Lucent Technologies
Bell Labs Innovations

MERLIN LEGEND®
Communications System
Release 6.1
Maintenance and Troubleshooting

Notice

Every effort was made to ensure that the information in this book was complete and accurate at the time of printing. However, information is subject to change.

See Appendix A, "Customer Support Information," for important information. It follows *Maintenance and Troubleshooting* in this binder.

Your Responsibility for Your System's Security

Toll fraud is the unauthorized use of your telecommunications system by an unauthorized party, for example, persons other than your company's employees, agents, subcontractors, or persons working on your company's behalf. Note that there may be a risk of toll fraud associated with your telecommunications system, and if toll fraud occurs, it can result in substantial additional charges for your telecommunications services.

You and your system manager are responsible for the security of your system, such as programming and configuring your equipment to prevent unauthorized use. The system manager is also responsible for reading all installation, instruction, and system administration documents provided with this product in order to fully understand the features that can introduce risk of toll fraud and the steps that can be taken to reduce that risk. Lucent Technologies 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. Lucent Technologies will not be responsible for any charges that result from such unauthorized use. For important information regarding your system and toll fraud, see Appendix A, "Customer Support Information."

Federal Communications Commission Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. For further FCC information, see Appendix A, "Customer Support Information."

Canadian Department of Communications (DOC)
Interference Information

This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

Le Présent Appareil Numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A préscrites dans le réglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Year 2000 Compliance

The MERLIN LEGEND Communications System is certified to be Year 2000 compliant. Additional information on this certification, and other issues regarding Year 2000 compliance, is available online at http://www.lucent.com/enteprise/sig/yr2000.

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	Issue 1, August 1998	

For more information about Lucent Technologies documents, refer to the section entitled, "Related Documents" in "*About This Book*."

Support Telephone Number

In the continental US, Lucent Technologies provides a toll-free customer helpline 24 hours a day. Call the Lucent Technologies Helpline at **1 800 628-2888** or your Lucent Technologies authorized dealer if you need assistance when installing, programming, or using your system. Outside the continental US, contact your local Lucent Technologies authorized representative.

Network Engineering Group

For assistance in designing a private network call the Network Engineering Group at 1 888 297-4700.

Lucent Technologies Corporate Security

Whether or not immediate support is required, all toll fraud incidents involving Lucent Technologies products or services *should be reported* to Lucent Technologies Corporate Security at **1 800 821-8235**. In addition to recording the incident, Lucent Technologies Corporate Security is available for consultation on security issues, investigation support, referral to law enforcement agencies, and educational programs.

Lucent Technologies Fraud Intervention

If you *suspect you are being victimized* by toll fraud and you need technical support or assistance, call BCS National Service Assistance Center at **1 800 628-2888**.

Warranty

Lucent Technologies provides a limited warranty on this product. Refer to "Limited Warranty and Limitation of Liability" in Appendix A, "Customer Support Information," which follows *Maintenance and Troubleshooting* in this binder.

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4 Control Unit Problems

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D Backing Up with a Memory Card

The exclamation point in an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

IMPORTANT SAFETY INSTRUCTIONS

When installing telephone equipment, always follow basic safety precautions to reduce the risk of fire, electrical shock, and injury to persons, including:

- Read and understand all instructions.

- Follow all warnings and instructions marked on or packed with the product.

- Never install telephone wiring during a lightning storm.

- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.

- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.

- Use caution when installing or modifying telephone lines.

- Use only Lucent Technologies-manufactured MERLIN LEGEND Communications System circuit modules, carrier assemblies, and power units in the MERLIN LEGEND Communications System control unit.

- Use only Lucent Technologies-recommended/approved MERLIN LEGEND Communications System accessories.

- If equipment connected to the analog extension modules (008, 408, 408 GS/LS) or to the MLX telephone modules (008 MLX, 408 GS/LS-MLX) is to be used for in-range out-of-building (IROB) applications, IROB protectors are required.

- Do not install this product near water, for example, in a wet basement location.

- Do not overload wall outlets, as this can result in the risk of fire or electrical shock.

- The MERLIN LEGEND Communications System is equipped with a 3-wire grounding-type plug with a third (grounding) pin. This plug will fit only into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact an electrician to replace the obsolete outlet. Do not defeat the safety purpose of the grounding plug.

- The MERLIN LEGEND Communications System requires a supplementary ground.

- Do not attach the power supply cord to building surfaces. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.

- Slots and openings in the module housings are provided for ventilation. To protect this equipment from overheating, do not block these openings.

- Never push objects of any kind into this product through module openings or expansion slots, as they may touch dangerous voltage points or short out parts, which could result in a risk of fire or electrical shock. Never spill liquid of any kind on this product.

- Unplug the product from the wall outlet before cleaning. Use a damp cloth for cleaning. Do not use cleaners or aerosol cleaners.

- Auxiliary equipment includes answering machines, alerts, modems, and fax machines. To connect one of these devices, you must first have a Multi-Function Module (MFM).

- Do not operate telephones if chemical gas leakage is suspected in the area. Use telephones located in some other safe area to report the trouble.

⚠ WARNING:

- *For your personal safety, DO NOT install an MFM yourself.*

- *ONLY an authorized technician or dealer representative shall install, set options, or repair an MFM.*

- *To eliminate the risk of personal injury due to electrical shock, DO NOT attempt to install or remove an MFM from your MLX telephone. Opening or removing the module cover of your telephone may expose you to dangerous voltages.*

SAVE THESE INSTRUCTIONS

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Intended Audience

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About This Book

The MERLIN LEGEND Communications System is an advanced digital switching system that integrates voice and data communications features. Voice features include traditional telephone features, such as Transfer and Hold, and advanced features, such as Group Coverage and Park. Data features allow both voice and data to be transmitted over the same system wiring.

Intended Audience

This book provides detailed information about system and telephone trouble reports and troubleshooting operations. It is intended for use by qualified field technicians who are responsible for system maintenance and troubleshooting, and as a reference by anyone needing such information, including support personnel, sales representatives, and account executives.

How to Use This Book

This book provides step-by-step procedures for isolating troubles both inside and outside the communications system. Refer to the chapter associated with the reported problem to start the troubleshooting procedure.

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How to Use This Book

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Refer to the following documentation for additional information:

- *Equipment and Operations Reference* provides detailed information on system hardware, telephones, and other equipment (not updated since Release 3.0).

- *Feature Reference* provides details on the features of the communications system.

- *System Planning* provides procedures and forms for planning a system for installation.

- *System Programming* gives procedural instructions for programming system features.

- Users' guides and Operators' Guides give procedural instructions for programming and using telephone features.

"Related Documents," later in this section, provides a complete list of system documentation together with ordering information.

In this document, the terms in the following list are used in preference to other, equally acceptable terms for describing communications systems.

Lines, Trunks and Facilities

Facility is a general term that designates a communications path between a telephone system and the telephone company central office. Technically a *trunk* connects a switch to a switch, for example the MERLIN LEGEND Communications System to the central office. Technically, a *line* is a loop-start facility or a communications path that does not connect two switches (for example, an intercom line or a Centrex line). However, in actual usage, the terms *line* and *trunk* are often applied interchangeably. In this book, we use *line/trunk* and *lines/trunks* to refer to facilities in general. Specifically, we refer to *digital facilities*. We also use terms such as personal line, ground-start trunk, Direct Inward Dialing (DID) trunk, and so on. When you talk to your local telephone company central office, ask them which terms they use for the specific facilities they connect to your system.

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Some older terms have been replaced with newer terms. The following list shows the old term on the left and the new term on the right:

trunk module	line/trunk module
trunk jack	line/trunk jack
station	extension
station jack	extension jack
analog data station	modem data workstation
digital data station	digital data workstation
7500B data station	digital data workstation
data station	data workstation

Typographical Conventions

Certain type fonts and styles act as visual cues to help you rapidly understand the information presented:

Example	Purpose
It is *very* important that you follow these steps. You *must* attach the wristband before touching the connection.	Italics indicate emphasis.
The part of the headset that fits over one or both ears is called a *headpiece*.	Italics also set off special terms.

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Product Safety Labels

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Example	Purpose
If you press the **Feature** button on an MLX display telephone, the display lists telephone features you can select. A programmed Auto Dial button gives you instant access to an inside or outside number.	The names of fixed-feature, factory-imprinted buttons appear in bold. The names of programmed buttons are printed as regular text.
Choose Ext Prog from the display screen.	Plain constant-width type indicates text that appears on the telephone display or personal computer (PC) screen.
To activate Call Waiting, dial *11.	Constant-width type in italics indicates characters you dial at the telephone or type at the PC.

Product Safety Labels

Throughout these documents, hazardous situations are indicated by an exclamation point inside a triangle and the word **CAUTION** or **WARNING**.

⚠ **WARNING:**

Warning indicates the presence of a hazard that could cause death or severe personal injury if the hazard is not avoided.

⚠ **CAUTION:**

Caution indicates the presence of a hazard that could cause minor personal injury or property damage if the hazard is not avoided.

Security

Certain features of the system can be protected by passwords to prevent unauthorized users from abusing the system. You should assign passwords wherever you can and limit knowledge of such passwords to three or fewer people.

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Related Documents

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Nondisplaying authorization codes and telephone numbers provide another layer of security. For more information, see Appendix A, "Customer Support Information" following *Maintenance and Troubleshooting*.

Throughout this document, toll fraud security hazards are indicated by an exclamation point inside a triangle and the words **Security Alert**.

▲ SECURITY ALERT:

Security Alert indicates the presence of a toll fraud security hazard. Toll fraud is the unauthorized use of your telecommunications system by an unauthorized party (for example, persons other than your company's employees, agents, subcontractors, or persons working on your company's behalf). Be sure to read "Your Responsibility for Your System's Security" on the inside front cover of this book and "Security of Your System: Preventing Toll Fraud" in Appendix A, "Customer Support Information."

Related Documents

In addition to this book, the documents listed below are part of the documentation set. Within the continental United States, these documents can be ordered from the Lucent Technologies BCS Publications Center by calling 1 800 457-1235.

Document No.	Title
	System Documents
555-661-100	*Customer Documentation Package*
	Consists of paper versions of *System Manager's Guide, Feature Reference,* and *System Programming*.
555-661-110	*Feature Reference*
555-661-111	*System Programming*
555-661-112	*System Planning*
555-661-113	*System Planning Forms*
555-661-116	*Pocket Reference*
555-661-118	*System Manager's Guide*

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Document No.	Title
555-661-150	*Network Reference*
555-661-800	*Customer Reference CD-ROM*
	Contains *System Manager's Guide, Feature Reference, System Programming,* and *Network Reference.*
	Telephone User Support
555-660-122	*MLX Display Telephones User's Guide*
555-630-150	*MLX-10D Display Telephone Tray Cards (5 cards)*
555-630-155	*MLX-16DP Display Telephone Tray Cards (5 cards)*
555-630-152	*MLX-28D and MLX-20L Telephone Tray Cards (5 cards)*
555-660-124	*MLX-5® and MLX-10® Nondisplay Telephone User's Guide*
555-630-151	*MLX-5 and MLX-1- Nondisplay Telephone Tray Cards (6 cards)*
555-660-120	*Analog Multiline Telephones User's Guide*
555-660-126	*Single-Line Telephones User's Guide*
555-6xx-xxx	*MDC and MDW Telephones User's Guide*
	System Operator Support
555-660-134	*MLX Direct-Line Consoles Operator's Guide*
555-660-132	*Analog Direct-Line Consoles Operator's Guide*
555-660-136	*MLX Queued Call Console Operator's Guide*
	Miscellaneous User Support
555-661-130	*Calling Group Supervisor and Service Observer User-Guide*
555-640-105	*Data/Video Reference*
	Documentation for Qualified Technicians
555-660-140	*Installation, Programming, & Maintenance (IP&M) Binder*
	Includes: *Installation, System Programming & Maintenance (SPM),* and *Maintenance & Troubleshooting*
	Toll Fraud Security
555-025-600	*BCS Products Security Handbook*

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How to Comment on This Document

We welcome your comments, both positive and negative. Please use the feedback form on the next page to let us know how we can continue to serve you. If the feedback form is missing, write directly to:

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Equipment

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Introduction

<div style="text-align: right; font-size: 3em; font-weight: bold;">1</div>

The purpose of maintenance is to detect, report, and clear problems quickly and with minimal disruption of service. The system attempts to isolate each problem to a single replaceable unit, whenever possible, by running automatic tests. In private networked systems (Release 6.0 and later, Hybrid/PBX mode), many problems are caused by programming errors rather than by malfunctioning hardware. Errors that the system cannot automatically correct are usually recorded in error logs. Most troubleshooting relies on checking the error logs and interpreting them, using Table 2-6.

Equipment

To perform maintenance, you need a maintenance terminal and some additional tools, all of which are defined below.

Maintenance Terminal

Whether you perform onsite or remote maintenance, you need a maintenance terminal:

- For onsite maintenance, you can use either an MLX-20L system programming console or a PC with System Programming and Maintenance (SPM) software.

- For remote maintenance, you must use a PC with SPM software.

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Equipment

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Detailed information about system programming is included in *System Programming* and in *System Programming and Maintenance (SPM)*.

You can use either a DOS PC or a Master Controller (MCII or MCIII) to run SPM. To connect a PC to the control unit, you need a 355AF adapter and a D8W-87 cord.

➡ NOTES:

1. Onsite programming maintenance is preferred if it is feasible; remote programming overrides onsite programming, except when onsite backup or restore is in progress. See "On-Site Programming Maintenance" on page 1–3 and "Remote Programming Maintenance" on page 1–6 for details.

2. In Release 6.0 and later systems (Hybrid/PBX mode) where systems are private networked and only one system has public switched networked trunks, you must use the Remote Access feature in order to access SPM on private networked systems. For details, see "Remote Programming Maintenance" on page 1–6.

Tools and Documentation

In addition to the maintenance terminal, you need the following tools and documentation:

- Trouble report documentation
- Troubleshooting guide
- NSAC contact name
- EIA breakout box
- Digital voltmeter (KS-20599 or equivalent)
- 110/66-type punchdown tool
- Dracon TS21 or equivalent touch-tone telephone for testing
- Assorted flathead and Phillips-head screwdrivers
- Long-nosed and regular pliers

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On-Site Programming Maintenance

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- Wrist grounding strap

- Modular cord (D8W-87)

- Replacement parts recommended by NSAC (if necessary)

- Programming terminal, MS-DOS PC (Zenith Sport 184) and 355AF Adapter

⚠ CAUTION:

Should you ever need to open a module and handle the circuit board, use the wrist strap to connect your wrist to a suitable ground first. Electrostatic discharge can destroy or severely damage the integrated circuits in the power supply, processor, and modules.

On-Site Programming Maintenance

You can perform onsite maintenance with an MLX-20L console or a PC with SPM software. This book provides maintenance instructions from the console. If you are using a PC, refer to *System Programming and Maintenance (SPM)* for details. If you use the UNIX® System, see the documentation for Integrated Solution III (IS III).

Setting Up the MLX-20L Console

To connect an MLX-20L console to the control unit, follow the steps below. Refer to Figure 1–1 on page 1–5.

▶ **1. Plug one end of a D8W-87 cord into one of the first five jacks on the leftmost 008 MLX module or 408 GS/LS-MLX module.**

The first MLX jack is the default. If it is already being used for the attendant console, choose another jack. If one of the jacks is already being used for system programming or maintenance, use that jack. Only one jack at a time can be used for system programming or maintenance.

▶ **2. Plug the other end of the D8W-87 cord into the LINE jack on the underside of the MLX-20L console.**

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On-Site Programming Maintenance

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MLX-20L Failure

If the MLX-20L console does not work, follow the steps below.

▶ **1. Replace the MLX-20L console with one that is known to be working (if available).**

▶ **2. If the failure persists, or if a working MLX-20L console is not available, connect the original MLX-20L console directly into the appropriate MLX jack on the control unit using a cord that is known to be working.**

▶ **3. If the trouble clears, replace the original D8W-87 cord.**

If not, use the PC as your maintenance terminal and then troubleshoot the leftmost MLX module. See "Module Problems" on page 4–34 for instructions.

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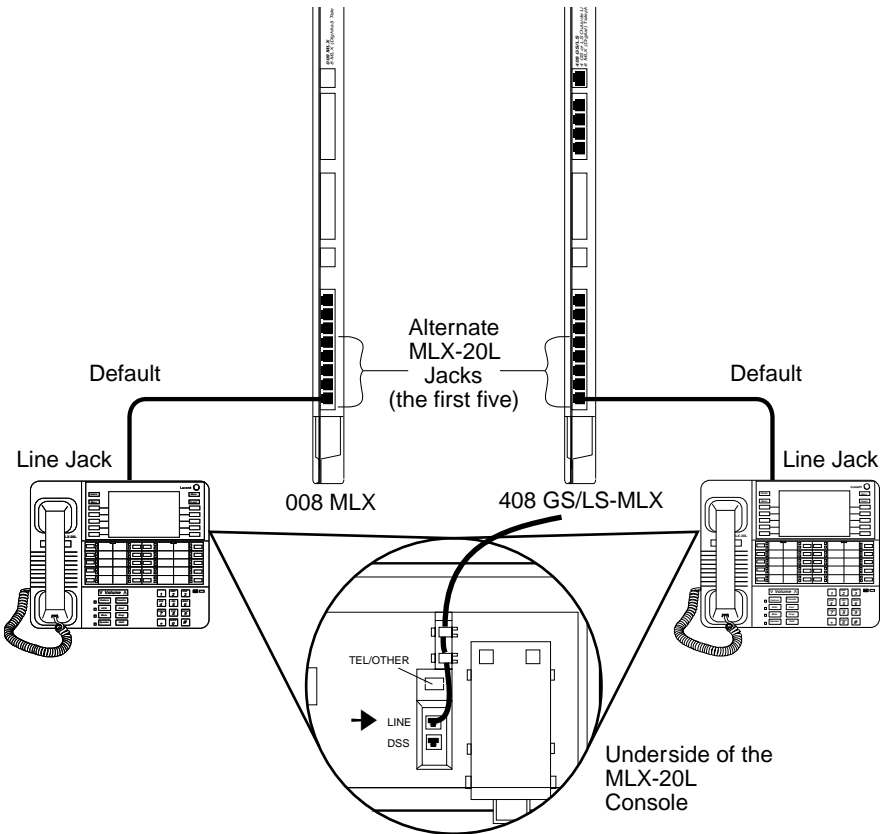
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Figure 1-1.   Setting Up the MLX-20L Console

Setting Up the PC

Plug a PC into the ADMIN jack on the processor module as shown in If you are using a remote PC for system programming, see "Remote Programming Maintenance" on page 1–6.

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Remote Programming Maintenance

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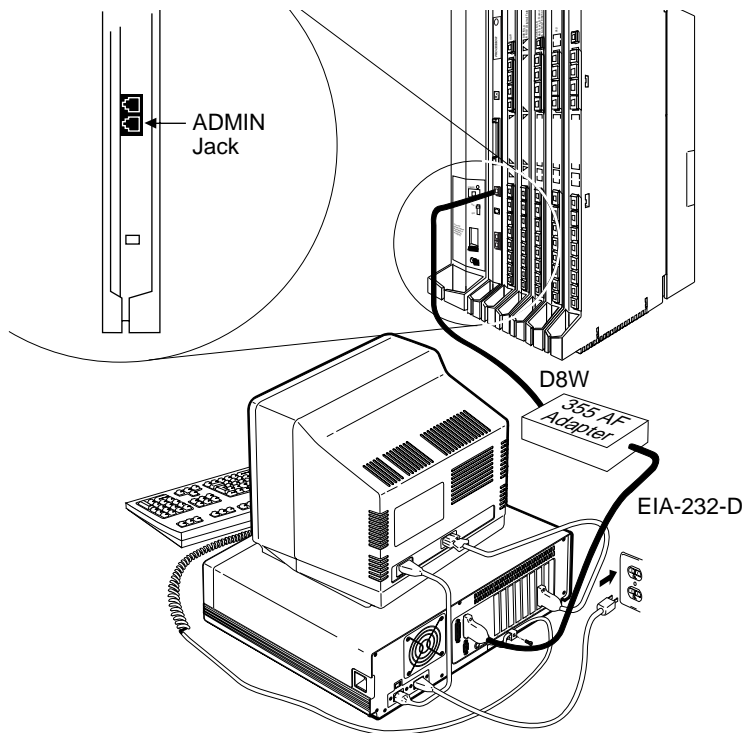
Figure 1-2.   Setting Up the PC

Remote Programming Maintenance

Remote maintenance allows you to support the system from an off-premises
location. You can check error logs and system status, execute a trace on one or
more facilities to verify call progression to isolate the source of a problem, and
restart the system remotely. Remote programming maintenance is particularly
useful for private networked switches (Release 6.0 and later systems,
Hybrid/PBX mode only).

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Remote Programming Maintenance

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To perform remote maintenance, you need a PC with SPM software, a tip/ring telephone, and a 1,200-bps modem. Beginning with Release 3.0, a 2,400-bps modem may also be used.

Considerations

Review the following points before you begin remote maintenance procedures.

- Remote maintenance overrides onsite maintenance and programming, except when onsite backup or restore is in progress. Before you perform remote maintenance, notify the customer's system manager.

- You can perform remote maintenance and programming only from a DOS PC, not from the UNIX environment. If you are running SPM under IS III, you cannot perform remote maintenance.

- Line noise can cause the SPM screen to display unpredictable results. If this occurs, hang up and redial.

➡ NOTE:
Under applicable tariffs, the customer is responsible for any charges incurred through the remote use of system facilities. Precautions should be taken to prevent unauthorized use of the system's outside lines by remote callers, also called toll fraud. See Appendix A, "Customer Support Information," for more information about security.

Setting Up Equipment for Remote Maintenance

To set up equipment for remote maintenance, follow the steps below while referring to Figure 1–3 and to *Installation.*

▶ 1. Connect the PC and modem.

- If you have an external modem, use an EIA-232-D cable.

- If you have an internal modem, the connection is already established.

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Using SPM

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▶ **2. Use a D8W cord to connect the modem to a T/R trunk jack.**

▶ **3. Use a D8W cord to connect the modem to a T/R telephone.**
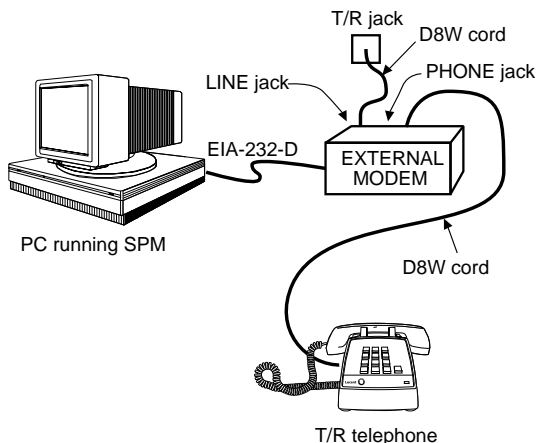
Figure 1-3. External Modem Setup

Using SPM

For more information about using SPM, see System Programming and Maintenance.

Starting SPM

The procedure for accessing SPM differs slightly, depending on whether your PC is connected directly or by modem to the control unit.

With a Direct Local Connection

To access SPM when your PC is connected directly to the control unit, follow the steps below.

▶ **1. If you do not have a hard drive, insert the SPM diskette into Drive A
      and switch to Drive A if it is not already the current drive.**

▶ **2. Start the SPM program.**

Console Display/Instructions	Additional Information	PC

Type *SPM*. The SPM Welcome screen appears, as shown below.

▶ **3. Press any key.**

```
      Welcome to SPM
    The MERLIN LEGEND
    System Programming
  & Maintenance Utility
  Please press any key
        to continue:
      Version X.xx
```

If the main menu (see Step 4) does
not appear, or if the information on
the screen is garbled, press any
key again.

▶ **4. Select an option by pressing one of the function keys.**

```
         SPM Main Menu
Menu: Select Function
Sys Program    Maintenance
Backup         Restore
Boards         Pass-Thru
Print Opts     Password
Monitor        Language
```

F1 F2 F3 F4 F5   F6 F7 F8 F9 F10

With a Local or Remote Modem Connection

When the equipment is set up, you can perform remote maintenance by dialing
the remote processor's built-in 2,400/1,200-bps modem using Remote Access.
You can dial the modem directly or call the system operator and request to be
transferred to the modem. In Release 6.0 and later systems (Hybrid/PBX mode)
where systems are private networked and only one system has public switched
networked trunks, you must use the Remote Access feature in order to access
the system with public switched networked trunks and from that system reach
any switches connected to it directly or indirectly via tandem trunks. All three
procedures are explained below.

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Using SPM

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Dialing the System Operator

If you do not know the remote access trunk number, dial the number for the customer's system. To dial the operator, follow the steps below.

▶ **1. Start SPM. When the Welcome message appears, press any key.**

▶ **2. Enter the command to put the modem in originate mode (this command varies depending on the type of modem you are using).**

▶ **3. Pick up the handset on the T/R telephone and dial the customer's system operator (the Listed Directory Number for the customer's system).**

▶ **4. When the attendant answers the call, explain what you are doing and ask for any passwords you may need; then ask the operator to transfer you to the modem by pressing the Transfer button and then dialing ∗10.**

⇒ NOTES:

1. If the password is not known, check the System Information Report or ask to speak with the system manager.

2. You can change the password without knowing the old password only when you perform onsite maintenance through the ADMIN jack.

▶ **5. When you hear the modem tone, hang up.**

▶ **6. If nothing appears on the SPM screen, press** Enter← **.**

▶ **7. Enter the password.**

When the Password: prompt appears, type the password (do not press Enter←). The SPM main menu appears, and you are ready to proceed with remote maintenance.

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Dialing the Modem Directly

To dial the modem directly, follow the steps below.

▶ **1. Start SPM. When the Welcome message appears, press any key.**

▶ **2. Enter the command to put the modem in originate mode (this command varies depending on the type of modem you are using).**

▶ **3. Pick up the handset on the T/R telephone and dial the remote access trunk number.**

This is possible only if a trunk is programmed as a dedicated trunk for remote access to the built-in modem.

▶ **4. If the dial tone begins with three short tones followed by a steady tone, dial the remote access barrier code from the T/R telephone; otherwise, go to Step 5.**

If you do not know the remote access barrier code, contact the customer's system manager, or check Form 3a, Incoming Trunks: Remote Access. If the system accepts the barrier code, you hear ringing followed by dial tone.

$\Longrightarrow$ NOTE:

You can change the barrier code without knowing the old one only when you perform onsite maintenance through the ADMIN jack.

▶ **5. Connect to the modem on the remote system.**

When you hear dial tone, dial ∗10.

▶ **6. When you hear the modem tone, hang up.**

If nothing appears on the SPM screen, press [Enter ←].

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Console Display/Instructions   **Additional Information**   **PC**

▶ **7. Enter the password.**

```
Enter Password:
```

Type the remote access password.
The password you enter does not
appear as you type it.

▶ **8. Select an option.**

```
         SPM Main Menu
Menu: Select Function
Sys Program    Maintenance
Backup         Restore
Boards         Pass-Thru
Print Opts     Password
Monitor        Language
```

[F1] [F2] [F3] [F4] [F5]   [F6] [F7] [F8] [F9] [F10]

Press one of the function keys.

NOTES:

1. If you do not know the password, check the System Information
   Report or ask to speak with the system manager.

2. You can change the password without knowing the old
   password only when you perform onsite maintenance through
   the ADMIN jack.

Private Networked Systems

In Release 6.0 and later systems, where systems are private networked and
only one system has public switched networked trunks, you must use this
method in order to access SPM on private networked systems. The Remote
Access code of the switch you are reaching must be programmed into the
non-local dial plan of the system from which you are calling. Remote Access
codes must be unique and unambiguous for all private networked systems.

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You dial into the system that has public switched network tandem trunks using Remote Access and then, from that system, reach a private networked switch using Remote Access again. To dial into the system that has public switched networked trunks, follow Steps 2–4 in the previous section, "Dialing the Modem Directly" on page 1–11. If you are already at an extension on a private networked system, skip these steps. Once you are connected to a system in the private network, follow the steps below.

▶ **1. Start SPM. When the Welcome message appears, press any key.**

▶ **2. Pick up the handset on the T/R telephone and dial the remote access code.**

This is possible only if the remote access code is programmed into the non-local dial plan of the system from which you are calling.

▶ **3. If the dial tone begins with three short tones followed by a steady tone, dial the remote access barrier code from the T/R telephone; otherwise, go to Step 5.**

If you do not know the remote access barrier code, contact the customer's system manager, or check Form 3a, Incoming Trunks: Remote Access. If the system accepts the barrier code, you hear ringing followed by dial tone.

$\Rightarrow$ **NOTE:**

You can change the barrier code without knowing the old one only when you perform onsite maintenance through the ADMIN jack.

▶ **4. Connect to the modem on the remote system.**

When you hear dial tone, dial ✶10.

▶ **5. When you hear the modem tone, hang up.**

If nothing appears on the SPM screen, press Enter↵.

Console Display/Instructions   **Additional Information**   **PC**

▶ **6. Enter the password.**

```
Enter Password:
```

Type the remote access password.
The password you enter does not
appear as you type it.

▶ **7. Select an option.**

```
          SPM Main Menu
Menu: Select Function
Sys Program    Maintenance
Backup         Restore
Boards         Pass-Thru
Print Opts     Password
Monitor        Language
```

F1
F2
F3
F4
F5

F6
F7
F8
F9
F10

Press one of the function keys.

⇒ NOTES:

1. If you do not know the password, check the System Information
   Report or ask to speak with the system manager.

2. You can change the password without knowing the old
   password only when you perform onsite maintenance through
   the ADMIN jack.

The SPM Display

SPM screens simulate the MLX-20L console (Figure 1–4).

Each SPM screen includes a 7-line by 24-character console simulation window
that corresponds to the display area of the MLX-20L telephone. To the right and
left of this console simulation window are columns, listing the keys that
correspond to similarly located buttons on the MLX-20L telephone.

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Figure 1-4.   The SPM Display

The 10 function keys, identified on screen as `F1` through `F10`, are used to select screen options. When a screen displays several choices, press the function key identified by the label next to your choice. (If you were working on the console you would press the telephone button next to your choice.)

Below the console simulation window are 20 simulated line buttons. Using `PgDn` (Inspect), you can determine the status of each line.

A list of labels on the right side of the screen shows key combinations that correspond to buttons on the MLX-20L telephone. Table 1–1 describes the function of PC keys within SPM.

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Table 1–1. Function of PC Keys in SPM

PC Key	Console	SPM Function
Home	Home	Quit. Exit from SPM and return to the DOS prompt when you have finished system programming. If you are using a modem, the call is disconnected.
End	Menu	Return to the SPM Main Menu.
PgUp	More	Display more menu items (when there is an additional screen and the > symbol appears next to the key).
PgDn	Inspct	Show the current information that has been programmed for a feature or button.
Alt + P	Drop	Stop. Enter a stop in a speed dialing sequence.
		This combination also deletes an entry in a field in any screen except one in which you are entering a speed dialing sequence.
Alt + F	Conf	Flash. Enter a switchhook flash in a speed dialing sequence.
Alt + C	n/a	TopSP. Return to the top of the System Programming menu.
Alt + H	Hold	Pause. Enter a pause in a speed dialing sequence.
Alt + U	n/a	Convert. Convert a backup file from an earlier release to Release 2.0 or later format.
Ctrl + F1	n/a	Help. Display a help screen about SPM operations. To exit from Help, press End.

Continued on next page

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Table 1–1. Continued

PC Key	Console	SPM Function
Ctrl + F5	n/a	Reset. Reset the communications port. For example, if the information on the screen is garbled, try exiting from and then re-entering the screen. If the screen remains garbled, use Ctrl + F5 to clear the screen and return to the SPM Welcome screen. Note that using Ctrl + F5 drops the modem connection.
Ctrl + F8	n/a	Browse. View print reports saved with Print Opts.
Ctrl + F9	n/a	Escape to shell. To use this key in sequence, you must set DEBUG=1 in the SPM configuration file ams.cfg. You can then use this key sequence to execute DOS (or UNIX system) commands. To return to SPM, type *exit*.
Enter ↵	Enter	This key on your PC can be used instead of F10 (Enter) when Enter appears as a choice in the 7-by-24 console simulation window.
← Bksp	Backspace	← Bksp can be used instead of F9 when it appears as a choice in the 7-by-24 console simulation window.
Del	Delete	The Del key on your PC can be used instead of F8 (Delete) when it appears as a choice in the 7-by-24 console simulation window.
↑ ↓ ← →	n/a	The up, down, left, and right arrow keys can be used to highlight selections in a menu and to select the 20 line buttons below the 7-by-24 console simulation window.

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Exiting SPM

To exit SPM, follow these steps.

Console Display/Instructions **Additional Information** **PC**

▶ **1. Return to the System Programming menu.**

If the display gives directions for returning to the main menu, follow the directions. If not, press F10 (Exit) to return to the previous menu. Continue to press F10 (Exit) until the main menu appears.

▶ **2. Select the Quit option.**

```
          SPM Main Menu
     Menu: Select Function
F1   Sys Program    Maintenance    F6
F2   Backup         Restore        F7
F3   Boards         Pass-Thru      F8
F4   Print Opts     Password       F9
F5   Monitor        Language       F10
```

Press the Home key.

Preparation for Hardware Maintenance

If you are performing onsite hardware maintenance, first remove the control unit housing (the cover of the control unit), then disconnect the AC power.

Removing the Control Unit Housing

To remove the control unit's housing, see Figure 1–5.

■ If you have a MERLIN II® Communications System or a MERLIN LEGEND Communications System (Release 2.1 or later):

1. Pull the bottom front of the housing towards you. When it releases, remove it by lifting up as shown in Figure 1–5.

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2. Remove the top cover from each carrier by pushing straight up from the front.

■ For a MERLIN LEGEND Communications System Release 2.0 or earlier:

1. Pry the clips from the housing on both sides of the control unit; use a screwdriver if they are difficult to remove.

2. Carefully pull the housing towards you.

NOTE:
If the MERLIN LEGEND (Release 2.0 or earlier) system has more than one carrier, make sure you hold the housing assembly on the basic carrier at the sides; otherwise, the housing may disassemble as the front and side panels are only slotted together.
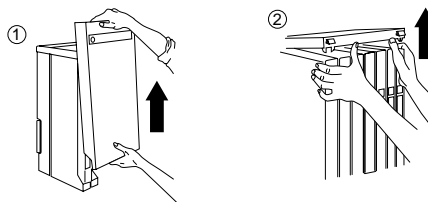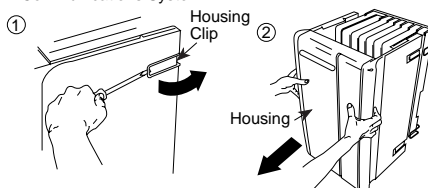
Figure 1-5.   Removing the Control Unit Housing

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Disconnecting AC Power

To disconnect the AC power, see Figure 1–6 and follow the steps below.

▶ **1. Disconnect the AC power to each auxiliary power unit by unplugging the power cord from the wall outlet.**

▶ **2. Disconnect the AC power to each carrier by unplugging the power cord from the wall outlet.**
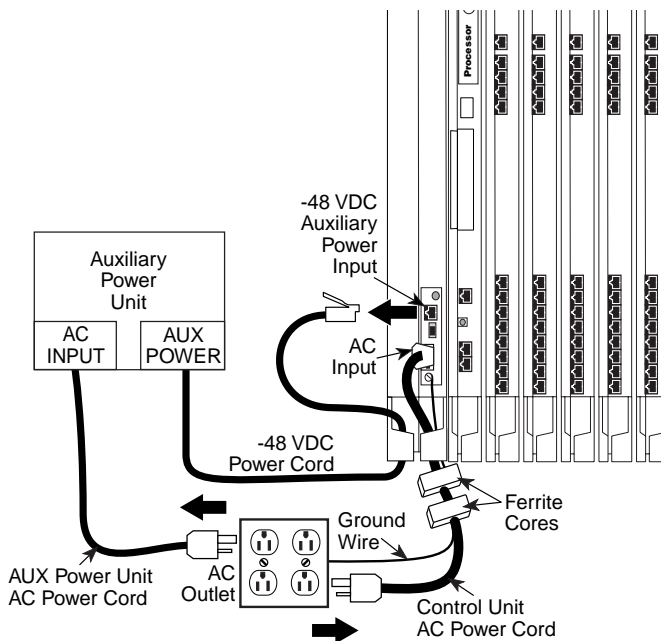
Figure 1-6.   Disconnecting AC Power

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The maintenance strategy presented in this section is only a guideline, not a fixed procedure. Refer to Figure 1–7 on page 1–22 whenever you are uncertain about how to proceed. It provides guidelines for analyzing problems in non-networked systems.

For private networked systems (Release 6.0 and later, Hybrid/PBX mode), call completion problems are usually caused by incorrect programming, although alarms and error logs should be checked initially. The source of the trouble may be the originating system or any system over which the call is conveyed. Fault isolation is required to identify one or more misprogrammed switches, because the problem may not originate at the system where it is reported. For this reason, technicians should attempt to log into each private networked system, preferably simultaneously, and originate test calls with traces to verify the messages, states, and activities associated with the facilities and switches. If the problem is indeed incorrect programming, a technician can correct it remotely without going to the customers' site(s). If test calling does not reveal the source of the problem, then hardware should be checked as with non-networked systems. More information about analyzing private network calling problems is included in "Network Calling Problems" on page 5–40.

As you become more experienced with maintaining and troubleshooting systems, you will most likely develop your own strategy.

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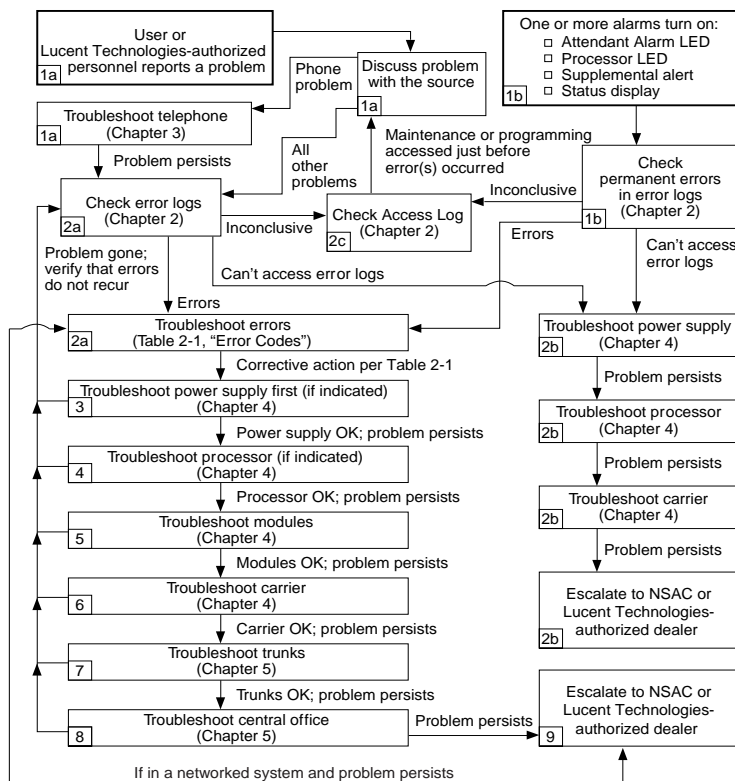
Figure 1-7. Maintenance Strategy

Trouble Reports

System trouble can be reported in two ways:

■ By users

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■ By system alarms (permanent errors)

Automatic Tests

The system performs ongoing maintenance automatically by running tests that do the following:

- Monitor the status of equipment
- Audit operations consistency
- Detect hardware malfunctions

Without disrupting normal service, the tests check hardware and software that are in service. The system registers any errors it detects in the error logs and, if possible, corrects them automatically.

Alarms

If the automatic tests indicate serious error conditions, the system generates an alarm. Depending on how the system is programmed, the system announces an alarm condition in one of the following ways:

- An LED for a line or feature button turns on at an operator console or other designated telephone.
- The red status LED on the processor module lights.
- In Release 3.0 and later, the error code/status display on the processor module displays F if a frigid start, or C if a cold start, occurs. See "System Restarts" on page 1–24 for details about frigid start (System Erase) or cold start (Restart).

  If a software installation or upgrade is taking place, a blinking character is displayed to indicate the status of the procedure. See "Forced Installation/Upgrade of System Software" on page 4–19 for more information.

- The status display indicates an alarm (on an MLX-20L console or a PC running SPM), and can be viewed on the Error screen.

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■ A supplemental alert, bell, chime, or strobe, if installed, is activated.

If an LED is programmed to indicate the alarm, the LED stays lit until the error is cleared.

When the system indicates an alarm, check the permanent error log screen.

Clearing Alarms

The system clears alarms automatically when the error condition no longer exists.

To clear an alarm manually, select **Drop** on the MLX-20L console or [Alt]+[P] on a PC while viewing the error. See "Error Logs" on page 2–1 for more information.

System Restarts

Depending on the severity and duration of a problem, you may need to restart the system manually. Some errors cause the system to restart automatically. Every restart causes an error log entry, and each type of restart has its own error code. A cold start (Restart) or frigid start (System Erase) also causes a C or F to appear on the error code/status display on the processor module.

There are three types of system restarts, all of which occur automatically:

■ Warm start (you cannot select this from the Maintenance menu)

■ Cold start (select Restart to do this manually)

■ Frigid start (select System Erase to do this manually)

Warm Start

A loss of power for less than 250 ms can cause a warm start. If this occurs, calls in progress are not dropped, but calls in the process of being connected may be dropped.

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Considerations

Power interruptions of less than 100 ms usually do not affect the system.

Warm starts may cause telephones without incoming calls to ring.

Cold Start (Restart)

If you need to restart the system, cold start (Restart) is recommended. Restart drops all calls but saves system programming.

⇒ NOTE:
Non-network systems continually update in the event of a cold start.

To perform a cold start, select Restart as follows:

Console Procedure	**Menu**:SysProgram→Exit→System→Yes
PC Procedure	F6 → F5 → F1 → F1 → F2

Considerations

A cold start (Restart) occurs automatically after a power interruption of more than one second.

A cold start (Restart) does not blank out the screen on an MLX-20L telephone until the cold start is completed.

A cold start (Restart) can cause extensions with the Extension Status feature to lose their toll restrictions.

For Release 6.1 and later systems, a cold start is performed to refresh the Message Waiting lights on a local system and on all remote MERLIN LEGEND systems that use the local system's Voice Messaging System. If, after a cold start, any Message Waiting lights on any of the systems are not refreshed, perform a manual update. See "Centralized Voice Messaging" on page 1-31, for more information.

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Frigid Start (System Erase)

⚠ CAUTION:

All system programming is erased. When you perform a frigid start (System Erase), all calls are dropped, and the system configuration information is erased. All system memory must be reinitialized, including system programming. Then the entire system must be rebooted.

To perform a frigid start, select System Erase as follows:

Console Procedure	**Menu:** Maintenance→Slot→Dial 00→Demand Test→System Erase (Line 5 of the display, left button)→System Erase→Yes
PC Procedure	F6 → F1 →Type 00→ F2 → F3 → F3 → F2

Considerations

System Erase is not displayed on the MLX-20L status display. To select System Erase, press the left button on Line 5 of the display twice.

After a System Erase, the default printer is the PC printer, not the Station Message Detail Recording (SMDR) printer. If you want onsite printouts from the SMDR printer, make sure you change the option.

To change the printer option, see *System Programming and Maintenance (SPM)* for information about the Print Opts option on the SPM Main Menu.

For more information about System Erase, see "See "Processor Problems" on page 4–12..

Isolating the Trouble

You can isolate any problem to one of the following areas:

- Telephone
- Control unit

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- Central office

- Private Network problems (Release 6.0 and later, Hybrid/PBX mode)

⇒ **NOTES:**

1. If you change the jack assignment of any telephone, be sure to record the extension jack change on Form 2a, System Numbering: Extension Jacks. See Appendix B, "System Numbering Forms," for details.

2. Private Network problems (Release 6.0 and later, Hybrid/PBX mode) are generally caused by incorrect programming. When attempting to isolate a private network problem following the guidelines here, see "Network Calling Problems" on page 5–40.

Check Telephone Problems

If a customer reports telephone problems, use the following steps as a guideline for determining the possible cause. Chapter 3, "Telephone Problems," discusses telephone problems in more detail.

▶ **1. Discuss the problem with the user who reported the problem.**

▶ **2. Run the appropriate test to verify the complaint.**

▶ **3. Replace the telephone with one that works properly.**

▶ **4. If the problem persists, go to the next section, "Check the Error Logs."**

▶ **5. If the problem persists, replace the telephone wiring.**

Check the Error Logs

If a system alarm turns on (see the top-right area of Figure 1–7 on page 1–22), begin troubleshooting by checking the permanent errors in the error logs.

Use the following steps as a guideline to check the error logs. For more information about performing the procedures, see "Checking the Error Logs" on page 2–2. Also, when you check the error logs, you should refer to Table 2–2, page 2–7 for a detailed description of each problem.

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▶ **1. Check the permanent errors.**

▶ **2. If errors still exist, check the transient errors.**

▶ **3. Check the last 99 errors whenever you want to review the 99 most recently recorded errors—either permanent or transient.**

⮕ **NOTE:**
In releases prior to 4.0, the error log displays only the last 10 messages.

Trouble Accessing the Error Logs

If you cannot access the error logs, or if the system is inoperable, use the following steps as a guideline to troubleshoot the system.

▶ **1. Check the power supply LED.**

  a. Is the power switch turned on?

  b. Is the power cord connected to an AC wall outlet that is not controlled by a wall switch?

  If the LED is off and you are sure that the power is connected and turned on, see "Power Supply Problems" on page 4–2.

▶ **2. If you still cannot access the error logs after checking the power supply, see "Processor Problems" on page 4–12.**

▶ **3. If you still cannot access the error logs after checking the processor, see "Carrier Problems" on page 4–126.**

▶ **4. If you still cannot access the error logs, review "System Inventory" on page 2–26 and escalate the problem to your technical support organization.**

Check the Access Log

At any time during the maintenance process, you can check the access log for maintenance and system programming. This log indicates the last 20 times that

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someone accessed maintenance or system programming. If you find that someone accessed maintenance or system programming shortly before the problem originated, that person may be able to help you isolate the trouble by providing additional information about what was done.

Once you receive that information, use any maintenance or system programming feature that may lead to the root of the problem. See "Access Log" on page 2–24 for additional information. See *System Programming* for information about system programming and the Inspect function.

Check the Power Supply

If the error logs indicate the power supply as the source of the problem, see "Power Supply Problems" on page 4–2.

Check the Processor

If the error logs indicate the processor as the source of the problem, use the following as a guideline to check the processor.

- Back up system programming.

    — System programming can be backed up to a floppy disk, using SPM.

    — For Release 3.0 and later, system programming can be backed up to a memory card, using SPM or the MLX-20L console. See Appendix D, "Backing Up with a Memory Card," for more information.

- See "Processor Problems" on page 4–12 to troubleshoot the processor.

Check the Modules

If the error logs indicate any modules, see "Module Problems" on page 4–34.

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Check the Control Unit Carrier

Within the control unit, the last possible cause of a problem is the carrier. If the carrier is damaged, it must be replaced. See "Carrier Problems" on page 4–126 for instructions.

Check the Trunks

Troubleshoot the trunks that are connected to the control unit. See Chapter 5, "Central Office and Network Problems."

Check the Central Office

If the error logs indicate the central office (CO) as the source of the problem, and you have resolved all other possible causes, notify the customer that they should call the central office and ask the central office to check the problem at their end (see Chapter 5, "Central Office and Network Problems"):

- If the problem is in the central office, wait for the CO to fix it. Then duplicate the problem conditions to ensure that the problem is really fixed.

- If the problem persists, get the customer to again call the central office with the problem.

- If they indicate that the problem is not in the central office, escalate the problem as described below.

Escalating the Problem

Escalate any unresolved problems to your technical support organization.

See "System Inventory" on page 2–26, which explains how to access the System Inventory screen. This screen contains information (such as the hardware vintage, software vintage, and ROM ID for each module) that your technical support organization may request.

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Centralized Voice Messaging

For Release 6.1 and later systems, Centralized Voice Messaging (CVM) enables usage of a single voice messaging system by other directly connected systems in a private network. When the Message Waiting lights on the local system and on all remote MERLIN LEGEND systems that use the local system's Voice Messaging System may need to be updated. The lights are updated manually by using the maintenance screens. Follow the procedures in "Updating the Message Waiting Lights".

For more information about Restart, see "Processor Problems" on page 4–12. For more information about the Restart procedure, see _System Programming_.

Updating the Message Waiting Lights

$\Longrightarrow$ NOTE:
These procedures are used only for Release 6.1 or later systems. Non-networked systems continually and automatically update in the event of a cold start.

Consider a manual update of the Message Waiting lights if:

- a processor is changed
- a VMS is changed on the hub system
- a cold start did not successfully refresh
- any other instance it is deemed necessary by a qualified technician

You must clear all the Message Waiting lights on the local MERLIN LEGEND system, and then refresh the Message Waiting lights on extensions that use a specific VMS, including telephones on a private networked MERLIN LEGEND system (see the Network Reference for more information). Follow these general steps below to update these lights.

▶ **1. Clear the Message Waiting lights for systems reporting trouble with lamp state.**

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2. Refresh the Message Waiting lights on the systems on the VMS on the private network.

> **NOTE:**
> Multiple refreshes across a private network, using tandem tie lines, can cause congestion and delayed refresh time, it is advisable to coordinate refresh operations in a private network to send only one refresh message.

Clearing the Message Waiting Lights

To clear the Message Waiting lights on the local system, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. Select Messaging Waiting Lamps Update from the System Maintenance screen.**

```
System:
Make a selection
Status        Upgrd/Instll
Error Log     MW LP Update
Inventory
Access Log
Exit
```
F7

Select MW LP Update.

▶ **2. Select Clear MWL to clear the Message Waiting lights on the telephones on the local MERLIN LEGEND system.**

```
Mesg Wait Lamp Update

Clear MWL
Refresh MWL

Backspace
Exit          Enter
```
F1

Select Clear MWL.

A Clear in Progress screen appears. When all the lights are cleared, a Clear Complete screen appears.

Console Display/Instructions   Additional Information   PC

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▶ **3. Select Exit, when** `Clear Complete` **appears.**

```
Mesg Wait Lamp Update


Clear Complete



Backspace
Exit          Enter
```

Select `Exit`.

Refreshing the Message Waiting lights

⇒ **NOTE:**

Systems using Messaging 2000 must perform refreshes manually, since the refresh command is not recognized.

To refresh the Message Waiting lights, follow the steps below.

▶ **1. Select Message Waiting Lamps Update from the System Maintenance screen.**

```
System:
Make a selection
Status       Upgrd/Instll
Error Log    MW LP Update
Inventory
Access Log
Exit
```

F7

Select `MW LP Update`.

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Console Display/Instructions   Additional Information   PC

▶ **2. Select Refresh MWL to refresh the Message Waiting lights on all telephones, including those across a private network that use a Voice Messaging System.**

```
Mesg Wait Lamp Update

Clear MWL
Refresh MWL

Backspace
Exit          Enter
```

F2

Select Refresh MWL.

After selecting Refresh MWL, the "Enter VMI Group" screen appears.

▶ **3. Enter the VMI group extension number (nnnn) for the Voice Messaging System, and press Enter**

⟹ **NOTE:**
All local and non-local systems connected to the CVMS will receive a refresh of Message Waiting lights..

```
Mesg Wait Lamp Update
Enter VMI Group:




Backspace
Exit          Enter
```

Dial or type nnnn, and press Enter. F10

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The following screen appears indicating that the Message Waiting refresh has begun. This screen remains until an Exit is selected.

```
Mesg Wait Lamp Update

Refresh message sent.
Refresh will continue in
background.

Exit
```

▶ **4. Select Exit.**

```
Mesg Wait Lamp Update

Refresh message sent.
Refresh will continue in
background.

Exit
```

Pressing Exit does not stop the process; the process continues in the background.

Unit Loads

A unit load is a measure of power (1.9 watts) used to determine the electrical load that the following components have on each carrier's power supply:

- Telephones and adjuncts
- Direct-Inward Dial (DID) modules

Only the telephones and adjuncts that connect to the analog and digital ports on the control unit require unit load calculation. Do not include any equipment with its own power supply (for example, an answering machine) in the unit load calculation.

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Checking Unit Loads

In the event of maintenance or equipment changes, recalculate the unit loads for each carrier where there is a different configuration. Use the worksheet in Appendix C, "Unit Load Calculation Worksheet."

Generally, if you can distribute the DID modules and telephone modules equally across the carriers, you prevent unnecessary drain on any one carrier.

The rules vary, however, depending on the system's mode. The next two sections provide the rules for calculating unit loads in various modes.

Unit Loads for Hybrid/PBX Mode

The power supply (model 391A1) generally supports six modules of any type in a Hybrid/PBX system. However, if both of the following conditions are true, the unit loads on a carrier can exceed the 54-unit (102.6-watts) maximum:

- All six carrier slots are occupied by MLX telephone or analog multiline telephone modules.
- The carrier has more than 45 MLX-20L telephones and/or 34-button analog multiline telephones installed.

Unit Loads for Key or Behind Switch Mode

In a Key or Behind Switch system with four or fewer modules, no calculation is needed. The power supply (model 391A1) generally supports four modules of any type in Key or Behind Switch mode.

Upgrading the Power Supply

The 391C1 or 391A3 power supply has a maximum rating of 75 unit loads. If your system contains a 391A1 or 391A2 power supply module, and the unit loads for that carrier will exceed 54, it is recommended that a 391A3 power supply or later be installed in the system. Auxiliary Power Units are no longer necessary.

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⚠ CAUTION:

Running the system with more than 54 unit loads (102.6 watts) per carrier may not appear to do harm. However, this can cause the system to malfunction, creating "No Trouble Found" conditions.

If a new power supply is required, complete installation instructions are provided in Installation.

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Error Logs, Access Logs, and System Inventory

2

As described in "Maintenance Strategy" on page 1-21, much of your troubleshooting relies on the error logs and the access log, for maintenance and system programming. Both of these maintenance features are described here in detail. This chapter also explains how to access the System Inventory screen, which you may need when you escalate problems to your technical support organization.

For information about entering and exiting maintenance functions on a console or a PC running SPM, see Chapter 1, "Introduction."

Error Logs

When an error occurs, the system records it in the error logs, which are stored in battery backed-up RAM. These errors indicate problems that span the entire system, including the control unit, telephones, adjuncts, and network interface.

Transient errors are less serious than permanent errors. However, some transient errors can become permanent if they occur a certain number of times,

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as shown in Table 2–1. The Threshold column indicates the number of occurrences at which a transient error becomes permanent.

Table 2–1.   Transient/Permanent Error Thresholds

Error Code	Error Description	Transient/Permanent Threshold
0C04	MWL FAC TIMEOUT	3
0C05	MWL DELIVERY DELAY	15
7402	LOOP BIT CONTROL NOT SET	4
7403	NO LOOP CURRENT	4
7404	STUCK RINGING	2
8403	NO EXTERNAL RELEASE	2
840B	NO LOOP CURRENT	4
840C	STUCK RINGING	2
840D	INCORRECT FIRMWARE STATE	2
2E01	T1 ACC VIOL	10

Checking the Error Logs

Once you have reviewed the error logs, you should print the error information.This will help you determine whether your work has resolved each problem. (Refer to the summary below or *System Programming* for additional information about printing.)

Summary

Console Procedure	**Menu**: Maintenance→System→Error Log→Last 30 or Permanent or Transient
PC Procedure	F6 → F1 → F2 → F1 or F2 or F3

Prior to Release 4.0, the error log displays only the last 10 messages.

Printing from Console	**Menu**: System Programming→Exit→**More**→ Print→**More**→**More**→Error Log
Printing from PC	F1 → F5 → PgUp → F3 → PgUp → PgUp → F6

To check the error logs, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the System option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
                                                                            F1

▶ **2. Select Error Log.**

```
System:
Make a selection
Status        Upgrd/Instll
Error Log
Inventory
Access Log
Exit          Enter
```
                                                                            F2

Console Display/Instructions	Additional Information	PC

▶ **3. Select an error log option.**

```
System Error Log:
Make a selection
Last 99
Permanent
Transient
(most recent alarm)
Exit
```

If you select `Last 99`, see   `F1`
"Checking the Last 99 Errors," page 2–5.
If you select `Permanent`, see   `F2`
"Checking Permanent Errors," page 2–4.
If you select `Transient`, see   `F3`
"Checking Transient Errors," page 2–5.

The most recent alarm message stays on the System Error Log screen
until it is replaced by another. The screen does not update the most
recent alarm while displayed; to see any updates, you need to exit this
screen and re-enter.

Checking Permanent Errors

Follow Steps 1 through 3 in ""Error Logs" on page 2-1". In Step 3, select
`Permanent`.

```
Permanent Errors:    >
xxxxxxxxxxxxxxxxxxxxxx
Slotxx  Portxx  Countxxx
First  mm/dd/yy hh:mm
Last  mm/dd/yy  hh:mm
Code xxxx
Exit
```

Press the More button to page   `PgDn`
through the permanent errors.

Press the Drop button to delete   `Alt`+`P`
an error log entry.

Line 2 provides a brief description of the error code identified on Line 6. For
more information about an error code, see Table 2-6.

Line 3 indicates the slot and port where the error was detected.

Line 5 indicates the error's last occurrence.

▶ **NOTE:**
Depending on which entry you delete, you might clear an alarm. See
"Alarms" on page 1-23, for additional information about alarms.

Checking Transient Errors

Follow Steps 1 through 3 in "Checking the Error Logs," page 2–2. In Step 3, select `Transient`.

```
Transient Errors:    >
xxxxxxxxxxxxxxxxxxxxx
Slotxx  Portxx  Countxxx
First  mm/dd/yy hh:mm
Last  mm/dd/yy  hh:mm
Code xxxx
Exit
```

Press the More button to page   PgUp
through the transient errors.

Press the Drop button to delete   Alt + P
an error log entry.

Line 2 provides a brief description of the error code identified on Line 6. For more information about an error code, see Table 2-6.

Line 3 indicates the slot and port where the error was detected.

Line 5 indicates the error's last occurrence.

Checking the Last 99 Errors

Follow Steps 1 through 3 in "Checking the Error Logs," page 2–2. In Step 3, select `Last 99`.

```
Last 99 System Errors:>

xxxxxxxxxxxxxxxxxxxxx
Slotxx  Portxx
Last  mm/dd/yy  hh:mm
Code xxxx
Exit
```

Press the More button to page
through the last 99 errors.   PgUp

Line 2 provides a brief description of the error code identified on Line 6. For more information about an error code, see Table 2-6.

Line 3 indicates the slot and port where the error was detected.

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Line 5 indicates the error's last occurrence.

> **NOTE:**
> You cannot delete an error log entry from this screen.

Interpreting Error Codes

Table 2–2 explains how to interpret each error from the error logs. For additional information about how to use the error logs, read this entire chapter and see "Maintenance Strategy" on page 1-21.

Table 2–2.   Error Codes

Error Codes	Description	Action
0001	**TIMEOUT COLD START:** System programming is okay.	No action required; however, if problem persists, troubleshoot the processor.
0002	**POWER UP WARM START:** System programming is okay.	No action required; however, if problem persists, troubleshoot the processor.
0003	**SOFTWARE COLD START:** System programming is okay.	If problem persists, troubleshoot the processor.
0004	**SOFTWARE WARM START:** System programming is okay.	If problem persists, troubleshoot the processor.
0005	**Reset - DIAGNOSTIC SWITCH:**	
0006	**INCOMPLETE COLD START:** System was cold-started while a restart was in progress.	If problem persists, troubleshoot the processor.
0007	**SANITY TIMEOUT RESET:** Faulty software, module, carrier, or processor sanity timer.	Troubleshoot module and or processor.

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Table 2–2. Error Codes (*Continued*)

0008	MAX RESET COUNT EXCEEDED: System was cold-started (System Reset) because too many warm starts occurred. System programming is okay.	If problem persists, troubleshoot the processor.
000A	POWER UP COLD START: A RAM failure was detected in the processor. System programming is okay.	If problem persists, troubleshoot the processor.
000B	CARD INSERTED/REMOVED:	No action required.
000C	SLOT STREAM CNT EXCEEDED: Slot has generated excessive interrupts.	If problem persists, troubleshoot the module.

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Table 2–2. Error Codes (*Continued*)

Error Codes	Description	Action
000D	FMWR NOT IN STANDBY MODE: Module firmware is not in standby mode.	If problem persists, troubleshoot the module.
000E	COMMAND BUFFER FULL:	If problem persists, troubleshoot the processor and module.
000F	TASK RUNNING TOO LONG:	No action required; however, if problem persists, troubleshoot the processor.
0010	INVALID SLOT INTERRUPT: Cannot determine module responsible for generating the interrupt.	Troubleshoot modules and replace if necessary. If the problem persists, troubleshoot the processor.
0011	STACK OVERFLOW: Processor problem.	Troubleshoot the processor.
0012	INVALID RESET FLAG: Processor problem.	Troubleshoot the processor.
0009	FRIGID START: System was restarted and initialized to default programming. This error is also logged after a System Erase.	If the processor was removed while in use, the system may perform a frigid start due to loss of system programming. Restore system as described in *System Programming and Maintenance (SPM)*, or in Appendix D, "Backing up with a Memory Card."
0013	DUART STREAMING INT: Processor problem.	Troubleshoot the processor.
0014	PROCESSOR ERR INTERRUPT: Processor problem.	Troubleshoot the processor.
0015	MODULE MISMATCH: Physical and logical type mismatch. Module inserted into wrong slot.	Change system programming to reflect the proper module or install the proper module.

