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August 1994

MERLIN LEGEND[®]
Communications
System
Release 3.0

Installation

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**AT&T 555-630-140
August 1994**

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.

Security of Your System Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there exists 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. For important information regarding your system and toll fraud, see Appendix A, "Customer Support Information." It follows *Maintenance and Troubleshooting* in this binder.

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." It follows *Maintenance and Troubleshooting* in this binder.

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 applicable aux appareils numériques de la class A prescrites dans le reglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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The ordering number for this document is 555-630-140. To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800-255-1242). For more information about AT&T documents, refer to the section entitled, "Related Documents" in "About This Book." The *Pocket Reference*, listed in that section, provides full ordering information for replacement parts, accessories, and other compatible equipment; or, contact your AT&T representative.

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 if you need assistance when installing or using your system.

Outside the continental U. S., contact your local AT&T representative.

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

IMPORTANT SAFETY INSTRUCTIONS

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

- Read and understand all instructions.
- Follow all warnings and instructions marked on or packed with the product.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Use only 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 is intended for qualified field technicians who install and upgrade the system.

How to Use This Book

Qualified technicians can use this book as a guide to installation and upgrading procedures. The technician is given specific steps for installing all units of the control unit, telephones, adjuncts and data equipment.

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 Planning* provides procedures and forms for planning a system for installation.
- *System Programming* gives procedural instructions for programming system features.
- Users' guides and Operators' Guides give procedural instructions for programming and using telephone features.

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

In 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, Direct Inward Dialing (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	7500B data station
analog voice and analog data station	analog voice and modem data station
digital voice and analog data station	MLX voice and modem data station
analog data only station	modem data-only station
digital data only station	7500B data-only station
digital voice and digital data station	MLX voice and 7500B data station

Typographical Conventions

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

Example	Purpose
It is <i>very</i> important that you follow these steps. You <i>must</i> 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 <i>headpiece</i> .	Italics also set off special terms.
If you press the Feature button on an MLX display telephone, the display lists telephone features you can select. A programmed Auto Dial button gives you instant access to an inside or outside number.	The names of fixed-feature, factory-imprinted buttons appear in bold. The names of programmed buttons are printed as regular text.
Choose Ext Prog from the display screen.	Plain constant-width type indicates text that appears on the telephone display or personal computer (PC) screen.
To activate Call Waiting, dial <i>*11</i> .	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” following *Maintenance and Troubleshooting*.

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 Customer Information Center by calling 1-800-432-6600.

Document No.	Title
	System Documents
555-630-117	<i>Introduction</i>
555-630-118	<i>System Manager's Guide</i>
555-630-110	<i>Feature Reference</i>
555-630-115	<i>Equipment and Operations Reference</i>
555-630-116	<i>Pocket Reference</i>
555-630-111	<i>System Programming</i>
555-630-112	<i>System Planning</i>
555-630-113	<i>System Planning Forms</i>
	Telephone User Support
555-630-122	<i>MLX-10D™, MLX-10DP™, MLX-28D™, and MLX-20L™ Display Telephones User's Guide</i>
555-630-150	<i>MLX-10D Display Telephone Tray Cards (5 cards)</i>
555-630-153	<i>MLX-28D and MLX-20L Telephone Tray Cards (5 cards)</i>
555-630-124	<i>MLX-10™ Nondisplay Telephone User's Guide</i>
555-630-151	<i>MLX-10 Nondisplay Telephone Tray Cards (6 cards)</i>
555-630-120	<i>Analog Multiline Telephones User's Guide</i>
555-630-126	<i>Single-Line Telephones User's Guide</i>
	System Operator Support
555-630-134	<i>MLX Direct-Line Consoles Operator's Guide</i>
555-630-132	<i>Analog Direct-Line Consoles Operator's Guide</i>
555-630-136	<i>MLX Queued Call Console Operator's Guide</i>
555-630-138	<i>MDC 9000 and MDW 900 Telephones User's Guide</i>
	Miscellaneous User Support
555-630-130	<i>Calling Group Supervisor's Guide</i>
555-630-129	<i>Data User's Guide</i>

How to Comment on This Document

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

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FEEDBACK FORM
MERLIN LEGEND Communications System Release 3.0

Title: **Installation, Programming, & Maintenance**

Order No.: **555-630-140** Date: **August 1994**

1. Please rate the effectiveness of this book in the following areas:

	Excellent	Good	Fair	Poor	Not Applicable
Ease of Use					
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Basking Ridge, NJ 07920. Fax: (908) 953-6912.

THIS FORM MAY BE PHOTOCOPIED

Introduction

1

Installation of the MERLIN LEGEND Communications System involves the following:

- Installing the control unit
- Installing the telephones
- Connecting system wiring
- Installing optional equipment

This chapter provides an overview of the installation process, which varies from customer to customer.

Installation Sequence

The following is a list of the components that the system can include and shows the order in which you should install them. When installing your customer's system, try to adhere to this order as much as possible:

1. Install the control unit (required).
2. Connect power accessories to the control unit (optional).
3. Install the telephones (required) and adjuncts (optional).
4. Connect the telephones to the control unit (required).

5. Connect the control unit to the network interface (required).
6. Connect the channel service unit (CSU) to the 100D module on the control unit (required only with the 100D module).
7. Connect the printer and PC to the control unit (optional).
8. Connect data equipment to the control unit (optional).
9. Initialize and test the system (required).
10. Install the control unit housing (required).
11. Install applications (optional).

A list of required tools and equipment is given before each installation procedure.

System Forms

Some of the installation procedures in this guide refer to system forms. These forms indicate information that is specific to your customer's system. The forms you need should be included with the system programming disk or memory card, which contains all of the programming specifically for your customer's system.

If you are upgrading an existing system and do not have the required forms for your customer's system, you can load System Programming and Maintenance (SPM) and print out the required forms.

If you find that you do not have a completed set of system forms for your customer's system, contact your technical support organization or the Customer Service Center (CSC). See the inside front cover for telephone numbers.

The system forms that you need are specific for each system, and include some or all of those described in the following sections.

Installling the Control Unit

- **Form 1, System Planning.** Some procedures in Chapter 2, “Installing the Control Unit,” refer to the Control Unit Diagram, which is printed on the reverse side of this form.
- **Form 3c, Incoming Trunks: Tie.** If you install a 400EM module in the control unit, use this form to determine the appropriate switch settings prior to installation.

Installing Telephones (Required) and Adjuncts (Optional)

The following forms indicate the telephones and adjuncts that you must install:

- Form 2a, System Numbering: Extension Jacks
- Form 2b, System Numbering: Digital Adjuncts
- Form 4b, Analog Multiline Telephone
- Form 4d, MLX Telephone
- Form 4e, MFM Adjunct: MLX Telephone
- Form 4f, Tip/Ring Equipment
- Form 5a, Direct-Line Console (DLC): Analog
- Form 5b, Direct-Line Console (DLC): Digital
- Form 5c, MFM Adjunct: DLC
- Form 5d, Queued Call Console (QCC)

Connecting the Network Interface

The following forms indicate the trunks that you must connect to the control unit. Information regarding the channel service unit (CSU) is included on these forms.

- Form 2c, System Numbering: Line/Trunk Jacks

- Form 3a, Incoming Trunks: Remote Access
- Form 3b, Incoming Trunks: DS1 Connectivity (100D Module)
- Form 3d, Incoming Trunks: DID

Connecting Data Equipment

The following forms indicate the data equipment you will need to set up data stations.

- Data Form 1a, Modem Data Station
- Data Form 1b, 75006 Data Station
- Data Form 2, Data Hunt Groups

Programming the System

If you have a system programming disk created with SPM or a Translation memory card, you do not need to program the system. Instead, you can use the disk or memory card to restore the system; see Chapter 7, “Initializing and Testing the System,” for instructions. If you did not receive a disk or a memory card and it is your responsibility to program the system, see *System Programming* for instructions.

Upgrading the System

If you are upgrading to Release 3.0 from Release 2.1, 2.0, 1.0, 1.1, or from the MERLIN® II Communications System, refer to Chapter 9, “Upgrading the System,” then Chapter 7, “Initializing and Testing the System,” for upgrade instructions.

NOTE:

You cannot retain the programming from the MERLIN II Communications System. You must first upgrade the hardware, then reprogram the system.

Installing the Control Unit

2

If you have not read Chapter 1, “Introduction,” do so before continuing with this chapter.

Overview

Installing the control unit involves the following procedures:

- Preparation requirements
- Installing the backboard
- Meeting the power and grounding requirements
- Checking the total unit load
- Installing the basic carrier
- Installing any expansion carriers
- Installing the power supply
- Installing the processor
- Installing the line/trunk and extension modules
- Connecting the control unit to AC power
- Powering up the system
- Powering down the system

The following sections provide detailed instructions for these installation procedures. Follow the procedures in the order in which they are presented.

Environment

The control unit must be installed on a backboard. The placement of the backboard, and the control unit on it, requires careful consideration. Make sure you install the backboard in an area that meets all of the environmental requirements listed in Table 2–1.

Table 2-1. Environmental Requirements

Operating Temperatures	40°-104°F (4°-40°C) Optimal temperature: 60°F(15.6°C)
Humidity	20%–80%
Airborne Contamination	Do not expose the control unit to moisture, corrosive gases, dust, chemicals, spray paint, or similar material.
Ventilation	Allow at least 1 in. (2.54 cm) on the right and left sides of the control unit and 12 in. (30.48 cm) minimum, above and below it, to prevent overheating, Do not place the control unit near extreme heat sources (for example: furnaces, heaters, attics, or direct sunlight).
Electrical Fields	Do not expose the control unit to devices that generate electrical currents causing interference (such as arc welders or motors).
Heat Dissipation	Basic carrier: 500 Btu/hr Basic carrier: with one expansion carrier 1000 Btu/hr Basic carrier: with two expansion carriers 1500 Btu/hr



WARNING:

Do not install the control unit outdoors.

Electrical Noise/Radio-Frequency Interference

In most cases, electrical noise is introduced to the system through trunk or telephone cables. However, electromagnetic fields near the control unit can also cause noise in the system. Therefore, you should *not* place the control unit and cable runs in areas where a high electromagnetic field strength exists.

Radio transmitters (AM and FM), television stations, induction heaters, motors (with commutators) of 0.25 horsepower (200 watts) or greater, and similar equipment are leading causes of radio-frequency interference (RFI). Small tools with universal motors are generally not a problem when they operate on separate power lines. Motors without commutators generally do not cause interference.

Field strengths below 1.0 volt per meter are unlikely to cause interference. To estimate the field strength produced by radio transmitters, divide the square root (✓) of the emitted power, in kilowatts, ($\div$) by the distance from the antenna in kilometers which equals (=) the field strength in volts per meter.

Example: $\{49,000 \text{ kw} = 7,000 \div 10 \text{ km (6.2 miles)} = 0.7 \text{ volts per meter}$

This yields the approximate field strength in volts per meter and is relatively accurate for distances greater than about half a wavelength (492 ft., or 150 m, for a frequency of 1000 Hz). If the result exceeds 1.0 volt per meter, you may have to install shielded cables and or Z200A filters. See Appendix A, "Customer Support Information," following *Maintenance and Troubleshooting*, for FCC Part 15 radio frequency regulations.

Control Unit Requirements

■ Dimensions

- Basic carrier: 14 in. wide by 23 in. high by 12 in. deep
- Basic carrier and one expansion carrier: 25 in. wide by 23 in. high by 12 in. deep

- Basic carrier and two expansion carriers: 37 in. wide by 23 in. high by 12 in. deep

■ Location

- Within 5 ft. (152 cm) of an AC power outlet that is *not* switch-controlled
- Within 25 ft. (762 cm) of the network interface, or use an Off-Premises Range Extender (OPRE)
- Within 1000 cable ft. (305 m) of telephones, or use an OPRE (for basic telephones)



CAUTION:

The AC outlet for the control unit cannot be switch-controlled. Plugging the control unit into such an outlet invites accidental disconnection of the system.

Hardware Preassembly Process

If an installation is to be preassembled, wired, programmed, and tested on the new lightweight plastic backboard, see “Installing the Backboard.”

Backboard Requirements

The backboard should be wide enough to accommodate the carrier and up to two additional carriers, assuming that system growth is anticipated. There should be enough room on each side of the control unit for the necessary wiring fields,

To accommodate the maximum control unit size, make sure the backboard meets the following requirements:

■ Material

- ¾-inch plywood
- Check with the local building code enforcement agency to see whether fire-retardant material is required.

- Make sure that the material meets local building codes.

- **Dimensions**

- With Systimax® wiring: 7 ft. wide by 4 ft. high

- Without Systimax wiring: 6 ft. wide by 3 ft. high

Installing the Backboard

When you are certain that the backboard meets the requirements indicated above, or is the new lightweight plastic material backboard with preassembled equipment in place, attach the backboard to the wall.

Use the following mounting hardware:

- For a wood mounting surface, use wood screws.
- For brick, cinderblock, or concrete, use masonry anchors.
- For plaster or plasterboard, use toggle bolts.
- For sheet metal, use sheet-metal screws and attach them to the structural members.

NOTE:

The mounting hardware should resist a combined pullout force of at least 650 pounds (295 kilograms).

AC Power and Grounding

Proper power and grounding are essential for the system to run correctly and safely.



