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MERLIN LEGEND® Communications System Releases 3.1 and 4.0

Maintenance and Troubleshooting

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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. AT&T does not warrant that this product is immune from or will prevent unauthorized use of common-carrier telecommunication services or facilities accessed through or connected to it. AT&T will not be responsible for any charges that result from such unauthorized use. 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 class A préscrites dans le reglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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

Support Telephone Number

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

AT&T Corporate Security

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

AT&T Fraud Intervention

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

Warranty

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

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 initially start the troubleshooting procedure.

Refer to the following documentation for additional information:

- *Equipment and Operations Reference* provides detailed information on system hardware, telephones, and other equipment.
- *Feature Reference* provides details on the features of the communications system.
- *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 the U.S.A. only, AT&T provides a toll-free customer Helpline (1 800 628-2888) 24 hours a day. Call the Helpline, or your AT&T representative, if you need assistance when installing, programming, or using your system.

Terms and Conventions Used

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, DID trunk, and so on. When you talk to your local telephone company central office, ask them what terms they use for the specific facilities they connect to your system.

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 station
digital data station	terminal adapter
7500B data station	terminal adapter
analog voice and analog data station	analog voice and modem data
digital voice and analog data station	MLX voice and modem data
analog data only station	modem data only station
digital data only station	terminal adapter only station
7500B data only station	terminal adapter only station
digital voice and digital data station	MLX voice and terminal adapter station
MLX voice and 7500B data station	MLX voice and terminal adapter station

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.

Typographical Conventions (continued)

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 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.

Nondisplaying authorization codes and telephone numbers provide another layer of security. For more information, see Appendix A, “Customer Support Information.”

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 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 AT&T GBCS Publications Fulfillment Center by calling 1 800 457-1235.

Document No.	Title
	System Documents
555-640-110	*Feature Reference*
555-640-111	*System Programming*
555-640-112	*System Planning*
555-640-113	*System Planning Forms*
555-640-116	*Pocket Reference*
555-640-118	*System Manager's Guide*
	Telephone User Support
555-640-122	*MLX-10D™, MLX-10DP™, MLX-16DP™, MLX-28D™, and MLX-20L™ Display Telephones User's Guide*
555-630-150	*MLX-10D Display Telephone Tray Cards (5 cards)*
555-630-153	*MLX-28D and MLX-20L Telephone Tray Cards (5 cards)*
555-640-124	*MLX-10™ Nondisplay Telephone User's Guide*
555-630-151	*MLX-10 Nondisplay Telephone Tray Cards (6 cards)*
555-640-120	*Analog Multiline Telephones User's Guide*
555-640-126	*Single-Line Telephones User's Guide*
555-640-138	*MDC 9000 and MDW 9000 Telephones User's Guide*
	System Operator Support
555-640-134	*MLX Direct-Line Consoles Operator's Guide*
555-640-132	*Analog Direct-Line Consoles Operator's Guide*
555-640-136	*MLX Queued Call Console Operator's Guide*
	Miscellaneous User Support
555-640-130	*Calling Group Supervisor's Guide*
555-640-105	*Data and Video Reference*

Document No.	Title
	Documentation for Qualified Technicians
555-640-140	*Installation, Programming & Maintenance (IP&M) Binder [consists of Installation, System Programming & Maintenance (SPM), Maintenance & Troubleshooting*
	Toll Fraud Security
555-025-600	*GBCS Products Security Handbook*

How to Comment on This Document

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Room 2W226
Basking Ridge, NJ 07920

Introduction

1

The purpose of maintenance is to detect, report, and clear problems quickly with minimal disruption of service. The system attempts to isolate each problem to a single replaceable unit, whenever possible, by running automatic tests. Errors that it cannot automatically correct are usually recorded in error logs. Most troubleshooting relies on checking the error logs and interpreting them, using Table 2–2, “Error Codes,” in Chapter 2.

Equipment

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

Maintenance Terminal

Whether you perform on-site or remote maintenance, you need a maintenance terminal:

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

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.

NOTE:
On-site programming maintenance is preferred if it is feasible; remote programming overrides on-site programming, except when on-site backup or restore is in progress. See "On-Site Programming Maintenance" and "Remote Programming Maintenance," later in this chapter, for details.

Tools

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

- 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
- Wrist grounding strap
- Replacement parts recommended by your technical support organization

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 on-site 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 Ill (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.

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.

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” in Chapter 4 for instructions.

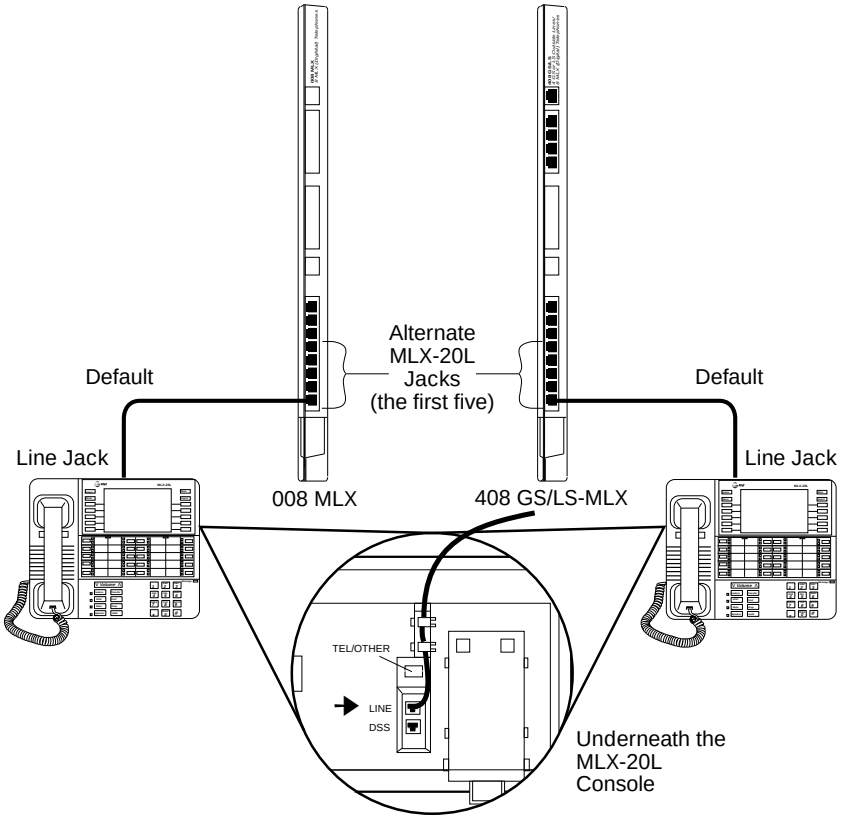

Figure 1–1. Setting Up the MLX-20L Console

Setting Up the PC

Plug a PC into the ADMIN jack on the processor module as shown in Figure 1–2. If you are using a remote PC for system programming, see “Remote Programming Maintenance.”

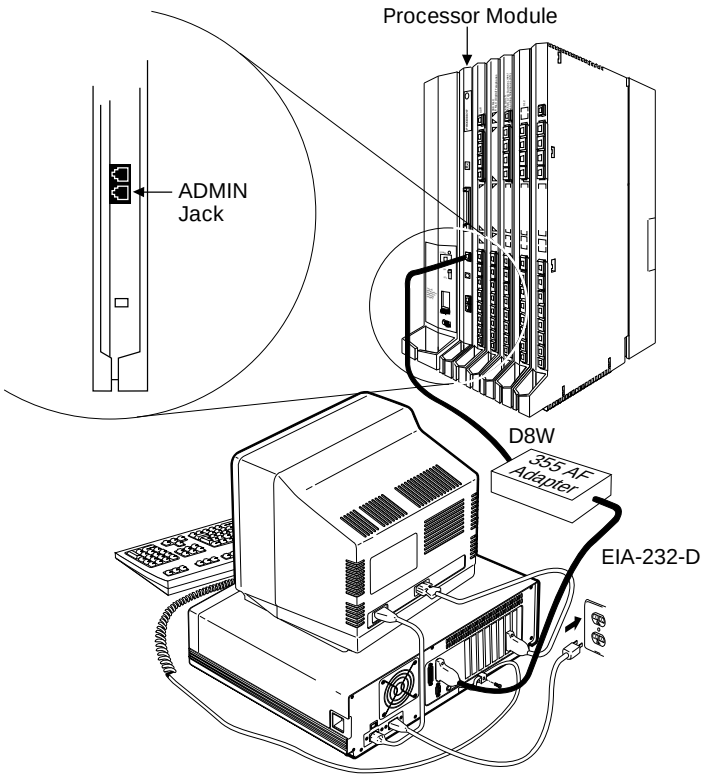

Figure 1–2. Setting Up the PC

Remote Programming Maintenance

Remote maintenance allows you to support the system from an off-premises location. You can check error logs and system status and restart the system remotely.

To perform remote maintenance, you need a PC with SPM software, a tip/ring telephone, and a 1200-bps modem. Beginning with Release 3.0, a 2400-bps modem may also be used.

Considerations

Review the following points before you begin remote maintenance procedures.

- Remote maintenance overrides on-site maintenance and programming, except when on-site 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 on 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.

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.

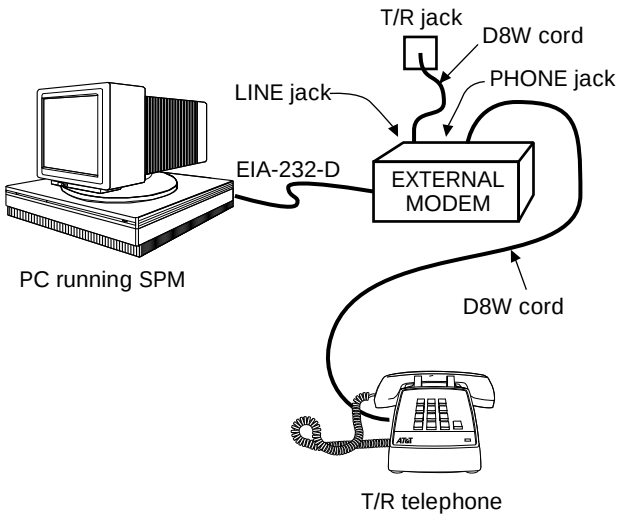

Figure 1–3. External Modem Setup

Using SPM

For more information on 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.

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

Console Display/Instructions	Additional Information	PC

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
F1  Sys Program    Maintenance  F6
F2  Backup         Restore      F7
F3  Boards         Pass-Thru    F8
F4  Print Opts     Password     F9
F5  Monitor        Language     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 2400/1200-bps modem. You can dial the modem directly or call the system operator and request to be transferred to the modem. Both procedures are explained below.

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 on-site maintenance through the ADMIN jack.

5 When you hear the modem tone, hang up.

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

6 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.

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.

NOTE:
You can change the barrier code without knowing the old one only when you perform on-site maintenance through the ADMIN jack.

5 Connect to the modem on the remote system.

When you hear dial tone, dial **110*.

6 When you hear the modem tone, hang up.

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

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
F1  Sys Program     Maintenance   F6
F2  Backup          Restore       F7
F3  Boards          Pass-Thru     F8
F4  Print Opts      Password      F9
F5  Monitor         Language      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 on-site maintenance through the ADMIN jack.

The SPM Display

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

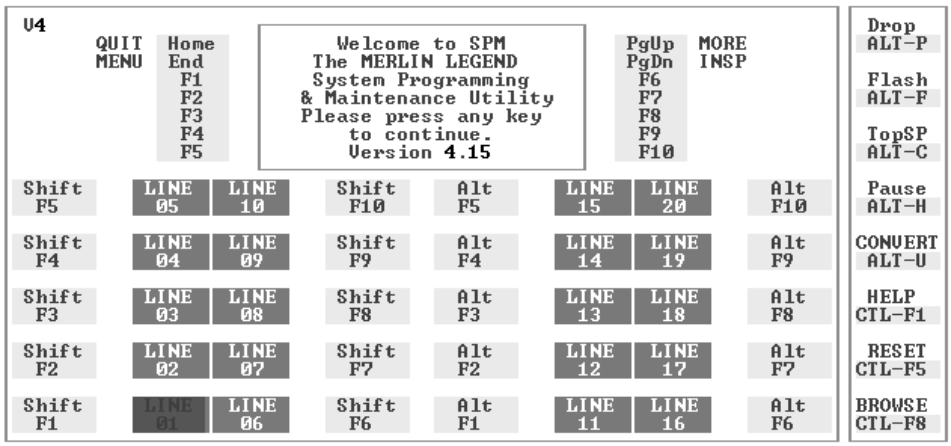

Figure 1–4. The SPM Display

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.

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.

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 + Pause	**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 + ↵	**Conf**	**Flash.** Enter a switchhook flash in a speed dialing sequence.
Alt + CapsLock	n/a	**TopSP.** Return to the top of the System Programming menu.
Alt + Home	**Hold**	**Pause.** Enter a Pause in a speed dialing sequence.
Alt + PgUp	n/a	**Convert.** Convert a backup file from an earlier release to Release 2.0 or later format.

Continued on next page

Table 1–1 *Continued*

Ctrl + F1	n/a	**Help.** Display a help screen about SPM operations. To exit from Help, press End.
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**	The ← 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.

Exiting SPM

To exit SPM, follow these steps.

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.

Console Display/Instructions	Additional Information	PC

2 Select the Quit option.

Console Display/Instructions	Additional Information	PC
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 on-site hardware maintenance, first remove the control unit housing (the cover of the control unit), then 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.
  2. Remove the top cover from each carrier by pushing it straight up from the front.

- If you have 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.

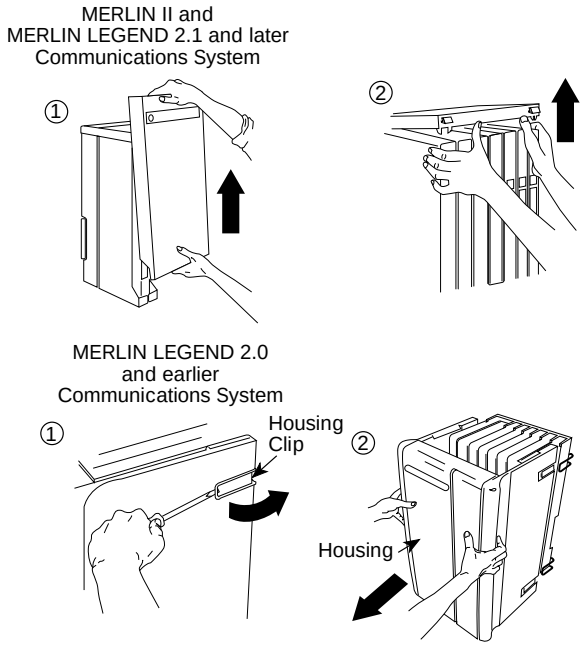

Figure 1–5. Removing the Control Unit Housing

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.**

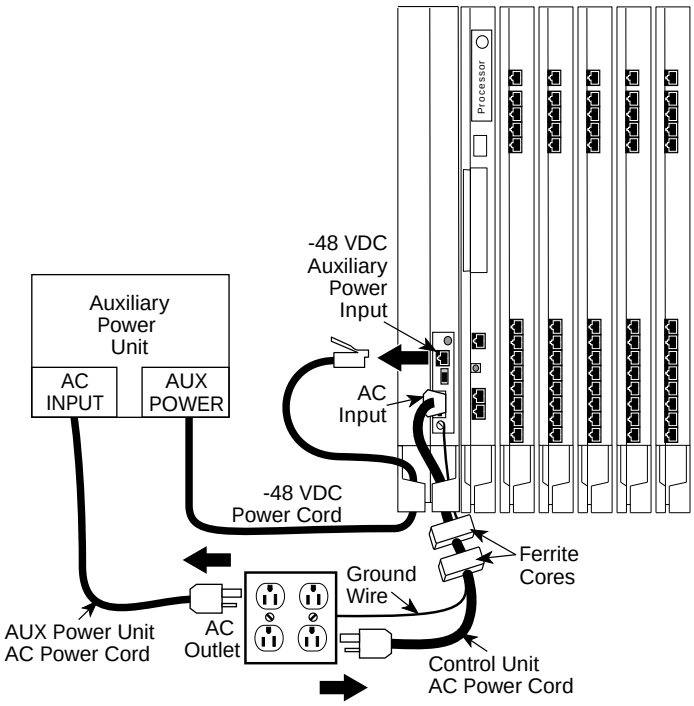

Figure 1–6. Disconnecting AC Power

Maintenance Strategy

The maintenance strategy presented in this section is only a guideline, not a fixed procedure. Refer to Figure 1–7 whenever you are uncertain as to how to proceed. As you become more experienced with maintaining and troubleshooting the system, you will most likely develop your own strategy.