Continued on next page

Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
0016	POWER UP COLD START: A module dual port RAM failure was detected. System programming is okay.	If problem persists, troubleshoot the module for the slot indicated.
0017	REAL TIME CLOCK FAULT: Date and/or Time incorrect or unreadable.	If this problem persists, replace the processor module.
0018	RTC COLD START: This error is not displayed.	
0019	RESET TIME & DATE: The system performs a cold start because the real time clock chip is not working correctly.	If this problem persists, replace the processor module.
0401	ABK CARD NOT INSERTED: A PCMCIA memory card for Translation is not inserted.	Insert a Translation card or a card that has not been formatted.
0402	ABK INCORRECT CARD TYPE: A PCMCIA card other than a Translation card is inserted.	Remove the current card and insert a Translation card or a card that has not been formatted.
0403	ABK CARD WRITE-PROTECTED: The Translation card has the write protection switch on.	Flip the write protection switch on the card to off (non-write protect mode/position.) It this problem persists, try another card, then replace the processor module if the problem remains.
0C01	NO I-VMS PORT IN SERV: This error indicates that the VMS machine may be down.	No action required.
0C02	DID INTERDIGIT TIMEOUT: May be noisy line or central office problem.	No action required. If problem persists, troubleshoot the DID line and inform the central office if necessary.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
0C03	ALL TTRs UNAVAILABLE: The system needed to use a TTR but one was not available for any and all reasons including: in use, not physically present, and out of service.	Check count and first and last occurrences to determine if error occurs too frequently. If so, check to see if you can add TTRs to the system. If you have prompt out of queue active, you may want to shorten the delay announcement message length. If you have the prompt out of queue feature and secondary announcement(s) active, you may want to increase the interval between the announcements. If you reprogram the delay announcement unit, recheck it to verify that the problem no longer exists. Check to see if you can add TTRs to the system.
0C04	MWL FAC TIMEOUT Two consecutive messages to update Message Waiting lights have been sent across the private network on the same tandem trunk and have not been acknowledged. When this happens three times, the error becomes permanent. The alarm remains in the log until a message for the facility is acknowledged or five days pass.	Check the error log for additional error codes. If the error log contains errors indicating problems with the 100D module, trouble shoot the 100D module using instructions in Chapter 4 of this guide. If the error log also contains errors indicating problems with the 400EM module, troubleshoot the 400EM module using instructions in Chapter 4 of this guide. If the 100D and/or the 400EM modules are functioning properly, troubleshoot the trunks using instructions in Chapter 5 of this guide.

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Table 2–2. Error Codes (*Continued*)

0C05	MWL DELIVERY DELAY A message to update non-local Message Waiting lights has exceeded the time period for delivery. A transient alarm occurs after one minute, and a permanent alarm occurs after 15 minutes. The alarm remains in the error log until a message is delivered or five days pass.	Check the error log for additional error codes. If the error log contains errors indicating problems with the 100D module, troubleshoot the 100D module using instructions in Chapter 4 of this guide. If the error log also contains erros indicating problems with the 400EM module, troubleshoot the module using instructions in Chapter 4 of this guide. If the 100D and/or the 400EM modules are functioning properly, troubleshoot the trunks using instructions in Chapter 5 of this guide. Check that the system receiving the message has enough TTRs to handle the volume of calls. Check the error logs on the sending system and then on the receiving system-more facilities may be needed.
1C01	POOL M-BUSY EXCEEDS 50%: More than half the trunks in the pool are busy.	Troubleshoot trunk.
1C02	DPR TEST NOT COMPLETED	Slot did not complete initializing.
1C03	FW UPGRADE ATTEMPT:	No action required.
1C04	FW UPGRADE COMPLETE:	No action required.
1C05	INVALID FMW 29 DETECTED: Incompatibility problem. The specified video system or data device is connected to an 008 or 408 GS/LS MLX with firmware vintage 0x29.	Replace the 008 or 408 MLX board with one of another firmware vintage and retire this permanent alarm manually.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
`0404`	`ABK EXTENSION BUSY`: An extension is in program, administration, or maintenance mode.	Wait until the extension changes mode. Make sure the programming device (SPM or the console) is not in programming mode when automatic backup is scheduled to occur.
`0405`	`ABK FAULTY CARD`: Unknown cause of a bad card.	Reset card and retry. It the problem remains, try another card. If the problem still remains, replace the processor module.
`0801` and `1C07` and `5801`	`CTI LINK DELETED`: A board renumber or slot restore moved the CTI Link to an unacceptable port and the system has removed the link.	Check that the following are true: 1. The system is in Hybrid/PBX mode. 2. The link is on an 008 MLX or 408 MLX board. 3. The MLX board firmware vintage is not 29. 4. Board renumber has not moved the extension to an operator position. 5. An MLX telephone is not connected to that port. 6. Board renumber has not moved the MLX extension to the system programming port.
`1C06`	`BAD BOARDS IN SYSTEM`: At least one incompatibility problem of type HER 0x1c05 detected. Turns on CPU red LED.	Replace the 008 or 408MLX board with one of another firmware vintage and retire this permanent alarm manually.
`1C07`	See error code 0801	
`2C01`	`T1 ACCESS VIOLATION`: T1 Services (Channels-Voice/Data) programmed incorrectly.	Check facility provisioning and reprogram channels appropriately for voice or data. If the problem persists, contact the NSAC.

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
2C02	BEARER CAPABILITY/INCOMPATIBILITY: A 64 kbps clear-channel data call was routed to a facility that does not have sufficient bandwidth to handle the call.	Verify that the ARS or UDP routing tables route a data call to a DS1 facility. Check the DS1 Type administration item for the specified facility. If the programmed value is *T1*, the caller must initiate a 56 kbps call. Check the DS1 Suppression administration item for the specified facility. If the programmed value is *AMI-ZCS*, the caller must initiate a 56 kbps call.
3001	ALARM TABLE FULL: The error logs are full, and no more errors can be added to them. Turns on the processor LED.	Correct indicated errors, and then remove entries from the transient system error log to free up space. If problem persists, cold-start the system before continuing with troubleshooting. Sys Program→System→Restart
4401	USER REQUESTED SYS ERASE: This error is logged after a System Erase. If the System Erase is successful, this error is removed immediately.	If this error remains in the transient log, do the System Erase again. If problem persists, troubleshoot the processor.
4402	USER REQST UPGRD/INSTALL: This is just a record of the event.	No action required.
4C01	POOL EMPTY: The system needed to use a trunk in a pool but no trunks were physically present in the pool, that is, all of the boards were removed from the system. See first argument number on the screen for pool index (1–11).	Check that the pool has a trunk assigned to it. If a trunk is assigned and the problem persists, replace the boards.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
4C02	POOL BUSY: The system needed to use a trunk in a pool. Trunks are physically present; however, non are idle and available for use, therefore they must be in use or out of service. See first argument number on the screen for pool index (1–11).	Check the count and first and last occurrences. If occurring too frequently, determine if facilities can be added or moved to this pool.
4C03	POOL BUSY &/OR OOS: The system needed to use a trunk in a pool. Trunks are physically present, some may be busy but some are idle. However, the idle trunks are not in service. See first argument number on the screen for pool index (1–11).	Restore if out of service.
5801	See error code 0801	
6C01	DS1 LOSS OF SIGNAL ALARM: Service on the link has been lost.	Usually no action is required. Troubleshoot the T1 trunk, channel service unit (CSU), and the cable between the CSU and the 100D module. If problem persists, escalate to your technical support organization.
6C02	DS1 BLUE ALARM: All unframed ones signal being received. The link cannot be used for communication.	Blue alarms are generated by intermediate equipment, such as a CSU or DDM 1000/2000. The far end of the network interface may be out of service. Troubleshoot the T1 trunk, channel service unit (CSU), and the cable between the CSU and the 100D module. If problem persists, escalate to your technical support organization.

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
6C03	**DS1 RED ALARM:** Incoming signal does not have valid framing information. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
6C04	**DS1 YELLOW ALARM:** The far end of the network interface has lost frame synchronization. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, check the CSU and the DS1 configuration (the framing format). If problem persists, escalate to your technical support organization.
6C05	**DS1 LOSS OF MULTIFRAME:** Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
6C06	**DS1 REMOTE MULTIFRAME:** The far end of the network interface is experiencing loss of multiframe. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
6C07	**DS1 MAJOR ALARM:** Average bit error rate exceeds 10E-3. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization. `Maintenance`→`Slot`→`Error Events`→`Current hr`
6C08	**DS1 MINOR ALARM:** Average bit error rate exceeds 10E-6.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization. `Maintenance`→`Slot`→`Error Events`→`Current hr`

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
`ьС09`	`DS1 MISFRAME ALARM:` Misframe count reached 18.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization. `Maintenance→Slot→Error Events→Current hr`
`ьС0A`	`DS1 SLIP ALARM:` Slip count reached 88.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization. `Maintenance→Slot→Error Events→Current hr`
`ьС0B`	`HARDWARE INOPERATIVE:` Hardware is not operating properly. If this is the only 100D (DS1) or 800 CO-BRI module, or if this is the module designated to have the active clock, its TDM bus clock generator was not activated.	If problem persists, escalate to your technical support organization.
`ьС0C`	`BRI LOSS OF SYNC:`	Usually no action is required. Troubleshoot the BRI trunk. If problem persists, contact your technical support organization.
`ьС0D`	`BRI NET DEACTIVATED:`	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
6C0B	BRI NET INV 2B+D LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
6C0C	BRI LOSS OF SYNC:	Usually no action is required. Troubleshoot the BRI trunk. If problem persists, contact your technical support organization.
6C0D	BRI NET DEACTIVATED:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
6C0E	BRI NET INV 2B+D LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
6C0F	BRI NET INV B1 LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
6C10	BRI NET INV B2 LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
6C11	BRI NET INV IL LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
6C12	BRI NET INV QM LB ACT:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.
7002	PRI SVC STATE INCONSIST:	Troubleshoot the PRI trunk and report to service provider; otherwise, no action required. If problem persists, contact your technical support organization.
7003	PRI D-CHNL INOPERATIVE:	Troubleshoot the PRI trunk and report to service provider; otherwise, no action required. If problem persists, contact your technical support organization.
7004	PRI B-CHNL NOT RELEASED:	Troubleshoot the PRI trunk and report to service provider; otherwise, no action required. If problem persists, contact your technical support organization.
7005	PRI B-CH GROUP INCONSIST:	Troubleshoot the PRI trunk and report to service provider; otherwise, no action required. If problem persists, contact your technical support organization.
7006	PRI PROTOCOL MISMATCH: A mismatch in the protocol being supplied versus the protocol expected by MERLIN LEGEND.	Inform the service provider to change the administration for this circuit. After the service provider restarts the circuit, verify that all alarms for this slot are cleared.
7401	TRK UPLINK MESSAGE ERROR: Communication problems between processor and modules. Unrecognized message from module to processor.	Test the trunk with a single-line telephone. If the problem is not in the trunk, replace the module with one that is known to be working. If the problem is gone when using the known good module, replace the module and restart.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
7402	LOOP CONTROL BIT NOT SET: No loop current on an outgoing call. If this error occurs four times consecutively, and if Automatic Maintenance-Busy is enabled and the 50% maintenance-busy limit has not been exceeded, the trunk is busied-out automatically.	Test the trunk with a single-line telephone. If the problem is not in the trunk, replace the module with one that is known to be working. If the problem is gone when using the known good module, replace the module and restart.
7403	NO LOOP CURRENT: Communication problems between the module and central office. No loop current. If this error occurs four times consecutively, and if Automatic Maintenance-Busy is enabled and the 50% maintenance-busy limit has not been exceeded, the trunk is busied-out automatically.	Test the trunk with a single-line telephone. If the problem is not in the trunk, replace the module with one that is known to be working. If the problem is gone when using the known good module, replace the module and restart.
7404	STUCK RINGING: Communication problems between the module and central office. If this error occurs twice consecutively, the trunk is busied-out automatically, whether or not Automatic Maintenance-Busy is enabled.	Test the trunk with a single-line telephone. If the problem is not in the trunk, replace the module with one that is known to be working. If the problem is gone when using the known good module, replace the module and restart.

Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
7801	**NOT IN NORMAL OP MODE:** Module not in normal operation mode. Reported in background module check.	Reset the board. If problem persists, troubleshoot the module. Maintenance→Slot→Slot Number→Reset
7802	**SANITY INT NOT GENERATED:** Only applies to modules that have extension jacks.	Reset the board. If problem persists, troubleshoot the module.
7803	**NO PORT BOARDS AVAILABLE:** This error is reported when modules are not present.	No action required. Delete this entry from the transient log.
7804	**INVALID SANITY RESPONSE:** This error occurs when a sanity test gets invalid responses. Applies only to modules that have extension jacks.	Reset the board. If problem persists, troubleshoot the module.
7805	**INVALID SLOT NUMBER:** Rarely occurs. Software could not process an event detection because the slot number was invalid.	No action required; however, if problem persists, restart the system.
7806	**NOT IN STANDBY MODE:** Reported during cold start or background check.	Reset the board. If problem persists, troubleshoot the module.
7807	**SELF TEST NOT COMPLETED:** Reported during cold start.	Reset the board. If problem persists, troubleshoot the module.
7808	**TEST RESULT REGISTER BAD:** A module error or processor error resulted while running test.	Reset the board. If problem persists, troubleshoot the module.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
7809	TEST STATUS REGISTER BAD: A module error or processor error resulted while running test.	Reset the board. If problem persists, troubleshoot the module.
780A	DPR TEST NOT COMPLETED: Reported during cold start.	If problem persists, troubleshoot the module.
780C	RAM TEST FAILURE: Memory failed the RAM test. Turns on the processor LED.	If problem persists, replace the processor.
780D	UPPER ROM FAILURE: Memory failed the ROM test. Turns on the processor LED.	If problem persists, replace the processor.
780E	LOWER ROM FAILURE: Memory failed the ROM test. Turns on the processor LED.	If problem persists, replace the processor.
8401	MISCELLANEOUS ERROR: Currently not reported.	No action required.
8402	WINK TOO SHORT: Outbound dialing problems on tie trunks. For a tie trunk with delay dial or wink start, the wink from the far end of the network interface is less than the minimum 100 ms. The tie trunk remains waiting for a valid signal.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable. Replace the module.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
`8403`	NO EXTERNAL RELEASE: Communication problems between the module and central office. Far end has not disconnected within four minutes. If this error occurs twice consecutively, the trunk is busied-out automatically, whether or not Automatic Maintenance-Busy is enabled.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable.
`8404`	ON HOOK BEFORE WINK: Outbound dialing problems on tie trunks. For a tie trunk with delay dial or wink start, the far end of the network interface went on-hook before the handshake was completed.	If problem persists, troubleshoot the tie trunk configuration. Troubleshoot the far end to see if it is working and translated properly. Troubleshoot for faulty cable. Replace the module.
`8405`	ON HOOK BEFORE READY: Outbound dialing problems on tie trunks. For a tie trunk with delay dial or wink start, the far end of the network interface went on-hook before the guard time elapsed.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for wink start and faulty cable. Troubleshoot the far end of the private network. Replace the module.
`8406`	INTERDIGIT TOO SHORT: Inbound dialing problems on tie and DID trunks.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable. Replace the module.
`8407`	BAD UPDATE: Communication problems occurred between the processor and the modules. Module may need to be replaced.	Turn the processor off and then on. Repeat system programming procedure. If problem persists, escalate to your technical support organization.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
8408	`ROTARY RATE > 12PPS:` Inbound dialing problems on tie and DID trunks.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable. Replace the module.
8409	`ROTARY RATE < 8PPS:` Inbound dialing problems on tie and DID trunks.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable. Replace the module.
840A	`BAD DOWNLINK MESSAGE:` Communication problems occurred between the processor and the modules. The module received an unrecognized message from the processor.	Turn the processor off and then on. Repeat system programming procedure. If the problem persists, replace the module.
840B	`NO LOOP CURRENT:` Communication problems between the module and the central office. No loop current. If this error occurs four times consecutively, and if Automatic Maintenance-Busy is enabled and the 50% maintenance-busy limit has not been exceeded, the trunk is busied-out automatically.	Replace the module with a similar module and test. If the problem is resolved, replace the bad module. If the problem persists, reinstall the old module and test the trunk.
840C	`STUCK RINGING:` Communication problems between the module and central office. If this error occurs four times consecutively, and if Automatic Maintenance-Busy is enabled and the 50% maintenance-busy limit has not been exceeded, the trunk is busied-out automatically.	Replace the module with a similar module and test. If the problem is resolved, replace the bad module. If the problem persists, reinstall the old module and test the trunk.

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
840D	INCORRECT FIRMWARE STATE: If this error occurs four times consecutively, and if Automatic Maintenance-Busy is enabled and the 50% maintenance-busy limit has not been exceeded, the trunk is busied-out automatically.	Turn power off for at least 1 second and then turn it on. Repeat system programming procedure. If problem persists, replace the module.
840E	UPLINK MESSAGE ERROR: Communication problems between the processor and the module. The module received an unrecognized message from the processor.	Turn the processor off and then on. Repeat system programming procedure. If the problem persists, replace the module.
840F	LOST IDLE MESSAGE ERROR:	
8C01	SLOTS NOT EQUAL: The module that occupies the indicated slot does not match the slot information contained in the PC or PCMCIA card backup file.	Troubleshoot the slot descriptions in your backup file against the actual system modules that occupy those slots. After the mismatch is corrected, repeat the restore operation.
9801	MCARD WRITE ERROR: Write to the memory card is not succeeding or is too slow.	Reset the card and try again. If the problem persists, replace the card and try again. If the problem still persists, replace the processor.
9802	MCARD ERASE ERROR: Erasure of the memory card is not succeeding or is too slow.	Reset the card and try again. If the problem persists, replace the card and try again. If the problem still persists, replace the processor.
9803	MCARD 12-VOLT ERROR: The memory card voltage is incorrect.	Reset the card and try again. If the problem persists, replace the card and try again. If the problem still persists, replace the processor.

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Table 2–2. **Error Codes (***Continued***)**

Error Codes	Description	Action
9C01	`NW REJECTS SPID:` Service on the link has been lost.	Check the programmed SPID for correctness. If it is incorrect, modify the programming; otherwise, contact the central office to correct the problem.
9C03	`LINK ESTABLISHMENT FAIL:` Service on the link has been lost.	Check that the line is securely connected to the port and that the LEDs on the board show proper operation. If the card appears to be working properly, make sure the CO has activated the line.
9C04	`NW NOT RESPOND TO SETUP:` Service on the link has been lost.	The private network is not responding to the MERLIN LEGEND messages. Contact the central office to correct the problem.
9C05	`NW NOT RESPOND TO RELEASE:` Service on the link has been lost.	The private network is not responding to the MERLIN LEGEND messages. Contact the central office to correct the problem.
9C07	`ENDPOINT UNINIT (L2/L3):` Service on the link is uninitialized.	The link is in the process of initializing. If this error remains logged for more than a half hour, try re-plugging the DSL. If the problem persists, contact the central office to correct the problem.
9C08	`PROTOCOL ERROR:` Service on the line may be affected.	The private network has indicated that a protocol error has occurred. Verify the line provisioning by running the NI-BRI Provisioning Test or through other means. If the provisioning is correct, contact your technical support organization.

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Table 2–2. **Error Codes (*Continued*)**

Error Codes	Description	Action
A401	CTI LINK BROADCAST RESET: Occurs during a broadcast reset. The Red LED on the CPU will not turn on, but the Red LED for the slot *will* turn on.	If several of these occur: Check that the system is in Hybrid/PBX mode. Validate the wiring and the connections. Press the Restart Button (see "Restart" on page 4–119). Call the TSO's Telephony Services Maintenance Group (800 242-2121) for the procedures to unload and reload the PBX driver.
A801	CTI LINK HIDDEN RESET: Occurs during a hidden reset.	If several of these occur, and the client application has "slow" response time: Validate the wiring and the connections. Press the Restart Button (see the procedure "Restart" on page 4–119). Call the TSO's Telephony Services Maintenance Group (800 242-2121) for the procedures to unload and reload the PBX driver.

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Access Log

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Access Log

In addition to checking the error logs, you can check the access log to help you troubleshoot. Each time maintenance or system programming is accessed, the event is recorded in an access log (up to the last 20 events). This information may be useful in determining whether one of those events caused an error detected shortly thereafter.

Reviewing the Access Log

Each event is documented by the time and date of occurrence. The station button (Sta) column indicates whether the event occurred from an MLX-20L console (if so, the extension number is displayed) or from SPM (SPMD if direct; SPMR if remote). The SP/M column indicates whether the event originated from System Programming (SP) or Maintenance (M).

Scanning the Log

The last 20 events are shown, beginning with the most recently accessed event. When you reach the end of the list, you hear a beep and all variable information is cleared from the screen. To return to the beginning of the list, select Exit and then select Access Log again.

Summary

Console Procedure   **Menu**: Maintenance→System→Access Log
PC Procedure   F6 → F1 → F4

To check the access log, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the System option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
`F1`

2. Display the first screen of the Access Log.

```
System
Make a selection
Status        Upgrd/Instll
Error Log
Inventory
Access Log
Exit          Enter
```
`F4`

▶ 3. **The screen below shows the access log.**

```
SysProg/MaintAccessLog >
Date   Time    Sta  SP/M
mm/dd/yy hh:mm xxxx  xx
mm/dd/yy hh:mm xxxx  xx
mm/dd/yy hh:mm xxxx  xx
mm/dd/yy hh:mm xxxx  xx
Exit
```

To page through the events,
 press the More button.   `PgUp`

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System Inventory

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System Inventory

If you need to contact your technical support organization, you may also need to access the System Inventory screen. The System Inventory screen shows you the hardware vintage, software vintage, and ROM ID for each module in the control unit.

Summary

Console Procedure **Menu**: Maintenance→System→Inventory→**More**
PC Procedure [F6]→[F1]→[F3]→[PgUp]

To check System Inventory, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the System option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
[F1]

▶ 2. **Select the Inventory option.**

```
System
Make a selection
Status       Upgrd/Instll
Error Log
Inventory
Access Log
Exit         Enter
```
[F3]

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System Inventory

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Console Display/Instructions   Additional Information   PC

When you access the System Inventory screen, Slot 00 information is
displayed. Line 2 indicates that the processor occupies Slot 00.

```
System Inventory:
Slot 00
Board Processor
Hardware Vintage:  xx
LEGEND 5.0 Vx.x
xxxxxxxxxxx
Exit
```

Press the More button to review
information for each subsequent slot.
When you reach the display for the
last slot, pressing the More button
redisplays the Slot 00 information.   [PgUp]

Reviewing the Screen

Lines 4, 5, and 6 indicate information that may be asked of you when you call
your technical support organization:

■ Line 4, the hardware vintage, indicates the revision level of the
   processor board's firmware.

■ Line 5 indicates the boot ROM release number for the board software,
   followed by the official software version number.

■ Line 6 indicates the revision levels of the ROM pairs on the processor
   board.

The screen below displays information for slots other than Slot 00.

```
System Inventory:
Slot xx
Board boardname
Hardware Vintage:  vv
Firmware Vintage:  vv
Application Vintage:
Exit
```

xx = slot number entered in Step 2

Press the More button to review
information for each subsequent slot.
When you reach the display for the
last slot, pressing the More button
redisplays the Slot 00 information.   [PgUp]

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System Inventory

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Phantom Modules

If the system includes a phantom module (an empty slot that has been programmed), the System Inventory screen does not recognize it. When replacing or adding modules, make sure phantom module slots remain empty, and that no modules are installed to their right.

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System Inventory

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Telephone Problems

3

Once you isolate a problem to the telephone (or a group of telephones), you can run various tests to check a telephone's operation.

Use the procedure below as a general guideline for troubleshooting telephones.

▶ **1. Replace the telephone (or adjunct) with one that works properly.**

▶ **2. If the problem persists, connect the telephone directly to the control unit, using a cord that works properly.**

- If this solves the problem, replace the original cord.

- The power supply may be shorted or open. If the wiring has been crushed or severed, replace it.

    a. Test the power supply for 48 VDC with a voltmeter or by reconnecting the telephone or adjunct.

    b. If the test for 48 VDC fails, replace the circuit pack in the telephone or adjunct.

⚠ CAUTION:
A faulty circuit pack has the potential to damage the power supply, which can cause widespread damage throughout the system.

▶ **3. If the problem persists, replace the mounting cord.**

▶ **4. If the problem continues, proceed as described in the next sections.**

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Fixing Telephone Problems

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If you change the jack assignment of any telephone, be sure to record the extension jack change on Form 2a, System Numbering: Extension Jacks. See Appendix B, "System Numbering Forms," for details.

Fixing Telephone Problems

If a reported telephone problem matches any symptom described in Table 3–1, refer to the referenced section of this chapter.

Table 3–1. Troubleshooting Telephone Problems

Symptom	Section
Intermittent telephone problem.	"General Telephone and Wiring Problems" on page 3-3
Analog multiline telephone LEDs and/or ringing tones do not work properly.	"Analog Multiline Telephone Problems" on page 3-4
Time appears on display of an analog multiline telephone, but incoming call information does not appear.	"Analog Multiline Telephone Problems" on page 3-4
Telephone does not receive tones from the control unit.	"Voice Transmission Problems" on page 3-4
Several single-line telephones cannot dial directly, even though they are receiving calls.	"Single-Line Telephone Problems" on page 3-5
Users cannot make outside calls on single-line, touch-tone telephones.	"Single-Line Telephone Problems" on page 3-5
Users are getting other people's calls.	"Call Forwarding Problems" on page 3-5

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Fixing Telephone Problems

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General Telephone and Wiring Problems

If intermittent telephone trouble occurs, use the following steps as a guideline to check for general telephone and wiring troubles.

$\Rightarrow$ NOTE:

Refer to "Troubleshooting Trunk Problems" on page 5–1 if the reported problem is echo during conversations on T1 trunks with GS emulation connected to a toll office.

▶ **1. Check modular connections in the telephone for loose or broken connectors.**

▶ **2. Check modular connections in the connecting blocks for loose or broken connectors.**

▶ **3. Check modular connections in the control unit for loose or broken connectors.**

▶ **4. Check transient errors in the error logs for any possible clues.**

▶ **5. If local power is provided, check the power supply connectors and voltages.**

▶ **6. Replace the telephone with a telephone that works to determine whether the problem is the telephone itself.**

▶ **7. If trouble disappears, replace the problem telephone.**

▶ **8. If the replacement telephone does not work properly, check the other telephones connected to the same module.**

- If these telephones work, the problem may be the wiring, or there may be a single-port failure on the module. To check the wiring, go to Step 12.

- If these telephones do not work, the fault is probably in the module. To check the module, go to Step 9.

▶ **9. Check the LEDs on the module.**

If the module does not have LEDs, see "System Status" on page 4–128 for more information.

▶ **10. Check the error log for relevant messages.**

See "Error Logs" on page 2–1.

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Fixing Telephone Problems

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▶ **11. Replace the faulty module.**

▶ **12. Replace the wiring between the module jack field and the telephone to see if there is a wiring problem.**

Analog Multiline Telephone Problems

If telephone LEDs and/or ringing tones do not work properly on analog multiline telephones, follow the steps below.

▶ **1. Move the T/P switch on the left-hand side to the T (test) position.**

You should hear tone ringing, and the red and green LEDs on the terminal should flash alternately.

▶ **2. If the LEDs do not light, replace the telephone with one that works.**

If the problem is resolved, go to Step 4.

▶ **3. If the LEDs do not light, retest the original telephone.**

Plug it directly into the appropriate jack on the control unit, using a cord that is known to be working.

If this resolves the problem, replace the original cord (or local power unit, if used).

▶ **4. Move the T/P switch to its normal position.**

The ringing tone should stop, and the LEDs should be off.

▶ **5. If any part of the test fails, replace the telephone.**

If the time appears on the display but incoming call information does not, move the T/P switch on the side of the telephone to the center position.

Voice Transmission Problems

If the telephone does not receive tones, check the control unit and wiring with a telephone that works.

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Fixing Telephone Problems

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Single-Line Telephone Problems

If more than one single-line telephone cannot dial correctly, even though they are receiving calls, use the steps below to test the touch-tone receivers (TTRs) for a single-line telephone.

▶ **1. Pick up the handset; then dial *04 and the 2-digit number of the TTR you want to test.**

- If you hear a busy tone, the receiver is in use/off hook.

- If you hear a reorder tone, you have misdialed or have reached an invalid TTR. Try again.

- If you hear a dial tone, go to Step 2.

▶ **2. Dial 123456789*0#.**

You should hear a dual-tone multi-frequency (DTMF) signal as you press each button. If the test is successful, you hear a three-beep confirmation tone one to three seconds after you press #.

▶ **3. Hang up and repeat Steps 1 and 2 for each TTR.**

▶ **4. If this test fails, replace the module containing the faulty TTR.**

If all TTRs fail this test, repeat the test, using a different telephone that works. If the tests are successful, replace the original telephone.

If users cannot make outside calls on a touch-tone telephone, check the individual trunk for rotary-dial programming. See System Programming for details.

Call Forwarding Problems

Call Forwarding problems usually occur when someone activates Call Forwarding unintentionally, resulting in a user receiving other users' calls.

Cancel the Call Forwarding feature (for the receiving telephone):

- On multiline telephones, press the Feature button and dial *34*.

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MLX Telephone Tests

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■ On single-line telephones, pick up the handset, dial #∗34∗, and then hang up.

⇒ **NOTE:**
You can cancel Call Forwarding from the receiving telephone or from the forwarding telephone, providing that you know the number.

MLX Telephone Tests

If the LEDs, ringer, buttons, switchhook, or display appear not to be working, try the steps below.

▶ **1. Pick up the handset.**

▶ **2. When you hear dial tone, press ∗00 (the feature access code).**

The telephone enters test mode. For some tests, this means the LEDs turn on; for others, it means the phone starts ringing.

  ■ This test connects a test tone to the B-channel and sends a repeated ring burst to the telephone.

  ■ On an MLX telephone with a DSS attached, all LEDs light and the phone rings throughout the test.

  ■ On an MLX display telephone, the display blanks out and is replaced with a grid of small dots.

▶ **3. Press each line/feature button (two LEDs each).**

The red and green LEDs should toggle on and off.

▶ **4. Press each fixed-feature button that has an LED (Feature, HFAI, Mute, and Speaker).**

Each LED should toggle on and off.

⇒ **NOTE:**
Mute and Speaker LEDs may not toggle consistently because they are managed by the control unit *and* the telephone.

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▶ **5. Press each fixed-feature button that does not have an LED (Transfer, Conf, Drop, and Hold) and each dialpad button.**

When you press each one of these buttons, the Message LED should toggle on and off.

▶ **6. Press the fixed-feature buttons and the dialpad buttons in the order shown below to turn on all the LEDs.**

    a. Volume down

    b. Volume up

    c. Transfer

    d. Conf

    e. Drop

    f. Hold

    g. Dial *123456789*0#*

The LEDs should toggle on and off.

▶ **7. If the MLX telephone does not have a display, hang up and go to Step 9; if it does, continue with the next step.**

▶ **8. To test an MLX display, press each display button.**

Each button name should display in the upper-left corner as described in Table 3–2.

▶ **9. If any of these tests fail, replace the MLX telephone.**

▶ **10. Test the Multi-Function Module (MFM) if present.**

    a. Connect a single-line telephone to the MFM.

    b. Pick up the handset on the single-line telephone.

    c. When you hear the system access or intercom dial tone, dial *09* from the single-line telephone.

  This connects the diagnostic test tone to the B-channel.

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> d. Dial $123456789*0#$; wait for silence, and then quickly press the
>   Recall button to perform a switchhook flash.
>
>   *You should hear a confirmation tone (three beeps).*
>
> e. Hang up.
>
>   *You should hear a ring burst, and the Message LED should turn on.*
>
> f. Dial #54 to turn off the Message LED and resume normal
>   operations.

▶ 11. If these tests fail, replace the MFM.

Table 3–2. MLX Telephone Display Buttons

Button	Display
Home	HOME
Menu	MENU
More	MORE
Inspct	INSPECT
Each unlabeled display button	DISPLAY BUTTON *nn*; where *nn* is 1–10, depending on which button you press.

System Requirements for Touch-Tone Receivers

A voice messaging system requires a certain number of TTRs in addition to any
system requirements for TTRs. The number of TTRs depends on the number of
ports used by the voice messaging system (see Table 3–3). TTRs are also
required in private networks using E&M, T1 tie, and tandem tie trunks.

In Release 6.0 and later systems, the use of the Prompt-Based Overflow
setting, which allows callers to request overflow coverage while waiting in a

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System Requirements for Touch-Tone Receivers

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calling group queue, requires TTRs for primary and secondary delay announcement devices that present the option to callers.

Table 3–3. TTRs Required by VMS/AA

Number of VMS Ports	Number of TTRs Required
1	1
2	1
3	2
4	2
6	3
8	4
12*	6*
18	8

*If a 12-port MERLIN LEGEND Enhanced Service Center is used, 8 TTRs are required.

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System Requirements for Touch-Tone Receivers

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Table 3–4 estimates the total number of TTRs required in the system, based on call volume and whether the system uses account codes. The call volume per hour in this table includes all calls originating from single-line telephones, calls on tie lines, incoming remote access and DID calls.

➤ **NOTE:**
You must consider the call traffic across a private network when estimating the number of required TTRs. This includes calls on analog tandem tie trunks and T1-emulated tandem tie trunks. In addition, if your private network includes Centralized Voice Messaging, you must consider the call traffic coming across the private network for the voice messaging system and the TTRs required for the updating of Message Waiting lights (Release 6.1 or later systems). For this updating, a TTR is required at the sending end and the receiving end. If the systems in the private network are connected by PRI trunks, no additional TTRs are needed.

Table 3–4. System Requirement for TTRs

	TTRs Required	
Calls/Hour	**No Account Codes Used**	**Account Codes Used**
110	2	4
180	4	6
350	4	8
420	6	8
610	6	10
710	8	10

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Table 3–5 shows the TTRs required for primary delay announcement devices.

**Table 3–5.   TTRs Required for Primary Delay Announcement
             Devices When Using Prompt-Based Overflow**

Number of Devices	Number of TTRs Required
1	1
2	2
3	3
4	4
5	4
6	5
7	5
8 or more	6

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Table 3–6 shows the TTRs required for secondary delay announcement devices.

Table 3–6.   TTRs Required for Secondary Delay Announcement Devices When Using Prompt-Based Overflow

Number of Devices	Number of TTRs Required
1	1
2	1
3	1
4	2
5	2
6	2
7	3
8	3
9	3
10 or more	4

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The following modules supply TTRs for the MERLIN LEGEND Communications System.

Table 3–7. Modules with TTRs

Module	No. of TTRs
008 OPT	2
012	2
016 (T/R)	4
400 GS/LS	4
400 (LS)	4
800 DID	2
800 LS-ID	2
MERLIN LEGEND Mail module	2

The following symptoms indicate that the system needs more TTRs.

- Single-line telephone users do not get dial tone when they lift the handset to dial out.

- The voice messaging system fails to transfer calls.

- Calls fail to ring or go to coverage prematurely.

- Reorder tone on UDP/ARS calls using tandem tie trunks.

- Delay in MWL tie trunks when tie trunks are available.

If these symptoms are present, use the following steps to calculate the system requirements for touch-tone receivers.

▶ **1. Determine the number of TTRs required for the voice messaging system (if present) from Table 3–3.**

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▶ **2. Estimate the hourly call volume for calls originating from single-line telephones, incoming calls (including private network tandem tie trunks) on remote access and Direct Inward Dial (DID) lines, all calls on tie lines, and calls routed to the voice messaging system.**

⇒ **NOTE:**

You must consider the call traffic across a private network when estimating the number of required TTRs. This includes calls on analog tandem tie trunks and T1-emulated tandem tie trunks. In addition, if your private network includes Centralized Voice Messaging, you must consider the call traffic coming across the private network for the voice messaging system and the TTRs required for the updating of Message Waiting lights (Release 6.1 or later systems). For this updating, a TTR is required at the sending end and the receiving end. If the systems in the private network are connected by PRI trunks, no additional TTRs are needed.

▶ **3. Use Table 3–4 to determine the number of TTRs required by the system.**

■ Use Column 2 if account codes are not being used.

■ Use Column 3 if account codes are being used.

▶ **4. Add the number of TTRs obtained in Steps 1 and 3. If the Group Calling Prompt-Based Overflow setting (Release 6.0 and later systems) is not being used, go to Step 6.**

▶ **5. If the Group Calling Prompt-Based Overflow setting is being used by calling groups, first add the number of TTRs needed for the primary delay announcement devices assigned to those calling groups, according to Table 3–5. Then add the number of TTRs needed for the secondary delay announcement devices assigned to those calling groups, according to Table 3–6.**

⇒ **NOTE:**

If no announcement is used on a primary or secondary delay announcement device, no TTRs are needed.

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▶ **6. Use Table 3–7 to determine the number of TTRs already supplied.**

▶ **7. Compare the total TTRs needed to the total TTRs already supplied to determined if additional TTRs are required.**

▶ **8. Add a new module if more TTRs are needed.**

   See Chapter 2, "Installing the Control Unit" in the *Installation* manual.

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Backing Up System Programming

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Control Unit Problems

4

The next step, after resolving problems with telephones, adjuncts, and related wiring, is to troubleshoot the control unit. Troubleshoot the control unit components in the following order:

- Power supply

- Processor

- Line/trunk and extension modules (hereafter referred to as *modules*)

- Carrier

⚠ WARNING:

Beware of hazardous voltages. Only qualified technicians should attempt to service the control unit. Follow all procedures carefully.

Backing Up System Programming

Before performing any procedure that requires powering down the system, save system programming in one of the following ways:

- Save the system programming to a floppy disk. See *System Programming and Maintenance (SPM)* for detailed instructions.

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■ Save the system programming to a memory card (beginning with Release 3.0). See Appendix D, "Backing up with a Memory Card," for detailed instructions. If automatic backups are performed, it may not be necessary to save system programming.

$\Longrightarrow$ **NOTE:**

If the processor module is not functioning, it may not be possible to back up system programming.

Power Supply Problems

If the power supply fails, all components connected to the carrier are automatically shut down.

Checking the Power Supply

If you suspect power supply failure, check the following parts:

■ Power supply LED

■ Interlocking post (on the carrier, behind the power supply)

■ Ring generator, if present

■ Auxiliary power unit(s), if present

⚠ WARNING:

Never remove the power supply without first turning off the power switch and disconnecting the power cord from the AC outlet.

Use the following procedures to check the power supply.

Checking the LED

If the power supply's LED is off, check the power switch. If it is off, turn on the power switch for each power supply in the control unit. _Start with the rightmost carrier and end with the basic carrier._ Watch for the responses below.

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- The green power LED should light on *each* power supply.

- The red LED on the processor should turn on for 15 to 45 seconds and then turn off.

- All indicators on the 100D, 800 NI-BRI, and 400EM modules (if present) should turn on and then off. They remain off when the modules are idle.

If any of these responses do not occur or if the console operator reports any problems, continue with "Checking the Interlocking Post" below.

Checking the Interlocking Post

If the power supply is not working, follow the steps below to check the interlocking post.

▶ **1. Follow Steps 1–4 in "Replacing the Power Supply" on page 4-10 to *remove* the power supply, then return to Step 2 below.**

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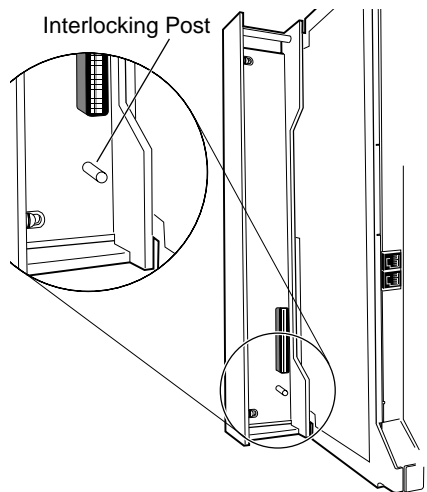
Interlocking Post

Figure 4-1.   Power Supply Interlocking Post

▶ 2. **Check the small, cylindrical interlocking post on the carrier that locks into the power supply (see Figure 4-1).**

   If the post is broken, replace the carrier.

▶ 3. **If the interlocking post is not broken, *reinstall* the power supply; follow Steps 5–8 in "Replacing the Power Supply" on page 4-10.**

Replacing the Ring Generator

If tip/ring devices (such as single-line telephones, fax machines, and answering machines) do not ring, and an older 012 module is installed, try the procedure below.

Current 012 modules contain built-in ring generators [apparatus code 517G13 (28) or higher letter]. If tip/ring devices connected to a newer module do not

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ring, see "Module Problems" on page 4-34. See Table 4–1 to determine which 012 module is installed.

$\Longrightarrow$ NOTE:

All 016 (T/R) modules contain built-in ring generators.

Table 4–1. PEC and Apparatus Codes for 012 Modules

012 Module	PEC	App. Code
With Ring Generator	61494	517G13 (28) or higher letter
Basic Telephone (without ring generator)	61487	517E13 or 517F13 or lower letter

⚠ WARNING:

Hazardous electrical voltages may be present if the following steps are not performed correctly.

To replace the ring generator, follow the steps below. Refer to Figure 4-7 throughout the procedure.

▶ **1. Follow Steps 1–4 in "Replacing the Power Supply" on page 4-10, to *remove* the power supply. Then return to Step 2 below.**

▶ **2. Place the power supply on its left side and remove the five screws.**

▶ **3. Carefully turn the power supply over on its right side and then remove the top of the power supply housing.**

▶ **4. Detach the cables from the inside edge of the plastic housing by removing them from the clips.**

▶ **5. Disconnect the 4-pin cable from the header labeled P202 on the left side of the power supply circuit board.**

You may need to pry back the clip to free the cable.

▶ **6. Disconnect the other cable from the header labeled P101 on the right side of the power supply circuit board.**

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You need to grip this cable firmly and pull forcefully.

▶ **7. Remove the four screws from the ring generator, as shown in
Figure 4-7.**

▶ **8. Remove the ring generator.**

▶ **9. Position the replacement ring generator, as shown in Figure 4-7.
Align the screw holes.**

Make sure the P1 header on the ring generator is on the same side of the
power supply housing as the P101 header on the circuit board.

▶ **10. Replace the four screws and fasten them to secure the ring
generator.**

▶ **11. Connect one end of the new ring generator's cable with the 3-pin
connectors to the header labeled P101 on the power supply circuit
board.**

This cable connector, as with all four of the cable connectors, is keyed so
that you cannot attach it to the header if it is turned the wrong way.

▶ **12. Connect the other end of the cable to the header labeled P1 on the
ring generator.**

The cable headers, P1 and P101, should be on the same side of the
housing, so that the cables are not crossing each other.

▶ **13. Connect one end of the new 4-pin cable to the header labeled P202
on the power supply circuit board.**

▶ **14. Connect the other end of the cable to the header labeled P2 on the
ring generator.**

▶ **15. Attach the cables to the clips on the inside edge of the plastic
housing.**

▶ **16. Replace the top of the module housing.**

Take time to ensure that the on/off faceplate on the front of the power
supply housing is aligned and inside the top cover.

▶ **17. Carefully, taking time to make sure the on/off faceplate stays
aligned, turn the module over and replace the five screws.**

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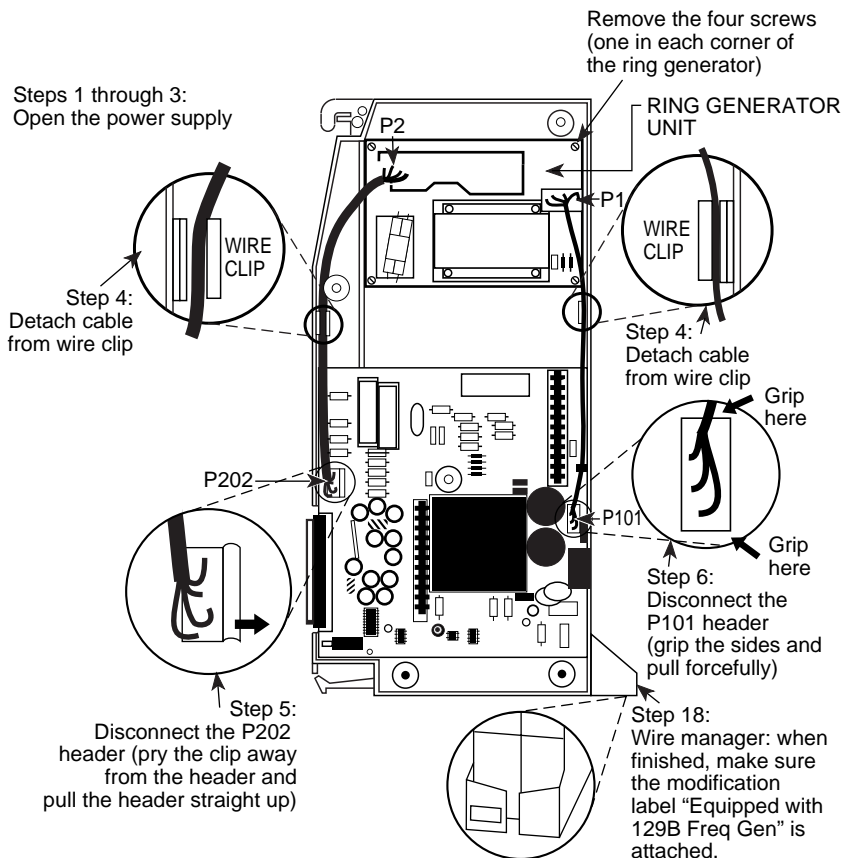
Figure 4-2.   Replacing a Ring Generator

▶ **18. Verify that the modification label (Equipped with 129B Freq Gen) is attached to the front of the power supply (shown in Figure 4-2).**

If not, attach the label supplied with the new ring generator.

▶ **19. Reinstall the power supply; follow Steps 5–8 in "Replacing the Power Supply" on page 4-10.**

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Replacing Auxiliary Power Units

Follow this procedure if any of the following symptoms occur:

- The LEDs on the multiline telephones that are connected to the last two modules in the carrier do not light.

- The last two slots in the carrier do not have power.

- The power supply LED is off.

To replace the auxiliary power unit, follow the steps below. Refer to Figure 4-9 throughout this procedure.

▶ **1. Make sure the switch on the power supply module is turned off.**

▶ **2. Unplug the power supply and the auxiliary power unit from the AC outlet.**

▶ **3. Disconnect the cord from the AUX POWER INPUT jack on the power supply module.**

▶ **4. Remove the auxiliary power unit (with the two cords still attached).**

▶ **5. Mount the replacement auxiliary power unit in place of the old one.**

▶ **6. Plug the power unit line cord into the J2 DC OUTPUT jack on the replacement auxiliary power unit.**

▶ **7. Plug the other end of the power unit line cord into the AUX POWER INPUT jack on the power supply.**

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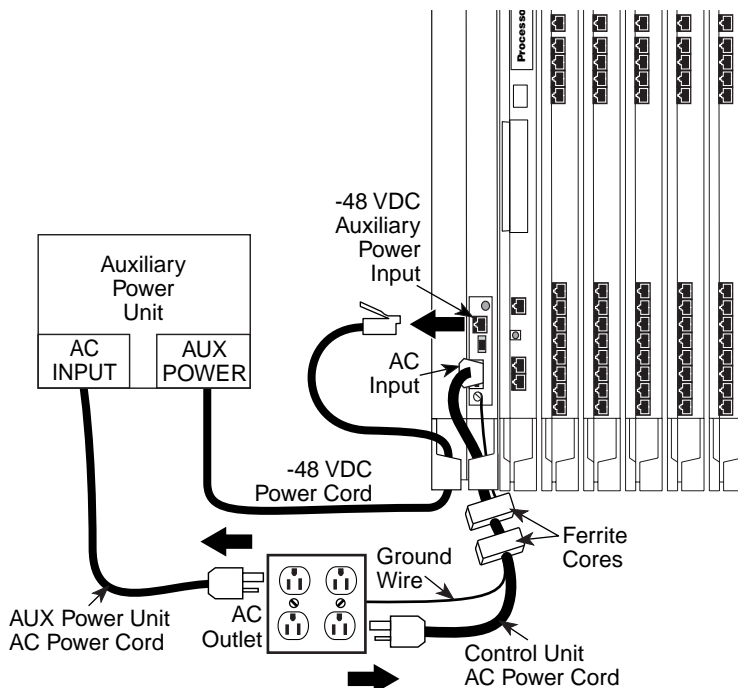
Figure 4-3.   Replacing an Auxiliary Power Supply

> ## ⚠ CAUTION:
> *Do not plug the power supply or the auxiliary power unit into the AC outlet until you are ready to turn on the system, as described in "Powering Up the System" in Chapter 2 of* Installation.
>
> *Do not attach the power cord(s) to any building surfaces.*

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Replacing the Power Supply

⚠ WARNING:

Beware of hazardous voltages; whenever the carrier connections are exposed, use extreme caution; do not touch them directly or with any type of tool. Follow all procedures carefully.

To remove the power supply module, follow the steps below.

► **1. If possible, back up system programming on a memory card (Release 3.0 or later only) or floppy disk.**

See *System Programming and Maintenance (SPM)* for information about backing up to a floppy. For information about backing up to a PCMCIA memory card, see Appendix D, "Backing Up with a Memory Card." If the basic carrier's power supply fails, you cannot back up system programming.

► **2. Power down the system.**

   a. Turn off the power supply in the basic carrier.

   b. Turn off the power supply in each expansion carrier.

   c. Unplug the auxiliary power unit, if present, from the AC outlet.

► **3. Unplug the system from the AC outlet.**

► **4. Remove the power supply.**

   a. Unplug the AC power cord from the power supply.

   b. Remove the ground wire attached to the grounding screw on the front of the power supply module.

   c. Remove the two ferrite cores, if present, from around the AC power cord and ground wire.

   d. Remove the power supply module.

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To replace the power supply module, follow the steps below and refer to Figure 4-9.

▶ **1. Insert a new power supply.**

    a. Reinstall the power supply module by hooking the top into the basic carrier and then swinging it down into place. Push the lower end firmly until the locking tab clicks.

    b. Replace the ferrite cores around the AC power cord and ground wire and slide the ferrite cores between the wire manager and the power supply module.

    c. Attach the ground wire to the grounding screw.

▶ **2. For each power supply and auxiliary power unit, connect the AC power cord to the connector marked AC INPUT on the power supply.**

▶ **3. Plug the other end of each AC power cord into the AC outlet.**

▶ **4. Power up the system by turning on the components listed below in the order given.**

    a. Power supply on each expansion carrier

    b. Power supply on the basic carrier

The system automatically cold starts.

⚠ CAUTION:

Do not plug the power supply or the auxiliary power unit into the AC outlet until you are ready to turn on the system, as described in "Powering Up the System" in Chapter 2 of Installation.

Do not attach the power cord(s) to any building surfaces.

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Processor Problems

If the error logs (or any aspect of troubleshooting) indicate that the processor is the problem, back up system programming if possible. See *System Programming and Maintenance (SPM)* for instructions on backing up to a floppy disk. See Appendix D, "Backing Up with a Memory Card," for instructions on backing up to a PCMCIA memory card.

Call your technical support organization for troubleshooting instructions.

■ If you are instructed to perform Peek, Poke, or System Erase, refer to the appropriate section below. *Do not perform any of these procedures unless you are instructed to do so.*

■ If you are instructed to replace the processor, see .

Peek

Peek is a demand test that allows you to examine but not change system memory.

! CAUTION:
Do not perform Peek unless you are following instructions from your technical support organization.

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial *00*→Enter→Demand→Test→Peek→Dial Address→**More**
PC Procedure	[F6]→[F2]→Type *00*→[F2]→[F1]→Type Address→[PgUp]

To perform Peek, follow the steps below.

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▶ 1. **From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

▶ 2. **Specify Slot 00.**

```
Slot:
Enter Slot number (00-17)


00

Backspace
Exit            Enter
```
Dial or type *00*, then select *Enter*.

F10

▶ 3. **Select the Demand Test.**

```
Slot 00:
Make a selection
Status
Demand Test



Exit
```
F2

▶ 4. **Select the Peek option.**

```
Demand Test Slot 00:
Make a selection
Peek
[Poke]
[System Erase]


Exit
```
Poke and *System Erase* are not displayed, which prevents customers from accidentally changing the processor memory.

F1

Console Display/Instructions **Additional Information** **PC**

▶ **5. Dial a memory address.**

```
Slot □□ Enter Hex
Address:
nnnnnnnn        Enter ▉
Backspace         Exit
A                    B
C                    D
E                    F
```

Dial [nnnnnnnn], then select `Enter`.

[F6]

The screen below shows the details of the address you specified.

```
Peek Address□xaaaaaaaa>

□xaaaa        □xaaaa
□xaaaa        □xaaaa
□xaaaa        □xaaaa
□xaaaa        □xaaaa
Exit
```

aaaaaaaa = address entered in
Step 5.

Press the More button to review
the next address.

[PgUp]

Poke

⚠ **CAUTION:**
*Do not perform Poke unless you are following instructions from your
technical support organization.*

Summary

Console Procedure   **Menu**: Maintenance→Slot→Dial the slot
no.→Enter→Reset→Yes.

PC Procedure   [F6]→[F2]→Type the slot no.→[F10]→[F7]→[F1]

To perform Poke, follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

▶ **2. Specify Slot 00.**

```
Slot:
Enter Slot number (00-17)


00

Backspace
Exit            Enter
```

Dial or type 00, then select Enter.

F10

▶ **3. Select the Demand Test.**

```
Slot 00:
Make a selection
Status
Demand Test


Exit
```
F2

▶ **4. Select Poke two times.**

```
Demand Test Slot 00:
Make a selection
Peek
〖Poke〗
〖System Erase〗

Exit
```

Poke and System Erase are not
displayed, which prevents customers
from accidentally changing the
processor memory.

Press the Poke button (the left   F2
button for Line 4) twice.   F2

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Console Display/Instructions   Additional Information   PC

▶ 5. **Select Continue.**

```
Poke - WARNING!! SYSTEM
MEMORY WILL BE MODIFIED!
Continue
Cancel



Exit
```
F1

▶ 6. **Follow the instructions from your technical support organization to select a memory address.**

```
Slot ⬜⬜ EnterHexAddress:
aaaaaaaa
                    Enter
Backspace           Exit
A                      B
C                      D
E                      F
```

▶ 7. **Follow the instructions from your technical support organization to modify the contents of the address entered in Step 6.**

```
0xaaaaaaaaa Enter data:
aa
                    Enter
Backspace           Exit
A                      B
C                      D
E                      F
```

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System Erase (Frigid Start)

⚠ CAUTION:
Do not perform a System Erase unless you are installing a replacement processor or following instructions from your technical support organization. This procedure erases all system programming from the processor and resets the system to factory defaults.

Summary

Console Procedure	**Menu**: Maintenance→Slot→→Dial 00→Enter→Demand Test→System Erase (Line 5, left button) →System Erase (Line 5, left button)→Yes
PC Procedure	F6 → F2 →Type 00→ F2 → F3 → F3 → F2
Preparation Time	Approximately 1 minute

To perform a System Erase (Frigid Start), follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F2

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Console Display/Instructions	Additional Information	PC

▶ **2. Specify Slot 00.**

```
Slot:
Enter Slot number (00-17)


00


Backspace
Exit           Enter
```

Dial or type 00, then select Enter.

`F10`

▶ **3. Select the Demand Test.**

```
Slot 00:
Make a selection
Status
Demand Test



Exit
```

`F2`

▶ **4. Select System Erase twice.**

```
Demand Test Slot 00:
Make a selection
Peek
[Poke]
[System Erase]

Exit
```

Poke and System Erase are not displayed, which prevents customers from accidentally changing the processor memory.

Press the System Erase button   `F3`
(the left button for Line 5) twice.   `F3`

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Console Display/Instructions   **Additional Information**   **PC**

▶ **5. Select Yes.**

```
Slot 00 System Erase:
System will be down...
Do you want to continue?
Yes
No


Exit
```
F2

The following screen appears.

```
System Erase:
Full-default Restarting
```

Forced Installation/Upgrade of System Software

⚠ **CAUTION:**
Forced installation should be performed only under emergency situations in which on-board system software has been corrupted.

All existing system programming will be erased by this procedure.

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Beginning with Release 3.0, the system software can be installed or upgraded through the PCMCIA interface slot on the processor module. Use the procedure below when one of the following takes place:

- System software becomes corrupted. Attempt to reinstall software with a Forced Installation memory card. If that does not solve the problem, replace the processor module.

- Upgrade to a later release of system software

Summary

Console Procedure **Menu**: Maintenance→System→Upgrd/Instll→
Exit→Exit→Yes

PC Procedure [F6]→[F1]→[F5]→[F2]

▶ **1. Back up system programming.**

To back up system programming onto a floppy disk, see *System Programming and Maintenance (SPM)*. To back up onto a memory card, see Appendix D, "Backing Up with a Memory Card." If the processor or system software is not working, you may not be able to back up system programming. If the system has been programmed to perform automatic backups, use the latest backup file to restore programming. See Step 12.

▶ **2. Insert a Forced Installation or Upgrade memory card into the PCMCIA interface slot on the processor module.**

See Figure 4-4.

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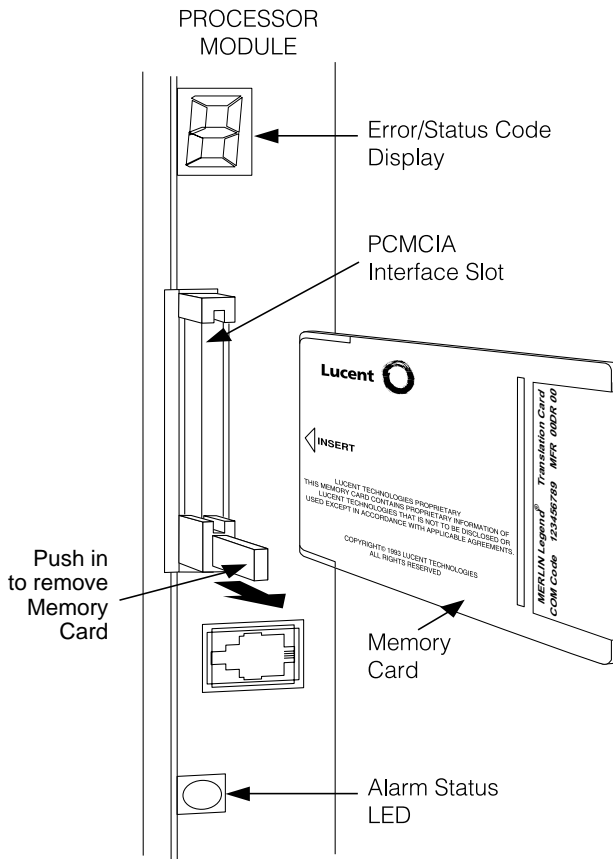
Figure 4-4.   Inserting a Memory Card

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Console Display/Instructions   Additional Information   PC

▶ **1. Initiate the software installation.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F1

- ■ If the maintenance screens are functioning correctly, select
  System from the Maintenance menu. Continue with Step 4.

- ■ If maintenance screens are unreliable or not available, power
  cycle the system by turning off the system and leaving it off for at
  least one second. Turn the system back on. The system boots
  from the memory card and automatically starts the installation
  software. Go to Step 11.

▶ **2. Select Upgrade/Install.**

```
System:
Make a selection
Status          Upgrd/Instll
Error Log
Inventory
Access Log
Exit
```
F6

▶ **3. Observe the memory card validation screens.**

```
Upgrade/Installation:

Validation of Memory Card
in Progress.



Exit
```

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Console Display/Instructions   Additional Information   PC

```
Upgrade/Installation:


Validation of Memory Card
Successfully Completed.



Exit
```
                                                                                                        F5

When completed, select `Exit` to continue.

▶ **4. Verify that the memory card or release number is the required one, and select Exit to continue.**

```
Upgrade:
MemCard Rel: 4.y Vnn.mm
Current Rel: 4.y Vnn.mm
Releases are compatible.



Exit
```
                                                                                                        F5

If the releases are incompatible, the following screen appears.

```
Upgrade:
MemCard Rel: 4.y Vnn.mm
Current Rel: 4.y Vnn.mm
Incompatible releases.



Exit
```
                                                                                                        F5

See for continuing instructions.

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Console Display/Instructions   Additional Information   PC

▶ 5. **If the release number is the one you want, select Yes.**

```
Upgrade/Installation:
System will be down ...
Do you want to continue?
Yes
No


Exit
```
F2

▶ 6. **If the forced installation is attempted while a line/trunk or extension is busy, the following screen appears.**

```
System Busy - Pls Wait

Dial Code:xxxx S/P:ss/pp




Exit
```
F5

▶ 7. **Observe the progress screen and the error/status display LED on the processor module.**

```
Upgrade/Installation:
Upgrade/Installation
In Progress.




```

The error/status LED should show a flashing L during installation of system software. Upon successful completion, the system performs a frigid start (System Erase). While the frigid start is in progress, an F shows on the error/status display.

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If the installation of system software was unsuccessful, an error code is displayed and the system may not function. See Table 4–2 and "Error Conditions During Forced Installation" on page 4-25.

▶ **8. Remove the memory card from the interface slot.**

▶ **9. Verify that system software has been correctly installed and that the default system programming is present.**

No error condition is displayed on the error/status display.

▶ **10. Restore system programming.**

After about 10 minutes, check to see if the RED alarm status LED is lit. If it is not, the installation was successful. If the LED is lit, check the error log for the following:

SYS software ROM failure

This indicates a ROM failure and unsuccessful installation.

If the forced installation was performed due to corrupted system software, it is possible that the backup of system programming might also be corrupted. Verify that the error condition that required a forced installation of software is not still present.

Error Conditions During Forced Installation

The error code/status display on the processor module or the maintenance screen informs you of problems during or after a forced installation. See Table 4–2 for error codes displayed. Also see the screens following the table for errors displayed on the maintenance console or PC.

The following error conditions can occur only during or immediately after a forced installation. Instructions for recovery follow the description of each error condition.