CAUTION:

If any of the following requirements are not met, the customer must contact a licensed electrician. Do not install the system until all requirements are met.

Verify that all of the following power and grounding requirements are met:

- The load center of appropriate current rating must be equipped with circuit breaker(s) labeled *120 VAC, 15 amps*.
- Each breaker must protect one dedicated quad AC outlet or two dedicated duplex AC outlets.
- All AC outlets must connect to the same load center and the ground wire must connect to the single-point ground bar on the first AC outlet (see Figure 2-1).
- One outlet must have an attached ground bar connected by a #6 AWG copper wire to an approved ground (see page 2-12 for a description of approved grounds). This ground bar is the system's single-point ground (see Figure 2-1).
- To prevent someone from accidentally shutting off the power, *do not* connect the control unit to a switch-controlled outlet.
- The AC outlet should be within 5 ft. (152 cm) of the control unit.
- Each carrier requires one AC outlet receptacle.
- Auxiliary equipment requires additional AC outlets.
- If a printer or PC is installed on the system, it must be plugged into the same AC branch as the power supply of the basic carrier.

If the printer or PC is 50 ft. (15 m) or more from the control unit, or is plugged into a different AC circuit, Asynchronous Data Units (ADUs) must be installed as well. Chapter 5, "Installing the PC, CAT, or Printer," includes complete installation instructions.

- The AC power requirements indicated in "AC Outlet Tests," below, must be met.

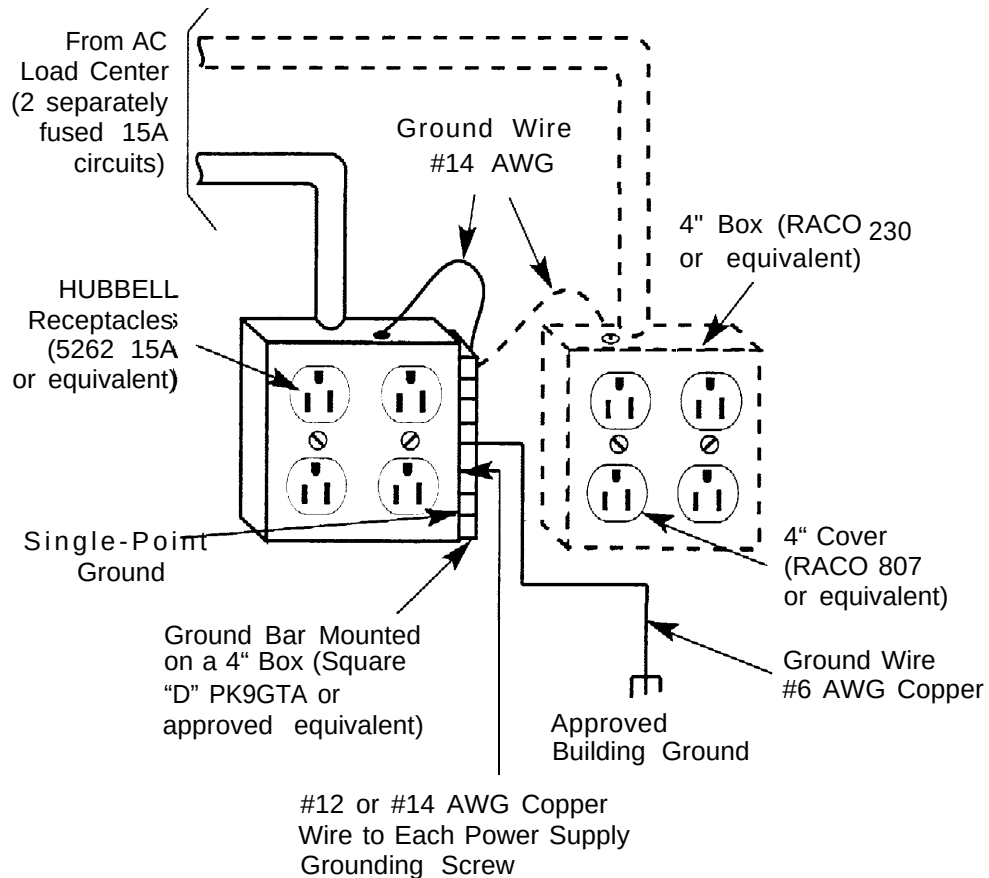


Figure 2-1. AC Grounding Requirements



CAUTION:

The AC outlet for the control unit cannot be switch-controlled, Hugging the control unit into such an outlet invites accidental disconnection of the system. The AC outlet must be properly wired as described in "AC Outlet Tests. "

Table 2-2. AC Power Requirements

Parameter	Value
Nominal voltage	117VAC
Voltage range	110-125 V AC
Frequency	60 Hz +/- 5%
Maximum current	3 amps per power supply
Power consumption	225 watts per power supply

AC Outlet Tests

If the AC outlet tests indicate that any of the power requirements in Table 2-2 are not met, your customer must contact a licensed electrician. *Do not* install the system until all requirements are met.

If the AC outlet tests reveal any of the following conditions, they must be corrected before you install the system:

- Open ground
- Hot and neutral reversed
- Open hot
- Open neutral
- Hot and ground reversed



WARNING:

Hazardous voltages are present during the following tests. Follow all instructions carefully when working with AC power line voltages.

Using an Ideal 61-035 Circuit Tester (or Equivalent)

1 Plug the circuit tester into the outlet that you want to test.

If the circuit is properly grounded, the yellow and white lights on the tester turn on.

2 Unplug the circuit tester.

Using a Volt-Ohm Milliammeter (VOM)

1 Set the VOM to the lowest scale on which you can read 130 V AC.

2 Measure the AC outlet voltages. See Figure 2-2.

- Phase to ground should be 110 to 125 V AC.
- Neutral to ground should be less than 1 V AC.
- Phase to neutral should be 110 to 125 V AC.

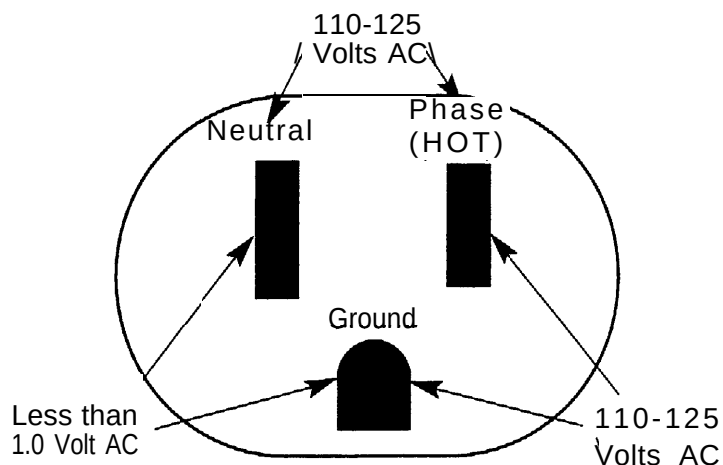


Figure 2-2. Measuring the AC Outlet Voltages



WARNING:

*If the voltage readings do not measure the values required, the AC outlet is improperly wired- **do not install the system**. Advise the customer to have a licensed electrician correct the problem.*

Grounding Requirements

Proper grounding of the installation site safeguards the system by protecting it from the following:

- Lightning
- Power surges
- Power crosses on central office trunks
- Electrostatic discharge (ESD)

When installing the control unit, make sure you meet the following grounding requirements:

- The control unit, the central office trunk protector, and the AC power service panel should be as close to each other as possible.
- Because equipment can be located throughout a building, the National Electrical Code requires that the ground point for the central office trunk protector be bonded to the AC power ground as shown in Figure 2-3.
- The AC outlet and the single-point ground bar must be properly grounded as shown in Figure 2-1 and Figure 2-3.
- Each power supply in the control unit must be connected to the single-point ground bar by a #12 AWG or a #14 AWG solid copper wire. Figures 2–1 and 2–3 show this connection.

This wire run should be as short as possible, preferably within 5 ft. (152 cm), not to exceed 10 ft. (305 cm), See “Approved Grounds,” later in this chapter, for more information.

- The AC outlet must be connected to the 147A protector with #12 AWG or a #14 AWG solid copper wire.

AC Power and Grounding

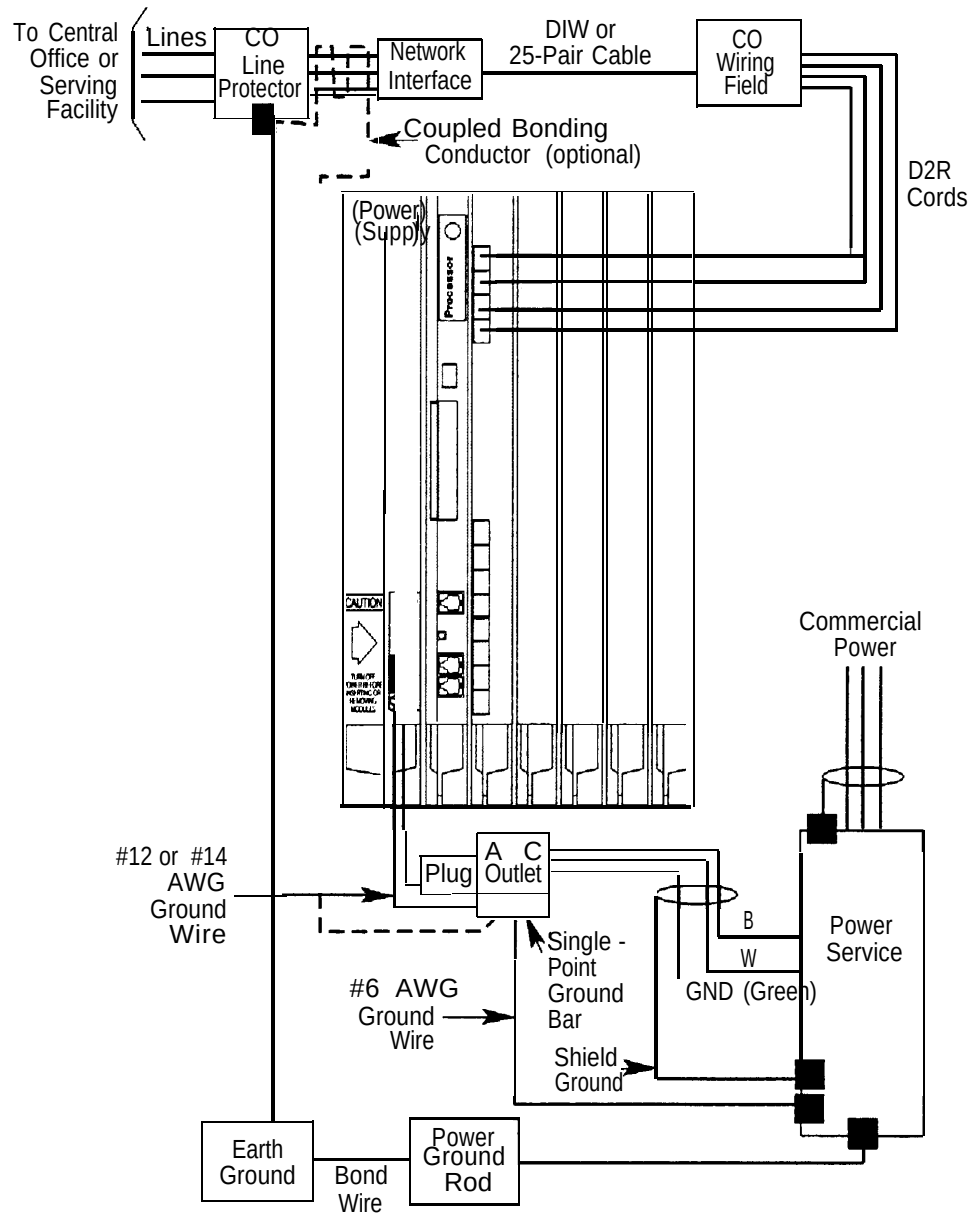


Figure 2-3. Central Office and AC Grounds



WARNING:

Improper ground can cause equipment failures, service outages, and electrical shock. Verify that the AC power uses an approved ground for its primary ground, that all voltage-limiting devices are grounded to an approved ground, and that the ground is one of the approved grounds listed below.

Approved Grounds

Approved grounds are listed below, in order of preference:

- **Building Steel.** The most preferred ground.
- **Acceptable Water Pipe.** Must be a metal, *not plastic or vinyl*, underground water pipe at least ½ in. (1.27 cm) in diameter, and in direct contact with the earth for at least 10 ft. (3 m).

It must be electrically continuous so that the protector ground is uninterrupted. (Check for insulated joints, plastic pipe, and plastic water meters that might interrupt electrical continuity.)