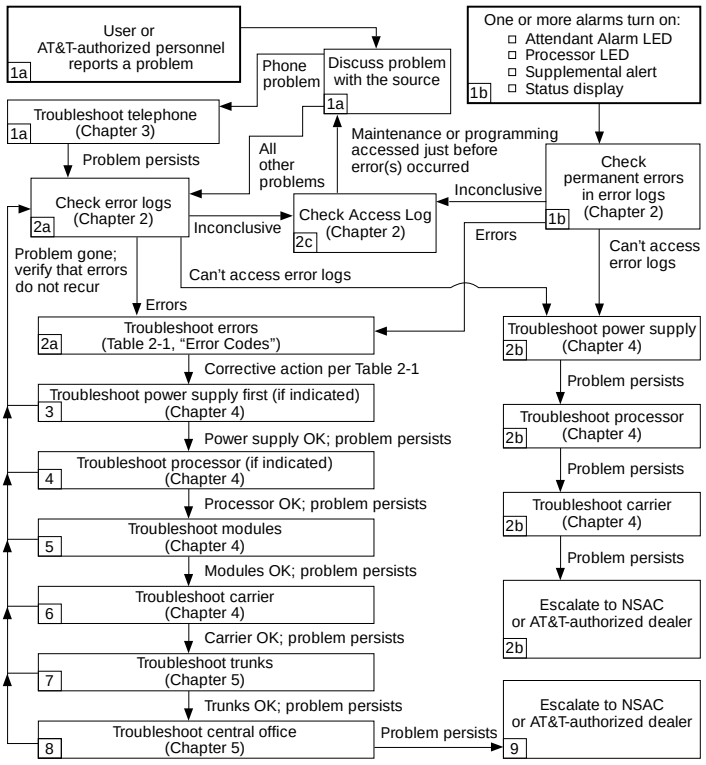

Figure 1–7. Maintenance Strategy

Trouble Reports

System trouble can be reported in two ways:

- By users
- By system alarms (permanent errors)

Automatic Tests

The system performs ongoing maintenance automatically by running tests that:

- 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 corrects them automatically, if possible.

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 Restart” 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 of System Software" in Chapter 4 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.
- 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+Pause on a PC while viewing the error. See "Error Logs" in Chapter 2 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.

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.

To perform a cold start, select Restart as follows:

Console Procedure	**Menu**→SysProgram→Exit→System→Restart →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 more information on the Restart procedure, see *System Programming*.

For more information on Restart, see “Processor Problems” in Chapter 4.

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 on-site printouts from the SMDR printer, make sure you change the option.

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

For more information on System Erase, see “Processor Problems” in Chapter 4.

Isolating the Trouble

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

- Telephone
- Control unit
- Central office

NOTE:
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.

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 “Checking the Error Logs” below.

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), 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 on performing the procedures, see “Checking the Error Logs” in Chapter 2. Also, when you check the error logs, you should refer to Table 2–2, “Error Codes,” in Chapter 2 for a detailed description of each problem.

1 Check the permanent errors.

2 If errors still exist, check the transient errors.

3 Check the last 10 errors whenever you want to review the 10 most recently recorded errors—either permanent or transient.

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” in Chapter 4.

2 If you still cannot access the error logs after checking the power supply, see “Processor Problems” in Chapter 4.

3 If you still cannot access the error logs after checking the processor, see “Carrier Problems” in Chapter 4.

4 If you still cannot access the error logs, review the “System Inventory” screen as detailed in Chapter 2 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 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 on what they did.

Once you receive that information, use any maintenance or system programming feature that may lead to the root of the problem. See “Access Log for Maintenance and System Programming” in Chapter 2 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” in Chapter 4.

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” in Chapter 4 to troubleshoot the processor.

Check the Modules

If the error logs indicate any modules, see “Module Problems” in Chapter 4.

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” in Chapter 4 for instructions.

Check the Trunks

Troubleshoot the trunks that are connected to the control unit. See Chapter 5, “Central Office 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 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” in Chapter 2, 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.

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.

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 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 be installed in the system. Auxiliary Power Units cannot be used with the 391A3 power supply.

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*.*

.

Error Logs, Access Logs, and System Inventory

2

As described in “Maintenance Strategy” in Chapter 1, 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 on 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, 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
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 "Summary" below or *System Programming* for additional information about printing.)

Summary

Console Procedure	**Menu**→Maintenance→System→Error Log→Last 10 or Permanent or Transient
PC Procedure	F6 → F1 → F2 → F1 or F2 or F3
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 Last *mm/dd/yy hh:mm* Access Log Exit Enter		F2
3 Select an error log option.		
System Error Log: Make a selection ■ Last 10 ■ Permanent ■ Transient (most recent alarm) Exit	If you select Last 10, see "Checking the Last 10 Errors" If you select Permanent, see "Checking Permanent Errors" If you select Transient, see "Checking Transient Errors"	F1 F2 F3

The most recent alarm message stays on the System Error Log screen until it is replaced by another one. 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 above for “Checking the Error Logs.” In Step 3, select Permanent.

Console Display/Instructions	Additional Information	PC
Permanent Errors: > *xxxxxxxxxxxxxxxxxxxx* Slot*xx* Port*xx* Count*xxx* First *mm/dd/yy hh:mm* Last *mm/dd/yy hh:mm* Code *xxxx* Exit	Press the **More** button to page through the permanent errors.	PgUp
	Press the **Drop** button to delete an error log entry.	Alt+PrtS

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

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” in Chapter 1 for additional information about alarms.

Checking Transient Errors

Follow Steps 1 through 3 above for “Checking the Error Logs.” In Step 3, select Transient.

Transient Errors: > *xxxxxxxxxxxxxxxxxxxx* Slot*xx* Port*xx* Count*xxx* First *mm/dd/yy hh:mm* Last *mm/dd/yy hh:mm* Code *xxxx* Exit	Press the **More** button to page through the transient errors.	PgUp
	Press the **Drop** button to delete an error log entry.	Alt+Pau

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

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

Line 5 indicates the error’s last occurrence.

Checking the Last 10 Errors

Follow Steps 1 through 3 above for “Checking the Error Logs.” In Step 3, select Last 10.

Console Display/Instructions	Additional Information	PC
Last 10 System Errors:> *xxxxxxxxxxxxxxxxxxxxx* Slot*xx* Port*xx* Last *mm/dd/yy hh:mm* Code *xxxx* Exit	Press the **More** button to page through the last 10 errors.	PgUp

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

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

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 on how to use the error logs, read this entire chapter and see “Maintenance Strategy” in Chapter 1.

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.
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.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
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.”
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.
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 problem persists, troubleshoot the processor.
0011	STACK OVERFLOW: Processor problem.	Troubleshoot the processor.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
0012	INVALID RESET FLAG: Processor problem.	Troubleshoot the processor.
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.
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 non-readable.	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.
0101	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.
0102	ABK INCORRECT CARD TYPE: A PCMCIA memory card for non-Translation is inserted.	Remove the current card and insert a Translation card or a card that has not been formatted.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
0103	ABK CARD WRITE-PROTECTED: The Translation card has the write protection switch on.	Flip the write protection switch on the card to off. It this problem persists try another card and then replace the processor module if the problem remains.
0104	ABK EXTENSION BUSY: A station is in program, administration, or maintenance mode.	Wait until the station changes mode.
0105	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.
0401	MEMORY CARD NOT PRESENT: A PCMCIA memory card is not inserted.	Insert an memory card.
0402	MEMORY CARD OF WRONG TYPE: The wrong type of PCMCIA memory card is inserted.	Remove the current card and insert the appropriate card.
0403	MEMORY CARD WRITE PROTECTED: The memory card has the write protection switch on.	Flip the write protection switch on the card to off. It this problem persists try another card and then replace the processor module if the problem remains.
0404	SOME STATION WAS IN PROGRAM MODE: A station was in program mode.	Wait until the station changes mode.
0405	MEMORY CARD FAILURE: 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.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
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.
1C01	POOL M-BUSY EXCEEDS 50%: More than half the trunks in the pool are busy.	Troubleshoot trunk.
1C02	FW UPGRADE ATTEMPT	If FW UPGRADE ATTEMPT is logged and FW UPGRADE COMPLETE is not, the firmware upgrade should be retried. The circuit module should be considered unreliable until a successful upgrade is performed.
1C03	FW UPGRADE ATTEMPT:	No action required.
1C04	FW UPGRADE COMPLETE:	No action required.
1C05	INVALIDE FMW 29 DETECTED: Incompatibility problem. The specified video endpoint or UDM is connedted to an 008 or 408 GS/LS MLX with firmware vinatage 0x29.	Replace the 008 or 408 MLX board with one of another firmware vintage and retire this permanent alarm manually.
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.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
2C01	T1 ACCESS VIOLATION: T1 Services (Channels-Voice/Data) administered incorrectly.	Check facility provisioning and reprogram channels appropriately for voice or data. If the problem persists, contact the NSAC.
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.
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 ones being received. Service on the link has been lost.	The far end of the network interface is 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.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
LC03	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.
LC04	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.
LC05	DS1 LOSS OF MULTIFRAME: Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
LC06	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.
LC07	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
LC08	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

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
4C09	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
4C0A	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
4C0B	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.
4C0C	BRI LOSS OF SYNC:	Usually no action is required. Troubleshoot the BRI trunk. If problem persists, contact your technical support organization.
4C0D	BRI SLIPS > 88:	Usually no action is required. Troubleshoot the BRI trunk. If problem persists, contact your technical support organization.
4C0E	BRI NET REQUESTED CLOCK:	Usually no action is required. The link should return to normal once the test is completed. If problem persists, contact your technical support organization.

Continued on next page

Table 2–2 ***Continued***

Error Codes	Description	Action
6C0F	BRI NET DEACTIVATE:	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 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.
6C11	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.
6C12	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.
6C13	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.
6C14	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.
7001	PRI SVC AUDIT TIMEOUT:	Troubleshoot the PRI trunk and report to service provider; otherwise, no action required. If problem persists, contact your technical support organization.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
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.
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.

Continued on next page

Table 2–2 *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 Automatic Maintenance-Busy is enabled or not.	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.
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

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
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.
7809	TEST STATUS 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 *Continued*

Error Codes	Description	Action
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.
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 Automatic Maintenance-Busy is enabled or not.	Troubleshoot the far end of the network interface to see if it is working and translated properly. Troubleshoot for faulty cable.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
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 whether it is working and translated properly. Troubleshoot for wink start and faulty cable. Troubleshoot the far end of the 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.
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.

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Table 2–2 ***Continued***

Error Codes	Description	Action
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.

Continued on next page

Table 2–2 ***Continued***

Error Codes	Description	Action
840D	INCORRECT FIRMWARE STATE: If this error occurs 4 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 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.
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. Replace the card if the problem persists and try again. If the problem 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. Replace the card if the problem persists and try again. If the problem persists, replace the processor.

Continued on next page

Table 2–2 *Continued*

Error Codes	Description	Action
9803	MCARD 12-VOLT ERROR: The memory card voltage is incorrect.	Reset the card and try again. Replace the card if the problem persists and try again. If the problem persists, replace the processor.
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 conected to the port and that the LEDs on the board show proper operation. If the card appears to be working properly, check that the line has been activated by the central office .
9C04	NW NOT RESPOND TO SETUP: Service on the link has been lost.	The 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 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.

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Table 2–2 *Continued*

Error Codes	Description	Action
9C08	PROTOCAL ERROR: Service on the line may be affected.	The network has indicated that a protocal error has occured. 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.

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).

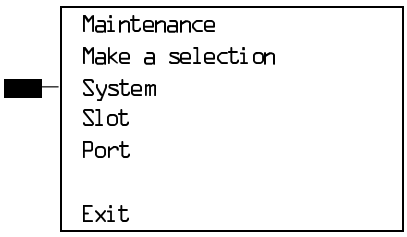
Scanning the Log

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.		
		F1

Console Display/Instructions	Additional Information	PC

2 Display the first screen of the Access Log.

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

F4

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

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
When you access the System Inventory screen, Slot 00 information is displayed. Line 3 indicates that the processor occupies Slot 00.		
System Inventory: Slot 00 Board Processor Hardware Vintage: *xx* LEGEND 4.0 V*x.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.

Console Display/Instructions	Additional Information	PC
System Inventory: Slot *xx* Board *boardname* Hardware Vintage: *vv* Firmware Vintage: *vv* Application Vinatage: vv 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

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.

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 persists, continue as described below.

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 proper section of this chapter.

Table 3–1. Troubleshooting Telephone Problems

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

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.

NOTE:
Refer to “Troubleshooting Trunk Problems” in Chapter 5 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” in Chapter 4 for more information.

10 Check the error log for relevant messages. See Chapter 2, “Error Logs, Access Logs, and System Inventory.”

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.

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 1234567890*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**.
- 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.

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 *1234567890*#*

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 below.

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.

d Dial *1234567890*#;* 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

The following symptoms indicate that the system needs more touch-tone receivers (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.

NOTE:
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.

2 Estimate the hourly call volume for calls originating from single-line telephones, incoming calls on remote access and Direct Inward Dial (DID) lines, and calls on tie lines.

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.

5 Use Table 3–5 to determine the number of TTRs already supplied.

6 Compare the numbers obtained in Steps 4 and 5 to see if additional TTRs need to be added.

7 Add a new module if indicated.

See *Installation*.

A voice messaging system requires a certain number of touch-tone receivers, (TTRs), in addition to any system requirements for TTRs. The number of TTRs required by the voice messaging system depends on the number of ports used by the voice messaging system.

Table 3–3. TTRs Required by VMS

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

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 in this table includes all calls originating from single-line telephones, calls on tie lines, incoming remote access and Direct Inward Dial (DID) calls, and calls routed to the voice messaging system.

Table 3–4. System Requirement for TTRs

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

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

Table 3–5. Modules with TTRs

Module	No. of TTRs
008 OPT	2
012	2
016	4
400 GS/LS	4
400	4
800 DID	2
800 LS-ID	2

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.

- 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.

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:

- 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 following responses:

- 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," later in this chapter, to *remove* the power supply, then return to Step 2 below.

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.

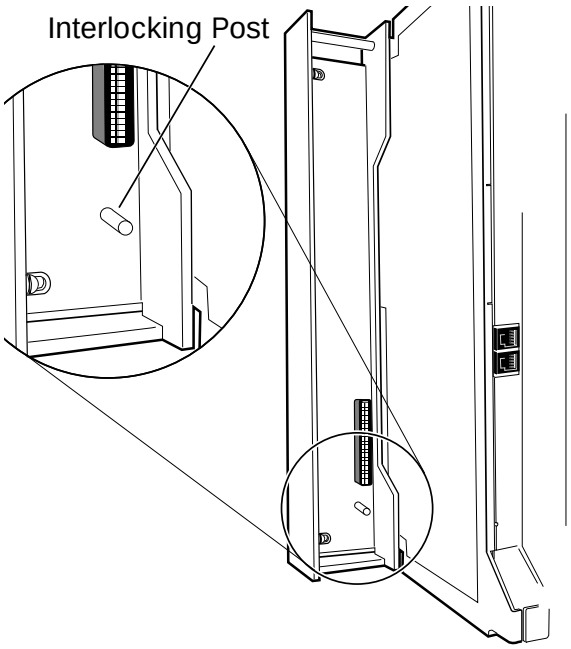


Figure 4–1. Power Supply Interlocking Post

3 If the interlocking post is not broken, *reinstall* the power supply; follow Steps 5–8 in "Replacing the Power Supply" later in this chapter.

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 ring, see “Module Problems” later in this chapter. See Table 4–1 below to determine which 012 module is installed.

NOTE:
All 016 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 4–2 throughout the procedure.

1. **Follow Steps 1–4 in “Replacing the Power Supply,” later in this chapter, 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.

You need to grip this cable firmly and pull forcefully.

7 Remove the four screws from the ring generator, as shown in Figure 4–2.

8 Remove the ring generator.

9 Position the replacement ring generator, as shown in Figure 4–2. 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.

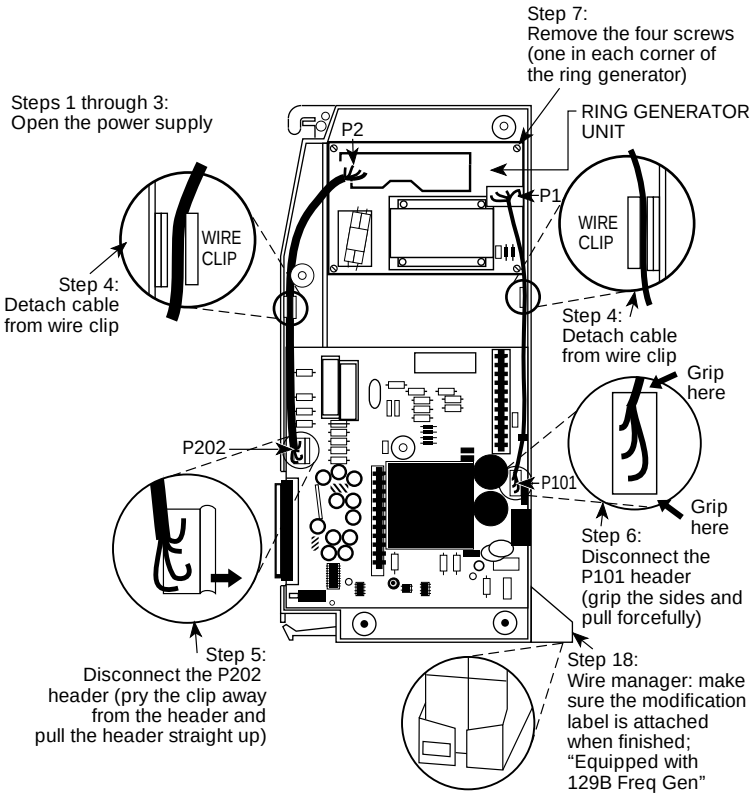


Figure 4–2. Replacing a Ring Generator

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,” later in this chapter.

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 4–3 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.