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Table 4–2. Error/Status Display Codes during Forced Installation

Code	Meaning	Action
L	Upgrade is in progress	No action required.
U	Install is in progress	No action required.
2	Incorrect memory card type	Insert correct memory card and repeat forced installation procedure.
4	Memory card corrupted	Insert new memory card and repeat forced installation procedure.
3	Incorrectly inserted or missing memory card	Insert memory card correctly and repeat forced installation procedure.
7	Bad processor board	Check that memory card is inserted correctly and try installation again. If it fails again, replace the processor module.
9	Unknown	Try installation again with a new memory card. If it fails again, contact your technical support organization.

⇒ NOTE:

Certain conditions force the system to retry the forced installation. The dot on the error code/status display becomes lit at the start of the first retry. (Look carefully; the dot may be hard to see.)

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Missing Card or Card Not Inserted Correctly

```
Upgrade/Installation:
Verify that Memory Card
has been installed
correctly.


Exit
```

Insert the memory card correctly; then select `Exit` and begin the forced installation procedure again.

Memory Card Is Wrong Type

```
Upgrade/Installation:
Memory Card is not the
correct type.
Remove and insert MERLIN
LEGEND Upgrade or
Installation Memory Card
Exit
```

Select `Exit` and repeat the forced installation procedure with a new memory card.

➡ **NOTE:**
   Forced installation can be performed successfully with an upgrade
   memory card only if the installation is performed through the
   maintenance screens.

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Memory Card Is Corrupted

```
Upgrade/Installation:
Information on the
Memory Card is corrupted.
Please remove the Memory
Card.


Exit
```

Select Exit and repeat the forced installation procedure with a new memory card.

System Busy

If the forced installation is attempted while a line/trunk or extension is busy, the following screen appears.

```
System Busy - Pls Wait

Dial Code:xxxx S/P:ss/pp



Exit
```

When all lines/trunks or extensions are freed, the installation continues. Select Exit to return to the System menu and cancel the installation. If system software is corrupted, system maintenance may not provide an accurate indication of busy lines/trunks or extensions. If this seems to be the case, verify that the listed extensions are truly not busy; then perform the installation by power-cycling the system. See Step 3 of this procedure.

Other Error Conditions

The following error conditions may not be viewed on the error code/status display or the maintenance screens.

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Power Cycle During Installation

The system automatically begins the installation procedure again. If the power source is unreliable, it is possible for the installation procedure to retry indefinitely. See "Power Supply Problems" on page 4-2 or Chapter 2 of *Installation* for details on providing a reliable power source.

Removal of Memory Card During Installation

The system is in an indeterminate state. Reinitiate the forced installation by power-cycling the system after inserting the memory card.

Incompatible Releases

If releases are incompatible, see *System Programming and Maintenance (SPM)* for instructions on converting the system programming before upgrading to the new release.

! CAUTION:
If releases are incompatible, pressing the hidden key deletes existing programming. Before pressing the hidden key, make a backup of the system programming. Use SPM or a PCMCIA translation card.

If the releases are incompatible, the following screen appears.

```
Upgrade:
MemCard Rel: 4.y Vnn.mm
Current Rel: 4.y Vnn.mm
Incompatible releases.



Exit
```

Pressing hidden key two times
deletes existing program.   [F5]

See SPM for instructions on converting the system programming before upgrading to the new release.

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If hidden key is pressed, the following screen appears.

```
Installation:
MemCard Rel: 4.y Vnn.mm
Current Rel: 4.y Vnn.mm
All translations will be
DELETED


Exit
```

`F5`

Replacing the Processor Module

A failed processor module must be replaced immediately.

To replace the processor module, follow the steps below.

▶ 1. **If possible, save system programming.**

See Appendix D, "Backing Up with a Memory Card." To back up onto a floppy disk, see *System Programming and Maintenance (SPM)*.

▶ 2. **Power down the system.**

    a. Turn off the power supply on the basic carrier.

    b. Turn off the power supply on each expansion carrier.

    c. Unplug the auxiliary power units (if present) from the AC outlet.

▶ 3. **Unplug the D8W cord(s) connecting the SMDR printer and/or system programming PC.**

▶ 4. **Remove the processor module.**

▶ 5. **Inspect the processor module for any visible problems.**

▶ 6. **Inspect the carrier.**

▶ 7. **For Release 3.0 and later, skip to Step 8. For Release 2.1 and earlier, install a feature module in the new processor.**

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Use the feature module from the old processor if it appears to be functioning correctly; otherwise, install a new feature module. See "Replacing the Feature Module" on page 4-32.

▶ **8. Install the new processor module.**

▶ **9. Power up the system.**

   a. Plug the auxiliary units (if present) into the AC outlet.

   b. Turn on the power supply on each expansion carrier.

   c. Turn on the power supply on the basic carrier.

   The system automatically cold starts.

▶ **10. Perform a System Erase (frigid start).**
   See "System Erase (Frigid Start)" on page 4-17 for instructions.

▶ **11. Restore system programming using one of the following items:**

   ■ The backup floppy disk or original system programming disk. See *System Programming and Maintenance* for instructions.

   ■ The backup memory card or original system programming memory card (Release 3.0 and later). See Appendix D, "Backing Up with a Memory Card," for instructions.

▶ **12. Reconnect the D8W cord(s) connecting the SMDR printer and/or system programming PC.**

▶ **13. Attach a tag to the old processor.**
   Use the tag to identify any visible problems and relevant error reports.

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Replacing the Feature Module

➡ NOTE:

This section applies only to releases earlier than Release 3.0.

⚠ CAUTION:

Make sure that you have a backup of system programming before replacing the feature module. See "Backing Up System Programming" on page 4-1.

To replace the feature module, follow the steps below.

▶ 1. **Make sure system power is off.**

▶ 2. **Remove the processor from the carrier.**

   a. Press up on the tab on the bottom rear of the module.

   b. Pull the bottom of the module away from the carrier.

   c. Lift upward to disengage the module from the rod on the top of the carrier.

▶ 3. **Place the processor on a flat surface.**

▶ 4. **Grasp both metal rings on the outside of the feature module and pull straight up.**

⚠ CAUTION:

Grasping only one of the rings may cause damage to components on the processor circuit board or feature module.

▶ 5. **Check the *HDR4* header on the processor circuit board for proper mode operation. (For more information about modifying the mode, see Chapter 2 of *Installation*.)**

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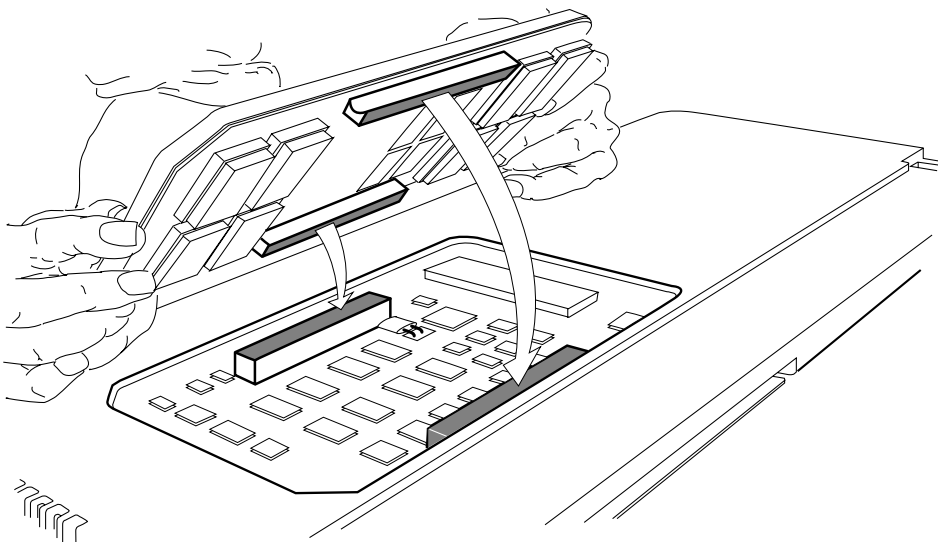
Figure 4-5.   Replacing the Feature Module

▶ 6. Align the connectors on the new feature module with the connectors in the processor (see Figure 4-5).

▶ 7. Firmly press the new feature module into the processor.

▶ 8. Insert the processor back into the carrier. (For more information about inserting the processor, see Chapter 2 of *Installation*.)

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Module Problems

If you suspect that a module is faulty, perform the following procedures:

- To identify the cause of module errors, run the module tests described below.

- To determine whether the module is faulty, replace it with a module of the same type. If the errors cease, the problem is solved.

Module Tests

The module tests in this section identify the cause of module malfunctions. After each module test, record any errors on the repair tag that will be shipped with the faulty module. If the module is sent for repair, this helps repair personnel troubleshoot the cause of the malfunction.

You should read through the following section, "Module Test Process," before running any module tests.

⎯➤ NOTE:
A module on which you run tests cannot be used for service. Because your customer depends on this service, run module tests during off hours, if possible. If you cannot, minimize the time required for each module's downtime whenever possible.

Module Test Process

Figure 4-6 shows the module test process. Refer to it and the text that follows for the recommended approach to testing modules.

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1 Check the equipment:
   □ power supply
   □ processor
     (back up the system programming)
   □ maintenance terminal
     (use the PC when testing
     MLX modules)

2 Check the error logs

3 Resolve any processor problems

4 Busy-out or reset the module

5 Run the Internal Loopback test →errors→

6 Check the error logs →errors→

7 Run the BchLoopback test for MLX modules only →errors→

8 Verify that voice calls can be made on each BRI line*

9 Run the CSU Loopback test for 100D modules only →errors→

Record the errors on the repair tag and continue with the next step.

10 Run the BRI Provisioning Test for NI-BRI modules only**

11 Replace the module if needed

12 Restore the module

_____

* If any problem arises with the voice call on an NI-BRI module, run the NI-BRI Provisioning Test next. While the BRI test is running, you can run the voice test on the next module.

** Run the NI-BRI Provisioning Test on any NI-BRI module that is going to be used for data calls or that had a problem with voice calls and was not previously tested with the tool.

Figure 4-6. Module Test Process

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⇒ **NOTES:**

1. If any problem arises with the voice call on an NI-BRI module, run the NI-BRI Provisioning Test next. While the BRI test is running, you can run the voice test on the next module.

2. Run the NI-BRI Provisioning Test on any NI-BRI module that is going to be used for data calls or that had a problem with voice calls and was not previously tested with the tool.

Considerations

Review the following items before you begin a module test procedure.

System Components

Before running a module test, make sure the following system components are working:

- Power supply

- Processor. Save the system programming onto a floppy disk. See *System Programming and Maintenance (SPM).* To back up onto a memory card, see Appendix D, "Backing Up with a Memory Card."

- Maintenance Terminal (MLX-20L console or PC). To run tests on the MLX module connected to the MLX-20L console, you must run the test from the PC, not from the MLX-20L console.

Busy-Out/Reset

Before running a module test, busy-out or reset the modules. Busy-Out is the best method, but it will not work if any line or extension is on a stable call. See "Busy-Out and Reset" on page 4-38 for more information about these features.

Test Notes

For each test, note the following points:

- When beginning the board controller test or the internal loopback module test, choose to run it once or repetitively.

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- You can interrupt any module test by selecting Exit (F5 on the PC).

- A module test can fail for one of the following reasons:

  — The module being tested was not busied-out. Exit the test, busy-out the module, and try again.

  — The error messages indicate that the module is faulty.

- If errors indicate that the module is faulty, record them on the module repair tag immediately after running the test.

  ⇒ **NOTE:**
  If the system does not recognize a 408 GS/LS-MLX module during testing, check the release number of the system. The 408 GS/LS-MLX module does *not* work with Releases 1.0 or 1.1. An 008 MLX module *must* be used to provide extension jacks with Releases 1.0 or 1.1.

To run a module test, follow the steps below.

▶ **1. To determine which modules are suspect, read the error logs and review any user-reported problems.**

▶ **2. If the error logs indicate the processor is the problem, refer to "Processor Problems" on page 4-12 to service the processor before continuing.**

Replacing a faulty processor may resolve module problems.

▶ **3. Busy-out or reset the module.**

See "Busy-Out and Reset" on page 4-38 for general guidelines.

▶ **4. Run the internal loopback test.**

See "Internal Loopback Test" on page 4–47. If errors occur, record them as described in "Considerations" on page 4-36.

▶ **5. Run the board controller test.**

See "Board Controller Test" on page 4–53. If errors occur, record them as described in "Considerations" on page 4-36.

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▶ **6. For MLX modules (008 MLX and 408 GS/LS-MLX) and 800 NI-BRI modules, continue with the B-Channel Loopback test.**

See "B-Channel Loopback Test" on page 4–57. If errors occur, record them as described in "Considerations" on page 4-36.

▶ **7. For 800 NI-BRI modules, continue with the NI-1 BRI Provisioning Test.**

See "800 NI-BRI Module Problems" on page 4–75. If errors occur, record them as described in "Considerations" on page 4-36.

▶ **8. For 100D modules, continue with the CSU loopback test.**

See "100D Module Problems" on page 4–100. If errors occur, record them as described in "Considerations" on page 4-36.

▶ **9. Replace the module with a module of the same type, whether you are troubleshooting or replacing the module permanently.**

▶ **10. Restore the module.**

Menu: Maintenance→Slot→Dial the slot no.→Restore→Yes

Restoring automatically undoes the busy-out and reset. For additional information about restoring a module, see "Restore" on page 4-45.

Persistent Module Problems

If any of the module tests fail and replacing the module does not clear the trouble, then either several modules may be faulty or the connector on the carrier may be faulty.

Busy-Out and Reset

Before running any module test, be sure to busy-out or reset the module.

■ Busy-out discontinues service from the module being tested to each line and extension only as they become idle. Busy-out is the preferred method, because it does not disrupt calls in progress.

■ Reset discontinues service to all lines and extensions on the module instantly.

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— In-progress calls are dropped if all of the calling parties on the call originate and terminate on the module being reset.

— If a call is using a line or extension on the module being Reset and another line and/or extension is involved in the call, the call on the module being reset is put on hold. In this case, the module can be removed and replaced. However, a demand test cannot be performed, because the module is not busied-out.

■ Check the status of the reset module before performing a demand test.

Menu: Maintenance→Slot→Status

Once you finish testing a module, you must restore it. Restoring a module terminates the Busy-out or Reset condition. See for instructions.

Busy-Out

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→Busy-Out→Yes.
PC Procedure	[F6]→[F2]→Type the slot no.→[F10]→[F2]→[F1]
Appropriate Modules	Any module that you are about to test
Time Estimate	Once all calls are terminated, the busy-out completes in less than 1 second. If calls in progress take too long, ask the callers to hang up.

To busy-out a module, follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

▶ **2. Specify the slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit          Enter
```

Dial or type [*nn*] then select Enter.

F10

▶ **3. Select Busy-Out.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Upgrade


Exit
```

xx = slot number entered in Step 2

F2

For all MLX modules, BChLoopback is also displayed as an option on this screen. For 100D modules, CSU-1pbk, Error Events, and Clock are also displayed as options on this screen. For all 800 NI-BRI modules, Clock, BChLoopback, and Provisioning are also displayed as options on this screen.

Console Display/Instructions　　　**Additional Information**　　　**PC**

▶ **4. Select Yes.**

```
Busy-Out Slot xx
Do you want to continue?
Yes
Cancel


Exit
```
xx = slot number entered in Step 2

▇

[F1]

The screen below appears while the module is discontinuing service to lines/trunks and extensions, without disrupting calls in progress.

```
Busy-Out Slot xx:

Busy-Out in Progress



Exit
```
xx = slot number entered in Step 2

The screen below appears when the module is successfully busied-out.

```
Busy-Out Slot xx:

Busy-Out Complete



Exit
```
xx = slot number entered in Step 2

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Console Display/Instructions   Additional Information   PC

The screen below appears when the busy-out fails. Try again, and be sure to specify the correct slot.

```
Busy-Out Slot xx:

Busy-Out FAILED



Exit
```

xx = slot number entered in Step 2

Reset

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→Reset→Yes.
PC Procedure	F6 → F2 →Type the slot no.→ F10 → F7 → F1
Appropriate Modules	Any module that you are about to test
Time Estimate	Less than 1 second (all calls in progress are terminated or put on hold immediately). If you do not want to interrupt calls in progress, use Busy-Out instead of Reset, as described above.

To reset the module, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F2

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Console Display/Instructions   Additional Information   PC

▶ **2. Specify the slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn


Backspace
Exit          Enter
```

Dial or type [*nn*], then select `Enter`.

`F10`

▶ **3. Select Reset.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy Out      Reset
Restore       Upgrade

Exit
```

xx = slot number entered in Step 2

`F7`

For all MLX modules, `BChLoopback` is also displayed as an option on this screen. For 100D modules, `CSU-lpbk`, `Error Events`, and `Clock` are also displayed as options on this screen. For all 800 NI-BRI modules, `Clock`, `BChLoopback,` and `Provisioning` are also displayed as options on this screen.

▶ **4. Select Yes.**

```
Reset Slot xx
Do you want to continue?
Yes
Cancel



Exit
```

xx = slot number entered in Step 2

`F1`

The screen below appears while the module is discontinuing service to lines/trunks and extensions. All calls in progress are being dropped.

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Console Display/Instructions   **Additional Information**   **PC**

```
Reset Slot xx:


Reset in Progress




Exit
```

xx = slot number entered in Step 2

The screen below appears when the module is successfully reset.

```
Reset Slot xx:


Reset Complete




Exit
```

xx = slot number entered in Step 2

The screen below appears when the Reset fails. Try again, and be sure to specify the correct slot.

```
Reset Slot xx:


Reset FAILED




Exit
```

xx = slot number entered in Step 2

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Restore

Once you complete module testing, restore it to terminate the Busy-Out or Reset condition.

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→ Enter→Restore→Yes.
PC Procedure	F6 → F2 →Type the slot no.→ F10 → F3 → F1
Appropriate Modules	Any module after testing it
Time Estimate	Less than 1 second.

To reset the module, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F2

▶ **2. Specify the slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit            Enter
```
Dial or type [*nn*], then select Enter.

F10

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Console Display/Instructions   **Additional Information**   **PC**

▶ **3. Select the Restore option.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy Out      Reset
Restore       Upgrade

Exit
```

xx = slot number entered in Step 2

F3

For all MLX modules, `BChLoopback` is also displayed as an option on this screen. For 100D modules, `CSU-1pbk`, `Error Events`, and `Clock` are also displayed as options on this screen. For all 800 NI-BRI modules, `Clock`, `BChLoopback`, and `Provisioning` are also displayed as options on this screen.

▶ **4. Select Yes.**

```
Restore Slot xx:
Do you want to continue?
Yes
Cancel

Exit
```

xx = slot number entered in Step 2

F1

The screen below appears while the module is restoring service to lines/trunks and extensions.

```
Restore Slot xx:

Restore in Progress

Exit
```

xx = slot number entered in Step 2

The screen below appears when the module is successfully restored.

Console Display/Instructions   **Additional Information**   **PC**

```
Restore Slot xx:


Restore Complete




Exit
```

xx = slot number entered in Step 2

The screen below appears when the Restore fails. Try again, and be sure to specify the correct slot.

```
Restore Slot xx:


Restore FAILED
Board Mismatch



Exit
```

xx = slot number entered in Step 2

Internal Loopback Test

This test checks communication between the processor and the module being tested. If you have not read , do so before continuing.

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Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→Demand Test→IntLoopback→Test Once or Test Repetitive.
PC Procedure	F6 → F2 →Type the slot no.→ F10 → F6 → F3 → F2 or F3
Appropriate Modules	This test can be run on any module. The 100D module and the 408 GS/LS-MLX module each have two digital switch elements (DSEs); both DSEs are tested.
Time Estimate	It takes approximately 1.5 minutes to run each test. The 100D module and 408 GS/LS-MLX module each take approximately 3 minutes, because they each have two DSEs.
Busy-Out or Reset	Busy-out or reset the module being tested prior to beginning the test. Both Busy-Out and Reset are in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Busy-Out and Reset" on page 4-38 for additional information.
Interrupting the Test	You can interrupt the test (both Test Once and Repetitive) by selecting Exit.
Test Failure	If the test fails, record the errors on the repair tag and replace the module.
Restore	Restore the module if it successfully completes all module tests and the errors no longer occur. Restore is in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Restore" on page 4-45 for additional information.

To run the Internal Loopback Module Test, follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

2. Specify the slot number (*nn* = 01 to 17).

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit            Enter
```

Dial or type [*nn*], then select `Enter`.

F10

▶ **3. Select Demand Test.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy Out      Reset
Restore       Upgrade


Exit
```

xx = slot number entered in Step 2

F5

For all MLX modules, `BChLoopback` is also displayed as an option on this screen. For 100D modules, `CSU-1pbk`, `Error Events`, and `Clock` are also displayed as options on this screen. For all 800 NI-BRI modules, `Clock`, `BChLoopback`, and `Provisioning` are also displayed as options on this screen.

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Console Display/Instructions   **Additional Information**   **PC**

▶ **4. Select Internal Loopback Test.**

```
Demand Test Slot xx:
Make a selection
Note:Busy out slot first
BoardCntrlr
IntLoopback


Exit
```

xx = slot number entered in Step 2

Exit   `F3`

To run the test once or run it repeatedly, select `Test Once` or `Repetitive`.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback
Test Once
Repetitive


Exit
```

xx = slot number entered in Step 2.

Select `Test Once` or   `F2`
`Repetitive`   `F3`

The screen below appears while the test is running. At the same time, if the module has a green LED, it flashes.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
in Progress



Exit
```

xx = slot number entered in Step 2

If you are running the repetitive test, the screen remains until the test fails. To interrupt repetitive testing, select `Exit`.   `F5`

The screen below appears only if you selected `Test Once` and the module passes the test.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
Successfully Completed



Exit
```

xx = slot number entered in Step 2

Console Display/Instructions   Additional Information   PC

The screen below appears when either test (Test Once or Repetitive) fails.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
FAILED
xxxxxxxxxxxxxxxxxxxxxxxxxx
xx xx xx xx xx xx xx xx
Exit
```

xx = slot number entered in Step 2

The 100D and 408 GS/LS-MLX module each have two DSEs. To display the second DSE's test results, press the More button.   [PgUp]

Lines 5 and 6 identify the cause of the failure or the number of errors found per port. There are up to 16 ports, numbered 0 through 15. Line 5 displays the results for ports 0 through 7; Line 6 is for ports 8 through 15.

Interpreting Test Results

If the test is successful, the module ports are free from error. Continue with the next module test or restore the module if you are through testing.

If the test fails, find the error message in Table 4–3 and proceed as indicated.

Table 4–3.   Internal Loopback Test Errors

Error Messages	Corrective Action
Slot is not busied-out	Exit the test, busy-out the slot, and try again.
Slot empty or not valid	Exit the test and try again; be sure to type the correct slot number. Do not indicate an empty slot or the processor (00).
FMWR not in Standby Mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.

Continued on next page

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Table 4–3. Continued

Error Messages	Corrective Action
Test running too long	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Not in TEST/STANDBY mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Any other error	Record the errors on the repair tag and replace the module.

NOTE:
Be sure to check the second screen if testing a 100D module or a 408 GS/LS-MLX module.

Restoring the Module

When you are finished running module tests, restore the module. See .

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Board Controller Test

This procedure tests the module's internal functions, such as ROM, RAM, the timer, dual-port RAM, and so on.

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→Demand Test→BoardCntrlr→Test Once or Repetitive
PC Procedure	[F6]→[F2]→Type the slot no.→[F10]→[F6]→[F3]→[F2] or [F3]
Appropriate Modules	This test can be run on all modules except the processor.
Time Estimate	Less than 1 second
Busy-Out or Reset	Busy-out or reset the module being tested prior to beginning the test. Both Busy-Out and Reset are in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Busy-Out and Reset" on page 4-38 for additional information.
Interrupting the Test	You can interrupt the test (Test Once or Repetitive) by selecting Exit.
Test Failure	If the test fails, record the errors on the repair tag and replace the module.
Restore	Restore the module if it successfully completes all module tests and the errors no longer occur. Restore is in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Restore" on page 4-45 for additional information.

To run the Board Controller Module Test, use the following steps.

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Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
<kbd>F2</kbd>

▶ 2. **Specify the slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit            Enter
```
Dial or type [*nn*], then select Enter.

<kbd>F10</kbd>

▶ 3. **Select Demand Test.**

```
Slot xx:
Make a selection
Status         Demand Test
Busy Out       Reset
Restore        Upgrade


Exit
```
xx = slot number entered in Step 2

<kbd>F6</kbd>

For all MLX modules, BChLoopback is also displayed as an option on this
screen. For 100D modules, CSU-1pbk, Error Events, and Clock are also
displayed as options on this screen. For all 800 NI-BRI modules, Clock,
BChLoopback, and Provisioning are also displayed as options on this
screen.

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Console Display/Instructions   Additional Information   PC

▶ 4. **Select the Board Controller Test.**

```
Demand Test Slot xx:
Make a selection
Note:Busy out slot first
BoardCntrlr
IntLoopback


Exit
```

xx = slot number entered in Step 2

F2

▶ 5. **Select Test Once or Repetitive.**

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Board Controller:
Test Once
Repetitive


Exit
```

xx = slot number entered in Step 2.

Select `Test Once` or   F2
`Repetitive`   F3

The screen below appears while the test is running. At the same time, if the module has a green LED, it flashes.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Board ControllerTest
in Progress


Exit
```

xx = slot number entered in Step 2

If you are running the repetitive test, the screen remains until the test fails. To interrupt repetitive testing, select `Exit`.   F5

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Console Display/Instructions   Additional Information   PC

The screen below appears only if you selected `Test Once` and the
module passes the test.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Board Controller Test
Successfully Completed



Exit
```

xx = slot number entered in Step 2

The screen below appears when either test (`Test Once` or `Repetitive`)
fails.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Board Controller Test
FAILED
xxxxxxxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxxxxxxxx
Exit
```

xx = slot number entered in Step 2

Lines 5 and 6 show error messages.
If there are more than two messages,
select More to see them.   PgUp

Interpreting Test Results

If the test completes successfully, the module's board controller is functioning
properly. Continue with the next module test or restore the module if you are
finished testing. If the test fails, find the error message in Table 4–4 and
proceed as indicated.

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Table 4–4.   Board Controller Test Errors

Error Messages	Corrective Action
Slot is not busied-out	Exit the test, busy-out the slot, and try again.
Slot empty or not valid	Exit the test and try again; be sure to type the correct slot number. Do not indicate an empty slot or the processor (00).
FMWR not in Standby Mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Test running too long	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Not in TEST/STANDBY mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Any other error	Record the errors on the repair tag and replace the module.

Restoring the Module

When you are finished running module tests, be sure to restore the module. See "Restore" on page 4-45.

B-Channel Loopback Test

This test verifies that specific communication paths on the MLX or 800 NI-BRI modules are operational. If you have not read "Module Test Process" on page 4-34, do so.

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Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→BchLoopback
PC Procedures	[F6]→[F2]→Type the slot no.→[F10]→[F4]
Appropriate Modules	This test can be run only on MLX or 800 NI-BRI modules.
Time Estimate	Approximately 1.5 minutes.
Busy-Out or Reset	Before beginning the test, busy-out or reset the module being tested. Both Busy-Out and Reset are in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Busy-Out and Reset" on page 4-38 for additional information.
Interrupting the Test	Interrupt the test by selecting Exit.
Test Failure	If the test fails, record the errors on the repair tag and replace the module.
Restore	Restore the module if it successfully completes all module tests and the errors no longer occur. Restore is in the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Restore" on page 4-45 for additional information.

To run the B-Channel Loopback Test, follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
█   F2

▶ 2. **Specify the module's 2-digit slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)

nn

Backspace
Exit            Enter
```
Dial or type [*nn*], then select Enter.

F10

▶ 3. **Select the B-Channel Loopback test.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy Out      Reset
Restore       Upgrade
BchLoopback
Exit
```
xx = slot number entered in Step 2

█   F4

For all 800 NI-BRI modules, Clock and Provisioning are also displayed
as options on this screen.

The screen below appears while the test is running.

Console Display/Instructions   **Additional Information**   **PC**

```
BchLoopback Slot xx:


BchLoopback in Progress




Exit
```

xx = slot number entered in Step 2

The screen below appears only if the module passes the test.

```
BchLoopback Slot xx:


BchLoopback Passed




Exit
```

xx = slot number entered in Step 2

The screen below appears only if the test fails.

```
BchLoopback Slot xx:
BchLoopback Failed
xxxxxxxxxxxxxxxxxxxxxxxxx
xx xx xx xx xx xx xx xx


Exit
```

xx = slot number entered in Step 2

Lines 3 and 4 identify the cause of the failure or the number of errors found per B-channel. On an MLX module, there are 16 B-channels, numbered 0 through 15. Line 3 displays the results for B-channels 0 through 7; Line 4 is for B-channels 8 through 15.

Interpreting Test Results

If the test completes successfully, the module's board controller is functioning properly. Continue with the next module test or restore the module if you are finished testing. If the test fails, find the error message in Table 4–5 and proceed as indicated.

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Table 4–5. Channel Loopback Errors

Error Messages	Corrective Action
Slot is not busied-out	Exit the test, busy-out the slot, and try again.
Slot empty or not valid	Exit the test and try again; be sure to type the correct slot number. Do not indicate an empty slot or the processor (00).
FMWR not in Standby Mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Test running too long	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Not in TEST/STANDBY mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Any other error	Record the errors on the repair tag and replace the module.

Restoring the Module

When you finish running module tests, be sure to restore the module. See "Restore" on page 4-45.

Replacing Modules

You can remove and insert line/trunk and extension modules (separately or at the same time) with the system power on without affecting normal call processing.

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⚠️ CAUTION:

This section does not apply to the processor or power supply.

Although the system is designed so that you can remove and replace modules without affecting call processing, partially inserting and removing a module can cause a cold start.

Adding a 100D module or changing any of its DS1 parameters requires that the system be idle.

When you replace a module, be sure to use the same module type. For example, do not put an 008 MLX module in place of a 400 GS/LS module. If a module is replaced with another type of module, or if a module is added to the system without powering down the system first, a cold start occurs.

If you move any module to a different slot, be sure to renumber the modules by selecting Board Renumber *from system programming. See* System Programming *for information about board renumbering*.

To replace a module, follow the steps below.

▶ **1. Busy-out or reset the module. Busy-Out is recommended.**

▶ **2. Label all cords (if they are not labeled already) and then unplug them from the module.**

For information about labeling trunk and cords, see Chapter 4 in *Installation*.
For instructions on checking poorly labeled wiring, see "Checking Unlabeled Wiring" on page 4-63.

▶ **3. Run a demand test by entering test mode.**

▶ **4. Remove the module by pushing up firmly on the tab at the bottom rear of the module and inspect the module for visible damage.**

▶ **5. Insert the new module. While holding the tab, bring the bottom of the module towards you and away from the carrier.**

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▶ **6. Restore the module. Lift up the module to disengage it from the rod at the top of the carrier.**

▶ **7. Connect the trunk and extension cords.**

▶ **8. Attach a tag, error printout, or any information that will help identify any visible problems, failure symptoms, and relevant error reports.**

Checking Unlabeled Wiring

If a label is missing or damaged, use a tone device and a telephone handset to match like wires.

You need the following tools:

- Tone device
- Telephone handset
- Telephone cord with an 8-pin modular plug
- 4-pair patch cord
- Diagonal pliers or wire strippers

To match like wires, follow the steps below.

▶ **1. Insert the telephone cord's 8-pin plug into an outlet on the floor area.**

▶ **2. Using diagonal pliers or wire strippers, cut off the end of the telephone cord to expose the pairs.**

▶ **3. Choose a single pair and then untwist the wires.**

▶ **4. Attach to each clip one wire from the pair you have chosen. The clips extend from the bottom of the tone device.**

▶ **5. Turn on the switch on the outside of the tone device.**

You hear a high-pitched, alternating signal.

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▶ **6. Take the telephone handset and a 4-pair patch cord to the cross-connect field between the control unit and the telephone.**

▶ **7. Go to the blue field on the cross-connect field and, starting at the top left corner, push the patch cord onto the first connecting block.**

▶ **8. Using the diagonal pliers or wire strippers, cut off the other end of the patch cord and expose the pairs.**

Do not cut out too much of the cord, because you need the length to test the top rows of the cross-connect field.

▶ **9. Attach the handset's clips, which extend from the base, to the exposed wires of the patch cord.**

▶ **10. Set the switch on the side of the handset to MONITOR.**

▶ **11. Listen to the handset for the tone device signal.**

- If you hear the signal, you have found the correct wires. Correctly label both the cross-connect field and the outlet.

- If you do not hear the signal, remove the patch cord from the connecting block and push the patch cord down onto the connecting block to the right of the one just tested. Keep moving the patch cord to the next connector block on the right until you find the pairs that carry the tone device signal.

Upgrading Circuit Module Firmware

Beginning with Release 3.0, MERLIN LEGEND Communications System allows upgrades or reinstallation of circuit module firmware through the PCMCIA interface slot on the processor module. The interface slot is a standard interface through which information may be added to or retrieved from the system.

Circuit modules introduced with Release 3.0 or later may use flash ROM to retain circuit module firmware. Unlike traditional ROMs, flash ROM can be written and erased without being removed from the circuit module. As of Release 4.0, the circuit modules that include this feature are the 016 (T/R), the 800 GS/LS-ID, and the 800 NI-BRI.

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Firmware on this circuit module can be upgraded or reinstalled with an Upgrade memory card. An upgrade is performed when a new release of firmware enhances a module's capabilities or corrects problems. Firmware can be reinstalled if the existing circuit module firmware has been corrupted.

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→Upgrade→Yes
PC Procedures	F6 → F2 →Type the slot no.→ F10 → F8 or F10 → F4
Appropriate Modules	This procedure can be run only on the 800 LS-ID, the 016 (T/R), and the 800 NI-BRI modules or modules introduced after Release 3.0.
Time Estimate	Approximately 1.5 minutes.
Busy-Out or Reset	The module is automatically busied-out after the upgrade procedure begins. If Busy-Out is not successful, you can wait for Busy-Out or select Reset.
Restore	Restore the module after the upgrade successfully completes. Restore is in the Slot menu, which you can access by doing the following from the console: **Menu**: Maintenance→Slot See "Restore" on page 4-45 for additional information.

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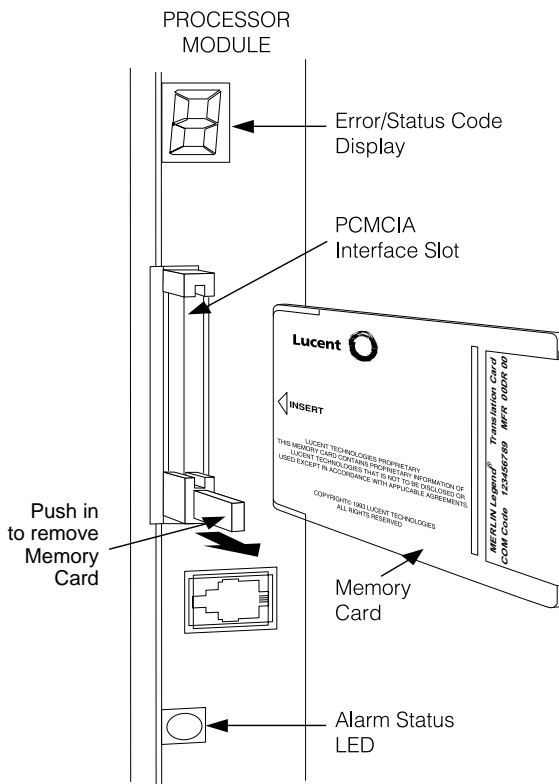
Figure 4-7.   Inserting the Upgrade Memory Card

To upgrade or reinstall circuit module firmware, follow the steps below.

▶ 1. **Insert an upgrade memory card containing the circuit module firmware into the PCMCIA interface slot on the processor board.**

See Figure 4-7.

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▶ **2. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

▶ **3. Specify the slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit          Enter
```
Dial or type [*nn*], then select Enter.

F10

▶ **4. Select Upgrade.**

The screen below appears for all modules except the 100D, 800 NI-BRI, and MLX boards.

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Upgrade


Exit
```
xx = slot number entered in Step 3

F8

For all MLX modules, BChLoopback is also displayed as an option on this screen. For all 800 NI-BRI modules, BchLoopback, Provisioning, and Clock are also displayed as options on this screen.

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The screen below appears if the module is a 100D.

Console Display/Instructions	Additional Information	PC

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Error Events
CSU-lpbk      Clock
Exit          Upgrade
```

xx = slot number entered in Step 3

F10

The screens below appear during the procedure.

```
Module Upgrade:


Validation of MemoryCard
in Progress.
```

```
Module Upgrade:


Validation of MemoryCard
Successfully Completed.



Exit
```

F5

When completed, select **Exit** to continue.

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▶ 5. **Select the firmware to be programmed.**

```
Upgrade Slot xx: >
aaaaaaaaaaaaaaa Ver: aa
Select one
aaaaaaaaaaaaaaa Ver: aa
aaaaaaaaaaaaaaa Ver: aa
aaaaaaaaaaaaaaa Ver: aa
Exit
```

xx = slot number entered in Step 3
Line 2 displays the firmware version
currently installed on the module.

Lines 4, 5 and 6 display firmware   F7
versions available on the memory   F8
card.   F9
If an angle bracket (>) appears in the
upper right corner of the screen, you
may select More to display the next
screen with additional firmware versions
available on the memory card.   PgUp

▶ 6. **Select Yes.**

```
Upgrade Slot xx:
Slot will be Busied Out.

Do you want to continue?
Yes
No
Exit
```

xx = slot number entered in Step 3

F3

If the firmware selected provides functionality that is different from the
circuit module's current firmware, the Maintenance display indicates that
a Board Renumber will be required once the installation is complete.

```
Upgrade Slot xx:
Slot will be Busied Out.
Renum board when done.
Do you want to continue?
Yes
No
Exit
```

xx = slot number entered in Step 3

F3

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If the module Busy-Out is blocked by an active line or extension, the following screen appears.

Choose to wait for the module to busy-out or reset the module.

```
Slot xx in Use:
Make a Selection
Continue Busy-Out
Reset


Exit
```

xx = slot number entered in Step 3

Continue Busy-Out does not interrupt calls in progress, but Reset does.

F1
F2

▶ 7. **Observe the status screen below.**

See "Error Conditions During Firmware Upgrade" on page 4-71 if error messages appear.

```
Upgrade Slot xx:

In Progress

xx % Completed

```

One of the following screens appears when the upgrade has successfully completed. If only a Restore is required to put the module back into service, the screen below appears.

```
Upgrade Slot xx:
Upgrade Successfully
Completed
Slot Busied Out.
Slot Restore needed.

Exit
```

F5

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If a Board Renumber is also required, the screen below appears.

```
Upgrade Slot xx:
Upgrade Successfully
Completed
Slot Busied Out.
Board Renumber needed.


Exit
```
␣␣␣ F5

Perform a Board Renumber and/or Restore as indicated above.

Error Conditions During Firmware Upgrade

The following error conditions can occur during a firmware upgrade. Recovery procedures follow each error condition.

Memory Card In Use By Another Feature

```
Module Upgrade:

Memory Card in use by
another feature


Exit
```
␣␣␣ F5

Select Exit and begin the upgrade procedure again.

Missing Card or Card Not Inserted Correctly

```
Module Upgrade:
verify that Memory Card
has been inserted
correctly.



■■■  Exit                                                      F5
```

Insert the memory card correctly; then select Exit and begin the upgrade procedure again.

Memory Card Is Corrupted

```
Module Upgrade:
Information on the
Memory Card is corrupted.
Please remove the
Memory Card.

■■■  Exit                                                      F5
```

Select Exit and repeat the upgrade procedure with a new memory card.

Module Cannot Be Upgraded

```
Upgrade Slot xx:              xx = slot selected in Step 3.
Module can not be
upgraded.



■■■  Exit                                                      F5
```

This procedure can be run only on the 800 GS/LS-ID, 016 (T/R), or 800 NI-BRI modules or other modules introduced after Release 3.0. Select Exit and repeat the upgrade procedure, being careful to select the correct slot. If upgrade canceled or upgrade incomplete appears on the error screen, the circuit

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module may be unreliable or unusable until a successful upgrade is performed
on it.

Module Error

```
Upgrade slot xx:
Module error




Exit
```

xx = slot selected in Step 3.

F5

Select **Exit** and reinitiate the upgrade procedure.

```
Upgrade slot xx:
Module error

Upgrade CANCELED.
Upgrade INCOMPLETE.

Exit
```

xx = slot selected in Step 3.

F5

Select **Exit** and reinitiate the upgrade procedure.

Memory Card File Error

```
Upgrade slot xx:
Memory Card file error.




Exit
```

xx = slot selected in Step 3.

F5

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Select **Exit**, then make sure that the memory card is properly inserted, and reinitiate the upgrade procedure.

```
Upgrade slot xx:
Memory Card file error.


Upgrade CANCELED
Upgrade INCOMPLETE


Exit
```

xx = slot selected in Step 3.

F5

Select **Exit**, then make sure that the memory card is properly inserted, and reinitiate the upgrade procedure. If the error occurs again, select **Exit** and insert a new memory card, then reinitiate the upgrade procedure.

Flash ROM Fails to Erase

```
Upgrade slot xx:
Memory on module will
not erase.
Upgrade CANCELED
Upgrade INCOMPLETE


Exit
```

xx = slot selected in Step 3.

F5

Repeat the upgrade procedure. If the upgrade continues to fail after several attempts, the module should be replaced. See "Replacing Modules" on page 4–61.

Upgrade Attempted on an Empty Slot

```
Upgrade slot xx:
No module in slot.




Exit
```

xx = slot selected in Step 3.

F5

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Select **Exit** and repeat the upgrade procedure, being careful to select the correct slot.

Board Memory Programming Failure

```
Upgrade slot xx:
Board Memory Programming
Failure.
Upgrade CANCELED
Upgrade INCOMPLETE


Exit
```

xx = slot selected in Step 3.

F5

Repeat the upgrade procedure. If the upgrade continues to fail after several attempts, the module should be replaced. See "Replacing Modules" on page 4–61.

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An 800 NI-BRI module requires running the provisioning test, in addition to the other module tests, under the following circumstances:

■ The module has data endpoints that use the BRI lines.

■ Voice Call manual testing of the module's BRI lines indicates problems.

The test described in this document supports the NI-1 BRI IOC Package "S" service configuration. Multiline-Hunt Group/Series Completion testing is included here.

See Figure 4-6 for a diagram of the entire module testing process. If you have any questions about the 800 NI-BRI module and do not find the answers here, contact NSAC at 1 800 628-2888.

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NI-1 BRI Provisioning Test

This test verifies that each communication path on the 800 NI-BRI module is operational by establishing and disconnecting a series of voice and data calls between any two communication paths on the module.

In Release 4.1 and later systems, the NI-BRI Provisioning Test is enhanced to include testing for BRI facilities that are part of Multiline Hunt Groups (MLHGs). Prior to testing, the BRI facility must have a MLHG group number programmed. The number (up to 10 digits) is appended to the end of the Directory Number (DN) (separated by a # character) programmed for the BRI line.

Before proceeding with this test, obtain completed copies of System Planning Form 3-i, Incoming Trunks: BRI Options and the NI-1 BRI Planner Form.

➡ NOTE:
If an 800 NI-BRI module has only one DN/SPID provisioned on it, the provisioning test cannot be run on that module. To test the line, move one DSL from another 800 NI-BRI module to this module. The DSL that is moved should have been tested successfully and, to make testing easier, should not be part of a MLHG. This move involves administering a line on the DSL and connecting the cable on the target module. Run the test on the two DNs. When the test is successfully completed, remove the programming from the board just tested so that the single line is left on the board. Then reconnect the cable to the original slot and port.

Beginning with Release 4.1, all 800 NI-BRI modules must be busied out and those BRI boards not being tested must be unplugged from the carrier before testing can begin.

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Summary

Busy-Out or Reset	Before beginning the test, busy-out or reset the module being tested. Both Busy-Out and Reset are on the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Restore" on page 4-45 for additional information.
Console Procedure	**Menu**: Maintenance→Slot→Dial the BRI slot no.→ Enter→Provisioning
PC Procedures	[F6]→[F2]→Type the BRI slot no.→[F10]→[F10]
Appropriate Modules	This test can be run only on 800 NI-BRI modules.
Time Estimate	Approximately 20 minutes for a fully utilized board. However, communication paths with errors increase the time. Boards with fewer programmed lines and no errors decrease the time.
Interrupting the Test	Interrupt the test by selecting Exit.
Test Failure	If the test fails, follow the instructions in Table 4–6 and in Table 4–7. If the module must be replaced, record the errors on the repair tag and replace the module.
Restore	Restore the module when it completes all module tests. Restore is on the Slot menu, which you can access by doing the following from the console:
	Menu: Maintenance→Slot
	See "Restore" on page 4-45 for additional information.

To run the provisioning test, follow the steps below.

NOTE:
Before proceeding with this test, obtain completed copies of System Planning Form 3-i, Incoming Trunks: BRI Options and the NI-1 BRI Planner Form.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the main menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
F2

▶ **2. Specify the 800 NI-BRI module's 2-digit slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit           Enter
```

Dial or type [*nn*], then select
Enter.

F10

▶ **3. Select the Provisioning test.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Clock
BchLoopback   Upgrade
Exit          Provisioning
```

xx = slot number entered in
Step 2

F10

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Console Display/Instructions   Additional Information   PC

▶ **4. If the test cannot be run to completion, an error message screen appears, such as the one shown below.**

```
Provisioning slot xx:


Test running too long




Exit
```
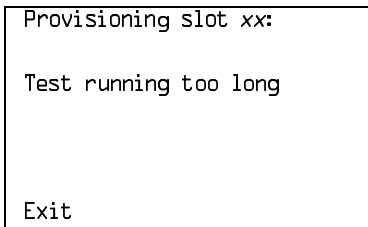
xx = slot number entered in
Step 2

F5

Find the error message in Table 4–6 and proceed as indicated.

Table 4–6.   NI-1 BRI Provisioning Test Errors

Error Messages	Corrective Action
Slot is not busied–out	Exit the test, busy-out the slot, and try again.
Slot empty or not valid	Exit the test and try again. Be sure to type the correct slot number; do not indicate an empty slot or the processor (00). If the problem persists, replace the 800 NI-BRI module.
Test running too long	Exit the test. Remove half of the DSL connectors and rerun the test. Note the result codes of those that fail and then disconnect them. Reconnect the untested DSLs and rerun the test. Note those that fail. Reconnect all DSLs.
Test won't start (Release 4.1 and later)	Check that all BRI boards not being tested are busied out and unplugged from the carrier. Run the test again.

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Console Display/Instructions   Additional Information   PC

▶ **5. Observe the status screens below.**

The screen below appears while the test is running.

```
Provisioning slot xx:


Provisioning in progress




Exit
```

xx = slot number entered in Step 2

While the test is running, the LEDs are in the following states:

GREEN	Blinks to indicate the test is running.
YELLOW	Flashes on and off while calls are being established and disconnected.
RED	Stays on until Layers 1–3 are initialized for all programmed communication paths on the module.

In Release 4.0, the screen below appears only if all 16 communication paths connected to the slot pass the tests.

```
Provisioning slot xx:

All Lines Passed



Exit
```

xx = slot number entered in Step 2

The screen below appears if fewer than 16 communication paths are programmed on the module or if one or more communication paths fail. On a module with fewer than 16 programmed paths, the screen will show OK for all successful paths, error codes for all failed paths, and ADMIN for any path that was not programmed. Before proceeding, record all the error codes on this screen, in the correct order.

Console Display/Instructions   Additional Information   PC

```
Provisioning slot xx:
At least 1 line not OK
xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
Exit
```

xx = slot number entered in Step 2

Lines 3 through 6 will contain at
least one error message.
See Table 4–7.

The communication paths' result codes are ordered as follows on lines 3
through 6:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Communication paths correspond to the following ports on the 800
NI-BRI module:

PATHS	PORT	PATHS	PORT
1, 2	1	3, 4	2
5, 6	3	7, 8	4
9, 10	5	11, 12	6
13, 14	7	15, 16	8

In Release 4.1 and later systems, the following screen appears when the
testing for all 16 communication paths is completed. On a module with
fewer than 16 programmed paths, the screen shows 0KN0H or 0KH
described in Table 4–7 for all successful paths; error codes for all failed
paths; and SPID for any path that was not programmed. Before
proceeding, record all the result codes on this screen, in the correct
order.

```
Provisioning slot xx:

xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx
Exit
```

xx = slot number entered in Step 2

Lines 3 through 6 will contain the
test result codes.
See Table 4–7.

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▶ **6. Interpret the test results.**

If the test completes successfully, the module's B-channels are functioning properly. If a communication path fails, find the result code in Table 4–7 and proceed as indicated.

▶ **7. Restore the module when all tests are completed.**

When all of the lines have passed the test, the red LED remains on until the CO reinitializes all of the lines.

Follow the procedures in Table 4–7 to examine each BRI line that has an error and make corrections, if necessary, before rerunning the tool.

Table 4–7.   NI-BRI Test Result Codes

Result Code	Description	Corrective Action
OK (Release 4.0 and earlier)	BRI facility provisioned with functioning voice and data capabilities	No action required if voice and data functions are expected.
CO-V	CO provisioning error for voice calls on that facility	The facility is correctly programmed and established on Layers 1, 2, and 3. However, a problem associated with the provisioning at the CO for voice calls was detected.
		If the facility is intended to provide voice calls, perform the following tests and record the results before contacting the LEC:
		Outgoing Voice Call Test (page 4-94)
		Incoming Voice Call Test (page 4-95)

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Table 4–7. Continued

Result Code	Description	Corrective Action
C0-V *continued*		Possible causes of this error are:
		Outgoing voice calls are not possible. Error identified at Outgoing Voice Call Test, Step 4.
		Incoming voice calls are not possible. Error identified at Incoming Voice Call Test, Step 2.
		If MLH is expected, the possible cause is that CO provisioning does not allow incoming voice calls, but either the DN or MLHG DN has been verified to be correct.
		IF MLH is not expected, the possible cause is that provisioning on the facility does not allow incoming voice calls.
		Additional call offering is provisioned. Additional call offering allows a voice call to be presented to a busy facility without either party recognizing the condition. Therefore, this condition cannot be detected by manual testing. This cause is valid if incoming voice calls can be received successfully.
		Features provisioned. Supplementary features such as transfer and conference are provisioned at the CO. This condition cannot be detected by manual testing. This cause is valid if incoming voice calls can be received successfully.

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Table 4–7. Continued

Result Code	Description	Corrective Action
CO-V *continued*		**Provisioning on the facility does not always allow outgoing and/or incoming calls.** Error identified at Outgoing Voice Call Test, Step 4 and/or Incoming Voice Call Test, Step 2.
		This condition may or may not be detected by any single manual test. Therefore, a sequence of calls may be necessary to determine the condition for the failure.
CO-D	CO provisioning error for data calls on that facility	The facility is correctly programmed and established on Layers 1, 2, and 3. However, a problem associated with the provisioning at the CO for data calls was detected.
		If the facility is intended to provide data calls, perform the following tests with either digital data terminals or analog data terminals and modem pools. Record the results before contacting the LEC:
		Outgoing Data Call Test (see page 4-96)
		Incoming Data Call Test (see page 4-97)
		If data terminals are not available, contact the LEC and advise them that the provisioning for data on the facility requires checking. If more information is required, contact the NSAC and provide them with the result code, the slot number, the port number, and the site information (remote access number, etc.).

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Table 4–7. Continued

Result Code	Description	Corrective Action
CO-D *continued*		The possible causes of this error are:
		Outgoing data calls are not possible. Error identified at Outgoing Data Call Test (page 4-96), Step 3.
		Incoming data calls are not possible. Error identified at Incoming Data Call Test (page 4-97), Step 2.
		If MLH is expected, the possible cause is that CO provisioning does not allow incoming data calls, but either the DN or MLHG DN has been verified to be correct.
		If MLH is not expected, the possible cause is that provisioning on the facility does not allow incoming data calls.
		Provisioning on the facility does not allow incoming data calls. Error identified at Outgoing Data Call Test (page 4-96), Step 3 and/or Incoming Voice Call Test (page 4-95) Step 2.
		This condition may or may not be detected by any single manual test. Therefore, a sequence of calls may be necessary to determine the condition for the failure.

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Table 4–7. Continued

Result Code	Description	Corrective Action
CO-DNV (Release 4.1 and later)	Error in LEGEND administration of DN and/or CO provisioning error for voice calls on that facility	The facility is correctly programmed and established with layers 1, 2, and 3. However, no incoming voice calls can be received. Check that the facility is programmed with the DN provided by the LEC.
		If the facility is part of an MLHG, check if the voice MLHG DN is absent. If the voice MLHG DN is absent, administer it and rerun the test. The possible causes of this error are:
		Incorrect DN/MLHG DN
		Incoming voice calls are not possible; error identified at Incoming Voice Call Test (page 4-95), Step 2, and the DN and MLHG DN cannot be verified.
CO-DND (Release 4.1 and later)	Error in LEGEND administration of DN and/or CO provisioning error for data calls on that facility	The facility is correctly programmed and established with layers 1, 2, and 3. However, no incoming data calls can be received. Check that the facility is programmed with the DN provided by the LEC.
		If the facility is part of an MLHG, check if the data MLHG DN is absent. If the data MLHG DN is absent, administer it and rerun the test. The possible causes of this error are:
		Incorrect DN/MLHG DN
		Incoming data calls are not possible; error identified at Incoming Voice Call Test (page 4-95), Step 2, and the DN and MLHG DN cannot be verified.

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Table 4–7. Continued

Result Code	Description	Corrective Action
CO-DDV (Release 4.1 and later)	Error in LEGEND administration of DN and/or CO provisioning error for voice and data calls on that facility	The facility is correctly programmed and established with layers 1, 2, and 3. However, no incoming data calls can be received. Check that the facility is programmed with the DN provided by the LEC.
		If the facility is part of an MLHG, check if the MLHG DN is absent. If the MLHG DN is absent, administer it and rerun the test.
		The possible cause of this error is any combination of the causes of CODNV and CODND.
DN (Release 4.1 and later)	Incorrect DN administration	The facility is established in layers 1, 2, and 3. Check that the facility is programmed with the DN provided by the LEC and rerun the test. If the error persists, contact the LEC.
		If the facility is part of an MLHG, check if the MLHG DN is absent. If the MLHG DN is absent, administer it and rerun the test.

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Table 4–7. Continued

Result Code	Description	Corrective Action
MLHV (Release 4.1 and later)	No voice hunting, or Incorrect voice MLHG DN and DN if MLHG DN is present, or Voice hunting was observed with no MLHG DN	The facility is correctly programmed and established with layers 1, 2, and 3 with functioning voice capabilities. The possible causes of this error are: **Incoming voice calls using the MLHG DN are not possible, but incoming voice calls using the DN are possible.** If voice hunting is expected, with the programmed MLHG DN, check that the facility is programmed with the MLHG DN provided by the LEC and rerun the test. If the error persists, contact the LEC. **Incoming voice calls using either the MLHG DN or DN are not possible, and both the MLHG DN and DN have been verified to be incorrect.** Reprogram the MLHG DN or DN and rerun the test. If the error persists, contact the LEC. **MLH is not expected.** The MLHG DN is not programmed and voice calls to the facility using the DN are terminated at the facility as a hunt call. Contact the LEC.

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Table 4–7. Continued

Result Code	Description	Corrective Action
MLHD (Release 4.1 and later)	No data hunting, or Incorrect data MLHG DN if MLHG DN is present, or Data hunting was observed with no MLHG DN	The facility is correctly programmed and established with layers 1, 2, and 3 with functioning data capabilities. The possible causes of this error are: **Incoming data calls using the MLHG DN are not possible, but incoming data calls using the DN are possible.** If data hunting is expected, with the programmed MLHG DN, check that the facility is programmed with the MLHG DN provided by the LEC and rerun the test. If the error persists, contact the LEC. **Incoming data calls using either the MLHG DN or DN are not possible, and both the MLHG DN and DN have been verified to be correct.** Reprogram the MLHG DN or DN and rerun the test. If the error persists, contact the LEC. **MLH is not expected.** The MLHG DN is not programmed and data calls to the facility using the DN are terminated at the facility as a hunt call. Contact the LEC.

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Table 4–7. Continued

Result Code	Description	Corrective Action
MLHDV (Release 4.1 and later)	No voice or data hunting, or Incorrect voice and data MLHG DN if MLHG DN is present, or Voice and data hunting was observed with no MLHG DN	The facility is correctly programmed and established with layers 1, 2, and 3 with functioning voice and data capabilities. Combination of the causes of MLHV and MLHD.
OKH (Release 4.1 and later)	BRI facility that is part of an MLHG is provisioned with functioning voice and data capabilities	No action is required if the MLH voice and data functionalities are expected. If MLH is not expected, verify that the MLHG DN is present and, if so, remove it and rerun the test.
OKNOH (Release 4.1 and later. See OK for Release 4.0 and earlier)	BRI facility that is *not* part of an MLHG is provisioned with functioning voice and data capabilities	No action is required if non-MLH voice and data functions are expected. If MLH is expected, verify that the MLHG DN is not present and, if so, administer it and rerun the test.
SPID (Release 4.1 and later)	No or incorrect SPID administration	Check that the facility is programmed with the SPID provided by the LEC and rerun the test. If the error persists, contact the LEC.

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Table 4–7. Continued

Result Code	Description	Corrective Action
LG	LEGEND BRI error on that facility	This result should never appear; if it does, contact the NSAC.
ADMCO (Release 4.0 and earlier)	LEGEND administration error and/or CO provisioning error on that facility	Check that the facility is programmed with the DN provided by the CO. If the DN was not programmed properly, correct it and rerun the test. If the error persists, perform the appropriate set of tests (voice only, data only, or voice and data) and record the results before contacting the LEC:
		Outgoing Voice Call Test (page 4-94)
		Incoming Voice Call Test (page 4-95)
		and/or
		Outgoing Data Call Test (page 4-96)
		Incoming Data Call Test (page 4-97)
		The possible causes of this error are:
		Incorrect DN. Error identified at Incoming Voice/Data Call Test, Step 2. Incoming calls fail.
		Any of the causes listed for CO-V **and** CO-D

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Table 4–7. Continued

Result Code	Description	Corrective Action
ADMIN	No administration or incorrect administration on that facility	Check that the facility is programmed with the SPID and DN provided by the CO. If the SPID and DN were not programmed properly, correct it and rerun the test. If an error persists, perform the appropriate set of tests (voice only, data only, or voice and data) and record the results before contacting the LEC:
		Outgoing Voice Call Test (page 4-94)
		Incoming Voice Call Test (page 4-95)
		or
		Outgoing Data Call Test (page 4-96)
		Incoming Data Call Test (page 4-97)
		The possible causes of this error are:
		Incorrect SPID. Error identified at Incoming Voice Call Test, Step 3; Incoming Voice Call Test, Step 2; Outgoing Data Call Test, Step 2; and/or Incoming Data Call Test, Step 2. Both outgoing and incoming calls fail.
		Incorrect DN. Error identified at Incoming Voice/Data Call Test, Step 2. Incoming calls fail.

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Table 4–7. Continued

Result Code	Description	Corrective Action
LAYR1	LAYER 1 BRI Provisioning error on facility	Examine the wiring for the line, ensuring that all connections have been closed. Rerun the test if a wiring problem is identified. If the problem persists, or if there is no wiring problem identified, swap the DSL and its administration to another port on the board.
		If the problem follows the DSL, contact the LEC.
		If the problem remains on the original port, mark the port defective and replace the 800 NI-BRI board.
LAYR2	LAYER 2 BRI Provisioning error on facility	Layer 1 is established. Unplug the connector and replug it into the same port. Rerun the test. If the problem persists, contact the LEC.
		The possible causes of this problem are:
		The DSL is provisioned with only one active DN (rather than two) at the CO.
		Two lines are programmed when only one line is provided by the CO.
		Check that the facilities are programmed properly and rerun the tests if you made any corrections.
LAYR3	LAYER 3 BRI Provisioning error on facility	Layers 1 and 2 are established.
		This result indicates that the CO does not do Layer 3 initialization. This error may not affect service, but the LEC must be contacted.

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Table 4–7. Continued

Result Code	Description	Corrective Action
NOTST	Testing was not performed on this facility because no other Layer 3 initialized facility was available in the time allowed for testing.	Layers 1, 2 and 3 are established. Correct the known problems on the other facilities and rerun the test.
?????	Testing was inconclusive because the line(s) used to test this one had problems.	Correct the known problems on other facilities and rerun the test.

Outgoing Voice Call Test

Place a voice call from the BRI line under test. Call either a working facility on the system or a phone on the premises that is connected to the central office (CO).

$\Rightarrow$ NOTE:

The 800 NI-BRI module must be restored (removed from the Maintenance-Busy state) before performing this test. See "Restoring the Module" on page 4-109.

▶ **1. Assign the BRI line to a button on an MLX display extension.**

If using a facility on the system as a destination, also assign the destination facility to a button on another MLX display phone.

▶ **2. Press the button associated with the BRI line under test.**

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The red LED next to this button should be on and steady. If not, check that the BRI line has been correctly assigned to this button.

▶ **3. Go off-hook by lifting the handset or pressing the speakerphone button.**

The red and green LEDs on this button should be on and steady. A dial tone should be heard. If not, record that the outgoing voice call test has failed.

▶ **4. Dial the destination number. (In a Centrex environment, it is necessary to dial a 9 before the destination number.**

Verify the following results and note any failures:

- Dial tone should be off after the first digit is dialed.

- Verify that the originating end hears ringback after the last digit is dialed and that the destination phone is ringing.

  If either indication is absent, check that the dialed digits are those of the destination Directory Number (DN).

- If the destination telephone can display calling party number, verify that the DN of the BRI line under test is displayed correctly. If not, record that the calling party information displayed is either incorrect or absent at the destination telephone.

▶ **5. Answer the call at the destination telephone and verify the connection.**

▶ **6. Disconnect the call at either the originating or receiving end.**

Verify that the green LED next to this button turns off and the connection is removed.

