	TN474			Message protocol error — incoming 3 NAK error.
2141	77	TN474			Self test found error in outgoing FIFO.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
2142	77	TN474			Self test found error in incoming FIFO.
2143	77	TN474			Self test found error in dual port RAM.
2144	77	TN474			Self test found error in PCC data RAM.
2145	77	TN474			Self test found error in PCC program ROM.
2146	77	TN474			Self test found error in 80186 processor.
2147	77	TN474			Self test found error in looparound test.
2150	77	TN474			Attempted to send message but message sequence numbers busy.
2158	77				Attempt to send message to PCC failed, try again.
2159	77				PCC in self test, try again after self test completes.
2160	77	TN474			Sanity failure on this circuit.
2161	77	TN474			PCC failed to go into internal loop mode.
2162	77	TN474			PCC failed to detect bad block check code.
2163	77	TN474			PCC returned bad echo of messge in internal loop mode.
2164	77	TN474			PCC failed to detect nonsequential message sequence number.
2165	77	TN474			Peripheral returned bad echo of message in end-to-end loop mode.
2166	77	TN474			PCC failed to run requested self test.
2167	77	TN474			PCC failed to finish self test in given time.
2168	77	TN474			Internal loop timed out.
2169	77	TN474			End-to-end loop timed out.

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
2170	77	TN474			PCC board experienced power failure.
2171	77	TN474			Lost DTR.
2180	82				The number of local trunks administered for trunk group on the snc is different than the number of remote trunks administered for same trunk group on the tandem.
3000	80	UN154	TN580	LAN Bus	HMP to UBI LAN packet loop test failure.
3001	80	UN154	TDM A Bus	TN580	Off-line UBI angel control channel talk/ listen failure (control channel *on* bus A).
3002	80	UN154	TDM B Bus	TN580	Off-line UBI angel control channel talk/ listen failure (control channel on bus B).
3003	80	UN154	TN580		HMP archangel message loop test failure.
3004	80	UN154			Port network frame clock from the UBI is insane.
3005	80	UN154	TN460 or TN481	TN441	Port network system clock from the UBI is insane.
3006	80	UN154			System D clock phase lock loop is out of lock.
3007	80	UN154	TN446		Data parity error detected on the UBI.
3008	81	TDM A Bus	UN154		TDM control channel is inoperable on TDM bus A.
3009	81	TDM B Bus	UN154		TDM control channel is inoperable on TDM bus B.
3010	16	TN768	TN580	TN401 or TN588	Module processor negatively acknowledged down link message.
	24	TN748	TN580	TN401 or TN588	
	25	TN748	TN580	TN401 or TN588	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3010 (contd)	27	TN754	TN580	TN401 or TN588	Module processor negatively acknowledged down link message.
	28	TN735	TN580	TN401 or TN588	
	29	TN742 or TN746	TN580	TN401 or TN588	
	31	TN768	TN580	TN401 or TN588	
	32	TN747	TN580	TN401 or TN588	
	33	TN753	TN580	TN401 or TN588	
	34	TN760	TN580	TN401 or TN588	
	45	TN763	TN580	TN401 or TN588	
	66	TN748	TN580	TN401 or TN588	
	68	TN767	TN580	TN401 or TN588	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3010 (contd)	69	TN762	TN580	TN401 or TN588	Module processor negatively acknowledged down link message.
	72	TN726	TN580	TN401 or TN588	
	75	TN555 or TN747	TN580	TN401 or TN588	
	78	TN556	TN580	TN401 or TN588	
	81	TDM Bus	TN580	TN401 or TN588	
3011					Resource needed for testing not available.
3012					Tone detector not available in module.
3013	16	TN768	UN154	TN580	No up link response message received from port under test.
	24	TN748	UN154	TN580	
	25	TN748	UN154	TN580	
	27	TN754	UN154	TN580	
	28	TN735	UN154	TN580	
	29	TN742 or TN746	UN154	TN580	
	32	TN747	UN154	TN580	
	33	TN753	UN154	TN580	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3013 (contd)	34	TN760	UN154	TN580	No up link response message received from port under test-
	44	TN760	UN154	TN580	
	45	TN763	UN154	TN580	
	66	TN748	UN154	TN580	
	68	TN767	UN154	TN580	
	69	TN762	UN154	TN580	
	75	TN555	UN154	TN580	
	78	TN556	UN154	TN580	
3014	24	TN748	UN154	TN401 **or** TN588	No response from tone detector during test.
	25	TN748	UN154	TN401 **or** TN588	
	34	TN748	UN154	TN401 **or** TN588	
	44	TN760	UN154	TN401 **or** TN588	
	66	TN748	UN154	TN401 **or** TN588	
3015	6	TN401 **or** TN588	TN580		No response from module processor idle time slot test.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3016	24	TN748	UN154		Module processor was unable to complete idle time slot test.
	25	TN748	UN154		
	66	TN748	UN154		
3017					Test not applicable to present port configuration.
3020	16	TN748	TN748		Crosstalk test failed.
	27	TN754	TN748		
	28	TN735	TN748		
	29	TN742 or TN746	TN748		
	32	TN747	TN748		
	33	TN753	TN748		
	34	TN760	TN748		
	44	TN760	TN748		
	45	TN763	TN748		
	54	TN556	TN748		
	68	TN767	TN748		
	69	TN762	TN748		
	72	TN726	TN748		
	83	TN556 or TN726 or TN735	TN748		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3020 (contd)	83 (contd)	TN742 or TN746 or TN747 or TN753 or TN754 or TN760 or TN762 or TN763 or TN767 or TN768			Crosstalk test failed.
3021	27	TN754	TN748	TN768	Conference test failed —the port may be operational (that is, this maybe a false failure due to an in seize/off hook during the test), or the problem may be off board.
	28	TN735	TN748	TN768	
	29	TN742 or TN746	TN748	TN768	
	32	TN747	TN748	TN768	
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	44	TN760	TN748	TN768	
	45	TN763	TN748	TN768	
	54	TN556	TN748	TN768	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3021 (contd)	68	TN767	TN748	TN768	Conference test failed —the port may be operational (that is, this maybe a false failure due to an in seize/off hook during the test), or the problem maybe off board.
	69	TN762	TN748	TN768	
	72	TN726	TN748	TN768	
	83	TN556 or TN726 or TN735 or TN742 or TN746 or TN747 or TN753 or TN754 or TN760 or TN762 or TN763 or TN767 or TN768	TN748	TN768	
3025	27	DTI	TN754		Electronic power feed restoral test failed due to an overcurrent fault.
	28	MET Terminal	TN735		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3025 (contd)	30	DTI	TN556 or TN735 or TN754 or TN762		Electronic power feed restoral test failed due to an overcurrent fault.
	48	DTI	TN556 or TN735 or TN762		
	69	MFAT Terminal	TN762		
3026	27	DTI	TN754		Electronic power feed inquiry test failure due to an overcurrent fault — EPF currently on.
	28	MET Terminal	TN735		
	30	DTI	TN556 or TN735 or TN754 or TN762		
	48	DTI	TN556 or TN735 or TN762		
	69	MFAT Terminal	TN762		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3027	27	DTI	TN754		Electronic power feed inquiry test failed due to an overcurrent fault — EPF currently off.
	28	M E T Terminal	TN735		
	30	DTI	TN556 or TN735 or TN754 or TN762		
	48	DTI	TN556 TN735 or TN762		
	69	MFAT Terminal	TN762		
3028	27	DTI	TN754		Electronic power feed inquiry test failed due to a no load fault — EPF currently on.
	28	M E T Terminal	TN735		
	30	DTI	TN556 or TN735 or TN754 or TN762		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3028 (contd)	48	DTI	TN556 or TN735 or TN762		Electronic power feed inquiry test failed due to a no load fault — EPF currently on.
	69	MFAT Terminal	TN762		
3029	27	TN754			Excessive digital counter errors.
	78	TN556			
3030	27	TN754			S channel looparound test failed.
3031	27	TN754			DCP bad scan counter exceeds threshold.
	28	MET Terminal	TN735		
	69	TN762			
3032	27	DTI	TN754		No response from EPF restoral test.
	28	MET Terminal	TN735		
	30	DTI	TN556 or TN735 or TN754 or TN762		
	48	DTI	TN556 or TN735 or TN762		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3032 (contd)	69	MFAT Terminal	TN762		No response from EPF restoral test.
3035	81	LAN Bus	UN154	TN580	LAN bus test failed — inconclusive results. Use Procedure 648 or 622 for better fault isolation.
3036	81	LAN Bus	UN154	TN580	No functional LAN bus interface boards found in module being tested.
3037	81	LAN Bus	UN154	TN580	LAN bus level 2 test failed.
3040	69	TN762			Digital looparound test failed.
3041	30	DTI	TN762		Remote station test failed.
	48	DTI	TN762		
	69	MFAT Terminal			
3042	28	TN735			Battery feed test failed.
	29	TN742			
3043	28	TN735			Factory external looparound test failed.
3048	32	TN747	TN748	TN768	Reflective 404 Hz tone test failed — the port may be operational (that is, this may be a false failure due to an in seize during the test), or the problem maybe off board.
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	44	TN760	TN748	TN768	
	45	TN763	TN748	TN768	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3049	32	TN747	TN748	TN768	Reflective 1004 Hz tone test failed — the port may be operational (that is, this maybe a false failure due to an in seize during the test), or the problem may be off board.
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	44	TN760	TN748	TN768	
	45	TN763	TN748	TN768	
3050	32	TN747	TN748	TN768	Reflective 2804 Hz tone test failed — the port may be operational (that is, this maybe a false failure due to an in seize during the test), or the problem may be off bead.
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	44	TN760	TN748	TN768	
	45	TN763	TN748	TN768	
3051	33	TN753	TN748	TN768	Non-reflective 1004 Hz tone test failed — the port may be operational (that is, this may be a false failure due to an in seize during the test), or the problem maybe off board.
3052	28	TN735	TN748	TN768	Reflective 1004 Hz R balance tone test failed — the port maybe operational (that is, this may be a false failure due to an off hook during the test), or the problem maybe off board.
	29	TN742 **or** TN746	TN748	TN768	
	69	TN762	TN748	TN768	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3053	29	TN742	TN748	TN768	Reflective 1004 Hz RC balance tone test failed — the port maybe operational (that is, this may be a false failure due to an off hook during the test), or the problem maybe off board.
3054	29	TN742	TN748	TN768	Non-reflective 1004 Hz R balance tone test failed — the port maybe operational (that is, this may be a false failure due to an off hook during the test or because the port is connected to off-premise equipment, some non-voice terminal equipment or some loop equipment), or the problem maybe off board.
3056	80	UN154			System clock failure — no clock present in the port network.
3057	80	UN154			UBI clock error.
3058	80	UN154			UBI test message loop failure.
3059	81	TDM A Bus			UBI bus corruption test failure — bus A.
3060	81	TDM B Bus			UBI bus corruption test failure — bus B.
3061	81	TDM Bus			TDM bus retransmission over threshold.
3062	81	TDM Bus			TDM bus no response over threshold.
3063	81	TDM Bus			TDM bus checksum over threshold.
3064	81	TDM Bus			Down-link message not sent to angel.
3065	80	UN154			UBI data parity error.
3066	80	UN154			LAN packet loop test failure.
3067	81	LAN Bus			LAN receive parity error.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKTl	CKT2	CKT3	Definition
3068	80	UN154			UBI write failure.
3069	80	UN154			UBI clock failure.
3070	80	UN154			UBI indicted as final attempt to recover failed TDM bus.
3071	80	UN154			Off-line UBI down link messages lost.
3076	16	TN768	UN154	TN580	Board sanity test failed, on-board microprocessor failed to be reset.
	24	TN748	UN154	TN580	
	25	TN748	UN154	TN580	
	27	TN754	UN154	TN580	
	28	TN735	UN154	TN580	
	29	TN742 or TN746	UN154	TN580	
	32	TN747	UN154	TN580	
	33	TN753	UN154	TN580	
	34	TN760	UN154	TN580	
	44	TN760	UN154	TN580	
	45	TN763	UN154	TN580	
	66	TN748	UN154	TN580	
	69	TN762	UN154	TN580	
	72	TN726	UN154	TN580	
	75	TN555 or TN767	UN154	TN580	