A metallic underground water pipe must be supplemented by the metal frame of the building, a concrete-encased ground, or a ground ring. If these grounds are not available, the water pipe ground can be supplemented by one of the following types of grounds:

- Other local metal underground systems or structures, such as tanks and piping systems, *but not gas pipes*
- Rod and pipe electrodes, a 5/8-in. (1.58-cm) solid rod or ¼-in. (0.63-cm) conduit or pipe electrode driven to a minimum depth of 8 ft. (244 cm)
- Plate electrode, a minimum of 2 square ft. (61 square cm) of metallic surface exposed to the exterior soil

- **Concrete-Encased Ground.** Must be an electrode, consisting of one of the following:
 - At least 20 ft. (6.1 m) of one or more steel reinforcing rods, each at least ½ in. (1.27 cm) in diameter
 - 20 ft. (6.1 m) of bare copper conductor not smaller than #4 AWG, encased in 2 in. (5 cm) of concrete
 - This electrode must be located within and near the bottom of a concrete foundation or footing that is in direct contact with the earth.
 - Ground ring, consisting of at least 20 ft. (6.1 m) of bare copper conductor (not smaller than #2 AWG) encircling the building. The ground ring must be in direct contact with the earth and buried at least 2.5 ft. (77 cm) below the earth's surface.



WARNING:

***Do not** use a metal underground gas piping system—this is a safety risk.*

Central Office Trunk Protection

The telephone company is responsible for providing the following protection of central office (co) trunks at the entrance to the site:

- Carbon blocks or gas discharge tubes connected to an approved ground
- Adequate bonding of the central office trunk protector ground and the power company ground



CAUTION:

*Check these requirements with a simple, visual inspection. If you cannot verify that the central office grounding requirements are met, contact the central office. **Do not** connect the control unit to the central office trunks until you are certain that these requirements are met.*

Heavy Lightning Protection

For most surges, adequate protection is provided by meeting the previously listed requirements. Additional protection is required when the customer is located in a heavy lightning area.

Connect a 147A protector to the system to limit surges from the AC lines and up to four CO trunks.

For systems with more than four CO trunks, do the following:

- Connect a 146A protector to the 147A protector, providing protection for an additional four trunks.
- Connect up to three (maximum) 146A protectors to a 147A protector, allowing a maximum of 16 trunks on one 147A protector.
- For more than 16 trunks, add another 147A protector and continue adding 146A protectors as needed. See Table 2–3 for various configurations and Figure 2–4 for a typical 147A protector installation.

Table 2-3. Heavy Lightning Protection

Number of CO Trunks	Required Protectors
1-4	147A
5-8	147A and a 146A
9-12	147A and two 146As
13-16	147A and three 146As
17-20	Second 147A
21-24	Second 147A and one 146A

NOTES:

1. When you use the second 147A, you can connect the 146As in any combination, up to a maximum of three 146As per 147A.
2. For detailed installation instructions, see the documentation packaged with the protectors.

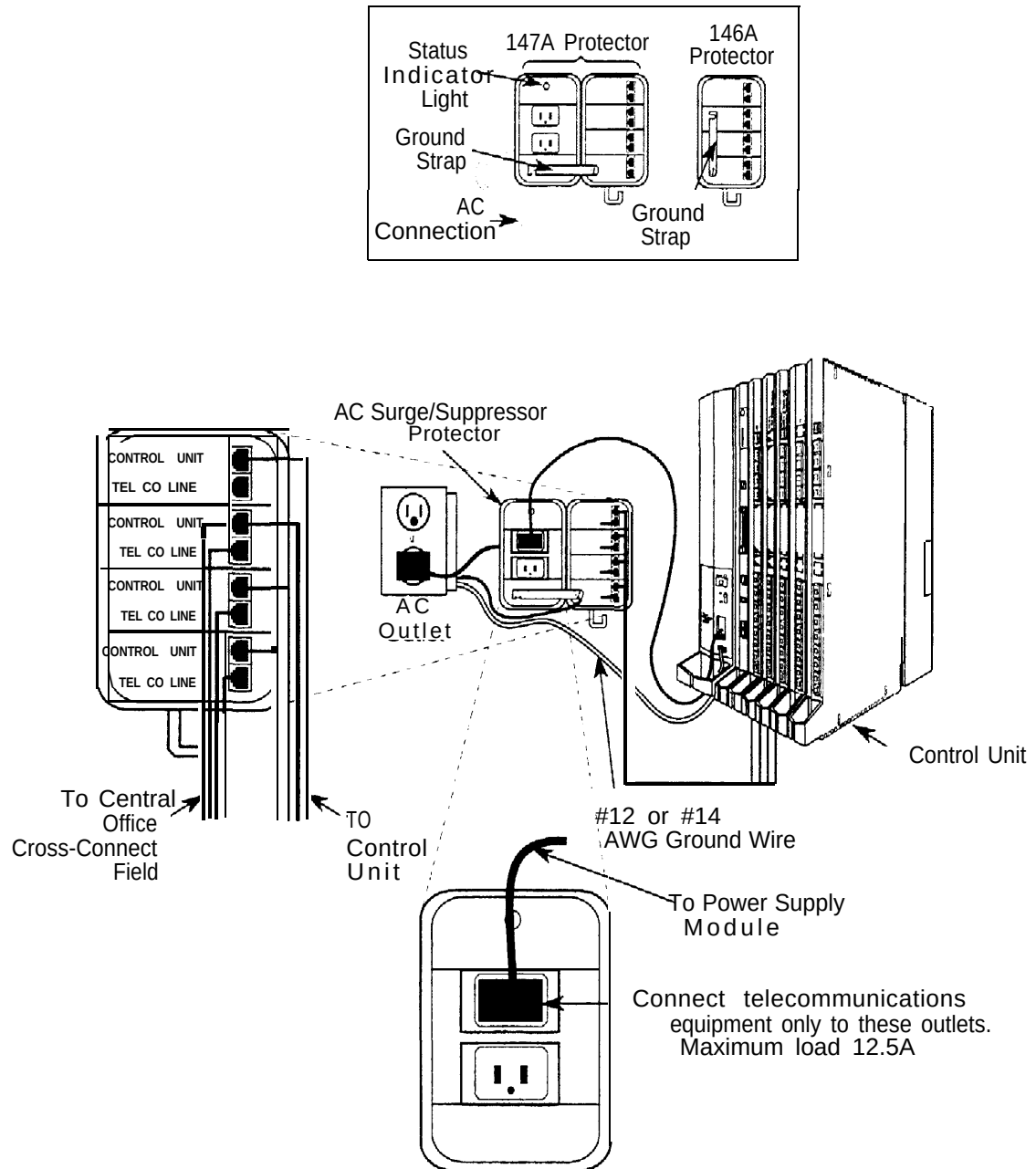


Figure 2-4. Installing 146A and 147A Protectors

Unit Loads

A unit load is a measure of power (1.9 watts) that you use to determine the electrical load that the components listed below place on the control unit's power supply.

- Telephones and adjuncts
- 800 DID modules

Only the telephones and adjuncts that connect to the analog and digital extension jacks (ports) on the control unit require unit load calculation. When calculating unit load, do not include any equipment with its own power supply.

Checking Unit Loads

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

As a general rule, if you can distribute the 800 DID modules and telephone modules equally across the carriers, you prevent unnecessary drain on any one carrier. However, the rule varies 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 Hybrid/PBX mode, without requiring an auxiliary power unit. If the following conditions are true, however, the unit loads on a carrier can exceed the 54-unit maximum and, therefore, require auxiliary power:

- All six carrier slots are occupied by MLX telephone or analog multiline telephone modules.
- The carrier has a total of more than 45 MLX-20L telephones 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.

Auxiliary Power Units

The power supply provides 54 unit loads to each carrier. If the unit load requirement for a carrier exceeds 54, an auxiliary power unit is needed to allow that carrier to support up to an additional 27 unit loads.



CAUTION:

Running the system with more than 54 unit loads per carrier may not appear to do harm. However, this can cause the system to malfunction, creating “NO Trouble Found” situations, such as malfunctioning LEDs on multiline telephones or power unit failure.

Any extension that is connected to the modules in the last two slots receives power from the auxiliary power unit instead of from the power supply.

If an auxiliary power unit is required, refer to “Installing the Auxiliary Power Unit,” later in this chapter, for instructions.

Installing the Basic Carrier

Continue with this procedure only if you have met all of the requirements discussed earlier in this chapter.

NOTE:

When you mount the basic carrier onto the backboard, leave 29 in. (73.66 cm) of backboard to the right. This allows you to easily install and remove the control unit cover, and also allows enough room for system expansion to the right for the total length of up to three carriers.

To install the basic carrier, follow the steps below:

- 1 **Mark the screw-hole locations on the backboard, using the basic carrier or the template supplied with the plastic preassembled backboard as a guide. See Figure 2-5.**

Make sure the carrier is level before marking the holes.

- 2 **Drill a pilot hole in the center of each of the four screw-hole marks.**
- 3 **Anchor the screws approximately halfway into the backboard.**
- 4 **Position the carrier on the screws and slide the carrier to the left.**
- 5 **Tighten the screws.**

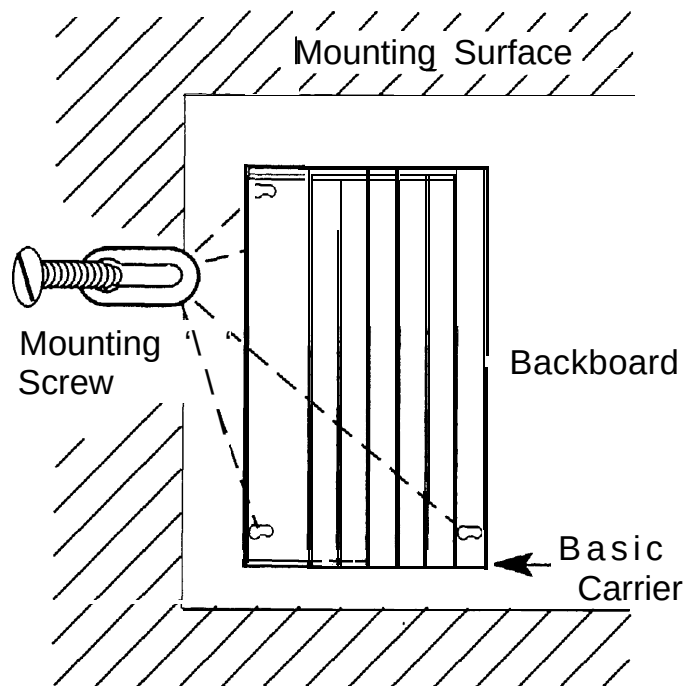


Figure 2-5. Marking the Basic Carrier Screw Holes

Installing the Power Supply



WARNING:

Do not attach any cables or power cords to the power supply until it is installed in the carrier.

Do not power up the control unit until all of the modules and power equipment are installed. Once they are installed, refer to "Powering Up the System," later in this chapter. Failure to comply with this procedure can result in shock hazard and or damage to the equipment.

If you are upgrading an older system and a ring generator is specified in the system forms (Control Unit Diagram), install it in the power supply before putting the power supply in the carrier. The procedure is detailed in Maintenance and Troubleshooting.

For expansion carriers only, a copper shield must be installed on the power supply before installing it in the carrier. The procedure is explained in "Installing a Copper Shield," later in this chapter.

Before touching leads, connectors, pins, and other components, use a properly grounded wrist strap, to prevent damage from electrostatic discharge (ESD).

Remove the protective cover from the gold-finger connector (on the back of the power supply) before inserting it into the carrier.

Installing the power supply can involve as many as four procedures, depending on the system configuration. The procedures are:

- Turning off all power to the control unit
- Installing a copper shield
- Installing the ferrite cores

NOTE:

It is not necessary to install ring generators in a new system with new012 (apparatus code 517G13 or later letter) modules or new 008 (apparatus code 5171328 or later letter). If you are upgrading or using older modules, see *Maintenance and Troubleshooting*.

Turning Off the Power

- 1 Turn off *each* power supply.**
- 2 Disconnect *all* power cords and auxiliary units.**

Installing a Copper Shield

The added power supply in each expansion carrier can cause excessive noise in the module occupying the next slot. To eliminate this noise, a copper foil shield is installed over the power supply. These shields and their labels are packaged in the power unit shielding kit included with the expansion carrier.

To install a copper shield, follow the steps below. Refer to Figure 2-6 throughout the procedure.

- 1 Make sure all power is off.**
- 2 Place the power supply on a flat surface with the right side up (as viewed from the front edge).**
- 3 Wipe the module free of any dust or dirt.**
- 4 Peel the backing paper from the smaller copper-foil shield to expose the adhesive.**

Check the positioning of the foil shields before sticking them to the side of the module. Once in place, the foil is difficult to remove.

- 5 Position the foil on the upper part of the module and work out any air bubbles as you press the foil firmly in place.**

6 Peel the backing paper from the larger copper-foil shield to expose its adhesive.

7 Position the foil on the lower part of the module.

a The shields *must* meet.

b They should *not* overlap or have *any* space between them.