Incoming Voice Call Test

Place a voice call from a known working telephone to the BRI line under test.

▭▶ **NOTE:**
The 800 NI-BRI module must be restored (removed from the Maintenance-Busy state) before performing this test. See "Restoring the Module" on page 4-109.

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▶ **1. Assign the BRI line to a button on an MLX display extension.**

If using a facility on the system as a destination, also assign the destination facility to a button on another MLX display phone.

▶ **2. Dial the DN of the BRI line under test at the originating telephone.**

Verify that alerting is indicated on the button associated with the BRI line being tested.

▶ **3. Verify that the originating number appears on the display of the MLX telephone programmed with the BRI line under test. Verify that the associated green LED flashes.**

If the correct number is not displayed, verify that the number dialed and the DFT administration are correct. If they are incorrect, repeat the test.

▶ **4. Answer the call (press line button if necessary) and verify the connection.**

Verify that the green LED next to this button is on and steady.

▶ **5. Disconnect the call at either the originating end or the receiving end.**

Verify that the green LED next to the button associated with the BRI line under test turns off.

Outgoing Data Call Test

Place a data call from the BRI line under test to either a working facility on the system or a data endpoint on the premise that is connected to the central office (CO). See the *Data and Video Reference* for details regarding setting up a data call with specific equipment.

⇒ NOTE:
The 800 NI-BRI module must be restored (removed from the Maintenance-Busy state) before performing this test. See "Restoring the Module" on page 4-109.

▶ **1. Assign the BRI line to a data terminal.**

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If using a facility on the system as a destination, assign the destination facility to another data terminal.

▶ **2. Dial the destination number. (In a Centrex environment, it is necessary to dial a 9 before the destination number.)**

Verify the following results and note any failures:

- You may hear dial tone at the beginning of dialing and ringback after completion. Alerting may be indicated at the destination.

  If both ringback and alerting are absent, check that the dialed digits are those of the destination DN. Redial, if necessary. If the call could not be established and the dialing was correct, record that an outgoing data call cannot be completed from this line and indicate the type of tone, if any, that was present at both ends.

- If the destination telephone can display the calling party number, verify that the DN of the BRI line under test is displayed correctly. If not, record that the calling party information displayed at the destination telephone is incorrect or absent.

▶ **3. Answer the call at the destination telephone and verify the connection.**

The destination data extension may be programmed for auto-answer. Verify that the red and green LEDs next to this button are on steady and the communication path is established.

▶ **4. Disconnect the call from either the originating or receiving end.**

Verify that the green LED turns off and the communication path is removed.

Incoming Data Call Test

Place a data call from a known working facility to the BRI line under test. See the *Data and Video Reference* for details regarding answering a data call with specific equipment.

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800 NI-BRI Module Problems

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$\Rightarrow$ **NOTE:**
The 800 NI-BRI module must be restored (removed from the Maintenance-Busy state) before performing this test. See "Restoring the Module" on page 4-109.

▶ **1. Assign the BRI line to a data terminal.**

If using a facility on the system as a destination, assign the destination facility to another data terminal.

▶ **2. Place a test call to the BRI line under test.**

Verify that alerting is indicated at the data extension associated with the BRI line. If not, check that the dialed number corresponds to the DN of the line.

■ If the number is not correct, redial the call.

■ Otherwise, record that the incoming data call test has failed and note the type of tone (busy, reorder, ringback, etc.) heard at the originating end.

▶ **3. If the data extension associated with the BRI line under test can display calling party number, verify that the originating DN appears on its display.**

If not, record that the calling party information displayed at the destination telephone is either incorrect or absent.

▶ **4. Answer the call and verify the connection.**

The data extension may be programmed for auto-answer. Verify that the green LED flashes until the call is answered.

▶ **5. Disconnect the call from either the originating or receiving end.**

800 NI-BRI Module Clock Status

If you have not been trained to perform BRI maintenance, contact your technical support organization for instructions on using this procedure.

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800 NI-BRI Module Problems

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Summary

Console Procedure

Menu: Maintenance→Slot→Dial the slot no.→Enter→Clock→Exit

PC Procedure

F6 → F2 →Type the slot no.→ F10 → F9 → F5

Console Display/Instructions   **Additional Information**   **PC**

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F2

▶ **2. Specify the 2-digit slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit          Enter
```

Dial or type [*nn*] and select Enter.

F10

▶ **3. Select Clock.**

```
Slot xx:
Make a selection
Status      Demand Test
Busy-Out    Reset
Restore     Clock
CSU-lpbk    Upgrade
Exit        Provisioning
```

xx = slot number entered in Step 2.

Provisioning and Clock are displayed only for the 800 NI-BRI module.

F9

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Console Display/Instructions   Additional Information   PC

▶ **4. If you need assistance in interpreting the information displayed on the screen, contact your technical support organization.**

```
Clock Slot xx:
mm/dd/yy     hh:00-hh:mm
Active: xxxx
Synch: xxxxx
Source: xxxx
Port: xx
Exit
```

xx = slot number entered in Step 2.

100D Module Problems

The 100D module requires the CSU Loopback Test, in addition to the other module tests. See Figure 4-35 for a diagram of the entire module testing process. If you have any questions about the 100D module that this section does not cover, contact your technical support organization.

Private Networked Systems

The Channel Service Unit (CSU) or Data Service Unit (DSU) at either end of a PRI tandem trunk over which a call could be routed, may be programmed for T1 or robbed-bit signaling rather than PRI signaling. This will cause the MERLIN LEGEND to raise a channel inoperative alarm. Verify that any CSU on the DS1 circuit between the MERLIN LEGEND and the public switched telephone network (PSTN) is programmed for the same framing as is the DS1 slot on the MERLIN LEGEND. Also, verify that any CSU on the PRI circuit between the MERLIN LEGEND and the PSTN is programmed for PRI signaling and not for T1 or robbed-bit signaling.

> **NOTE:**
> If your existing MERLIN LEGEND Communications system is now going to be used for a private network using tandem trunks, check the framing to be sure PRI signaling is supported.

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Error Events

In addition to checking the error logs, the 100D module requires that you check the error events specific to the 100D module. See "Error Events," later in this chapter, for details.

CSU Loopback Test

The Channel Service Unit (CSU) Loopback Test verifies that the communication path between the following CSUs, 551 T1, ESF T1, or the ACCULINK® 3150, and the 100D module is operational.

Summary

Console Procedure	**Menu**: Maintenance→Slot→Dial the slot no.→Enter→CSU-lpbk
PC Procedure	F6 → F2 →Type the slot no.→ F10 → F4
Appropriate Modules	This test can be run only on 100D modules.
Time Estimate	Approximately 2 minutes
EQ IN and EQ OUT (551 T1 CSU)	For the 551 T1 CSU only, connect a patch cord from the CSU EQ IN jack to the CSU EQ OUT jack. Details are provided below.

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DTE LOOPBACK (ESF T1 CSU)	For the ESF T1 CSU only, flip the DTE LOOPBACK switch on the front panel to the up position to activate the loopback. Details are provided below.
LINE LOOPBACK (ACCULINK 3150 CSU)	For the ACCULINK 3150 only, select front panel Line Loopback command. Details are provided below.
Busy-Out or Reset	Prior to beginning the test, busy-out the 100D module. Both Busy-out and Reset are in the Slot menu, which you can access by doing the following from the console: Menu: Maintenance→Slot. See "Busy-Out and Reset" on page 4-38 for additional information.
Interrupting the Test	You can interrupt the test by selecting Exit.
Test Failure	If the test fails, record the errors on the repair tag and replace the module.
Restore	If the 100D module successfully completes the CSU Loopback Test, restore the module. Restore is in the Slot menu, which you can access by doing the following from the console: Menu: Maintenance→Slot. See "Restore" on page 4-45 for additional information.

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In preparation for running the CSU Loopback Test, perform the steps below at the CSU.

▶ **1. Busy-out the 100D module.**

▶ **2. Prepare the CSU.**

For the 551 T1 CSU, connect the EQ OUT and EQ IN jacks (see Figure 4-8).

    a. Plug one end of a bantam-to-bantam patch cord (or a loopback fixture) into the EQ OUT jack on the front of the CSU.

    b. Plug the other end of the patch cord into the EQ IN jack on the CSU.

This causes the 551 T1 CSU to either loop back the private network signal or send the all-ones pattern, depending on the chosen CSU option.

For the ESF T1 CSU, flip the DTE LOOPBACK switch on the front panel to the up position to activate the loopback test (see Figure 4-9).

For the ACCULINK 3150 CSU, Press the **F2** button on the front panel to select Test from the menu screen. From the Test screen, press the **F2** button to select Lpbk. From the Loopback screen, press the right arrow once to display additional loopback tests. Press the **F3** button to display DLB (DTE Loopback). When DLB is selected, Test Started appears on line 2 of the menu screen. (See Figures 4-10 through 4-13.)

The ACCULINK 3160/3164 DSU/CSU is physically similar to the 3150 CSU with programming on the front panel and menus appearing on the LCD screen. For the preparation of specific tests, see the operator's guide that comes with the unit.

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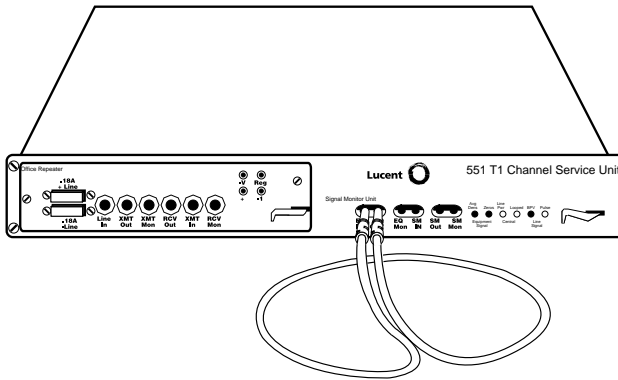
Figure 4-8.   551 T1 CSU Loopback Connection
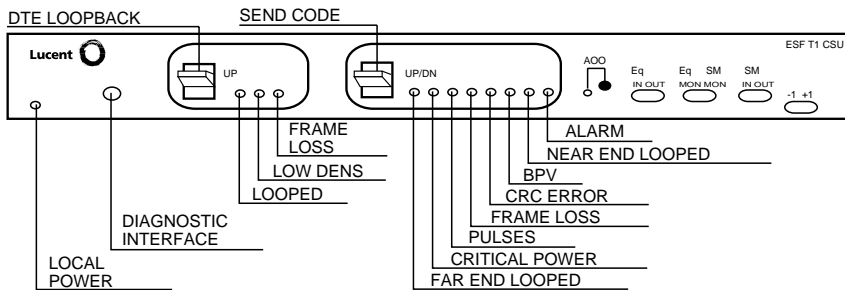
Figure 4-9.   ESF T1 CSU DTE Loopback Connection

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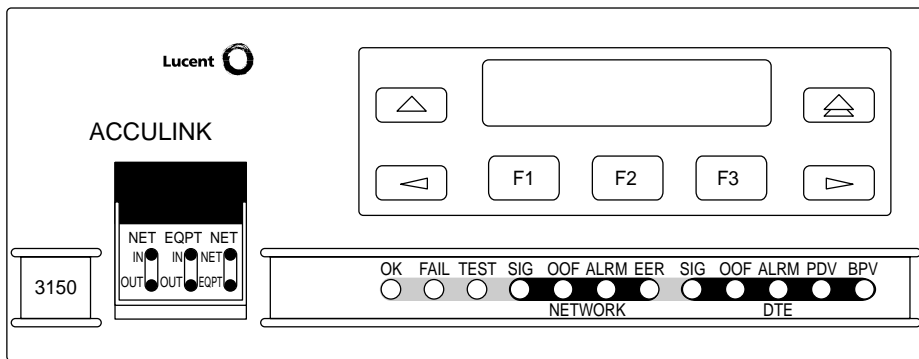
Figure 4-10.   ACCULINK 3150 CSU Front Panel
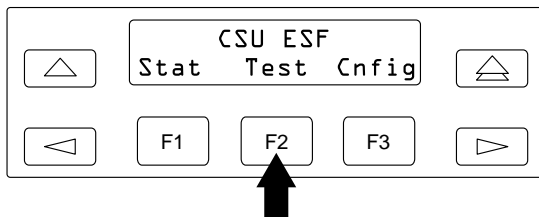
Figure 4-11.   ACCULINK 3150 CSU DTE Loopback Command 1
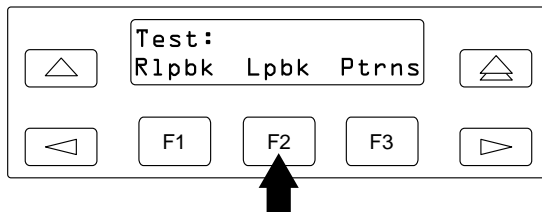
Figure 4-12.   ACCULINK 3150 CSU DTE Loopback Command 2

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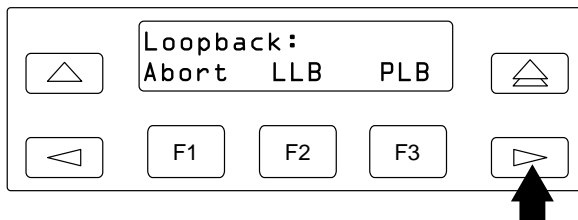
Figure 4-13.   ACCULINK 3150 CSU DTE Loopback Command 3
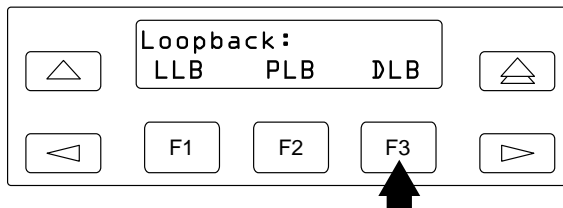
Figure 4-14.   ACCULINK 3150 CSU DTE Loopback Command 4

To run the CSU Loopback Test, follow the steps below.

▶ 1. **From the Maintenance menu, select the Slot option.**

Console Display/Instructions   Additional Information   PC

▶ 2. **Specify the 2-digit slot number (*nn* = 01 to 17).**

Dial or type [*nn*] and select Enter.

```
Slot:
Enter Slot number (00-17)


nn


Backspace
Exit           Enter
```

F10

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Console Display/Instructions   Additional Information   PC

▶ **3. Select the CSU Loopback Test.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Error Events
CSU-lpbk      Clock
Exit          Upgrade
```

xx = slot number entered in Step 2.

`Error Events` and `Clock` are
displayed only for the 100D
module.

F4

The screen below appears while the test is running. At the same time,
the module's green LED flashes.

```
CSU-lpbk Slot xx:


CSU-lpbk in Progress




Exit
```

xx = slot number entered in Step 2.

The screen below appears only if the module passes the test.

If the test is successful, contact the CO and ask them to check from their
end.

```
CSU-lpbk Slot xx:


CSU-lpbk Passed




Exit
```

xx = slot number entered in Step 2.

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Console Display/Instructions   Additional Information   PC

The screen below appears when the test fails.

```
CSU-lpbk Slot xx:
CSU-lpbk Failed
xxxxxxxxxxxxxxxxxxxxxxxx
xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx
Exit
```

xx=slot number entered in Step 2.

Lines 3 through 6 identify the cause of the failure or the number of errors found per channel. There are 24 channels, numbered 1 through 24. Line 3 displays the results for channels 1 through 6; Line 4 is for channels 7 through 12; Line 5 is for channels 13 through 18; Line 6 is for channels 19 through 24.

Interpreting Test Results

If the test is successful, the connection between the CSU and the 100D module is good, and the 100D module is probably okay. Continue with the next module test; restore the module if you are finished testing.

If the test fails, find the error message in Table 4–8 and proceed as indicated.

Table 4–8.   Internal Loopback Test Errors

Error Messages	Corrective Action
Slot is not busied-out	Exit the test, busy-out the slot, and try again.
Slot empty or not valid	Exit the test and try again; be sure to type the correct slot number. Do not indicate an empty slot or the processor (00).
FMWR not in Standby Mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.

Continued on next page

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Table 4–8. Continued

Error Messages	Corrective Action
Test running too long	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Not in TEST/STANDBY mode	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Any errors on the CSU-lpbk Failed screen	Check the cable between the 100D module and the CSU; then retest. If the problem persists, check the CSU settings.
	Exit the test and try again; if this error persists, record the errors on the repair tag and replace the module being tested.
Any other error	Record the errors on the repair tag and replace the module; if in doubt, escalate to your technical support organization.

Restoring the Module

After completing the CSU Loopback Test, follow the steps below to restore the module.

▶ **1. If you are finished testing modules, restore the 100D module. Refer to "Restore" on page 4-45 for instructions.**

▶ **2. Reset the CSU.**

- For the 551 T1 CSU, unplug the patch cord, first from the EQ IN jack and then from the EQ OUT jack.

- For the ESF T1 CSU, flip the DTE LOOPBACK switch down (to deactivate the loopback).

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■ For the ACCULINK 3150 CSU press the right arrow key once to display the Ctrl selection, then press the F3 button to select Ctrl. Press the right arrow key twice to display the reset selection. Now press the F1 button to initiate a reset of the CSU.

Automatic Tests for the 100D Module

Every 15 minutes, the system checks the 100D module for the following:

■ Initialization. The system ensures that all T1 ports are properly initialized and placed into service. It also resolves the conflicts of different service levels (for example, between the individual ports or for the initialization of the ports to support features).

■ Error Detection. The system detects errors and takes the trunk out of service, if appropriate. It attempts to restore the trunk and put it back into service.

■ Error Recording. The system records all errors and outages in the error logs.

■ Audits and Updates. The system checks the state of the T1 facilities through audits, status checks, and error logging.

■ Synchronization. The system maintains proper synchronization to the loop clock and switches to the local clock when the loop clock is not available (for example, during a loss of signal or a blue alarm). When the loop clock source is restored, the system switches back to the loop clock.

100D Module Error Events

This procedure allows you to check for 100D module errors. If you have any questions about interpreting these errors, contact your technical support organization.

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100D Module Problems

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Summary

Console Procedure   Menu: Maintenance→Slot→Dial the slot
                           no.→Enter→Error Events→Current hr or Previous hr

PC Procedure   F6 → F2 →Type the slot no.→F10 → F8 → F1 or F2

To check for errors, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
                                                                        F2

2. Specify the 2-digit slot number (*nn* = 01 to 17).

```
Slot:
Enter Slot number (00-17)


nn

Backspace
Exit          Enter
```
                           Dial or type [*nn*] and select Enter.

                                                                        F10

▶ **3. Select Error Events.**

```
Slot xx:
Make a selection
Status       Demand Test
Busy-Out     Reset
Restore      Error Events
CSU-lpbk     Clock
Exit
```
                           xx=slot number entered in Step 2.

                                                                        F8

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Console Display/Instructions   Additional Information   PC

▶ 4. **Select the current hour or a previous hour.**

```
Error Events Slot xx:
Make a selection
Current hr
Previous hr


Exit
```

xx=slot number entered in Step 2.

Select `Current hr`   F1
or `Previous hr`   F2

The current hour always begins at ##:00 and ends at the last complete 15-minute interval. For example, if the current time is 09:46, selecting `Current hr` displays the errors that have accumulated between 09:00 and 09:45.

The screen below displays the errors that have accumulated during the current hour.

The screen below displays the errors that have accumulated during the previous hour.

```
Previous hr Slot xx:


mm/dd/yy        hh:00-hh:mm
CurAlm aaaa     MaxAlm aaaa
MIS SLP ES      BS SEC FS
xxx xxx xxx xxx xxx xxx
Exit
```

xx=slot number entered in Step 2

100D Module Clock Status

If you have not been trained to perform T1 maintenance, contact your technical support organization for instructions on using this procedure.

Summary

Console Procedure   Menu: `Maintenance`→`Slot`→`Dial the slot no.`→`Enter`→`Clock`→`Exit`

PC Procedure   F6 → F2 →Type the slot no.→ F10 → F9 → F5

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100D Module Problems

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Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the Slot option.**

▶ 2. **Specify the 2-digit slot number (*nn* = 01 to 17).**

```
Slot:
Enter Slot number (00-17)


nn


Backspace
Exit           Enter
```

Dial or type [*nn*] and select `Enter`.

F10

▶ 3. **Select Clock.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Error Events
CSU-lpbk      Clock
Exit
```

xx = slot number entered in Step 2.

`CSU-lpbk` and `Error Events` are
displayed only for the 100D module.

F9

▶ 4. **If you need assistance in interpreting the information displayed on the screen, contact your technical support.**

```
Clock Slot xx:
mm/dd/yy      hh:00-hh:mm
Admin as:
Active:
Synch source:
PPM: xxx
Exit
```

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Computer Telephony Integration (CTI) Link Problems

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Computer Telephony Integration (CTI) Link Problems

If you experience CTI link problems, you can perform the following maintenance procedures:

- Viewing Status. This procedure identifies whether the MERLIN LEGEND Communications System recognizes that the link is physically connected and operational.

- Test. This procedure allows you to check whether the MERLIN LEGEND Communications System and the PBX driver are communicating across the link without involving the Telephony Services product. This is helpful in isolating a problem to the Telephony Services product.

- Restart. This procedure cleans up a link that is experiencing problems, then reconnects the link and makes it operational again. Restart does not shut down the link, but does affect traffic on that port.

- Vary the Hiding Time. This procedure may be helpful if a link displays problems. This should be done only at the request of a Tier 3 engineer.

$\Longrightarrow$ NOTE:
Review the procedures in "Module Problems" on page 4-34 to determine that the module into which you have plugged is not faulty.

Before you start maintenance or troubleshooting procedures for the CTI link, verify the following:

- The MERLIN LEGEND Communications System is operating in Hybrid/PBX mode.

- The CTI link is plugged into a port on an 008 MLX or a 408 MLX module.

- The link is plugged into the RJ45 jack on the ISDN card in the Telephony Server and the wire connection to the server is complete.

- The firmware for the MLX module is of vintage earlier or later than 29. Link administration is prevented on modules using firmware 29.

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Viewing Status

Summary

Console Procedure   **Menu**: Maintenance→Port→Station→Dial port
                           number→Enter→Status→Exit

PC Procedure   [F6]→[F3]→Type port number→[F10]→[F1]→[F5]

To check Extension Status, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
[F3]

▶ **2. Select Station.**

```
Port:
Make a selection
Line/Trunk      Modem
Station         B-Channel
RS232 Port1
RS232 Port2
Exit            Enter
```
[F2]

Console Display/Instructions   Additional Information   PC

▶ **3. Enter extension number and select Enter.**

```
Station:
Enter a station number

xxxx

Backspace
Exit           Enter
```

xxxx is dial plan number, slot/port,
or logical ID.

F10

The following screen appears if the port is not a CTI link.

```
Station:
Make a selection
Status
Busy Out
Restore

Exit           Enter
```

xxxx is dial plan number, slot/port,
or logical ID.

F5

Exiting from the non-CTI link screen returns you to the selection screen
shown in Step 2 so that you can enter a new port number and try again.
The following screen appears if the port is a CTI link.

▶ **4. Select Status.**

```
CTI Link xxxx:
Make a selection
Status        Test
Restart



Exit
```

xxxx is dial plan number, slot/port,
or logical ID.

F1

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| Console Display/Instructions | Additional Information | PC |

▶ **5. Select Exit.**

```
CTI Link xxxx:
SlotPort: xxxx
Physical Link:
PBX Driver Conn:
Alarms:
Maintenance Busy:
Exit
```

xxxx is dial plan number,
slot/port, or logical ID.
Physical Link: up or down
PBX Driver Conn: up or down
Alarms: suspended or active
Maintenance Busy: yes or no
A yes in the Maintenance Busy   [F2]
field means that the slot shown
in the Slot/Port field of this screen
is maintenance busy. Do a slot
restore on that slot.

Selecting Exit returns you to the screen in Step 2 for further testing or you can exit the maintenance routine from that screen.

Test

Summary

Console Procedure   **Menu**: Maintenance→Port→Station→Dial port
number→Enter→Test→Exit

PC Procedure   [F6]→[F3]→Type port number→[F10]→[F6]→[F5]

To perform the CTI Link test, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ 1. **From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
■■■

F3

▶ 2. **Select Station.**

```
Port:
Make a selection
Line/Trunk     Modem
Station        B-Channel
RS232 Port1
RS232 Port2
Exit           Enter
```
■■■

F2

▶ 3. **Enter extension number and select Enter.**

```
Station:
Enter a station number


xxxx


Backspace
Exit           Enter
```

xxxx is dial plan number, slot/port, or logical ID.

■■■   F10

▶ 4. **Select Test.**

```
CTI Link xxxx:
Make a selection
Status        Test
Restart



Exit           Enter
```

xxxx is dial plan number, slot/port, or logical ID.

■■■

F6

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Console Display/Instructions   Additional Information   PC

The following screen appears while the test is in progress.

```
Test CTI Link xxxx:


Test in Progress




Exit
```

xxxx is dial plan number, slot/port, or logical ID.

The following screen appears if the test fails.

```
Test CTI Link xxxx:


Test FAILED




Exit
```

xxxx is dial plan number, slot/port, or logical ID.
For this screen, check the following:
1. Verify wiring
2. Go to status screen, see if Physical link and PBX Driver Conn are both up; if the PBX driver is not loaded, PBX Driver Conn is down

[F5]

If the test fails, exiting from this screen will return you to the selection screen shown in Step 4.

The following screen appears if the test passes.

▶ **5. Select Exit.**

```
CTI Link xxxx:


Test Successfully
Completed



Exit
```

xxxx is dial plan number, slot/port, or logical ID.

[F5]

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Selecting Exit returns you to the selection screen shown in Step 4 where you can select further maintenance options or exit the maintenance routine.

Restart

Summary

Console Procedure	**Menu**: Maintenance→Port→Station→Dial port number→Enter→Restart→Exit
PC Procedure	F6 → F3 →Type port number→ F10 → F1 → F5

To perform the restart routine, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F3

▶ **2. Select Station.**

```
Port:
Make a selection
Line/Trunk      Modem
Station         B-Channel
RS232 Port1
RS232 Port2
Exit            Enter
```
F2

Console Display/Instructions   Additional Information   PC

▶ **3. Enter extension number and select Enter.**

```
Station:
Enter a station number

xxxx

Backspace
Exit          Enter
```

xxxx is dial plan number, slot/port, or logical ID.

`F10`

▶ **4. Select Restart.**

```
CTI Link xxxx:
Make a selection
Status          Test
Restart



Exit
```

xxxx is dial plan number, slot/port, or logical ID.

`F2`

▶ **5. Select Yes.**

```
Restart CTI Link xxxx:
Do you want to continue?
Yes
Cancel



Exit
```

xxxx is dial plan number, slot/port, or logical ID.

`F1`

The following screen appears while the restart is in progress.

```
Restart CTI Link xxxx:


Restart in Progress



Exit
```

xxxx is dial plan number, slot/port, or logical ID.

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Console Display/Instructions   Additional Information   PC

If the restart fails, the following screen appears.

```
Restart CTI Link xxxx:


Restart FAILED




Exit
```

xxxx is dial plan number, slot/port,
or logical ID.

F5

Selecting Exit returns you to the selection screen shown in Step 4,
where you can select further maintenance options or exit the
maintenance routine. If the restart passes, the following screen appears.

```
Restart CTI Link xxxx:

Restart Successfully
Completed


Exit
```

xxxx is dial plan number, slot/port,
or logical ID.

F5

Selecting Exit returns you to the selection screen shown in Step 4,
where you can select further maintenance options or exit the
maintenance routine.

Varying Hiding Time

⚠ CAUTION:

*This procedure should be done only under the direction of NSAC/Tier 3
engineers. It is not recommended for users or service technicians. If this
value is changed, a corresponding change must be made for the PBX
driver under the direction of Technical Support Organization (TSO)
personnel.*

Hiding time is the amount of time (in seconds) that the link could be broken but
users would not notice. This interval occurs when the link experiences a hidden

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reset until the system generates a broadcast reset. A broadcast reset affects CTI link operations and reinitializes the link. The factory setting for hiding time is 25 seconds, with a range of settings from 0 to 90 seconds.

Varying the hiding time may be helpful if the link displays problems. If broadcast resets would help identify when a CTI link problem occurs, reduce the hiding time to 10. This broadcasts all link troubles that cause resets. If broadcast resets inhibit troubleshooting a CTI link problem, increase the hiding time. If the broadcast reset messages still interfere with troubleshooting the problem, set the hiding time to zero(0). Setting the value to zero eliminates all broadcast resets; everything is hidden.

Summary

Console Procedure	**Menu**: Maintenance→Port→Station→Dial port number→Enter→Restart→Yes→Exit
PC Procedure	F6 → F3 →Type port number→ F10 → F2 → F1 → F5
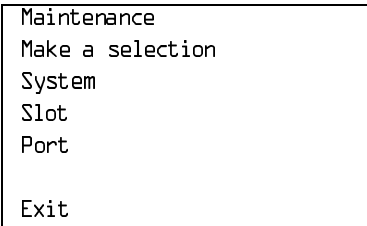
To vary hiding time, follow the steps below.

Console Display/Instructions   **Additional Information**   **PC**

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
                                                                          F3

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Console Display/Instructions   Additional Information   PC

▶ **2. Select Station.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1
RS232 Port2
Exit          Enter
```
`F2`

▶ **3. Enter extension number and select Enter.**

```
Station:
Enter a station number


xxxx

Backspace
Exit          Enter
```

xxxx is dial plan number, slot/port,
or logical ID.

`F10`

▶ **4. Select Hiding Time.**

Hiding Time is *not* shown on the display, but may be selected by pressing
the associated softkey twice.

```
CTI Link xxxx:
Make a selection
Status        Test
Restart


              [Hiding Time]
Exit
```

xxxx is dial plan number, slot/port,
or logical ID.

`F9` `F9`

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Removing a CTI Link

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Console Display/Instructions **Additional Information** **PC**

The following screen appears.

```
CTI Link xxxx:
Enter seconds for hiding
a broken link (0-90)
xx



Exit          Enter
```

xxxx is dial plan number,
slot/port, or logical ID.
xx is number of seconds (0–90).
default is 25 seconds. If you
enter 1 through 9, the value
is changed to a 10.

If you choose Exit from this screen, no data is entered and you return to the screen shown in Step 4.

If you choose Enter from this screen, the data is entered and you return to the screen shown in Step 4.

Removing a CTI Link

The following two procedures are used for CTI link removal:

- Permanent Removal. When you want to permanently remove a CTI link from the MERLIN LEGEND Communications System.

- Link Shutdown. When you want to temporarily idle a CTI link before working on it.

Permanent Removal

For a permanent CTI link removal, perform the following steps:

▶ **1. (optional) Suspend MERLIN LEGEND alarming for the CTI link.**

Refer to the *System Manager's Guide* for the steps to suspend the alarming. If Step 1 is not performed, the system may generate an alarm about the CTI link before Step 5 is performed.

▶ **2. Upload the PBX Driver (MLPD).**

Refer to the *System Manager's Guide* for instructions.

▶ **3. Unplug the CTI link.**

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Removing a CTI Link

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▶ **4. Remove the ISDN link interface card, if desired.**

Refer to the PC/ISDN Platform Installation and Reference, or similar installation manual from the ISDN link interface card vendor.

▶ **5. Remove the MERLIN LEGEND administration.**

Delete the MLX port from the list of CTI link ports, using MERLIN LEGEND system programming (at the MLX-20L or SPM). After this, it is safe to plug in an MLX telephone, a data module, or an ISDN terminal adapter. See System Programming.

Link Shutdown

Temporarily idling a CTI link before performing maintenance is an optional procedure on the server side; it can prevent unwanted MERLIN LEGEND Communications System alarms. However, a link shutdown is not required before performing maintenance.

For a link shutdown, perform the following steps:

▶ **1. Suspend MERLIN LEGEND alarming for the CTI link.**

If Step 1 of the link shutdown is not performed, then the MERLIN LEGEND may generate alarms about the CTI link while under maintenance. See the MERLIN LEGEND System Manager's Guide for detailed instructions on this procedure.

▶ **2. Prevent new CTI link traffic.**

If Step 2 is not performed before working on the CTI link, an application may get confused. For example, if an application sent a service request (such as Make Call) but the CTI link is taken down for maintenance before the MERLIN LEGEND sends a reply, the application will think the request failed even if it succeeded. In contrast, if this step is performed, the application will immediately receive a failure reply. See the MERLIN LEGEND Network Manager's Guide for detailed instructions on the Block, Offline, and mloam commands.

▶ **3. Wait for CTI link traffic to subside.**

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Carrier Problems

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If the Offline or mloam command was used in Step 2, skip to Step 4. This step applies only if the Block command was used in Step 2.

Determine when traffic has stopped. On the NetWare server, start the mloam or wmloam tool, then go to the Link Status screen. View the line CTI Link Msg. Rate. If the value shown is 0, then traffic on the link has stopped. Refer to the *System Manager's Guide* for details.

▶ **4. Unplug the CTI link or perform appropriate maintenance.**

Carrier Problems

Typical carrier problems include power supply failure, sudden failure of one or more modules, or system problems that cannot be isolated to a specific module. If you find a problem with the carrier, it must be replaced; carriers cannot be repaired in the field.

Removing the Faulty Carrier

▶ **1. Remove the control unit housing.**

If you need instructions, see "Removing the Control Unit Housing" on page 1–18.

▶ **2. Back up system programming.**

If you need instructions, see *System Programming and Maintenance (SPM)* (for disk backups) or Appendix D, "Backing Up with a Memory Card."

▶ **3. Power down the system by turning off the components listed below, in the order given.**

   a. Power supply on the basic carrier

   b. Power supply on each expansion carrier

   c. Auxiliary power units (if present)

▶ **4. Unplug the control unit from the AC outlet.**

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▶ **5. Remove the processor, the power supply, and all other modules from the faulty carrier. (If you prefer to remove the cords first, make sure that they are labeled.)**

▶ **6. Put the modules aside, in order, so that you can reinstall them later in the replacement carrier.**

▶ **7. Remove all modules from the carriers to the right of the faulty carrier.**

▶ **8. Starting with the *rightmost* carrier, loosen the four screws that secure the four corners of the carrier to the backboard.**

▶ **9. Slide the carrier to the right until the connector disengages from the carrier to the left.**

▶ **10. Pull the carrier away from the wall so that the screws slip through the large screw holes.**

▶ **11. Repeat Steps 8–10 until the faulty carrier is removed.**

Replacing the Carrier

After removing the faulty carrier, use the steps below as a guideline for installing a new carrier.

▶ **1. Install the replacement carrier(s). See *Installation* for instructions.**

▶ **2. Replace the modules with all cords connected as they were before.**

Checking System and Slot Status

In addition to checking error logs, and the access log, and running module tests, you can request System Status and Slot Status information for each module.

System Status

The power supply, processor, 400EM module, and 100D module are the only modules that have LEDs. The System Status screen displays simulated LEDs for the processor and for each of these modules but not for the power supply.

The System Status procedure allows you to check simulated LEDs for the processor and other modules. This is explained in detail in "Interpreting the System Status Screen" on page 4-130.

Summary

Console Procedure **Menu**: Maintenance→System→Status

PC Procedure $\boxed{\text{F6}}$ → $\boxed{\text{F1}}$ → $\boxed{\text{F1}}$

To check System Status, follow the steps below.

Console Display/Instructions **Additional Information** **PC**

▶ 1. **From the Maintenance menu, select the System option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
$\boxed{\text{F1}}$

▶ 2. **Select Status.**

```
System:
Make a selection
Status         Upgrd/Instll
Error Log
Inventory
Access Log
Exit           Enter
```
$\boxed{\text{F1}}$

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Interpreting the System Status Screen

```
System Status:
Slot00:Raaa
Slot01:Raaa Yaaa Gaaa
Slot02:Raaa Yaaa Gaaa
Slot03:Raaa Yaaa Gaaa
Slot04:R     Y     G


Exit
```

R*aaa* = status (On, Off, No) of red LED.
R*aaa* = status (On, Off, No) of yellow LED.
R*aaa* = status (On, Off, No) of green LED.

The System Status screen simulates LEDs for each module. The simulated LEDs are represented as R (red), Y (yellow), and G (green).

Immediately following R, Y, or G is its status (*aaa* in the screens shown above), which can be On, Off, or No status (an empty slot in the control unit).

Red LED

When the red LED is on, the module is not in service because it is in standby mode, being tested, or is in an alarm condition. When a module resumes normal operations, the red LED turns off.

Yellow LED

When the yellow LED is on, it usually means that at least one call is in progress on that module. This is usually true for modules with trunks. When this is the status, you must reset the board if you want to terminate any calls in progress rather than waiting for them to terminate during a Busy-Out.

Green LED

The green LED is usually off. It may be on during power up or when an Internal Loopback or CSU Loopback Test is running.

Sample LED Display (Slot 4)

If a call is in progress on a module that is in a working or normal state, the System Status display for that module appears as:

Roff Yon Goff.

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If a slot is empty, R, Y, and G appear without indicating a status. Slot 4 is empty, according to the sample screen in the last procedure.

Slot Status

Slot Status provides the following information for a module in a particular slot:

- LED status
- Errors (yes or no)
- Mode (initialization, standby, test, or normal)
- Alarms (yes or no)
- Maintenance busy (yes or no)

Summary

Console Procedure   **Menu**: Maintenance→Slot→Dial the slot no.→Enter→Status

PC Procedure $\boxed{\text{F6}}$ → $\boxed{\text{F2}}$ →Type the slot no.→ $\boxed{\text{F10}}$ → $\boxed{\text{F1}}$

To check Slot Status, follow the steps below.

      Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Slot option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
                                                   $\boxed{\text{F2}}$

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Console Display/Instructions   **Additional Information**   **PC**

▶ **2. Specify the 2-digit slot number (*nn* = 00 to 17).**

```
Slot:
Enter Slot number (00-17)


nn


Backspace
Exit          Enter
```

Dial or type [*nn*] and select `Enter`.

`F10`

▶ **3. Select the Status option.**

```
Slot xx:
Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Upgrade
CSU-lpbk
Exit
```

xx = slot number entered in Step 2.

`F1`

For all MLX modules, `BChLoopback` is also displayed as an option on this screen. For 100D modules, `CSU-lpbk`, `Error Events`, and `Clock` are also displayed as options on this screen. For all 800 NI-BRI modules, `Clock`, `BChLoopback`, and `Provisioning` are also displayed as options on this screen.

If you selected Slot 00, the screen below appears. For detailed information about this status screen, see .

```
Status Slot 00:

LED:        Raaa
Errors:
Alarms:


Exit
```

R*aaa*=status (On, Off, No) of red LED.

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Console Display/Instructions	**Additional Information**	**PC**

If you selected a slot other than 00, the screen below appears. For detailed information about this status screen, see "Slot Status" on page 4-131.

```
Status Slot xx:
LED: Raaa Yaaa Gaaa
Errors:
Mode:
Alarms:
Maintenance Busy:
Exit          Next
```

xx = slot number entered in Step 2.
R*aaa* = status (On, Off, No) of red LED
Y*aaa* = status (On, Off, No) of yellow LED
G*aaa* = status (On, Off, No) of green LED

Select Next to go from one slot
to the next.   F10

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Central Office and Private Network Problems

5

If you have tested the telephones and the modules in the control unit, you have isolated the trouble to the trunks or the CO. To isolate the trouble further, follow the instructions in this chapter to troubleshoot the trunks. If the trouble persists after following these instructions, the customer should contact the CO and ask a representative to troubleshoot from that end.

Trunk Errors

The system records errors not only for trunks, but for T1 ports on the module as well. In some cases, errors occur not because a single port fails, but because the entire T1 link fails. When this happens, 100D automatic testing activates an alarm.

Troubleshooting Trunk Problems

Table 5–1 provides a quick guide to troubleshooting trunks.

➡️ NOTE:

If the customer reports echoes during conversations on T1 trunks with GS emulation to a toll office, check the system programming for T1 trunks. The system is not intended to work with GS emulation to a toll office. Tie trunk emulation must be programmed. Program the module to emulate tie trunks to the central office.

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Table 5–1.   Troubleshooting Trunk Symptoms

Symptom	Section
Incoming calls not being received	Incoming Trunk Problems, page 5-4
Cannot make outgoing calls	Outgoing Trunk Problems, page 5-3
General trunk problems	Manual Correction of Trunk Problems, page 5-2

Manual Correction of Trunk Problems

If the system cannot seize a trunk even after repeated attempts, you may have to replace the module.

To identify the trunk problem, follow the steps below.

▶ **1. Check for dial tone at the control unit.**

▶ **2. If you do not hear dial tone, check the error logs and make a trunk test call.**

▶ **3. Check for dial tone at the network interface.**

It is sometimes difficult for the customer to detect trunk troubles. If a trunk is down, the system records an error in the error log and takes the trunk out of service. However, if an incoming-only trunk is down, the only sign of trouble is customer complaints that incoming calls are not being received.

Check the error logs for messages about trunk type (such as DID, tie, and T1). Also check the wiring and the system parameters (for example, touch-tone/rotary, toll restriction, and disconnect time interval).

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Outgoing Trunk Problems

If the system cannot seize outgoing trunks, try the following procedure for
analog lines.

➡ **NOTE:**
You cannot perform this procedure on a rotary telephone.

▶ **1. Check for outside dial tone at the network interface.**

For GS trunks, apply ground to the ring lead to get dial tone. If dial tone is
not present, notify the customer.

➡ **NOTE:**
Steps 2 through 4 only apply to Hybrid/PBX mode. Go to Step 5 for
systems in Key or Behind Switch mode.

▶ **2. Pick up the handset of a test telephone to check for system dial
tone.**

Dial *03, then dial the maintenance password.

   1. If the password is not known, check the System Information
      Report or ask to speak with the system manager.

   2. You can change the password without knowing the old password
      only when you perform on-site maintenance through the ADMIN
      jack.

▶ **3. Dial the 2-digit trunk number (01–80) of the trunk you want to test.**

▶ **4. Listen for dial tone.**

   - If dial tone is not present, use a test telephone to isolate the
     problems either to the module where the trunk terminates or to
     the location in the trunk access equipment.

   - If dial tone is present, dial a working outside number to verify that
     the call can be completed.

       — Dialing an outside number on a single-line telephone
         works only if the trunk accepts touch-tone dialing.

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— If you are using a single-line telephone to dial out to an E&M tie trunk or a T1 tie trunk, wait for a click before dialing the outside number.

If the trunk is busy, you hear a busy tone. If you dial a wrong trunk type (such as DID) or an invalid trunk number, you hear a reorder tone.

▶ **5. If the module continues to malfunction, replace it.**

Incoming Trunk Problems

If incoming trunks do not work properly, try the following procedure.

▶ **1. Place an incoming call through the troubled trunk.**

- For a loop-start (LS) trunk, connect a single-line telephone to the trunk at the network interface.

- For a ground-start (GS) trunk, connect a single-line telephone to the trunk at the network interface and press the GS button. (For GS trunks, the telephone must have a GS button attached to it.)

▶ **2. Listen for ringing.**

▶ **3. Pick up the handset and check line seizure.**

▶ **4. Dial an outside number and verify that you have good two-way transmission.**

▶ **5. At the maintenance terminal, check the trunk programming to be sure this trunk has been properly translated.**

See the system planning forms.

▶ **6. If the module continues to malfunction, replace it.**

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Trunk Errors

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Testing Trunks Automatically

The automatic maintenance program takes the ports out of service when a trunk is malfunctioning. When a port is out of service, it is *maintenance-busy*. The trunk is periodically tested and put back into service if possible.

Maintenance-Busy Status

When maintenance-busy is enabled and a trunk cannot be seized for an outgoing call, the trunk is automatically put into a maintenance-busy state. When a trunk is in a maintenance-busy state, no outgoing calls can be placed on it. However, the trunk can still receive incoming calls.

$\Rightarrow$ NOTE:
Maintenance-busy does not apply to DID trunks, since DID trunks cannot be used to make outgoing calls.

While the trunk is in a maintenance-busy state, the software periodically runs tests, attempting to seize the trunk:

- If the seizure is unsuccessful, the trunk stays in a maintenance-busy state.

- If the seizure is successful, the trunk is placed back in service.

- If a test is running when an incoming call is received on the trunk, the test is dropped and the call is processed.

No more than 50 percent of trunks in a pool can be in maintenance-busy states at one time. The only exceptions are as follows:

- User-imposed maintenance-busy (for example, module replacement)

- Module maintenance-busy (for example, a loss-of-service alarm in the 100D module)

- No external release at the central office end of the line

- Digital Trunks

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Permanent Errors

A permanent error is entered in the error logs when more than 50 percent of analog trunks in a pool are maintenance-busy. When the maintenance-busy level falls below 50 percent, the system automatically removes the permanent error.

$\Rightarrow$ NOTE:
Make sure that modules are not in a maintenance-busy state during a backup procedure. Any module in a maintenance-busy state is recorded as such on the backup disk.

Maintenance-Busy Causes

The causes of maintenance-busy vary according to the type of trunk and are detailed in the following sections.

Ground-Start (GS) Trunks

The following events cause maintenance-busy on a ground-start trunk:

- A seizure of the trunk is attempted that results in incomplete handshaking (or no loop current) between the central office (CO) and the system.

  After four occurrences, the trunk is put into a maintenance-busy state and a permanent error is logged.

- The CO fails to disconnect when the GS trunk is dropped by the system.

  After two occurrences, the trunk is put into a maintenance-busy state and a permanent error is logged.

Loop-Start (LS) Trunks

No loop current exists when the LS trunk is seized. The port is marked *maintenance-busy*, and a permanent error is logged after four occurrences.

Tie Trunks

The following events cause maintenance-busy on a tie trunk:

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- A seizure of an outgoing tie trunk fails.

- A transient error is reported. After four unsuccessful seizure attempts, the port is marked *maintenance-busy* and the error becomes permanent.

- The CO fails to disconnect.

- A transient error is reported. After two occurrences, the port is marked *maintenance-busy* and the error becomes permanent.

➡ NOTE:
The test is not run on auto-out tie trunks.

Maintenance-Busy Programming

You can select Maintenance-Busy as a system programming option. If you do, there is also a menu selection to include tie trunks.

Maintenance-Busy Status

See "Checking Ports" below for information about maintenance-busy status.

Checking Ports

You perform the following procedures from the maintenance terminal. By selecting Port from the Maintenance screen, you can check the maintenance-busy status and other information for individual trunks and extensions.

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Once you determine the maintenance-busy status, you might also be interested in the following other features on the Port menu:

- Resetting EIA-232 ports and modems
- Busying-out and restoring trunks and extensions
- Auditing DS1 PRI lines or calls

Checking Trunk Maintenance-Busy Status

Summary

Console Procedure   **Menu**: Maintenance→Port→Line/Trunk→
Dial the dial plan no.→Enter→Status

PC Procedure   F6 → F3 → F1 →Type the dial plan no.→F10 → F1

To check a trunk's maintenance-busy status, follow the steps below.

Console Display/Instructions   **Additional Information**   **PC**

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F3

▶ **2. Select the Line/Trunk option.**

```
Port
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
F1

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Console Display/Instructions   Additional Information   PC

▶ **3. Specify the dial plan (line) number for the trunk (nnn = 801 to 880).**

```
Line/Trunk:
Enter line number

nnn

Backspace
Exit          Enter
```

Dial or type [nnn], then select Enter.

F10

▶ **4. Select trunk Status.**

```
Line/Trunk  xxx:
Make a selection
Status
Busy Out
Restore

Exit
```

xxx = line number entered in Step 3

F1

The maintenance-busy status for the trunk you selected is displayed as a
Yes or a No, in that field (line 6) on the screen below.

```
Line   xxx:
Dial Plan:  xxxx
SlotPort:  sspp
LogicId:  xxx
Label:  xxxxxxxxxx
Maintenance Busy:  xxx
Exit          Next
```

xxx = line number entered in Step 3

Select Next to see the status of the
next trunk.   F10

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Checking Extension Maintenance-Busy Status

Summary

Console Procedure   **Menu**: Maintenance→Port→Station→Dial the
                           dial plan no.→Enter→Status

PC Procedure   [F6]→[F2]→[F1]→Type the dial plan no.→[F10]→[F1]

To check an extension's maintenance busy status, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
[F3]

2. Select the Station (extension) option.

```
Port
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
[F2]

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Console Display/Instructions   **Additional Information**   **PC**

▶ **3. Specify the dial plan extension number (*nnnn* = 1- to 4-digit
number).**

```
Station:
Enter station number

nnnn

Backspace
Exit          Enter
```

Dial or type [*nnnn*], then select Enter.

F10

▶ **4. Select Status.**

```
Station  xxxx:
Make a selection
Status
Busy Out
Restore

Exit
```

xxxx = extension number entered in
Step 3

F10

▶ **5. The maintenance-busy status for the trunk you selected is
displayed as a** Yes **or a** No**, in that field (line 6) on the screen below.**

```
Station  xxx:
Dial Plan:  xxxx
SlotPort:  sspp
LogicId:  xxx
Label:  xxxxxxxxx
Maintenance Busy:  xxx
Exit          Next
```

Select Next to see the status of the
next trunk.   F10

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Checking Digital Subscriber Line (DSL) Maintenance-Busy Status

Summary

Console Procedure	**Menu**: Maintenance→Port→Line/Trunk→Dial the dial plan no.→Enter→Status
PC Procedure	$\boxed{F6} \rightarrow \boxed{F3} \rightarrow \boxed{F1} \rightarrow$ Type the dial plan no.$\rightarrow\boxed{F10}\rightarrow\boxed{F1}$

To check the maintenance-busy status of a Digital Subscriber Line (DSL), follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
$\boxed{F3}$

2. Select the Digital Subscriber Line (DSL) option.

```
Port
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
$\boxed{F8}$

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Console Display/Instructions   Additional Information   PC

▶ **3. Specify the dial plan number for the DSL (*sspp* = 2-digit slot number and 2-digit port number).**

```
DSL:
Enter line number


sspp


Backspace
Exit          Enter
```

Dial or type [*sspp*], then select Enter.

F10

▶ **4. Select DSL Status.**

```
DSL  sspp:
Make a selection
Status
Busy Out
Restore


Exit
```

sspp = slot/port number entered in
Step 3

F1

▶ **5. The maintenance-busy status for the trunk you selected is displayed as a Yes or a No, in that field (line 6) on the screen below.**

```
DSL  sspp:
Dial Plan:  xxxx
SlotPort:  sspp
LogicId:  xxx
Label:  xxxxxxxxxx
Maintenance Busy:  xxx
Exit          Next
```

sspp = slot/port number entered in
Step 3

Select Next to see the status of the
next DSL.

F10

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Busying-Out a Trunk

Summary

Console Procedure   **Menu**: Maintenance→Port→Line/Trunk→
                         Dial the dial plan no.→Enter→Busy-Out

PC Procedure $\boxed{\text{F6}}$ → $\boxed{\text{F3}}$ → $\boxed{\text{F1}}$ →Type the dial plan no.→$\boxed{\text{F10}}$ → $\boxed{\text{F2}}$

To busy-out a trunk, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
$\boxed{\text{F3}}$

2. Select the Line/Trunk option.

```
Port
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
$\boxed{\text{F1}}$

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Console Display/Instructions   Additional Information   PC

▶ 3. **Specify the dial plan number (line) for the trunk (*nnn* = 801 to 880).**

```
Line/Trunk:
Enter line number

nnn

Backspace
Exit          Enter
```

Dial or type [*nnn*], then select Enter.

$\boxed{\text{F10}}$

▶ 4. **Select Busy-Out.**

```
Line/Trunk  xxx:
Make a selection
Status
Busy Out
Restore

Exit
```

xxx = line number entered in Step 3

$\boxed{\text{F2}}$

The screen below is shown until Busy-Out finishes or fails.

```
Line/Trunk  xxx:

Busy-Out in Progress




Exit
```

xxx = line number entered in Step 3

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Console Display/Instructions   Additional Information   PC

The screen below appears when Busy-Out is completed successfully.

```
Line/Trunk  xxx:


Busy-Out Successfully
Completed



Exit
```

xxx = line number entered in Step 3

The screen below appears when Busy-Out fails. If this occurs, exit and try again.

```
Line/Trunk  xxx:


Busy-Out FAILED




Exit
```

xxx = line number entered in Step 3

Busying-Out an Extension

Summary

Console Procedure	**Menu**: Maintenance→Port→Station→Dial the dial plan no.→Enter→Busy-Out
PC Procedure	F6 → F3 → F2 →Type the dial plan no.→ F10 → F2

To busy-out an extension, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
`F3`

▶ **2. Select the Station (extension) option.**

```
Port
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
`F2`

▶ **3. Specify the dial plan number extension number (nnnn = 1- to 4-digit extension number).**

```
Station:
Enter station number


nnnn

Backspace
Exit          Enter
```

Dial or type [nnnn], then select Enter.

`F10`

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Console Display/Instructions   Additional Information   PC

If *nnnn* is the CTI link, you see the following screen:

```
CTI Link xxxx:
Make a selection
Status       Test
Restart



Exit
```

xxxx is dial plan number,
slot/port, or logical ID.

F5

Press Exit. You are returned to the selection screen above.

▶ **4. Select Busy-Out.**

```
Station   xxxx:
Make a selection
Status
Busy Out
Restore

Exit
```

xxxx = extension number entered in
Step 3

F2

The screen below is shown until Busy-Out finishes or fails.

```
Station   xxxx:

Busy-Out in Progress




Exit
```

xxxx = extension number entered in
Step 3

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Console Display/Instructions   **Additional Information**   **PC**

The screen below appears when Busy-Out is completed successfully.

```
Station  xxxx:

Busy-Out Successfully
Completed


Exit
```

xxxx = extension number entered in
Step 3

The screen below appears when Busy-Out fails. If this occurs, exit and
try again.

```
Station  xxxx:

Busy-Out FAILED




Exit
```

xxxx = extension number entered in
Step 3

[F5]

Busying-Out a Digital Subscriber Line (DSL)

Summary

Console Procedure   **Menu**: Maintenance→Port→DSL→Dial the dial plan
                        no.→Enter→Busy-Out

PC Procedure   [F6]→[F3]→[F8]→Type the dial plan no.→[F10]→[F2]

To busy-out a Digital Subscriber Line (DSL), follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F3

2. Select the DSL option.

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
F8

▶ **3. Specify the dial plan DSL number (*sspp* = 2-digit slot number and 2-digit port number).**

```
DSL:
Enter DSL (sspp)

sspp



Exit          Enter
```

Dial or type [*sspp*], then select Enter

F10

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Console Display/Instructions   **Additional Information**   **PC**

▶ **4. Select Busy-Out.**

```
DSL sspp:
Make a Selection
Status
Busy Out
Restore
Error Events
Exit
```

sspp = slot/port number entered in
Step 3

F2

The screen below is shown until Busy-Out finishes or fails.

```
DSL sspp:

Busy-Out in Progress




Exit
```

sspp = slot/port number entered in
Step 3

The screen below appears when Busy-Out is completed successfully.

```
DSL sspp:

Busy-Out Successfully
Completed



Exit
```

sspp = slot/port number entered in
Step 3

The screen below appears when Busy-Out fails. If this occurs, exit and
try again.

```
DSL sspp:

Busy-Out FAILED




Exit
```

sspp = slot/port number entered in
Step 3

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Restoring a Trunk

Summary

Console Procedure	**Menu:** Maintenance→Port→Line/Trunk→Dial the dial plan no.→Enter→Restore
PC Procedure	F6 → F3 → F1 →Type the dial plan no.→ F10 → F3

To restore a trunk, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F3

▶ **2. Select the Line/Trunk option.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```

F1

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Console Display/Instructions   Additional Information   PC

▶ 3. **Specify the dial plan number (line) for the trunk (*nnn* = 801 to 880).**

```
Line/Trunk:
Enter line number

nnn

Backspace
Exit          Enter
```

Dial or type [*nnn*], then select Enter

F10

▶ 4. **Select Restore.**

```
Line/Trunk xxx:
Make a Selection
Status
Busy Out
Restore

Exit
```

xxx = line number entered in
Step 3

F3

▶ 5. **The screen below is shown until Restore finishes or fails.**

```
Restore Line/Trunk xxx:

Restore in Progress




Exit
```

xxx = line number entered in
Step 3

The screen below appears when Restore is completed successfully.

```
Restore Line/Trunk xxx:

Restore Successfully
Completed



Exit
```

xxx = line number entered in
Step 3

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Console Display/Instructions   Additional Information   PC

The screen below appears when Restore fails. If this occurs, exit and try again.

```
Restore Line/Trunk xxx:

Restore FAILED




Exit
```

xxx = line number entered in
Step 3

F5

Restoring an Extension

Summary

Console Procedure	**Menu**: Maintenance→Port→Station→Dial the dial plan no.→Enter→Restore
PC Procedure	F6 → F3 → F2 →Type the dial plan no.→F10 → F3

To restore an extension, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F3

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Console Display/Instructions   Additional Information   PC

▶ **2. Select the Station (extension) option.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```

F2

▶ **3. Specify the dial plan extension number (*nnnn* = 1- to 4-digit number).**

```
Station:
Enter station number

nnnn

Backspace
Exit          Enter
```

Dial or type [*nnnn*], then select Enter

F10

▶ **4. Select Restore.**

```
Station xxxx:
Make a Selection
Status
Busy Out
Restore

Exit
```

xxxx = extension number entered in Step 3

F3

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Console Display/Instructions   Additional Information   PC

The screen below is shown until Restore finishes or fails.

```
Restore Station xxxx:

Restore in Progress




Exit
```

xxxx = extension number entered in
Step 3

The screen below appears when Restore is completed successfully.

```
Restore Station xxxx:

Restore Successfully
Completed


Exit
```

xxxx = extension number entered in
Step 3

The screen below appears when Restore fails. If this occurs, exit and try again.

```
Restore Station xxxx:

Restore FAILED




Exit
```

xxxx = extension number entered in
Step 3

F5

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Restoring a Digital Subscriber Line (DSL)

Summary

Console Procedure   **Menu**: Maintenance→Port→DSL→Dial the dial plan
                          no.→Enter→Restore

PC Procedure   F6 → F3 → F8 →Type the dial plan no.→F10 → F3

To restore an extension, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
F3

▶ **2. Select the Station (extension) option.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
F8

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Console Display/Instructions   **Additional Information**   **PC**

▶ **3. Specify the dial plan extension number (sspp = 2-digit slot number and 2-digit port number).**

```
DSL:
Enter DSL  number


sspp




Exit          Enter
```

Dial or type [sspp], then select Enter

F10

▶ **4. Select Restore.**

```
DSL sspp:
Make a Selection
Status
Busy Out
Restore
Error Events
Exit
```

sspp = slot/port number entered in
Step 3

F3

The screen below is shown until Restore finishes or fails.

```
Restore DSL  sspp:

Restore in Progress




Exit
```

sspp = slot/port number entered in
Step 3

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Console Display/Instructions   Additional Information   PC

The screen below appears when Restore is completed successfully.

```
Restore DSL  sspp:


Restore Successfully
Completed



Exit
```

sspp = slot/port number entered in
Step 3

The screen below appears when Restore fails. If this occurs, exit and try again.

```
Restore DSL  sspp:


Restore FAILED




Exit
```

sspp = slot/port number entered in
Step 3

Resetting an RS-232 Port

The ADMIN (SPM) port is RS-232 Port 1, and the SMDR port is RS-232 Port 2.

Summary

Console Procedure	**Menu**: Maintenance→Port→RS232 Port1 or RS232 Port2→Dial the dial plan no.→ Enter→Reset→Yes
PC Procedure	F6 → F3 → F3 or F4 →Type the dial plan no.→ F10 → F1 → F3

To reset an RS-232 port, follow the steps below.

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Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port


Exit
```
[F3]

▶ **2. Specify the RS-232 port.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```

Select RS232 Port 1 or   [F3]
RS232 Port 2.   [F4]

▶ **3. Specify the dial plan extension number (*sspp* = 2-digit slot number and 2-digit port number).**

```
RS232 Port x:
Make a selection
Reset




Exit
```

x = port selected in Step 2

[F1]

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Console Display/Instructions   Additional Information   PC

▶ **4. Select Yes.**

```
RS232 Port x Reset:

Do you want to continue?
Yes
Cancel

Exit
```

x = port selected in Step 2

F2

The screen below is shown until Reset finishes or fails.

```
RS232 Port x Reset:

Reset in Progress




Exit
```

x = port selected in Step 2

The screen below appears when Reset is completed successfully.

```
RS232 Port x Reset:

Reset Successfully
Completed



Exit
```

x = port selected in Step 2

The screen below appears when Reset fails. If this occurs, exit and try again.

```
RS232 Port x Reset:

Reset FAILED




Exit
```

x = port selected in Step 2

F5

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Resetting the Processor's Internal Modem

Summary

Console Procedure   **Menu**: Maintenance→Port→Modem→Reset→Yes

PC Procedure $\boxed{F6}$ → $\boxed{F3}$ → $\boxed{F6}$ → $\boxed{F1}$ → $\boxed{F2}$

To reset the processor's internal modem, follow the steps below.

Console Display/Instructions   Additional Information   PC

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```
$\boxed{F3}$

▶ **2. Select the Modem option.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
$\boxed{F6}$

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Console Display/Instructions   **Additional Information**   **PC**

▶ **3. Select Reset.**

```
Modem Port:
Make a selection
Reset




Exit
```

F1

▶ **4. Select Yes.**

```
Modem Port Reset:

Do you want to continue?
Yes
Cancel

Exit
```

F2

The screen below is shown until Reset finishes or fails.

```
Modem Port Reset:

Reset in Progress




Exit
```

The screen below appears when Reset is completed successfully.

```
Modem Port Reset:

Reset Successfully
Completed



Exit
```

F5

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Console Display/Instructions   Additional Information   PC

The screen below appears when Reset fails. If this occurs, exit and try again.

```
Modem Port Reset:

Reset FAILED



Exit
```

F5

Auditing DS1 PRI B-Channels

The Auditing Lines and Auditing Calls procedures initiate an audit. Once an audit is initiated, you need to wait for the far end to send a message, which usually takes about four minutes. After waiting four minutes, check the error logs to see if any new PRI errors have occurred.