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3076 (contd)	78	TN556	UN154	TN580	Board sanity test failed, on-board microprocessor failed to be reset.
3077	16	TN768	UN154	TN580	Board sanity test failed, on-board microprocessor failed to be restarted.
	24	TN748	UN154	TN580	
	25	TN748	UN154	TN580	
	27	TN754	UN154	TN580	
	28	TN735	UN154	TN580	
	29	TN742 or TN746	UN154	TN580	
	32	TN747	UN154	TN580	
	33	TN753	UN154	TN580	
	34	TN760	UN154	TN580	
	44	TN760	UN154	TN580	
	45	TN763	UN154	TN580	
	66	TN748	UN154	TN580	
	69	TN762	UN154	TN580	
	72	TN726	UN154	TN580	
	75	TN555 or TN767	UN154	TN580	
	78	TN556	UN154	TN580	
3078	29	TN742 or TN746			Ringing application circuit test failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3079	16	TN768	UN154	TN580	Control channel loop board test failed.
	24	TN748	UN154	TN580	
	25	TN748	UN154	TN580	
	27	TN754	UN154	TN580	
	28	TN735	UN154	TN580	
	29	TN742 **or** TN746	UN154	TN580	
	32	TN747	UN154	TN580	
	33	TN753	UN154	TN580	
	34	TN760	UN154	TN580	
	44	TN760	UN154	TN580	
	45	TN763	UN154	TN580	
	66	TN748	UN154	TN580	
	68	TN767	UN154	TN580	
	69	TN762	UN154	TN580	
	72	TN726	UN154	TN580	
	75	TN555 **or** TN767	UN154	TN580	
	78	TN556	UN154	TN580	
	83	TN556 TN726 or TN735	TN748		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3079 (contd)	83 (contd)	TN742 **or** TN746 **or** TN747 **or** TN753 **or** TN754 **or** TN760 **or** TN762 **or** TN763 **or** TN767 **or** TN768			Control channel loop board test failed.
3080	34	TN760			EPF E and M lead test — E lead failure.
	44	TN760			
3081	34	TN760			EPF E and M lead test — M lead failure.
	44	TN760			
3086	29	TN742 TN746			Ringing application station test failed.
3090	78	TN556	UN154		LANBIC parity error counter test failed.
3091	78	TN556	UN154		D channel looparound test failed.
3092	78	TN556	UN154	TN580	D channel in permanent looparound.
3093	78	TN556	UN154	TN580	Layer one deactivated.
3094	78	TN556	BRI Terminal		Layer one pending activation — terminal activate.
3095	78	TN556	BRI Terminal		Layer one pending activation — terminal idle.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3100	81	TDM A Bus	TN748	UN154	Bad tone time slots on TDM bus A.
3101	81	TDM B Bus	TN748	UN154	Bad tone time slots on TDM bus B.
3102	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier C insane.
3103	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier C insane.
3104	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier D insane.
3105	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier D insane.
3106	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier E insane.
3107	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier E insane.
3108	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier C insane, the carrier is sparsely populated (one or two boards in the carrier).
3109	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier C insane, the carrier is sparsely populated (one or two boards in the carrier).
3110	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier D insane, the carrier is sparsely populated (one or two boards in the carrier).
3111	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier D insane, the carrier is sparsely populated (one or two boards in the carrier).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3112	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier E insane, the carrier is sparsely populated (one or two boards in the carrier).
3113	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier E insane, the carrier is sparsely populated (one or two boards in the carrier).
3114	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier C insane, the carrier contains no boards.
3115	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier C insane, the carrier contains no boards.
3116	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier D insane, the carrier contains no boards.
3117	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier D insane, the carrier contains no boards.
3118	81	TDM A Bus	UN154	TN580	Control channel loop carrier test on TDM A found carrier E insane, the carrier contains no boards.
3119	81	TDM B Bus	UN154	TN580	Control channel loop carrier test on TDM B found carrier E insane, the carrier contains no boards.
3120	81	TDM A Bus	TN748	TN768	TDM bus A failure detected by the digit detection test.
3121	81	TDM B Bus	TN748	TN768	TDM bus B failure detected by the digit detection test.
3122	81	TDM A Bus	TN748	UN154	One to five time slots busy on TDM bus A.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3123	81	TDM Bus	TN748	UN154	One to five time slots busy on TDM bus B.
3124	81	TDM A Bus	TN748	UN154	Six to 20 time slots busy on TDM bus A.
3125	81	TDM B Bus	TN748	UN154	Six to 20 time slots busy on TDM bus B.
3126	81	TDM A Bus	TN748	UN154	21 to 50 time slots busy on TDM bus A.
3127	81	TDM B Bus	TN748	UN154	21 to 50 time slots busy on TDM bus B.
3128	81	TDM A Bus	TN748	UN154	TDM bus A placed out of service, more than 50 busy time slots.
3129	81	TDM B Bus	TN748	UN154	TDM bus B placed out of service, more than 50 busy time slots.
3135	16	TN768	UN154		Bad major heading in CCMS message.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3135 (contd)	66	TN748	UN154		Bad major heading in CCMS message.
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3136	16	TN768	UN154		Bad port number in CCMS message.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3136 (contd)	75	TN555	UN154		Bad port number in CCMS message.
	78	TN556	UN154		
3137	16	TN768	UN154		Bad data in CCMS message.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3138	16	TN768	UN154		Bad sub qualifier in CCMS message.
	24	TN748	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3138 (contd)	25	TN748	UN154		Bad sub qualifier in CCMS message.
	27	TN745	UN154		
	28	TN735	UN154		
	29	TN742 **or** TN746	UN154		
	32	TN767	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3139	16	TN768	UN154		CCMS message not consistent with current state.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3139 (contd)	29	TN742 or TN746	UN154		CCMS message not consistent with current state.
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN720	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3140	16	TN768	UN154		Bad logical link in CCMS message.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3140 (contd)	34	TN760	UN154		Bad logical link in CCMS message.
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3141	16	TN768	UN154		CAM state inconsistency.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3141 (contd)	68	TN767	UN154		CAM state inconsistency.
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3142	16	TN768	UN154		External RAM failure.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3142 (contd)	78	TN556	UN154		External RAM failure.
3143	16	TN768	UN154		Internal RAM failure.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3144	16	TN768	UN154		Board initialization audit error.
	24	TN748	UN154		
	25	TN748	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3144 (contd)	27	TN754	UN154		Board initialization audit error.
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3145	16	TN768	UN154		Internal ROM failure.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3145 (contd)	32	TN747	UN154		Internal ROM failure.