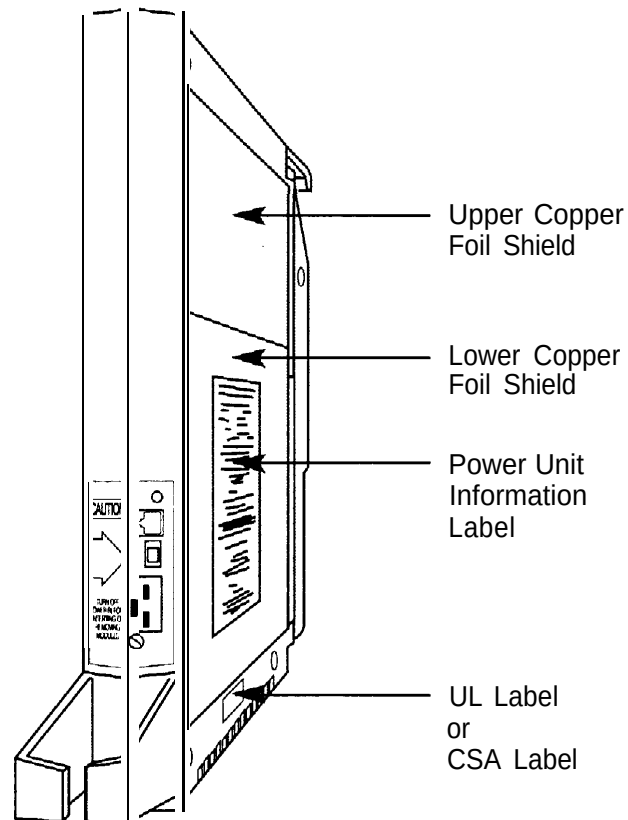


Figure 2-6. Installing a Copper Shield in the Power Supply

- 8 Tuck the foil shield tightly along the ledge (or crease) of the housing and work out any air bubbles as you press the foil firmly in place.**
- 9 With the copper-foil shield in place, put the power unit information label on the lower piece of foil.**
- 10 Attach the UL or CSA label on the power supply below the copper-foil shield.**

Installing the Power Supply Module in the Carrier

- 1 Lower the power supply module hook onto the rod on top of the carrier.**
- 2 Make sure the connector on the module mates properly with the connector on the carrier.**
- 3 Push the module into the carrier until it locks into place.**

Installing the Ferrite Cores

At this point, the power supply should have been installed in the carrier, but there should be no cables or power cords attached to the power supply module.

NOTE:

If you are upgrading a system, unplug the AC power cord and remove the ground wire attached to the grounding screw on the front of the power supply.

Follow these steps to install the ferrite cores:

- 1 Feed the AC power and ground wire through the wire manager (refer to Figure 2-7).**
- 2 Open the ferrite cores by unsnapping the plastic case.**
- 3 Attach a ferrite core around the AC power cord and the ground wire by snapping the plastic case shut.**
- 4 Attach the second ferrite core adjacent to the first ferrite core by repeating Steps 2 and 3.**
- 5 Slide the ferrite cores between the wire manager and the power supply module (refer to Figure 2-7).**
- 6 Attach the ground wire to the grounding screw on the power supply module.**
- 7 Check that the other end of the ground wire is connected to the terminals of the single-point ground bar on the AC outlet box.**



CAUTION:

Do not connect the power cord until the entire control unit is assembled.

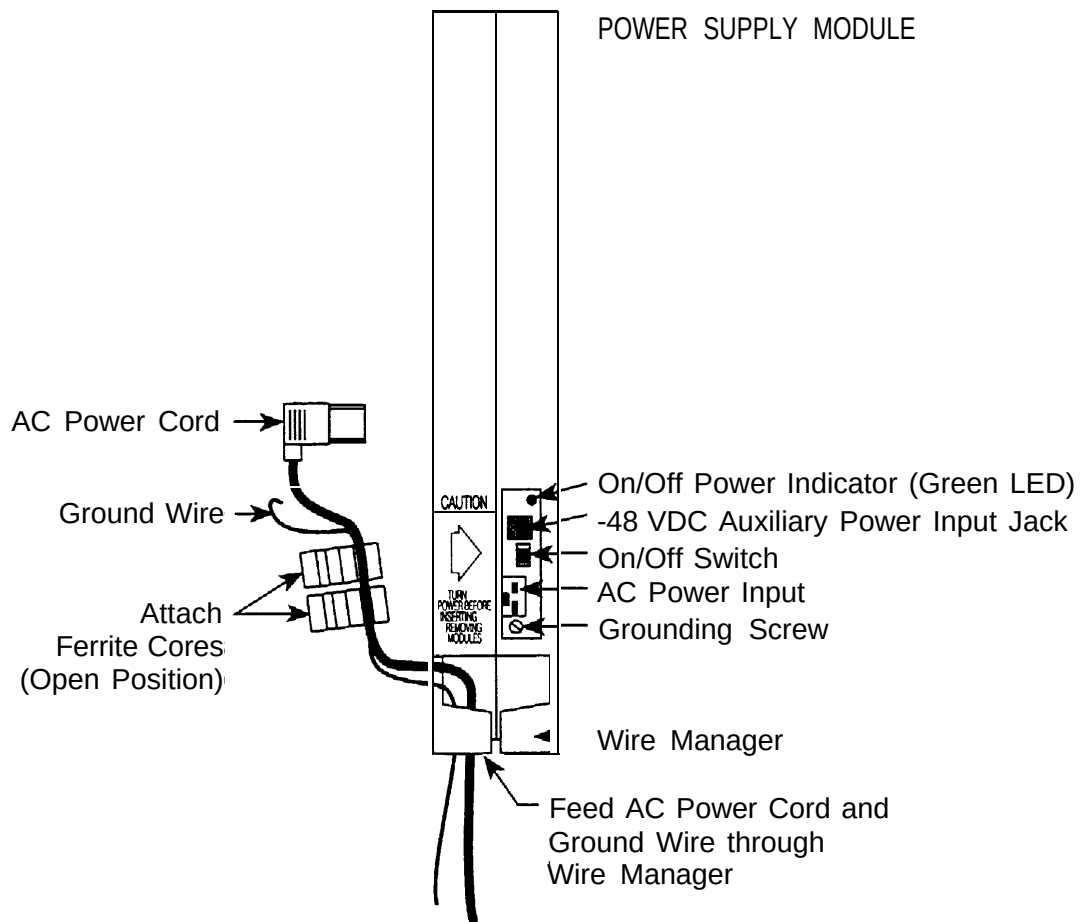


Figure 2-7. Installing the Ferrite Cores

Installing the Auxiliary Power Unit

The Control Unit Diagram on the back of Form 1, System Planning, indicates whether an auxiliary power unit is required for the carrier that you are installing.

NOTE:

Use the 9024 auxiliary power unit for new installations. You can continue to use a previously installed 335A auxiliary power unit, as long as no new telephones or modules are added to the carrier.

To install an auxiliary power unit, follow the steps below. Refer to Figure 2-8 throughout this procedure.

- 1 Turn off the switch on the power supply.**
- 2 Mount the auxiliary power unit on a surface (preferably the backboard) within 2 ft. (61 cm) of the control unit.**
- 3 Plug the power unit line cord into the AUX POWER INPUT jack on the power supply.**
- 4 Plug the other end of the line cord into the AUX POWER jack on the auxiliary power unit.**



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” later in this chapter.

If the system is backed up by an Uninterruptible Power Supply (UPS), connect the auxiliary power to the UPS.

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

Use only the power unit line cord supplied with the auxiliary power unit. An incorrect cord will damage the power supply and may damage modules.

Installing the Auxiliary Power Unit

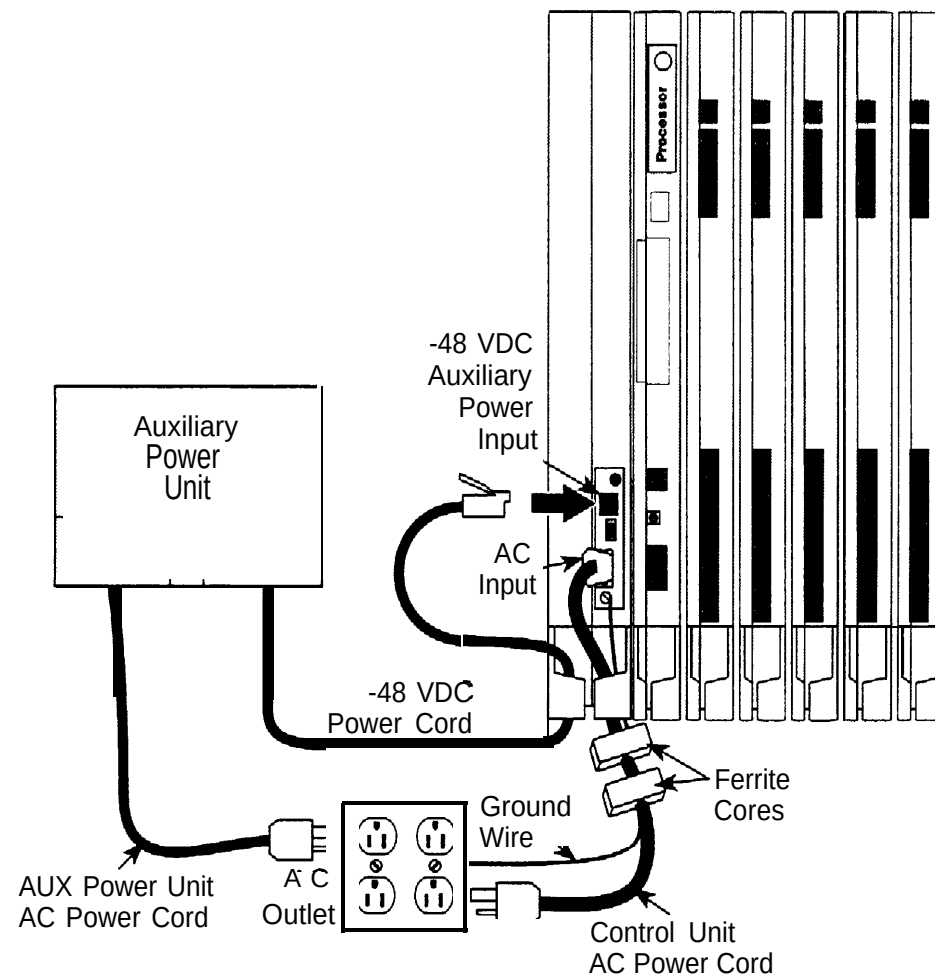


Figure 2-8. Installing an Auxiliary Power Unit

Installing Expansion Carriers

If you are adding an expansion carrier to an existing system, see “Upgrading the Control Unit” in Chapter 9 before continuing.

If you are to install one or more expansion carriers, follow the steps below to mount each one. Refer to Figure 2–9 and Figure 2–5 throughout the procedure.

1 Locate the breakaway plastic tab on the right side of the previously mounted carrier. Using a flat-blade screwdriver, gently pry the tab open to expose the card extender.

2 Align the connector of the expansion carrier with the card extender on the previously mounted carrier and slide the connector onto the extender.

3 Mark the screw-hole locations on the backboard, using the expansion carrier or the template that comes with the preassembled plastic backboard as a guide.

Make sure the carrier is level before marking the holes.

4 Disconnect the expansion carrier connector from the previously mounted carrier and put the expansion carrier aside.

5 Drill a pilot hole in the center of each of the four screw-hole marks.

6 Anchor the screws approximately halfway into the backboard.

7 If housing clips are to be installed on the housing and this is the last carrier in the control unit, place the housing clips around the right-hand molding for the screws on the back of the carrier.

If not, go to Step 8.

8 Position the expansion carrier on the screws and slide it to the left, to reconnect the expansion carrier card extender to the previous carrier’s connector.

9 Make sure the connection is secure.

10 Make sure the carrier is level and that the housing clips extend as far as possible from the right side of the carrier.

11 Tighten the screws.

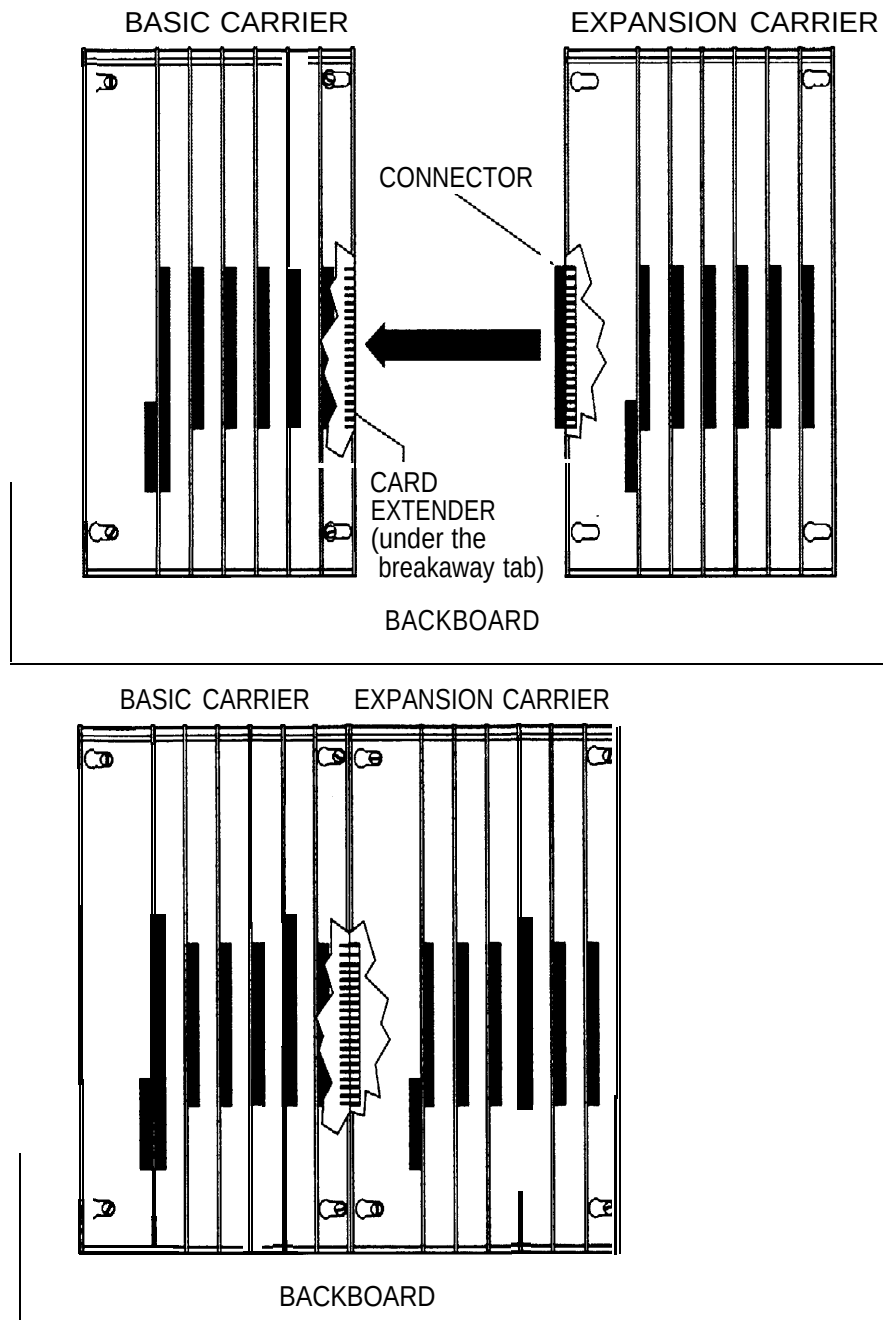


Figure 2-9. Connecting the Carriers

Installing the Processor

Installing the processor includes the following procedures:

- If *both* of the following conditions are true, follow the procedures in Chapter 9, “Modifying the Processor for Key Mode.”
 - Form 1, System Planning, indicates Permanent Key mode.
 - Form 2c, System Numbering: Line/Trunk Jacks, indicates no GS (ground-start) trunks in the Incoming Trunk Type column.
- Insert the processor into the carrier as indicated in “Installing the Processor in the Carrier,” later in this chapter.

NOTES:

1. If the system is programmed for Permanent Key mode, check the switch setting. Refer to Chapter 9, “Modifying the Processor for Key Mode” for detailed procedures. If the switch is set to Permanent Key-only operation, all trunks revert to loop-start. If the switch is not set, any programmed designation for ground-start trunks is retained.

The ground-start pool never has trunks assigned to it automatically, but must be programmed after the ground-start ports are designated. Ground-start trunks are assigned to the ground-start pool on initialization, except in a system switched for Permanent Key mode operation. (In Release 1.0, ground-start and loop-start trunks automatically defaulted to loop-start.)

2. Beginning with Release 3.0, the feature module required for Release 2.1 and earlier is no longer needed. The Release 3.0 processor module contains a PCMCIA memory card interface capable of accommodating a 4-MB memory card. This card is used to install or upgrade system software and perform firmware upgrades on circuit modules. It can be used to backup and restore system programming.

**CAUTION:**

Before touching leads, connectors, pins, and other components when handling the circuit board, use a properly grounded wrist strap to prevent damage from electrostatic discharge (ESD).

Installing the Processor in the Carrier

To install the processor in the carrier, follow the steps below, Refer to Figure 2-10.

- 1 Remove the protective cover from the gold-finger connector on the back of the processor.**
- 2 Lower the hook on top of the processor module onto the rod on top of the carrier in Slot 0, the first slot next to the power supply.**
- 3 Make sure that the connector on the module mates properly with the connector on the carrier as you swing the processor down into place.**

**CAUTION:**

To avoid damage, do not force the module. If the module does not insert easily, press the bottom rear locking tab, remove the module, and inspect the module and carrier for damage or obstruction. The bottom-rear locking tab is shown in Figure 2–10. This tab is used on all modules.

If there is no damage and no obstruction, reinsert the module.

A damaged carrier or module must be replaced.

- 4 Push firmly until the processor snaps into place.**

The processor should be securely attached to the carrier and locked in place by the locking tab on the bottom rear of the processor.

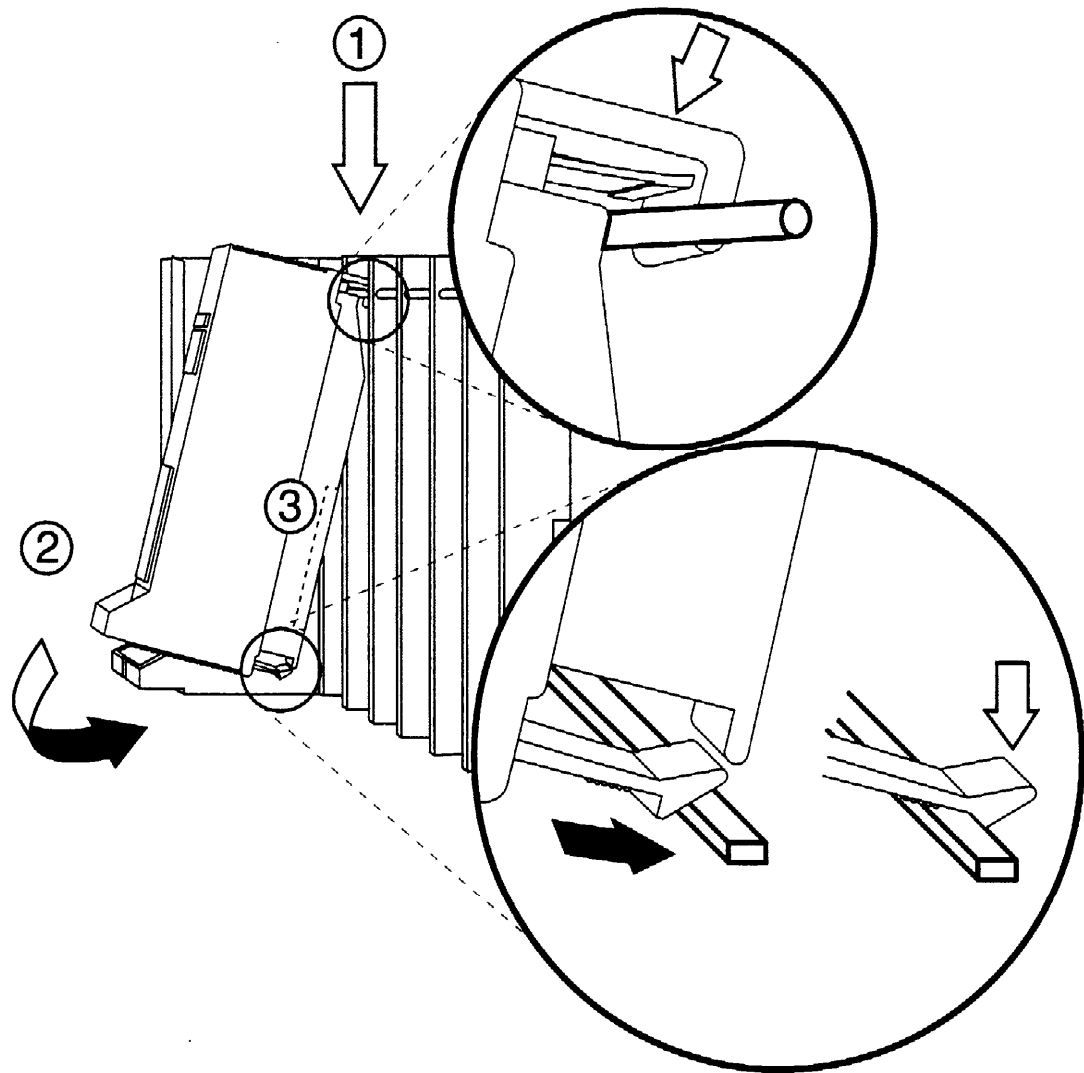


Figure 2-10. Installing the Processor into the Carrier

Installing the Modules



CAUTION:

Use a properly grounded wrist strap to prevent damage from electrostatic discharge (ESD) when installing the modules, and avoid touching leads, connectors pins, and other components.

Guidelines

Follow these guidelines when you install modules, as indicated on the Control Unit Diagram of Form 1, System Planning:

- Do not leave empty slots between modules. The system ignores modules installed beyond any empty slot.
- If a phantom module (a programmed empty slot) is indicated on the Control Unit Diagram, make sure the slot remains empty and do not install any modules to the right of it. The system ignores any modules installed to the right of a programmed empty slot.
- Make sure you install each module in its assigned slot. If you install a module in the wrong slot, the system will not function properly,
- Be sure to place all 012 modules and all 008 OPT modules without built-in ring generators in carriers with modules that have ring generators so that the modules without ring generators can be supported.
- Once you have installed the power supply and the processor in the basic carrier, use the remaining slots for the modules as follows:
 - Basic carrier: slots 1 through 5
 - First expansion carrier: slots 6 through 11
 - Second expansion carrier: slots 12 through 17

Installing Modules

To install modules starting from slot 1 (the first open slot next to the processor), follow the steps below:

- 1 For each 400EM tie line/trunk module, for jacks numbered 1 through 4 in Figure 2-11, check Form 3c, incoming Trunks: Tie, for E&M signaling type.**

Set the dual in-line packaging (DIP) switches on the front of the 400EM Tie Trunk module according to the E&M signaling type settings listed in Table 2-4 and Table 2-5 and shown in Figure 2-11. The default E&M signal does not require any adjustments in the DIP switches.

- 2 Remove the protective cover from each module's gold-finger connector.**
- 3 Lower the hook on top of the module onto the rod on the top of the carrier in the appropriate slot. See Figure 2-10.**
- 4 Make sure the connector on the module mates properly with the connector on the carrier.**
- 5 Swing the module into the slot and firmly push the module into the carrier until it locks into place.**



CAUTION:

To avoid damage, do not force the module. If the module does not insert easily, press the bottom rear locking tab, remove the module, and inspect the module and carrier for damage or obstruction.

If there is no damage and no obstruction, reinsert the module. A damaged carrier or module must be replaced.

- 6 Repeat Steps 1 through 5 for each module you want to install.**

Tie Trunks

Tie trunks connect two separate PBX communications systems either directly or through one or more central offices, as if they were one system at the same location. In the MERLIN LEGEND Communications System, the 400EM module is the originating and terminating unit for tie trunk operation.

Tie Trunk Signaling

The 400EM (tie trunk) module can transmit signals in three different formats. Each format is made up of a specific signaling mode and a specific signaling type. The DIP switches on the 400EM module allow you to select the signaling mode for tie trunk transmission. The signaling type is selected through system programming.

Signaling Modes

There are two signaling modes:

- **E&M.** This is a standard interface. The E&M signaling leads are separate from the transmission leads, requiring a 3-pair wire interface.
- **Simplex.** In Simplex, the two signaling leads are superimposed onto the analog transmission leads, providing a 2-pair wire interface for connecting two local systems at minimal cost.

Protected or Unprotected

Depending on the type of tie trunk installation, protective resistance may be installed to protect the circuit from outside interference from high-voltage transients or voltage fluctuations. In Simplex mode, the circuit always requires protective resistance. The E&M mode can be either protected or unprotected, depending upon the location of the distant PBX.

Signaling Types

Three different signaling types combine with the signaling modes. Together these create the proper signaling format for each system. Signaling types in each mode are as follows:

- **E&M Mode**
 - Type 1 Standard** (default factory setting). This setting is used to connect two systems through telephone company facilities.
 - Type 1 Compatible**. This setting connects two systems directly (without using telephone company facilities).
- **Simplex Mode**
 - Type 5**. This setting is used on 4-wire (2-pair) circuits.

400EM (Tie Trunk) Module DIP Switches

During installation of 400EM (Tie Trunk) modules, refer to Table 2-4 and Table 2-5, and to Figure 2-11 for the correct DIP switch settings for varying signaling protocols.

Table 2-4. Setting the 400EM (Tie Trunk) Module DIP Switches

Ports (as numbered in Figure 2-11)		DIP Switch Position	Signaling Type		
			1S (Default) and 1C Unprotected E&M Mode	1C and 1S Protected E&M Mode	5 Simplex Mode
2	4	1	ON	OFF	OFF or ON
		2	ON	OFF	OFF or ON
		3	OFF	OFF	ON
		4	OFF	OFF	ON
		5	OFF	OFF	ON
1	3	6	ON	OFF	OFF or ON
		7	ON	OFF	OFF or ON
		8	OFF	OFF	ON
		9	OFF	OFF	ON
		10	OFF	OFF	ON

NOTE:

DIP switches 1, 2, 6 and 7 determine whether the tie trunks are protected or unprotected. DIP switches 3, 4, 5, 8, 9, and 10 determine the mode. Simplex mode is *always* protected. Therefore the Protected/Unprotected settings for DIP switches 1, 2, 6 and 7 have no effect.

The successful implementation of a tie trunk format is dependent upon matching the characteristics of both the PBX systems it connects. The preferred signaling formats for a tie trunk originating in the system are shown in Table 2-5 below.