- Auditing Lines. If troubleshooting indicates problems with PRI lines between the control unit and the CO, this audit, if successful, fixes the problem. It allows either side of the PRI interface to synchronize both ends by exchanging messages.

- Auditing Calls. If troubleshooting indicates problems with PRI calls to or from MLX telephones, this audit, if successful, fixes the problem. It allows either side of the PRI interface to synchronize both ends by exchanging messages.

NOTE:
If an audit fails, the customer should call the CO to correct the problem from that end. Repeat the audit when the problem is fixed.

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Auditing Lines

Summary

Procedure	**Menu**: Maintenance→Port→B-Channel→Dial the slot and port no.→Enter→ Audit Lines
PC Procedure	F6 → F3 → F7 →Type the slot and port no.→F10→ F1
Appropriate Slot or Port	This test can be run only on the slot and port of a DS1 PRI B-channel.
Time Estimate	4 minutes
Backup Procedure	Not required
Busy-Out or Reset	Not required
Interrupting the Test	You cannot interrupt this test.
Restore	Not required

To audit lines, follow the steps below.

Console Display/Instructions   **Additional Information**   **PC**

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F3

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Console Display/Instructions   Additional Information   PC

▶ **2. Select the B-Channel option.**

```
Port:
Make a selection
Line/Trunk    Modem
Station       B-Channel
RS232 Port1   DSL
RS232 Port2
Exit          Enter
```
F7

▶ **3. Specify the slot and port number (ss=2-digit slot number; pp=2-digit port number).**

```
B-Channel:
Enter B-Channel (sspp)


xxxx



Exit          Enter
```

Dial or type [sspp]and select Enter.

F10

▶ **4. Select Audit Line.**

```
B-Channel xxxx:
Make a selection
Audit Line
Audit Call



Exit
```

xxxx = slot and port number entered in Step 3.

F1

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Console Display/Instructions   Additional Information   PC

The screen below appears only if the audit message is successfully created and sent.

```
BChannel xxxx Audit Line

Audit Initiated




Exit
```

xxxx = slot and port number entered in Step 3.

After about four minutes, check the error logs.

- If new PRI errors occur, contact your technical support organization for help on interpreting the results and your action.

- If no new PRI messages appear, the ends are most likely in agreement.

The screen below appears when the message cannot be sent due to signaling failure.

```
BChannel xxxx Audit Line

Audit Failed




Exit
```

xxxx = slot and port number entered in Step 3.

This indicates that the problem may be at the CO end. First, make sure the correct B-channel is selected. If the correct B-channel is selected, the customer or Lucent Technologies representative acting as the customer's agent should ask the CO to clear the problem from that end. If the problem is not at the CO end, select the correct B-channel and repeat the Audit Lines procedure.

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Auditing Calls

Summary

Console Procedure	**Menu**: Maintenance→Port→B-Channel→Dial the slot and port no.→Enter→Audit Call
PC Procedure	$\boxed{F6} \to \boxed{F3} \to \boxed{F7} \to$ Type the slot and port no.→$\boxed{F10} \to \boxed{F2}$
Appropriate Slot or Port	This test can be run only on the slot and port of a DS1 PRI B-channel.
Time Estimate	Four minutes
Backup Procedure	Not required
Busy-Out or Reset	Not required
Interrupting the Test	You cannot interrupt this test.
Restore	Not required

To audit calls, follow the steps below.

Console Display/Instructions   **Additional Information**   **PC**

▶ **1. From the Maintenance menu, select the Port option.**

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

$\boxed{F3}$

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Console Display/Instructions **Additional Information** **PC**

▶ **2. Select the B-Channel option.**

```
Port:
Make a selection
Line/Trunk     Modem
Station        B-Channel
RS232 Port1    DSL
RS232 Port2
Exit           Enter
```
`F7`

▶ **3. Specify the slot and port number (ss=2-digit slot number; pp=2-digit port number).**

```
B-Channel:
Enter B-Channel (sspp)


xxxx



Exit           Enter
```

Dial or type [sspp] and select Enter.

`F10`

▶ **4. Select Audit Call.**

```
B-Channel xxxx:
Make a selection
Audit Line
Audit Call



Exit
```

xxxx = slot and port number entered
in Step 3.

`F2`

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Console Display/Instructions   Additional Information   PC

The screen below appears only if the audit message is successfully created and sent.

```
BChannel xxxx AuditCall


Audit Initiated




Exit
```

xxxx = slot and port number entered in Step 3.

After about four minutes, check the error logs.

- If new PRI errors occur, contact your technical support organization for help on interpreting the results and your action.

- If no new PRI messages appear, the ends are most likely in agreement.

The screen below appears when the message cannot be sent.

```
BChannel xxxx Audit Call


Audit Failed




Exit
```

xxxx = slot and port number entered in Step 3.

If this occurs, make sure an active call is in progress on the specified B-channel and try the audit again.

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In Release 6.0 and later systems (Hybrid/PBX mode), when a system is configured in a private network, various calls placed on one switch to another switch may not complete correctly.

$\Rightarrow$ NOTE:

If your private network consists of more than two systems, a system manager in the private network should be appointed to maintain system forms for all systems in the private network. Any local modifications should be cleared with this coordinating system manager, who must ensure that changes to a local system do not have undesirable effects on the private network as a whole. When modifications are made, he or she should see that corresponding changes are made, as necessary, at private networked systems. If your private network consists of two systems, the managers should work together to assess and agree upon any changes.

Troubleshooting Guidelines and Preparation

Before troubleshooting problems, obtain copies of your system's planning forms. Many of the solutions offered in this chapter require that you contact the coordinating system manager in your private network, who maintains records of how systems in your private network are programmed and keeps them up to date. Problems can occur when changes are made in a private network without considering the needs of the private network as a whole. In particular, changes to local and non-local dial plans, Uniform Dial Plan (UDP) routes, Automatic Route Selection (ARS) routes, and remote access settings can have unintended effects on other systems in your private network.

To solve a problem, you may need to perform system programming using your MLX-20L programming console or PC equipped with System Programming and Maintenance (SPM) software.

Most of the problems outlined here can be solved by system managers working together in a two system private network or with the coordinating system manager in a larger private network. However, some problems require the

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intervention of a Lucent Technologies technician. In the USA only, Lucent
Technologies provides a toll-free customer Helpline (1 800 628-2888) 24 hours
a day. You may want to allow only the coordinating system manager to contact
the Helpline, because this person has the complete information that allows
Lucent Technologies technicians to understand problems that you are
experiencing. Under certain circumstances, you may be charged for
consultation with Helpline personnel. Contact your Lucent Technologies
representative or authorized dealer, if you have any questions concerning
consultation charges.

The troubleshooting instructions in this chapter provide information about
reviewing current programming on your local system. You can find out about
current programming in the following three ways:

- System Forms. Review the filled-out system form that includes the
  programming information you need. This method requires that forms be
  available and up-to-date.

- System Reports. Appendix B of *Network Reference*, "Sample Reports,"
  includes samples of reports that you may require when troubleshooting
  private network problems, along with the menu options for selecting
  each report. To see a report, select the Print option on the System
  Programming menu and then choose a report. The *Feature Reference*,
  Appendix F, includes samples of all system reports.

- System Programming. Many of the system programming procedures
  that you may need to perform are summarized in Chapter 5, "System
  Management" of *Network Reference*. *System Programming* includes
  instructions for accessing system programming by using the MLX-20L
  console or SPM software on a personal computer. The troubleshooting
  instructions also cite procedures from *System Programming*.

The next topic provides specific information to help you review non-local
extension ranges, patterns, and routing on your system. This information is
required for several of the troubleshooting procedures in this chapter.

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Reviewing the Non-Local Dial Plan and Routing

Some of the troubleshooting steps in this chapter require that you review the extension ranges programmed in the non-local dial plan and/or the routing for private network calls. Use one of the following three methods to do this:

- System Form. Check System Non-Local UDP Administration Form in the Installation Specification before proceeding. This form summarizes the extension ranges and routing for the patterns programmed in your system. For each route, the pool number, programmed digit manipulation, the Facility Restriction Level (FRL) value are listed, and the voice/data attribute is listed.

- System Report. To see a system print report of existing non-local extension ranges, patterns, and routes, select the Print option on the System Programming menu and then choose NonLcl UDP. Appendix B, "Network Reports" of *Network Reference*, includes a sample.

- System Programming. To check the current call routing on a system, consult "UDP Routing" in Chapter 3 of *System Programming*. Alternatively, follow one of the summary procedures listed below, starting from the System Programming menu on your console or PC.

Console Procedure	Tables→UDP Routing→Press **Inspct** to view current patterns in use→Exit→Dial the number of the pattern that you want to review→Enter→Press **Inspct** to view the current routing for the pattern→Exit→ Exit→Exit→Exit
PC Procedure	[F8]→[F7]→Press [PgDn] to view current patterns in use→[F5]→Enter the number of the pattern that you want to review→[F10]→Press [PgDn] to view the current routing for the pattern→[F5]→[F5]→[F5]→[F5]

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Call to a Non-Local Extension: Unexpected Busy Tone

This topic discusses unexpected busy tones that may be caused by system features. It applies not only to regular calls from one private network extension to another but also to remote access calls that are routed among private network systems. "Call to Non-Local Extension: Silence or Fast Busy Tone" in Chapter 6 of *Network Reference*, outlines possible causes for a busy tone that relate either to system programming of facilities or to call routing.

As a first step, the caller should try using Callback. All available local routes for the call may be busy, and Automatic or Selective Callback allows the call to queue for the next available tandem trunk assigned to the Route 1 pool.

If a user is having trouble with the Callback feature, see "Callback Does Not Work" in Chapter 6 of *Network Reference*.

If the wait time for an available local trunk is unacceptable, you may be able to change the local extension or barrier code FRL and/or route FRLs for the UDP pattern in order to make more routes available for the call.

If you want to make changes in FRLs for routes, speak with the coordinating system manager for your private network and consult the following resources:

- "How Facility Restrictions Levels Work in a Network" in Chapter 4 of *Network Reference* discusses FRL planning in detail.

- To change a UDP route FRL, see "Uniform Dial Plan Routing" in Chapter 5 of *Network Reference,* or "UDP Routing" in Chapter 3 of *System Programming.*

- To change the extension FRL, see *System Programming,* Chapter 3, "Programming Procedures."

- To change the FRL assigned to a remote access barrier code, see "Remote Access" in *System Programming*, Chapter 3. Follow the guidelines in "Remote Access Default Class-of-Restriction Settings" in Chapter 4 of *Network Reference*.

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⚠ SECURITY ALERT:

FRLs, applied to ARS and UDP routes, default class-of-restrictions (COR) for all tie and/or all non-tie tandem trunks, extensions, and remote access barrier codes are particularly important for maintaining security in a private network. Before changing FRLs in your system, check with the coordinating system manager, who should understand the security implications for your local system and for the private network as a whole.

Changing local FRLs may not work simply because the problem is not on the local system. In this case, see "Call to Non-Local Extension: Silence or Fast Busy Tone" in Chapter 6 of *Network Reference*.

Call to Non-Local Extension: Silence or Fast Busy Tone

The following are likely circumstances in which silence occurs when a call is attempted:

- A selected tie or analog facility between the caller or called extension is out of service. If your system is linked by tandem tie trunks and silence occurs, call the other system on a PSTN line/trunk in order to determine whether a tie trunk is out of service. If it is not, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

- No Touch-Tone Receivers (TTRs) available at a remote system when using tie trunks. This can be verified by checking for the `DC03` error on the error log on the remote switches. If this error persists, contact your local service representative.

A fast busy tone can have one of several causes. Before investigating further, check the following possibilities:

- A technician may be performing maintenance on local tandem trunks or non-local tandem trunks included in the routes for the call.

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- A power failure may have occurred at the destination system or at another private networked system whose tandem trunks are included in routes for the call.

- Some of the problems described in this section can occur when a system manager makes a change in a private networked system's local dial plan, non-local dial plan, switch identifier, or DS1 Switch Type setting. Ensure that your private network system forms are kept up-to-date and that changes are cleared with the coordinating system manager.

Possible Cause 1: All programmed available routes for the call are busy.

What to do: Note the extension number range(s) being called. Check that the pattern assigned to the range includes routes that include pools that have a sufficient number of trunks to handle the call volume.

- If you're not sure of the pattern number being used to route calls in your local system, see "Reviewing the Non-Local Dial Plan and Routing" in Chapter 6 of *Network Reference*.

- To add different routes that can handle the call, consult the coordinating system manager and see "Uniform Dial Plan Routing" in Chapter 5 of *Network Reference*, or "UDP Routing" in Chapter 3 of *System Programming*.

- If you do not have enough tandem trunks to handle intersystem calls, consider assigning pools of PSTN trunks to less preferred routes (4 or 3 and 4, for example). If you program such routes and they involve higher toll costs than routes that specify tandem facilities, you may need to adjust extension and route FRLs in order to restrict access to them. Be sure that you discuss any changes with the coordinating system manager.

- If the routing is correct and enough routes are included in the pattern, but the problem persists, check if PRI lines are used. If they are, check the error log for D-channel inoperative and loss of signal alarms indicating lines are inoperative. If the D-channel inoperative alarm has

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occurred, check the CSU/DSU associated with the line for correct
programming. If the loss at signal alarm has occurred, check for open
cables, etc. If these conditions are not present, go to Possible Cause 3.

Possible Cause 2: *Callback Queuing is not used.*

What to Do: All available local routes for the call may be busy, and Automatic or
Selective Callback allows the call to queue for the next available tandem trunk
assigned to the Route 1 pool. As a first step, the caller should try using
Callback.

If a user is having trouble with the Callback feature, see "Callback Does Not
Work" in Chapter 6 of *Network Reference*.

Possible Cause 3: *Not enough trunks are assigned to the pools for UDP
routes.*

What to Do: Consult System Form 2c, System Numbering: Line/Trunk Jacks to
determine the assignments. To see a report of pool assignments, select the
Print option on the System Programming menu and then choose Trunk Info
and General.

- If more trunks are available and need to be assigned, follow the
  procedure in "Trunks to Pools Assignment" in Chapter 3 of *System
  Programming* to assign more tandem trunks. All the tandem trunks in a
  pool must be of the same type (tie or PRI).

- If not enough trunks are available, consider adding more to your system.

- If there are sufficient trunks assigned but the problem persists, go to
  Possible Cause 4.

Possible Cause 4: *Facilities are available but restricted and the caller is not
able to access them.*

What to Do: Verify that the extension's FRL is higher than or equal to the UDP
route FRL.

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If you want to make changes in FRLs for routes, speak with the coordinating system manager for your private network and consult the following resources:

- "How Facility Restrictions Levels Work in a Network" in Chapter 4 of *Network Reference* discusses FRL planning in detail.

- To change a UDP route FRL, see "Uniform Dial Plan Routing" in Chapter 5 of *Network Reference*, or "UDP Routing" in Chapter 3 of *System Programming*.

- To change the extension FRL, see *System Programming*, Chapter 3, "Programming Procedures."

- To change the FRL assigned to a remote access barrier code, see "Remote Access" in *System Programming*, Chapter 3. Follow the guidelines in "Remote Access Default Class-of-Restriction Settings" in Chapter 4 of *Network Reference*.

⚠️ SECURITY ALERT:

FRLs, applied to ARS and UDP routes, default CORs for all tie and/or all non-tie tandem trunks, extensions, and remote access barrier codes are particularly important for maintaining security in a private network. Before changing FRLs in your system, check with the coordinating system manager, who should understand the security implications for your local system and for the private network as a whole.

Changing local FRLs may not work simply because the problem is not on the local system. In this case, go to Possible Cause 5.

Possible Cause 5: *The FRL for the default COR for non-tie trunks (PRI) on the remote system may be blocking tandem calls. The private network is an all-PRI network.*

What to Do: Check with the coordinating system manager so that he or she can determine where the problem exists. This may involve more than one system, depending upon how your private network is set up. For example, a call might be routed across the private network in a fashion such as this:

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Origin System A→System B→System C→Destination System D

In this configuration, the coordinating system manager must check routes and default COR attributes for Systems B and C.

- Check to make sure the calling restriction of the default COR is set to unrestricted. The factory setting is outward restricted, which blocks calls across the private network.

- Check that the routes voice/data capability is correct for the type of call being made. The factory setting is Both, which will support both voice and data calls.

- In each intervening system, compare the FRLs assigned to routes for the call with the default COR FRL. The route FRL must be equal to or lower than the default COR value or the call is blocked. The factory setting is 3.

- If FRL settings are not the cause, go to Possible Cause 6.

Possible Cause 6: *There may be a numbering conflict in the switch identifiers for the trunks that carry the call. Within a private network, switch identifiers should be unique and unambiguous. If they are not, calls may terminate prematurely or continue to route unexpectedly.*

What to Do: The coordinating system manager must check system planning Form Non-Local UDP Administration Form in the Installation Specification and review the switch identifiers for all systems over which calls travel to reach the destination extension(s). To review a report including the switch identifiers programmed on your local system, select the Print option on the System Programming menu and then choose Trunk Info and General.

- If the switch identifiers are not correct, the coordinating system manager must see that a change is made at one or more non-local systems where the conflict exists. To change the current switch identifiers at your local system, see "Switch Identifiers" in Chapter 5 of *Network Reference*, or "UDP Facilities" in Chapter 3 of *System Programming*.

- If the switch identifiers are correct and the problem persists, do one of the following:

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— If the call is being routed over any tandem PRI facilities, go to Possible Cause 7.

— If the call is being routed over tandem tie trunks only, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Possible Cause 7: *The Switch Type setting at both ends of a tandem PRI facility may match.*

What to Do: The coordinating system manager must check the programmed Switch Type settings at private networked systems. Calls are not routed properly unless the Switch Type setting is correctly programmed at the systems on both ends of any tandem PRI facilities on the call route. If only MERLIN LEGEND Communications Systems are included in the routing, the switch type settings on the systems must be different. For example, if System A is connected to System B by tandem PRI trunks, System A can be set to a switch type of LEGEND-PBX and System B can be set to LEGEND-Ntwk. It does not matter which system is assigned the PBX or Network switch type as long as the switch types are different.

If a DEFINITY ECS or DEFINITY ProLogix Solutions system has its Interface field set to Network, any MERLIN LEGEND Communications Systems connected to it by tandem PRI trunks must specify LEGEND-Ntwk. If the Interface field specifies User, the MERLIN LEGEND Communications System facilities must be programmed with the LEGEND-PBX setting.

■ If the call is routed over a tandem PRI facility connected to your system, ensure that the system at the other end of the facility is programmed correctly to work with your own setting. Consult system Non-Local UDP Administration Form in the Installation Specification. To see a report including the switch type programmed for PRI facilities on your system, select the Print option on the System Programming menu and then choose PRI Info. "PRI Facilities Switch Type" in *Network Reference* provides summary instructions for determining the switch type programmed at your system and changing it if necessary. "Switch Type" in the Chapter 4 "PRI Facilities" section of *System Programming* gives full details.

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- In Release 6.1 and later systems, the PRI Switch Type Test requests the system at the other end to verify that the correct PRI switch type is programmed. This test should be run only by Lucent Technologies technicians or authorized representatives.

- If the call is carried over other systems connected by tandem PRI facilities, the coordinating system manger must ensure that the settings are correct, as in this example of MERLIN LEGEND Communications Systems:

  System A LEGEND-PBX→System B LEGEND-Ntwk→System C LEGEND-PBX

- If the switch type settings are correct and problem persists, do one of the following:

  — If the call is a data call, go to Possible Cause 8.

  — If the call is not a data call, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Console Display/Instructions	**Additional Information**	**PC**

▶ **1. At the Slot screen, enter the slot number of the 100D module that is tied to the other system, and press Enter.**

```
Slot:
Enter Slot number (00-17)

nn

Backspace
Exit            Enter
```

Dial or type *nn*, then select Enter.   F10

Console Display/Instructions	**Additional Information**	**PC**

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▶ **2. Press More.**

```
Slot xx:                    >

Make a selection
Status        Demand Test
Busy-Out      Reset
Restore       Error Events
CSU-lpbk      Clock
Exit          Upgrade
```

xx = slot number of the 100D   `PgDn`
module
entered in Step 1

▶ **3. Select PriSwTypTst.**

```
Slot xx:
Make a selection
PriSwTypTst




Exit
```

As the system checks for the Switch Type setting, the screen below appears.

```
PRI Sw Type Tst Slot xx



Test Once



Exit
```

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Console Display/Instructions   Additional Information   PC

As the system continues to check for the Switch Type setting, the screen below appears.

```
PRI Sw Type Tst Slot xx



Test in Progress



Exit
```

If the MERLIN LEGEND system at the other end of the PRI tandem trunk is programmed in the opposite mode, the screen below appears.

```
PRI Sw Type Test Slot xx

Test Passed




Exit
```

If the MERLIN LEGEND system at the other end of the PRI tandem trunk is programmed in the same mode, or does not respond within the timeout, the screen below appears.

```
PRI Sw Type Test Slot xx

Test Failed




Exit
```

If the system at the other end does not respond, the 100D module at the other end may not be programmed for PRI, or the system at the other end of the PRI circuit may not be a MERLIN LEGEND Communications System.

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If you have a MERLIN LEGEND system Release 6.0, or if you want more information about the Switch Type setting, consult the system Non-Local UDP Administration Form in the Installation Specification. To see a report including the switch type programmed for PRI facilities on your system, select the Print option on the System Programming menu, and then choose PRI Info. The "PRI Facilities Switch Type" section in Chapter 5 of the Network Reference provides summary instructions for determining the switch type programmed at your system and changing it if necessary. The procedure for "Switch Type" in the "PRI Facilities" section of Chapter 3 of System Programming gives full details.

■ If the call is carried over other systems connected by tandem PRI facilities, the coordinating system manger must ensure that the settings are correct, as in this example of MERLIN LEGEND Communications Systems:

System A LEGEND-PBX→System B LEGEND-Ntwk→System C LEGEND-PBX

■ If the switch type settings are correct and problem persists, do one of the following:

— If the call is a data call, go to Possible Cause 8.

— If the call is not a data call, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Possible Cause 8: The FRL for the default COR for tie trunks (T1-emulated voice or data, or analog) on the remote system may be blocking tandem calls. The private network includes at least one analog tie trunk.

What to Do: Check with the coordinating system manager so that he or she can determine where the problem exists. This may involve more than one system, depending upon how your private network is set up. For example, a call might be routed across the private network in a fashion such as this:

Origin System A→System B→System C→Destination System D

In this configuration, the coordinating system manager must check routes and default COR attributes for Systems B and C.

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Call to Non-Local Extension: Warble Tone (Error Tone)

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- Check to make sure the calling restriction of the default COR is set to unrestricted. The factory setting is outward restricted, which blocks calls across the private network.

- Check that the routes voice/data capability is correct for the type of call being made. The factory setting is Both, which will support both voice and data calls.

    - In each intervening system, compare the FRLs assigned to routes for the call with the default COR FRL. The route FRL must be equal to or lower than the default COR value or the call is blocked. The factory setting is 3.

    - If FRL settings are not the cause, go to Possible Cause 9.

Possible Cause 9: If the call is a 64-kbps data call, all routing facilities may not support this data speed.

What to Do: Unless you are directly connected to the destination system, the coordinating system manager must check the routes for the call. To check the local routes, see "Reviewing the Non-Local Dial Plan and Routing" in Chapter 6 of *Network Reference*. To change the routing in order to specify facilities that can handle the call, see "Uniform Dial Plan Routing" in Chapter 5 of *Network Reference*, or "UDP Routing" in Chapter 3 of *System Programming*.

If the call is routed over any analog facilities (tie or loop-start, for example), T1-emulated voice or data facilities, it cannot go through. If the call is routed over PRI and/or BRI facilities, a speed of 64 kbps may be possible. If this is not the cause of the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Call to Non-Local Extension: Warble Tone (Error Tone)

There are several reasons why a call to a non-local extension receives warble tone. The first two possibilities are easy to check, because they all derive from

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Call to Non-Local Extension: Warble Tone (Error Tone)

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the local system. The third possible cause only occurs when there are tandem PRI facilities included in the route for the call.

Possible Cause 1: *The extension number is omitted from the non-local dial plan.*

What to do: Check your system's non-local dial plan to see whether the destination extension number is included in a programmed extension range. If it is not, you have solved the problem. If it is included, check all tandem switches to ensure that the extension is in their non-local dial plans. To add the extension to the non-local dial plan, consult the coordinating system manager and see "Non-Local Dial Plan Numbering" in Chapter 5 of *Network Reference,* or "System Renumbering" in Chapter 3 of *System Programming*. If it is included in all programmed extension ranges, proceed to Possible Cause 2.

Possible Cause 2: *The remote system rejects the dialed number on an all PRI network route.*

What to do: Check that the number that arrived is in the non-local dial plan. If the number is in the non-local dial plan, verify that it is a valid extension number for a station, adjunct, calling group, Listed Directory Number (LDN), Remote Access, Dial 0, or ARS.

Possible Cause 3: *The pattern does not have pools assigned to any routes.*

What to do: Verify that the correct pattern is assigned to the range. If the pattern is correct, assign the pools to the routes.

Possible Cause 4: *The FRL assigned to the extension may not permit the call on any of the routes included in the pattern for the call.*

What to do: Look at the system form for the caller's extension. Depending on the type of extension (analog multiline, MLX, digital or analog data, operator, and so on) the extension form varies. You can see a report that lists all extension FRLs by choosing the Print option on the System Programming menu, then selecting Ext Direct. You can see programmed route FRLs by choosing Non-Lcl UDP from the same menu.

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For the call to go through, the extension FRL must be equal to or greater than at least one of the route FRLs for the pattern that is programmed to reach the destination extension range.

- If it is appropriate to change the extension FRL, see "ARS Restriction Levels for Extensions" in Chapter 4 of *System Programming.*

- If you change one or more route FRLs, the modification may restrict or unrestrict calling from some private network extensions. Be sure to clear any changes with the coordinating system manager for the private network. If you decide to make this change, see "Uniform Dial Plan Routing" on page 5–19 or "UDP Routing" in Chapter 4 of *System Programming.* For details about FRLs in private networks, see "Facility Restriction Levels and Remote Access" on page 4–5.

- If a local extension or route FRL is not the problem, the coordinating system manager must determine the private network route for the call once it leaves your local system. If there is an intervening system between yours and the destination, proceed to Possible Cause 5.

- If there is no intervening system between yours and the destination, go to Possible Cause 5.

Possible Cause 5: The FRL for the default COR for non-tie trunks (PRI) on the remote system may be blocking tandem calls. The private network is an all PRI network.

What to Do: Check with the coordinating system manager so that he or she can determine where the problem exists. This may involve more than one system, depending upon how your private network is set up. For example, a call might be routed across the private network in a fashion such as this:

Origin System A→System B→System C→Destination System D

In this configuration, the coordinating system manager must check routes and default COR attributes for Systems B and C.

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Calls to Non-Local Extensions: Unexpected Busy Tone

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- Check to make sure the calling restriction of the default COR is set to unrestricted. The factory setting is outward restricted, which blocks calls across the private network.

- Check that the routes voice/data capability is correct for the type of call being made. The factory setting is Both, which will support both voice and data calls.

- In each intervening system, compare the FRLs assigned to routes for the call with the default COR FRL. The route FRL must be equal to or lower than the default COR value or the call is blocked. The factory setting is 3.

- If FRL settings are not the cause, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Calls to Non-Local Extensions: Unexpected Busy Tone

This topic discusses unexpected busy tones that may be caused by system features. It applies not only to regular calls from one private network extension to another but also to remote access calls that are routed among private network systems.

Possible Cause: *Intersystem callers may receive a busy tone that is unexpected because they know that the call recipient has coverage. However, in a private network non-local calls are treated as outside calls by the system. The non-local extension may not have coverage for outside calls turned on.*

What to Do: Depending upon how the non-local system is set up, try one of the following techniques in order to reach the extension:

- If the destination extension can be dialed directly via Direct Inward Dialing (DID) or PRI dial-plan routing, try calling the destination extension over public switched telephone network tandem trunks. If you receive the same busy tone, then the Coverage setting may be the problem. Call the system manager

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Call to Non-Local Extension Reaches Wrong Extension

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> or receptionist at the non-local system and have them check the
> extension to ensure that coverage is correct and that the
> extension is functional.

■ If you cannot dial the extension directly, use public switched
telephone network facilities or the non-local dial plan in order to
reach the operator for the non-local system. Have the operator
transfer you to the extension. You should be able to leave a
message for the extension user with voice mail or with the
operator.

If neither of the above methods solves the problem, call the non-local system's
system manager or the private network coordinating system manager and
explain the situation.

Call to Non-Local Extension Reaches Wrong Extension

Possible Cause: *If a call to a non-local extension connects to the wrong
extension, one or more non-local dial plan extension ranges and/or routes may
be incorrectly programmed. Non-local dial plan numbers must be unique and
unambiguous or calls can be misrouted. Furthermore, digit absorption and
prepending for the routes must be programmed correctly.*

What to Do: First, review the local routing for the call (see "Reviewing the
Non-Local Dial Plan and Routing" in Chapter 6 of *Network Reference*). Then
follow the steps below.

> 1. At your local system, ensure that routing for the destination
> extension specifies pools of trunks connecting to the correct
> adjacent system (if there is more than one). If digit prepending or
> absorption is needed, make sure that it is correctly programmed.
> If you find an error, you have solved the problem. If not, proceed
> to Step 2.

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Call to Non-Local Extension: Message from CO

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2. If you are directly connected to the system where the destination extension is located, go to Step 3. Otherwise, the coordinating system manager should repeat Step 1 for each system through which the call is routed until you reach the system where the destination extension is located.

3. Check with the system manager at the destination system or with the coordinating system manager to ensure that the extension number is in the local dial plan for that system.

$\Longrightarrow$ NOTE:

The system does not permit programming of non-local extension ranges that conflict with extension numbers included in the local or non-local dial plan. However, conflicts can still arise due to digit prepending or absorption as a call is routed across the private network.

If this is not the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Call to Non-Local Extension: Message from CO

Possible Cause: If someone calls a non-local extension and connects to a central office message announcing a misdialed number or some other problem, the call is routed over a PSTN trunk (PSTN facility pools rather than tandem trunk pools are sometimes assigned to secondary UDP routes such as Routes 3 or 4). Problems can occur when the programming for a PSTN route does not at least prepend the correct digits (as in 555, for a local access call, or 1555 for a toll access call prefixed before a 4-digit extension number) and possibly absorb digits as well, in order for the call to be directed properly.

What to Do: Check the UDP range for the pattern to which the dialed extension is assigned. See "Reviewing the Non-Local Dial Plan and Routing" in Chapter 6 of Network Reference for instructions.

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Transfer to Non-Local Extension Not Completed

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If there is no error in the local programming and there is an intervening system between yours and the system where the destination extension is located, speak with the coordinating system manager. The coordinating system manager should check the intervening system's UDP tables for proper digit manipulation. He or she can determine whether the routing problem is on that system.

If this is not the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Transfer to Non-Local Extension Not Completed

There are several possible causes for an incomplete transfer. They are very easy to check.

- Voice-Announced Transfer. Voice-announced transfers cannot be made to non-local extensions.

- Transfer from PassageWay Telephony Services Client. Transfers with consultation cannot be made from PassageWay Telephony Services clients to non-local extensions. The user must make such a transfer by using a telephone.

$\Rightarrow$ NOTE:

PassageWay Telephony Services clients cannot use an application to transfer calls across the private network. The user must make transfers manually using a telephone. If the transfer recipient is a PassageWay Telephony Services client, only the transfer originator calling information is delivered to the extension, not information about the original caller.

- PSTN Trunk Transfer. The system permits trunk-to-trunk transfers of inside or outside calls to non-local extensions, regardless of whether system programming has prohibited trunk-to-trunk transfer. However, trunk-to-trunk transfer does not work under the following circumstances:

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Transfer Call to Non-Local Extension Does Not Return

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— Trunk-to-trunk transfer is prohibited at the transferring
extension and the call is an outside call being transferred
to a local PSTN line/trunk.

— The transfer originator is attempting to transfer an outside
PSTN or private network call to or from a loop-start line that
does not have reliable disconnect. All loop-start lines
connected to private networked systems must have
reliable disconnect.

If the problem persists, call the Lucent Technologies Helpline at 1 800
628-2888; consultation charges may apply.

Transfer Call to Non-Local Extension Does Not Return

Possible Cause: *If a transfer to a non-local extension cannot be completed
(due to the extension being busy, for example), it only returns when the call is
routed over tandem PRI facilities, not tandem tie trunks or the PSTN trunks that
may be used for less preferred routes.*

What to Do: Review the routing for the call (see "Reviewing the Non-Local Dial
Plan and Routing" in Chapter 6 of *Network Reference* for instructions), and
check with the coordinating system manager if necessary. If the call is routed
over any tandem tie trunks or over any PSTN facilities, you have solved the
problem.

If the call is routed only over tandem PRI facilities, call the Lucent Technologies
Helpline at 1 800 628-2888; consultation charges may apply.

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Conference: Cannot Add Call

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Conference: Cannot Add Call

Non-local extensions are treated as outside parties for the purpose of transfer. A non-local conference participant takes up one of the two outside calls permitted in a conference.

NOTE:
A PassageWay Telephony Services client cannot add a non-local extension to a conference. The user must add the conferee by using a telephone. If a conferee is dropped, the PassageWay Telephony Services client display does not so indicate. A PassageWay Telephony Services client, when added to a conference, only sees information about the conference originator, not about other conferees.

If this is not the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

DID Calls Not Completed

There are several reasons why Direct Inward Dialing (DID) calls across a private network may not complete, either due to busy facilities or to faulty programming. The coordinating system manager may need to address the problem.

Possible Cause 1: *All programmed and available routes for the call are busy.*

What to do: This problem solves itself when traffic decreases. Only address the problem if it persists.

Note the extension number range for the DID destination. At the system where the call is received from the PSTN, check that the pattern assigned to the range includes sufficient different routes with pools (of tandem and/or PSTN facilities) to handle the call volume. This is accomplished by checking the error for errors 4C01 (Pool Empty), 4C02 (Pool Busy), or 4C03 (Pool Busy and/or Out-of-Service). If any of these error codes are present, check the pool index on

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DID Calls Not Completed

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the maintenance screen to determine if it matches the pool used to deliver the call. If it matches, check occurrence times and count. If the count is too high and the occurrences indicate the problem occurred within the duration of the occurrences, consider changing the routing of the call, pool sizes, or add trunks to the pool if empty.

- To add more routes that can handle the call, see "Uniform Dial Plan Routing" in Chapter 5 of *Network Reference*, or "UDP Routing" in Chapter 3 of *System Programming*.

- If more trunks are available and need to be assigned, follow the procedure in "Trunks to Pools Assignment" in Chapter 3 of *System Programming* to assign more tandem trunks. All the tandem trunks in a pool must be of the same type (tie or PRI).

- If not enough trunks are available, consider adding more to the system.

- If there are sufficient trunks assigned and the problem persists, the cause of the problem may be at an intervening system between the one where the calls are received from the PSTN and the destination. Go to Possible Cause 2.

- If there are sufficient trunks and routes and there are no intervening systems between the one where the calls are received from the PSTN and the destination, contact the provider of the DID service. If this does not solve the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Possible Cause 2: *The FRL for the default COR for all tie (T-1 emulated voice or data, or analog) or non-tie trunks (PRI) on the remote system may be blocking tandem calls.*

What to Do: Check with the coordinating system manager so that he or she can determine where the problem exists. This may involve more than one system, depending upon how your private network is set up. For example, a call might be routed across the private network in a fashion such as this:

Origin System A→System B→System C→Destination System D

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ARS Calls Are Blocked

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In this configuration, the coordinating system manager must check routes and default COR attributes for Systems B and C.

- Check to make sure the calling restriction of the default COR is set to unrestricted. The factory setting is outward restricted, which blocks calls across the private network.

- Check that the routes voice/data capability is correct for the type of call being made. The factory setting is Both, which will support both voice and data calls.

- In each intervening system, compare the FRLs assigned to routes for the call with the default COR FRL. The route FRL must be equal to or lower than the default COR value or the call is blocked. The factory setting is 3.

- If FRL settings are not the cause, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

ARS Calls Are Blocked

Check Possible Cause 2 listed in "DID Calls Not Completed" of the previous section. When an ARS call is routed across the private network, it can be intercepted because the default COR FRL at a private networked system is lower than the ARS route (or the UDP route if the system is sending the call to another private networked system).

If this is not the cause, check the Disallowed List entries applied to default COR settings at systems where the call is routed either to the PSTN or to another system in the private network. Compare the entries to the dialed digits; a Disallowed List may be blocking the call. If it is necessary to change the Disallowed List, see "Disallowed Lists" in Chapter 3 of *System Programming*. Check the ARS programming to verify that the remote machine's ARS code is being prepended. Verify that switch identifiers have been assigned to all private network tandem trunks.

If this does not solve the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

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Callback Does Not Work

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Callback Does Not Work

Callback allows queueing for an available line/trunk connected to the local system. If a user attempts an ARS- or UDP-routed call and hears a busy signal or warble tone, the signal may be derived from a non-local system's tandem or PSTN facilities. If this is the case, Callback does not work. When all available routes on the local system are busy, a caller can use Callback to wait for an available facility in the Route 1 pool.

Private Network Call Transmission Level (Volume) Too Low or Too High

When transmission levels are too high or too low, the coordinating system manager must investigate the cause.

Possible Cause 1: *Switch identifiers programmed incorrectly.*

What to Do: Refer to the table below as you examine the problem. It lists the rules for programming switch identifiers. At each system in a private network, each tandem trunk is programmed (individually or as part of a block of trunks) to indicate the type of system connected to the other end of the trunk as well as the distance between the connected systems.

- 1–20 = trunk connected to a MERLIN LEGEND Communications System that is more than 200 miles away

- 21–40 = trunk connected to a MERLIN LEGEND Communications System that is within 200 miles

- 41–50 = trunk connected to a system that is not a MERLIN LEGEND Communications System (for example, a DEFINITY ECS communications system) and is more than 200 miles away

■   51–60 = trunk connected to a system that is not a MERLIN
LEGEND Communications System (for example, a DEFINITY
ProLogix Solutions communications system) and is within 200
miles

⇒ **NOTE:**
DEFINITY ECS and DEFINITY ProLogix Solutions systems are beyond the
scope of this guide. For information about how these systems identify
tandem facilities, see the documentation for the applicable system.

Follow the steps below to check on the problem.

1.   Check the routing for the call, and identify each system where the
call is routed, including the system where the call originated or
was received from the public switched telephone network. See
"Reviewing the Non-Local Dial Plan and Routing" in Chapter 6 of
Network Reference for instructions.

2.   As necessary, note the switch identifier programmed on each
system for the trunks that carry the calls. To review a report
including the switch identifiers programmed on a system, select
the Print option on the System Programming menu and then
choose Trunk Info and General.

3.   Look for switch identifiers that incorrectly specify the distance
between systems or that specify the incorrect type of system. The
diagram below shows how switch identifiers might be
programmed at either end of tandem trunks in a hypothetical
private network. A switch identifier is programmed to identify the
system at the *opposite* end of the tandem trunk. In the example,
all three switches are MERLIN LEGEND Communications
Systems. On the facility that links Systems A and B, the system
managers program identifiers to indicate that they are within 200
miles of one another. Next to the name of each system, is the
switch identifier associated with that switch. The switch is

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Private Network Call Transmission Level (Volume) Too Low or Too High

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programmed on the switches on the other end of the tandem trunk. Systems B and C are linked by trunks whose identifiers indicate distant systems.
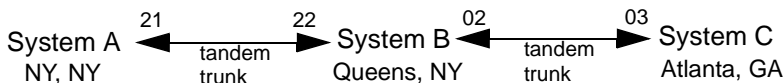
The example below shows programming that would be incorrect in the same private network. The link between Systems A and B has mismatched identifiers, because System B specifies that System A is more than 200 miles away. System C incorrectly specifies System B as a non-MERLIN LEGEND Communications System.
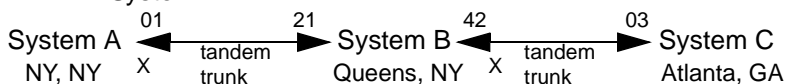
4. If any of the programming is incorrect, one or more system managers must correct it. The coordinating system manager must clear any changes. To change the switch identifiers at your local system, see "Switch Identifiers" on page 5–13 or "UDP Facilities" in Chapter 3 of *System Programming*. If the programming appears to be correct, skip to Step 6.

5. Make some test calls across the private network. If calls are at the proper levels, the problem is solved. If transmission levels are still incorrect, proceed to Step 6.

6. If the identifiers appear correct but the distance between systems is between 180 and 220 miles, you may need to experiment with switch identifiers in order to achieve the correct transmission levels. Return to Step 4.

If changing one or more switch identifiers do not solve the problem,

Possible Cause 2: *More than three analog spans are involved in the call.*

What to Do: This may occur when calls are transferred or forwarded multiple times across analog facilities. Consider changing to digital facilities if this

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MLX Displays: Private Network Call Display Problems

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situation occurs frequently. Contact your Lucent Technologies representative or Local Authorized Dealer for instructions.

If the problem is not solved with the above instructions, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

MLX Displays: Private Network Call Display Problems

There are several possible causes for this problem, all of them easy to check:

Possible Cause 1: Non-local extension calls and outside calls routed on tandem tie trunks display at recipient MLX display telephones as outside calls, for example, TIE-TRK.

What to Do: Check the call routing and find out whether any tandem tie trunks are included in the route. You may need to contact the coordinating system manager. If the call originated from the PSTN on a PRI or BRI facility with Automatic Number Identification (ANI), the original calling party information displays when private network routing is over tandem PRI trunks only. Check the call routing and see whether any tandem tie trunks are included in the route.

Possible Cause 2: Call transferred to the extension.

What to Do: If the call was transferred to the extension, only the transfer originator information displays, not the name and/or number of the original caller, even if PRI ANI was available for the original call.

Possible Cause 3: Display Preference setting for MLX incorrect

What to Do: If the call route for an intersystem call includes only tandem PRI trunks and the call was not transferred, the Display Preference setting for the MLX display telephone extension may not be programmed as you expect. The factory setting displays the caller's extension number. Check System Planning Form, MLX Telephones, for the recipient extension or see "Display Preferences for Intersystem Calls" in Chapter 5 of Network Reference to check the setting

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PassageWay Call Display Problems

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through system programming. If you see the word "Ext" in the display, change
the programming to Both.

You can see a report for the extension, showing the display preference, by
choosing the Print option on the System Programming menu, then selecting
Ext Info and entering the extension number. If the display shows a 10-digit
ANI as PRI-TRK Ext 9089575555, you may want to change the display
option from Name to Both and then the display would look like PRI-TRK
9089575555.

Possible Cause 4: *Transfer completed too quickly.*

What to Do: Callers must wait at least two seconds before completing
transfers.

If none of these factors caused the problem, call the Lucent Technologies
Helpline at 1 800 628-2888; consultation charges may apply.

PassageWay Call Display Problems

In private networks, calls to and from PassageWay Telephony services clients
may not display or initiate screen pop as expected. The operation varies
according to the application, according to the following rules:

- For an outgoing call, if the PassageWay Telephony Services
  application uses the length of a destination telephone number to
  differentiate PSTN calls from UDP calls, a PassageWay Telephony
  Services client displays a non-local extension call in the same
  way as it does inside calls.

- For an outgoing call, if the PassageWay Telephony Services
  application uses receipt of the *Network Reached event* to
  differentiate PSTN calls from inside calls, a PassageWay
  Telephony Services client displays a non-local extension call or
  other UDP-routed call in the same way as it does an outside call
  made to the public switched telephone network.

- For an incoming call, if the PassageWay Telephony Services application uses the length of ANI information to differentiate PSTN calls from UDP calls, a PassageWay Telephony Services client displays a non-local dial plan call as an inside call.

- For an incoming call, if the PassageWay Telephony Services application uses the presence of a trunk identifier in the *delivered event* to differentiate PSTN calls from UDP calls, a PassageWay Telephony Services client displays a non-local dial plan call in the same way it does a PSTN call.

- For an incoming PSTN call that enters the private network on a PRI trunk with an ANI of length shorter than seven digits and crosses PRI tandem trunks only, the recipient PassageWay Telephony Services client display depends on the PassageWay Telephony Services application implementation.

If none of these factors explain the problem, contact the application provider. If the application provider instructs you to do so, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

ARS Calls Go to System Operator (Unassigned Extension)

Possible Cause: *System managers in your private network may have set up ARS and remote access to route outgoing calls to PSTN facilities on switches where these calls are most economical.*

What to Do: If such calls are reaching a system operator (unassigned extension) on a private networked system, rather than being routed to the PSTN, the coordinating system manager must check the tandem facilities that carry calls to the system where the operator is located. The problem is caused when one or more tandem trunks has no switch identifier (the factory setting).

If this is not the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

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DID or PRI Dial-Plan Routed Calls Not Completed

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DID or PRI Dial-Plan Routed Calls Not Completed

Possible Cause 1: DID and PRI calls cannot be routed to a 5-digit DEFINITY ECS or DEFINITY ProLogix Solutions system.

What to Do: Verify system programming and the digits received from the PSTN. Refer to Chapter 5, "Non-Local Dial Plan Number" for details on programming required.

Possible Cause 2: DID or PRI routing not correct.

What to Do: The coordinating system manager should check the DID or PRI routing. These calls may come into one private networked switch and be routed across the private network to an extension on another system in the private network. The routing must specify the correct tandem trunk pools, extension numbers, and digit manipulation.

If the routing is correct, contact the service provider. If the service provider instructs you to do so, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Excessive Line Noise on Voice and Data Calls

Possible Cause: Clocks are not properly synchronized.

What to Do: The coordinating system manager should check error logs at problem systems. If slips are occurring at a high rate or an alarm was raised, clock synchronization is a problem. The coordinating system manager should then check the programming for the PRI tandem trunk(s) and/or PSTN digital facilities that carry the calls. A single clock source is used for all private networked systems so that calls are properly synchronized. For details about clock synchronization in a private network, see "Clock Synchronization" in
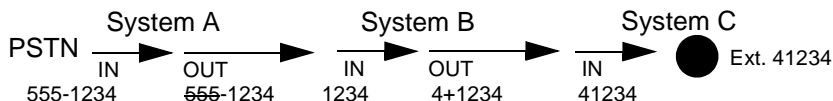
Chapter 5 of Network Reference. To program clock synchronization, see Chapter 3 of System Programming.

If the clock source is correct, ensure that the specified port is functioning properly and has an in-service facility connected to it.

If this does not solve or explain the problem, call the Lucent Technologies Helpline at 1 800 628-2888; consultation charges may apply.

Station Message Detail Recording (SMDR) Reports Do Not Include Calls across the Private Network

SMDR reports may report calls using more than one call record on more than one system. Depending upon how SMDR is programmed and how calls are routed, you may need to consult several SMDR records to trace a call that is routed over private network tandem trunks. To log private network calls, SMDR should be programmed to report both incoming and outgoing calls.

```
         System A            System B            System C
PSTN ──────▶──────────▶──────────▶──────────▶────●  Ext. 41234
     IN     OUT       IN     OUT       IN
   555-1234  555-1234  1234   4+1234   41234
```

The diagram above shows how a single call, routed across a private network, is both an incoming and an outgoing call in the same system. For private network calls, outgoing call records report the incoming tandem trunk number in the STN. field (see System B above). Dialed digits shown on the report do not reflect any digit manipulation (addition or absorption) performed by the local system.

Calls across the private network are not recorded, even at a tandem switch, if the call is not answered unless the outgoing facility is a loop-start or ground-start trunk. Then calls are logged, even unanswered calls.

If the system date and time are not synchronized across the private network, it may be hard to recognize the records for a single call, even when the systems

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are in the same time zone. When they are not, time zone differences must also be considered.

Conclusion of Hardware Maintenance

Installing the Control Unit Housing (Release 2.1 or Later)

After you have completed maintenance and troubleshooting on Release 2.1 or later, follow the steps below to reinstall the control unit housing.

Installing the Top Cover

To install the top cover, see Figure 5–1 and follow these steps.

▶ **1. Be sure the cords have been pressed through the wire managers at the base of the modules.**

▶ **2. Hold the top cover with the hooks facing you.**

▶ **3. Engage the tabs at the rear of the top cover with the carrier.**

▶ **4. Lower the top cover, so that the legs lock into the vents on the module.**

Installing the Front Cover

To install the front cover, see Figure 5-76 and follow these steps.

▶ **1. Hook the top of the front cover onto the top cover.**

▶ **2. Push down on the bottom of the front cover until it locks securely on the base of the wire manager on the modules.**

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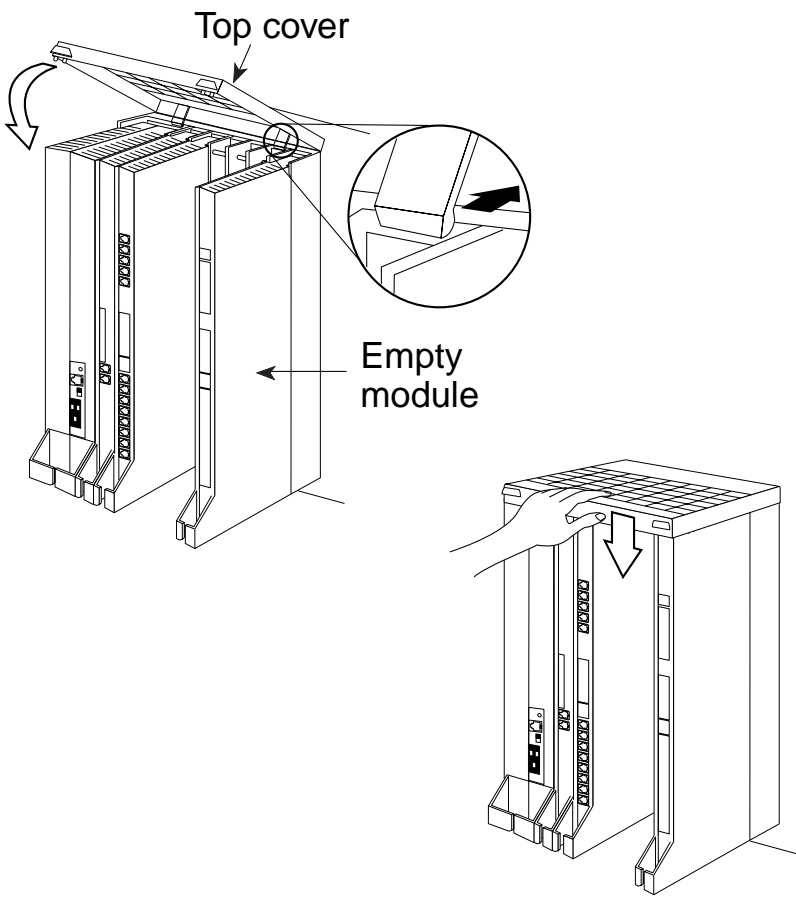
Figure 5-1.   Installing the Control Unit Top Cover (Release 2.1 and Later)

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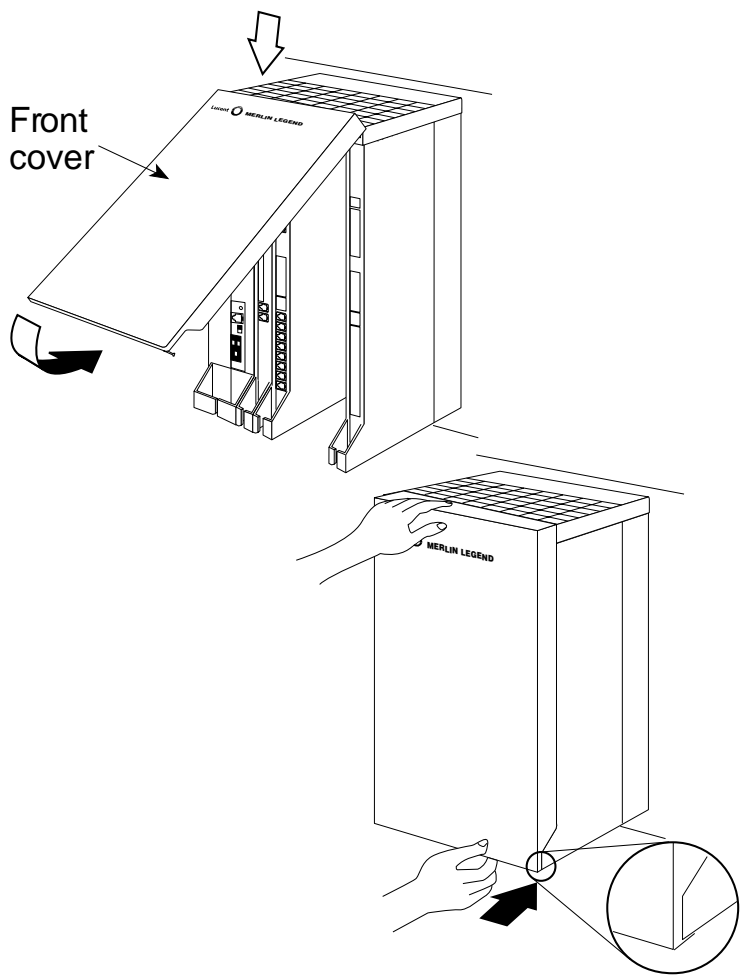
Figure 5-2.   Installing the Control Unit Front Cover (Release 2.1 and Later)

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Installing the Control Unit Housing (Release 2.0 or Earlier)

After you have completed maintenance and troubleshooting, follow the steps below to reinstall the Release 2.0 or earlier control unit housing.

▶ **1. Assemble the control unit housing. See Figure 5-3.**

- If the housing is already assembled, go to Step 2.

- If the housing is not assembled:

    a. Lay the front panel(s) face down.

    b. If you are housing more than one carrier, connect the front panels together by lining up the arrows and then sliding the panels until the semicircles form a complete circle.

    c. Connect the side panels to the front panel(s) similarly.

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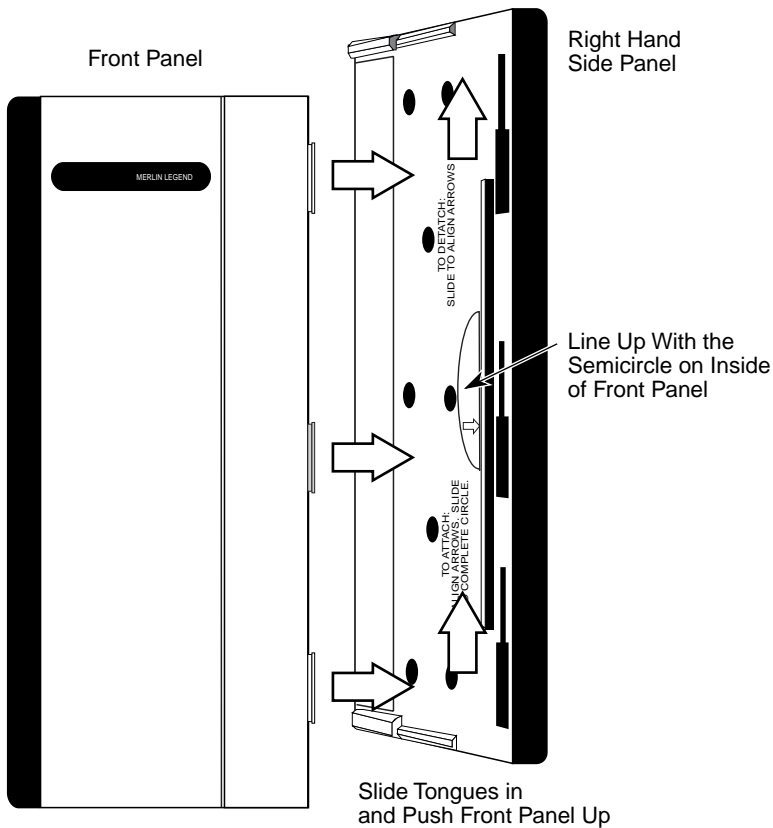
Figure 5-3.   Assembling the Control Unit Housing (Release 2.0 and Earlier)

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Slide housing cover forward into clips
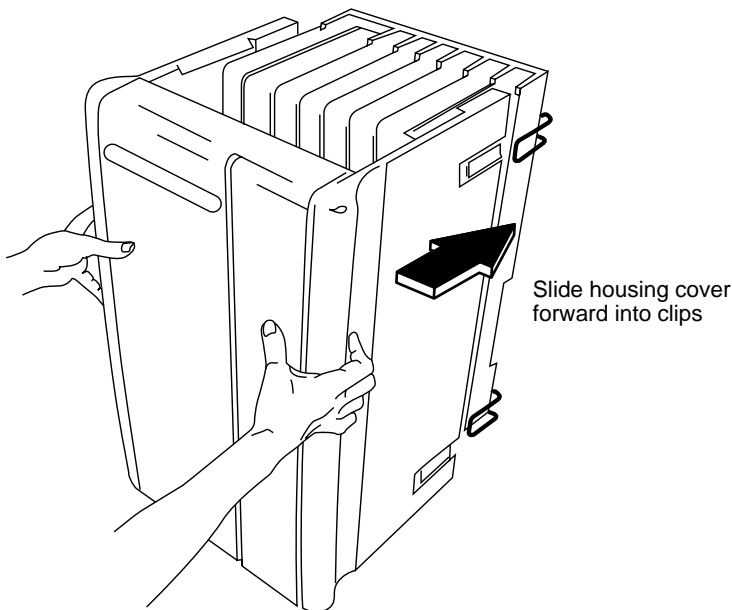
Figure 5-4. Installing the Control Unit Housing (Release 2.0 and Earlier)

▶ **2. Line up the wire clips attached to the carrier with the recesses on the outside of the side panels. See Figure 5-4.**

If the wire clips are not attached to the control unit, see "Installing the Housing Clips" in Chapter 2 of *Installation*.

▶ **3. Push the panels back until the clips hook over the tabs and rest in the recesses.**

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Support Telephone Number

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Customer Support Information

A

Support Telephone Number

In the USA only, Lucent Technologies provides a toll-tree customer Helpline (1 800 628-2888) 24 hours a day. If you need assistance when installing, programming, or using your system, call the Helpline, or your Lucent Technologies representative. Consultation charges may apply.

Outside the USA, if you need assistance when installing, programming, or using your system, contact your Lucent Technologies representative.

Federal Communications Commission (FCC) Electromagnetic Interference Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a

residential area is likely to cause harmful interference, in which case the user
will be required to correct the interference at his or her own expense.

Canadian Department of Communications (DOC) Interference Information

This digital apparatus does not exceed the Class A limits for radio noise
emissions set out in the radio interference regulations of the Canadian
Department of Communications.

Le Présent Appareil Numérique n'émet pas de bruits radioélectriques
depassant les limites applicables aux appareils numériques de la classe A
préscrites dans le reglement sur le brouillage radioélectrique edicté par le
ministère des Communications du Canada.

FCC Notification and Repair Information

This equipment is registered with the FCC in accordance with Part 68 of its
rules. In compliance with those rules, you are advised of the following:

- Means of Connection. Connection of this equipment to the telephone
  network shall be through a standard network interface jack, USOC
  RJ11C, RJ14C, RJ21X. Connection to E&M tie trunks requires a USOC
  RJ2GX. Connection to off-premises extensions requires a USOC RJ11C
  or RJ14C. Connection to 1.544-Mbps digital facilities must be through a
  USOC RJ48C or RJ48X. Connection to DID requires a USOC RJ11C,
  RJ14C, or RJ21X. These USOCs must be ordered from your telephone
  company. Connection to 56-Kbps or 64-Kbps facilities requires a USOC
  RJ11C, RJ14C, or RJ21.

- Party Lines and Coin Telephones. This equipment may not be used with
  party lines or coin telephone lines.

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- Notification of Local Telephone Companies. Before connecting this equipment, you or your equipment supplier must notify your local telephone company·s business office of the following:

    — The telephone number(s) you will be using with this equipment

    — The appropriate registration number and ringer equivalence number (REN), which can be found on the back or bottom of the control unit, as follows:

    □ If this equipment is to be used as a Key system, report the registration number AS593M-72914-KF-E

    □ If the system provides both manual and automatic selection of incoming/outgoing access to the network, report the registration number AS593M-72682-MF-E

    □ If there are no directly terminated trunks, or if the only directly terminated facilities are personal lines, report the registration number AS5USA-65646-PF-E

    □ The REN (Ringer Equivalence Number) for all three systems is 1.5A

    — The facility interface code (FIC) and service order code (SOC):

    □ For tie line connection, the FIC is TL31M and the SOC is 9.0F

    □ For connection to off-premises stations, the FIC is OL13C and the SOC is 9.0F

    □ For equipment to be connected to DID facilities, the FIC is 02RV2-T and the SOC is AS.2

    □ For equipment connected to 56-Kbps or 64-Kbps digital facilities, the FIC is 021S5 and the SOC is 6.0Y.

        — 04DU9-BN for D4 framing format with AMI zero code suppression

        — 04DU9-DN for D4 framing format with bipolar 8 zero code suppression (B8ZS)

        — 04DU9-IKN for extended superframe format (ESF) with AMI zero code suppression

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— 04DU9-ISN with ESF and B8ZS

- □ For equipment to be connected to 56-Kbps or 64-Kbps digital facilities, the FIC is 02B1Q.

— The quantities and USOC numbers of the jacks required

— For each jack, the sequence in which lines are to be connected, the line types, the FIC, and the REN by position when applicable

- Ringer Equivalence Number (REN). The REN is used to determine the number of devices that may be connected to the telephone line. Excessive RENs on the line may result in the devices not ringing in response to an incoming call. In most, but not all, areas the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the local telephone company to determine the maximum REN for the calling area.

- Disconnection. You must also notify your local telephone company if and when this equipment is permanently disconnected from the line(s).

Installation and Operational Procedures

The manuals for your system contain information about installation and operational procedures.