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3146	16	TN768	UN154		CCMS message corrupted.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3146 (contd)	45	TN763	UN154		CCMS message corrupted.
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN1S4		
	78	TN556	UN154		
3147	16	TN768	UN154		Instruction set failure.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3147 (contd)	72	TN726	UN154		Instruction set failure.
	75	TN555	UN154		
	78	TN556	UN154		
3148	16	TN768	UN154		Program logic inconsistency.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3149	16	TN768	UN154		Code memory error.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3150	16	TN768	UN154		NPE audit error.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3150 (contd)	28	TN735	UN154		NPE audit error.
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UNl54		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3151	16	TN768	UN154		Down-link message buffer overflow.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3151 (contd)	33	TN753	UN154		Down-link message buffer overflow.
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
	66	TN748	UN154		
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3152	16	TN768	UN154		Port translation audit error.
	24	TN748	UN154		
	25	TN748	UN154		
	27	TN754	UN154		
	28	TN735	UN154		
	29	TN742 or TN746	UN154 UN154		
	32	TN747	UN154		
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3152 (contd)	66	TN748	UN154		Port translation audit error.
	68	TN767	UN154		
	69	TN762	UN154		
	72	TN726	UN154		
	75	TN555	UN154		
	78	TN556	UN154		
3153	16	TN768	UN154		DSP insane returned.
	24	TN748	UN154		
	25	TN748	UN154		
	66	TN748	UN154		
3154	16	TN768	UN154		Bad port translation.
	24	TN748	UN154		
	25	TN748	UN154		
	66	TN748	UN154		
3155	16	TN768	UN154		DPR read error.
	24	TN748	UN154		
	25	TN748	UN154		
	66	TN748	UN154		
3156	32	TN747	UN154		Electronic power feed overload.
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3156 (contd)	45	TN763	UN154		Electronic power feed overload.
3157	32	TN747	UN154		Electronic power feed no load.
	33	TN753	UN154		
	34	TN760	UN154		
	44	TN760	UN154		
	45	TN763	UN154		
3158	29	TN742 **or** TN746	UN154 UN154		Ringing voltage absent.
3159	29	TN742 **or** TN746	UN154 UN154		Zero current absent.
3160	29	TN742 **or** TN746	UN154 UN154		Switch hook error.
3161	29	TN742 **or** TN746	UN154		Ring trip voltage absent.
3162	29	TN742 **or** TN746	UN154		Station is absent.
3163	29	TN742 **or** TN746	UN154		Zero crossing detection failure.
3164	30	DTI	TN735 **or** TN754 **or** TN762		No acknowledgment from station.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3164 (contd)	48	DTI	TN735 or TN762		No acknowledgment from station.
3165	30	DTI	TN735 or TN754 or TN762		Link reset OK.
	48	DTI	TN735 or TN762		
3166	30	DTI	TN735 or TN754 or TN762		Link reset fail.
	48	DTI	TN735 or TN762		
3167	30	DTI	TN735 or TN754 or TN762		Transmit stuck.
	48	DTI	TN735 or TN762		
3168	30	DTI	TN735 or TN754 or TN762		Bad scan alarm.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3168 (contd)	48	DTI	TN735 TN762		Bad scan alarm.
3169	30	DTI	TN735 or TN754 or TN762		EPF off, overcurrent.
	48	DTI	TN735 or TN762		
3170	27	TN754			Down-link buffer overflow.
	28				
	69	TN762			
3171	72	TN726			Initialization test failed.
3172	75	TN555			Unable to write LAN translation RAM.
	78	TN556			
3173	75	TN555			LANBIC transmit parity error.
	78	TN556			
3174	75	TN555			LANBIC receive parity error.
	78	TN556			
3175	75	TN555			LAN bus timeout.
	78	TN556			
3176	75	TN555			LAN critical error.
	78	TN556			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3177	75	TN555			Transmit FIFO underflow.
	78	TN556			
3178	75	TN555			Unable to write LAN translation RAM (board error).
	78	TN556			
3179	75	TN555			Bad translation RAM (board error).
	78	TN556			
3180	75	TN555			Checksum error.
	78	TN556			
3181	75	TN555			DLCI out of range.
	78	TN556			
3182	75	TN555			Port transmit FIFO overflow.
	78	TN556			
3183	75	TN555			Port receive FIFO overflow.
	78	TN556			
3184	79	BRI Terminal	TN556		BRI terminal activated.
3185	79	BRI Terminal	TN556		BRI terminal deactivated.
3186	79	BRI Terminal	TN556		EPF off, overcurrent.
3187	79	BRI Terminal	TN556		Bipolar violations error.
3188	75	TN555	TN767		Loss of serial signal.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3189	75	TN555	TN767		Return of serial signal.
3190	27	TN754			Buffer full.
	28	TN735			
	69	TN762			
3193	68	TN767	Link		DS-1 X-ray clock synchronization test had loss of signal.
	75	TN767	Link		
3194	68	TN767	UN154	Link	DS-1 X-ray clock synchronization test failed.
	75	TN767	UN154	Link	
3195	68	Link	TN767		DS-1 remote loop test failed.
	75	Link	TN767		
3196	68	TN767	UN154	TN580	Some facility alarm response messages not received.
	75	TN767	UN154	TN580	
3197	75	TN555	TN767		DS-1 packet adjunct reports loss of serial signal.
3198	75	TN555	TN767		DS-1/packet adjunct serial interface integrity test failed.
3199	75				Packet adjunct: resource needed for testing not available.
3200	75	TN555	UN154	TN580	Packet adjunct: board sanity test failed, on-hard microprocessor failed to be reset.
3201	75	TN555	UN154	TN580	Packet adjunct: board sanity test failed, on-board microprocessor failed to be restarted.
3202	75	TN555	UN154	TN580	Packet adjunct: control channel loop test failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3203	75	TN555	UN154	TN580	Packet adjunct: no up link response message received from port under test.
3205	45	TN763	Facility		Diagnostic test failure — on-board problem.
3206	32	TN747	Facility		Diagnostic test failure — on-board problem (this maybe a false failure due to an in seize during the test).
3207	32	Facility	TN747		Diagnostic test failure — off-board problem, problem with external facilities (this may be a false failure due to an in seize during the test).
3208	33	TN753	Facility		Battery feed test failure — on-board problem (during demand testing, this may be a false failure due to an in seize during the test).
3209	33	Facility	TN753		Battery feed test failure — off-board problem, problem with external facilities.
3210	32	Facility	TN747		No up link response message received from port under test — probably off-board problem, problem with external facilities (this may be a false failure due to an in seize during the test).
	33	Facility	TN753		
3214	--	Port Board	TN452 or UN154	TN400 or TN580	Port board was removed or went insane.
3215	25	TN748	TN768		DTMF detection failed.
3216	25	TN748	TN748		Speech passing failed.
3217	25	TN748			Digit blocking failed.
3219	25	TN748			DTMF detector DSP insane.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3220	24	TN748	TN768		Dial tone detection failed.
	66	TN748	TN768		
3221	24	TN748	TN768		Utility tone detection failed.
	66	TN748	TN768		
3222	24	TN748	TN768		Stutter dial detection failed.
	66	TN748	TN768		
3223	24	TN748	TN768		Ringback detection failed.
	66	TN748	TN768		
3224	24	TN748	TN768		Special ring back detection failed.
	66	TN748	TN768		
3225	24	TN748	TN768		Intercept tone detection failed.
	66	TN748	TN768		
3226	24	TN748	TN768		Busy tone detection failed.
	66	TN748	TN768		
3227	24	TN748	TN768		Reorder tone detection failed.
	66	TN748	TN768		
3228	24	TN748	TN768		Immediate ring back detection failed.
	66	TN748	TN768		
3229	24	TN748	TN768		Autovon precedence ring back tone detection failed.
	66	TN748	TN768		
3230	24	TN748	TN768		Remote hold detection failed.
	66	TN748	TN768		