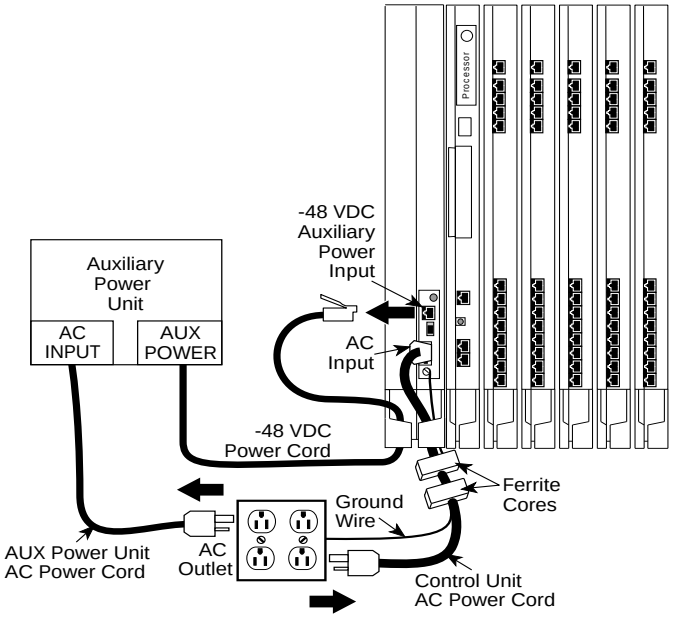


Figure 4–3. Replacing an Auxiliary Power Supply

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.

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.

To replace the power supply module, follow the steps below and refer to Figure 4–3.

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.

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 “Replacing the Processor,” later in this chapter.

Peek

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

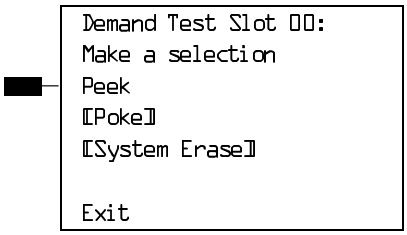
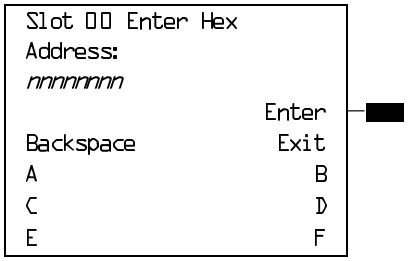
CAUTION:
Do not perform Peek unless you are following instructions from your technical support organization.

Summary

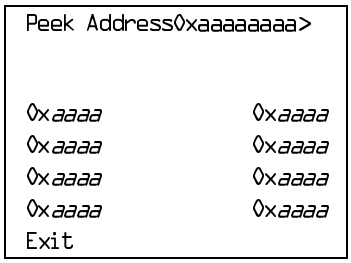
Console Procedure	**Menu**→Maintenance→Slot→Dial *00*→Enter →Demand→Test→Peek→Dial Address→**More**
PC Procedure	F6→F2→Type *00*→F2→F1→Type Address→PgUp

To perform Peek, follow the steps below.

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

Console Display/Instructions	Additional Information	PC
4 Select the Peek option.		
	Poke and System Erase are not displayed, which prevents customers from accidentally changing the processor memory.	F1
5 Dial a memory address.		
	Dial [*nnnnnnnn*], then select Enter.	F6

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

	*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.

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

Console Display/Instructions	Additional Information	PC
3 Select the Demand Test.		
Slot □□: Make a selection Status Demand Test Exit		F2
4 Select Poke two times.		
Demand Test Slot □□: 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 button for Line 4) twice.	F2 F2
5 Select Continue.		
Poke - WARNING!! SYSTEM MEMORY WILL BE MODIFIED! Continue Cancel Exit		F1
7 Follow the instructions from your technical support organization to select a memory address.		
Slot □□ EnterHexAddress: aaaaaaaa Enter Backspace Exit A E C D E F		

Console Display/Instructions	Additional Information	PC

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

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

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.

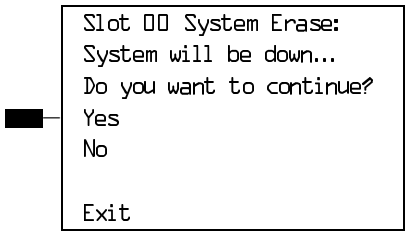
Summary

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

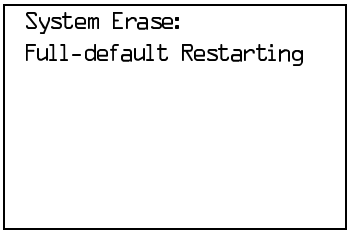
To perform a System Erase (Frigid Start), follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Slot option.		
Maintenance Make a selection System ■ Slot Port Exit		F2
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, the left button for line 5, twice.	F3 F3

Console Display/Instructions	Additional Information	PC
5 Select Yes.		



F2



Forced Installation/Upgrade of System Software

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

All existing system programming will be erased by this procedure.

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

- 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.
- Upgrading 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 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.

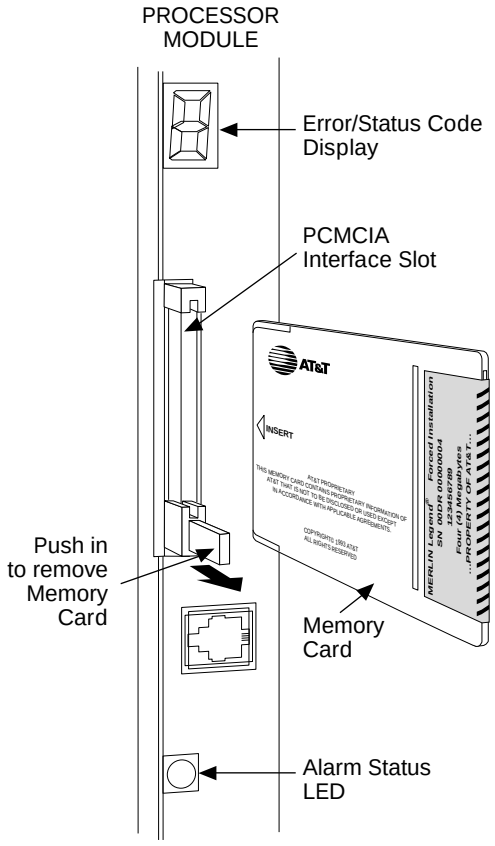
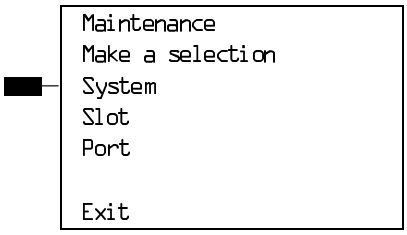


Figure 4–4. Inserting a Memory Card

Console Display/Instructions	Additional Information	PC

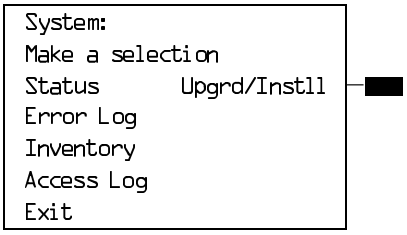
3 Initiate the software installation.



F1

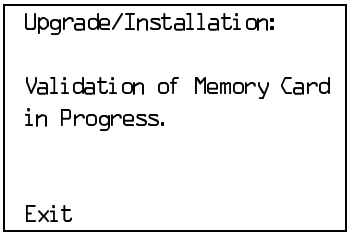
- If the maintenance screens are functioning correctly, select System from the Maintenance menu. Continue with Step 4.
- If maintenance screens are unreliable or not available, power cycle the system by turning off the system and leaving it off for at least one second. Turn the system back on. The system boots from the memory card and automatically starts the installation software. Go to Step 11.

4 Select Upgrade/Install.



F6

5 Observe the memory card validation screens.



Console Display/Instructions	Additional Information	PC
Upgrade/Installation: Validation of Memory Card Successfully Completed. Exit		F5

When completed, select Exit to continue.

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

Console Display/Instructions	Additional Information	PC
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.

Console Display/Instructions	Additional Information	PC
Upgrade: MemCard Rel: 4.y Vnn.mm Current Rel: 4.y Vnn.mm Incompatible releases. Exit		F5

See “Other Error Conditions,” following this section, for continuing instructions.

Console Display/Instructions	Additional Information	PC

7 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
```

8 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
```

9 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.

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.”

10 Remove the memory card from the interface slot.

11 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.

12 Restore system programming.

After about 10 minutes, check to see if the red alarm status LED is lit, (RED). 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 only occur during or immediately after a forced installation. Instructions for recovery follow the description of each error condition.

Table 4–2. Codes Displayed on the Error/Status Display 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.)

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.

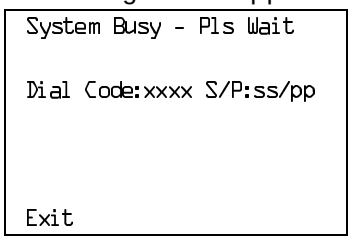
Memory Card Is Corrupted

```
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.



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.

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” 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. Re-initiate 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 will delete existing programming. Before pressing the hidden key, make a backup of the system programming. Use SPM or a PCMCIA translation card.

Console Display/Instructions	Additional Information	PC
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.		
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.

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” that follows this section.

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” above for instructions.

11 Restore system programming using one of the following.

- 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.

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.”

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*.)

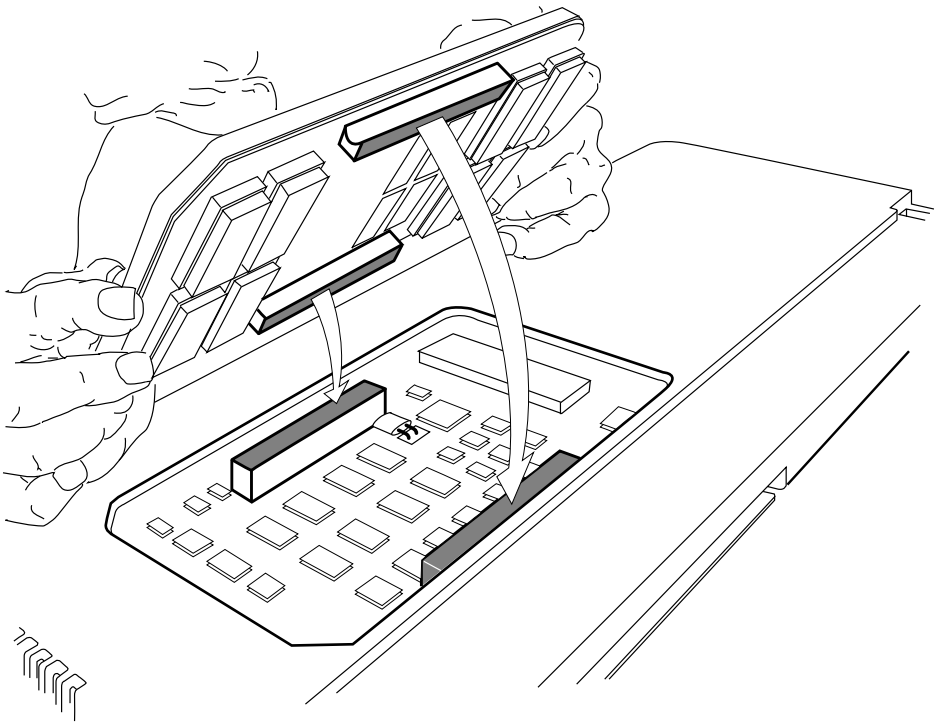


Figure 4–5. Replacing the Feature Module

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.*)

Module Problems

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

- 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

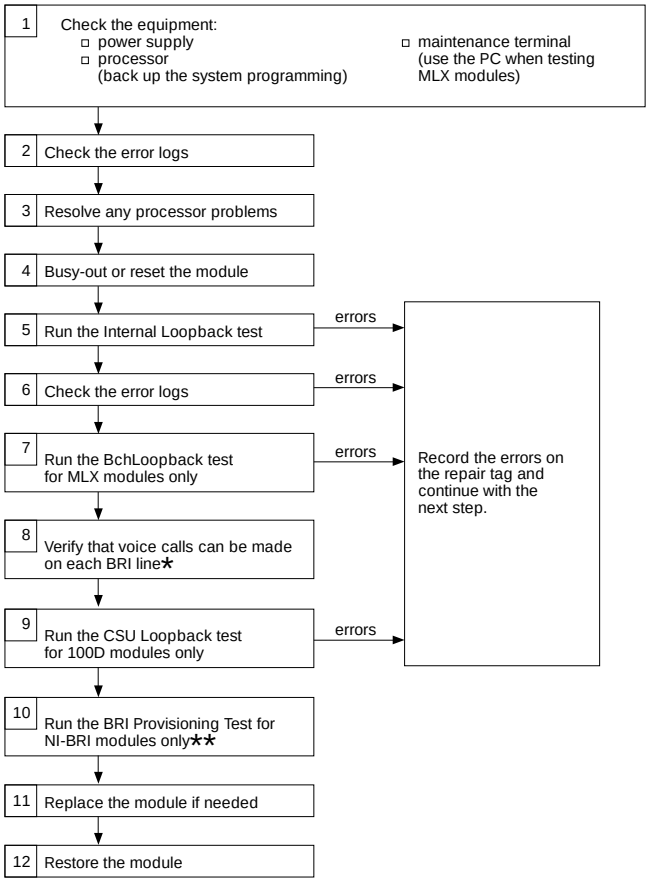
The module tests in this section identify the cause of module malfunctions. After each module test, record any errors on the repair tag that will be shipped with the faulty module. If the module is sent for repair, this helps repair personnel troubleshoot the cause of the malfunction.

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.



* 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

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,” later in this chapter, for more information on these features.

Test Notes

For each test, you should note the following:

- When beginning the board controller test or the internal loopback module test, choose to run it once or repetitively.
- 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," earlier in this chapter, 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" for general guidelines.

4 Run the internal loopback test.

See "Internal Loopback Test," later in this chapter. If errors occur, record them as described in "Considerations" above.

5 Run the board controller test.

See "Board Controller Test," later in this chapter. If errors occur, record them as described in "Considerations" above.

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" later in this chapter. If errors occur, record them as described in "Considerations" above.

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

See "800 NI-BRI Module Problems" later in this chapter. If errors occur, record them as described in "Considerations" above.

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

See "100D Module Problems" later in this chapter. If errors occur, record them as described in "Considerations" above.

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 on restoring a module, see “Restore,” later in this chapter.

Persistent Module Problems

If any of the module tests fail and replacing the module does not clear the trouble, then:

- Several modules may be faulty.
- 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.
  - — 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 “Restore,” later in this chapter, 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.

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 (*n=00 to 17*).		
Slot: Enter Slot number (00-17) *nn* Backspace Exit Enter	Dial or type [*nn*], then select Enter.	F10

Console Display/Instructions	Additional Information	PC

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-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.

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


Exit
```

xx = slot number entered in Step 2

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.

Console Display/Instructions	Additional Information	PC
Busy-Out Slot *xx*: Busy-Out Complete Exit	*xx* = slot number entered in Step 2	

The screen below appears when the busy-out fails again; 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
```

2 Specify the slot number (nn = 00 to 17).

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


nn
Backspace
Exit                Enter               F10
```

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

3 Select Reset.

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

Exit                                    F7
```

xx = slot number entered in Step 2

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.

Console Display/Instructions	Additional Information	PC

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.

```
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

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 restore 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 (n = 00 to 17).**		
	Slot: Enter Slot number (00-17) *nn* Backspace Exit Enter	Dial or type [*nn*], then select Enter.	F10

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-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.

```
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 “Module Test Process” above, do so before continuing.

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," earlier in this chapter, 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 the "Restore" procedure, earlier in this chapter, for additional information.

To run the Internal Loopback Module Test, 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

Console Display/Instructions	Additional Information	PC

2 Specify the slot number (*nn* = 00 to 17).

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


nn
Backspace
Exit          Enter
```

Dial or type [*nn*], then press 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-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 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

F3

Console Display/Instructions	Additional Information	PC

5 To run the test once or run it repeatedly, select Test Once or Repetitive.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaa
Internal Loopback
Test Once
Repetitive

Exit
```

xx = slot number entered in Step 2

Select Test Once or Repetitive — F2 / 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 aaaaaaaaaaaaaaaaa
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 aaaaaaaaaaaaaaaaa
Internal Loopback Test
Successfully Completed


Exit
```

xx = slot number entered in Step 2

The screen below appears when either test (Test Once or Repetitive) fails.

Console Display/Instructions	Additional Information	PC
Demand Test Slot *xx*: Board *aaaaaaaaaaaaaaaaa* Internal Loopback Test FAILED *xxxxxxxxxxxxxxxxxxxxxxxx* *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.
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 “Restore,” earlier in this chapter.

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 number. → Enter→Demand Test→BoardCntrlr→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 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," earlier in this chapter, 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 the "Restore" procedure, earlier in this chapter, for additional information.

To run the Board Controller Module Test, use the following steps.

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* = 00 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

F6

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.

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 *aaaaaaaaaaaaaaaa* Board Controller: Test Once Repetitive Exit	*xx* = slot number entered in Step 2	F2 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 *aaaaaaaaaaaaaaaa* Board Controller Test in Progress Exit	*xx* = slot number entered in Step 2 If you are running the repetitive test, this 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 *aaaaaaaaaaaaaaaa* Board Controller Test Successfully Completed Exit	*xx* = slot number entered in Step 2	

The screen below appears when either test (Once or Repetitive) fails.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaa
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.

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,” earlier in this chapter.

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” above, do so.

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,” earlier in this chapter, 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," earlier in this chapter, for additional information.

To run the B-Channel Loopback Test, follow the steps below.

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 module's 2-digit slot number (*nn* = 00 to 17).		

`Slot:`
`Enter Slot number (00-17)`
 	
nn
`Backspace`
`Exit  Enter`
	Dial or type [*nn*], then select `Enter`.	

Console Display/Instructions	Additional Information	PC

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 B-channels are 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.