Table 2-5. Signaling Formats for the 400EM (Tie Trunk) Module

Installation Situation		Preferred Signaling Format			
From System		System		Distant Location	
To	Distant Location	Signaling Mode/Type	Protected or Unprotected	Signaling Mode/Type	Protected or Unprotected
MERLIN II	Same site co-located	Type 5 Simplex	N/A	Type 5 Simplex	N/A
System 25/75/85 or DEFINITY	Same site co-located	Type 5 Simplex	N/A	Type 5 Simplex	N/A
System 25/75/85 or DEFINITY	Inter-office	Type 5 Simplex	N/A	Type 5 Simplex	N/A
Dimension PBX	Same site co-located	E&M Type 1 C (Compatible)	Unprotected	E&M Type 1 S (Standard)	Unprotected
Dimension PBX	Inter-office	E&M Type 1C (Compatible)	Protected	E&M Type 1 S (Standard)	Protected
Other Systems	Same site co-located	E&M Type 1 C (Compatible)	Unprotected	E&M Type 1S (Standard)	Unprotected
Other Systems	Inter-office	E&M Type 1 C (Compatible)	Unprotected	E&M Type 1 S (Standard)	Requires a protection unit
MERLIN LEGEND	Same site co-located or inter-office	Type 5 Simplex	N/A	Type 5 Simplex	N/A

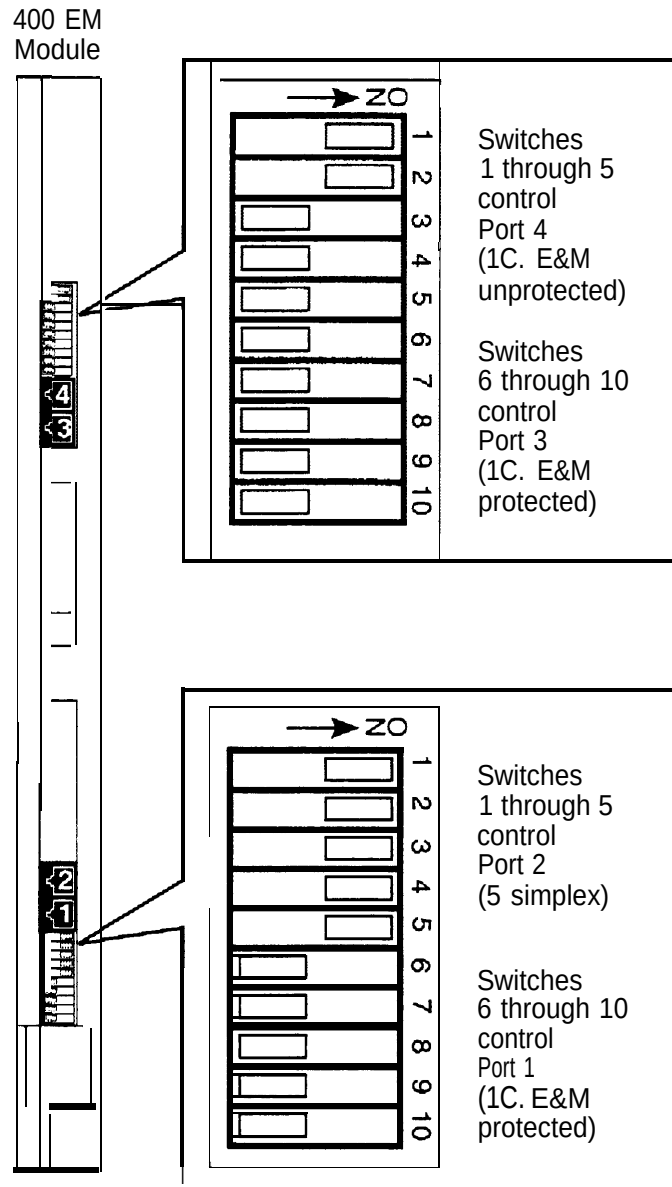


Figure 2-11. 400EM Module Sample Dip Switch Settings for Signaling Types 1C and 5

Labeling

- 1 After all modules have been installed, label all jacks with the numbered labels provided with the feature module.**

- Line/trunk labels have green numbers on off-white background.
- Telephone labels have blue numbers on off-white background.

See Figure 2-12 for the locations of line/trunk jacks and telephone jacks on each module, and label them as described next.

- 2 Label each line/trunk jack on the modules sequentially, 1 through 80. Begin with the module in slot 1, numbering from bottom to top on each module and working from left to right across the carrier(s).**

The 100D module has 24 numbers assigned to the line/trunk jack.

- 3 Label each telephone jack sequentially, 1 through 144. Begin with the module in slot 1, numbering from bottom to top on each module and working from left to right across the carrier(s).**



CAUTION:

The 008 OPT module is assigned 12 logical IDs, and the last four numbers are not assigned to jacks. For example, if the previous module (on the left) is labeled with logical IDs 1 through 8, label the 008 OPT jacks with logical IDs 9 through 16. Skip numbers 17 through 20. When you label the next module (on the right), label the first jack as logical ID 21.

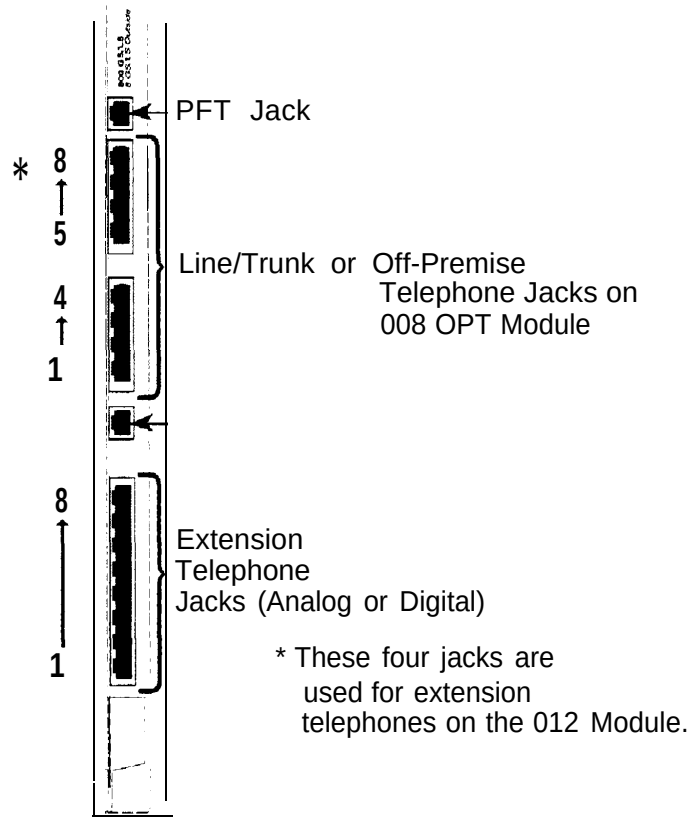


Figure 2-12. Line/Trunk and Telephone Jack Locations on Each Module

Replacing a Module



CAUTION:

This section does not apply to the processor or power supply.

Although the system allows you to remove and replace modules without affecting call processing, partially inserting and removing a module can cause a cold start.

To add a 100D module or change any of its DS1 parameters, the system must be idle.

When you replace a module, use the same module type. For example, do not put a 008 MLX module in place of a 400 GS/LS/TTR 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 (System Reset) occurs.

*If you move any module to a different slot, be sure to renumber the modules by selecting *Board Renumber* from system programming. See System Programming for information about board renumbering.*

NOTE:

You can remove and replace line/trunk and extension modules with the system power on, without affecting normal call processing.

To remove and replace a module, follow the steps below, Refer to Figure 2-13.

- 1 Busy-out or reset the module. (Busy-out is recommended.)**
- 2 Label all cords (if they are not labeled already) and then unplug them from the module.**

For information about labeling trunk and extension cords, see Chapter 3, “Installing Telephones and Adjuncts” and Chapter 4, “Connecting the Control Unit to the Network Interface.” For instructions on checking unlabeled wiring, see “Checking Unlabeled Wiring” in Chapter 3 of the *Maintenance and Troubleshooting* guide.
- 3 Run a demand test by entering the test mode.**
- 4 Power down the system, if required. See “Powering Down the System,” later in this chapter, for instructions.**
- 5 Remove the module by pushing up firmly on the tab at the bottom rear of the module.**
- 6 While holding up the tab, swing the bottom of the module towards you and away from the carrier.**
- 7 Lift up the module to disengage it from the rod on the top of the carrier.**
- 8 Inspect the module for visible damage.**
- 9 Insert the new module. See Figure 2-10.**
- 10 Restore the module. Refer to Chapter 7, “Initializing and Testing the System,” for instructions.**
- 11 Connect the trunk and extension cords.**
- 12 Attach a tag, error printout, and any information that will help identify any visible problems or failure symptoms.**

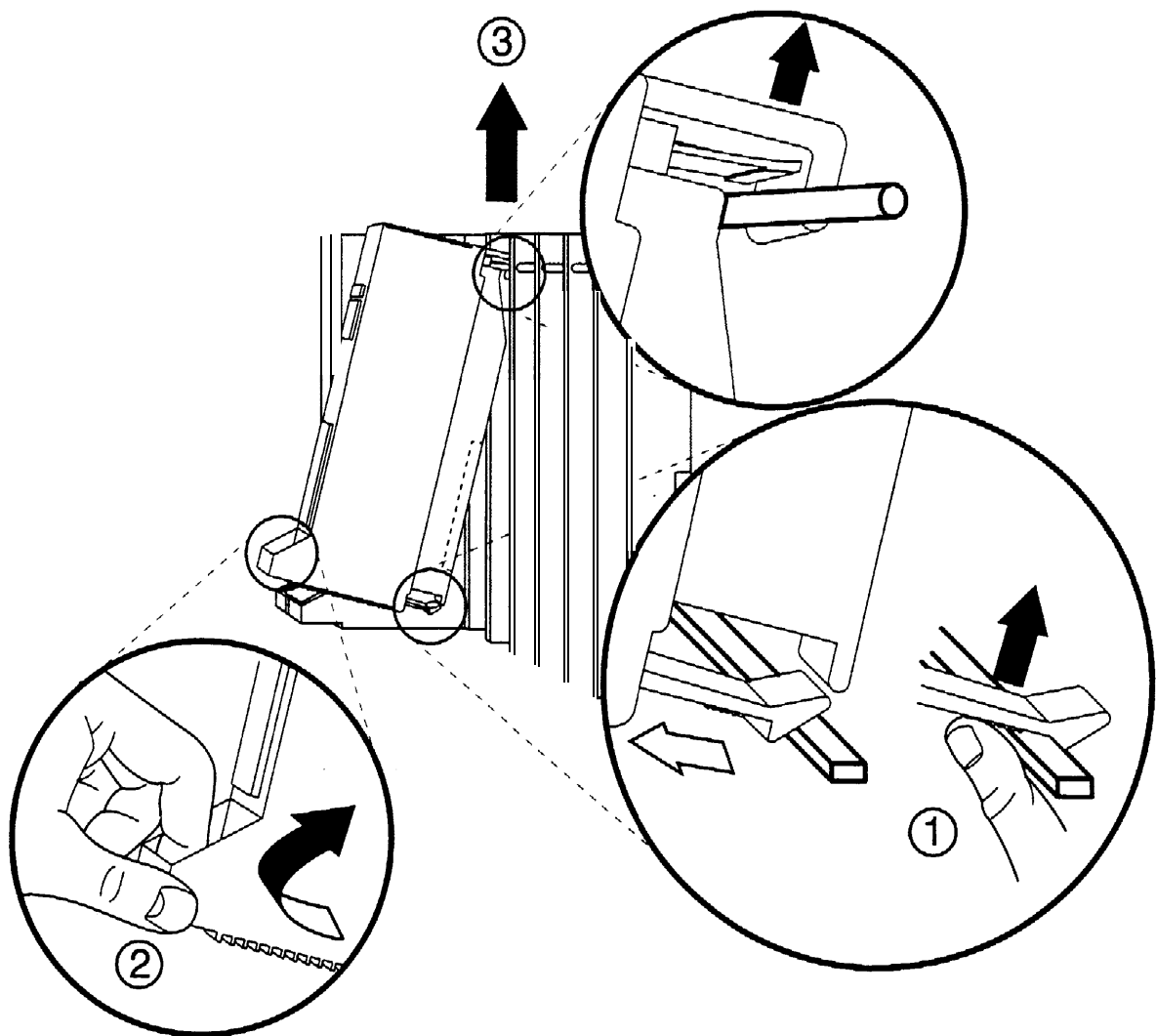


Figure 2-13. Removing Modules from the Carrier

Connecting the Control Unit to an AC Outlet



CAUTION:

Make sure the AC outlet has been tested for proper grounding. The outlet should be 117-V AC, 60-Hz, 3-wire (phase, neutral, ground). See “AC Outlet Tests,” earlier in this chapter, for instructions.

To prevent someone from accidentally shutting off the power, do not connect the control unit to a switch-controlled outlet. The AC outlet should be within 5 ft. (152 cm) of the control unit.

To connect the control unit to a dedicated AC outlet, follow the steps below.

- 1 Turn the basic carrier’s power supply switch to the OFF position.**
- 2 Turn off the power supply switches on the expansion carriers.**
- 3 Unplug the power cords from any auxiliary power units.**
- 4 Plug one end of the power cord into the AC INPUT connector just below the power switch on the front of the basic carrier’s power supply.**
- 5 Plug the other end of the power cord into the AC outlet, allowing at least 1 ft. (30.4 cm) of slack in the cord.**
- 6 Repeat Steps 4 and 5 for each expansion carrier.**



CAUTION:

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

Powering Up the System



CAUTION:

Follow the procedure below to power up the system only if the system is completely installed, failure to comply with this procedure can result in shock hazard or damage to the equipment.