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3231	24	TN748	TN768		Answer back detection failed.
	66	TN748	TN768		
3232	24	TN748	TN768		404 Hz level invalid.
	66	TN748	TN768		
3233	24	TN748	TN768		1004 Hz 16 db level invalid.
	66	TN748	TN768		
3234	24	TN748	TN768		1004 Hz O db level invalid.
	66	TN748	TN768		
3235	24	TN748	TN768		2804 Hz level invalid.
	66	TN748	TN768		
3236	24	TN748	TN768		Detected 1004 Hz as CP tone.
	66	TN748	TN768		
3237	24	TN748	TN768		Detected excessive noise on 1004 Hz tone.
	66	TN748	TN768		
3238	24	TN748	TN768		Detection of data count invalid.
	66	TN748	TN768		
3245	16	TN768	TN748		DTMF digit generation failed.
3246	24	TN748			Detection of quiet tone failed.
	66	TN748			
3247	24	TN748	TN768		Detected idle on a busy time slot.
	66	TN748	TN768		
3248	24	TN748			Tone detector DSP insane.
	66	TN748			

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3250	16	TN768	TN748		Dial tone generation failed.
3251	16	TN768	TN748		Utility tone generation failed.
3252	16	TN768	TN748		Stutter dial generation failed.
3253	16	TN768	TN748		Ringback generation failed.
3254	16	TN768	TN748		Special ring back generation failed.
3255	16	TN768	TN748		Intercept tone generation failed.
3256	16	TN768	TN748		Busy tone generation failed.
3257	16	TN768	TN748		Reorder tone generation failed.
3258	16	TN768	TN748		Immediate ring back generation failed.
3259	16	TN768	TN748		Autovon precedence ring back tone detection failed.
3260	16	TN768	TN748		Remote hold generation failed.
3261	16	TN768	TN748		Answer back generation failed.
3262	16	TN768	TN748		404 Hz level invalid.
3263	16	TN768	TN748		1004 Hz 16 db level invalid.
3264	16	TN768	TN748		1004 Hz O db level invalid.
3265	16	TN768	TN748		2804 Hz level invalid.
3266	16	TN768	TN748		Detected 1004 Hz as CP tone.
3267	16	TN768	TN748		Detected excessive noise on 1004 Hz tone.
3268	16	TN768	TN748		Generation of count invalid.
3275	16	TN768			Generator DSP is insane.
3276	30	DTI	ANN17 **or** SN224		MFET telephone set failed.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3277	30	DTI	SN270 or SN271		DTL looparound failure at digital set.
3278	28	SN224	TN452	TN400	Two bits set in MLP status register (MFET and controller failure).
	69	ANN17	TN452	TN400	
3279	28	SN224	TN452	TN400	Two bits set in MLP status register (48V overload and controller failure).
	69	ANN17	TN452	TN400	
3280	28	SN224	TN452	TN400	Two bits set in MLP status register (48V overload and MFET failure).
	69	ANN17	TN452	TN400	
3281	28	SN224	TN452	TN400	Three bits set in MLP status register (48V overload, MFET, and controller failure).
	69	ANN17	TN452	TN400	
3282	30	DTI	SN270 or SN271		Even channel of digital set is stuck in DTL looparound.
3283	48	DTI	SN270 or SN271		Odd channel of digital set is stuck in DTL looparound.
3284	30	DTI	SN270 or SN271	ANN16	No response from firmware DTL looparound test on remote peripheral.
3285	30	DTI	SN270 or SN271	ANN16	Cannot run firmware DTL looparound test on remote peripheral.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3286	30	DTI	SN270 or SN271	ANN16	Firmware DTL looparound test failed on remote peripheral.
3290	28	TN735	TN748	TN768	Dial tone test failure (check for correct usage of the external loopback connector).
	29	TN742 or TN746	TN748	TN768	
	32	TN747	TN748	TN768	
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	45	TN763	TN748	TN768	
	69	TN762	TN748	TN768	
3291	28	TN735	TN748	TN768	Quiet tone test failure, noise detected (check for correct usage of the external loopback connector).
	29	TN742 or TN746	TN748	TN768	
	32	TN747	TN748	TN768	
	33	TN753	TN748	TN768	
	34	TN760	TN748	TN768	
	45	TN763	TN748	TN768	
	69	TN762	TN748	TN768	
3292	29	TN746	TN748	TN768	404 Hz tone test failure (check for correct usage of the external loopback connector).