- Repair Instructions. If you experience trouble because your equipment is malfunctioning, the FCC requires that the equipment not be used and that it be disconnected from the network until the problem has been corrected. Repairs to this equipment can be made only by the manufacturers, their authorized agents, or others who may be authorized by the FCC. In the event repairs are needed on this equipment, contact your authorized Lucent Technologies dealer or, in the USA only, contact the National Service Assistance Center (NSAC) at 1 800 628-2888.

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- Rights of the Local Telephone Company. If this equipment causes harm to the telephone network, the local telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will also be informed of your right to file a complaint with the FCC.

- Changes by the Local Telephone Company. Your local telephone company may make changes in its facilities, equipment, operations, or procedures that affect the proper functioning of this equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

- Hearing Aid Compatibility. The custom telephone sets for this system are compatible with inductively coupled hearing aids, as prescribed by the FCC.

- Automatic Dialers. WHEN PROGRAMMING EMERGENCY NUMBERS AND/OR MAKING TEST CALLS TO EMERGENCY NUMBERS:

  — Remain on the line and briefly explain to the dispatcher the reason for the call.

  — Perform such activities in off-peak hours, such as early morning or late evening.

- Direct Inward Dialing (DID). This equipment returns answer supervision signals to the Public Switched Telephone Network when an incoming call is:

  — Answered by the called station

  — Answered by the attendant

  — Routed to a recorded announcement that can be programmed by the customer premises equipment user

  — Routed to a dial prompt

  This equipment returns answer supervision on all DID calls forwarded back to the Public Switched Telephone Network. Permissible exceptions occur when:

  — A call is unanswered

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— A busy tone is received

— A reorder tone is received

Allowing this equipment to be operated in such a manner as not to provide proper answer supervision signaling is in violation of Part 68 FCC rules.

■ New Network Area and Exchange Codes. The MERLIN LEGEND software does not restrict access to any new area codes or exchange codes established by a local telephone company. If the user has established toll restrictions on the system that could restrict access, then the user should check the lists of allowed and disallowed dial codes and modify them as needed.

■ Equal Access Codes. This equipment is capable of providing users access to interstate providers of operator services through the use of access codes. Modifications of this equipment by call aggregators to block access dialing codes is a violation of the Telephone Operator Consumers Act of 1990.

DOC Notification and Repair Information

NOTICE: The Canadian Department of Communications (DOC) label identifies certified equipment. This certification means that the equipment meets certain operational, and safety requirements of the telecommunications network protective. The DOC does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect it to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring for single-line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

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Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or any equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected. This precaution may be particularly important in rural areas.

⚠ CAUTION:
Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority or electrician, as appropriate.

To prevent overloading, the Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop used by the device. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

DOC Certification No.: 230 4095A

CSA Certification No.: LR 56260

Load No.: 6

Renseignements sur la notification du ministère des Communications du Canada et la réparation

AVIS: L'étiquette du ministère des Communications du Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme à certaines normes de protection, d'exploitation et de sécurité des réseaux de télécommunications. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. Dans certains cas, les fils intérieurs de l'enterprise utilisés pour un service individuel à ligne unique peuvent être prolongés au moyen d'un dispositif homologué de raccordement (cordon prolongateur téléphonique interne). L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêchent pas la dégradation du service dans certaines situations. Actuellement, les entreprises de télécommunication ne permettent pas que l'on raccorde leur matériel à des jacks d'abonné, sauf dans les cas précis prévus pas les tarifs particuliers de ces entreprises.

Les réparations de matériel homologué doivent être effectuées par un centre d'entretien canadien autorisé désigné par le fournisseur. La compagnie de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particuliérement importante dans les régions rurales.

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AVERTISSEMENT: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

L'indice de charge (IC) assigné à chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordée à un circuit téléphonique bouclé utilisé par ce dispositif. La terminaison du circuit bouclé peut être constituée de n'importe quelle combinaison de dispositifs, pourvu que la somme des indices de charge de l'ensemble des dispositifs ne dépasse pas 100.

> No d'homologation: 230 4095A
>
> No de certification: CSA LR 56260
>
> L'indice de charge: 6

**MERLIN LEGEND D.O.C.
Location Label Placement**

**Ministère des Communications
du Canada emplacement de
l'étiquette**

Lucent ○   **MERLIN LEGEND**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Model 511A Control Unit

Complies with Part 68, FCC Rules. See the SystemReference Manual for proper FCC Classification.
FCC Reg. Nos. MF: AS593M-72682-MF-E
KF: AS593M-72914-KF-E
PF: AS5USA-65646-PF-E
REN: 1.5A

(SA) ® **LR 56260**

**TELEPHONE
EQUIPMENT**

(UL) **LISTED
538E** ®

MADE IN U.S.A.

Use only Lucent Technologies manufactured MERLIN LEGEND circuit modules, carrier assemblies, and power units, as specified in the Installation Manual, in this product. There are no user serviceable parts inside. Contact your authorized agent for service and repair.

This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère Communications du Canada.

CANADA

DR ID

WARNING: If equipment is used for out-of-building applications, approved secondary protectors are required. See Installation Manual.

AVERTISSEMENT: Si l'equipment est utilisé pour des applications extérieures, l'installation d'un protecteur secondaire est requise. Voir le manuel d'Installation.

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Security of Your System: Preventing Toll Fraud

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Security of Your System: Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there is an increasing problem of telephone toll fraud. Telephone toll fraud can occur in many forms, despite the numerous efforts of telephone companies and telephone equipment manufacturers to control it. Some individuals use electronic devices to eliminate or falsify records of these calls. Others charge calls to someone else's number by illegally using lost or stolen calling cards, billing innocent parties, clipping on to someone else's line, or breaking into someone else's telephone equipment physically or electronically. In certain instances, unauthorized individuals make connections to the telephone network through the use of the Remote Access features of your system.

The Remote Access features of your system, if you choose to use them, permit off-premises callers to access the system from a remote telephone by using a telephone number with or without a barrier code. The system returns an acknowledgment signaling the user to key in his or her barrier code, which is selected and programmed by the system manager. After the barrier code is accepted, the system returns dial tone to the user. In Release 3.1 and later systems, barrier codes are by default restricted from making outside calls. In prior releases, if you do not program specific outward calling restrictions, the user will be able to place any call normally dialed from a telephone associated with the system. Such an off-premises network call is originated at, and will be billed from, the system location.

The Remote Access feature, as designed, helps the customer, through proper administration, to minimize the ability of unauthorized persons to gain access to the private network. Most commonly, phone numbers and codes are compromised when overheard in a public location, through theft of a wallet or purse containing access information, or through carelessness (for example, writing codes on a piece of paper and improperly discarding it). Additionally, hackers may use a computer to dial an access code and then publish the information to other hackers. Enormous charges can be run up quickly. It is the customer's responsibility to take the appropriate steps to properly implement the features, evaluate and administer the various restriction levels, protect

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access codes, and distribute access codes only to individuals who have been fully advised of the sensitive nature of the access information.

Common carriers are required by law to collect their tariffed charges. While these charges are fraudulent charges made by persons with criminal intent, applicable tariffs state that the customer of record is responsible for payment of all long-distance or other private network charges. Lucent Technologies cannot be responsible for such charges and will not make any allowance or give any credit for charges that result from unauthorized access.

To minimize the risk of unauthorized access to your communications system:

- Use a nonpublished Remote Access number.

- Assign access codes randomly to users on a need-to-have basis, keeping a log of *all* authorized users and assigning one code to one person.

- Use random-sequence access codes, which are less likely to be easily broken.

- Use the longest-length access codes the system allows.

- Deactivate all unassigned codes promptly.

- Ensure that Remote Access users are aware of their responsibility to keep the telephone number and any access codes secure.

- When possible, restrict the off-network capability of off-premises callers, using calling restrictions, Facility Restriction Levels (Hybrid/PBX mode only), and Disallowed List capabilities. In Release 3.1 and later systems, a prepared Disallowed List (number 7) is provided and is designed to prevent the types of calls that toll-fraud abusers often make.

- When possible, block out-of-hours calling.

- Frequently monitor system call detail reports for quicker detection of any unauthorized or abnormal calling patterns.

- Limit Remote Call Forwarding to persons on a need-to-have basis.

- Change access codes every 90 days.

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■ Use the longest-length barrier codes possible, following the guidelines for passwords. (See"Choosing Passwords" on page A-24)

Toll Fraud Prevention

Toll fraud is the unauthorized use of your telecommunications system by third parties to make long distance telephone calls. Under the law, you, the customer, are responsible for paying part or all of those unauthorized calls. Thus, the following information is of critical importance.

Unauthorized persons concentrate their activities in two areas with the MERLIN LEGEND Communications System:

■ They try to transfer out of the MERLIN LEGEND Communications System to gain access to an outgoing trunk and make long-distance calls.

■ They try to locate unused or unprotected mailboxes and use them as drop-off points for their own messages.

The following is a discussion of how toll fraud is often perpetrated and ways to prevent unauthorized access that can lead to toll fraud.

Physical Security, Social Engineering, and General Security Measures

Criminals called hackers may attempt to gain unauthorized access to your communications system and voice messaging system in order to use the system features. Hackers often attempt to trick employees into providing them with access to a private network facility (line/trunk) or a private network operator. This is referred to as social engineering. Hackers may pose as telephone company employees and employees of Lucent Technologies or your authorized dealer. Hackers will go through a company's trash to find directories, dialing instructions, and other information that will allow them to break into the system. The more knowledgeable they appear to be about the employee names, departments, telephone numbers, and the internal procedures of your company, the more likely it is that they will be able to trick an employee into helping them.

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Preventive Measures

Take the following preventive measures to limit the risk of unauthorized access by hackers:

- Provide good physical security for the room containing your telecommunications equipment and the room with administrative tools, records, and system manager information. These areas should be locked when not attended.

- Provide a secure trash disposal for all sensitive information, including telephone directories, call accounting records, or anything that may supply information about your communications system. This trash should be shredded.

- Educate employees that hackers may try to trick them into providing them with dial tone or dialing a number for them. All reports of trouble, requests for moving extensions, or any other administrative details associated with the MERLIN LEGEND Communications System should be handled by one person (the system manager) or within a specified department. *Anyone claiming to be a telephone company representative should be referred to this person or department.*

- No one outside of Lucent Technologies needs to use the MERLIN LEGEND Communications System to test facilities (lines/trunks). If a caller identifies him or herself as an Lucent Technologies employee, the system manager should ask for a telephone number where the caller can be reached. The system manager should be able to recognize the number as an Lucent Technologies telephone number. *Before connecting the caller to the administrative port of the MERLIN LEGEND Communications System, the system manager should feel comfortable that a good reason to do so exists.* In any event, it is not advisable to give anyone access to private network facilities or operators, or to dial a number at the request of the caller.

- Any time a call appears to be suspicious, call the Lucent Technologies GBCS Fraud Intervention Center at 1 800 628-2888 (fraud intervention for System 25, PARTNER® and MERLIN® systems).

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■ Customers should also take advantage of Lucent Technologies monitoring services and devices, such as the NetPROTECT^{SM} family of fraud detection services, CAS with HackerTracker®, and CAT Terminal with Watchdog. Call 1 800 638-7233 to get more information on these Lucent Technologies fraud detection services and products.

Security Risks Associated with Transferring through Voice Messaging Systems

Toll fraud hackers try to dial into a voice mailbox and then execute a transfer by dialing *T. The hacker then dials an access code (either 9 for Automatic Route Selection or a pooled facility code) followed by the appropriate digit string to either direct dial or access a private network operator to complete the call.

$\Rightarrow$ NOTE:

In Release 3.1 and later systems, all extensions are initially and by default restricted from dial access to pools. In order for an extension to use a pool to access an outside line/trunk, this restriction must be removed.

Preventive Measures

Take the following preventive measures to limit the risk of unauthorized transfers by hackers:

■ Outward restrict all MERLIN LEGEND voice mail port extensions. This denies access to facilities (lines/trunks). In Release 3.1 and later systems, voice mail ports are by default outward restricted.

■ As an additional security step, private network dialing for all extensions, including voice mail port extensions, should be processed through ARS using dial access code 9.

⚠ SECURITY ALERT:

The MERLIN LEGEND system ships with ARS activated with all extensions set to Facility Restriction Level 3, allowing all international calling. **To prevent toll fraud,** *ARS Facility Restriction Levels (FRLs) should be established using:*

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- *FRL 0 for restriction to internal dialing only*

- *FRL 2 for restriction to local private network calling only*

- *FRL 3 for restriction to domestic long distance (excluding area code 809 for the Dominican Republic as this is part of the North American Numbering Plan, unless 809 is required)*

- *FRL 4 for international calling*

- In Release 3.1 and later systems, default local tables are factory-assigned an FRL of 2. This simplifies the task of restricting extensions: the FRL for an extension merely needs to be changed from the default of 3.

- Each extension should be assigned the appropriate FRL to match its calling requirements. All voice mail port extensions not used for Outcalling should be assigned to FRL 0 (the factory setting in Release 3.1 and later).

- Deny access to pooled facility codes by removing pool dial-out codes 70, 890-899, or any others on your system.

- Create a Disallowed List or use the pre-prepared Disallowed List number 7 (Release 3.1 and later systems only) to disallow dialing 0, 11, 10, 1700, 1809, 1900, and 976 or 1(wildcard)976. In Release 3.1 and later systems, Disallowed List number 7 does not include 800 and 1800 and 411 and 1411, but Lucent Technologies recommends that you add them. Assign all voice mail port extensions to this Disallowed List. Lucent Technologies recommends assigning Disallowed List number 7. *This is an added layer of security, in case outward restriction is inadvertently removed.* (In Release 3.1 and later systems, voice messaging ports are assigned by default to Disallowed List number 7.)

  If your system is part of a private network, assign Disallowed List 7 to Remote Access.

  If Outcalling is required by voice messaging system extensions:

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- Program an ARS Facility Restriction Level (FRL) of 2 on voice mail port extension(s) used for Outcalling. This allows calls to use the default local ARS table that is defaulted to an FRL of 2 and any other ARS routes with an FRL of 2 or less.

- If 800 and 411 numbers are used, remove 1800, 800, 411, and 1411 from Disallowed List (number 7).

- If Outcalling is allowed to long distance numbers, build an Allowed List for the voice mail port extension(s) used for Outcalling. This list should contain the area code and the first three digits of the local exchange telephone numbers to be allowed.

- In a private network, if your switch is outcalling only to non-local private network extensions, program the VMI ports with an FRL of 2.

Additional general security recommended for voice messaging systems:

- Use a secure password for the General Mailboxes.

- The default administration mailbox, 9997, must be reassigned to the system manager's mailbox/extension number and securely password protected.

- All voice messaging system users must use secure passwords known only to the user.

Security Risks Associated with the Automated Attendant Feature of Voice Messaging Systems

Two areas of toll fraud risk associated with the Automated Attendant feature of voice messaging systems are the following:

- Pooled facility (line/trunk) access codes are translated to a menu prompt to allow Remote Access. If a hacker finds this prompt, the hacker has immediate access. (In Release 3.1 and later systems, dial access to pools is initially factory-set to restrict all extensions: to allow pool access, this restriction must be removed by the system manager.)

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- If the Automated Attendant prompts callers to use Remote Call Forwarding (RCF) to reach an outside telephone number, the system may be susceptible to toll fraud. An example of this application is a menu or submenu that says, "To reach our answering service, select prompt number 5," and transfers a caller to an external telephone number.

- Remote Call Forwarding can only be used securely when the central office provides "reliable disconnect" (sometimes referred to as forward disconnect or disconnect supervision), which guarantees that the central office will not return a dial tone after the called party hangs up. In most cases, the central office facility is a loop-start line/trunk which does not provide reliable disconnect. When loop-start lines/trunks are used, if the calling party stays on the line, the central office will return a dial tone at the conclusion of the call, enabling the caller to place another call as if it were being placed from your company. Ground-start trunks provide reliable disconnect and should be used whenever possible.

Preventive Measures

Take the following preventive measures to limit the risk of unauthorized use of the Automated Attendant feature by hackers:

- *Do not* use Automated Attendant prompts for ARS Codes or Pooled Facility Codes.

- Assign all unused Automated Attendant Selector Codes to zero, so that attempts to dial these will be routed to the system attendant.

- If Remote Call Forwarding (RCF) is required, MERLIN LEGEND Communications System owners should coordinate with their Lucent Technologies Account Team or authorized dealer to verify the type of central office facility used for RCF. If it is a ground-start line/trunk, or if it is a loop-start line/trunk and central office reliable disconnect can be ensured, then nothing else needs to be done.

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$\implies$ **NOTE:**

In most cases these will be loop-start lines/trunks without reliable disconnect. The local telephone company will need to be involved to change the facilities used for RCF to ground start lines/trunks. Usually a charge applies for this change. Also, hardware and software changes may need to be made in the MERLIN LEGEND Communications System. The MERLIN MAIL and MERLIN LEGEND Mail Automated Attendant feature merely accesses the RCF feature in the MERLIN LEGEND Communications System. Without these changes being made, this feature is highly susceptible to toll fraud. These same preventive measures must be taken if the RCF feature is active for MERLIN LEGEND Communications System extensions whether or not it is accessed by an Automated Attendant menu.

Security Risks Associated with the Remote Access Feature

Remote Access allows the MERLIN LEGEND Communications System owner to access the system from a remote telephone and make an outgoing call or perform system administration, using the private network facilities (lines/trunks) connected to the MERLIN LEGEND Communications System. Hackers, scanning the public switched network by randomly dialing numbers with war dialers (a device that randomly dials telephone numbers, including 800 numbers, until a modem or dial tone is obtained), can find this feature, which will return a dial tone to them. They can even employ war dialers to attempt to discover barrier codes.

Preventive Measures

Take the following preventive measures to limit the risk of unauthorized use of the MERLIN LEGEND Communications System Remote Access feature by hackers:

- The Remote Access feature can be abused by criminal toll fraud hackers, if it is not properly programmed. Therefore, this feature should not be used unless there is a strong business need.

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Other Security Hints

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- It is strongly recommended that customers invest in security adjuncts, which typically use one-time passcode algorithms. These security adjuncts discourage hackers. Since a secure use of the Remote Access feature generally offers savings over credit-card calling, the break-even period can make the investment in security adjuncts worthwhile.

- If a customer chooses to use the Remote Access feature without a security adjunct, then multiple barrier codes should be employed, with one per user if the system permits. The MERLIN LEGEND system permits a maximum of 16 barrier codes.

- The maximum length should be used for each barrier code, and should be changed periodically. Barrier codes, like passwords, should consist of a random, hard-to-guess sequence of digits. While MERLIN LEGEND Release 3.0 permits a barrier code of up to 11 digits, systems prior to Release 3.0 permit barrier codes of up to only four digits.

If Remote Access is used, an upgrade to MERLIN LEGEND Communications System Release 3.0 is encouraged to take advantage of the longer barrier code.

Other Security Hints

Make sure that the Automated Attendant Selector Codes do not permit outside line selection.

Multiple layers of security are always recommended to keep your system secure.

Following are a number of measures and guidelines that can help you ensure the security of your communications system and voice messaging system.

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Other Security Hints

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Educating Users

Everyone in your company who uses the telephone system is responsible for system security. Users and attendants/operators need to be aware of how to recognize and react to potential hacker activity. Informed people are more likely to cooperate with security measures that often make the system less flexible and more difficult to use.

- Never program passwords or authorization codes onto Auto Dial buttons. Display telephones reveal the programmed numbers and internal abusers can use the Auto Dial buttons to originate unauthorized calls.

- Discourage the practice of writing down barrier codes or passwords. If a barrier code or password needs to be written down, keep it in a secure place and never discard it while it is active.

- Instruct operators and attendants to tell their system manager when they answer a series of calls where there is silence on the other end or the caller hangs up.

- Advise users who are assigned voice mailboxes to frequently change personal passwords and not to choose obvious passwords.

- Ensure that the system manager advises users with special telephone privileges (such as Remote Access, Outcalling, and Remote Call Forwarding) of the potential risks and responsibilities.

- Be suspicious of any caller who claims to be with the telephone company and wants to check an outside line. Ask for a callback number, hang up and confirm the caller's identity.

- Never distribute the office telephone directory to anyone outside the company; be careful when discarding it (shred the directory).

- Never accept collect telephone calls.

- Never discuss your telephone system's numbering plan with anyone outside the company.

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Educating Operators

Operators and attendants need to be especially aware of how to recognize and react to potential hacker activity. To defend against toll fraud, operators should follow the guidelines below:

- Establish procedures to counter *social engineering. Social engineering is a con game that hackers frequently use to obtain information that may help them gain access to your communications system or voice messaging system.*

- When callers ask for assistance in placing outside or long-distance calls, ask for a callback extension.

- Verify the source. Ask callers claiming to be maintenance or service personnel for a callback number. Never transfer to *10 without this verification. Never transfer to extension 900.

- Remove the headset and/or handset when the console is not in use.

Detecting Toll Fraud

To detect toll fraud, users and operators should look for the following:

- Lost voice mail messages, mailbox lockout, or altered greetings
- Inability to log into voice mail
- Inability to get an outside line
- Foreign language callers
- Frequent hang-ups
- Touch-tone sounds
- Caller or employee complaints that the lines are busy
- Increases in internal requests for assistance in making outbound calls (particularly international calls or requests for dial tone)
- Outsiders trying to obtain sensitive information
- Callers claiming to be the "phone" company
- Sudden increase in wrong numbers

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Establishing a Policy

As a safeguard against toll fraud, follow these guidelines for your MERLIN LEGEND Communications System and voice messaging system:

- Change passwords frequently (at least quarterly). Changing passwords routinely on a specific date (such as the first of the month) helps users to remember to do so.

- Always use the longest-length password allowed.

- Establish well-controlled procedures for resetting passwords.

- Limit the number of invalid attempts to access a voice mailbox to five or less.

- Monitor access to the MERLIN LEGEND dial-up maintenance port. Change the access password regularly and issue it only to authorized personnel. Disconnect the maintenance port when not in use. (However, this eliminates Lucent Technologies 24-hour maintenance surveillance capability and may result in additional maintenance costs.)

- Create a communications system management policy concerning employee turnover and include these suggestions:

    — Delete all unused voice mailboxes in the voice mail system.

    — If a terminated employee had Remote Access calling privileges and a personal authorization code, remove the authorization code immediately.

    — If barrier codes and/or authorization codes were shared by the terminated employee, these should be changed immediately.

- Regularly back up your MERLIN LEGEND system files to ensure a timely recovery should it be required. Schedule regular, off-site backups.

- Keep the Remote Maintenance Device turned off when not in use by Lucent Technologies or your authorized dealer.

- Limit transfers to registered subscribers only.

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- Use the Security Violations Notification options (Mailbox Lock or Warning Message) to alert you of any mailbox break-in attempts. Investigate all incidents.

- Review security policies and procedures and keep them up-to-date.

Choosing Passwords

Passwords should be the maximum length allowed by the system.

Passwords should be hard to guess and should **not** contain:

- All the same numbers (for example, 1111, 666666)

- Sequential characters (for example, 123456)

- Numbers that can be associated with you or your business, such as your name, birthday, business name, business address, telephone number, or social security number.

- Words or commonly used names.

Passwords should be changed regularly, at least on a quarterly basis. Recycling old passwords is not recommended. Never program passwords (or authorization codes or barrier codes) onto a speed dial button.

Improving Physical Security

You should always limit access to the system console (or attendant console) and supporting documentation. Following are some recommendations:

- Keep the system console and supporting documentation in an office that is secured with a changeable combination lock. Provide the combination only to those individuals having a real need to enter the office.

- Keep telephone wiring closets and equipment rooms locked.

- Keep telephone logs and printed reports in locations that only authorized personnel can enter.

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- Design distributed reports so they do not reveal password or trunk access code information.

- Keep the voice messaging system Remote Maintenance Device turned off.

Limiting Outcalling

When Outcalling is used to contact subscribers who are off-site, use the MERLIN LEGEND Communications System Allowed Lists and Disallowed Lists or Automatic Route Selection features to minimize toll fraud.

If the Outcalling feature will not be used, outward restrict all voice messaging system ports. If Outcalling will be used, ports not used for Outcalling should be Outward Restricted (for MERLIN MAIL Voice Messaging Systems, port 2 on a two-port system, port 4 on a four-port system, ports 5 and 6 on a six-port system). Use Outward Restriction, Toll Restrictions, Allowed Lists, Disallowed Lists and Facility Restrictions Levels, as appropriate to minimize the possibility of toll fraud.

Limited Warranty and Limitation of Liability

Lucent Technologies warrants to you, the customer, that your MERLIN LEGEND Communications System will be in good working order on the date Lucent Technologies or its authorized reseller delivers or installs the system, whichever is later ("Warranty Date"). If you notify Lucent Technologies or its authorized reseller within one year of the Warranty Date that your system is not in good working order, Lucent Technologies will without charge to you repair or replace, at its option, the system components that are not in good working order. Repair or replacement parts may be new or refurbished and will be provided on an exchange basis. If Lucent Technologies determines that your system cannot be repaired or replaced, Lucent Technologies will remove the system and, at your option, refund the purchase price of your system, or apply the purchase price towards the purchase of another Lucent Technologies system.

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If you purchased your system directly from Lucent Technologies, Lucent Technologies will perform warranty repair in accordance with the terms and conditions of the specific type of Lucent Technologies maintenance coverage you selected. If you purchased your system from a Lucent Technologies-authorized reseller, contact your reseller for the details of the maintenance plan applicable to your system.

This Lucent Technologies limited warranty covers damage to the system caused by power surges, including power surges due to lightning.

The following will not be deemed to impair the good working order of the system, and Lucent Technologies will not be responsible under the limited warranty for damages resulting from:

- Failure to follow Lucent Technologies' installation, operation, or maintenance instructions

- Unauthorized system modification, movement, or alteration

- Unauthorized use of common carrier communication services accessed through the system

- Abuse, misuse, or negligent acts or omissions of the customer and persons under the customer's control

- Acts of third parties and acts of God

LUCENT TECHNOLOGIES' OBLIGATION TO REPAIR, REPLACE, OR REFUND AS SET FORTH ABOVE IS YOUR EXCLUSIVE REMEDY.

EXCEPT AS SPECIFICALLY SET FORTH ABOVE, LUCENT TECHNOLOGIES, ITS AFFILIATES, SUPPLIERS, AND AUTHORIZED RESELLERS MAKE NO WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIM ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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Limitation of Liability

Except as provided below, the liability of Lucent Technologies and its affiliates and suppliers for any claims, losses, damages, or expenses from any cause whatsoever (including acts or omissions of third parties), regardless of the form of action, whether in contract, tort, or otherwise, shall not exceed the lesser of: (1) the direct damages proven; or (2) the repair cost, replacement cost, license fee, annual rental charge, or purchase price, as the case may be, of the equipment that gives rise to the claim. Except as provided below, Lucent Technologies and its affiliates and suppliers shall not be liable for any incidental, special, reliance, consequential, or indirect loss or damage incurred in connection with the equipment. As used in this paragraph, consequential damages include, but are not limited to, the following: lost profits, lost revenues, and losses arising out of unauthorized use (or charges for such use) of common carrier telecommunications services or facilities accessed through or connected to the equipment. For personal injury caused by Lucent Technologies' negligence, Lucent Technologies' liability shall be limited to proven damages to person. **No action or proceeding against Lucent Technologies or its affiliates or suppliers may be commenced more than twenty-four (24) months after the cause of action accrues.** THIS PARAGRAPH SHALL SURVIVE FAILURE OF AN EXCLUSIVE REMEDY.

Remote Administration and Maintenance

The Remote Administration and Maintenance feature of your telecommunications system, if you choose to use it, permits users to change the system features and capabilities from a remote location.

The Remote Administration and Maintenance feature, through proper administration, can help you reduce the risk of unauthorized persons gaining access to the private network. However, telephone numbers and access codes can be compromised when overheard in a public location, are lost through theft of a wallet or purse containing access information, or through carelessness (for example, writing codes on a piece of paper and improperly discarding them). Additionally, hackers may use a computer to dial an access code and then

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publish the information to other hackers. Substantial charges can accumulate quickly. It is your responsibility to take appropriate steps to implement the features properly, evaluate and administer the various restriction levels, and protect and carefully distribute access codes.

Under applicable tariffs, you will be responsible for payment of toll charges. Lucent Technologies cannot be responsible for such charges and will not make any allowance or give any credit resulting from unauthorized access.

To reduce the risk of unauthorized access through Remote Administration and Maintenance, please observe the following procedures:

- The System Administration and Maintenance capability of a Hybrid/PBX or Key system is protected by a password.

  — Change the default password immediately.

  — Continue to change the password regularly.

  — Only give the password to people who need it and impress upon them the need to keep it secret.

  — If anyone who knows the password leaves the company, change the password immediately.

- If you have a special telephone line connected to your Hybrid/PBX or Key system for Remote Administration and Maintenance, you should do one of the following:

  — Unplug the line when it is not being used.

  — Install a switch in the line to turn it off when it is not being used.

  — Keep the Remote Administration and Maintenance telephone number secret. Only give it to people who need to know it, and impress upon them the need to keep it a secret. Do not write the telephone number on the Hybrid/PBX or Key system, the connecting equipment, or anywhere else in the system room.

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- If your Remote Administration and Maintenance feature requires that someone in your office transfer the caller to the Remote Administration and Maintenance extension, you should impress upon your employees the importance of only transferring authorized individuals to that extension.

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System Numbering Forms

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When you change any existing trunk or extension wiring, record information about the wiring on the appropriate system numbering form. This appendix includes examples of all of the system numbering forms, and instructions for completing Form 2a, "System Numbering: Extension Jacks." The system numbering forms, which are included in this appendix, are as follows:

- Form 2a, System Numbering: Extension Jacks(Figure B-1)

- Form 2b, System Numbering: Digital Adjuncts (Figure B-2)

- Form 2c, System Numbering: Line/Trunk Jacks (Figure B-3)

- Form 2d, System Numbering: Special Renumbers (Figure B-4)

See *System Planning* for completed forms which contain more detailed information regarding the configuration of your customer's system.

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Form 2a, System Numbering: Extension Jacks

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Form 2a, System Numbering: Extension Jacks

Renumber System*
❑ 2-Digit ◆   ❑ Selected Extension Numbers   ❑ 3-Digit   ❑ Set Up Space

Mod. Type	Log. ID	Jack Type A	Jack Type D†	Jack Type B	Eqpt.	2-Dig Ext. No.◆	3-Dig. Ext. No.	Set Up Space	Renumber to	Label	Old Ext. No.	Wire No.	Person, Location, or Function	Ring Freq.‡	Voice Mail
	1					10	100	7100							
	2					11	101	7101							
	3					12	102	7102							
	4					13	103	7103							
	5					14	104	7104							
	6					15	105	7105							
	7					16	106	7106							
	8					17	107	7107							
	9					18	108	7108							
	10					19	109	7109							
	11					20	110	7110							
	12					21	111	7111							
	13					22	112	7112							
	14					23	113	7113							
	15					24	114	7114							
	16					25	115	7115							
	17					26	116	7116							
	18					27	117	7117							
	19					28	118	7118							
	20					29	119	7119							
	21					30	120	7120							
	22					31	121	7121							
	23					32	122	7122							
	24					33	123	7123							

Shaded lines indicate possible operator positions.
◆ Factory Setting
* The system capacity for Personal Directories is decreased by one whenever an MLX-20L telephone is connected to an MLX port.
† Use Form 2b for adjuncts connected via MFM or ISDN Terminal Adapter (such as the ExpressRoute 1000 or 7500B data module).
‡ Ringing Frequency is programmable on the 016 T/R module only.

Figure B-1.   Form 2a, System Numbering: Extension Jacks

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Form 2a, System Numbering: Extension Jacks

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The following explains how to complete Form 2a.

The number in the logical ID column refers to the number of the extension jack in the control unit.

1. In the "Eqpt" (Equipment). column, enter the type of device (such as an MLX-20L console) that is connected to the extension jack. On the second line, enter any attached adjuncts (such as an answering machine).

2. In the "Old Ext. No." column, if the wire run is being changed, enter the extension number of the old extension. If you are working with a new installation, leave this space blank.

3. In the "Renumber to" column, enter the extension number of the extension, if not already filled in. (This includes new installations.)

4. In the "Wire No." column, enter the number of the wire as indicated by the label on the wire.

5. In the "Person, Location, or Function" column, enter the name of the person at the location of, or the function of (such as a fax machine) the extension, and any miscellaneous information particular to that extension.

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Form 2b, System Numbering: Digital Adjuncts

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Form 2b, System Numbering: Digital Adjuncts

Log. ID	Factory-Set 2-digit	Factory-Set 3-digit	Factory-Set Set Up Space	Renumber to	Adjuncts	2B	Pass. Bus	MLX Telephone Ext. No.	Person, Location, Function, and Equipment Type
1	710	300	7300						
2	711	301	7301						
3	712	302	7302						
4	713	303	7303						
5	714	304	7304						
6	715	305	7305						
7	716	306	7306						
8	717	307	7307						
9	718	308	7308						
10	719	309	7309						
11	720	310	7310						
12	721	311	7311						
13	722	312	7312						
14	723	313	7313						
15	724	314	7314						
16	725	315	7315						
17	726	316	7316						
18	727	317	7317						
19	728	318	7318						
20	729	319	7319						
21	730	320	7320						
22	731	321	7321						
23	732	322	7322						
24	733	323	7323						
25	734	324	7324						
26	735	325	7325						
27	736	326	7326						
28	737	327	7327						
29	738	328	7328						
30	739	329	7329						
31	740	330	7330						
32	741	331	7331						
33	742	332	7332						
34	743	333	7333						
35	744	334	7334						
36	745	335	7335						
37	746	336	7336						
38	747	337	7337						
39	748	338	7338						
40	749	339	7339						

Figure B-2.   Form 2b, System Numbering: Digital Adjuncts

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Form 2c, System Numbering: Line/Trunk Jacks

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Form 2c, System Numbering: Line/Trunk Jacks

Music On Hold, Line/Trunk No. _____ Source _____   **Maintenance Alarm,** Line/Trunk No. _____
Loudspeaker Page, Line/Trunk No(s). _____   **Loop-Start Reliable Disconnect***
☐ No ◆   ☐ Yes

Module Type and Slot No.	Log. ID	Jack Type (LS, GS, DID, Tie, etc.)	Line/ Trunk No.	Pool Dial-Out Code†‡	Re-number to	Incoming Line/Trunk Type (Main No., Personal Line, WATS, FX, etc.)	Telephone Number or Equipment	Label	Outmode Signaling TT◆	Outmode Signaling R	Toll Type Prefix Req'd for LD Yes◆	Toll Type Prefix Req'd for LD No	Hold Disc. Interval Short	Hold Disc. Interval Long ◆	QCC Operator to Receive Calls† (No ◆)	QCC Queue Priority Level† (4 ◆)	Function
	1		801					⌐⌐⌐⌐⌐⌐									
	2		802					⌐⌐⌐⌐⌐⌐									
	3		803					⌐⌐⌐⌐⌐⌐									
	4		804					⌐⌐⌐⌐⌐⌐									
	5		805					⌐⌐⌐⌐⌐⌐									
	6		806					⌐⌐⌐⌐⌐⌐									
	7		807					⌐⌐⌐⌐⌐⌐									
	8		808					⌐⌐⌐⌐⌐⌐									
	9		809					⌐⌐⌐⌐⌐⌐									
	10		810					⌐⌐⌐⌐⌐⌐									
	11		811					⌐⌐⌐⌐⌐⌐									
	12		812					⌐⌐⌐⌐⌐⌐									
	13		813					⌐⌐⌐⌐⌐⌐									
	14		814					⌐⌐⌐⌐⌐⌐									
	15		815					⌐⌐⌐⌐⌐⌐									
	16		816					⌐⌐⌐⌐⌐⌐									
	17		817					⌐⌐⌐⌐⌐⌐									
	18		818					⌐⌐⌐⌐⌐⌐									
	19		819					⌐⌐⌐⌐⌐⌐									
	20		820					⌐⌐⌐⌐⌐⌐									

◆ Factory Setting
* If the system has AUDIX Voice Power/FAX Attendant System™, Integrated Administration will automatically set Loop-Start Reliable Disconnect to Yes.
† Hybrid/PBX mode only.

‡ Maximum: 11 pools with up to 80 trunks per pool.
Factory settings: 70 (main), 891 (dial-in tie), 892 (automatic-in tie).

Figure B-3.   Form 2c, System Numbering: Line/Trunk Jacks

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Form 2d, System Numbering: Special Renumbers

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Form 2d, System Numbering: Special Renumbers

Pools* (Form 2c) Description	Factory-Set Number	Renumber to
	70	
	890	
	891	
	892	
	893	
	894	
	895	
	896	
	897	
	898	
	899	

Group Paging (Form 7b) Group ID	Factory-Set Number	Renumber to
	793	
	794	
	795	
	796	
	797	
	798	
	799	

Park Zone (Form 6a) Description	Factory-Set Number	Renumber to
	881	
	882	
	883	
	884	
	885	
	886	
	887	
	888	

DSS Page Buttons	
PAGE 1	Beginning extension for range _____
PAGE 2	Beginning extension for range _____
PAGE 3	Beginning extension for range _____

ARS Dial-Out Code†	Default	Renumber to
	9	

Group Calling (Form 7d) Group ID Label	Factory-Set Number	Renumber to
	770	
	771	
	772	
	773	
	774	
	775	
	776	
	777	
	778	
	779	
	780	
	781	
	782	
	783	
	784	
	785	
	786	
	787	
	788	
	789	
	790	
	791	
	7920	
	7921	
	7922	
	7923	
	7924‡	
	7925‡	
	7926‡	
	7927‡	
	7928‡	
	7929‡	

Listed Directory Number* (QCC Queue)	Factory-Set Number	Renumber to
	800	

Remote Access Code (Form 3a)	Factory-Set Number	Renumber to
	889	

* *Hybrid/PBX mode only.*
† *ARS Dial-Out Code is Idle Line Preference Code in Key mode.*
‡ *Reserved for AUDIX Voice Power/FAX Attendant System.*

Figure B-4.   Form 2d, System Numbering: Special Renumbers

Unit Load Calculation Worksheet

C

If you determine that you need to recalculate the unit load for any carrier, use the instructions on the following worksheet.

➡ **NOTES:**

1. You should have a separate copy of the worksheet for each carrier.

2. See "Unit Loads" on page 1-35 for information on recalculating unit loads.

The 391C1 or 391A3 power supplies have a maximum rating of 75 unit loads. If your system contains a 391A1 or 391A2 power supply module, and the unit loads for that carrier will exceed 54, it is recommended that a 391A3 power supply be installed in the system. Auxiliary Power Units cannot be used with the 391A3 power supply.

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Unit Load Worksheet

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Unit Load Worksheet

1. Number of modules in carrier (excluding power supply and processor):   _____

    - If fewer than five, power is adequate.

    - If five or six, continue to Step 2.

2. Key or Behind Switch mode only:

    Indicate configuration of lines; then go to Step 5.

    ☐ Square
    ☐ Modified

3. Hybrid/PBX mode only:

    Do all modules in the carrier have MLX and/or analog multiline telephone jacks?

    ☐ Yes
    ☐ No

    - If no, a newer power supply is not needed.

    - If yes, continue to Step 4.

4. Hybrid/PBX mode only:

    Calculate the total number of MLX and analog multiline telephones:

    Number of MLX-20L consoles connected to modules in the carrier   _____

    Number of MLX-28D consoles connected to modules in the carrier   _____

    Number of 34-button analog multiline telephones connected to modules in the carrier   _____

    Total of MLX-20L, MLX-28D, and 34-button analog telephones   _____

    - If total is less than or equal to 45, auxiliary power is not required.

    - If the total is greater than 45, continue to Step 5.

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Unit Load Worksheet

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5. Calculate the estimated unit loads.

Module	Qty x	Unit Load	= Total
008		12.0	
008 MLX		13.5	
008 OPT		8.0	
012		8.4	
016 (T/R)		12.8	
100D		0.0	
400 (LS)		0.0	
400 EM		8.0	
400 GS/LS/TTR		8.0	
408		12.0	
408 GS/LS		12.0	
408 GS/LS-MLX		13.5	
800		0.0	
800 NI-BRI		0.0	
800 GS/LS		0.0	
800 GS/LS-ID		8.0	
800 DID		8.0	
MERLIN LEGEND Mail		0.0	
Total Estimated Unit Load			

- If the total is less than or equal to 54, any power supply module is sufficient.

- If the total is greater than 54, continue to Step 6.

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Unit Load Worksheet

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6. Calculate the actual carrier unit load.

Equipment	Qty x	Unit Load Hybrid/PBX or Modified	Square	= Total
Network Access Lines*				
DID		1.0	1.0	
DS1		0.0	0.0	
GS/LS		0.0	0.0	
Tie		1.4	1.4	
Telephones				
MLX-5		0.9	1.2	
MLX-5D		0.9	1.2	
MLX-10		0.9	1.2	
MLX-10D		0.9	1.2	
MLX-16DP		1.5	1.5	
MLX-28D		1.2	1.7	
MLX-20L		1.1	1.6	
BIS-10		0.9	1.1	
BIS-22		1.0	1.3	
BIS-22D		1.0	1.3	
BIS-34		1.1	1.5	
BIS-34D		1.1	1.5	
MLC-5		0.0	0.0	
MDC-9000		0.0	0.0	
MDCW-9000		0.0	0.0	
10-Button Basic		0.9	1.1	
10-Button HFAI		1.0	1.2	
34-Button Basic		0.9	1.1	
34-Button DLX		1.2	1.7	
34-Button BIS		1.2	1.4	
34-Button BIS/DIS		1.2	1.4	
Single-Line Telephone		0.6	0.7	

Continued

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Unit Load Worksheet

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*   Unit loads are computed per trunk for trunk-type private network access lines.

Equipment	Qty x	Unit Load		= Total
		Hybrid/PBX or Modified	Square	
Optional Equipment[1]				
Direct Station Selector[2]		0.7	0.9	
General Purpose Adapter		0.8	1.0	
Hands-Free Unit		0.8	1.0	
Headset Adapter		0.8	1.0	
PC ISDN Card				
		Total Actual Unit Load		

---

1. The MFM has its own wall power unit located at the telephone and therefore is not added to the unit load calculation.

2. Up to two DSSs (one DSS per MLX-28D or MLX-20L console) can be powered from each control unit carrier. For example, a 3-carrier system can have 6 system operator positions, each with one DSS powered from the control unit.

- If the total actual unit load is less than or equal to 54, any power supply module is sufficient.

- If the total actual unit load is greater than 54, continue to Step 7.

7. Try to exchange modules between carriers to reduce the unit loads to 54. (Remember that the 100D, 400 (LS), 400 GS/LS/TTR, 800 GS/LS-ID, 800, 800 NI-BRI, and 800 GS/LS modules have unit loads of 0.0.) Repeat Steps 1 through 6 to recalculate unit loads for the new configuration.

   - If the exchange reduces the unit load to 54 or less, any power supply module is sufficient.

   - If the exchange does not reduce the unit load to 54 or less, a 391A3 power supply is needed. Continue to Step 8.

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Unit Load Worksheet

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➡ NOTE:
Empty slots are not permitted between modules.

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Unit Load Worksheet

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8. Calculate the unit loads for slots 5 and 6 of the carrier.

Equipment	Qty x	Unit Load Hybrid/PBX or Modified	Square	= Total
Network Access Lines*				
DID		1.0	1.0	
DS1		0.0	0.0	
GS/LS		0.0	0.0	
Tie		1.4	1.4	
Telephones				
MLX-5		0.9	1.2	
MLX-5D		0.9	1.2	
MLX-10		0.9	1.2	
MLX-10D		0.9	1.2	
MLX-16DP		1.5	1.5	
MLX-28D		1.2	1.7	
MLX-20L		1.1	1.6	
BIS-10		0.9	1.1	
BIS-22		1.0	1.3	
BIS-22D		1.0	1.3	
BIS-34		1.1	1.5	
BIS-34D		1.1	1.5	
MLC-5		0.0	0.0	
MDC-9000		0.0	0.0	
MDCW-9000		0.0	0.0	
10-Button Basic		0.9	1.1	
10-Button HFAI		1.0	1.2	
34-Button Basic		0.9	1.1	
34-Button DLX		1.2	1.7	
34-Button BIS		1.2	1.4	
34-Button BIS/DIS		1.2	1.4	
Single-Line Telephone		0.6	0.7	

Continued

---

*   Unit loads are computed per trunk for trunk-type private network access lines.

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Unit Load Worksheet

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	Qty x	Unit Load		= Total
Equipment		Hybrid/PBX or Modified	Square	
Optional Equipment[1]				
Direct Station Selector[2]		0.7	0.9	
General Purpose Adapter		0.8	1.0	
Hands-Free Unit		0.8	1.0	
Headset Adapter		0.8	1.0	
Total Actual Unit Load for Slots 5 and 6				

---

1. The MFM has its own wall power unit located at the telephone and therefore is not added to the unit load calculation.

2. Up to two DSSs (one DSS per MLX-28D or MLX-20L console) can be powered from each control unit carrier. For example, a 3-carrier system can have 6 system operator positions, each with one DSS powered from the control unit.

- If the unit load for slots five and six is less than or equal to 27, power is sufficient for the carrier.

- If the unit load for slots five and six is more than 27, continue to Step 9.

9. Try to exchange modules between carriers to reduce the unit loads for slots 5 and 6 through 27. The 100D, 400 (LS), 400 GS/LS/TTR, 800 GS/LS-ID, 800, 800 NI-BRI, and 800 GS/LS modules have unit loads of 0.0. Repeat Steps 1 through 8 to recalculate unit loads for new configurations.

- If the exchange reduces the unit load for slots five and six through 27 or less, power is sufficient.

- If the exchange does not reduce the unit loads for slots 5 and 6 through 27, install wall power units for the appropriate number of telephones to reduce the unit load to 27.

   $\Longrightarrow$ **NOTE:**
   Empty slots are not permitted between modules.

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Unit Load Worksheet

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Unit Load Worksheet

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Backing Up with a Memory Card

D

A PCMCIA (Personal Computer Memory Card International Association) interface slot is present on the processor module. The slot is a standard interface through which information can be added to or obtained from the system using a memory card. The PCMCIA interface slot accepts one memory card at a time.

This section covers the following memory card functions:

- Memory card formatting
- Restore
- Backup
- Automatic backup

Card Types

The types of memory cards are described below. The card type is identified by a preprinted, color-coded label.

- Upgrade Card. This card is used for MERLIN LEGEND Communication System software upgrades. The upgrade can be performed by the system manager using the memory card and the Maintenance option on the SPM Main Menu. This card is identified by an orange label with black lettering.

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Card Types

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- Translation Card. The backup and restore procedures previously available to system managers through SPM (using the PC and floppy disks) can now be performed using the memory card and the new Backup/Restore option on the System menu. A new automatic backup feature permits you to set the system to perform automatic backups to the memory card on a daily or weekly basis. See and for more information. This card is identified by a white label with black lettering.

- Forced Installation. For use by qualified service technicians only, this card is used when the system software has been corrupted and a re-installation must be done at the customer site. The use of the card for forced installation is reserved for emergency situations in which the system software on the processor module has been damaged. This card is identified by an orange label with black lettering. In addition, black stripes are present on the card to distinguish it from an upgrade card.

shows a sample Translation card.

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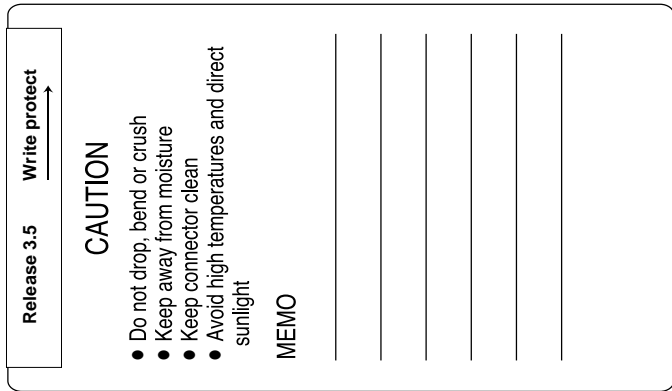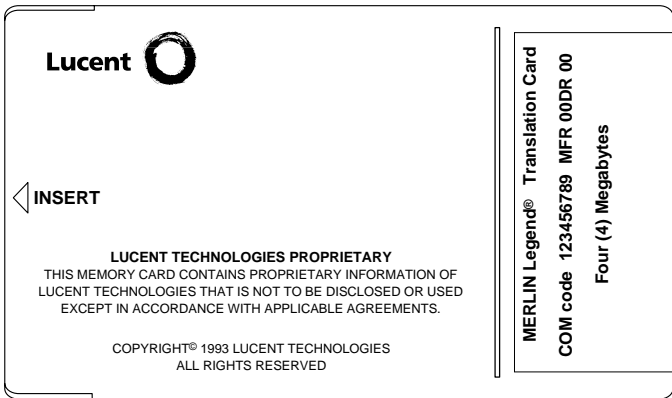*Issue 1*
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Card Types

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Figure D-1.   PCMCIA Translation Memory Card

Inserting the Card

To insert the card, hold the card with the Lucent Technologies logo facing up and the arrow pointing toward the slot. See Figure D-2 for the proper way to insert the memory card into the slot on the processor module.
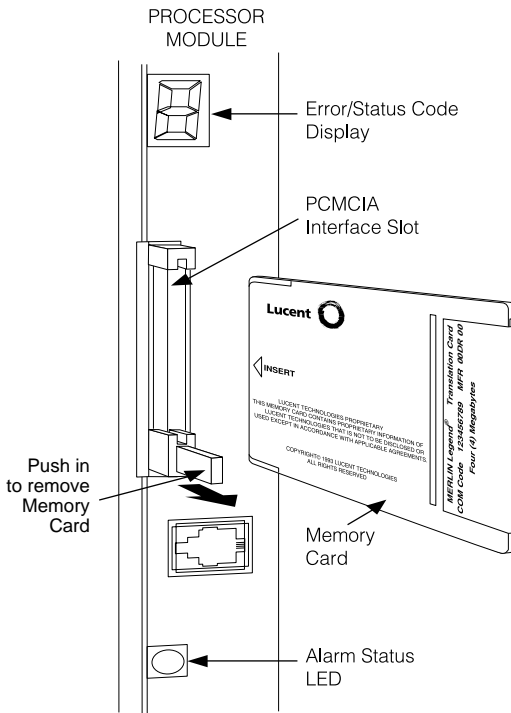

Figure D-2.   Inserting the Memory Card

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Memory Card Formatting

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Memory Card Formatting

The memory card may have to be formatted before you begin any manual or automatic backup procedures. This section details the screens and messages that appear during the format procedure.

⚠ CAUTION:

Formatting overwrites previous data on the memory card. Make certain that there is no important information on the card before you begin formatting.

Unformatted Card

```
Memory Card Backup:
Inserted Memory Card is
not the correct type.
Do you want it formatted?
Yes
No
Exit
```

If you begin a backup procedure with an unformatted or incorrectly formatted card, this screen appears.

The inserted memory card is not the correct type. You have the option of formatting the memory card as a translation memory card or repeating the backup procedure with a different translation memory card.

➡ NOTES:

1. Only 4-MB Series I or Series II PCMCIA memory cards may be formatted, except those already formatted as translation cards.

2. If a memory card cannot be formatted, a message appears on screen. These messages are noted in the procedures as appropriate.

A memory card may need to be formatted if it is intended for use as a translation card but is currently blank, or contains data other than backup files for the system.

Format Warning

```
Format Memory Card:
All data on card will be
DELETED.
Do you want it formatted?
Yes
No
Exit
```

This screen appears if you respond to format the memory card.

Select Yes (or press `F3`) to begin the memory card format. Table D–1 lists the screen messages that may appear while formatting is in progress.

Table D–1. Memory Card Formatting Messages

Message	What it Means
`Formatting Memory Card`	The format is in progress.
`Formatting of Memory Card Completed.`	The format was successful and has completed.
`Memory Card cannot be formatted.`	The memory card cannot be formatted. Remove the card and repeat the procedure with another card.
`Formatting of Memory Card FAILED.`	The format was unsuccessful. Remove the card and repeat the procedure with another card.
`Missing Card or Card Not Inserted Correctly`	Verify that the card is inserted correctly and repeat the procedure.

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Backup

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Backup

Use this procedure to make a copy of your customized system data. You should create a backup at least three times during system installation (so that programmed information is not lost), and once after each system upgrade, service technician visit, or major system reconfiguration.

Summary: Backup

Programmable by	System Manager
Mode	All
Idle Condition	System Forced Idle
Planning Form	Form 1, System Planning
Factory Setting	Not applicable
Valid Entries	1- to 11-character filename
Inspect	Yes
Copy Option	No
Console Procedure	Insert memory card→System→Back/Restore→ Backup→Select backup file→Dial the new backup filename→Enter→Yes→Exit→Exit→Exit
PC Procedure	Insert memory card→ F1 → F9 → F1 →Select backup file→Type the new backup filename→ F6 → F1 → F5 → F5 → F5

Procedure: Backup

1. Insert the memory card into the PCMCIA interface slot on the processor module.

Console Display/Instructions   Additional Information   PC

2. Select the System menu.

```
System Programming:     >
Make a selection
System        Extensions
SysRenumber   Options
Operator      Tables
LinesTrunks   AuxEquip
Exit          NightSrvce
```
F1

3. Select Back/Restore.

```
System:
Make a selection
Restart       MaintenBusy
SProg Port    Date
Mode          Time
Board Renum   Back/Restore
Exit
```
F9

▶ 4. **Select Backup.**

```
Memory Card:
Make a selection
Backup
Restore
Auto Backup

Exit
```
F1

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Backup

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Console Display/Instructions   **Additional Information**   **PC**

▶ **5. Select the backup filename.**

```
Memory Card Backup:
Make a selection
BACK1.*****    AUTO.BACK1
BACK2.*****    AUTO.BACK2
BACK3.*****

Exit
```

If you select AUTO.BACK1 or
AUTO.BACK2, go to Step 8. You
cannot rename either of these
two files

If you select BACK1., BACK2., or
BACK3. and do not want to rename
the file, go to Step 8.
Press the button or function key
next to your selection.

▶ **6. Rename the backup file (*n* = 1 to 11 characters).**

```
Backup File: Enter name
BACKx.mmdd
Punctuation
Backspace
A '           ¬ B
C –           & D
E .           Space F
```

x = backup file selected in Step 5
mm/dd = current month and day

Use Punctuation to toggle between
the letters and punctuation.
Dial or type [*n*].

Use the buttons next to the display
to specify the letters A through I and
punctuation. Use the line/feature
buttons to specify additional alpha-
numeric characters for labels. Use
the template provided with the MLX-20L
telephone to see which line buttons
correspond to which alphanumeric
characters.

▶ **7. Save your entry.**

Select Enter.   F6

Note: F6 , not F10 .

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Backup

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Console Display/Instructions   Additional Information   PC

▶ **8. Respond to the prompt.**

```
Backup filename:


Do you want to continue?
Yes
No


Exit
```

filename = file selected in
Step 5 or entered in Step 6

Select No to abort the backup.   F2
Go to Step 11.

Select Yes to continue the backup.   F1

▶ **9. Observe the backup progress screen.**

```
Backup filename:
Backup in Progress,
Please Wait.


xx% completed


Exit
```

filename = file selected in Step 5
or entered in Step 6

xx% = percentage of backup
completed

●

▶ **10. Observe the backup completion screen.**

```
Backup nnnnnnnnnnn:
Backup Successfully
Completed.




Exit
```

nnnnnnnnnnn = backup
filename

▶ **11. Return to the System Programming menu.**

Select Exit three times.   F5 F5 F5

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Automatic Backup

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Automatic Backup

If an automatic backup fails for any reason, except when the failure results from the memory card being write-protected, the automatic backup feature is turned off. Follow the procedure below to reprogram automatic backup.

Summary: Automatic Backup

Programmable by	System Manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	Weekly backup (Sunday at 2:00 am)
Valid Entries	Daily: hhmm (00 to 23; 00 to 59) Weekly: dhhmm (0 to 6; 00 to 23; 00 to 59)
Inspect	No
Copy Option	No
Console Procedure	To program daily backup: Insert memory card→System→Back/Restore→ Auto Backup→Daily→**Drop**→Dial time→Enter →Exit→Exit
	To program weekly backup: Insert memory card→System→Back/Restore→ Auto Backup→Weekly→**Drop**→Dial day and time→Enter→Exit→Exit
PC Procedure	To program daily backup: Insert memory card→ F1 → F9 → F3 → F2 → Alt + P →Type time→ F10 → F5 → F5
	To program weekly backup: Insert memory card→ F1 → F9 → F3 → F3 → Alt + P →Type day and time→ F10 → F5 → F5

Procedure: Automatic Backup

Console Display/Instructions   Additional Information   PC

1. Insert the memory card into the PCMCIA interface slot on the processor module.

▶ **2. Select the System menu.**

```
System Programming:     >
Make a selection
System        Extensions
SysRenumber   Options
Operator      Tables
LinesTrunks   AuxEquip
Exit          NightSrvce
```
`F1`

▶ **3. Select Back/Restore.**

```
System:
Make a selection
Restart       MaintenBusy
SProg Port    Date
Mode          Time
Board Renum   Back/Restore
Exit
```
`F9`

▶ **4. Select Auto Backup.**

```
Memory Card:
Make a selection
Backup
Restore
Auto Backup


Exit
```
`F2`

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Automatic Backup

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Console Display/Instructions	Additional Information	PC

▶ **5. Make a selection.**

```
Auto MemCard Backup:
Select one
Off
Daily
Weekly


Exit          Enter
```

Select Off,   `F1`
Daily, or   `F2`
Weekly   `F3`

▶ **6. Save your entry.**   ●   ◆

  Select Enter.   `F10`

If you selected Off, you have finished this
procedure. Go to Step 7.

If you selected Daily, go to
● Daily Backup Procedure.

If you selected Weekly, go to
◆ Weekly Backup Procedure.

▶ **7. Return to the System Programming menu.**

  Select Exit two times.   `F5` `F5`

● Daily Backup Procedure

  1. Erase the current daily backup time (*xxxx*).

```
Daily MemCard Backup:
Enter hour (00-23) and
minutes (00-59) HHMM
xxxx

Backspace
Exit          Enter
```

Press **Drop**.   `Alt`+`P`

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Console Display/Instructions   Additional Information   PC

▶ **2. Enter the time when you want the automatic backup to run every day (*hh* = 00 to 23, *mm* = 00 to 59).**

```
Daily MemCard Backup:
Enter hour (00-23) and
minutes (00-59) HHMM



Backspace
Exit          Enter
```

Dial or type [*hhmm*].   ⟲

▶ **3. Save your entry.**

Select Enter.   F6

▶ **4. Return to the System Programming menu.**

Select Exit two times.   F5 F5

◆   Weekly Backup Procedure

1. Erase the current weekly backup day and time (*xxxxx*).

```
Weekly MemCard Backup:
Enter day (0-6) hr (00-23)
and min (00-59) DHHMM
xxxxx

Backspace
Exit          Enter
```

Press **Drop**.   Alt + P

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Automatic Backup

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Console Display/Instructions   Additional Information   PC

▶ 2. **Enter the day (*d* = 0 to 6) and time (*hh* = 00 to 23, *mm* = 00 to 59) when you want the automatic backup to run each week.**

```
Weekly MemCard Backup:
Enter day (0-6), hr (00-23)
and min (00-59) DHHMM



Backspace
Exit          Enter
```

0 = Sunday, 1 = Monday, and so on.

Dial or type [*dhhmm*].   ⟳

▶ 3. **Save your entry.**

Select Enter.   F10

▶ 4. **Return to the System Programming menu.**

Select Exit two times.   F5 F5

Backup Messages

During manual or automatic backup procedures, additional screens may appear to alert you to problems with the translation memory card, the backup file, or the backup procedure. This section contains illustrations of each screen and information about what to do if the screen appears.

➔ NOTE:

The screens shown in this section are from the manual backup procedure; however, the screens that may appear in both the manual and automatic backup procedures are similar. The screens in both procedures differ only in the appearance of the first line. On the automatic backup screens, AutoMemory Card Backup replaces the word Backup shown on the screens below.

Backup Canceled

```
Backup x:
BACKUP IS CANCELED.
File has been DELETED.



Exit
```

x = backup filename

If the system detects an error, either on the memory card or with the backup file, or if you abort the backup, this screen appears.

The backup file being created is deleted, and the backup is aborted.

You must repeat the backup procedure.

Card Removed While Backup Is in Progress

```
Backup x:
BACKUP IS CANCELED.
Verify that Memory Card
has been inserted
correctly.
File has been DELETED.
Exit
```

x = backup filename

The memory card is not inserted or is inserted incorrectly while a backup is in progress. The backup file that was being created is deleted and the backup is aborted. You must reinsert the memory card and repeat the backup procedure.

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Automatic Backup

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Card Missing or Card Not Inserted Correctly

```
Memory Card Backup:
Verify that Memory Card
has been inserted
correctly.


Exit
```

The memory card is either not inserted or is inserted incorrectly. The backup is aborted. You must reinsert the memory card and repeat the backup procedure. This screen may also appear if the wrong type of memory card is inserted and a backup or automatic backup is requested within one minute of insertion. Verify that the card is a translation memory card.

Card Is Write-Protected

```
Memory Card Backup:
Memory Card is Write-
Protected.
Reset Write-Protect Tab
on Memory Card.

Exit
```

The memory card is write-protected. You must remove the memory card, flip the write-protect tab, reinsert the memory card, and repeat the backup procedure.

⚠ CAUTION:
The memory card may be write-protected to avoid the accidental erasure of the backup files. Make certain this is not the case before you change the write-protect tab.

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Restore

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Card Failure

```
Memory Card Backup:
Backup Failure
Try a different file or
a new Memory Card.


Exit
```

If the card is damaged, repeat the backup with a different card. If a backup is in
progress and fails, the system makes two additional attempts at the backup. At
the start of each attempt, a message appears with the percentage of the backup
that is completed. If the backup fails after three attempts, the screen shown
above appears. Repeat the backup procedure using a different file and/or
memory card.