1 Turn on the power switch for each expansion carrier: start with the power supply in the rightmost carrier.

The green power lights on each expansion carrier power supply should turn on.

2 Turn on the power switch on the basic carrier power supply.

- The dot on the one-character display LED flashes.
- The green light on the power supply should turn on.
- The red light on the processor should turn on for 15 to 45 seconds and then turn off.
- All indicators on the 100D and 400EM line/trunk modules (if present) should turn on and then off. They remain off when the modules are idle.

3 If any of these conditions are not met, refer to *Maintenance and Troubleshooting*.

Powering Down the System

You may need to power down the system for troubleshooting during installation, or to add new equipment to the carrier.



CAUTION:

Follow these steps in the exact sequence.

To power down the system, follow the steps below.

- 1 Turn off the power supply on the basic carrier.**
- 2 Turn off the power supplies on the expansion carriers.**
- 3 Unplug any auxiliary power units.**

Because the power supplies are already off, the sequence for removing auxiliary power cords is not important.

- 4 Unplug the system from the AC outlet.**

Installing Telephones and Adjuncts

3

The control unit supports the MLX-10, MLX-10D, MLX-10DP, MLX-20L, and MLX-28D telephones, with or without Direct Station Selectors (DSSs), as well as analog multiline and single-line telephones. It also supports various adjuncts, which may require Multi-Function Modules (MFMs) or other adapters for installation.

This chapter provides installation instructions for the following procedures:

- Installing Multi-Function Modules
- Installing adjuncts
- Installing Direct Station Selectors
- Assembling MLX telephones
- Connecting telephones to the control unit

To connect data equipment to the system, see Chapter 6, “Connecting Data Equipment.” To connect the MERLIN PFC, see Chapter 8, “Installing Applications.”

Installing Multi-Function Modules

The Multi-Function Module (MFM) is an optional adapter that provides a modular jack connection to MLX telephones for the two classes of adjuncts listed below:

- Tip/ring (T/R) devices such as single-line telephones, fax machines, modems, and credit card verification terminals. Once connected, the MLX telephone and adjunct work independently of each other. This means they can send and receive calls at the same time. The MFM is the only T/R adapter you can use with MLX telephones.
- Supplemental alerts such as bells, chimes, horns, and strobes. These alerts notify people in noisy areas of incoming calls.

Considerations

Review the following items before you begin the procedure.

- If you install an MFM, do so *before* you assemble the MLX telephone.
- You *must* connect the KS 22911 power supply to an electrical outlet within 50 ft. (15 m) of cord length of the MLX telephone.
- If you connect an MFM and two DSSs to a telephone, you *must* install a 406743419 power unit.
- If a wall jack is more than 7 ft. (213 cm) from an MLX telephone, you must use a longer D8W cord.
- The MFM uses one of the two channels when it is active. This means that when an adjunct, such as a fax machine, and the MLX telephone are in use at the same time, Voice Announce to Busy is not possible. (Voice Announce to Busy is a feature that allows users to be paged on the speakerphone even if they are on a call.)
- The MFM has two jumper blocks that are factory-set for T/R operation. The MFM is packaged with the following items, shown in Figure 3-1:
 - KS22911 power supply
 - 400B or 400B2 adapter
 - D6AP cord

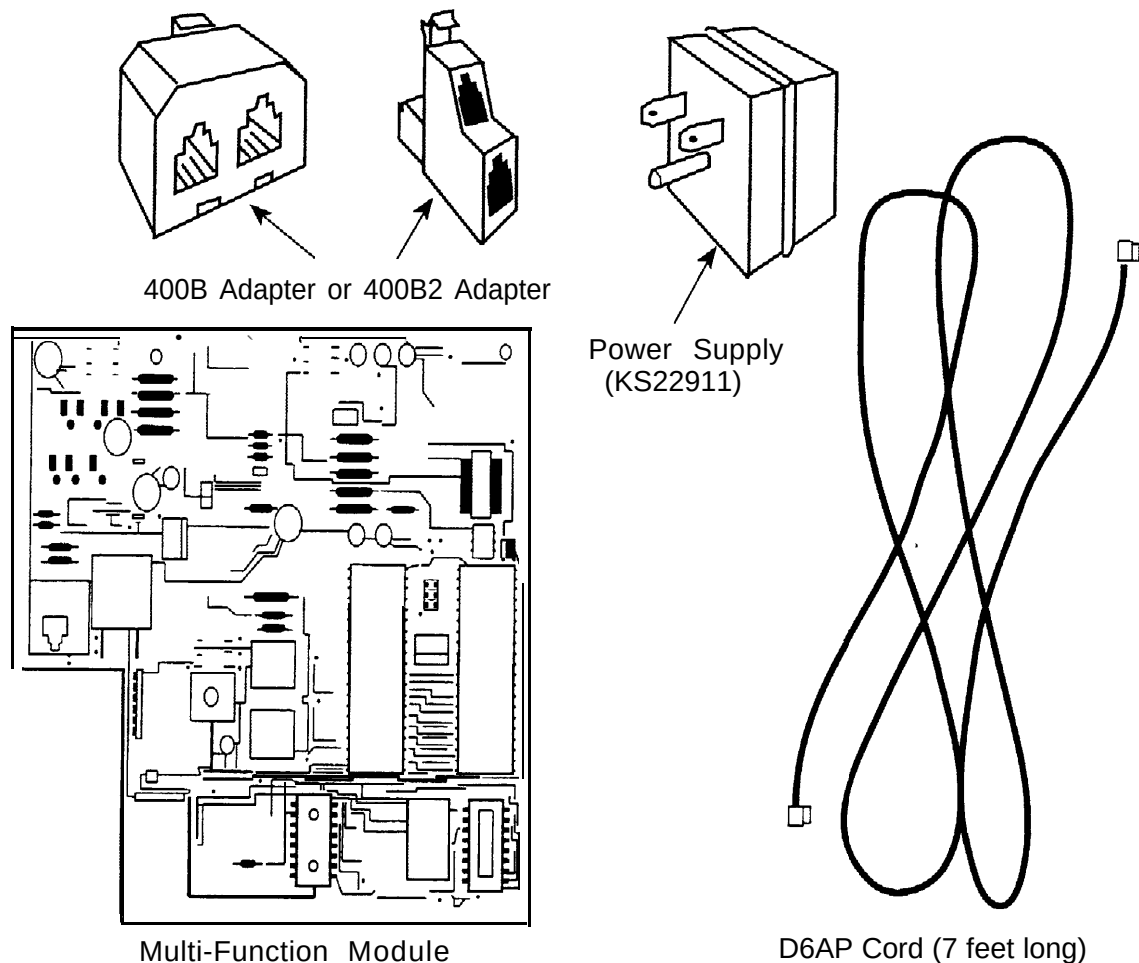


Figure 3-1. Multi-Function Module Packing List



RISK OF ELECTRICAL SHOCK: Follow all warnings and cautions.



WARNING:

Only a qualified technician should install, repair, or set options for an MFM.

Do not touch the circuitry on the MFM. Touching the circuitry may result in component damage from electrostatic discharge.

Before installing an MFM, disconnect all trunk and/or power cords that are attached to the MLX telephone. This is to ensure that no hazardous voltages are present during installation. Ringing voltage from the MFM attached to the MLX telephone can cause electrical shock if adjustments are made while the cords are connected.

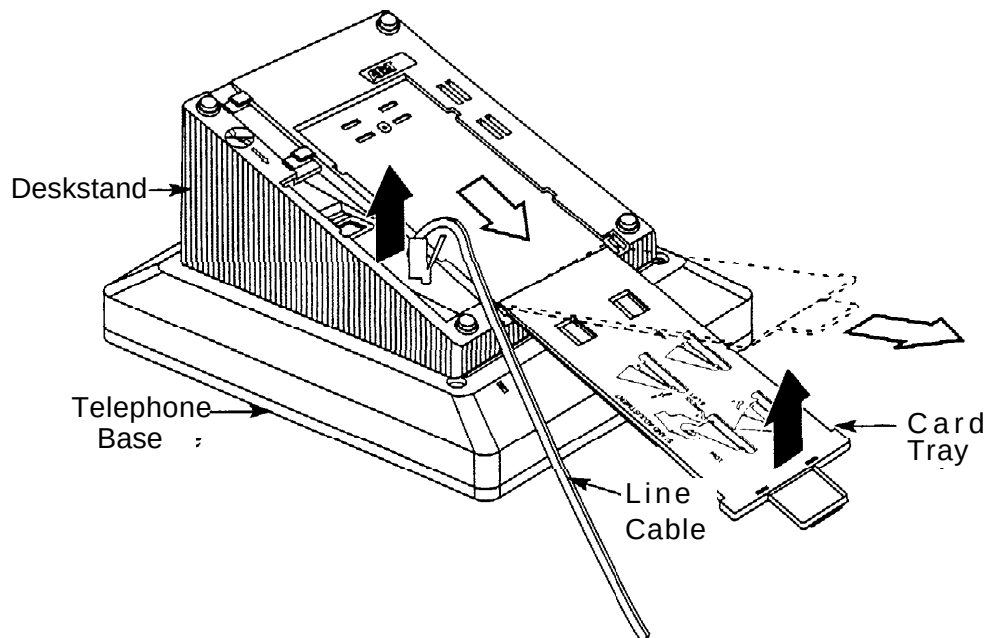


Figure 3-2. Removing the User Card Tray and Line Cable

To install or replace an MFM and change its pin settings, follow these steps.

NOTE:

If you are installing or replacing an MFM in a wall-mounted MLX-10, MLX-10D, or an MLX-10DP telephone, start at Step 3.

- 1 Place the telephone face down on a flat surface; remove the user card tray and line cable from the bottom of the deskstand. See Figure 3-2.**

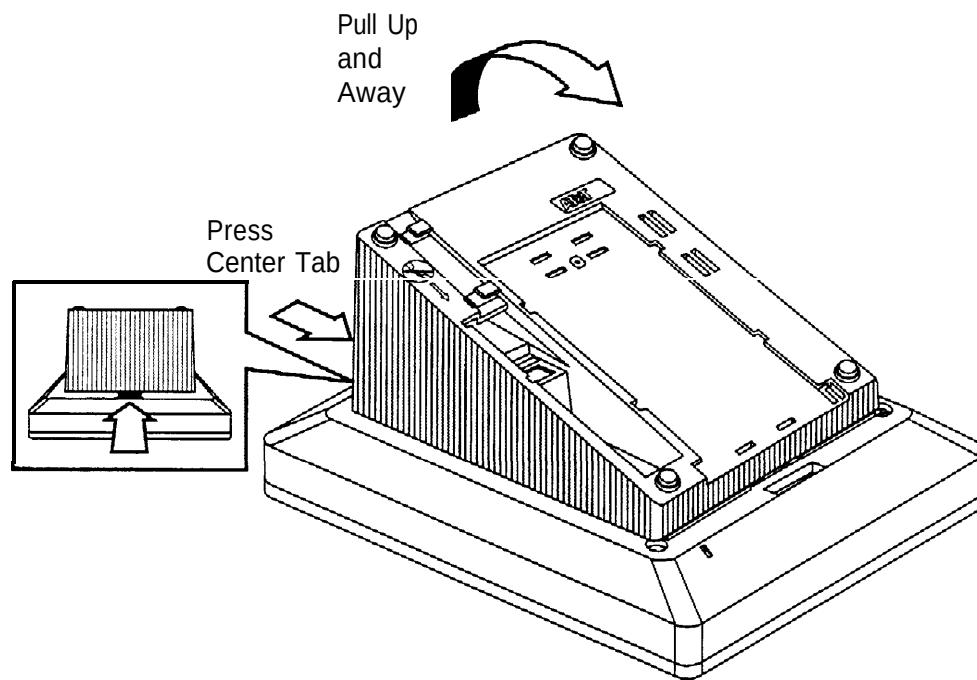


Figure 3-3. Releasing the Deskstand

2 Release and remove the deskstand from the telephone, See Figure 3-3 and Figure 3-4.

- a Press on the top rear center of the deskstand to release the tab.
- b Pull the deskstand up toward you and swing away from the telephone.