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 are finished running module tests, be sure to restore the module. See “Restore” earlier in this chapter for instructions.

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.

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 a 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 on 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 on labeling trunk and cords, see Chapter 4 in *Installation*.
For instructions on checking poorly labeled wiring, see “Checking Unlabeled Wiring” following Step 8.

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.

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 one wire from the pair you have chosen to each clip. 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.

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 don't 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, the 800 GS/LS-ID, and the 800 NI-BRI.

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, 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 unsuccessful, you are given the option of waiting for a Busy-Out or selecting 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," earlier in this chapter, for additional information.

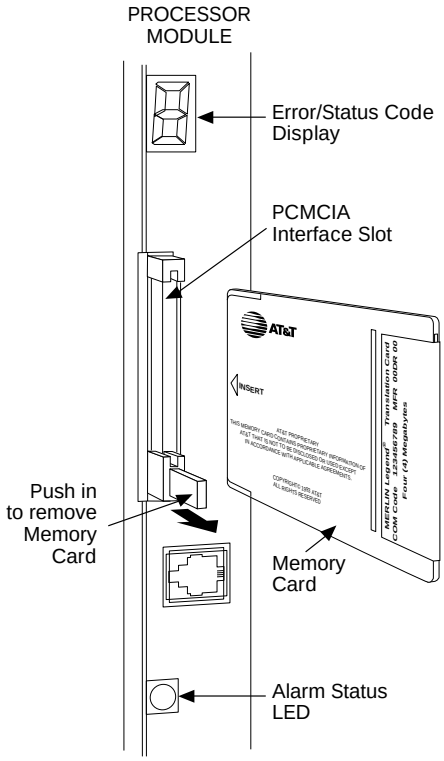


Figure 4–7. Inserting the Upgrade Memory Card

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.

Console Display/Instructions	Additional Information	PC

2 From the Maintenance menu, select the Slot option.

```
Maintenance:
Make a selection
System
Slot
Port

Exit
```

F2

3 Specify the slot number (*nn* = 00 to 17).

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

nn

Backspace
Exit          Enter
```

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

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.

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.
```

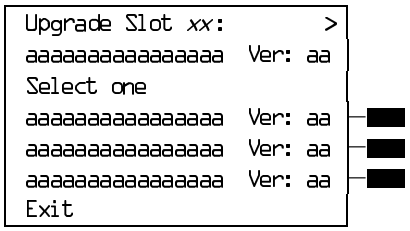
```
Module Upgrade:

Validation of MemoryCard
Successfully Completed.


Exit
```

F5

When completed, select Exit to continue.

Console Display/Instructions	Additional Information	PC

5 Select the firmware to be programmed.

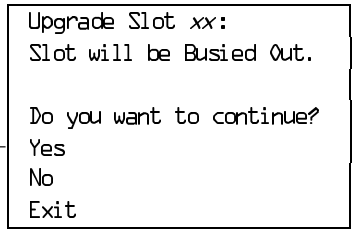


xx = slot number entered in Step 3
Line 2 displays the firmware version currently installed on the module.

Lines 4, 5 and 6 display firmware versions available on the memory card. F7 F8 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

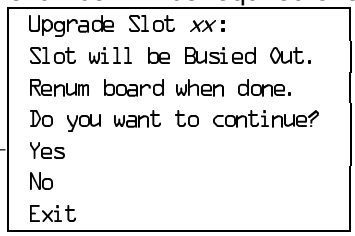
6 Select Yes.



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.



xx = slot number entered in Step 3

F3

If the module Busy-Out is blocked by an active line or extension, the following screen appears.

Console Display/Instructions	Additional Information	PC

7 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

8 Observe the status screen below.

See the next section, “Error Conditions During Firmware Upgrade” 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

If a Board Renumber is also required, the screen below appears.

Console Display/Instructions	Additional Information	PC
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

Console Display/Instructions	Additional Information	PC
Upgrade Slot *xx*: Module can not be upgraded. Exit F5	*xx* = slot selected in Step 3.	

This procedure can only be run on the 800 GS/LS-ID, 016, 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 module may be unreliable or unusable until a successful upgrade is performed on it.

Module Error

Console Display/Instructions	Additional Information	PC
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

Select Exit, then make sure that the memory card is properly inserted, and reinitiate the upgrade procedure.

Console Display/Instructions	Additional Information	PC
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 the Module.”

Upgrade Attempted on an Empty Slot

Upgrade Slot *xx*: No module in slot. Exit	*xx* = slot selected in Step 3.	F5

Select Exit and repeat the upgrade procedure, being careful to select the correct slot.

Board Memory Programming Failure

Console Display/Instructions	Additional Information	PC
Upgrade Slot *xx*: Board Memory Programming Failure. Upgrade CANCELED. Upgrade INC0MPLETE. 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 the Module.”

800 NI-BRI Module Problems

An 800 NI-BRI module requires running the Provisioning Test, in addition to the other module tests, under the following circumstances:

- If the module has data endpoints that will use the BRI lines
- If 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 not 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 that this section does not cover, contact NSAC.

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.

Before proceeding with this test, have available 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 multi-line hunt group. This move involves administering the lines and connecting the cables on the target module. Run the test on the three 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, and reconnect the cables to the orginal slot and port.

Summary

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,” earlier in this chapter, 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 will increase the time. Boards with fewer administered lines and no errors will decrease the time.
Interrupting the Test	Interrupt the test by selecting `Exit`.
Test Failure	If the test fails, follow the instructions in Tables 4–6 and 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 in the Slot menu, which you can access by doing the following from the console: **Menu**→`Maintenance`→`Slot` See "Restore," earlier in this chapter, for additional information.

To run the Provisioning Test, follow the steps below.

NOTE:
Before proceeding with this test, have available completed copies of *System Planning Form 3–i, Incoming Trunks*: *BRI Options* and the *NI-1 BRI Planner Form*.

Console Display/Instructions	Additional Information	PC
1 From the main menu, select the Slot option.		
Maintenance Make a selection System Slot Port Exit		F2

Console Display/Instructions	Additional Information	PC
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
4 If the test canot be run to completion, an error message screen appears, such as the one shown below:		
Provisioning slot *xx*: Slot is not busied-out 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 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.

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 administered communication paths on the module.

The screen below appears only if all sixteen 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 sixteen communication paths are administered on the module or if one or more communication paths fail. On a module with fewer than sixteen administered paths, the screen will show “OK” for all successful paths, error codes for all failed paths, and “ADMIN” for any path that was not administered. Before proceeding, record all the error codes on this screen, in the correct order.

```
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

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 will remain on until the CO reinitializes all of the lines.

Follow the procedures in Table 4–7 for examining 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	BRI facility provisioned with functioning voice and data capabilities	No action required if voice and data functionalities are expected.
CO-V	CO provisioning error for voice calls on that facility	This result indicates that facility is correctly administered 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 (described later in this section) and record the results before contacting the LEC: ■ Outgoing Voice Call Test ■ Incoming Voice Call Test

Continued on next page

Table 4–7 *Continued*

Result Code	Description	Corrective Action
C0-V *continued*		Possible causes for this error are: ■ *No calling party number* (Error identified at Incoming Voice Call Test, Step 3) **Note:** One or both of the following conditions can result in the absence of calling party number: - Originator is provisioned for privacy. - Receiver (BRI line under test) is provisioned for non-delivery of calling party information. ■ *Outgoing and/or incoming calls are not possible at all times*. (Error identified at Outgoing Voice Call Test, Step 3 and/or Incoming Voice Call Test, Step 2) This condition may or may not be detectable by performing the above tests only once. Therefore, repeat the tests several times, mixing outgoing and incoming voice calls, varying the disconnecting end, connecting on some calls but not others, etc. ■ *Features provisioned* NI-BRI features are provisioned at the CO for features other than normal call handling, such as transfer, conference, or additional call offering. With additional call offering provisioned, a voice call can be presented to a busy facility undetected by both calling and called parties. Therefore, this condition is not detectable by manual testing. The condition is possible if incoming calls can be successfully received.

Continued on next page

Table 4–7 *Continued*

Result Code	Description	Corrective Action
C0-D	CO provisioning error for data calls on that facility	This result indicates that facility is correctly administered 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 (described later in this section) with either digital data terminals or analog data terminals and modem pools. Record the results before contacting the LEC: ■ Outgoing Data Call Test ■ Incoming Data Call Test 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.) Possible causes for this error are: ■ *No calling party number* (Error identified at Incoming Data Call Test, Step 3) Note: One or both of the following conditions can result in the absence of calling party number: - Originator is provisioned for privacy. - Receiver (BRI line under test) is provisioned for non-delivery of calling party information. ■ *Outgoing and/or incoming calls are not possible at all times*. (Error identified at Outgoing Data Call Test, Step 2 and/or Incoming Data Call Test, Step 2) This condition may or may not be detectable by performing the above tests only once. Therefore, repeat the tests several times, mixing outgoing and incoming data calls, varying the disconnecting end, connecting on some calls but not others, etc. ■ *X.25 provisioned for either B- or D-channel* This condition is not detectable by manual testing.

Continued on next page

Table 4–7 *Continued*

Result Code	Description	Corrective Action
CO-DV	CO provisioning error for voice and data calls on that facility	This result indicates that facility is correctly administered and established on Layers 1, 2, and 3. However a problem associated with the provisioning at the CO for voice and data calls was detected. Perform the following voice and data tests (described later in this section) with either digital data terminals or analog data terminals and modem pools. Record the results before contacting the LEC: ■ Outgoing Voice Call Test ■ Incoming Voice Call Test ■ Outgoing Data Call Test ■ Incoming Data Call Test 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.) Possible causes for this error are: ■ *EKTS or EKTS CACH provisioning* (Error identified at Outgoing 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 are not possible. This condition is detectable by the tests listed above. ■ *Any of the causes listed for CO-V and CO-D*
LG	MERLIN LEGEND BRI error on that facility	This result should never appear; if it does, contact the NSAC.

Continued on next page

Table 4–7 *Continued*

Result Code	Description	Corrective Action
ADMC0	MERLIN LEGEND administration error and/or CO provisioning error on that facility	Check that the facility is administered with the DN provided by the CO. If the DN was not administered 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 ■ Incoming Voice Call Test **and/or** ■ Outgoing Data Call Test ■ Incoming Data Call Test Possible causes for 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*
ADMIN	No administration or incorrect administration on that facility	Check that the facility is administered with the SPID and DN provided by the CO. If the SPID and DN were not administered properly, correct them 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 ■ Incoming Voice Call Test **or** ■ Outgoing Data Call Test ■ Incoming Data Call Test Possible causes for this error are: ■ *Incorrect SPID* (Error identified at Outgoing 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.

Continued on the next page

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. Possible causes of this problem are: ■ The DSL is provisioned with only one active DN (rather than two) at the CO ■ Two lines are administered when only one line is provided by the CO. Check that the facilities are administered 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.
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.

Continued on the next page

Table 4–7 *Continued*

Result Code	Description	Corrective Action
?????	Testing was inconclusive because the lines(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 to either a working facility on the system or to a phone on the premise that is connected to the Central Office (CO).

NOTE:
The 800 NI-BRI module must be restored (removed from the Maintenance Busy state) before performing this test.

1 Assign the BRI line to a button on an MLX display station.

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.

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.

1 Assign the BRI line to a button on an MLX display station.

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 either at 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.

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 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 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 station 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 facililty to the BRI line under test. See the *Data and Video Reference* for details regarding answering 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.

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 station 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 station 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 station 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.

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* = 00 to 17).		
Slot: Enter Slot number (00-17) *nn* Backspace Exit Enter	Dial or type [*nn*], then 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
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* 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 4–6 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.

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.
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," earlier in this chapter, 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 the "Restore" procedure, earlier in this chapter, for additional information.

In preparation for running the CSU Loopback Test, perform the following steps 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 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** buttonon 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.

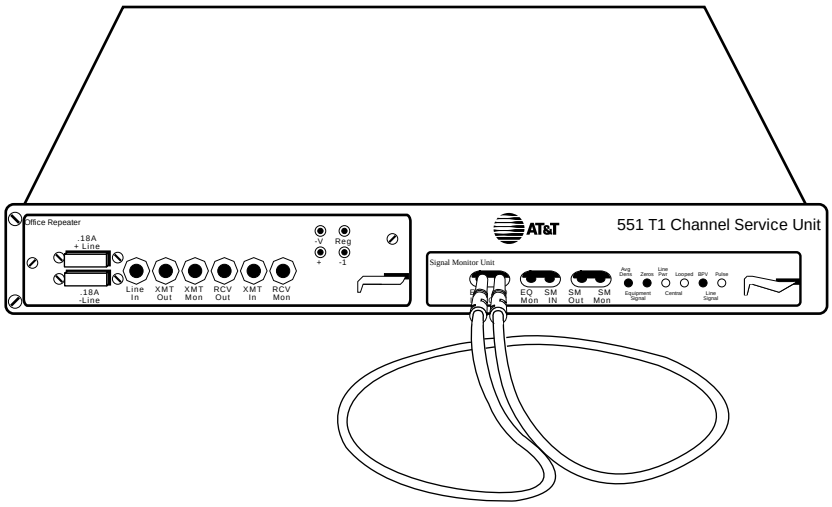


Figure 4–8. 551 T1 CSU Loopback Connection

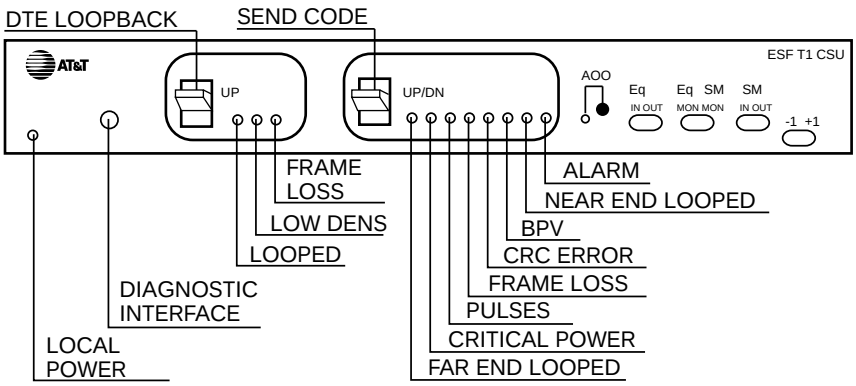


Figure 4–9. ESF T1 CSU DTE Loopback Connection

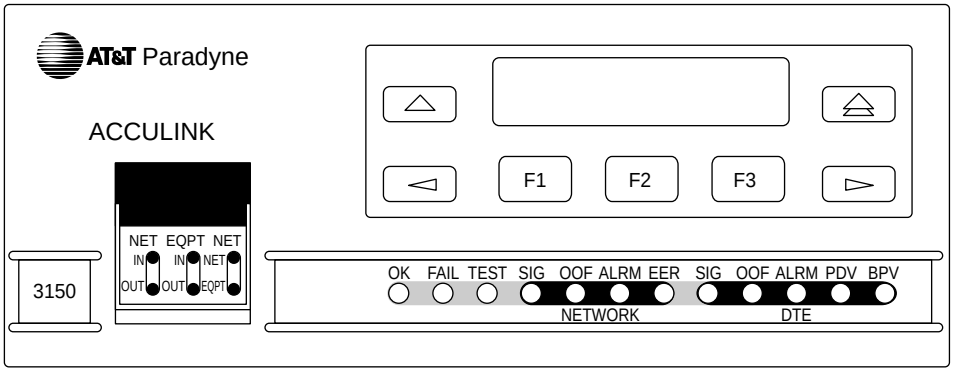


Figure 4–10. ACCULINK 3150 CSU Front Panel

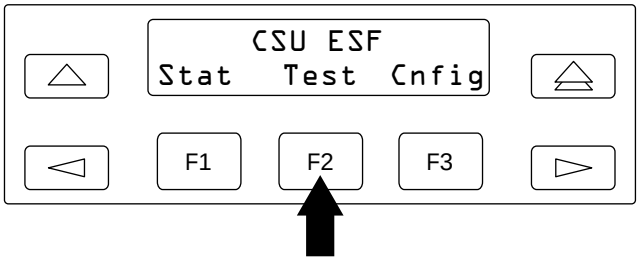


Figure 4–11. ACCULINK 3150 CSU DTE Loopback Command 1

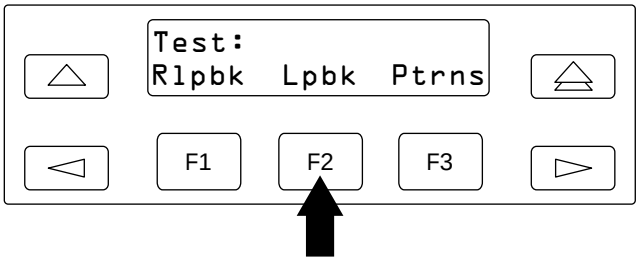


Figure 4–12. ACCULINK 3150 CSU DTE Loopback Command 2

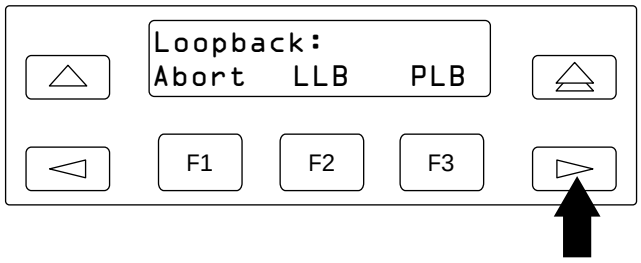


Figure 4–13. ACCULINK 3150 CSU DTE Loopback Command 3

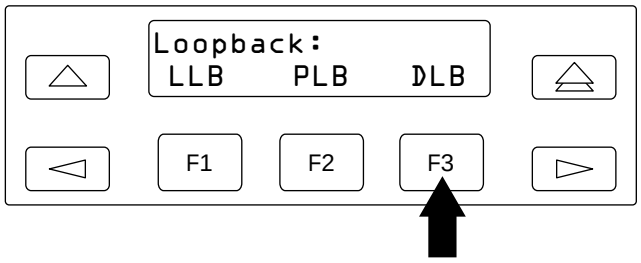


Figure 4–14. ACCULINK 3150 CSU DTE Loopback Command 4

To run the CSU Loopback Test, follow the steps below.

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* = 00 to 17).		
Slot: Enter Slot number (00-17) *nn* Backspace Exit Enter	Dial or type [*nn*], then select Enter.	F10
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.

Console Display/Instructions	Additional Information	PC
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 their end.

CSU-lpbk Slot *xx*: CSU-lpbk Passed Exit	*xx* = slot number entered in Step 2

The screen below appears when the test fails.

CSU-lpbk Slot *xx*: CSU-lpbk Failed *xxxxxxxxxxxxxxxxxxxxxxx* *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.
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," earlier in this chapter, 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).
- 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.

Summary

Console Procedure	**Menu**→Maintenance→Slot→Dial the slot no.→ Enter→Error Events→Current hr or Previous hr
PC Procedures	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

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*], then select Enter.

3 Select Error Events.