Restore

Use this procedure to restore system conditions that were backed up onto a
translation memory card. The information in a backup file on the translation card
is copied to the system.

The restore procedure is necessary under the following conditions:

- System RAM is corrupt.
- A previously stored set of system conditions is preferred over the current
  set.
- The processor module is replaced.
- After a System Erase (frigid start) has been performed.
- The system software has been reinstalled.

The Inspect feature (**Inspct** or PgDn) is available to view the attributes of the
backup files on the memory card prior to initiating the restore procedure. The
attributes included on the Inspect screen are the filename, the time and day of
the file backup/update, the location of the system programming port, and

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information about the system software release from which the backup was made.

If any type of programming is taking place at another extension when you begin the restore procedure, the restore is canceled and the number of the busy extension appears on the screen. Repeat the restore procedure when the busy extension becomes idle.

If a line is busy (incoming call or active call) when you begin the restore procedure, the restore is canceled and the number of the active line appears on the screen. Repeat the restore procedure when the line becomes idle.

Also see "Restore Messages'' on page D-22 for information about errors that may occur during the restore procedure.

Summary: Restore

Programmable by	System Manager
Mode	All
Idle Condition	System Forced Idle
Planning Form	Not applicable
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	Yes
Copy Option	No
Console Procedure	Insert memory card→System→Back/Restore →Restore→ Select restore file→Yes
PC Procedure	Insert memory card→ F1 → F9 → F2 →Select restore file→ F3

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Restore
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Procedure: Restore

Console Display/Instructions   **Additional Information**   **PC**

1. Insert the memory card into the PCMCIA interface slot on the processor module.

▶ 2. **Select the System menu.**

```
System Programming:      >
Make a selection
System        Extensions
SysRenumber   Options
Operator      Tables
LinesTrunks   AuxEquip
Exit          NightSrvce
```
F1

▶ 3. **Select Back/Restore.**

```
System:
Make a selection
Restart        MaintenBusy
SProg Port     Date
Mode           Time
Board Renum    Back/Restore
Exit
```
F9

▶ 4. **Select Restore.**

```
Memory Card:
Make a selection
Backup
Restore
Auto Backup

Exit
```
F2

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Restore

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Console Display/Instructions   **Additional Information PC**

▶ **5. Select the restore file.**

```
Memory Card Restored:
Select one
BACK1.mmdd      AUTO.BACK1
BACK2.mmdd      AUTO.BACK2
BACK3.mmdd


Exit            Enter
```

mmdd = month and day of backup

Press the button or function key next to your selection.

▶ **6. Observe the restore file validation screen.**

```
Memory Card Restore:


File is being validated.
```

▶ **7. Respond to the prompt.**

```
Restore n:
System will be down...
Do you want to continue?
Yes
No

        Exit
```

n = filename selected in Step 5

Select Yes to continue the restore   F3

Select No to abort the restore.   F2
Go back to Step 5.

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Restore

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Console Display/Instructions   **Additional Information PC**

▶ **8. Observe the restore progress screen.**

```
Restore n:
Restore in Progress,
Please Wait.
```

n = filename selected in Step 5

▶ **9. Observe the restore file validation screen.**

```
Restore n:
Restore Successfully
Completed.
System is Restarting.
Please Wait.
```

n = filename selected in Step 5

The session is finished and the system restarts. You must enter system programming again to continue.

Restore Messages

During the restore procedure, additional screens may appear to alert you to problems with the translation memory card, the backup file, or the restore procedure. This section show you what to do if a screen appears.

Card Missing or Card Not Inserted Correctly

```
Memory Card Restore:
Verify that Memory Card
has been inserted
correctly.


Exit
```

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Restore

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The memory card is either not inserted or inserted incorrectly. The restore is aborted. Reinsert the card and repeat the restore procedure. This screen may also appear if the wrong type of memory card is inserted and a restore is requested within one minute of insertion. Verify that the card is a translation memory card.

Card Removed after Confirmation

```
Memory Card Restore:
RESTORE IS CANCELED.
System is DOWN.



```

The memory card was removed from the processor slot while the restore was in progress. The restore is aborted; the system performs a System Erase (frigid start). Reinsert the memory card and repeat the restore procedure.

Wrong System Programming Port

```
Restore n:
Change Sys Programming
Port to Extension xxxx
before Restoring.


Exit
```

n = filename selected
xxxx = system programming
port extension

The system programming port is not set to the same system programming port as that set in the backup file. The restore is aborted. Use the Inspect feature to view the port of the file on the card. Change the system programming port to match the port shown on the card (see "System Programming Position Assignment" in System Programming or System Programming Summary) and repeat the restore procedure.

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Restore

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Release Mismatch

```
Restore n:
File is Not Compatible
for Release X.Y
Restore Canceled.
Conversion Required.


Exit
```

n = filename selected
X.Y = release number

This screen appears only if you are upgrading from Release 3.0 or higher and the releases are not compatible.

Card Failure

```
Memory Card Restore:
Restore Failure.
Try a different file
or a new Memory Card.



Exit
```

If the restore fails because the card is damaged, the system performs a System Erase (frigid start). Repeat the restore procedure using a different file and/or memory card.

Card Failure after Confirmation

```
Restore x:
Restore Failure
RESTORE IS CANCELED.


System is DOWN.


```

x = filename selected

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Restore

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If the restore fails because the card is damaged, the system performs a System Erase (frigid start). Repeat the restore procedure using a different file and/or memory card.

Wrong Type of Card

```
Memory Card Restore:
Inserted Memory Card is
not the correct type.
Remove and insert MERLIN
LEGEND Backup/Restore
Card.
Exit
```

The inserted card does not match the card option selected from the System menu. Remove the card and repeat the restore procedure with the correct type of card. See "Card Types" on page D-1 for information about the card labels.

Board Mismatch

```
Restore x:
Restore Failure
RESTORE IS CANCELED.
Board mismatch between
control unit and file.


Exit
```

x = filename selected

A mismatch exists between the hardware components present on the current system and the hardware components reflected in the backup file. The restore is aborted. You can do one of the following:

■ Repeat the restore procedure with another file.

■ Modify the system hardware to match the configuration of the backup file and repeat the restore procedure with the same file.

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Strap in Place for Key Mode, but Mode Set to Hybrid/PBX

```
Restore n:
Restore Failure
RESTORE IS CANCELED.
Restore File Mode is
Hybrid/PBX. Control Unit
strap in place for KEY.
Exit
```

n = filename selected

⚠ CAUTION:

This procedure should be performed only by qualified service personnel.

If the processor module has been strapped for Permanent Key mode, a restore to Hybrid/PBX mode is not possible. See Chapter 9 in *Installation* for details about modifying the processor.

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Modifying the Processor

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Modifying a Release 2.1 or Earlier Processor for Permanent Key Mode

E

Modifying the Processor

⚠ CAUTION:

This procedure must be performed for KF registration with the FCC.

This procedure prevents the system from being programmed as a Hybrid-PBX system. Do this only if the system is programmed for Key mode and GS trunks are not indicated on Form 2c, System Numbering: Line/Trunk Jacks.

To modify the processor for Permanent Key mode, follow the steps below. Refer to Figure E–1.

▶ **1. Remove the processor from its packaging.**

▶ **2. Place the processor on a flat surface.**

▶ **3. If the feature module is installed, remove it.**

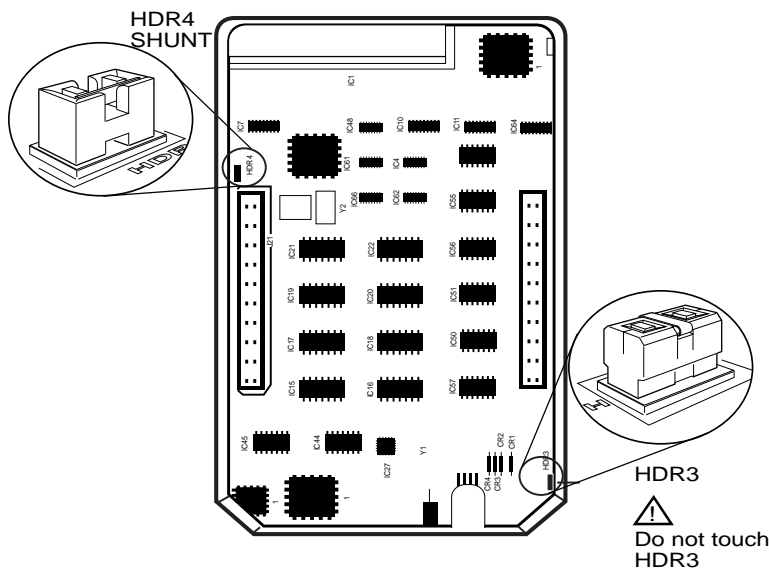See "Replacing the Feature Module" on page 4–32 for instructions.

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Modifying the Processor

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Figure E-1.   Modifying the Processor for Key Mode

⚠ CAUTION:

*Do not touch the HDR3 header on the processor board; the header is
exposed when the feature module is not installed in the processor. If the
HDR3 header is removed, system programming may be deleted and will
have to be restored.*

▶ **4. On the exposed portion of the processor board, find the header
marked *HDR4*; it is in the upper-left area.**

A shunt is attached to one of the pins on the HDR4 header.

▶ **5. Remove the shunt from the single header pin; then reinsert it so
that it covers both pins on the header.**

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Installing the Control Unit Housing

Page E-3

▶ **6. Take the KF label from the Jack Numbering Labels Sheet, which is packaged with the feature module, and fasten it to the wire manager at the base of the module.**

Installing the Control Unit Housing

To install the control unit's housing in a Release 2.1 or earlier system, follow the steps below.

▶ **1. Lay the front panel(s) face down.**

▶ **2. If you are housing more than one carrier, connect the front panels together.**

   a. Line up the arrows.

   b. Slide the panels until the semicircles form a complete circle. See Figure E-2.

▶ **3. Connect the side panels to the front panel(s) in the same way.**

▶ **4. Pick up the housing and place it on the control unit. If the system has more than one carrier, make sure you hold the housing only from the basic carrier side; otherwise, the housing can disassemble.**

   a. Line up the wire clips that are attached to the carrier with the recesses on the outside of the side panels.

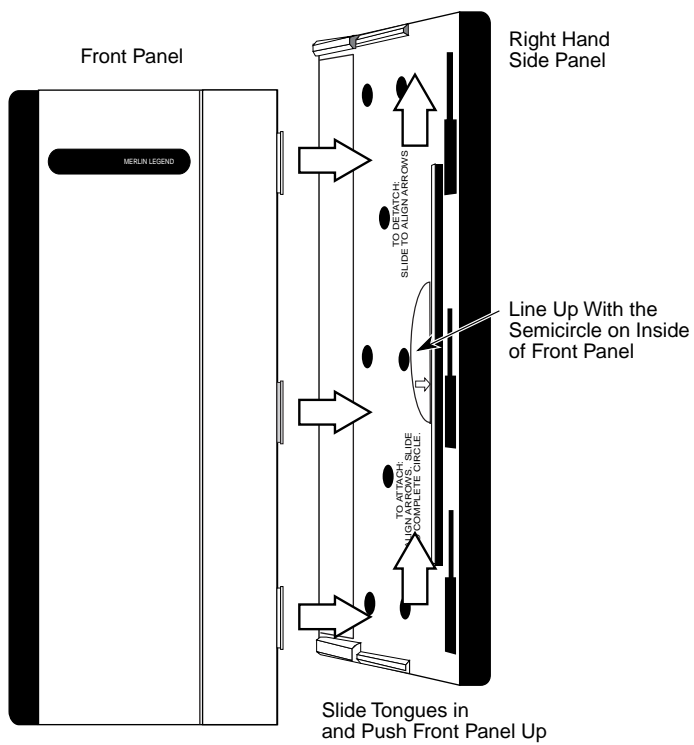   b. Push back the panels until the clips hook over the tabs and rest in the recesses.

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Installing the Control Unit Housing

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Front Panel

Right Hand
Side Panel

MERLIN LEGEND

TO DETATCH:
SLIDE TO ALIGN ARROWS

Line Up With the
Semicircle on Inside
of Front Panel

TO ATTACH: SLIDE
ALIGN ARROWS. SLIDE
TO COMPLETE CIRCLE.

Slide Tongues in
and Push Front Panel Up

Figure E-2.   Installing the Control Unit Housing

NI-1 BRI Provisioning

F

This appendix provides detailed information concerning the features and translations that make up the ISDN Ordering Code (IOC) standardized capability package "S", as well as the Multiline Hunt (MLH) feature. The MLH feature may be provisioned as either the Multiline Hunt Group or Series Completion feature depending on the CO switch type.

Specific translations are provided for the following switches:

- Lucent Technologies 5ESS
- Northern Telecom DMS-100
- Siemens SSC EWSD

After determining that the local service provider offers National ISDN-1 service, the information contained in this appendix should be given to the local service provider if necessary.

➡ NOTE:
The administrative screens shown in this appendix are representative samples only. The local service provider will need to enter applicable data (such as the telephone numbers) where necessary. Also note that the administration covered in this appendix *does not* take place on the MERLIN LEGEND Communications System. All administration is performed by the local service provider on the CO switch.

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Lucent Technologies 5ESS Switch Translations

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Lucent Technologies 5ESS Switch Translations

For the Lucent Technologies 5ESS switch, Capability Package "S" (2B) includes alternate voice/circuit-switched data on two B-channels. Data and voice capabilities include Calling Number Identification. Please note that in order to have simultaneous calls on the two B-channels, two Directory Numbers (DNs) must be assigned with this package.

The Lucent Technologies 5ESS switch also provides for alternate voice and data hunting on one DN via the Series Completion feature.

ISDN Capability Package "S"

The information listed below provides the DN translations that define Capability Package "S," and the screens and fields that must be populated.

The information provided shows the translations for one DSL and two DNs. For multiple DSLs/DNs, the CO will duplicate these screens and enter the applicable DSL and DN values as needed.

ISDN Ordering Code: Capability S

VIEW 23.2

DN1 Translations

Fields that must be populated on Screens 1, 2, 3 and 4:

1. DSL TN <C plus Telephone number>
9. ASSOC <U>
11. OE <enter OE and type>
14. D ISCN <enter value>
15. DSERV <SX>
16. B1SERV <DMD>
17. B2SERV <DMD>
18. NT1 TYPE <enter NT1 type>
20. DSL CLS <STD>

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21.   RSTR MP <N>
22.   MDPKT <0>
23.   MTERM <2>
42.   USPID <enter value>
43.   MAXBCHL <2>
44.   ACT USER <Y>

Fields that must be populated on Screens 4, 5, and 6:

48.   CKT TN <enter TN>
49.   CKT LCC <enter LCC>
50.   CKT RAX <enter RAX value>
55.   TERMTYP <TYPEA>
56.   DISPLAY <Y>
60.   CSV <1>
61.   CSV CHL <ANY>
63.   CSV LIMIT <1>
69.   CSD <2>
70.   CSD CHL <ANY>
72.   CSD LIMIT <2>
126.   CPN SCRN <Y>
140.   PIC <enter PIC

The Calling Number Identification feature is assigned using the standard BRCS
preconstructed features **/LICNDA** and **/CPCOFA**. If it is possible, request
/CPCPFA for the Calling Number Identification feature as it provides a clearer
display of the CPN information.

The Redirecting Number Delivery Feature is assigned using the preconstructed
RND feature, **/RND**. These features are assigned to the user in View 23.8,
Field 109.

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DN2 Translations

⟹ NOTE:

DSL information was built with DN1.

Fields that must be populated on Screens 1, 2, 3 and 4:

1.	DSL TN	<C plus second *Telephone number*>
9.	ASSOC	<U>
11.	OE	<enter OE and type>
42.	USPID	<enter value>
43.	MAXBCHL	<2>
44.	ACT USER	<Y>

Fields that must be populated on Screens 4, 5, and 6:

48.	CKT TN	<enter TN>
49.	CKT LCC	<enter LCC>
50.	CKT RAX	<enter RAX value>
55.	TERMTYP	<TYPEA>
56.	DISPLAY	<Y>
60.	CSV	<1>
61.	CSV CHL	<ANY>
63.	CSV LIMIT	<1>
69.	CSD	<2>
70.	CSD CHL	<ANY>
72.	CSD LIMIT	<2>
126.	CPN SCRN	<Y>
140.	PIC	<enter PIC>

The Calling Number Identification feature is assigned using the standard BRCS preconstructed features **/LICNDA** and **/CPCOFA**. If it is possible, request **/CPCPFA** for the Calling Number Identification feature as it provides a clearer display of the CPN information.

The Redirecting Number Delivery Feature is assigned using the preconstructed RND feature, **/RND**. These features are assigned to the user in View 23.8, Field 109.

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Series Completion Feature Translations

The sample screens shown below illustrate the translations for alternate voice and data hunting on one main DSL and three DNs forming a linear series completion group. Voice hunting is provided via Series Completion (Field 87, **SERHLN**). Data hunting is provided via Call Forward Data Busy Line (**/CFDBLAC**).

The 5ESS limits the number of members of a series completion group to 16 DNs, and the number of lines forwarded via **/CFDBLAC** to the value specified on Screen 9, Field 176 (**SIMINTRA**). This value is currently set to 99 series completion groups, but can be changed.

_____

```
5ESS SWITCH LABNSC1
SCREEN 1 OF 14              RECENT CHANGE  23.8
                         DSL/BRCS ASSIGNMENT

(*)1. DSL TN C 2228700  SERVICES AND FEATURES   SCREENS
(*)4. MLHG   ____       --------------------   -------
(*)5. TERM   ____       BRCS FEATURE LIST    6
(*)6. DSL OE _ _____ BRCS FEATURE PARAMETERS 7 to 9
(*)9. ASSOC  U             CKT             4 & 5
                          DELFEAT LIST        14
                          DPKT                10
                          DSL INFO             2
                          ODB                 11
                          PPB1                12
                          PPB2                13
                          USER INFO        3
```

_____

_____

```
5ESS SWITCH LABNSC1
SCREEN 2 OF 14          RECENT CHANGE  23.8
```

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```
                            DSL/BRCS ASSIGNMENT (DSL INFO)

     >11. OE            I 00101209    25. CUT DGTS2228
      14. D ISCN        007096        26. ACSR GRP_____
      15. D SERV        SX            27. DFLT SRV_____
      16. B1 SERV       DMD
      17. B2 SERV       DMD
      18. NT1 TYPE      AULC
      19. PM GRP        PMDEF
      20. DSL CLS       STD
      21. RSTR MP       N
      22. ACSR INH      Y
      23. MDPKT         8
      24. MTERM         2
```

_____

_____

```
                                 5ESS SWITCH LABNSC1
     SCREEN 3 OF 14                 RECENT CHANGE 23.8
                            DSL/BRCS ASSIGNMENT (USER INFO)

     >28. USPID    0122287000
      29. MAXB CHL      1
      30. ACT USER      Y
      31. PPB1 USR      N
      32. PPB2 USR      N
      33. AGI           _
```

_____

_____

```
                                 5ESS SWITCH LABNSC1
     SCREEN 4 OF 14                 RECENT CHANGE  23.8
                              DSL/BRCS ASSIGNMENT (CKT)

     >34. CKT TN    2228700CIRCUIT VOICE (CSV)CIRCUIT DATA (CSD)
      35. CKT LCC   DSL      46. CSV         1   55. CSD          1
      36. CKT RAX   1        47. CSV CHL   ANY   56. CSD CHL    ANY
      37. CKT MLHG  ___      48. CSV ACO         57. CSD ACO
      38. CKT TERM  ___      49. CSV LIMIT   1   58. CSD LIMIT    1
      39. NEW TN    ___      50. CSV NBLIMIT     59. CSD NBLIMIT __
      40. CONFIG GRP NI17507B 51. SP DNA         60. K56 DNA
      41. TERMTYP   TYPEA    52. SP DNA QTY      61. K56 DNA QTY
      42. DISPLAY   Y        53. AU DNA          62. K64 DNA
```

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```
     43. EKTS        ___      54. AU DNA QTY      63. K64 DNA QTY
     44. CA          ___
     45. CA QTY       __
```

```
                                        5ESS SWITCH LABNSC1
     SCREEN 5 OF 14                    RECENT CHANGE 23.8
                                        DSL/BRCS ASSIGNMENT
     (CKT)

    >64. TKS    N    72. SAR QTY__    82. BUSY MONITORN
     65. TAUTO  N    73. SAR ORIGN    83. ATT MLHG____
     66. SHARED N    74. SAR TERMN    84. RBV TGN____
     67. SAUTO  N    75. INCOMINGN    85. ERCO ASGNN
     68. PRIVACYN    76. INTERCOMN    86. ERCO ACTN
     69. ICP    N    77. ORIG CWN     87. SERHLN2228701
     70. SUSO   N    78. PP N         88. BCK LNK N
     71. SUST   N    79. CA PREFI     89. ACD POS NUM____
                     80. AUTO HOLDN   90. CIDIALALLOW
                     81. ONE TOUCHN   91. PIC ____
                                      92. PTC ____
                                      95. E911 PSAP N
```

```
                          5ESS SWITCH LABNSC1
      SCREEN 6 OF 14                RECENT CHANGE 23.8
                                DSL/BRCS ASSIGNMENT
```

>106. BFGN _____ _   109. FEATURE LIST (FL)

```
            A          A                  A          A
ROW FEATURE A P C R  FEATURE A P C R  FEATURE A P C R  FEATURE A P C R

 1 /LIDLXA Y N N 10 ____ _ _ _ _ 19 ____ _ _ _ _ 28 ____ _ _ _ _
   2 /CPCPFA Y N N 11 ____ _ _ _ _ 20 ____ _ _ _ _ 29 ____ _ _ _ _
 3 /CFDBLAC Y N N 12 ____ _ _ _ _ 21 ____ _ _ _ _ 30 ____ _ _ _ _
 4 _____ _ _ _ _ 13 ____ _ _ _ _ 22 ____ _ _ _ _ 31 ____ _ _ _ _
```

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```
5 _____ _ _ _ _ 14 ____ _ _ _ _ 23 ____ _ _ _ _ 32 ____ _ _ _ _
6 _____ _ _ _ _ 15 ____ _ _ _ _ 24 ____ _ _ _ _ 33 ____ _ _ _ _
7 _____ _ _ _ _ 16 ____ _ _ _ _ 25 ____ _ _ _ _ 34 ____ _ _ _ _
8 _____ _ _ _ _ 17 ____ _ _ _ _ 26 ____ _ _ _ _ 35 ____ _ _ _ _
9 _____ _ _ _ _ 18 ____ _ _ _ _ 27 ____ _ _ _ _ 36 ____ _ _ _ _
```

_____

__

_____

___

```
                                              5ESS SWITCH LABNSC1
    SCREEN 7 OF 14                           RECENT CHANGE 23.8
                       DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS

    >134. TG:GRPID   0      146. ACSR GRPNM _____ 158. QALWD       _
     135. MOH ALW    _      147. EDS:GRPNM  _____ 159. PRIORITY Q  _
     136. IDP NAME  _____   148. BCLID GRP  _____ 160. ARSSI       __
     137. DPAT CAT   0      149. PFA:VGRPNM _____ 161. DIALPLN     __
     138. ICR SFG    0      150. PFA:DGRPNM _____ 162. ALWMDR      _
     139. SC1NAME   _____   151. ATH:VGRPNM _____ 163. ACSR PINREQ _
     140. SC1S       _      152. ATH:DGRPNM _____ 164. DRING       _
     141. SC2NAME   _____   153. MDR:GRPNM  _____ 165. DCW DRING   _
     142. SC2S       _      154. ACCT:GRPNM _____ 166. CWO DRING   _
     143. CPUO:SELQ1 0      155. ARS:VGRPNM _____ 167. MWY DRING   _
     144. CPUO:SELQ2 0      156. ARS:DGRPNM _____
     145. CPUT:TPREDQ 0     157. FRL        ___
```

_____

```
                                              5ESS SWITCH LABNSC1
    SCREEN 8 OF 14                           RECENT CHANGE 23.8
                       DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

    >172. MESSAGE SERVICE (MSS)      175. MW:DCNDN _____

     ROW   FEATURE   GRPNM
      1    _____  _____
      2    _____  _____
      3    _____  _____
      4    _____  _____
```

_____

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_____

                                        5ESS SWITCH LAts. While MERLIN
    LEGEND Release 3.0 permits a barrier code of up to 11 digits, systems
    prior to Release 3.0 permit barrier codes of up to only four digits.

    If Remote Access is used, an upgrade to MERLIN LEGEND Communicaations
    System Release 3.0 is encouraged to take advantage of the longer barrier
    code.
    Other Security Hints xe "Security Hints:description"
    Make sure that the Autom0
    3   _____   _____   0   0   0
    4   _____   _____   0   0   0
    6   _____   _____   0   0   0
    6   _____   _____   0   0   0
_____

                                        5ESS SWITCH LABNSC1
    SCREEN 10 OF 14   RECENT CHANGE 23.8
                              DSL/BRCS ASSIGNMENT (DPKT)

    >183. DPKT TN   ____   192. IECP DNIC ____   198. H PVC LCN __
     184. LCC   ____   193. PB GRP   __   199. L IN LCN   __
     185. RAX   _   194. NOTIF   NO   200. H IN LCN   __
     186. MLHG   ____   195. ICP   N   201. L 2W LCN   __
     187. TERM   __   196. HUNT NOTIF __   202. H 2W LCN   __
     188. LNR HNT TN ____   197. TCID   __   203. L OUT LCN __
     189. HUNT DEACT _   204. H OUT LCN __
     190. CHL SEL   N   205. BUSY LIMIT ___
     191. NEW TN   _____   206. PMDR GRP   _____
                                                   207. PMDR ACT   _
                                                   208. DNA   ___
                                                   209. DNA QTY   _
_____

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```
_____
                                              5ESS SWITCH LABNSC1
  SCREEN 11 OF 14                            RECENT CHANGE 23.8
                                  DSL/BRCS ASSIGNMENT (ODB)


 >210. ODB TN     _____    222. RATE          234. L IN LCN   ___
  211. LCC        ___      223. N2        _   235. H IN LCN   ___
  212. RAX        0        224. T1        _   236. L 2W LCN   ___
  213. MLHG       _        225. T3            237. H 2W LCN   __
  214. TERM       ____     226. WNDSZ     _   238. L OUT LCN  ___
  215. LNR HNT TN _____ 227. NEW TN    _   239. H OUT LCN  ___
  216. HUNT DEACT _        228. IECP DNIC     240. BUSY LIMIT ___
  217. CHL SEL    N        229. PB GRP    _   241. PMDR GRP   _____
  218. ISCN1      _____   230. NOTIF     _   242. PMDR ACT   _
  219. ISCN2      _____   231. T3XX   0      243. DNA        ___
  220. BAND       0        232. ICP    N      244. DNA QTY    _
  221. ODB        _        233. HUNT NOTIF ___
_____
                                              5ESS SWITCH LABNSC1
  SCREEN 12 OF 14                            RECENT CHANGE 23.8
                                  DSL/BRCS ASSIGNMENT (PPB1)


 >245. PPB1 TN    _____   254. RATE          264. H PVC LCN  ___
  246. LCC        ___      255. N2            265. L IN LCN   ___
  247. RAX        0        256. T1            266. H IN LCN   ___
  248. MLHG       ____     257. T3            267. L 2W LCN   ___
  249. TERM       ___      258. WNDSZ         268. H 2W LCN   ___
  250. LNR HNT TN ___      259. NEW TN        269. L OUT LCN  ___
  251. HUNT DEACT _        260. IECP DNIC     270. H OUT LCN  ___
  252. CHL SEL    N        261. PB GRP        271. BUSY LIMIT ___
  253. ISCN       _____   262. ICP  N        272. PMDR GRP   _____
                           263. HUNT NOTIF    273. PMDR ACT   _
_____
```

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_____

```
                                     5ESS SWITCH LABNSC1
    SCREEN 13 OF 14                   RECENT CHANGE 23.8
                             DSL/BRCS ASSIGNMENT (PPB2)


   >274. PPB2 TN   _       283. RATE      ___    293. H PVC LCN  ___
    275. LCC        ___    284. N2        ___    294. L IN LCN    ___
    276. RAX        0      285. T1        ___    295. H IN LCN    ___
    277. MLHG      ____    286. T3        ___    296. L 2W LCN    ___
    278. TERM      ____    287. WNDSZ     ___    297. H 2W LCN    ___
    279. LNR HNT TN _____ 288. NEW TN    ___    298. L OUT LCN   ___
    280. HUNT DEACT _      289. IECP DNIC ___    299. H OUT LCN   ___
    281. CHL SEL   N       290. PB GRP    ___    300. BUSY LIMIT ___
    282. ISCN      ____    291. ICP        N     301. PMDR GRP    ____
                           292. HUNT NOTIF _     302. PMDR ACT    _
```

_____

```
                                     5ESS SWITCH LABNSC1
    SCREEN 14 OF 14                   RECENT CHANGE 23.8
                             DSL/BRCS ASSIGNMENT

   WARNING: These fields delete features currently on the view or in a BFG.
            Deletion of a feature in BFG may invoke BFG reselection.

   303. DELFEAT

   ROW   FEATURE
    1            _____
    2            _____
    3            _____
```

No Messages

_____
___

_____
___

```
    5ESS SWITCH LABNSC1
    SCREEN 1 OF 14              RECENT CHANGE  23.8
                                    DSL/BRCS ASSIGNMENT

    (*)1. DSL TN C 2228701   SERVICES AND FEATURES          SCREENS
    (*)4. MLHG      ____      --------------------           -------
```

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```
   (*)5. TERM      ____      BRCS FEATURE LIST              6
   (*)6. DSL OE _ _____   BRCS FEATURE PARAMETERS     7 to 9
   (*)9. ASSOC  U            CKT                         4 & 5
                             DELFEAT LIST                  14
                             DPKT                          10
                             DSL INFO                       2
                             ODB                           11
                             PPB1                          12
                             PPB2                          13
                             USER INFO                      3
```

_____
_____

```
   5ESS SWITCH LABNSC1
   SCREEN 2 OF 14              RECENT CHANGE  23.8
                              DSL/BRCS ASSIGNMENT (DSL INFO)

  >11. OE          I 00101209    25. CUT DGTS2228
   14. D ISCN      007096        26. ACSR GRP_____
   15. D SERV      SX            27. DFLT SRV_____
   16. B1 SERV     DMD
   17. B2 SERV     DMD
   18. NT1 TYPE    AULC
   19. PM GRP      PMDEF
   20. DSL CLS     STD
   21. RSTR MP     N
   22. ACSR INH    Y
   23. MDPKT       8
   24. MTERM       2
```

_____
_____

```
                                  5ESS SWITCH LABNSC1
   SCREEN 3 OF 14                  RECENT CHANGE 23.8
                              DSL/BRCS ASSIGNMENT (USER INFO)

  >28. USPID    0122287001
   29. MAXB CHL     1
   30. ACT USER     Y
   31. PPB1 USR     N
   32. PPB2 USR     N
   33. AGI          _
```

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_____

___

```
                                   5ESS SWITCH LABNSC1
   SCREEN 4 OF 14                   RECENT CHANGE 23.8
                                    DSL/BRCS ASSIGNMENT (CKT)

  >34. CKT TN    2228701  CIRCUIT VOICE (CSV)     CIRCUIT DATA (CSD)
   35. CKT LCC    DSL    46. CSV        1      55. CSD        1
   36. CKT RAX    1      47. CSV CHL    ANY    56. CSD CHL    ANY
   37. CKT MLHG   ___    48. CSV ACO           57. CSD ACO
   38. CKT TERM   ___    49. CSV LIMIT  1      58. CSD LIMIT  1
   39. NEW TN     ___    50. CSV NBLIMIT       59. CSD NBLIMIT __
   40. CONFIG GRP NI17507B 51. SP DNA          60. K56 DNA
   41. TERMTYP    TYPEA  52. SP DNA QTY        61. K56 DNA QTY
   42. DISPLAY    Y      53. AU DNA            62. K64 DNA
   43. EKTS       ___    54. AU DNA QTY        63. K64 DNA QTY
   44. CA         ___
   45. CA QTY     __
```

_____

_____

```
                                    5ESS SWITCH LABNSC1
   SCREEN 5 OF 14                    RECENT CHANGE 23.8
                                   DSL/BRCS ASSIGNMENT (CKT)

  >64. TKS       N    72. SAR QTY   __   82. BUSY MONITOR   N
   65. TAUTO     N    73. SAR ORIG  N    83. ATT MLHG       ____
   66. SHARED    N    74. SAR TERM  N    84. RBV TGN        ____
   67. SAUTO     N    75. INCOMING  N    85. ERCO ASGN      N
   68. PRIVACY   N    76. INTERCOM  N    86. ERCO ACT       N
   69. ICP       N    77. ORIG CW   N    87. SERHLN         2228701
   70. SUSO      N    78. PP        N    88. BCK LNK         N
   71. SUST      N    79. CA PREF   I    89. ACD POS NUM    ____
                      80. AUTO HOLD N    90. CIDIAL         ALLOW
                      81. ONE TOUCH N    91. PIC            ____
                                         92. PTC            ____
                                         95. E911 PSAP      N
```

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```
                                    5ESS SWITCH LABNSC1
     SCREEN 6 OF 14                  RECENT CHANGE 23.8
                                    DSL/BRCS ASSIGNMENT

>106. BFGN _____ _          109. FEATURE LIST (FL)

          A        A        A        A

ROW FEATURE A P C R FEATURE A P C R FEATURE A P C R  FEATURE A P C R

1 /LIDLXA Y N N  10 ____ _ _ _ 19 ____ _ _ _ 28 ____ _ _ _ _

2  /CPCPFA Y N N  11 ____ _ _ _ _ 20 ____ _ _ _ 29 ____ _ _ _ _

3 /CFDBLAC Y N N  12 ____ _ _ _ _ 21 ____ _ _ _ 30 ____ _ _ _ _

4 _____ _ _ _ _ 13 ____ _ _ _ _ 22 ____ _ _ _ 31 ____ _ _ _ _

5 _____ _ _ _ _ 14 ____ _ _ _ 23 ____ _ _ _ 32 ____ _ _ _ _

6 _____ _ _ _ _ 15 ____ _ _ _ _ 24 ____ _ _ _ 33 ____ _ _ _ _

7 _____ _ _ _ _ 16 ____ _ _ _ 25 ____ _ _ _ 34 ____ _ _ _ _

8 _____ _ _ _ _ 17 ____ _ _ _ 26 ____ _ _ _ 35 ____ _ _ _ _

9 _____ _ _ _ _ 18 ____ _ _ _ 27 ____ _ _ _ 36 ____ _ _ _ _
```

_____

___

```
     5ESS SWITCH LABNSC1
     SCREEN 7 OF 14                          RECENT CHANGE 23.8
                   DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

     >134. TG:GRPID   0      146. ACSR GRPNM _____ 158. QALWD       _
      135. MOH ALW    _      147. EDS:GRPNM _____ 159. PRIORITY Q  _
      136. IDP NAME   _____  148. BCLID GRP _____ 160. ARSSI       __
      137. DPAT CAT   0      149. PFA:VGRPNM _____ 161. DIALPLN     __
```

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```
     138. ICR SFG     0       150. PFA:DGRPNM _____   162. ALWMDR      _
     139. SC1NAME     _____  151. ATH:VGRPNM _____   163. ACSR PINREQ _
     140. SC1S        _       152. ATH:DGRPNM _____   164. DRING       _
     141. SC2NAME     _____  153. MDR:GRPNM  _____   165. DCW DRING   _
     142. SC2S        _       154. ACCT:GRPNM _____   166. CWO DRING   _
     143. CPUO:SELQ1  0       155. ARS:VGRPNM _____   167. MWY DRING   _
     144. CPUO:SELQ2  0       156. ARS:DGRPNM _____
     145. CPUT:TPREDQ 0       157. FRL        ___
```

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___

```
                                           5ESS SWITCH LABNSC1
     SCREEN 8 OF 14                        RECENT CHANGE 23.8
                     DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

     >172. MESSAGE SERVICE (MSS)        175. MW:DCNDN _____

  ROW   FEATURE   GRPNM


    1   _____  _____
    2   _____  _____
    3   _____  _____
    4   _____  _____
```

_____

___

```
                                           5ESS SWITCH LABNSC1
     SCREEN 9 OF 14                        RECENT CHANGE 23.8
                     DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

                     >176. CALL FORWARDING FEATURE PARAMETERS (CF)
```

ROW FEATURE FWD TO DN TIMEOUT BSRING SIMINTER SIMINTRA

ROW	FEATURE	FWD TO DN	TIMEOUT	BSRING	SIMINTER	SIMINTRA
1	/CFDBLAC	2228701	0	N	1	99
2	_____	_____	0	0	0	
3	_____	_____	0	0	0	
4	_____	_____	0	0	0	
5	_____	_____	0	0	0	
6	_____	_____	0		0	0

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```
5ESS SWITCH LABNSC1
SCREEN 1 OF 14                RECENT CHANGE  23.8
                                 DSL/BRCS ASSIGNMENT

(*)1. DSL TN C 2228702SERVICES AND FEATURES  SCREENS
(*)4. MLHG      ____    -------------------- -------
(*)5. TERM      ____    BRCS FEATURE LIST 6
(*)6. DSL OE _ _____BRCS FEATURE PARAMETERS  7 to 9
(*)9. ASSOC  U          CKT              4 & 5
                            DELFEAT LIST       14
                            DPKT                     10
                            DSL INFO         2
                            ODB                      11
                            PPB1                     12
                            PPB2                     13
                            USER INFO          3
```

_____

_____

_____

_____

```
5ESS SWITCH LABNSC1
SCREEN 2 OF 14     RECENT CHANGE  23.8
                            DSL/BRCS ASSIGNMENT (DSL INFO)

>11. OE           I 00101209    25. CUT DGTS2228
 14. D ISCN       007096        26. ACSR GRP_____
 15. D SERV       SX            27. DFLT SRV_____
 16. B1 SERV      DMD
 17. B2 SERV      DMD
 18. NT1 TYPE     AULC
 19. PM GRP       PMDEF
 20. DSL CLS      STD
 21. RSTR MP      N
 22. ACSR INH     Y
 23. MDPKT        8
```

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```
   24. MTERM          2
```

_____
_____

```
                                     5ESS SWITCH LABNSC1
  SCREEN 3 OF 14                         RECENT CHANGE 23.8
                            DSL/BRCS ASSIGNMENT (USER INFO)

 >28. USPID    0122287002
  29. MAXB CHL       1
  30. ACT USER       Y
  31. PPB1 USR       N
  32. PPB2 USR       N
  33. AGI            _
```

_____
___

```
                                     5ESS SWITCH LABNSC1
  SCREEN 4 OF 14                         RECENT CHANGE  23.8
                              DSL/BRCS ASSIGNMENT (CKT)

 >34. CKT TN    2228702  CIRCUIT VOICE (CSV)       CIRCUIT DATA (CSD)
  35. CKT LCC    DSL     46. CSV        1        55. CSD         1
  36. CKT RAX    1       47. CSV CHL    ANY      56. CSD CHL   ANY
  37. CKT MLHG   ___     48. CSV ACO             57. CSD ACO
  38. CKT TERM   ___     49. CSV LIMIT  1        58. CSD LIMIT   1
  39. NEW TN     ___     50. CSV NBLIMIT         59. CSD NBLIMIT __
  40. CONFIG GRP NI17507B 51. SP DNA             60. K56 DNA
  41. TERMTYP    TYPEA   52. SP DNA QTY          61. K56 DNA QTY
  42. DISPLAY    Y       53. AU DNA              62. K64 DNA
  43. EKTS       ___     54. AU DNA QTY          63. K64 DNA QTY
  44. CA         ___
  45. CA QTY     __
```

_____

_____
_____

```
                                     5ESS SWITCH LABNSC1
  SCREEN 5 OF 14                         RECENT CHANGE 23.8
                              DSL/BRCS ASSIGNMENT (CKT)

 >64. TKS      N    72. SAR QTY__  82. BUSY MONITORN
```

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```
     65. TAUTO     N    73. SAR ORIGN  83. ATT MLHG   ____
     66. SHARED    N    74. SAR TERMN  84. RBV TGN    ____
     67. SAUTO     N    75. INCOMINGN  85. ERCO ASGN  N
     68. PRIVACY   N    76. INTERCOMN  86. ERCO ACT   N
     69. ICP       N    77. ORIG CWN   87. SERHLN     2228701
     70. SUSO      N    78. PP N       88. BCK LNK    N
     71. SUST      N    79. CA PREFI   89. ACD POS NUM____
                        80. AUTO HOLDN 90. CIDIAL     ALLOW
                        81. ONE TOUCHN 91. PIC        ____
                                       92. PTC        ____
                                       95. E911 PSAP  N
```

_____
___

                                    5ESS SWITCH LABNSC1
     SCREEN 6 OF 14   RECENT CHANGE 23.8
                                   DSL/BRCS ASSIGNMENT

>106. BFGN _____ _   109. FEATURE LIST (FL)

         A   A   A   A

ROW FEATURE A P C R FEATURE A P C R FEATURE A P C R FEATURE A P C R

 1 /LIDLXA Y N N 10 ____ _ _ _ _ 19 ____ _ _ _ _ 28 ____ _ _ _ _
 2 /CPCPFA Y N N 11 ____ _ _ _ _ 20 ____ _ _ _ _ 29 ____ _ _ _ _
 3 /CFDBLAC Y N N 12 ____ _ _ _ _ 21 ____ _ _ _ _ 30 ____ _ _ _ _
 4 _____ _ _ _ _ 13 ____ _ _ _ _ 22 ____ _ _ _ _ 31 ____ _ _ _ _
 5 _____ _ _ _ _ 14 ____ _ _ _ _ 23 ____ _ _ _ _ 32 ____ _ _ _ _
 6 _____ _ _ _ _ 15 ____ _ _ _ _ 24 ____ _ _ _ _ 33 ____ _ _ _ _
 7 _____ _ _ _ _ 16 ____ _ _ _ _ 25 ____ _ _ _ _ 34 ____ _ _ _ _
 8 _____ _ _ _ _ 17 ____ _ _ _ _ 26 ____ _ _ _ _ 35 ____ _ _ _ _
 9 _____ _ _ _ _ 18 ____ _ _ _ _ 27 ____ _ _ _ _ 36 ____ _ _ _ _

_____
___

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___

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```
                                       5ESS SWITCH LABNSC1
    SCREEN 7 OF 14                      RECENT CHANGE 23.8
                    DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)


    >134. TG:GRPID   0      146. ACSR GRPNM _____ 158. QALWD      _
     135. MOH ALW    _      147. EDS:GRPNM  _____ 159. PRIORITY Q _
     136. IDP NAME  _____   148. BCLID GRP  _____ 160. ARSSI      __
     137. DPAT CAT   0      149. PFA:VGRPNM _____ 161. DIALPLN    __
     138. ICR SFG    0      150. PFA:DGRPNM _____ 162. ALWMDR     _
     139. SC1NAME   _____   151. ATH:VGRPNM _____ 163. ACSR PINREQ _
     140. SC1S       _      152. ATH:DGRPNM _____ 164. DRING      _
     141. SC2NAME   _____   153. MDR:GRPNM  _____ 165. DCW DRING  _
     142. SC2S       _      154. ACCT:GRPNM _____ 166. CWO DRING  _
     143. CPUO:SELQ1 0      155. ARS:VGRPNM _____ 167. MWY DRING  _
     144. CPUO:SELQ2 0      156. ARS:DGRPNM _____
     145. CPUT:TPREDQ 0     157. FRL        ___
_____
                                       5ESS SWITCH LABNSC1
    SCREEN 8 OF 14                      RECENT CHANGE 23.8
                    DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

    >172. MESSAGE SERVICE (MSS)      175. MW:DCNDN _____


     ROW    FEATURE   GRPNM
      1    _____  _____
      2    _____  _____
      3    _____  _____
      4    _____  _____
_____
```

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_____

```
                                        5ESS SWITCH LABNSC1
     SCREEN 9 OF 14                     RECENT CHANGE 23.8
                        DSL/BRCS ASSIGNMENT (HIGH RUNNER FEATURE PARAMETERS)

                   >176. CALL FORWARDING FEATURE PARAMETERS (CF)

     ROW    FEATURE   FWD TO DN   TIMEOUT BSRING  SIMINTER  SIMINTRA
      1    /CFDBLAC    2228701 0      N        1 99
      2    _____ _____ 0       0        0
      3    _____ _____      0        0         0
      4    _____ _____      0        0         0
      5    _____ _____      0        0         0
      6    _____ _____ 0       0         0
```

_____

———

Northern Telecom DMS-100 Switch Translations

For the Northern Telecom DMS-100 switch, Capability Package "S" (2B)
includes alternate voice/circuit-switched data on two B-channels. Data and
voice capabilities include Calling Number Identification. Please note that the
assignment of two DNs is required for this package.

The DMS-100 switch also provides for alternate voice and data hunting on one
DN via the Multiline Hunt Group feature.

ISDN Capability Package "S"

The information listed below provides the DN translations that define Capability
Package "S," and the commands that must be executed.

ISDN Ordering Code: Capability S

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DN1 Translations

Provision DN1 using the following translations.

Define a new Logical Terminal Identifier (LTID) using the SLT command:

```
SONUMBER <<cr> or $>
LTID <enter identifier value>
FUNCTION <ADD>
LTCLASS <BRAFS>
CS <Y>
PS <N>
MAXKEYS <64>
TEI_TYPE <DTEI>
ABS <NOPMD>
ABS <$>
EKTS <N>
SPIDSFX option
        SPID_SUFFIX <enter spid suffix value>
PVC option
        VERSION <FUNCTIONAL>
        ISSUE <2>
```

Associate new DN with LTID using the NEW command:

```
SONUMBER <<cr> or $>
DN <enter DN>
LCC <ISDNKSET>
GROUP <enter group name>
SUBGRP <enter subgrp value>
NCOS <enter ncos value>
SNPA <enter NXX value>
KEY <1>
RINGING <Y>
LATANAME <enter value>
LTG <enter value>
LEN_OR_LTID <enter assigned value>
```

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DMS-100 normally delivers the Calling Party Number and the Redirecting
Number, if available.

Attach LTIDs to LEN using SLT command:

    SONUMBER <<cr> or $>
    LTID <enter value>
    FUNCTION <ATT>
    LEN <enter LEN to which LTID will be attached>

DN2 Translations

Provision DN2 using the following translations.

Define a new Logical Terminal Identifier (LTID) using the SLT command:

    SONUMBER <<cr> or $>
    LTID <enter identifier value>
    FUNCTION <ADD>
    LTCLASS <BRAFS>
    CS <Y>
    PS <N>
    MAXKEYS <64>
    TEI_TYPE <DTEI>
    ABS <NOPMD>
    ABS <$>
    EKTS <N>
    SPIDSFX option
            SPID_SUFFIX <enter spid suffix value>
    PVC option
            VERSION <FUNCTIONAL>
            ISSUE <2>

Associate new DN with LTID using the NEW command:

    SONUMBER <<cr> or $>
    DN <enter DN>
    LCC <ISDNKSET>
    GROUP <enter group name>

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SUBGRP <enter subgrp value>
NCOS <enter ncos value>
SNPA <enter NXX value>
KEY <1>
RINGING <Y>
LATANAME <enter value>
LTG <enter value>
LEN_OR_LTID <enter assigned value>

DMS100 normally delivers the Calling Party Number and the Redirecting
Number, if available.

Attach LTIDs to LEN using SLT command:

SONUMBER <<cr> or $>
LTID <enter value>
FUNCTION <ATT>
LEN <enter LEN to which LTID will be attached>

Multiline Hunt Group Feature Translations

The sample screens shown below illustrate the translations for alternate voice
and data hunting on three DSLs and six DNs forming a circular hunt group. This
hunting is provided via the Multiline Hunt Group feature.

The screens shown in this section are examples. DNs shown on these screens
should be replaced with applicable data.

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```
QDN 2257141
_____
DN:   2257141
TYPE: PILOT OF DNH HUNT GROUP
SNPA: 201SIG:  N/A LNATTIDX: N/A
HUNT GROUP:  22     HUNT MEMBER:  O
LTID: PSATS    141
LTCLASS:  BRAFS
LINE CLASS CODE:   ISDNKSET
KEY:  1
CUSTGRP:      MDCSCA  SUBGRP: O        NCOS: O  RING: Y
OPTIONS:
SFC
6ROUP OPTIONS:
CIR RCVD
MEMBER INFO:
     1 2257146
     2 2257145
     3 2257144
     4 2257143
     5 2257142
_____
```

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```
QLT PSATS 141
_____
LTID:  PSATS 141
SNPA: 201
DIRECTORY NUMBER:    2257141
LT GROUP NO: 13
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N    CACH: N
BEARER SERVICE RESTRICTIONS:     NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:       01
LEN: HOST  01 1 10 01   TEI: DYNAMIC
CUSTGRP:        MDCSCA  SUBGRP: O  NCOS: ORING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT PILOT.
HUNT GROUP:  22 HUNT MEMBER: O
OPTIONS:
SFC
              KEY     DN
              ---     --
               1     DN              2257141

              KEY    FEATURE
              ---    -------
                NONE

6ROUP OPTIONS:
CIR RCVD
MEMBER INFO:_
   1    2257146
   2    2257145
   3    2257144
   4    2257143
   5    2257142

_____

___
```

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```
QLT PSATS 142
_____
LTID: PSATS     142
SNPA: 201
DIRECTORY NUMBER:2257142
LT GROUP NO: 13
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
BEARER SERVICE RESTRICTIONS:     NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:      01
LEN: HOST  01 1 10 02    TEI: DYNAMIC
CUSTGRP:         MDCSCA  SUBGRP: O  NCOS: O  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT MEMBER (NOT PILOT).
HUNT GROUP: 22      HUNT MEMBER: 5
OPTIONS:
SFC
    KEY      DN
    ---      --
     1   DN            2257142

     KEY      FEATURE
     ---      -------
     NONE

PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____
DN:    2257143
TYPE: MEMBER OF DNH HUNT GROUP
SNPA: 201  SIG: N/A    LNATTIDX: N/A
HUNT GROUP: 22       HUNT MEMBER: 4
LTID: PSATS     143
LTCLASS: BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
CUSTGRP:        MDCSCA  SUBGRP: O  NCOS: O  RING: Y
OPTIONS:
SFC
PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____
```

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_____

```
___

LTID: PSATS     143
SNPA: 201
DIRECTORY NUNBER:2257143
LT GROUP NO: 13
LTCLASS:  BRAFS   DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
BEARER SERVICE RESTRICTIONS:    NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:      01
LEN: HOST  01 0 07 01    TEI: DYNAMIC
CUSTGRP:         MDCSCA  SUBGRP: O  NCOS: O  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT MEMBER (NOT PILOT).
HUNT GROUP: 22      HUNT MEMBER:  4
OPTIONS:
SFC

   KEY      DN
   ---      --
    1   DN            2257143

   KEY FEATURE
   ---    -------
      NONE

PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
```
_____
```
QDN 2257144;QLT PSATS 144
```
_____
```
DN:    2257144
TYPE: MEMBER OF DNH HUNT GROUP
SNPA: 201  SIG: N/A    LNATTIDX: N/A
HUNT GROUP: 22        HUNT MEMBER: 3
LTID: PSATS    144
LTCLASS:  BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
CUSTGRP: MDCSCA  SUBGRP: O  NCOS: O  RING: Y
OPTIONS:
SFC
PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
```

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_____

_____

___

```
LTID: PSATS     144
SNPA: 201
DIRECTORY NUMBER:     2257144
LT GROUP NO: 13
LTCLASS: BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
BEARER SERVICE RESTRICTIONS:     NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:      01
LEN: HOST   01 1 10 01    TEI: DYNAMIC
CUSTGRP:        MDCSCA  SUBGRP: O  NCOS: O  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT MEMBER (NOT PILOT).
HUNT GROUP: 22      HUNT MEMBER: 3
OPTIONS:
SFC

   KEY         DN
   ---         --
    1          DN          2257144

   KEY FEATURE
   ---   -------
      NONE

PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
```

_____
QDN 2257145;QLT PSATS 145

_____
```
DN:     2257145
TYPE: MEMBER OF DNH HUNT GROUP
SNPA: 201   SIG: N/A    LNATTIDX: N/A
HUNT GROUP: 22        HUNT HENBER: 2
LTID: PSATS     145
LTCLASS: BRAFS
LINE CLASS CODE:   ISDNKSET
KEY: 1
CUSTGRP:        MDCSCA   SUBGRP: O  NCOS: O  RING: Y
OPTIONS:
SFC
```

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```
PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____


_____
___

LTID: PSATS      145
SNPA: 201
DIRECTORY NUMBER:2257145
LT GROUP NO: 13
LTCLASS: BRAFS   DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
BEARER SERVICE RESTRICTIONS:    NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:      01
LEN: HOST  01 1 10 02    TEI: DYNAMIC
CUSTGRP:        MDCSCA  SUBGRP: O  NCOS: O  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT MEMBER (NOT PILOT).
HUNT GROUP: 22      HUNT MEMBER: 2
OPTIONS:
SFC

   KEY         DN
   ---         --
    1          DN              2257145

   KEY     FEATURE
   ---     -------
      NONE

PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____
QDN 2257146;QLT PSATS 146
_____
DN: 2257146
TYPE: MEMBER OF DNH HUNT GROUP
SNPA: 201   SIG:  N/A    LNATTIDX: N/A
HUNT GROUP: 22      HUNT MEMBER: 1
LTID: PSATS      146
LTCLASS: BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
```

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```
CUSTGRP:        MDCSCA  SUBGRP: O  NCOS: O  RING: Y
OPTIONS:
SFC
PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____


_____
___

LTID: PSATS 146
SNPA: 201
DIRECTORY NUMBER:2257146
LT GROUP NO: 13
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
BEARER SERVICE RESTRICTIONS:     NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
SPID-SUFFIX:       01
LEN: HOST  01 0 07 01    TEI: DYNAMIC
CUSTGRP:  MDCSCA  SUBGRP: O  NCOS: O  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
DN IS ASSIGNED AS A DNH HUNT MEMBER (NOT PILOT).
HUNT GROUP: 22       HUNT MEMBER:  1
OPTIONS:
SFC

   KEY        DN
   ---        --
    1         DN              2257146

   KEY FEATURE
   ---     -------
     NONE

PILOT DN: 2257141
GROUP OPTIONS:
CIR RCVD
_____
QLEN 1 1 10 1;QLEN 1 1 10 2;QLEN 1 0 7 1
_____
LEN:    HOST  01 1 10 01
ISG: 0 DCH: 1 ISG BRA Channel: 21
CARCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER :  32
PM TERMINAL NUMBER:     322
```

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```
 TEI         LTID        CS    PS      BCH/ISG Bd
 ---   ------------  --    --      ----------
DYNAMIC   PSATS     141    Y N          -
DYNAMIC   PSATS     144    Y N          -
```
_____

_____

___

```
LEN:    HOST  01 1 10 02
ISG: 0 DCH: 1 ISG BRA Channel: 21
CARCODE:  BX27AA     PADGRP: NPDGP
PM NODE NUMBER : 32
PM TERMINAL NUMBER:    323

  TEI         LTID    CS PSBCH/ISG Bd
  ---   ------------  --     --    ----------
DYNAMIC   PSATS     142    Y N -
DYNAMIC   PSATS     145    Y N -
```
_____
```
LEN:    HOST  01 0 07 01
ISG: 0 DCH: 1 ISG BRA Channel: 24
CARCODE:  BX27AA     PADGRP: NPDGP
PM NODE NUMBER : 31
PM TERMINAL NUMBER:    226

  TEI         LTID    CS PSBCH/ISG Bd
  ---   ------------  --     --    ----------
DYNAMIC   PSATS     143    Y N -
DYNAMIC   PSATS     146    Y N -
```
_____
STOP2

Siemens SSC EWSD Switch Translations

For the Siemens SSC EWSD switch, Capability Package "S" (2B) includes alternate voice/circuit-switched data on two B-channels. Data and voice capabilities include Calling Number Identification. Please note that the assignment of two DNs is required for this package.

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Siemens SSC EWSD Switch Translations

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The Siemens SSC EWSD switch provides for either voice or data hunting on one DN via the Series Completion feature. The same provisioning is used for either a voice or data series completion group.

ISDN Capability Package "S"

The information listed below provides the DN translations that define Capability Package "S," and the screens and fields that must be populated.

The information provided shows the translations for one DSL and two DNs. For multiple DSLs/DNs, the CO will duplicate these screens and enter the applicable DSL and DN values as needed.

ISDN Ordering Code: Capability S

```
DISPACCESS:EQN=20-0-5-4;         EXEC'D
ACCESS DATA                      MASKNO:04328
                                 MASKNO:00000
EQN =20-0-5-4,
CLOSS = 0,
BCHEQN =2,
BCEQN = SP   & AU3   & C56   & C64,
CPDDN = 2156855917-VI   & 2156855917-CMD,
CPVDN2 = 2156855917,
COE = CLASS1,
LINKOPT = DYNNOPAL,
BAPROF = 0;
DISPSUB:DN=6855917;
NPA = 215    DN = 6855917    EQN = 20-0-5-4          MASKNO:03800
         CAT = IBA                                   MASKNO:03774
         BCHDN = 2                                   MASKNO:03798
         BCDN = SP   &AU3   &C56   &C64              MASKNO:04535
         CT = VI                                     MASKNO:04396
         LCC = BVCE    RAX = 1                       MASKNO:03785
         BCHCT = 2                                   MASKNO:06282
         IBCHCT = 2                                  MASKNO:06288
         OBCHCT = 2                                  MASKNO:06291
         PIC = 0288-SP                               MASKNO:04398
```

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```
        & 0288-AU3
        CHRG = FRSA1                           MASKNO:03775
        COS = ICND & RND                       MASKNO:03777
        CRBLIM = 2                             MASKNO:03798
        CT = CMD                               MASKNO:04396
        LCC = BCMD    RAX = 1                   MASKNO:03785
        BCHCT = 2                              MASKNO:06282
        IBCHCT = 2                             MASKNO:06288
        OBCHCT = 2                             MASKNO:06291
        PIC = 0288-C56                         MASKNO:04398
            & 0288-C64
        CHRG = FRSA1                           MASKNO:03775
        COS = ICND   &RND                      MASKNO:03777
        CRBLM = 2                              MASKNO:03798


DISPTSP:TSPID=215685591701                     MASKNO:04383
EQN: 20-0-5-4
USID: 5
TSPID: 215685591701
TERMLIM: 1                                     MASKNO:04386
DN: 6855917                                    MASKNO:04382
CT: VI                                         MASKNO:04385
DN: 6855917                                    MASKNO:04382
CT: CMD                                        MASKNO:04385
DISPSUB:DN=6855919;
NPA = 215    DN = 6855919    EQN = 20-0-5-4    MASKNO:03800
        CAT = IBA                              MASKNO:03774
        BCHDN = 2                              MASKNO:03798
        BCDN = SP    &AU3    &C56    &C64      MASKNO:04535
         CT = VI                               MASKNO:04396
        LCC =BVCE    RAX = 1                   MASKNO:03785
        BCHCT = 2                              MASKNO:06282
        IBCHCT = 2                             MASKNO:06288
        OBCHCT = 2                             MASKNO:06291
        PIC = 0288-SP                          MASKNO:04398
                & 0288-AU3
        CHRG = FRSA1                           MASKNO:03775
```

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```
         COS = ICND & RND              MASKNO:03777
         CRBLIM = 2                    MASKNO:03798
          CT = CMD                     MASKNO:04396
         LCC = BCMD    RAX = 1         MASKNO:03785
         BCHCT = 2                     MASKNO:06282
         IBCHCT = 2                    MASKNO:06288
         OBCHCT = 2                    MASKNO:06291
         PIC = 0288-C56                MASKNO:04398
              & 0288-C64
         CHRG = FRSA1                  MASKNO:03775
         COS = ICND   &RND             MASKNO:03777
         CRBLIM = 2                    MASKNO:03798

  DISPTSP:TSPID=215685591901;          MASKNO:04383
  EQN: 20-0-5-4
  USID: 1
  TSPID: 215685591901
  TERMLIM: 1                           MASKNO:04386
  DN: 6855919                          MASKNO:04382
  CT:  VI                              MASKNO:04385
  DN: 6855919                          MASKNO:04382
  CT:  CMD                             MASKNO:04385
```

Series Completion Feature Translations

The information listed below provides the translation for either voice or data
hunting on three DSLs and six DNs forming a circular series completion group.

The screens shown in this section are examples. DNs shown on these screens
should be replaced with applicable data.