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3293	32	TN747			No current seen on seize. (Perhaps no battery provided by the loop circuit or could be missing the external loopback connector).
3294	34	TN760			Receiving port did not see seizure by the transmitting port (no ringing or could be missing the external loopback connector).
3295	34	TN760			Digit zero not received by the loop port (sent by the test port).
3296	34	TN760			Digit one not received by the loop port (sent by the test port).
3297	34	TN760			Digit two not received by the loop port (sent by the test port).
3298	34	TN760			Digit three not received by the loop port (sent by the test port).
3299	45	TN763			Port fault. Port was seized, and a port fault was reported (no ground detected by ground detect circuit during the self test or could be missing the external loopback connector).
3300	45	TN763			Signaling fault. Port was seized, no ground was detected, ground detect circuit was self tested and it passed — therefore the fault lies elsewhere (could be missing the external loopback connector).
3301	45	TN763			Port did not respond when the seize message was sent (could be missing the external loopback connector).
3302	62	TN771B			Port 0 initialization failure.
3303	62	TN771B			Port 1 initialization failure.
3304	62	TN771B			Port 2 initialization failure.
3305	62	TN771B			Port 3 initialization failure.

continued

TABLE A-1. Specific Fault Codes *(continued)*

Specific Fault Code	Unit Type	CKT1	CKT2	CKT3	Definition
3306	62	TN771B			Bad port - background maintenance failure, Check for loss of D clock from HBI (UN154) before replacing first indictment. Use Procedure 620 to test the UN154. Check for bus problems (including wiring).
3307	62	TN771B			MTCP DCP Port 2 unavailable -in use by call processing.
3308	62	TN771B			MTCP DCP Port 2 unavailable - maintenance busy.
3309	32	TN747			Trunk Port is not in an idle state, maintenance testing unreliable due to possible in-seize on the port.
3309	33	TN753			Trunk Port is not in an idle state, maintenance testing unreliable due to possible in-seize on the port.
3309	34	TN760			Trunk Port is not in an idle state, maintenance testing unreliable due to possible in-seize on the port.
3309	45	TN763			Trunk Port is not in an idle state, maintenance testing unreliable due to possible in-seize on the port.
3310	72	TN726	TN771		Handshake failed during external loop test-
3310	72	TN771	TN726		Handshake failed during external loop test.
3311	62	TN771			Maintenance test board failed during test.
3312	72	TN726	UN154		No “PROCEED” message received from data line port.
3313	72	TN726	TN771		External digital loop test failed.
3314	34	TN760			Trunk Port is not in an idle state, maintenance testing unreliable due to permanent in-seize treatment on the port.

GLOSSARY

9-track tape drive — A tape drive with nine tracks used to record call detail recording (CDR) information on magnetic tape.

access code — A 1-, 2-, 3- or 4-digit dial code used to activate or cancel a feature or access an outgoing trunk. Star (*) or pound (#) can be used as the first digit of an access code.

access security — The capability of a PBX to grant or deny access to facilities or services, including network access, based on a unique personal identifier, such as speaker verification.

account code — A dialed code used with call detail recording that allows a call to be charged to a specific department's or project's account.

adjunct — A device that does one or more tasks for another device. For example, a 3B2 computer dedicated to logging and processing call detail records received from a PBX is serving as an adjunct to the PBX.

administer — To establish or change the characteristics of a system.

alarm — An indication that a failure has occurred. The three levels of alarms are: major, minor, and warning.

analog — The representation of information by means of continuously variable physical quantities such as amplitude, frequency, phase, or resistance. See also *digital.*

analog voice terminal — A telephone that receives acoustic voice signals and sends analog electrical signals along the line. Analog voice terminals are served by a single wire pair (tip and ring). The AT&T Model 2500 telephone set is atypical example of an analog voice terminal.

architecture — The organizational structure of a system, including hardware and/or software.

asynchronous data transmission — A method of transmitting data in which each character is preceded by a start bit and followed by a stop bit, thus permitting data characters to be transmitted at irregular intervals. See also *synchronous data transmission.*

asynchronous data unit (ADU) — A data communications equipment (DCE) device that allows direct connection between RS-232C equipment and a PBX.

asynchronous transmission See *asynchronous data transmission.*

AT&T ISDN basic rate interface (ISDN BRI) An AT&T corporate specification that describes the level-l, 2, and 3 interfaces for BRIs on AT&T products. See also *AT&T ISDN primary rate interface (PRI).*

AT&T ISDN primary rate interface (ISDN PRI) An AT&T corporate specification that describes level-l, 2, and 3 interfaces for primary rate interfaces (PRIs) on AT&T products. See also *AT&T ISDN basic rate interface (BRI).*

attendant A person at a console on a customer's premises who provides personalized service for incoming callers and voice-services users by performing switching and signaling operations.

attendant console The workstation used by an attendant. The attendant console allows the attendant to originate a call, answer an incoming call, transfer a call to another extension or trunk, put a call on hold, and remove a call from hold. Attendants using the console can also manage and monitor some system operations.

attenuation A decrease in amplitude of a sinusoidal wave as it traverses a transmission line.

audible alerting tone See *ringback tone.*

Automatic Number Identification (ANI) The process of automatically identifying a calling party's telephone number and transmitting that number from the caller's local central office (CO) to another point on or off the public network. The term *"ANI"* is sometimes used for the calling number itself as well as for the process of identifying and transmitting it.

auxiliary trunk A trunk used to connect auxiliary equipment, such as radio paging equipment, to a PBX.