```
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

F8

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.

Console Display/Instructions	Additional Information	PC
Current 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	

The screen below displays the errors that have accumulated during the previous hour.

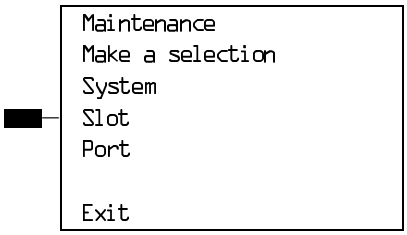
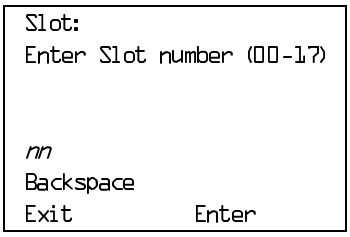
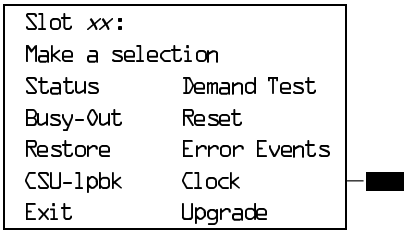
Previous hr Slot *xx*: *mm/dd/yy* *hh:00-hh:mm* CurAlm *aaaa* MaxAlm *aaaa* MIIS SLP ES BS SEC FS *xxx xxx xxx xxx xxx xxx* Exit	*xx* = slot number entered in Step 2

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

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Slot option.		
		F2
2 Specify the 2-digit slot number (*nn* = 00 to 17).		
	Dial or type [*nn*], then select Enter.	F10
3 Select Clock.		
	*xx*=slot number entered in Step 2 CSU-lpbk and Error Events are displayed only for the 100D module.	F9

Console Display/Instructions	Additional Information	PC

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
```

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” in Chapter 1.

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.

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 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, the access log, and running module tests, you can request System Status and Slot Status information for each module.

System Status

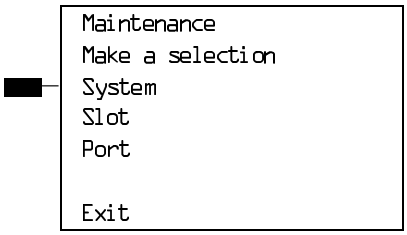
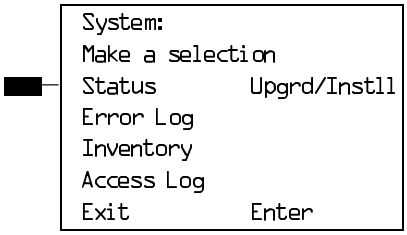
The power supply, processor, 400EM module, and 100D module are the only modules that have LEDs. The System Status screen displays simulated LEDs for the processor and each of these modules but not for the power supply.

The System Status procedure allows you to check simulated LEDs for the processor and other modules. This is explained in detail in “Reading the System Status Screen,” later in this chapter.

Summary

Console Procedure	**Menu**→Maintenance→System→Status
PC Procedure	F6 → F1 → F1

To check System Status, follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the System option.		
		F1
2 Select Status.		
		F1

Interpreting the System Status Screen

Console Display/Instructions	Additional Information	PC
System Status: Slot00:R*aaa* Slot01:R*aaa* Y*aaa* G*aaa* Slot02:R*aaa* Y*aaa* G*aaa* Slot03:R*aaa* Y*aaa* G*aaa* Slot04:R Y G Exit	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	

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.
```

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	F6→F2→Type the slot no.→F10→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		F2
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 “Slot Status,” earlier in this chapter.

```
Status Slot 00:

LED:          Raaa
Errors:

Alarms:

Exit
```

R*aaa*=status (On, Off, No) of red LED.

If you selected a slot other than 00, the screen below appears. For detailed information about this status screen, see “Slot Status,” earlier in this chapter.

```
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

Central Office 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.

Table 5–1. Troubleshooting Trunk Symptoms

Symptom	Section
Incoming calls not being received	Incoming Trunk Problems
Cannot make outgoing calls	Outgoing Trunk Problems
General trunk problems	Manual Correction of Trunk Problems

NOTE:
If the customer reports echos 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.

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).

Outgoing Trunk Problems

If the system cannot sieze 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:
The 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.

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 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.
  - — 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.

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.

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

Permanent Errors

A permanent error is entered in the error logs when more than 50 percent of analog trunks trunks in a pool are maintenance-busy. When the maintenance-busy level falls below 50 percent, the system automatically removes the permanent error.

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) Trunk

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) Trunk

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 Trunk

The following events cause maintenance-busy on a tie trunk.

- 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 on 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. Once you determine the maintenance-busy status, you might also be interested in the other features on the Port menu, which include the following:

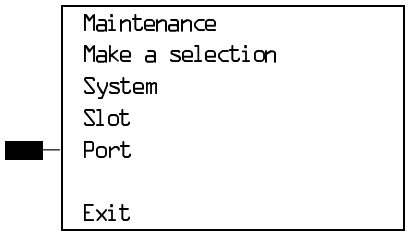
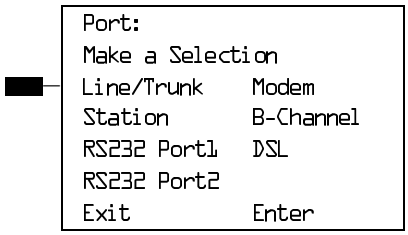
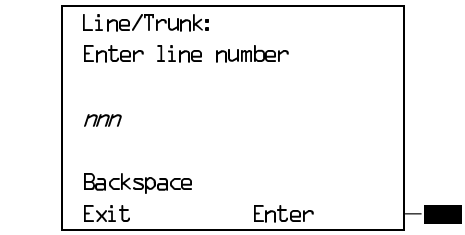
- Resetting EIA-232 ports and modems
- Busying-out and restoring trunks and extensions
- Auditing DS1 PRI lines or calls

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.		
		F3
2 Select the Line/Trunk option.		
		F1
3 Specify the dial plan (line) number for the trunk (*nnn* = 801 to 880).		
	Dial or type [*nnn*], then select Enter.	F10

Console Display/Instructions	Additional Information	PC
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.

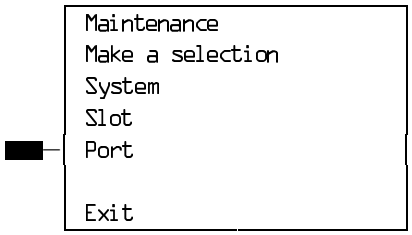
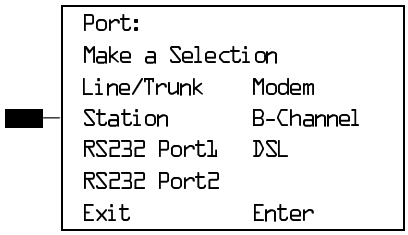
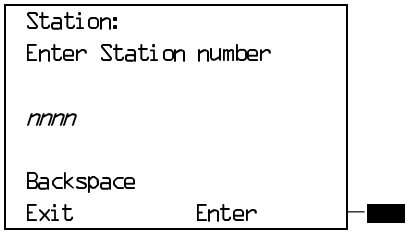
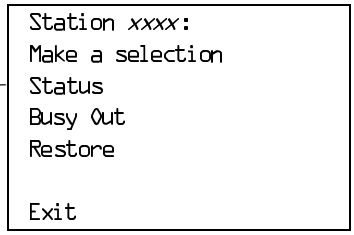
Line *xxx*: Dial Plan: *xxxx* SlotPort: *sspp* LogicId: *xxx* Label: *xxxxxxxxxx* Maintenance Busy: *xxx* Exit Next	*xxx* = line number entered in Step 3 Select Next to see the status of the next trunk.	 F10

Checking Extension Maintenance-Busy Status

Summary

Console Procedure	**Menu**→Maintenance→Port→Extension→Dial the dial plan no.→Enter→Status
PC Procedure	F6→F3→F2→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.		
		F3
2 Select the Station (extension) option.		
		F2
3 Specify the dial plan extension number (*nnnn* = 1- to 4-digit number).		
	Dial or type [*nnnn*], then select Enter.	F10
4 Select Status.		
	*xxxx* = extension number entered in Step 3	F1

The maintenance-busy status for the extension selected is displayed as a Yes or a No in the field (line 6) on the screen below.

Console Display/Instructions	Additional Information	PC
Station: *xxxx* Dial Plan: *xxxx* SlotPort: *sspp* LogicId: *xxx* Profile: *xxxxxxxxxx* Maintenance Busy: Exit Next	Select Next to see the status of the next extension.	F10

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	F6→F3→F1→Type the dial plan no.→F10→F1

To check a Digital Subscriber Line (DSL)'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

Console Display/Instructions	Additional Information	PC
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		F8
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 Error Events Exit	*sspp* = slot/port 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.

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

Busying-Out a Trunk

Summary

Console Procedure	**Menu**→Maintenance→Port→Line/Trunk→ Dial the dial plan no.→Enter→Busy-Out
PC Procedure	F6→F3→F1→Type the dial plan no.→F10→F2

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

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

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.

0

F10

Console Display/Instructions	Additional Information	PC

4 Select Busy-Out.

```
Line/Trunk xxx:
Make a Selection
Status
Busy Out
Restore

Exit
```

xxx = line number entered in Step 3

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

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

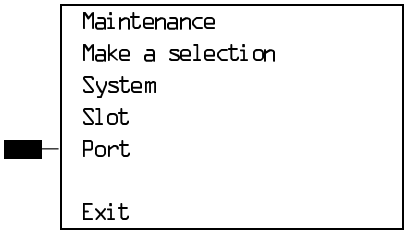
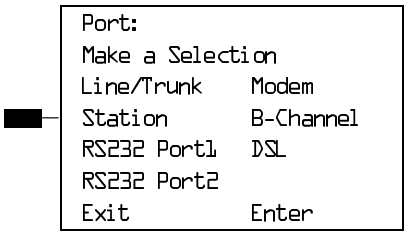
Busying-Out an Extension

Summary

Console Procedure **Menu**→Maintenance→Port→Extension→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.		
		F3
2 Select the Station (extension) option.		
		F2

Console Display/Instructions	Additional Information	PC
3 Specify the dial plan 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
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	
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

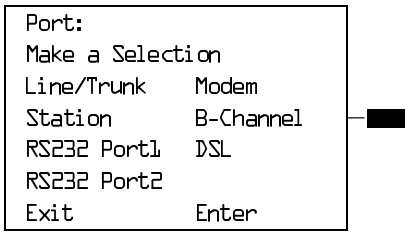
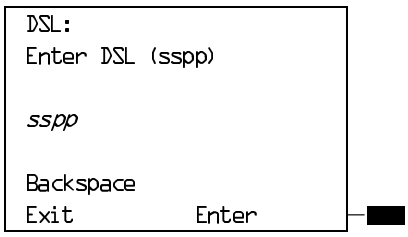
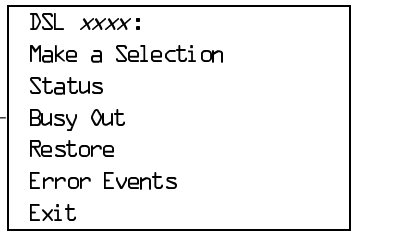
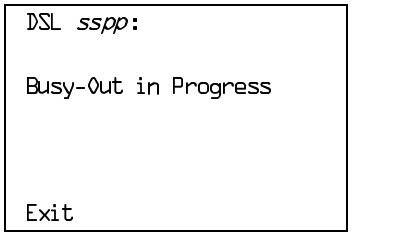
PC Procedure: F6→F3→F8→Type the dial plan no.→F10→F2

To busy-out a Digital Subscriber Line (DSL), follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Port option.		

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

F3

Console Display/Instructions	Additional Information	PC
2 Select the DSL option.		
		F8
3 Specify the dial plan DSL number (*sspp* = 2-digit slot number and 2-digit port number).		
	Dial or type [*sspp*], then select Enter.	F10
4 Select Busy-Out.		
	*sspp* = slot/port number entered in Step 3	F2
The screen below is shown until Busy-Out finishes or fails.		
	*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
```

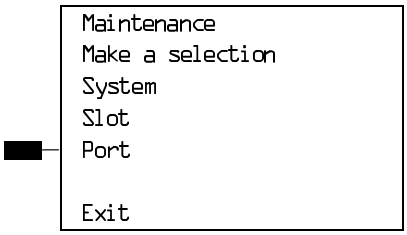
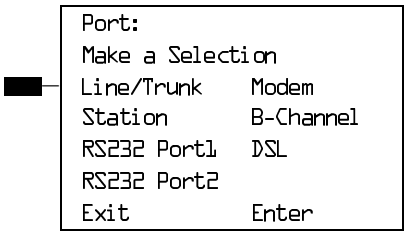
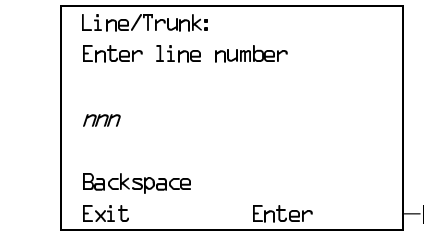
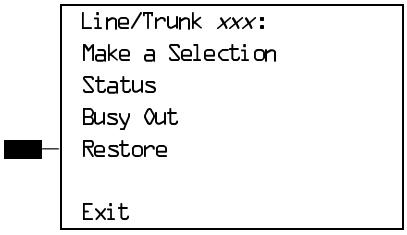
sspp = slot/port number entered in Step 3

Restoring a Trunk

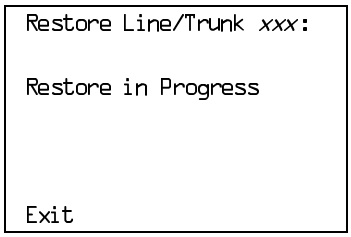
Summary

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.

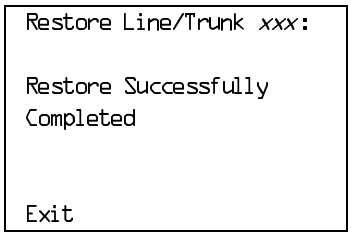
Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Port option.		
		F3
2 Select the Line/Trunk option.		
		F1
3 Specify the dial plan number (line) for the trunk (*nnn = 801 to 880*).		
	Dial or type [*nnn*], then select Enter.	F10
4 Select Restore.		
	*xxx* = line number entered in Step 3	F3

The screen below is shown until Restore finishes or fails.



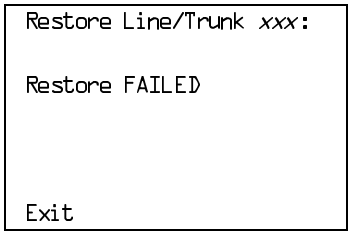
xxx = line number entered in Step 3

The screen below appears when Restore is completed successfully.



xxx = line number entered in Step 3

The screen below appears when Restore fails. If this occurs, exit and try again.



xxx = line number entered in Step 3

Restoring an Extension

Summary

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

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.

4 Select Restore.

```
Station: xxxx
Make a Selection
Status
Busy Out
Restore

Exit
```

xxxx = extension number entered in Step 3

F3

The screen below is shown until Restore finishes or fails.

Console Display/Instructions	Additional Information	PC
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	

Restoring a Digital Subscriber Line (DSL)

Summary

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
3 Specify the dial plan extension number (*sspp* = 2-digit slot number and 2-digit port number).		
DSL: Enter DSL number *sspp* Backspace Exit Enter	Dial or type [*sspp*], then select Enter.	F10

Console Display/Instructions	Additional Information	PC

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

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.