```
         NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18   16:22:05
M        0959       OMT-00/LEONLY2816/04328

         DISPSDNDAT:EQN=20-0-0-1&20-0-5-0&40-0-2-4:
```

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Siemens SSC EWSD Switch Translations

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        EXEC'D

        ISDN ACCESS DATA   MASKNO:04328
                                MASKNO:00000
        VIEW = EQN.
        EQN = 20-0-00-01.
        BCHEQN = 2.
        BCEQN = SP.
        BCEQN = AU3.
        BCEQN = C56.
        BCEQN = C64.
        CPDDN = 2156851189-VI.
        CPDDN = 2156851189-CMD.
        COE = CLASS1.
        LINKOPT = DYNNOPAL.
        NCCSL = D1--4.
        NCCSL = D2--4.
        NPCSL = P1--0.
        NPCSL = P2--0.
        NSL = 10.
        L2TIM = T200-10.
        L2TIM = T201-10.
        L2TIM = T203-3.
        L2COUNT = N200-3.
        L2COUNT = OIFDCC-1.
        L2COUNT = OIFDPC-3.
        CPVDN2 = 2156851189.
        CPVDN2 = 2156851289:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0001
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:08
M   0959   OMT-00/LEONLY2816/04328

        SUBSCRIBER   MASKNO:04328
                                MASKNO:00000

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```
            VIEW = DN.
            NPA = 215.
            DN = 6851189.
            EQN = 20-0-00-01.
            BCHDN = 2.
            BCDN = SP.
            BCDN = AU3.
            BCDN = C56.
            BCDN = C64.
            BCHCT = 2-VI.
            BCHCT = 2-CMD.
            BCHCT = 0-PMD.
            IBCHCT = 2-VI.
            IBCHCT = 2-CMD.
            IBCHCT = 0-PMD.
            OBCHCT = 2-VI.
            OBCHCT = 2-CMD.
            OBCHCT = 0-PMD.
            CT = VI.
            C1 = CMD:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0002
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:31
M       0959    OMT-00/LEONLY2816/04328
                SUBSCRIBER              MASKNO:04328
                                    .   MASKNO:00000

            VIEW = DNCT.
            NPA = 215.
            DN = 6851189.
            EQN = 20-0-00-01.
            CT = VI.
            CAT = IBA.
            LCC = PKGSV.
            RAX = 1.
            COS = ICND.
            COS = RND.
            COSDAT = SERCOMP-6851289.
```

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Siemens SSC EWSD Switch Translations

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```
            PIC = 222-SP.
            PIC = 288-AU3.
            CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0003
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:15
M          0959      OMT-00/LEONLY2816/04328


            SUBSCRIBER                    MASKNO:04328
                                          MASKNO:00000
            VIEW = DNCT.
            NPA = 215.
            DN = 6851189.
            EQN = 20-0-00-01.
            CT = CMD.
            CAT = IBA.
            LCC = PKGSD.
            RAX = 1.
            COS = ICND.
            COS = RND.
            COSDAT = SERCOMP-6851289.
            PIC = 222-C56.
            PIC = 288-C64.
            CRBLIM = 1:
  INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0004
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:19
M          0959      OMT-00/LEONLY2816/04328


            SUBSCRIBER                    MASKNO:04328
                                          MASKNO:00000
            VIEW = DN.
            NPA = 215.
            DN = 6851289.
```

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```
        EQN = 20-0-00-01.
        BCHDN = 2.
        BCDN = SP.
        BCDN = AU3.
        BCDN = C56.
        BCDN = C64.
        BCHCT = 2-VI.
        BCHCT = 2-CMD.
        BCHCT = 0-PMD.
        IBCHCT = 2-VI.
        IBCHCT = 2-CMD.
        IBCHCT = 0-PMD.
        OBCHCT = 2-VI.
        OBCHCT = 2-CMD.
        OBCHCT = 0-PMD.
        CT = VI.
        CT = CMD:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0005
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:22
M        0959        OMT-00/LEONLY2816/04328


        SUBSCRIBER              MASKNO:04328
                                MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6851289.
        EQN = 20-0-00-01.
        CT = VI.
        CAT = IBA.
        LCC = PKGSV.
        RAX = 1.
        COS = ICND.
        COS = RND.
        COSDAT = SERCOMP-6852199.
        PIC = 222-SP.
```

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```
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0006
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:26
M       0959    OMT-00/LEONLY2816/04328


        SUBSCRIBER              MASKNO:04328
                               MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6851289.
        EQN = 20-0-00-01.
        CT = CMD.
        CAT = IBA.
        LCC = PKGSD.
        RAX = 1.
        COS = ICND.
        COS = RND.
        COSDAT = SERCOMP-6852199.
        PIC = 222-C56.
        PIC = 288-C64.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0007
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000 96-01-18
16:22:29
M       0959    OMT-00/LEONLY2816/04328


        TERMINAL SERVICE PROFILE DATA      MASKNO:04328
                                          MASKNO:00000
        VIEW = TSP.
        EQN = 20-0-00-01.
        USID = 1.
        TSPID = 2156851189.
```

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      TERMLIM = 1.
      TSPCOS = CHDBCHR:
  INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0008
      NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:32
M   0959   OMT-00/LEONLY2816/04328

      TERMINAL SERVICE PROFILE DATAMASKNO:04328
                            MASKNO:00000
      VIEW = TSPDNCT.
      EQN = 20-0-00-01.
      TSPID = 2156851189.
      NPA = 215.
      DN = 6851189.
      CT= VI:
  INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0009
      NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:35
M   0959   OMT-00/LEONLY2816/04328

      TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                            MASKNO:00000
      VIEW = TSPDNCT.
      EQN = 20-0-00-01.
      TSPID = 2156851189.
      NPA = 215.
      DN = 6851189.
      CT= CMD:
  INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0010
      NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18

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16:22:38
M   0959   OMT-00/LEONLY2816/04328

           TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                                  MASKNO:00000
           VIEW = TSP.
           EQN = 20-0-00-01.
           USID = 2.
           TSPID = 2156851289.
           TERMLIM = 1.
           TSPCOS = CHDBCHR:
  INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0011
           NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:40
M   0959   OMT-00/LEONLY2816/04328

           ISDN ACCESS DATA   MASKNO:04328
                                                  MASKNO:00000
           VIEW = EQN.
           EQN = 20-0-05-01.
           BCHEQN = 2.
           BCEQN = SP.
           BCEQN = AU3.
           BCEQN = C56.
           BCEQN = C64.
           CPDDN = 2156852199-VI.
           CPDDN = 2156852199-CMD.
           COE = CLASS1.
           LINKOPT = DYNNOPAL.
           NCCSL = D1--4.
           NCCSL = D2--4.
           NPCSL = P1--0.
           NPCSL = P2--0.
           NSL = 10.
           L2TIM = T200-10.
           L2TIM = T201-10.

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```
            L2TIM = T203-3.
            L2COUNT = N200-3.
            L2COUNT = OIFDCC-1.
            L2COUNT = OIFDPC-3.
            CPVDN2 = 2156852199.
            CPVDN2 = 2156852299:
INTERRUPTION TEXT JOB 0959



CONTINUATION TEXT 0012
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:44
M          0959       OMT-00/LEONLY2816/04328


            SUBSCRIBER                     MASKNO:04328
                                           MASKNO:00000
            VIEW = DN.
            NPA = 215.
            DN = 6852199.
            EQN = 20-0-05-00.
            BCHDN = 2.
            BCDN = SP.
            BCDN = AU3.
            BCDN = C56.
            BCDN = C64.
            BCHCT = 2-VI.
            BCHCT = 2-CMD.
            BCHCT = 0-PMD.
            IBCHCT = 2-VI.
            IBCHCT = 2-CMD.
            IBCHCT = 0-PMD.
            OBCHCT = 2-VI.
            OBCHCT = 2-CMD.
            OBCHCT = 0-PMD.
            CT = VI.
            CT = CMD:
INTERRUPTION TEXT JOB 0959
```

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CONTINUATION TEXT 0013
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:48
M   0959   OMT-00/LEONLY2816/04328

        SUBSCRIBER   MASKNO:04328
                                          MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6852199.
        EQN = 20-0-05-00.
        CT = VI.
        CAT = IBA.
        LCC = PKGSV.
        RAX = 1.
        COS = ICND.
        COS = RND.
        COSDAT = SERCOMP-6852299.
        PIC = 222-SP.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0014
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:22:51
M   0959   OMT-00/LEONLY2816/04328

        SUBSCRIBER   MASKNO:04328
                                          MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6852199.
        EQN = 20-0-05-00.
        CT = CMD.
        CAT = IBA.
        LCC = PKGSD.
        RAX = 1.

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```
            COS = ICND.
            COS = RND.
            COSDAT = SERCOMP-6852299.
            PIC = 222-C56.
            PIC = 288-C64.
            CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0015
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
6:22:55
M          0959      OMT-00/LEONLY2816/04328


            SUBSCRIBER                    MASKNO:04328
                                          MASKNO:00000
            VIEW = DN.
            NPA = 215.
            DN = 6852299.
            EQN = 20-0-05-00.
            BCHDN = 2.
            BCDN = SP.
            BCDN = AU3.
            BCDN = C56.
            BCDN = C64.
            BCHCT = 2-VI.
            BCHCT = 2-CMD.
            BCHCT = 0-PMD.
            IBCHCT = 2-VI.
            IBCHCT = 2-CMD.
            IBCHCT = 0-PMD.
            OBCHCT = 2-VI.
            OBCHCT = 2-CMD.
            OBCHCT = 0-PMD.
            CT = VI.
            CT = CMD:
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```

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CONTINUATION TEXT 0016

      NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18

16:22:58
M   0959   OMT-00/LEONLY2816/04328

      SUBSCRIBER   MASKNO:04328
                                  MASKNO:00000
      VIEW = DNCT.
      NPA = 215.
      DN = 6852299.
      EQN = 20-0-05-00.
      CT = VI.
      CAT = IBA.
      LCC = PKGSV.
      RAX = 1.
      COS = ICND.
      COS = RND.
      COSDAT = SERCOMP-6853119.
      PIC = 222-SP.
      PIC = 288-AU3.
      CRBLIM = 1:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0017

      NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18

16:23:01
M   0959   OMT-00/LEONLY2816/04328

      SUBSCRIBER   MASKNO:04328
                                  MASKNO:00000
      VIEW = DNCT.
      NPA = 215.
      DN = 6852299.
      EQN = 20-0-05-00.
      CT = CMD.
      CAT = IBA.
      LCC = PKGSD.
      RAX = 1.

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```
            COS = ICND.
            COS = RND.
            COSDAT = SERCOMP-6853119.
            PIC = 222-C56.
            PIC = 288-C64.
            CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0018
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:05
M           0959       OMT-00/LEONLY2816/04328


            TERMINAL SERVICE PROFILE DATA    MASKNO:04328
                                             MASKNO:00000
            VIEW = TSP.
            EQN = 20-0-05-00.
            USID = 1.
            TSPID = 2156852199.
            TERMLIM = 1.
            TSPCOS = CHDBCHR:
  INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0019
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:07
M           0959       OMT-00/LEONLY2816/04328


            TERMINAL SERVICE PROFILE DATA    MASKNO:04328
                                             MASKNO:00000
            VIEW = TSPDNCT.
            EQN = 20-0-05-00.
            TSPID = 2156852199.
            NPA = 215.
            DN = 6852199.
```

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        CT= VI:
   INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0020
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:11
M   0959   OMT-00/LEONLY2816/04328

                TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                                  MASKNO:00000
                VIEW = TSPDNCT.
                EQN = 20-0-05-00.
                TSPID = 2156852199.
                NPA = 215.
                DN = 6852199.
                CT= CMD:
   INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0021
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:13
M   0959   OMT-00/LEONLY2816/04328

                TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                                  MASKNO:00000
                VIEW = TSP.
                EQN = 20-0-05-00.
                USID = 2.
                TSPID = 2156852299.
                TERMLIM = 1.
                TSPCOS = CHDBCHR:
   INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0022
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:16

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M   0959   OMT-00/LEONLY2816/04328

          ISDN ACCESS DATA   MASKNO:04328
                                       MASKNO:00000
          VIEW = EQN.
          EQN = 40-0-02-04.
          BCHEQN = 2.
          BCEQN = SP.
          BCEQN = AU3.
          BCEQN = C56.
          BCEQN = C64.
          CPDDN = 2156853119-VI.
          CPDDN = 2156853119-CMD.
          COE = CLASS1.
          LINKOPT = DYNNOPAL.
          NCCSL = D1--4.
          NCCSL = D2--4.
          NPCSL = P1--0.
          NPCSL = P2--0.
          NSL = 10.
          L2TIM = T200-10.
          L2TIM = T201-10.
          L2TIM = T203-3.
          L2COUNT = N200-3.
          L2COUNT = OIFDCC-1.
          L2COUNT = OIFDPC-3.
          CPVDN2 = 2156853119.
          CPVDN2 = 2156853219:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0023
          NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:20
M   0959   OMT-00/LEONLY2816/04328

          SUBSCRIBER   MASKNO:04328
                                       MASKNO:00000

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```
        VIEW = DN.
        NPA = 215.
        DN = 6853119.
        EQN = 40-0-02-04.
        BCHDN = 2.
        BCDN = SP.
        BCDN = AU3.
        BCDN = C56.
        BCDN = C64.
        BCHCT = 2-VI.
        BCHCT = 2-CMD.
        BCHCT = 0-PMD.
        IBCHCT = 2-VI.
        IBCHCT = 2-CMD.
        IBCHCT = 0-PMD.
        OBCHCT = 2-VI.
        OBCHCT = 2-CMD.
        OBCHCT = 0-PMD.
        CT = VI.
        CT = CMD:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0024
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:23
M       0959    OMT-00/LEONLY2816/04328


        SUBSCRIBER              MASKNO:04328
                                MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6853119.
        EQN = 40-0-02-04.
        CT = VI.
        CAT = IBA.
        LCC = PKGSV.
        RAX = 1.
        COS = ICND.
        COS = RND.
```

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```
            COSDAT = SERCOMP-6853219.
            PIC = 222-SP.
            PIC = 288-AU3.
            CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0025
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:27
M           0959        OMT-00/LEONLY2816/04328


            SUBSCRIBER                    MASKNO:04328
                                          MASKNO:00000
            VIEW = DNCT.
            NPA = 215.
            DN = 6853119.
            EQN = 40-0-02-04.
            CT = CMD.
            CAT = IBA.
            LCC = PKGSD.
            RAX = 1.
            COS = ICND.
            COS = RND.
            COSDAT = SERCOMP-6853219.
            PIC = 222-C56.
            PIC = 288-C64.
            CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0026
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:30
M           0959        OMT-00/LEONLY2816/04328


            SUBSCRIBER                    MASKNO:04328
                                          MASKNO:00000
```

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```
            VIEW = DN.
            NPA = 215.
            DN = 6853219.
            EQN = 40-0-02-04.
            BCHDN = 2.
            BCDN = SP.
            BCDN = AU3.
            BCDN = C56.
            BCDN = C64.
            BCHCT = 2-VI.
            BCHCT = 2-CMD.
            BCHCT = 0-PMD.
            IBCHCT = 2-VI.
            IBCHCT = 2-CMD.
            IBCHCT = 0-PMD.
            OBCHCT = 2-VI.
            OBCHCT = 2-CMD.
            OBCHCT = 0-PMD.
            CT = VI.
            CT = CMD:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0027
            NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:34
M        0959      OMT-00/LEONLY2816/04328


            SUBSCRIBER              MASKNO:04328
                                    MASKNO:00000
            VIEW = DNCT.
            NPA = 215.
            DN = 6853219.
            EQN = 40-0-02-04.
            CT = VI.
            CAT = IBA.
            LCC = PKGSV.
            RAX = 1.
            COS = ICND.
            COS = RND.
```

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```
        COSDAT = SERCOMP-6851189.
        PIC = 222-SP.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0028
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:37
M       0959    OMT-00/LEONLY2816/04328


        SUBSCRIBER                  MASKNO:04328
                                    MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6853219.
        EQN = 40-0-02-04.
        CT = CMD.
        CAT = IBA.
        LCC = PKGSD.
        RAX = 1.
        COS = ICND.
        COS = RND.
        COSDAT = SERCOMP-6851189.
        PIC = 222-C56.
        PIC = 288-C64.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959


CONTINUATION TEXT 0029
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:40
M       0959    OMT-00/LEONLY2816/04328


        TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                        MASKNO:00000
        VIEW = TSP.
```

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```
        EQN = 40-0-02-04.
        USID = 1.
        TSPID = 2156853119.
        TERMLIM = 1.
        TSPCOS = CHDBCHR:
  INTERRUPTION TEXT JOB 0959
```

CONTINUATION TEXT 0030
```
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:43
M       0959      OMT-00/LEONLY2816/04328


        TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                        MASKNO:00000
        VIEW = TSPDNCT.
        EQN = 40-0-02-04.
        TSPID = 2156853119.
        NPA = 215.
        DN = 6853119.
        CT= VI:
  INTERRUPTION TEXT JOB 0959
```

CONTINUATION TEXT 0031
```
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:46
M       0959      OMT-00/LEONLY2816/04328


        TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                        MASKNO:00000
        VIEW = TSPDNCT.
        EQN = 40-0-02-04.
        TSPID = 2156853119.
        NPA = 215.
        DN = 6853119.
        CT= CMD:
  INTERRUPTION TEXT JOB 0959
```

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CONTINUATION TEXT 0032
          NAVK1/BELLCORNJRB/APS 13.0 PS0071/00096-01-18
16:23:49
M   0959   OMT-00/LEONLY2816/04328

          TERMINAL SERVICE PROFILE DATA   MASKNO:04328
                                                             MASKNO:00000
          VIEW = TSP.
          EQN = 40-0-02-04.
          USID = 2.
          TSPID = 2156853219.
          TERMLIM = 1.
          TSPCOS = CHDBCHR:

END JOB 0959 EXEC'D

Glossary

Italics

The use of italics in the glossary denotes multiple usage of the italicized text throughout the glossary.

Numerics

2B data	Digital information carried by two *B-channels* for better performance and quality; the *bit rate* is twice that of one B-channel used alone.
7500B data module	See *ISDN 7500B Data Module.*

A

account code	Code used to associate incoming and outgoing calls with corresponding accounts, employees, projects, and clients.
ACCUNET	AT&T's switched digital service for 56-kbps, 64-kbps restricted, and 64-kbps clear circuit-switched data calls.
address	A coded representation of the destination of data or of the data's originating terminal, such as the dialed extension number assigned to the data terminal. Multiple terminals on one communications line must each have a unique address.
ADDS	(Automated Document Delivery System) Computer-based application that stores documents in a database and automatically faxes them on request.
adjunct	Optional equipment used with the communications system, such as an alerting device or *modem* that connects to a multiline telephone or to an extension jack.

ALS	(Automatic Line Selection) Programmed order in which the system makes outside lines available to a user.
ambiguous numbering	Numbering of extension ranges, remote access codes, or other system components that causes conflicts in private network operations. These numbers can be unique and still be ambiguous. For example, Extension 441 is different from Extension 4410. However, for *UDP routing* purposes, the two numbers are ambiguous and a call intended for Extension 4410 is misrouted on the first three digits sent, to Extension 441. See also *unambiguous numbering*.
AMI	(alternate mark inversion) Line coding format in which a binary one is represented by a positive or negative pulse, a binary zero is represented by no line signal, and subsequent binary ones must alternate in polarity; otherwise, a *bipolar violation* occurs. AMI is used in the *DS1* interface.
Analog data station	See *modem data station.*
analog transmission	Mode of transmission in which information is represented in continuously variable physical quantities, such as amplitude, frequency, phase, or resistance. See also *digital transmission*.
ANI	(Automatic Number Identification) Process of automatically identifying a caller's billing number and transmitting that number from the caller's local central office to another point on or off the public network.
application	Software and/or hardware that adds functional capabilities to the system. For example, MERLIN Identifier is an application that provides caller identification information (if available in the local area or jurisdiction).
ARS	(Automatic Route Selection) System feature that routes calls on outside facilities according to the number dialed and line/trunk availability. To initiate ARS, the user dials a *dial-out code*, also called an "ARS access code."
ASCAP	(American Society of Composers, Artists, and Producers)

ASN	(AT&T Switched Network) AT&T telecommunications services provided through an Integrated Digital Services Network Primary Rate Interface (ISDN-PRI) trunk, *Accunet* switched digital service, *Megacom*, *Megacom 800*, Software Defined Network (*SDN*), Multiquest, and Shared Access for Switch Services (SASS).
asynchronous data transmission	A method of transmitting a short bitstream of digital data, such as printable characters represented by a 7- or 8-*bit* ASCII code. Each string of data bits is preceded by a start bit and followed by a stop bit, thus permitting data to be transmitted at irregular intervals. See also *synchronous data transmission*.
AT&T Attendant	Application with equipment that connects to one or more *tip/ring* extension jacks and automatically answers incoming calls with a recorded announcement; directs calls in response to touch tones.
AT&T Switched Network	See *ASN*.
AUDIX Voice Power	A voice-processing application, part of *IS II/III*, that provides Automated Attendant, Call Answer, Information Service, Message Drop, Voice Mail, and, optionally, *Fax Attendant System* for use with the system.
Automated Attendant	*IS II/III*, *MERLIN LEGEND Mail*, and *Lucent Technologies Attendant* application that automatically answers incoming calls with a recorded announcement and directs callers to a department, an extension, or the system operator.
Automated Document Delivery System	See *ADDS*.
automatic immediate cycling	Process that occurs in private network when all available routes for a call specify systems with matching *switch identifiers*. The call is routed from the originating system to the destination system and back to the originating system in a continuous loop. *Switch identifiers* labelling systems must be unique across a private network.
Automatic Line Selection	See *ALS*.

Automatic Number Identification	See *ANI*.
automatic ringdown tie-trunk	See *automatic-start tie trunk*.
Automatic Route Selection	See *ARS*.
automatic-start tie trunk	*Tie trunk* on which incoming calls are routed to an operator or other designated destination without a start signal, as soon as the trunk is seized; the destination is specified during programming. Also called "automatic ringdown" or "auto-in" tie trunk.
auxiliary power unit	Device that provides additional power to the system.

B

B8ZS	(bipolar 8 zero substitution) Line-coding format that encodes a string of eight zeros in a unique binary sequence to detect bipolar violations.
backup	Procedure for saving a copy of system programming onto a floppy disk or *memory card*. See also *restore.*
bandwidth	Difference, expressed in hertz, between the highest and lowest frequencies in a range that determines channel capacity.
barrier code	Password used to limit access to the *Remote Access* feature of the system. In a *private network*, it is especially important that barrier codes be required for all types of remote access.
basic carrier	Hardware that holds and connects the *processor module*, *power supply module*, and up to five other modules in the system. See also *expansion carrier*.

baud rate	Strictly speaking, a measurement of transmission speed equal to the number of signal level changes per second. In practice, often used synonymously with *bit rate* and *bps*.
B-channel	(Bearer-channel) 64- or 56-kbps channel that carries a variety of digital information streams, such as voice at 64 kbps, data at up to 64 kbps, wideband voice encoded at 64 kbps, and voice at less than 64 kbps, alone or combined.
Basic Rate Interface	See *BRI*.
Bearer-channel	See *B-channel*.
Behind Switch mode	One of three modes of system operation, in which the control unit is connected to (behind) another telephone switching system, such as *Centrex* or DEFINITY, which provides features and services to telephone users. See also *Hybrid/PBX mode* and *Key mode*.
binary code	Electrical representation of quantities or symbols expressed in the base-2 number system, which includes zeros and ones.
bipolar 8 zero substitution	See *B8ZS*.
bipolar signal	Digital signal in which pulses (ones) alternate between positive and negative. See also *AMI*, *B8ZS*, and *bipolar violation*.
bipolar violation	Condition occurring when two positive or two negative pulses are received in succession. See also *AMI* and *B8ZS*.
BIS	(Built-In Speakerphone) Part of the model name of some analog multiline telephones.
bit	(binary digit) One unit of information in binary notation; it can have one of two values, zero or one.
bit rate	Speed at which bits are transmitted, usually expressed in *bps*. Also called "data rate."

blocking	Condition in which end-to-end connections cannot be made on calls because of a full load on all possible services and facilities. See also *glare.*
BMI	(Broadcast Music Incorporated)
board	A module, for example, 100D or 408 MLX GS/LS, that allows you to connect lines/trunks and extensions to the communications system.
board assignment	System Programming and Maintenance (SPM) procedure for assigning line/trunk and extension modules to slots on the control unit.
board renumbering	System programming procedure for renumbering boards that have already been assigned to specific slots on the control unit.
BRI	(Basic Rate Interface) A standard protocol for accessing Integrated Service Digital Network (ISDN) services.
broadband	Transmission path having a bandwidth greater than a voice-grade channel.
BTMI	(basic telephone modem interface)
bus	Multiconductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.
button	Key on the face of a telephone that is used to access a line, activate a feature, or enter a code on a communications system.
byte	Sequence of *bit*s (usually eight) processed together. Also called "octet."

C

Call Accounting System	See *CAS.*
Call Accounting Terminal	See *CAT.*

Caller ID	A service provided by some local telephone companies (if local regulations allow) that supplies the calling party telephone number. In Release 3.0 and later, an 800 GS/LS-ID module on the system can capture this information and display it on the screens of MLX telephones. See also *ANI*.
Calling group	Team of individuals who answer the same types of calls.
Call Management System	See *CMS*.
CAS	(Call Accounting System) DOS- or UNIX System-based application that monitors and manages telecommunications costs.
CAT	(Call Accounting Terminal) Standalone unit with a built-in microprocessor and data buffer that provides simple call accounting at a low cost.
CCITT	(International Telegraph and Telephone Consultative Committee)
CCS	(common-channel signaling) Signaling in which one channel of a group of channels carries signaling information for each of the remaining channels, permitting each of the remaining channels to be used to nearly full capacity. In the system's 100D module, channel 24 can be designated as the signaling channel for channels 1–23.
centralized telephone programming	Programming of features on individual telephones; performed at a central location by the system manager. See also *system programming* and *extension programming.*
central office	See *CO*.
Centrex	Set of system features to which a user can subscribe on telephone trunks from the local telephone company.
channel	Telecommunications transmission path for voice and/or data.
channel service unit	See *CSU*.

checksum	Sum of ones in a sequence of ones and zeros used to detect or correct errors in data transmission.
circuit-switched data call	Data call made through an exclusively established and maintained connection between *data stations*.
class of restriction	See *COR*.
clear data channel	Clear data channels (also called unrestricted data channels) allow the transmission of occurrences of more than seven contiguous zero bits. If a clear data channel is requested and only restricted channels are available, the call will be rejected. See also restricted data channel.
clock synchronization	When digital signals are transmitted over a communications link, the receiving end must be synchronized with the transmitting end to receive the digital signals without errors using clock synchronization. A system synchronizes itself by extracting a timing signal from an incoming digital stream. All the digital facilities in a private network operate from a single common clock, preferably a port connected to a digital *PSTN* facility on a *hub system* or a system that connects two private network systems. In this case, all digital facilities specify a loop clock source. One system in a private network may be specified as a local clock source when no functioning digital facility in the private network is connected to the *PSTN*. All other digital facilities then use this clock and specify their clock sources as loop. Primary, secondary, and tertiary clock sources are specified to allow backup synchronization in the event that the primary source is out of service.
CMS	(Call Management System) DOS-based application that simulates the actions of a system operator by answering and distributing calls. Also produces reports for call analysis.
CO	(central office) Location of telephone switching equipment that provides local telephone service and access to toll facilities for long-distance calling.

coaxial cable	Cable consisting of one conductor, usually a small copper tube or wire within and insulated from another conductor of larger diameter, usually copper tubing or copper braid.
codec	(coder-decoder) Device used to convert analog signals such as speech, music, or television to digital form for transmission over a digital medium and back to the original analog form.
collected digits	Digits that a caller dials in response to an integrated voice response application's menus (also called *prompted digits*); collected digits may be used to initiate *screen pop* at a system extension. See also *CTI link*.
combination configuration	A *private network* arrangement that combines characteristics of *Virtual Private Network* (*VPN*), a *series configuration,* and a *star configuration.*
common channel signaling	See *CCS*.
communications system	Software-controlled processor complex that interprets dialing pulses, tones, and/or keyboard characters and makes the proper interconnections both inside and outside. Consists of a computer, software, a storage device, and carriers with special hardware to perform the actual connections. Provides voice and/or data communications services, including access to public and private networks, for telephones and other equipment. Also referred to in this guide as "system," short for MERLIN LEGEND Communications System.
control unit	*Processor module*, *power supply module*, other *modules*, *carriers*, and housing of the system.
console	Telephone and *adjuncts* (if any) at operator or system programmer extension.
CONVERSANT	Entry-level voice response application that automatically answers and routes calls and executes telephone transactions.
conversion resource	See *modem pool*.

coordinating system manager	In a *private network* that includes more than two systems, the system manager who acts as a clearinghouse for any changes made on local systems, that effect the private network, assuring that all system managers work together and that local system changes do not have undesirable effects on the private network as a whole.
COR	(class of restriction) Various types of restrictions that can be assigned to *remote access* trunks or barrier codes. These restrictions consist of calling restrictions, *ARS* Facility Restriction Levels (*FRL*s), Allowed Lists, Disallowed Lists, and Automatic Callback queuing.
Coverage	Set of system features that can determine how extensions' calls are covered when the person at the extension is busy or not available.
CRC	(cyclic redundancy check) An error-detection code used on *DS1* facilities with the extended superframe format (*ESF*).
CSU	(channel service unit) Equipment used on customer premises to provide *DS1* facility terminations and signaling compatibility.
CTI link	(Computer Telephony Integration) link. A hardware/software feature that is part of the PassageWay Telephony Services application. It allows the use of Lucent Technologies-certified software applications on a *LAN* running Novell NetWare software in a *Hybrid/PBX mode* system. These applications may provide special features for client control of such calling activities as power dialing. See also *screen pop.*
cyclic redundancy check	See *CRC*.

D

D4 framing format	*Framing format* consisting of a sequence of individual frames of 24 eight-*bit* slots and one signal bit (193 bits) in a 12-frame superframe. See also *ESF*.
Data-channel	See *D-channel*.
data communications equipment	See *DCE*.
data module	A type of *ISDN terminal adapter* that acts as the *DCE* at a *data workstation* that communicates over high-speed *digital* facilities.
data rate	See *bps*.
data station	Special type of extension where data communications take place; includes *DTE* and *DCE*; sometimes a telephone is also part of a data station.
data terminal	An input/output device (often a personal computer) that can be connected to the control unit via an interface.
data terminal equipment	See *DTE* and *data terminal*.
data workstation	Special type of extension where data communications take place; includes *DTE* and *DCE*; sometimes a telephone is also part of a data workstation.
DCE	(data communications equipment) Equipment such as *modems* or ISDN terminal adapters used to establish, maintain, and terminate a connection between the system and data terminal equipment (*DTE*), such as printers, personal computers, host computers, or private network workstations.
DCP	(Digital Communications Protocol) AT&T proprietary protocol to transmit digitized voice and data over the same communications link.
D-channel	(Data-channel) 16- or 64-kbps channel that carries signaling information or data on a *PRI* or *BRI*.

dedicated feature buttons	The imprinted feature buttons on a telephone: **Conf** or **Conference**, **Drop**, **Feature**, **HFAI** (Hands Free Answer on Intercom), **Hold**, **Message**, **Mute** or **Microphone**, **Recall**, **Speakerphone** or **Spkrphone**, and **Transfer**.
delay-start tie trunk	*Tie trunk* or *tandem tie trunk* on which the originating end of the tie trunk transmits an off-hook signal to the receiving end and waits for the receiving end to send an off-hook signal followed by an on-hook signal. Also called "dial-repeating tie trunk."
desktop videoconferencing system	A system application that allows face-to-face, simultaneous video and voice communications between individuals and requires high-speed data transmission facilities. See also *group videoconferencing system.*
DFT	(direct facility termination) See *personal line*.
DHG	(data hunt group) Group of analog or digital *data stations* that share a common access code. Calls are connected in a round-robin fashion to the first available data station in the group.
dial access	See *feature code*.
Dialed Number Identification Service	See *DNIS*.
dial-out code	Digit (usually a 9) or digits dialed by telephone users to get an outside line.
dial plan	Numbering scheme for system extensions, lines, and trunks.
dial-repeating tie trunk	*Tie trunk* on which the originating end of the tie trunk transmits an off-hook signal to the receiving end and waits for the receiving end to send an off-hook signal followed by an on-hook signal. Also called "dial-repeating tie trunk."
DID	(Direct Inward Dial) Service that transmits from the telephone company central office and routes incoming calls directly to the called extension, *calling group*, or outgoing line/trunk *pool*, bypassing the system operator.

DID trunk	Incoming trunk that receives dialed digits from the local exchange, allowing the system to connect directly to an extension without assistance from the system operator.
digital	Representation of information in discrete elements such as off and on or zero and one. See also *analog transmission*.
Digital Communications Protocol	See *DCP*.
digital data station	See *ISDN terminal adapter data station.*
Digital Signal 0	See *DS0*.
Digital Signal 1	See *DS1*.
digital subscriber line	See *DSL*.
digital switch element	See *DSE*.
digital transmission	Mode of transmission in which the information to be transmitted is first converted to digital form and then transmitted as a serial stream of pulses. See also *analog transmission*.
DIP switch	(dual in-line package) Switch on a 400EM module used to select the signaling format for tie-line transmission. Also used on other equipment for setting hardware options.
direct facility termination	(DFT) See *personal line*.
Direct Inward Dial	See *DID.*
Direct-Line Console	See *DLC*.
Direct Station Selector	See *DSS*.
display buttons	Buttons on an MLX display telephone used to access the telephone's display.

DLC	(Direct-Line Console) Telephone used by a system operator to answer outside calls (not directed to an individual or a group) and inside calls, transfer calls, make outside calls for users with outward calling restrictions, set up conference calls, and monitor system operation.
DNIS	(Dialed Number Identification Service) Service provided by AT&T and MCI; it routes incoming 800 or 900 calls according to customer-selected parameters, such as area code, state, or time of call.
door answering unit	Device connected to a basic telephone jack and used at an unattended extension or front desk.
DOS	(disk operating system)
drop-and-insert equipment	A device that can be installed between systems connected by *tandem PRI trunks* or T1-emulated *tandem tie trunks* to allow fractional use of the facility, that is, use of fewer than 23 of the PRI *B-channels* or fewer than 24 of the T1 *channels*. In a PRI facility, the equipment must never drop Channel 24, the *D-channel*. All channels must still be programmed and all count towards the system maximum of 80 lines.
DS0	(Digital Signal 0) Single 64-kbps voice or data channel.
DS1	(Digital Signal 1) *Bit*-oriented signaling interface that multiplexes twenty-four 64-kbps channels into a single 1.544-Mbps stream.
DSL	(Digital Subscriber Line) A Digital Subscriber Line provides full-duplex service on a single twisted metallic pair (2-wire) at a rate sufficient to support ISDN Basic Rate Access.
DSS	(Direct Station Selector) 60-button *adjunct* that enhances the call-handling capabilities of an MLX-20L or MLX-28D telephone used as an operator console.
DTE	(data terminal equipment) Equipment that makes the endpoints in a connection over a data connection; for example, a data terminal, personal computer, host computer, or printer.

DTMF signaling	(dual-tone multifrequency signaling) Touch-tone signaling from telephones using the voice transmission path. DTMF signaling provides 12 distinct signals, each representing a dialed digit or character, and each composed of two voiceband frequencies.

E

E&M signaling	Trunk supervisory signaling, used between two communications systems, in which signaling information is transferred through two-state voltage conditions (on the Ear and Mouth leads) for analog applications and through two *bits* for digital applications. See also *tie trunk*.
EIA	(Electronic Industries Association)
EIA-232-D	Physical interface, specified by the *EIA*, that transmits and receives asynchronous data at speeds of up to 19.2-kbps over cable distances of 50 feet (15 m).
Electronic Switching System	See *ESS*.
endpoint	Final destination in the path of an electrical or telecommunications signal.
ESF	(extended superframe format) *PRI* framing format consisting of individual frames of 24 eight-bit slots and one signal bit (193 bits) in a 24-frame extended superframe.
ESS	(Electronic Switching System) Class of central office (*CO*) switching systems developed by Lucent Technologies in which the control functions are performed principally by electronic data processors operating under the direction of a stored program.
expansion carrier	Carrier added to the control unit when the basic carrier cannot house all of the required modules. Houses a power supply module and up to six additional modules.

ExpressRoute 1000	Data communications device that allows connection between an RS-232 *DTE* device and the control unit using MLX extension jacks on the 008 MLX or 408 GS/LS-MLX module.
extended superframe format	See *ESF*.
extension	An endpoint on the internal side of the communications system. An extension can be a telephone with or without an adjunct. Also called "station." See also *data workstation.*
extension jack	An analog, digital, or *tip/ring* physical interface on a module in the control unit for connecting a telephone or other device to the system. Also called "station jack."
extension programming	Programming performed at an extension to customize telephones for personal needs; users can program features on buttons, set the telephone ringing pattern, and so on. See also *centralized telephone programming* and *system programming*.

F

facility	Equipment (often a *line/trunk*) constituting a telecommunications path between the system and the telephone company central office (*CO*).
Facility Restriction Level	See *FRL*.
factory setting	Default state of a device or feature when an optional setting is not programmed by the user or system manager.
fax	(facsimile) Scanning and transmission of a graphic image over a telecommunications facility, or the resulting reproduced image, or the machine that does the scanning and transmitting.

Fax Attendant System	Fax handling and processing application available with *AUDIX Voice Power*.
FCC	(Federal Communications Commission)
feature	Function or service provided by the system.
feature code	Code entered on a dialpad to activate a feature.
feature module	Prior to Release 3.0, a circuit pack inserted into the *processor module*, used to provide system features and replaced when the system is upgraded.
Feature screen	Display screen on MLX display telephones; provides quick access to commonly used features.
ferrite core	Attachment to the AC power cord and ground wire of the carrier power supply for compliance with FCC, part 15 requirements.
Flash ROM	Beginning with Release 3.0, a type of read-only memory provided on the *processor module*, used to supply system features.
foil shield	Copper foil sheet (for power units) used to prevent excessive noise on the module.
forced idle	Condition of the system during certain programming or maintenance procedures; system prevents initiation of new calls.
foreign exchange	See *FX*.
Fractional-T1	A digital transmission facility consisting of at least one, and fewer than 24 *DS0* channels using robbed-bit signaling and connecting a *PBX* and a *central office* or toll office.
frame	One of several segments of an analog or digital signal that has a repetitive characteristic. For example, a *DS1* frame consists of a framing *bit* and 24 bytes, which equals 193 bits.
framing format	Pattern of *frames* used in transmissions.
frequency generator	See *ring generator*.

FRL	(Facility Restriction Level) Calling restriction type that restricts calls to certain specified *ARS* and *UDP* routes.
FX	(Foreign exchange) Central office (*CO*) other than the one that is providing local access to the public telephone network.

G

General Purpose Adapter	See *GPA*.
glare	Condition that occurs when a user tries to call out on a *loop-start line* at the same time that another call arrives on the same line.
GPA	(General Purpose Adapter) Device that connects an analog multiline telephone to optional equipment such as an answering machine or a fax machine.
ground-start trunk	Trunk on which the communications system, after verifying that the trunk is idle (no ground on tip lead), transmits a request for service (puts ground on ring lead) to the telephone company central office (*CO*).
Group IV (G4) fax machine	A fax unit, offering 400 by 100 dots per inch (DPI) in fine mode, that can operate at any speed for communication with a Group III (G3) fax machine or another Group IV (G4) fax machine.
group videoconferencing system	A system application that allows face-to-face, simultaneous video and voice communications between groups and requires high-speed data transmission facilities. See also *desktop videoconferencing system.*

H

Hands Free Answer on Intercom	See *HFAI*.
hands-free unit	See *HFU*.
headset	Lightweight earpiece and microphone used for hands-free telephone operation.
HFAI	(Hands Free Answer on Intercom) Feature that allows a user to answer a voice-announced call.
HFU	(Hands-Free Unit) Unit for analog multiline telephones that allows users to make and receive calls on the speakerphone without using the handset.
Home screen	Display normally shown on an MLX display telephone; shows time, date, and call information, and shows when some features are in use.
host	Telephone company or other switch providing features and services to the system users, usually when the system is operating in *Behind Switch mode*.
hub system	In *private network* that is arranged in a *star configuration*, the communications system through which all calls across the private network pass.
Hybrid/PBX mode	One of three modes of system operation, in which the system uses line/trunk *pool*s and *ARS* in addition to *personal lines*. Provides a single interface (**SA** buttons) to users for both internal and external calling. See also *Behind Switch mode* and *Key mode*.

I

ICLID	(Incoming Call Line Identification) See *Caller ID*.

ICOM buttons	(intercom buttons) Telephone buttons that provide access to inside system lines for calling other extensions or receiving calls from them.
immediate-start tie trunk	*Tie trunk* on which no start signal is necessary; dialing can begin immediately after the trunk is seized.
in-band signaling	See *robbed-bit signaling*.
inside dial tone	A tone users hear when they are off-hook on an **SA** or **ICOM** button.
Inspect screen	Display screen on an MLX display telephone that allows the user to preview incoming calls and see a list of the features programmed on line buttons.
Integrated Administration	Capability of *IS III* that simplifies the programming of common information for the system, *AUDIX Voice Power*, and, if it is also installed, *Fax Attendant System*.
Integrated Services Digital Network	See *ISDN*.
Integrated Solution II/III	See *IS II/III*.
Integrated Voice Power Automated Attendant	*IS II* application that automatically answers incoming calls with a recorded announcement and directs callers to a department, an extension, or the system operator.
intercom buttons	See **ICOM** *buttons.*
interface	Hardware and/or software that links systems, programs, or devices.
intersystem calls	In a *private network*, calls between a local extension and a *local or non-local dial plan* extension.
Intuity CONVERSANT	Voice response application that automatically answers and routes calls and executes telephone transactions.
I/O device	(input/output device) Equipment that can be attached to a computer internally or externally for managing a computer system's input and output of information.

IROB protector	(In-Range Out-of-Building protector) Surge-protection device for off-premises telephones at a location within 1000 feet (305 m) of cable distance from the control unit.
IS II/III	(Integrated Solution II or Integrated Solution III) Set of UNIX System-based applications that augments and provides additional services using the system.
ISDN	(Integrated Services Digital Network) Public or private network that provides end-to-end digital connectivity for all services to which users have access by a limited set of standard multipurpose user and *network interfaces*; provides digital circuit-switched or packet-switched connections within the private network and to other networks for national and international digital connectivity.
ISDN 7500B Data Module	Data communications device that allows connection between an RS-232 *DTE* device and the control unit by MLX extension jacks on the 008 MLX or 408 GS/LS-MLX module.
ISDN terminal adapter	(Integrated Services Digital Network terminal adapter) A device that connects the communications system with *data terminal equipment (DTE)*; for example, an *ISDN terminal adapter* or *modem* acting as *data communications equipment (DCE)* for a PC.
ISDN terminal adapter data station	A type of data station that includes an ISDN terminal adapter as its DCE. It may also include an MLX telephone for simultaneous voice and data (ISDN terminal adapter data-only station). These data stations connect to MLX extension jack modules for digital transmission of data over a DS1 facility.

J

jack	Physical connection point to the system for a telephone, line/trunk, or other device. Also called "port."

K

kbps	(kilobits per second)
Key mode	One of three modes of system operation, in which the system uses personal lines on line buttons for outside calls, with a separate interface (**ICOM** buttons) for inside calling. See also Behind Switch mode and Hybrid/PBX mode.

L

LAN	(local area network) Arrangement of interconnected personal computers or terminals, sometimes accessing a host computer, sometimes sharing resources such as files and printers.
LDN	(Listed Directory Number)
LED	(light-emitting diode) Semiconductor device that produces light when voltage is applied; light on a telephone.
line	Connection between extensions within the communications system; often, however, used synonymously with trunk.
line and trunk assignment	Assignment of lines and trunks connected to the system control unit to specific buttons on each telephone.
line coding	Pattern that data assumes as it is transmitted over a communications channel.
line compensation	Adjustment for the amount of cable loss in decibels (dB), based on the length of cable between a 100D module and a channel service unit (CSU) or other far-end connection point.
line/trunk	Refers to inside system lines and outside lines/trunks in general terms. See also line and trunk.

line/trunk jack	Physical interface on a module in the control unit for connecting an outside line/trunk to the communications system. Also called "trunk jack."
line/trunk and extension module	Module on which the jacks for connecting central office lines/trunks and/or the jacks for connecting the extensions are located.
local dial plan	In a system that is part of a *private network*, a list of extension ranges that the local system references in order to route local *intersystem calls* via *UDP*.
local host computer access	A method for connecting an extension jack to an on-site computer for data-only calls through a *modem* or *ISDN terminal adapter*.
local loop	The two-way connection between a customer's premises and the central office (CO).
local user	In a *private network*, a person whose extension is connected to the local control unit.
logical ID	Unique numeric identifier for each *extension* and *line/trunk jack* in the system control unit.
loop-start line	Line on which a closure between the tip and ring leads is used to originate or answer a call. High-voltage 20-Hz AC ringing current from the central office signals an incoming call.
Lucent Technologies Attendant	Application with equipment that connects to one or more *tip/ring* (T/R) extension jacks and automatically answers incoming calls with a recorded announcement; directs calls in response to touch tones.

M

Magic on Hold	A Lucent Technologies Music On Hold enhancement that promotes a company's products or services.
Mbps	(megabits per second)

Megacom	The AT&T tariffed digital *WATS* offering for outward calling.
Megacom 800	The AT&T tariffed digital 800 offering for inward calling.
memory card	Storage medium, similar in function to a floppy disk, that allows information to be added to or obtained from the communications system through the PCMCIA interface slot on the processor module.
MERLIN Identifier	Adjunct that allows users to receive, store, and use information provided by Caller ID.
MERLIN and MERLIN LEGEND Mail Voice Messaging Systems	Applications that provide automated attendant, call answering, and voice-mail services on the system.
MFM	(Multi-Function Module) Adapter that has a *tip/ring* mode for answering machines, modems, fax machines, and tip/ring alerts, and an *SAA* mode for -48 VDC alerts. It is installed inside an MLX telephone and is used to connect optional equipment to the telephone. The optional equipment and the telephone operate simultaneously and independently.
MLX-5 or MLX-5D telephone	5-line button digital telephone offered with (MLX-5D) or without (MLX-5) a 2-line by 24-character display.
MLX-10, MLX-10D or MLX-10DP telephone	10-line button digital telephone offered with (MLX-10D) or without (MLX-10) a 2-line by 24-character display. The MLX-10DP allows connection of *Passageway Direct Connection Solution.*
MLX-16DP telephone	16-line button digital telephone offered with a 2-line by 24-character display, allowing connection of *Passageway Direct Connection Solution.*
MLX-20L telephone	20-line button digital telephone with a 7-line by 24-character display.
MLX-28D telephone	28-line button digital telephone with a 2-line by 24-character display.

mode codes	Streams of touch-tone codes used by voice messaging applications to communicate with the system's control unit.
modem	Device that converts digital data signals to analog signals for transmission over a telephone line, and analog signals received on a telephone line to digital signals.
modem data station	A type of data station that includes a modem as its DCE. It may also include an MLX telephone for simultaneous voice and data (MLX voice and modem data station), an analog multiline telephone (analog voice and modem data station), or a single-line telephone for dialing only (modem data-only station). These data stations connect respectively to MLX, analog, or tip/ring extension jack modules. They provide analog transmission of data.
modem pool	Pair, or group of pairs, of *modems* and data modules with interconnected RS-232 interfaces that converts digital signals to analog, or analog signals to digital, thereby allowing users with *ISDN terminal adapter data stations* to communicate with users who have analog *modem data stations*.
module	Circuit pack in the control unit that provides the physical jacks for connection of telephones and/or outside lines/trunks to the communications system. In the name of a module, the first digit indicates the number of *line/trunk jacks* it contains; the last digit indicates the number of *extension jacks* it contains. If no letters appear after the number, a line/trunk module provides *loop-start lines* or an extension jack module provides analog or *tip/ring* jacks. For example, a 408 GS/LS MLX module contains four line/trunk jacks and eight digital (MLX) extension jacks, and provides either *loop-start* (LS) or *ground-start* (GS)*trunks.*

monitored extension	Extension for which one or more CTI applications is receiving call information. The CTI application does not have to be directly attached to the equipment at the extension in order to monitor calls. The call information may appear on the PC screen of another extension that has been programmed to receive it. See also *CTI link* and *unmonitored extension.*
Multi-Function Module	See *MFM*.
multiline telephone	An analog or digital (MLX) telephone that provides multiple line buttons for making or receiving calls or programming features.
multiplexing	The division of a transmission channel into two or more independent channels, either by splitting the frequency band into a number of narrower bands or by dividing the channel into successive time slots.
Music On Hold	Customer-provided music source or Magic on Hold connected to the system through a *loop-start* jack.

N

network	Configuration of communications devices and software connected for information interchange.
network interface	Hardware, software, or both that links two systems in an interconnected group of systems, for example, between the local telephone company and a PBX.
NI-1 BRI	(National Integrated Services Digital Network 1 Basic Rate Interface) A type of digital facility that carries the equivalent of three lines. Two are called *B-channels* and provide voice and data communications services. A third *D-channel* controls signaling and maintains operations on the B-channels.
non-local user	In a *private network*, a user who is connected to another system in the private network and not to the local system.

non-local dial plan	In a system that is part of a *private network*, a list of extension ranges that the local system references in order to route non-local *intersystem calls via UDP*.
non-satellite system	In a *private network,* a *communications system* that is directly connected to and located more than 200 miles from the local system.

O

off-hook	Telephone is said to be off-hook when the user has lifted the handset, pressed the **Speakerphone** button to turn on the speakerphone, or used a headset to connect to the communications system or the telephone network.
off-premises telephone	See *OPT*.
ones density	Requirement for channelized *DS1* service to the public network that eight consecutive zeros cannot occur in a digital data stream.
on-hook	Telephone is said to be on-hook when the handset is hung up, the speakerphone is turned off, and the user is not using a headset to connect to the communications system or the telephone network.
OPT	(off-premises telephone) *Single-line telephone* or other *tip/ring* device connected to the system via an 008 OPT module in the control unit. Appears as an inside extension to the system, but may be physically located away from the system.
OPX	(off-premises extension)
out-of-band signaling	Signaling that uses the same path as voice-frequency transmission and in which the signaling is outside the band used for voice frequencies.

P

parity	The addition of a *bit* to a bit string so that the total number of ones is odd or even, used to detect and correct transmission errors.
PassageWay Direct Connection Solution	Set of software applications that provides an interface between a personal computer and an MLX telephone.
PBX	(private branch exchange) Local electronic telephone switch that serves local stations (for example, extensions within a business) and provides them with access to the public network.
PC	personal computer
PCMCIA memory card	(Personal Computer Memory Card International Association memory card) See *memory card*.
peripheral system	In a *private network*, a system that does not connect to more than one other system, sometimes called an "end node."
personal line	Central office line/trunk that terminates directly at one or more extensions. In *Hybrid/PBX mode*, a personal line cannot be part of a line/trunk *pool*. Also called "DFT" (direct facility termination).
PFT	(Power Failure Transfer) Feature that provides continuity of telephone service during a commercial power failure by switching some of the system's line/trunk connections to telephones connected to specially designated extension jacks.
phantom extension	An extension that is not actually plugged into the system but is used, for example, as a calling group member covered by a *voice messaging system*.
pool	In *Hybrid/PBX mode*, a group of outside lines/trunks that users can access with a **Pool** button or by dialing an access code on an **SA** *button*. Also used by the *ARS* feature when choosing the least expensive route for a call.

point-to-point facility	In a *private network,* a line/trunk that passes through the *PSTN* without using the switching capabilities of the PSTN.
port	See *jack*. Also, refers to *extension* or *line/trunk jacks* before these are numbered according to the *dial plan* during programming. The lowest jack on a module is always Port 1.
Power Failure Transfer	See *PFT*.
power supply module	Device that directs electricity to modules and telephones on the system. One power supply module is needed for each carrier, and an *auxiliary power unit* is added if needed.
PRI	(Primary Rate Interface) Standard interface that specifies the protocol used between two or more communications systems. As used in North America, it provides twenty-three 64-kbps *B-channels* for voice and/or data and one 16-kbps *D-channel*, which carries multiplexed signaling information for the other 23 channels.
primary system operator position	First jack on the first MLX or analog multiline extension module in the control unit, that is, the extension jack with the lowest logical ID in the system.
prime line	Individual extension number assigned to a telephone in a system operating in *Behind Switch mode*. Each telephone user has his or her own prime line and is automatically connected to that line when he or she lifts the handset.
private communications network or private network	An interconnected group of *communications systems*, which may consist of MERLIN LEGEND Communications Systems, DEFINITY Enterprise Communications Servers (ECS), and/or DEFINITY ProLogix Solutions.
private network tandem trunks	The facilities that connect *communications systems* in a *private network*. See also *tandem tie trunks* and *tandem PRI trunks*.

processor module	Module in the second slot of the control unit (Slot 0, to the right of the *power supply module*). Includes the software and memory that runs the system.
programming port reassignment	Reassignment of the system programming jack position to any of the first five extension jacks on the first MLX module in the control unit.
protocol	Set of conventions governing the format and timing of message exchanges between devices, such as an MLX telephone and the control unit.
PSTN	Network that is commonly accessible for local or long-distance calling. Also called "public network" or "public switched network."
PSTN trunk	In a *private network*, a facility that connects a private networked system to the public switched telephone network.
public switched telephone network	See *PSTN*.

Q

QCC	(Queued Call Console) MLX-20L telephone used by a system operator in *Hybrid/PBX mode* only. Used to answer outside calls (directed to a system operator position) and inside calls, direct inside and outside calls to an extension or an outside telephone number, serve as a message center, make outside calls for users with outward calling restrictions, set up conference calls, and monitor system operation.

R

RAM	(random-access memory) Computer memory in which an individual *byte* or range of bytes can be addressed and read or changed without affecting other parts of memory.
read-only memory	See *ROM*.
Remote Access	System feature that allows an outside caller to gain access to the system, almost as if at a system extension. In a *private network*, remote access settings are used to control calls routed via *ARS* or *UDP* routing across the network.
restore	Procedure whereby saved and archived system programming is reinstated on the system, from a floppy disk or *memory card*. See also *backup*.
restricted data channel	Restricted data channels do not allow the transmission of occurrences of more than seven contiguous zero bits. See also *unrestricted data channel*.
ring generator	Circuit pack added to the power supply that generates a high-voltage, 20–30 Hz signal to ring a telephone.
riser cable	Cable that runs between floors in a multistory building and connects wiring closets.
RS-232	Physical interface, specified by the Electronics Industries Association (EIA), that transmits and receives asynchronous data at distances of up to 50 feet (15 m).
robbed-bit signaling	Signaling in which the least significant *bit* of every sixth frame per channel is used for signaling in that channel.
ROM	(read-only memory) Computer memory that can be read but cannot be changed.

S

SAA	(Supplemental Alert Adapter) Device that permits alerting equipment to be connected to an analog multiline telephone jack so that people working in noisy or remote areas of a building can be alerted to incoming calls.
SA buttons	Telephone buttons that provide access to both inside and outside calls.
satellite system	In a private network, a communications system that is directly connected to and located within 200 miles of the local system.
screen pop	Refers to a computer-telephony software application that takes caller information (for example, provided by Caller ID service), queries a database, and displays a screen with information about the caller onto a user's PC screen. Screen pop requires that an identifying number or code be available to identify the calling party. See also CTI link.
SDN	(Software Defined Network) AT&T private networking service created by specialized software within the public network.
series configuration	A private network arrangement where either two or four or more communications systems are connected in a line, with no particular system acting as the hub system. See also star configuration.
SID	[station (extension) identification]
signaling	Sending of information between devices to set up, maintain, or cease a connection such as a telephone call.
simplex signaling	Transmission of signals in one direction only across a telecommunications channel.
single-line telephone	Industry-standard touch-tone or rotary-dial telephone that handles one call at a time and is connected to the system via an extension jack on an 012, 016 (T/R), or 008 OPT module.
slot	Position in a carrier for a module; numbered from 0.

SMDR	(Station Message Detail Recording) Feature that captures usage information on incoming and outgoing calls.
SMDR printer	Printer used to produce SMDR reports. Connected to the system via an RS-232 jack on the *processor module*.
Software Defined Network	See *SDN*.
special character	Pause, Stop, or End-of-Dialing signal in a programmed dialing sequence such as a speed dial number.
SPM	(System Programming and Maintenance) *DOS*- or *UNIX* System-based application for programming the system.
square key	Configuration in *Key mode* operation in which all outside lines appear on all telephones.
star configuration	A *private network* arrangement where either three or more communications systems are connected with one system acting as the *hub system*. See also *series configuration*.
station	See *extension*.
station jack	See *extension jack*.
Station Message Detail Recording	See *SMDR*.
Supplemental Alert Adapter	See *SAA*.
switch	See *communications system*.
Switched 56 Service	DS1 Switched 56 Service is an end-to-end digital, 56-kbps, full duplex, synchronous, circuit-switched service offering. The service is offered by network service providers and by some Local Exchange Carriers (LECs) as circuit-switched, 56-kbps service.T1-emulated tandem tie trunks in a private network can be programmed for data.
switchhook flash	Momentary (320 ms to 1 second) on-hook signal used as a control; may be directed to the control unit or to a *host* switch outside the system. Also called "Recall" or "timed flash."

switch identifier	A number assigned to a *tandem trunk* in a *private network*. It identifies the system connected to the far end of the trunk. Switch identifiers are based on the type of system and its distance from the system where the identifier is assigned. See also *satellite system* and *non-satellite system*.
synchronous data transmission	Method of transmitting a continuous digital data stream in which the transmission of each binary *bit* is synchronized with a master clock. See also *asynchronous data transmission*.
system acceptance test	Test of all trunks, telephones, data terminals, and features after installation to ensure that they are working correctly.
System Access buttons	See *SA buttons*.
system date and time	Date and time that appear on MLX display telephones and *SMDR* reports.
system programming	Programming of system functions and features that affect most users, performed from an MLX-20L telephone or a computer using *SPM*. See also *extension programming* and *centralized telephone programming.*
System Programming and Maintenance	See *SPM*.
system renumbering	Procedure used to change the numbers assigned to telephones, adjuncts, *calling group*s, paging groups, park zones, *Remote Access*, and lines/trunks.

T

T1	Type of digital transmission facility that in North America transmits at the *DS1* rate of 1.544 Mbps.
T1-emulated data	A T1 tie trunk programmed for S56DATA for use by data calls at speeds up to 56 kbps. These trunks may be used for tandem and non-tandem operation.

T1-emulated voice	A T1 tie trunk programmed for Tie-PBX or Tie-Toll for use by voice calls.
T1 Switched 56 service	*T1* digital data transmission over the *public network* or over a *private network* at 56 *kbps*. See *Switched 56 service*.
tandem switching	The capability of *private network* communications systems that allows them to direct outside calls from one facility to another facility, rather than just to an extension. Calls may be sent, for example, from a *PSTN* facility to a *tandem trunk* or vice versa.
tandem trunk	An private outside facility (as opposed to an inside system line) that connects two communications systems in a *private network* and can carry calls to another outside facility through *tandem switching*. The trunk is not connected to the *PSTN*.
tandem tie trunk	A *tandem trunk* that is an analog *delay-start tie trunk*, providing a single line/trunk per facility and allowing *analog transmission* of voice and low-speed data. Or a T1 facility offering 24 channels on emulated tie trunks and programmed for voice or data.
tandem PRI trunk	(tandem Primary Rate Interface trunk) A private network trunk.
TAPI	Telephony Application Programming Interface. An application programming interface that allows computer telephony applications to be used. TAPI is not yet supported by the MERLIN LEGEND Communications System. See also *TAPI, CTI*.
telephone power supply unit	Equipment that provides power to an individual telephone.
terminal adapter	See *ISDN terminal adapter*.
tie trunk	Private trunk directly connecting two telephone switches.
timed flash	See *switchhook flash*.
tip/ring	Contacts and associated conductors of a *single-line telephone* plug or jack.

touch-tone receiver	See *TTR*.
T/R	See *tip/ring*.
trunk	Telecommunications path between the communications system and the telephone company central office (*CO*) or another switch. Often used synonymously with *line*.
trunk jack	See *line/trunk jack*.
trunk pool	See *pool*.
TSAPI	Telephony Services Application Programming Interface. An application programming interface that allows computer telephony applications to be used. TSAPI is supported by the MERLIN LEGEND Communications System Release 5.0. See also *TAPI, CTI*.
TTR	(touch-tone receiver) Device used to decode *DTMF* touch-tones dialed from *single-line* or *Remote Access* telephones.

U

UDP	(Uniform Dial Plan) Composed of the *local dial plan* and *non-local dial plan*. A dial plan that allows a caller at any extension in a *private network* to dial the same number of digits to reach any other extension in the private network, even if the originating extension is physically connected to one communications system and the terminating extension is physically connected to a different communications system.

unambiguous numbering	The practice of numbering of extension ranges, remote access codes, or other system components to avoid routing conflicts in private network or local calling. For example, Extension 441 is unique when compared to Extension 4410. However it is ambiguous, because a system routes as soon as it matches the digits sent for a call with the digits in a local plan or in a non-local dial plan extension range. When a caller dials 4410, a system routes the call to Extension 441 immediately, without considering the last dialed digit.
Uniform Dial Plan	See *UDP*.
uninterruptible power supply	See *UPS*.
unit load	Measure of the power load drain of a module, telephone, or *adjunct*.
unmonitored extension	An extension for which no CTI application is receiving call information. See also *CTI link* and *monitored extension*.
unrestricted data channel	Unrestricted data channels (also called clear data channels) allow the transmission of occurrences of more than seven contiguous zero bits. If an unrestricted data channel is requested and only restricted channels are available, the call will be rejected. See also restricted data channel.
UPS	(uninterruptible power supply) Device that connects to the system to provide 117 VAC to the equipment when the commercial power source fails.

V

VAC	(alternating-current voltage)
VDC	(direct-current voltage)
VMI	(voice messaging interface) An enhanced *tip/ring* port.

videoconferencing system	System application that allows face-to-face meetings, with voice and video, to occur between individuals or groups. This application requires high-speed data transmission facilities. See also *desktop videoconferencing* and *group videoconferencing.*
virtual private network	See *VPN.*
VPN	(virtual private network) A type of *private network* that uses the switching capabilities of the *PSTN*, rather than *tandem switching*, to direct calls between connected communications systems. A VPN may constitute a part of a private network.
voice-band channel	A transmission channel, generally in the 300–3400-Hz frequency band.
voice mail	Application that allows users to send messages to other system extensions, forward messages received with comments, and reply to messages.
voice messaging interface	See *VMI.*

W

WATS	(Wide Area Telecommunications Service) Service that allows calls to certain areas for a flat-rate charge based on expected usage.
wink-start tie trunk	*Tie trunk* on which the originating end transmits an off-hook signal and waits for the remote end to send back a signal (a wink) that it is ready for transmission.

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