B-channel For an Integrated Services Digital Network (ISDN), a 64-Kbps channel, accompanied by timing, intended to carry a wide variety of digital information streams (such as voice at 64 Kbps, data at less than or equal to 64 Kbps, wideband voice encoded at 64 Kbps, and voice at less than 64 Kbps) alone or combined with other digital information streams. See also *D-channel.*

basic rate interface (BRI) A standard ISDN frame format. A BRI runs at a speed of 192 Kbps and supports two 64-Kbps voice or data B-channels and one 16-Kbps signaling and data D-channel per port. The remaining 48 Kbps are used for framing and D-channel contention.

baud A unit of transmission speed equal to the number of signal events per second.

binary-coded decimal (BCD) Either of two standard codes for the representation of characters. A standard 4-bit code permits the representation of decimal numbers, with each decimal digit represented by a 4-digit binary number.

bit (binary digit) One unit of information in binary notation (having two possible states or values: 0 or 1).

bit rate See *data rate.*

bits per second (bps) The number of units of information in binary notation that is transmitted or received per second.

buffer A circuit or component that isolates 1 electrical circuit from another. Typically, a buffer holds data from 1 circuit or process until another circuit or process is ready to accept the data. In software, a buffer is an area of memory used for temporary storage.

bus A multiconductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.

busy out The removal of a maintenance object (MO) from service. The MO is out of service until it is released; this prevents call-processing software from using the busied-out resource.

byte A sequence of bits, usually consisting of eight bits processed together.

cabinet Housing for racks, shelves, or carriers that contain electronic equipment.

cable 1. The physical connection between two pieces of equipment (for example, cable from a data terminal to a modem) or between a piece of equipment and a termination field (for example, circuit pack input/output (I/O) cables). A cable is usually made of metal conductors with plastic insulation. Lightwave fibers can be considered cables but are usually called fibers.

2. To connect two devices or a device and a termination field.

cable connector The connector on the end of a cable. A cable connector provides a means of connecting wires on a cable to specific data or power leads on data equipment- A cable connector is either a cable jack (female) or a cable plug (male).

call detail recording (CDR) A service that records detailed call information for incoming and outgoing calls, and associates these calls with account codes.

Call Detail Recording Utility (CDRU)	Applications software running on an AT&T 3B2/300, 3B2/310, or 3B2/400 processor to collect, store, optionally filter, and output call-detail records for direct or polled output to Call Accounting Systems (CASs) or other peripheral devices.
Call Accounting System (CAS)	A processor-based PBX adjunct that records call-detail records transmitted from a PBX and process that data to provide information for managing voice terminal usage and control expenditures. With some adjuncts (for example, Centralized System Management (CSM), applications processors (APs), and customer host computers), CAS is coresident with other applications. Others (for example, AT&T CAS Teleseer®) are special-purpose adjuncts dedicated to processing and reporting cdl-detail records.
call-progress tone	One of a set of tones (for example, ringback tone, busy tone, or reorder tone) that a caller can receive from a PBX to indicate the status of a call or the facilities used by the call.
carrier	Amounting rack for plug-in circuit cards.
central office (CO) call	A call routed directly-the public network.
central office (CO) trunk	A telecommunications channel that provides access from a PBX to the public network-the local CO.
centralized attendant service (CAS)	A service that enables the attendants for a private network to be centralized on one of the PBXs in the network. The attended PBX is called a *CAS main,* and each unattended PBX is called a *CAS branch.*
channel	A communications path for transmitting voice and/or data.
circuit	1. An arrangement of electrical elements-which electric current flows. 2. A channel or communications path between two or more points.
clock bus	A conductor or group of conductors carrying clock signals.
connection	The means by which a signal can travel from one circuit to another.
connectivity	The connection of disparate devices within a single system.
console	See *attendant console.*
control-channel bus	The time-division-multiplexed (TDM) bus carrying control-channel messages.
cursor	The visual indicator on a terminal screen that marks the user's location. A cursor is often used to indicate the position at which a character can be entered or deleted. More than one cursor may be present on some terminal screens.

D-channel	The 16- or 64-Kbps packet-switched channel on a basic rate interface (BRI) or primary rate interface (PRI) that carries signaling messages and packet-switched user data. A D-channel is the ISDN PRI Q.931 signaling channel. (AD-channel can also carry data, but this capability is not used on an AT&T DEFINITY™ Communications System Generic 2.)
data channel	The means of transmission for and the intervening equipment used in the transfer of information in a given direction.
data-communications interface unit (DCIU)	An interface between the AT&T System 85 main processor and application processors (APs), Audio Information Exchange (AUDIX) equipment, or, in a distributed communications system (DCS) configuration, other PBXs.
data link	The configuration of physical facilities enabling end terminals to communicate directly with each other.
data rate	The transmission of data measured in bits per second (bps).
data terminal	An input/output device that has either switched or direct access to a host computer or to an applications processor (AP). The AT&T data terminals include: the AT&T Personal Terminal 510D, and the models 500,513, and 515 Business Communications Terminal (BCT).
DCIU link	A hardware communications link that connects two data-communications interface units (DCIUs).
DCIU port	A gateway to or from an application such as a Distributed Communications System (DCS). The data-communications interface unit (DCIU) ports are the endpoints of a virtual circuit and look like an input/output device to the application.
Dedicated Switch Connection (DSC)	A feature that functions as a hardwired link between two ports on a PBX, providing a full-time line between the assigned endpoints. Once administered, the connection remains intact until removed.
default	A value assigned automatically by system software when a user chooses not to assign a value. The user has the option of accepting or changing the default.
digital	The representation of information in discrete elements such as off and on or 0 and 1. See also *Analog.*
Digital Communication Protocol (DCP)	An AT&T proprietary protocol used to transmit both digitized voice and digitized data over the same communications link. A DCP link is made up of two information channels and one signaling channel.
digital facility	A switching or transmission facility specifically designed to handle digital signals.

digital telephone — See *digital voice terminal.*

digital terminal data module (DTDM) — An integrated or adjunct data module that shams with a digital voice terminal the same physical port for connection to a PBX. The function of a DTDM is similar to that of a processor data module (PDM) and modular processor data module (MPDM) in that it converts *RS-232C* signals to Digital Communications Protocol (DCP) signals.

digital transmission — A mode of transmission in which the information to be transmitted is first converted to digital from and then transmitted as a serial stream of pulses.

digital trunk — A dedicated telecommunicates channel on which information (such as voice and data) is transmitted and/or received in digital form only.