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 RS232 Port2 Exit Enter	Select RS232 Port1 or RS232 Port2.	F3 F4
3 Select Reset.		
RS232 Port*x*: Make a selection Reset Exit	*x* = port selected in Step 2	F1

Console Display/Instructions	Additional Information	PC

4 Select Yes.

```
RS232 Portx 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 Portx Reset:

Reset in Progress



Exit
```

x = port selected in Step 2

The screen below appears when Reset is completed successfully.

```
RS232 Portx 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 Portx Reset:

Reset FAILED



Exit
```

x = port selected in Step 2

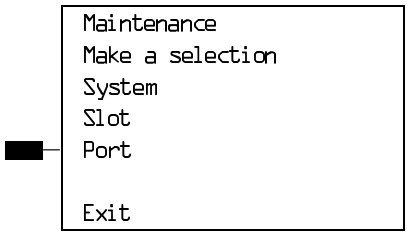
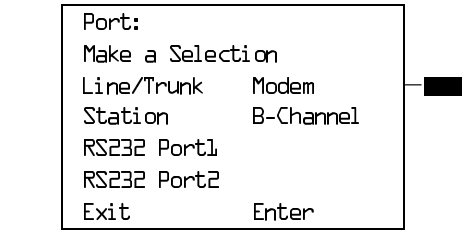
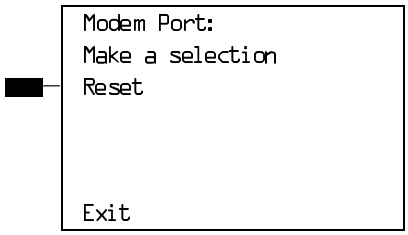
F5

Resetting the Processor's Internal Modem

Summary

Console Procedure	**Menu**→Maintenance→Port→Modem→Reset→Yes
PC Procedure	F6 → F3 → F6 → F1 → 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.		
		F3
2 Select the Modem option.		
		F6
3 Select Reset.		
		F1

Console Display/Instructions	Additional Information	PC

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
```

F5

The screen below appears when Reset is completed successfully.

```
Modem Port Reset:

Reset Successfully
Completed


Exit
```

F5

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.

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
2 Select the B-Channel option.		
Port: Make a Selection Line/Trunk Modem Station B-Channel RS232 Port1 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

Console Display/Instructions	Additional Information	PC

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

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 central office (CO) end. First, make sure the correct B-channel is selected. If the correct B-channel is selected, the customer or AT&T repreentative 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.

Auditing Calls

Summary

Console Procedure	**Menu**→Maintenance→Port→B-Channel→Dial the slot and port no.→Enter→Audit Call
PC Procedure	F6→F3→F7→Type the slot and port no.→F10→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		F3

Console Display/Instructions	Additional Information	PC

2 Select the B-Channel option.

```
Port:
Make a Selection
Line/Trunk      Modem
Station         B-Channel
RS232 Port1
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.

```
BChannel xxxx:
Make a selection
Audit Line
Audit Call


Exit
```

xxxx = slot and port number entered in Step 3.

F2

The screen below appears only if the audit message is successfully created and sent.

```
BChannel xxxx Audit Call

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.

Console Display/Instructions	Additional Information	PC
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.

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 5–2 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.

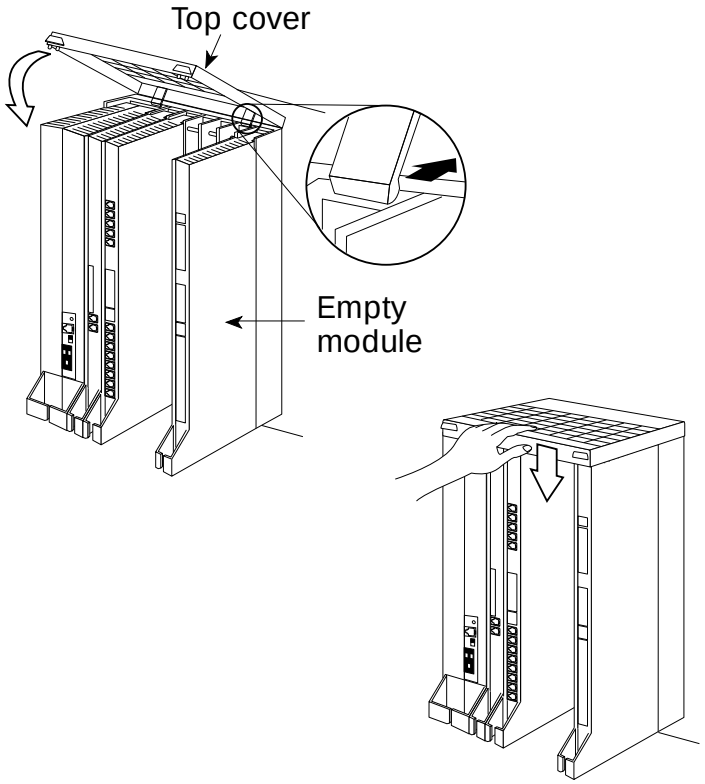


Figure 5–1. Installing the Control Unit Top Cover (Release 2.1 and Later)

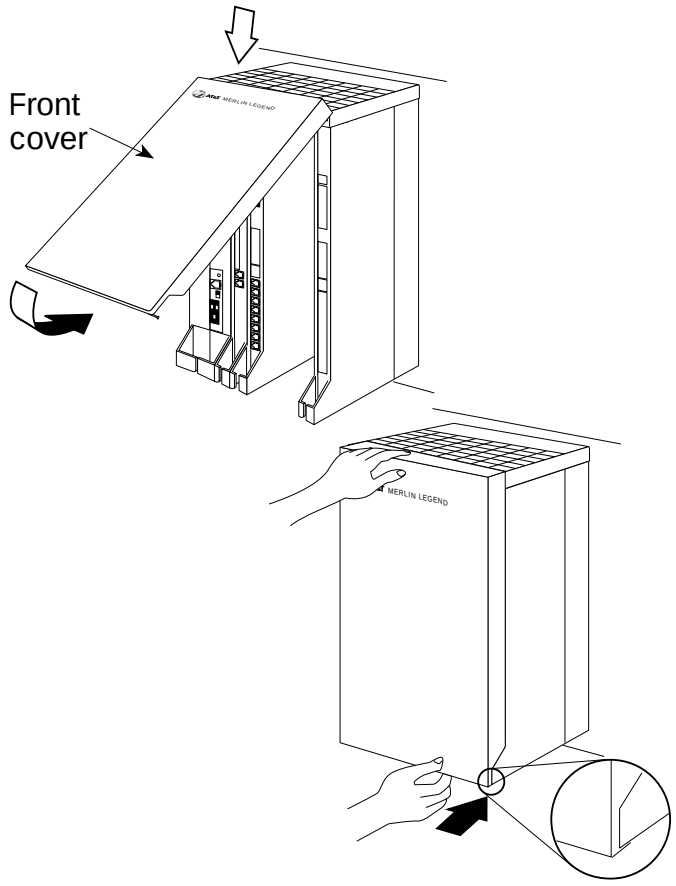


Figure 5–2. Installing the Control Unit Front Cover (Release 2.1 and Later)

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.

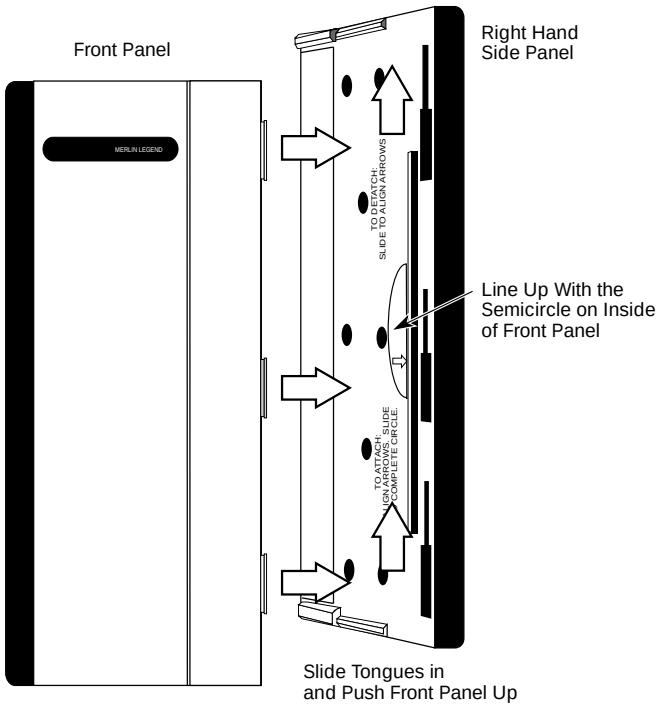


Figure 5–3. Assembling the Control Unit Housing (Release 2.0 and Earlier)

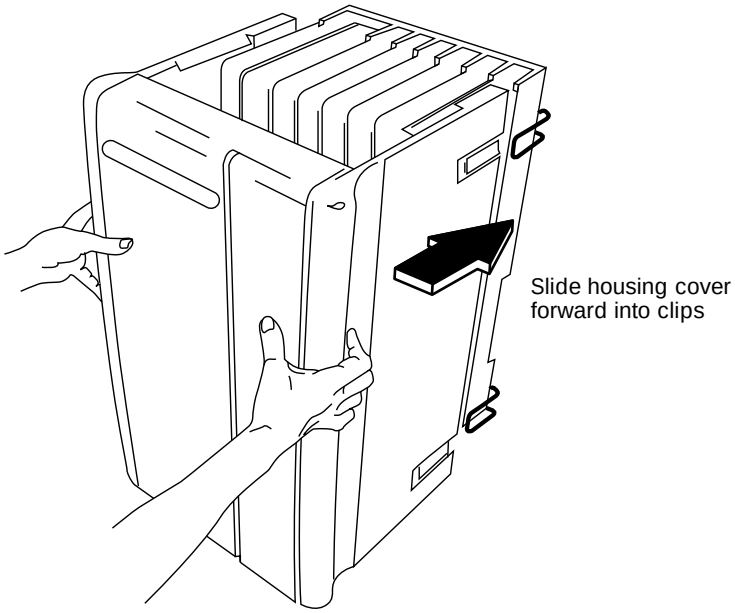


Figure 5–4. Installing the Control Unit Housing (Release 2.0 and Earlier)

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.

Customer Support Information

A

Support Telephone Number

In the U.S.A. only, AT&T 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 AT&T representative. Consultation charges may apply.

Outside the U.S.A., if you need assistance when installing, programming, or using your system, contact your AT&T 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 radioelectriques depassant les limites applicables aux appareils numériques de la class A préscrites dans le reglement sur le brouillage radioelectrique 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.
- **Notification to the 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 number AS593M-72914-KF-E.
    - If the system provides both manual and automatic selection of incoming/outgoing access to the network, report the number AS593M-72682-MF-E.
    - If there are no directly terminated trunks, or if the only directly terminated facilities are personal lines, report the 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 to be connected to 1.544-Mbps digital service, the SOC is 6.0P and the FIC is:
  - 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.
  - 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 AT&T dealer or, **in the U.S.A. only**, contact the National Service Assistance Center (NSAC) at 1 800 628-2888.
- **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 at 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:
  - — Answered by the called station
  - — Answered by the attendant
  - — Routed to a recorded announcement that can be administered 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 are when:

- — A call is unanswered
- — 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 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 telecommunications network protective, operational, and safety requirements. 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.

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.

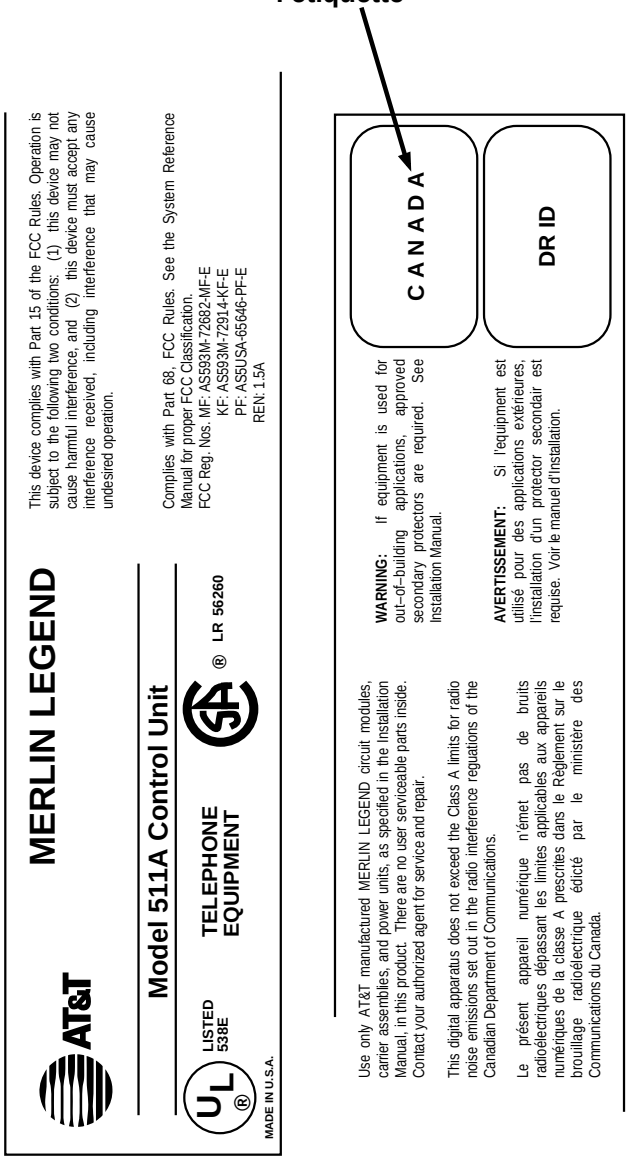
AVERTISSEMENT: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un electricien, selon le cas.

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 dispositits 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



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 prevent 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, and 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 administered 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 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 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 network charges. AT&T 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 will allow.
- 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.
- Use the longest-length barrier codes possible, following the guidelines for passwords. (See “Choosing Passwords.”)

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 network facility (line/trunk) or a network operator. This is referred to as social engineering. Hackers may pose as telephone company employees and employees of AT&T or your authorized dealer. Hackers will go through a company's trash to find directories, dialing instructions, and other information that will enable 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.

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 AT&T needs to use the MERLIN LEGEND Communications System to test facilities (lines/trunks). If a caller identifies him or herself as an AT&T 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 AT&T 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 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 AT&T GBCS Fraud Intervention Center at 1 800 628-2888 (fraud intervention for System 25, PARTNER® and MERLIN® systems).
- Customers should also take advantage of AT&T monitoring services and devices, such as the NetPROTECT℠ family of fraud detection services, CAS with HackerTracker®, and CAT Terminal with Watchdog. Call 1 800 638-7233 to get more information on these AT&T 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 network operator to complete the call.

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, 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:*

- *FRL 0 for restriction to internal dialing only*
- *FRL 2 for restriction to local 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 and default toll 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 default 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 AT&T recommends that you add them. **Assign all voice mail port extensions to this Disallowed List. AT&T 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 Outcalling is required by voice messaging system extensions:

- Program an ARS Facility Restriction Level (FRL) of 2 on voice mail port extension(s) used for Outcalling.
- 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.

Additional general security 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.

- 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 Automatic Route Selection (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 AT&T 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.

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 system. The MERLIN MAIL Automated Attendant feature merely accesses the RCF feature in the MERLIN LEGEND 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 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 network facilities (lines/trunks) connected to the MERLIN LEGEND 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 administered. Therefore, this feature should not be used unless there is a strong business need.

- 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.

Following are a number of measures and guidelines that can help you ensure the security of your communications system and voice messaging system.

Multiple layers of security are always recommended to keep your system secure.

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.
- Operators or attendants should tell their system manager if they answer a series of calls where there is silence on the other end or the caller hangs up.
- Users who are assigned voice mailboxes should frequently change personal passwords and should not choose obvious passwords.
- The system manager should advise 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.

Educating Operators

Operators or 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

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 AT&T's 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 AT&T or your authorized dealer.
- Limit transfers to registered subscribers only.
- 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 and 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.

Physical Security

You should always limit access to the system console (or attendant console) and supporting documentation. The 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.
- 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 Restrcitions Levels, as appropriate to minimize the possibility of toll fraud.

Limited Warranty and Limitation of Liability

AT&T warrants to you, the customer, that your MERLIN LEGEND Communications System will be in good working order on the date AT&T or its authorized reseller delivers or installs the system, whichever is later ("Warranty Date"). If you notify AT&T or its authorized reseller within one year of the Warranty Date that your system is not in good working order, AT&T 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 AT&T determines that your system cannot be repaired or replaced, AT&T 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 AT&T system.

If you purchased your system directly from AT&T, AT&T will perform warranty repair in accordance with the terms and conditions of the specific type of AT&T maintenance coverage you selected. If you purchased your system from an AT&T-authorized reseller, contact your reseller for the details of the maintenance plan applicable to your system.

This AT&T 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 AT&T will not be responsible under the limited warranty for damages resulting from:

- Failure to follow AT&T's 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

AT&T'S OBLIGATION TO REPAIR, REPLACE, OR REFUND AS SET FORTH ABOVE IS YOUR EXCLUSIVE REMEDY.

EXCEPT AS SPECIFICALLY SET FORTH ABOVE, AT&T, 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.

Limitation of Liability

Except as provided below, the liability of AT&T 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, AT&T 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 AT&T's negligence, AT&T's liability shall be limited to proven damages to person. **No action or proceeding against AT&T 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 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 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. AT&T 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.
- 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.

System Numbering Forms

B

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.

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

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.

Form 2b, System Numbering: Digital Adjuncts

Log. ID	Factory-Set			Renumber to	Adjuncts	2B	Pass. Bus	MLX Telephone Ext. No.	Person, Location, Function, and Equipment Type
	2-digit	3-digit	Set Up Space						
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						

Figure B–2. Form 2b, System Numbering: Digital Adjuncts

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		Toll Type Prefix Req'd for LD		Hold Disc. Interval		QCC Operator to Receive Calls† (No ✦)	QCC Queue Priority Level† (4 ✦)	Function
									TT✦	R	Yes✦	No	Short	Long ✦			
	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

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.

NOTE:

- You should have a separate copy of the worksheet for each carrier.
- See “Unit Loads” in Chapter 1 for information on recalculating unit loads.

The 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 be installed in the system. Auxiliary Power Units cannot be used with the 391A3 power supply.

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: ☐ Square ☐ Modified

   Indicate configuration of lines; then go to Step 5.

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.

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		12.8	
100D		0.0	
400		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	
		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.

6. Calculate the actual carrier unit load.

	Qty x	Unit Load		= Total
Equipment		**Hybrid/PBX or Modified**	**Square**	
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-10		0.9	1.2	
MLX-10D		0.9	1.2	
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 network access lines.

•	Qty x	Unit Load		= Total
Equipment		**Hybrid/PBX or Modiffied**	**Square**	
Optional Equipment†				
Direct Station Selector‡		0.7	0.9	
General Purpose		0.8	1.0	
Adapter		0.8	1.0	
Hands-Free Unit		0.8	1.0	
Headset Adapter				
		Total Actual Unit Load		

† The MFM has its own wall power unit located at the telephone and therefore is not added to the unit load calculation.

‡ 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, 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.

   NOTE:
   Empty slots are not permitted between modules.

8. Calculate the unit loads for slots 5 and 6 of the carrier.

	Qty x	Unit Load		= Total
Equipment		**Hybrid/PBX or Modiffied**	**Square**	
Network Access Lines*				
DS1		0.0	0.0	
GS/LS		0.0	0.0	
Tie		1.4	1.4	
Telephones				
MLX-10		0.9	1.2	
MLX-10D		0.9	1.2	
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	
MDW-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 network access lines.

	Qty x	Unit Load		= Total
Equipment		**Hybrid/PBX or Modiffied**	**Square**	
Optional Equipment†				
Direct Station Selector‡		0.7	0.9	
General Purpose		0.8	1.0	
Adapter		0.8	1.0	
Hands-Free Unit		0.8	1.0	
Headset Adapter				
		Total Unit Load for Slots 5 and 6		

† The MFM has its own individual wall power unit located at the telephone and therefore is not added to the unit load calculation.

‡ 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 five and six through 27. (Remember that the 100D, 400, 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 configuration.
   - 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.

NOTE:
Empty slots are not permitted between modules.

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.

- **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 “Backup” and “Restore” 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.

Figure D–1 shows a sample Translation card.

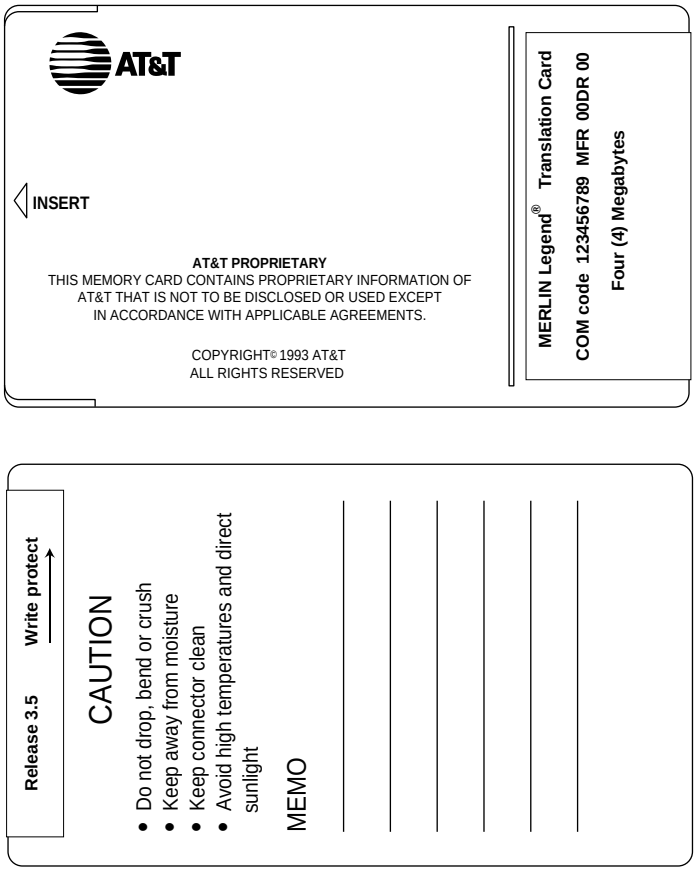


Figure D–1. PCMCIA Translation Memory Card

Inserting the Card

To insert the card, hold the card with the AT&T 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.

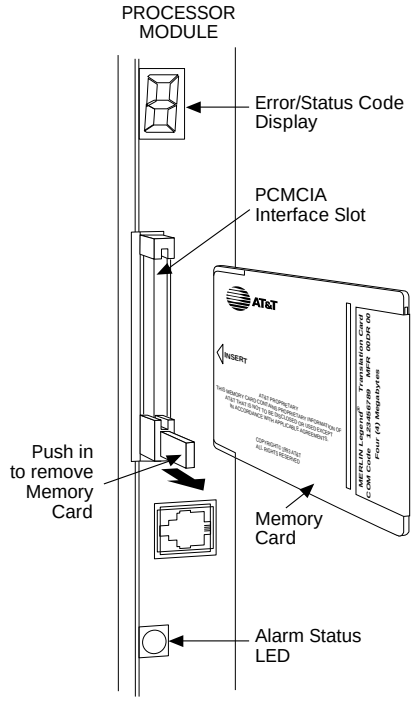


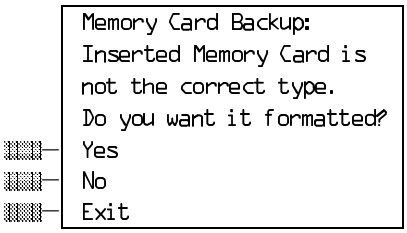
Figure D–2. Inserting the Memory Card

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



If you begin a backup procedure with an unformatted or incorrectly formatted card, this screen appears.

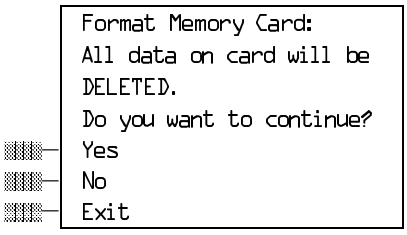
The inserted memory card is not the correct type. You have the option of formatting the memory card as a translation memory card or repeating the backup procedure with a different translation memory card.

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.

3. 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



This screen appears if you respond to the system prompt 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.

Backup

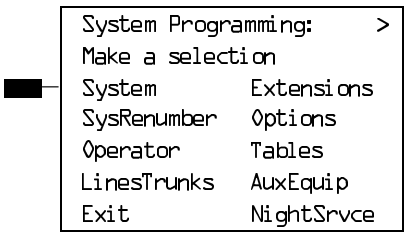
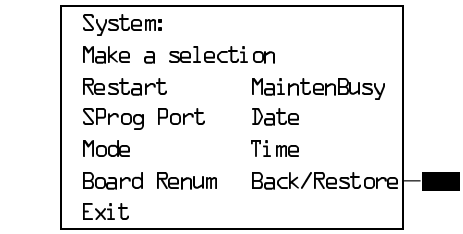
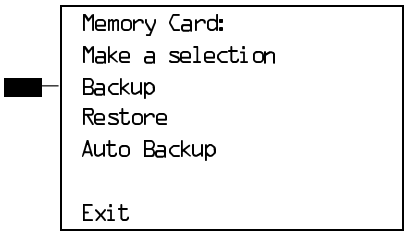
Use this procedure to make a copy of your customized system data. You should create a backup at least three times during system installation (so that programmed information is not lost), and once after each system upgrade, service technician visit, or major system reconfiguration.

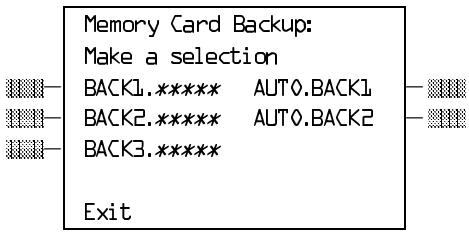
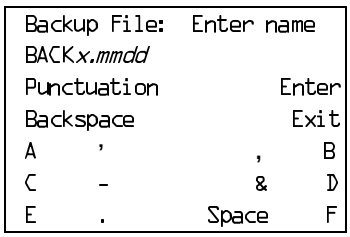
Summary: Backup

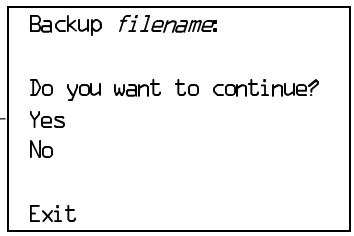
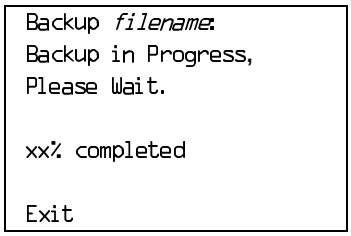
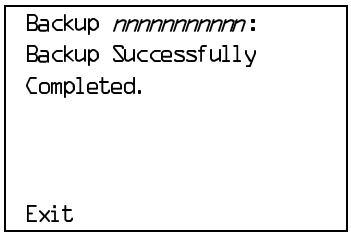
Programmable by	System Manager
Mode	All
Idle Condition	System Forced Idle
Planning Form	Form 1, System Planning
Factory Setting	Not applicable
Valid Entries	1- to 11-character filename
Inspect	Yes
Copy Option	No
Console Procedure	Insert memory card→System→Back/Restore→Backup→Select backup file→Dial the new backup filename→Enter→Yes→Exit→Exit→Exit
PC Procedure	Insert memory card→F1→9 →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.		
		F1
3 Select Back/Restore.		
		9
4 Select Backup.		
		F1

Console Display/Instructions	Additional Information	PC
5 Select the backup filename.		
	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).		
	*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 alphanumeric 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.	**Note**: F6, not F10.	F6

Console Display/Instructions	Additional Information	PC
8 Respond to the prompt.		
	*filename* = file selected in Step 5 or entered in Step 6 Select No to abort the backup. Go to Step 11. Select Yes to continue the backup.	F2 F1
9 Observe the backup progress screen.		
	*filename* = file selected in Step 5 or entered in Step 6 *xx*% = percentage of backup completed	
10 Observe the backup completion screen.		
	*nnnnnnnnnn* = backup filename	
11 Return to the System Programming menu.		
Select **Exit** three times.		F5 F5 F5

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→Weelky→**Drop**→Dial day and time →Enter→Exit→Exit
PC Procedure	To program daily backup: Insert memory card→F1→9 →F3→F2→ Alt + PrtScr→Type time→F10→F5→F5 To program weekly backup: Insert memory card→F1→9 →F3→F3→ Alt + PrtScr→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.		

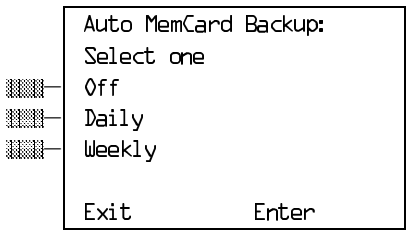
```
System:
Make a selection
Restart         MaintenBusy
SProg Port      Date
Mode            Time
Board Renum     Back/Restore
Exit
```

9

4 Select Auto Backup.		

```
Memory Card:
Make a selection
Backup
Restore
Auto Backup

Exit
```

F3

Console Display/Instructions	Additional Information	PC
5 Make a selection.		
	Select Off, Daily, or Weekly	F1 F2 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

Console Display/Instructions	Additional Information	PC
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 + Pause
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**.		F10
4 Return to the System Programming menu.		
Select **Exit** two times.		F5 F5

◆ Weekly Backup Procedure

Console Display/Instructions	Additional Information	PC
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+Pause
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

Console Display/Instructions	Additional Information	PC
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.

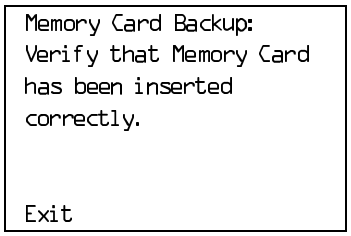
You must repeat the backup procedure.

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

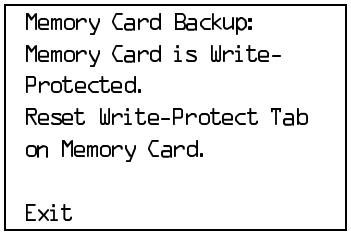
The memory card is not inserted or is inserted incorrectly while a backup is in progress. The backup file that was being created is deleted and the backup is aborted. You must reinsert the memory card and repeat the backup procedure.

Card Missing or Card Not Inserted Correctly



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



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.

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 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” 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→9 →F2→Select restore file→F3

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.		

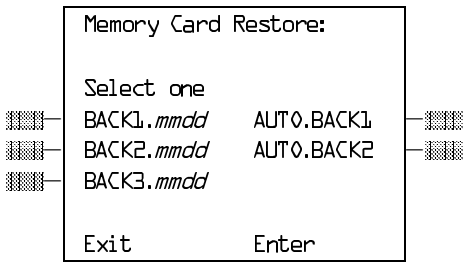
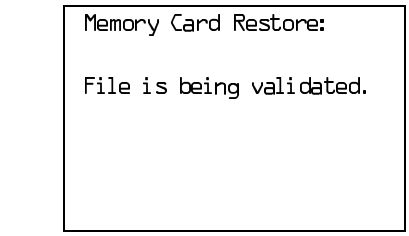
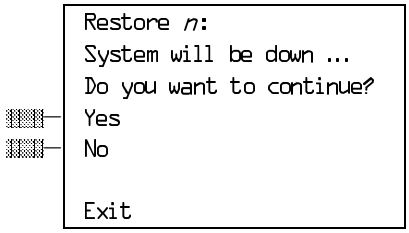
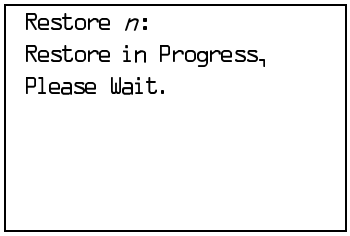
```
System:
Make a selection
Restart         MaintenBusy
SProg Port      Date
Mode            Time
Board Renum     Back/Restore
Exit
```

9

4 Select Restore.		

```
Memory Card:
Make a selection
Backup
Restore
Auto Backup

Exit
```

F2

Console Display/Instructions	Additional Information	PC
5 Select the restore file.		
	*mmdd* = month and day of backup Press the button or function key next to your selection.	
6 Observe the restore file validation screen.		
		
7 Respond to the prompt.		
	*n* = filename selected in Step 5 Select Yes to continue the restore. Select No to abort the restore. Go back to Step 5.	F3 F2
8 Observe the restore progress screen.		
	*n* = filename selected in Step 5	

Console Display/Instructions	Additional Information	PC
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 contains displays of each screen and information about what to do if the screen appears.

Card Missing or Card Not Inserted Correctly

```
Memory Card Restore:
Verify that Memory Card
has been inserted
correctly.


Exit
```

The memory card is either not inserted or inserted incorrectly. The restore is aborted. You must 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 and the system performs a System Erase (frigid start). You must reinsert the memory card and repeat the restore procedure.

Wrong System Programming Port

Console Display/Instructions	Additional Information	PC
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.

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 only appears if you are upgrading from Release 3.0 or higher and the releases are not compatible.

Card Failure

Console Display/Instructions	Additional Information	PC

```
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

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” for information about the card labels.

Board Mismatch

Console Display/Instructions	Additional Information	PC
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.