digital voice terminal — A voice terminal that converts analog voice signals into digital electrical signals to be sent along the voice terminal line. Digital voice terminals use Digital Communications Protocol (DCP) and are served by two pairs of wire. DCP voice terminals include: models 7402D, 7403D, 7404D, 7405D, 7406D, 7407D, 510D, and the 515 Business Communications Terminal (BCT).

digital-to-analog converter (DAC) — A device that converts data in digital form to the corresponding analog signals.

disk — A magnetic platter coated with magnetic material and used as a storage medium.

disk drive — A mechanical device that stores data on and retrieves data from one or more disks. See also *disks.*

disk tape system assembly (DTSA) — A disk-based mass-storage unit that physically houses the disk drive, the tape drive, and the DC-to-De power converter for powering the drives. It replaces the high-capacity minirecorder (HCMR) and reduces system reload time.

duplication — The use of redundant components to improve availability. When a duplicated subsystem fails, its backup redundant subsystem automatically takes over.

equipment location — A designated position (address) of a line or a trunk in the PBX hardware.

error — A single occurrence of either an incorrect event during normal system service or an incorrect response to a test stimulus during initialization, background testing, or demand testing. An error can be detected by firmware or software tests and is the result of a fault, a software bug, or noise.

error-free second — Any second in which no bit errors are received. An error-free second is used as a measure of performance for digital signal level-l (DS1) service.

errored second — A second in which at least one bit error occurs.

extension number — A 1- to 5-digit number by which calls are routed-a PBX or, with a Uniform Dialing Plan (UDP),-a private network. Extension numbers are primarily associated with voice and/or data terminals but can also be used for functions associated with specific features.

facility — A telecommunications transmission pathway and associated equipment. See also *trunk, line.*

facility-associated signaling — Signaling in which a D-channel carries the signaling only for those channels on the same physical interface.

failure — The condition in which the number of detected errors exceeds a predetermined threshold. When a failure occurs, an alarm signals that the threshold has been exceeded; the level of the alarm shows the effect of the failure on the quality of service.

far end — The end of a data path. See also *near end.*

fault — A physical defect in a hardware component of a system that causes improper circuit operation. Some faults are considered intermittent because they occur with no predictable or regular frequency. Others are considered solid because they occur in a regular pattern.

field — A category of information in a record or database. A field typically has two parts: field name, which identifies a predefine category of information (such as *supv* for supervisor), and field value, which contains specific information about that category (such as *Smith J).* A field can also bean area on a terminal screen that shows information or requires users to enter information.

Force Administration Data System (FADS) — A method of collecting and storing traffic-related information for Centralized Attendant Service (CAS) and/or for some types of Call Management System (CMS) splits. For the CMS applications, FADS has largely been replaced by the management information system (MIS).

frame — One of several segments of an analog or digital signal that has a repetitive characteristic.

full duplex — A transmission system capable of carrying signals in both directions simultaneously.

ground-start signaling on a trunk	A method by which, on outgoing calls, a PBX transmits a request for services to a distant PBX by grounding the trunk's ring lead. When the distant PBX is ready to receive the digits of the called number, that PBX grounds the trunk's tip lead. When the first PBX detects this ground, the digits are sent. On incoming calls, detection of ground on the trunk's ring lead is sufficient to cause the call to route to a predetermined destination, normally the system attendant group. No digits are received.
glare	The simultaneous seizure of a 2-way trunk.
half-duplex transmission	Transmission in both directions but in only one direction at a time.
handset	The handheld part of a voice terminal that you pick up, talk into, and listen from.
handshaking	A process, that occurs after successful call setup but before actual data transmission, between 2 data devices to ascertain whether their data transmission parameters are set to permit successful data transmission.
hard disk	See *disk.*
hertz (Hz)	A unit of frequency equal to one cycle per second.
Integrated Services Digital Network (ISDN)	A public or private network that provides end-to-end digital connectivity to support a wide variety of services, including voice and nonvoice service to which users have access by a limited set of CCITT-defined, standard multipurpose user-network interfaces. Such a network,-internationally accepted standard interfaces, provides circuit-switched or packet-switched connectivity within the network and links to other ISDNs to provide national and international digital connectivity. Users have access to this larger network through a limited set of standard multipurpose customer interfaces.
intercept tone	An alternating high- and low- frequency tone that indicates a dialing error or denial of the service requested.
interface	A common boundary between two systems or pieces of equipment.
ISDN terminal	The endpoint in the system capable of supporting a call using either the basic rate interface (BRI) or primary rate interface (PRI) Integrated Services Digital Network (ISDN) signaling. An ISDN terminal can be a digital multiplexed interface message-oriented signaling (DMI-MOS) interface, an AT&T public ISDN interface, or a 5ESS® PRI.
layer	See *level.*
level	The basis of the structure of the Open Systems Interconnection (OSI) network model, which consists of a series of levels used in communication.

LED (light-emitting diode)
A semiconductor device that produces light when voltage is applied. LEDs provide a visual indication of the operational status for hardware components, the results of maintenance tests (for example, in use, pass, fail), and the alarm status of circuit packs.

line
A communication link between a customer's PBX or central office (CO) switching system and a voice terminal or other terminal.

link access procedure on the D-channel (LAPD)
A link-layer protocol on the Integrated Services Digital Network (ISDN) basic rate interface (BRI) and primary rate interface (PRI) data-link layer (level 2). LAPD provides data transfer between two devices, and error and flow control on multiple logical links. LAPD is used for signaling and low-speed packet data (X.25 and mode 3) on the signaling (D) channel and for mode 3 data communications on a bearer (B) channel.

local
Pertaining to, or within, the physical limits of the serving PBX.

local area network (LAN)
A networking arrangement specifically designed to support a limited geographical area. Generally, a LAN is limited in range to a maximum of 6.2 miles and provides high-speed carrier service with low error rates. Common configurations include: daisy chain, star (including circuit switched), ring, and bus.

local area network (LAN) bus
A high-bandwidth bus that transmits packets at a rate of 40 Mbps.

logical channel (or circuit)
A message slot on a digital communications link. A logical channel is one of the logically independent elements of a data stream that is multiplexed onto a single communications carrier.

logical D-channel
The portion of a physical D-channel used to carry signaling for one Integrated Services Digital Network (ISDN) endpoint.

maintenance
The activities involved in keeping a telecommunications system in proper working condition: the detection and isolation of software and hardware faults and automatic and manual recovery from these faults.

maintenance tests
Tests that detect and diagnose system problems. Each maintenance text consists of a sequence of stimuli applied to a circuit or a software function. The system response to the test is compared with the expected results. Maintenance tests can be demand tests, destructive tests, nondestructive tests, periodic tests, scheduled tests, initialization tests, and audits.

major alarm
An indication of a failure that has caused critical degradation of service and requires immediate attention. Major alarms are automatically displayed on light emitting diodes (LEDs) located on the attendant console and maintenance or alarming circuit card, logged to the alarm log, and reported to a remote maintenance facility (if applicable).

management information message (MIM)
The level-3 messages that convey management and maintenance information between a PBX and a basic rate interface (BRI) terminal.

modem
A device that converts digital data signals to analog signals for transmission over voice-terminal circuits. The analog signals are converted back to the original digital data signals by another modem at the other end of the circuit. Also called a *data set.*

modem pooling
A capability that provides shared conversion resources (modems and data modules) for cost-effective access to analog facilities by data terminals. When needed, modem pooling inserts a conversion resource into the path of a data call. Modem pooling serves both outgoing and incoming calls.

network
A series of points, nodes, or stations connected by communications channels.