Strap in Place for Key Mode but Mode is Set to Hybrid

```
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 the *Installation Guide* for details on modifying the processor.

Modifying a Release 2.1 or Earlier Processor for Key Mode

E

Release 2.1 and Earlier

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 Permenant 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” in Chapter 4 for instructions.

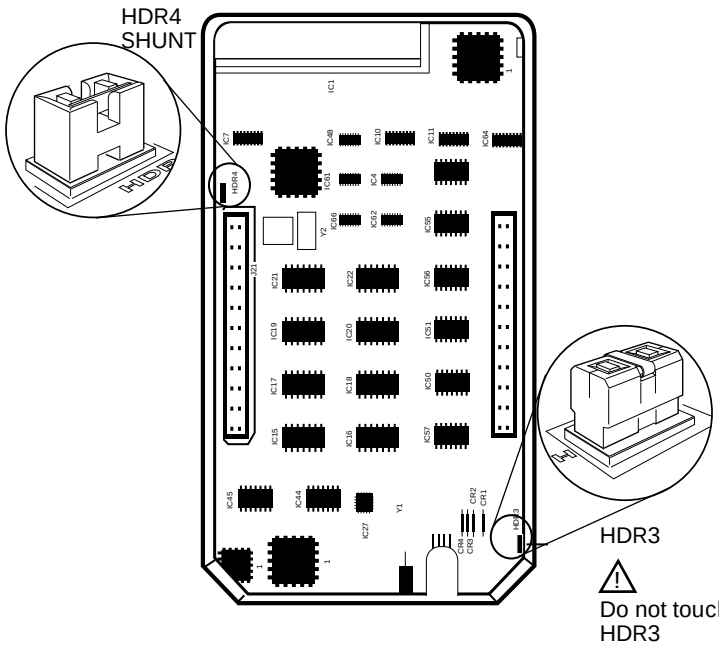


Figure E–1. Modifying the Processor for Key Mode

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.

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 (Release 2.1 and Earlier)

To install the control unit's housing, 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.

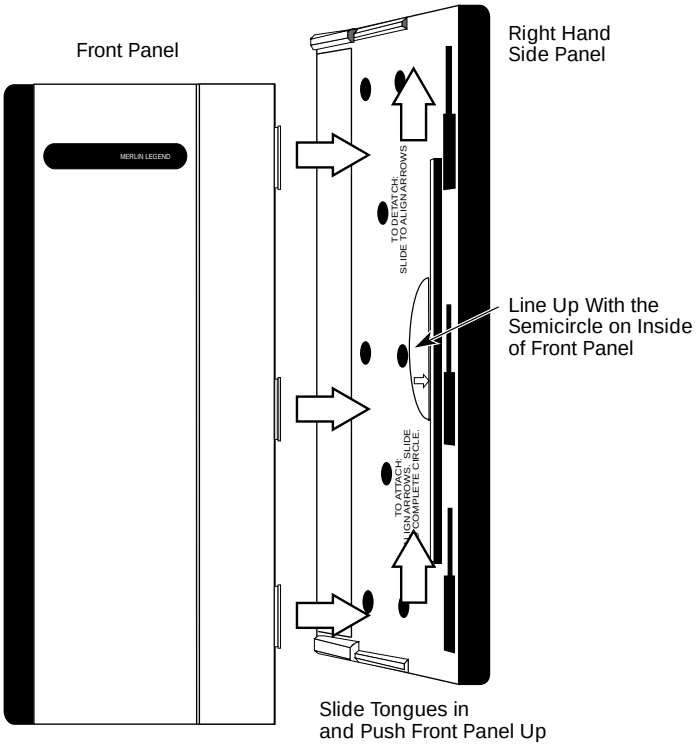


Figure E–2. Installing the Control Unit Housing

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 Multi-Line Hunt (MLH) feature. The MLH feature may be provisioned as either the Multi-Line Hunt Group or Series Completion feature depending on the CO switch type.

Specific translations are provided for the following switches:

- AT&T 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.

AT&T 5ESS Switch Translations

For the AT&T 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 DNs must be assigned with this package.

The AT&T 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>
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.

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.

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
                            DSL/BRCS ASSIGNMENT (DSL INFO)

>11. OE              I 00101209          25. CUT DGTS  2228
 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      2228700    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
```

```
                                                  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     __
 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   _________  _________
```

```
                                                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
```

```
                                                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    _
```

```
                                          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   _
```

```
                                          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 ln
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     ____        ---------------------        -------
(*)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 DGTS 2228
 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             _
```

```
                                    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
```

```
                                          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     __
 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   ________  ________
```

```
                                                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
```

```
5ESS SWITCH LABNSC1
SCREEN 1 OF 14                          RECENT CHANGE  23.8
                                      DSL/BRCS ASSIGNMENT

(*)1. DSL TN C 2228702     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
                            DSL/BRCS ASSIGNMENT (DSL INFO)

>11. OE              I 00101209          25. CUT DGTS  2228
 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    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 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
```

```
                                                  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     __
 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   _________  _________
```

```
                                                    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 Multi-Line 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

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*>

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*>

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*>

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 Nuinber 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*>

Multi-Line 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 Multi-Line Hunt Group feature.

The screens shown in this section are examples, DNs shown on these screens should be replaced with applicable data.

```
QDN 2257141
_____________________________________________________________________________

DN:       2257141
TYPE: PILOT OF DNH HUNT GROUP
SNPA: 201      SIG:  N/A       LNATTIDX: N/A
HUNT GROUP:  22     HUNT MEMBER:  0
LTID: PSATS        141
LTCLASS:  BRAFS
LINE CLASS CODE:   ISDNKSET
KEY:  1
CUSTGRP:               MDCSCA  SUBGRP: 0       NCOS: 0  RING: Y
OPTIONS:
SFC
6ROUP OPTIONS:
CIR RCVD
MEMBER INFO:
       1       2257146
       2       2257145
       3       2257144
       4       2257143
       5       2257142
_____________________________________________________________________________
```

```
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: O    RING: 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
```

```
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
```

```
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
```

```
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
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
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

  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  PS      BCH/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  PS      BCH/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.

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
                      & 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
             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 PS0071/000          96-01-18  16:22:05
M       0959              OMT-00/LEONLY 2816/04328

        DISPSDNDAT:EQN=20-0-0-1&20-0-5-0&40-0-2-4:
        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 PS0071/000        96-01-18      16:22:08
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                   MASKNO:04328
                                                     MASKNO:00000
        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 PS0071/000      96-01-18      16:22:31
M       0959            OMT-00/LEONLY 2816/04328
        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.
        PIC = 222-SP.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0003
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:22:15
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:22:19
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                 MASKNO:04328
                                                   MASKNO:00000
        VIEW = DN.
        NPA = 215.
        DN = 6851289.
        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 PS0071/000      96-01-18      16:22:22
M       0959            OMT-00/LEONLY 2816/04328

        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.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0006
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:22:26
M       0959            OMT-00/LEONLY 2816/04328

        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/LEONLY 2816/04328

        TERMINAL SERVICE PROFILE DATA                MASKNO:04328
                                                     MASKNO:00000
        VIEW = TSP.
        EQN = 20-0-00-01.
        USID = 1.
        TSPID = 2156851189.
        TERMLIM = 1.
        TSPCOS = CHDBCHR:
INTERRUPTION TEXT JOB 0959

CONTINUATION TEXT 0008
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000        96-01-18      16:22:32
M       0959            OMT-00/LEONLY 2816/04328

        TERMINAL SERVICE PROFILE DATA                MASKNO: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 PS0071/000      96-01-18      16:22:35
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:22:38
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000        96-01-18        16:22:40
M       0959            OMT-00/LEONLY 2816/04328

        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.
        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 PS0071/000      96-01-18      16:22:44
M       0959            OMT-00/LEONLY 2816/04328

        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
```

```
CONTINUATION TEXT 0013
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000        96-01-18        16:22:48
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:22:51
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                 MASKNO:04328
                                                   MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6852199.
        EQN = 20-0-05-00.
        CT = CMD.
        CAT = IBA.
        LCC = PKGSD.
        RAX = 1.
        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 PS0071/000      96-01-18      6:22:55
M       0959            OMT-00/LEONLY 2816/04328

        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:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0016
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:22:58
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000        96-01-18        16:23:01
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                   MASKNO:04328
                                                     MASKNO:00000
        VIEW = DNCT.
        NPA = 215.
        DN = 6852299.
        EQN = 20-0-05-00.
        CT = CMD.
        CAT = IBA.
        LCC = PKGSD.
        RAX = 1.
        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 PS0071/000      96-01-18      16:23:05
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:07
M       0959            OMT-00/LEONLY 2816/04328

        TERMINAL SERVICE PROFILE DATA              MASKNO:04328
                                                   MASKNO:00000
        VIEW = TSPDNCT.
        EQN = 20-0-05-00.
        TSPID = 2156852199.
        NPA = 215.
        DN = 6852199.
        CT= VI:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0020
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:23:11
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:13
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:16
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000        96-01-18        16:23:20
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                   MASKNO:04328
                                                     MASKNO:00000

        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 PS0071/000      96-01-18      16:23:23
M       0959            OMT-00/LEONLY 2816/04328

        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.
        COSDAT = SERCOMP-6853219.
        PIC = 222-SP.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0025
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000        96-01-18        16:23:27
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:30
M       0959            OMT-00/LEONLY 2816/04328

        SUBSCRIBER                                 MASKNO:04328
                                                   MASKNO:00000
        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 PS0071/000        96-01-18        16:23:34
M       0959            OMT-00/LEONLY 2816/04328

        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.
        COSDAT = SERCOMP-6851189.
        PIC = 222-SP.
        PIC = 288-AU3.
        CRBLIM = 1:
INTERRUPTION TEXT JOB 0959
```

```
CONTINUATION TEXT 0028
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:23:37
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:40
M       0959            OMT-00/LEONLY 2816/04328

        TERMINAL SERVICE PROFILE DATA              MASKNO:04328
                                                   MASKNO:00000
        VIEW = TSP.
        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 PS0071/000      96-01-18      16:23:43
M       0959            OMT-00/LEONLY 2816/04328

        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 PS0071/000      96-01-18      16:23:46
M       0959            OMT-00/LEONLY 2816/04328

        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

CONTINUATION TEXT 0032
        NAVK1/BELLCORNJRB/APS 13.0 PS0071/000      96-01-18      16:23:49
M       0959            OMT-00/LEONLY 2816/04328

        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

#

7500B data module See *ISDN terminal adapter*.

7500B data station See *ISDN terminal adapter data station*

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 communication 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.

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 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*.

analog data station See *modem data station.*

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 trunks according to the number dialed and trunk availability.

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, *Accune*t 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, 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 MAIL*, and *AT&T Attendant* application that automatically answers incoming calls with a recorded announcement and directs callers to a department, an extension, or the system operator.

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 violation*. See also *bipolar signal*.

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.

basic carrier — Hardware that holds and connects the *processor*, *power supply*, and up to five 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-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.

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.” See also *baud 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 or holds the processor or power supply.

board assignment — *SPM* procedure for assigning *line/trunk and extension modules* to slots on the *control unit*.

board renumbering — System programming procedure for renumbering *line/trunk and extension* modules that have already been assigned to specific *slots* on the *control unit*.

BRI — (Basic Rate Interface) Standard interface that specifies the protocol used between two or more communications systems. BRI provides two 64-kbps *B-channel*s for voice and/or data and one 16-kbps *D-channel*, which carries multiplexed signaling information for the other 2 channels.

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 — In Release 3.0 and later, a system feature that supports a caller identification service provided by some local telephone companies (if local regulations allow) supplying the calling party telephone number. 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*.
campus cable	Cable that runs between buildings connected to the same communications system.
CAS	(Call Accounting System) DOS- or UNIX System-based application that monitors and manages telecommunications costs.
CAT	(Call Accounting Terminal) Stand-alone unit with a built-in microprocessor and data buffer that provides simple call accounting at a low cost.
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 lines/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*.

clock synchronization Operation of digital facilities from a common clock.

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.

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 modules*, *line/trunk and extension modules*, *carriers*, and housing of the system.

console Refers to telephone and adjuncts (if any) at an operator or system programmer extension.

CONVERSANT Voice response application that automatically answers and routes calls and executes telephone transactions.

conversion resource See *modem pool*.

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 (*FRLs*), Allowed Lists, Disallowed Lists, and pool dial out restrictions.

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.

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 hunt group	See *DHG*.
data module	See *ISDN Terminal Adapter*.
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 (*I/0*) device (often a personal computer) that can be connected to the control unit via an interface.
data terminal equipment	See *DTE* and *data terminal*.
DCE	(data communications equipment) Equipment such as *modem*s or data modules used to establish, maintain, and terminate a connection between the system and data terminal equipment (*DTE*), such as printers, personal computers, host computers, or network workstations.
D-channel	(Data-channel) 64-kbps channel that carries signaling information or data on a *PRI* or 16-kpbs channel to carry signaling information on *BRI*.
dedicated feature buttons	The imprinted feature buttons on a multiline telephone: **Conf** or **Conference**, **Drop**, **Feature**, **HFAI** (Hands Free Answer on Intercom), **Hold**, **Message**, **Mute** or **Microphone**, **Recall**, **Speaker** or **Speakerphone**, and **Transfer**.
delay-dial start tie trunk	See *dial-repeating tie trunk*
DFT	(direct facility termination) See *personal line*.

DHG (data hunt group) Group of modem or *ISDN terminal adapters* which have 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 "7") 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 "delay dial start tie trunk."

DID (Direct Inward Dialing) Service that transmits from the telephone company central office and routes incoming calls directly to the called extension, *calling group*, or outgoing 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 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 Dialing	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 the AT&T Switched Network (*ASN*); 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)

DS0 (Digital Signal 0) Single 64-kbps voice or data *channel*.

DS1 (Digital Signal Level 1) *Bit*-oriented signaling interface that multiplexes twenty-four 64-kbps channels into a single 1.544-Mbps stream.

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 2-state voltage conditions (on the Ear and Mouth leads) for analog applications and through two *bit*s 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 ft. (15 m.)

Electronic Switching System See *ESS*.

endpoint Final destination in the path of an electrical or telecommunications signal.

ESF (extended superframe format) *Framing format* consisting of individual frames of 24 eight-*bit* slots and one signal bit (193 bits) in a 24-frame extended superframe. See also *D4 framing format.*

ESS (Electronic Switching System) Class of central office (*CO*) switching systems developed by AT&T 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 and up to six additional modules.

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 station.*

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*.

extended superframe format See *ESF*.

F

facility Equipment (often a *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 procedure; system prevents initiation of new calls.

foreign exchange See *FX*.

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) *ARS* calling restriction type that restricts outgoing calls to certain specified 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* trunk at the same time that another call arrives on the same trunk.

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.

H

Hands Free Answer on Intercom See *HFAI*.

hands-free unit See *HFU*.

headset Lightweight earpiece, microphone, and adapter 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 older 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*.

Hybrid/PBX mode One of three modes of system operation, in which the system uses trunk *pools* and *ARS* in addition to *personal lines*. Provides a single interface (***SA** buttons*) to users for both inside and outside 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.

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 network and to other networks for national and international digital connectivity.

ISDN terminal adapter A type of data communications equipment that transmits digital signals over digital telephone company facilities, for example, PRI. A digital data station uses an ISDN Terminal Adapter (such as the ExpressRoute 1000 or ISDN 7500B data module) as its DCE

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. 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, 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 internal 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 like 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 or loop-start communications path with *CO*; 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 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 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 host computer access A method for connecting an extension jack to an on-site computer for data-only calls through a *modem* or data module.

local loop See *access line.*

logical ID Unique numeric identifier for each *extensio*n and *line/trunk jack* in the system control unit.

loop-start trunk Trunk 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.

M

Magic on Hold An AT&T Music on Hold enhancement that promotes a company’s products or services or provides custom music selection.

Mbps megabits per second

Megacom AT&T’s tariffed digital *WATS* offering for outward calling.

Megacom 800 AT&T’s 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 communication 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 identification services provided by the local telephone company.

MERLIN Mail Voice Messaging System Application that provides 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. 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-10 or MLX-10D telephone 10-line button digital telephone offered with (MLX-10D) or without (MLX-10) a 2-line by 24-character display.

MLX-10DP Same as an MLX-10D except it has an adjunct in the back for connecting the *Passageway Direct Connect Solution* application.

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 (modulator-demodulator) 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 trunks* 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, provides either loop-start (LS) or *ground-start* (GS)*trunks.* There are also modules for the processor and power supply.

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.

O

off-hook Telephone is said to be off-hook when the user has lifted the handset, pressed the **Speaker** 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 by 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 Connect Solution	Set of software applications to provide an interface between a personal computer and the system: cardfile, telephone programming application, call log and viewer, incoming call management and identification and applications manager.
pass-through	Connection from the internal *modem* to an attached IS II/IS III application on the system.
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*.

personal line — Central office trunk that terminates directly on one or more telephones. In *Hybrid/PBX mode*, a personal line cannot be part of a trunk *pool*. Also called “DFT” (direct facility termination). Also refers to lines represented on line buttons in *Key Mode*.

PFT — (Power Failure Transfer) Feature that provides continuity of telephone service during a commercial power failure by switching some of the system’s trunk connections to telephones connected to specially designated extension jacks.

pool — In *Hybrid/PBX mode*, a group of outside 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.

port — See *jack*. Also, refers to *extension* or *line 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 the module exceeds capacity.

PRI — (Primary Rate Interface) Standard interface that specifies the protocol used between two or more communications systems. As used in North America, provides twenty-three 64-kbps *B-channel*s for voice and/or data and one 64-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.

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.

public network Network that is commonly accessible for local or long-distance calling. Also called “public switched telephone network.”

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.

restore Procedure whereby saved and archived system programming is reinstated on the system, from a floppy disk or *memory card*. See also *backup*.

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 -48-VDC 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 a single interface to users for both inside and outside calling.
SDN	(Software Defined Network) AT&T private networking service created by specialized software within the public network.
SID	(station identification)
simplex signaling	Transmission of signals in one direction only across a telecommunications channel.
signaling	Sending of control and status information between devices to set up, maintain, or cease a connection such as a telephone call.
single-line telephone	Industry-standard touch-tone or rotary-dial telephone that handles only one call at a time and is connected to the system via an *extension jack* on a basic 012 or 008 OPT module.
slot	Position in a *carrier* for a module; numbered from 0 (*processor module*).
SMDR	(Station Message Detail Recording) Feature that captures detailed usage information on incoming and outgoing voice and data 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 an Auto Dial or Personal Speed Dial number.
SPM	(System Programming and Maintenance) *DOS*- or UNIX system-based application for programming and maintaining the system.

square key	Configuration in *Key mode* operation in which all outside lines appear on all telephones.
station	See *extension*.
station jack	See *extension jack*.
Station Message Detail Recording	See *SMDR*.
Supplemental Alert Adapter	See *SAA*.
switchhook flash	Momentary (320 ms to 1 second) on-hook signal used as a control signal. May be directed either to the control unit or to a *host* switch outside the system. Also called “Recall” or “timed flash.”
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 *PC* 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.
TDM	(time-division multiplex) Process where the transmission channel is divided into time slots.
telephone power supply unit	Equipment that provides power to an individual telephone.
tie trunk	Private trunk directly connecting two telephone switches. See also *automatic-start tie trunk*, *delay-dial-start tie trunk*, *immediate-start tie trunk*, and *wink-start tie trunk.*
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	A 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*.
TTR	(touch-tone receiver) Device used to decode *DTMF* touch-tones dialed from *single-line telephones* or *Remote Access* telephones.

U

uninterruptible power supply — See *UPS*.

unit load — Measure of the power load drain of a module, telephone, or *adjunct*.

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.

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 extensions in the system, 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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