Network Control Operations Support System (NCOSS)
An AT&T service that requires the use of buffered call-detail records data collection with a local storage unit (LSU), such as the 94A LSU or 3B2 Call Detail Recording Utility (CDRU).

network processing element (NPE)
A distributed time-slot interchanger (TSI) that controls time slot assignment, gain adjustment, port connectivity, and port conferencing for circuit-switched connections.

nonfacility associated signaling (NFAS)
A method that allows multiple T1 links to share a single D-channel on one of the spans. One T1 link is therefore configured as 23 B-channels plus one D-channel, while the other spans that share the D-channel are configured with the B-channels.

nondestructive test
A maintenance test, executed on a maintenance object (MO), that does not interrupt service.

periodic maintenance information data structure (PMIDS)
A storage area that counts errors found in a system during processing.

physical location
The address (cabinet number, carrier number, slot number, and circuit number) of a cabinet, carrier, slot, or circuit.

port
The data or voice transmission “outlet” on a device used for communicating with other devices.

port carrier
A carrier containing port circuit cards and power units.

port tester
A portable tool that isolates problems to a voice terminal, port circuit card, or wiring between them.

primary rate interface (PRI)
A standard Integrated Services Digital Network (ISDN) frame format recommended by the CCITT.

protocol	A set of conventions governing the format and timing of message exchanges that control data movement and error correction.
queue	An ordered sequence of items (for example, outgoing trunk calls, incoming Call Management System (CMS) calls, or CMS agent positions) waiting to be processed.
queuing	The process of holding calls in order of their arrival to await connection to an attendant, answering group, or idle trunk. Calls are automatically connected, unless priority queuing is provided, in first-in, tint-out (FIFO) sequence.
random-access memory (RAM)	Computer memory whose contents can be changed at any time.
read-only memory (ROM)	Computer memory that can be read repeatedly but cannot be changed.
read operation	The process of retrieving information from memory.
Remote Carrier Group	A feature that helps locate a port carrier up to 100 miles from a PBX over digital services level-l (DS1) facilities.
reorder tone	A fast-busy tone indicating that at least one of the facilities, such as a trunk or a digit transmitter, required for a call was not available when the call was placed.
ringback tone	The audible signal heard at the calling voice terminal to indicate that the called party is being rung. In some contexts, ringback tone does not mean that the called party is receiving an audible signal.
RS232C	A physical interface specified by the Electronic Industries Association (EIA). RS-232C transmits and receives asynchronous data at speeds up to 19.2 Kbps over cable distances up to 50 feet.
serial data transmission	An operation where data is transmitted or processed one bit after the other.
signaling	The sending of control and status information between devices to set up or take down a connection.
slot	A track in a carrier used to guide the plug end of a circuit card to the pins on the carrier backplane. The slot number is used as part of a circuit card’s address.
small computer system interface (SCSI)	An American National Standards Institute (ANSI) bus standard that provides a high-level command interface between host computers and peripheral devices.

small computer system interface (SCSI) controller	The entities on the SCSI bus other than the host adapters (HAs). The six controller types are direct-access (hard disk), sequential access (tape), printer, processor, write-once read-multiple (optical disk), and read-only direct-access (optical disk).
soft switch	A planned transfer of system control from one processor to another without affecting service.
Station Message Detail Recording (SMDR)	A specific call-detail recording capability consisting of a PBX adjunct that provides buffering plus either a 9-track tape image of call-detail records or a direct output of records suitable for printing.
status indicator	See *status light.*
status information	Information defining the current state of call processing within a PBX.
status light	An indicator light showing the status of an appearance by the state of the light (lighted, flashing, fluttering, or dark).
switch administrator	A person responsible for specifying features and/or services available to users of the PBX.
synchronization	The process in which proper phase alignment to a transmitter is made so that the beginning and end of a character, message, time slot, or frame can be readily identified for information retrieval.
synchronous data transmission	A mode of digital transmission in which discrete signal elements are transmitted at a fixed and continuous rate. Synchronous data transmission requires Sending and receiving devices to operate in step with each other. See also *asynchronous data transmission.*
tie trunk	A dedicated telecommunications channel connecting two PBXs.
time-division multiplexing (TDM)	Multiplexing that divides a transmission channel into successive time slots.
traditional module	A module control cabinet and up to three port cabinets that function as a single switching module.
traffic	The flow of voice and data communications-a PBX.
translations	Specific information assigned to a voice terminal or to the system and customized for the user.
trunk	A dedicated telecommunications channel.
trunk group	Telecommunications channels assigned as a group for certain functions.
trunk port	The hardware providing the access point to the PBX for each circuit associated with a trunk.

universal bus interface A control-complex circuit card for universal modules that interfaces the module processor to the cabinet bus, LAN bus, and clock bus.

universal module A single-cabinet replacement for a traditional AT&T System 85 R2 call-processing module using high-circuit density technology to provide more circuitry in less space, usually at lower cost. The universal module architecture is a combination of AT&T System 85 and AT&T System 75 architectures that uses a modified module control complex that allows System 75 port circuit cards to be used on System 85.

universal module control cabinet A common cabinet configured with a universal module control complex, common port network (PN), and power.

universal module control carrier ‘he AT&T System 85 module that consists of DEFINITY™ Communications System port technology and design, DEFINITY™ Communications System intramodule network fabric, and a modified System 85 R2V4 module control carrier.

universal module processor A module processor that is capable of supporting the cost-reduced port hardware common between AT&T DEFINITY™ Communications System Generic 1 and 2.

virtual card One of the three electrical circuit card locations to which a circuit card located on the universal module maps.

virtual call A call made without a B-channel.

virtual circuit The entire path between two end processors. A virtual circuit can consist of more than one communications link and is also used in packet switching. In the data-communications interface unit (DCIU) application, the terms *data path* or *control path* are used instead of *virtual circuit.*

virtual equipment location The AT&T System 85 R2 electrical equipment location referenced by an equipment location on the universal module.

voice service The switching and transmission of voice frequencies.

warning alarm An indication of a failure that has caused minimal degradation of service. Warning alarms are displayed on the maintenance circuit card’s light-emitting diode (LED) and logged to the alarm log. Typically, a warning alarm affects only one user (for example, only one extension or voice terminal).

WATS trunk A one-way outgoing telecommunications channel used to place a Wide Area Telecommunications Service (WATS) call, or a one-way incoming telecommunication channel used to receive an 800-service call.

Wide Area Telecommunications Service (WATS) A service that allows calls to a certain area or areas for a flat-rate charge based on expected usage.

wink-start tie trunk A tie trunk on which, after establishing a connection with a distant PBX for an outgoing call, the system waits for a momentarily signal (wink) before sending the digits of the called number. Similarly, on an incoming call, the system sends the wink signal when ready to receive digits.

write operation The process of putting information into memory.

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