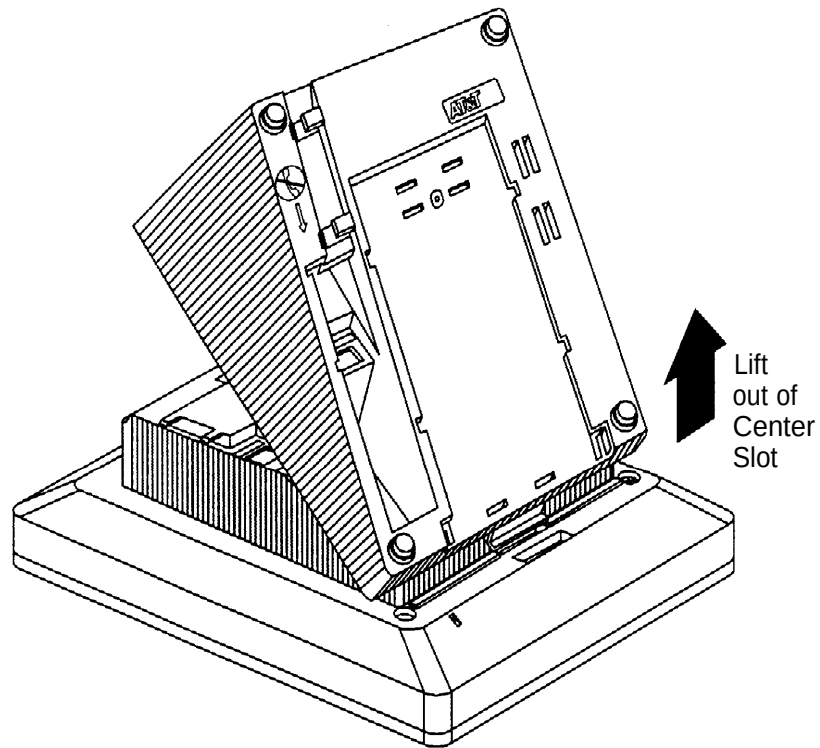


Figure 3-4. Removing the Deskstand

- c Lift the deskstand out of the locating slot in the telephone base and place to one side.

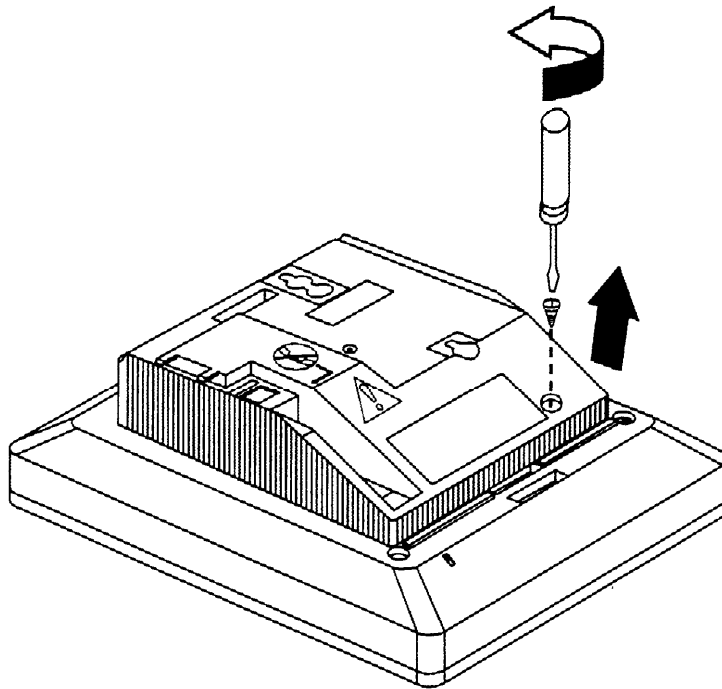


Figure 3–5. Releasing the Module Cover Screw

3 Release and remove the module cover. See Figure 3-5, Figure 3-6, and Figure 3-7.

- a Use a screwdriver to remove the screw in the lower righthand corner of the module cover.

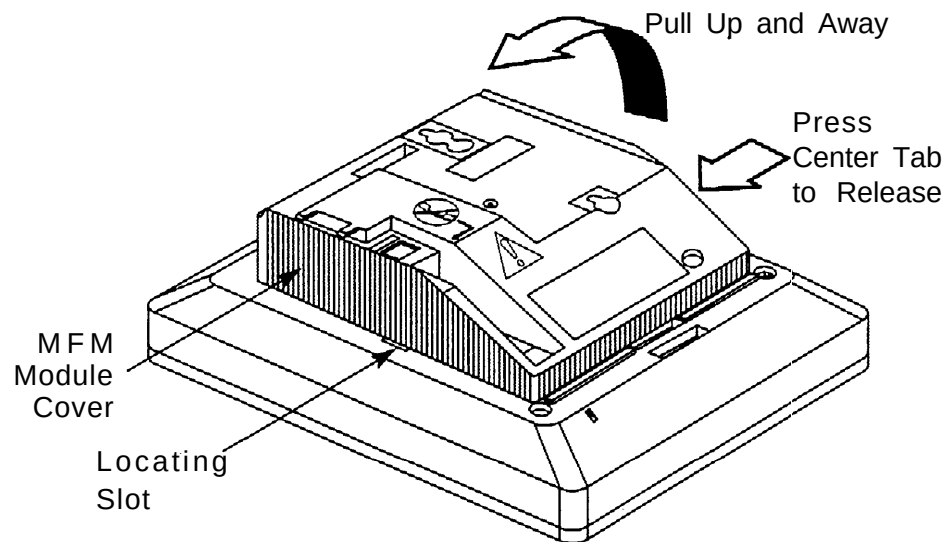


Figure 3-6. Releasing the Module Cover

- b Press the center of the right side of the module cover with one hand to release the locking tab.
- c Swing open the module cover to release it from the left side locating slot.

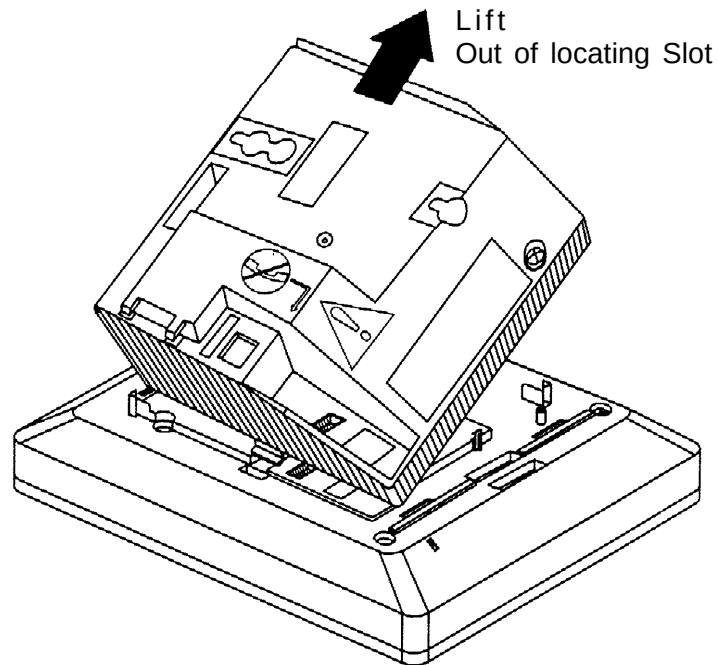


Figure 3–7. Removing the Module Cover

- d Lift module cover out of locating slot and place to one side.

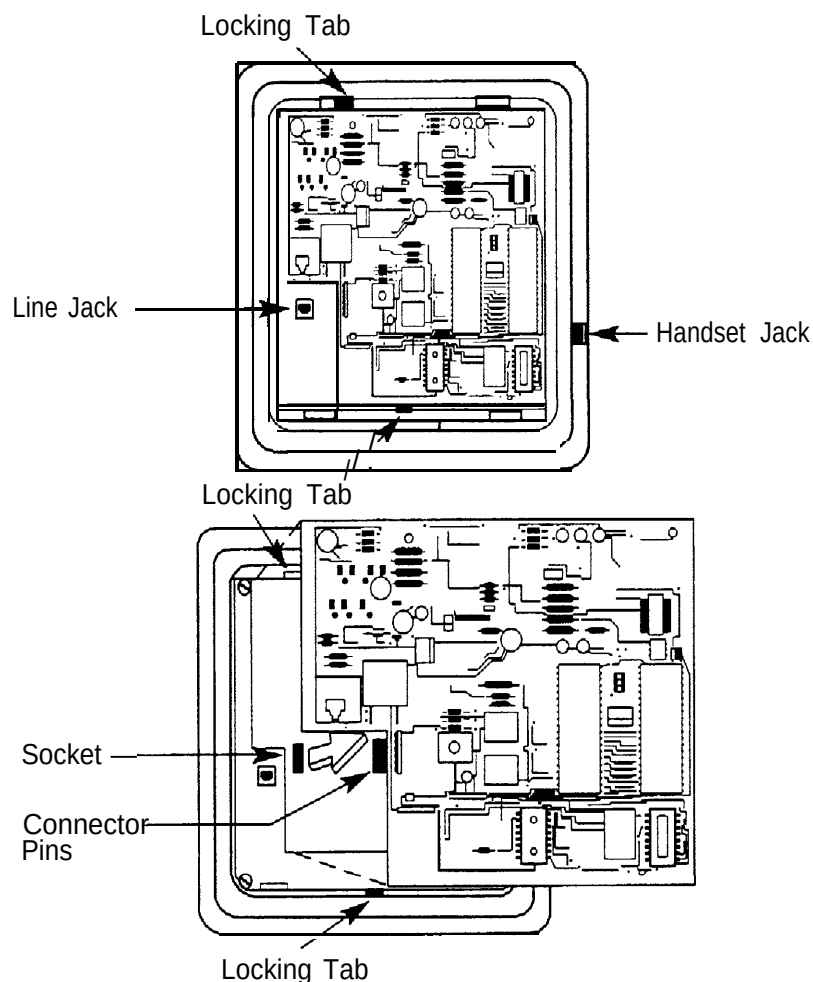


Figure 3-8. Removing an MFM Module

4 To install a new MFM, go to Step 5. To reset jumpers on an existing MFM, go to Step 6. To remove an existing MFM, continue (see Figure 3-8).

- a Disconnect any cords attached to the phone and note the connections so that you can reconnect the cords to the appropriate jacks later.
- b Locate the MFM locking tabs on the top and bottom of the telephone base, then spread the tabs apart to release the MFM.
- c Grasp the MFM by the edges and pull it up to free the connector pins. *Do not touch the Connector pins.*
- d Set the MFM aside on a clean surface.

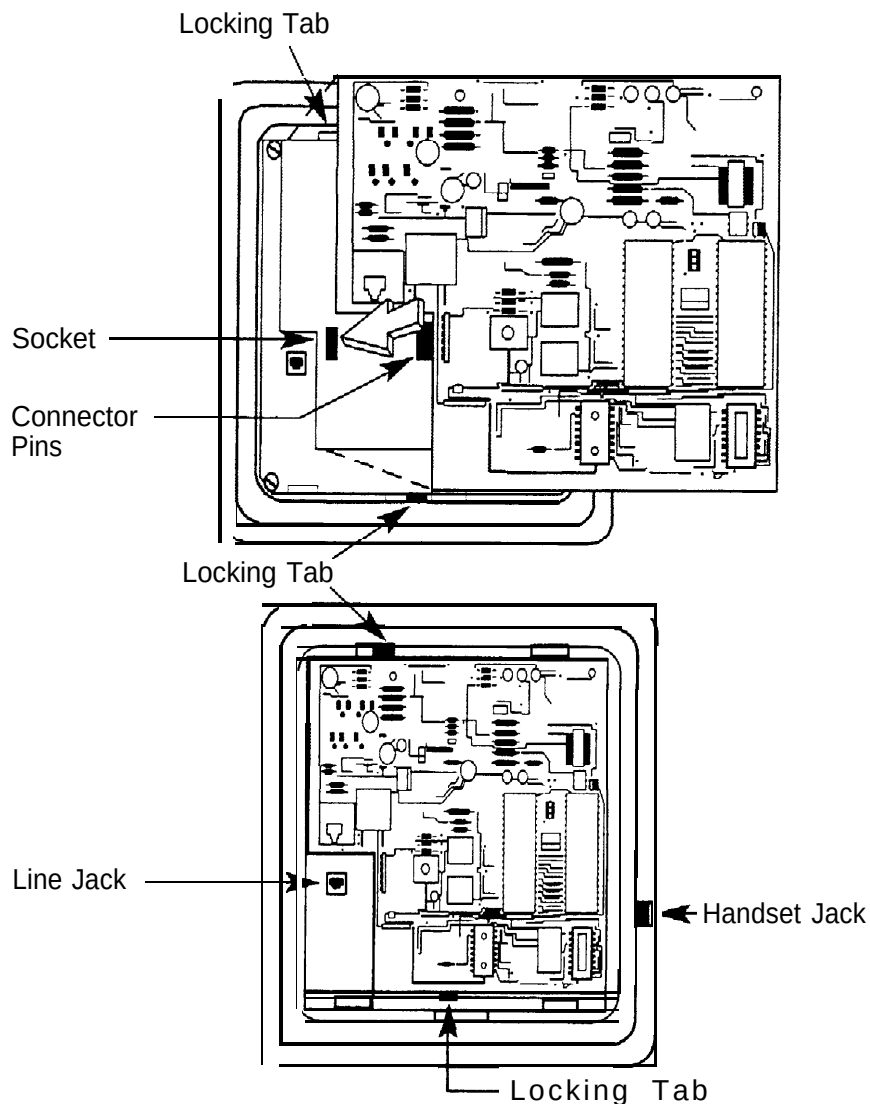


Figure 3-9. Installing an MFM Module

5 Install the new MFM. See Figure 3-9.

- a Hold the MFM circuit board by the edges with the long connector pins facing the socket. Take care not to touch the connector pins.
- b Lower the MFM to insert the pins into the socket in the telephone base,
- c Press firmly on the MFM board to snap the locking tabs into place. *The connector pins and tabs must be secure.*

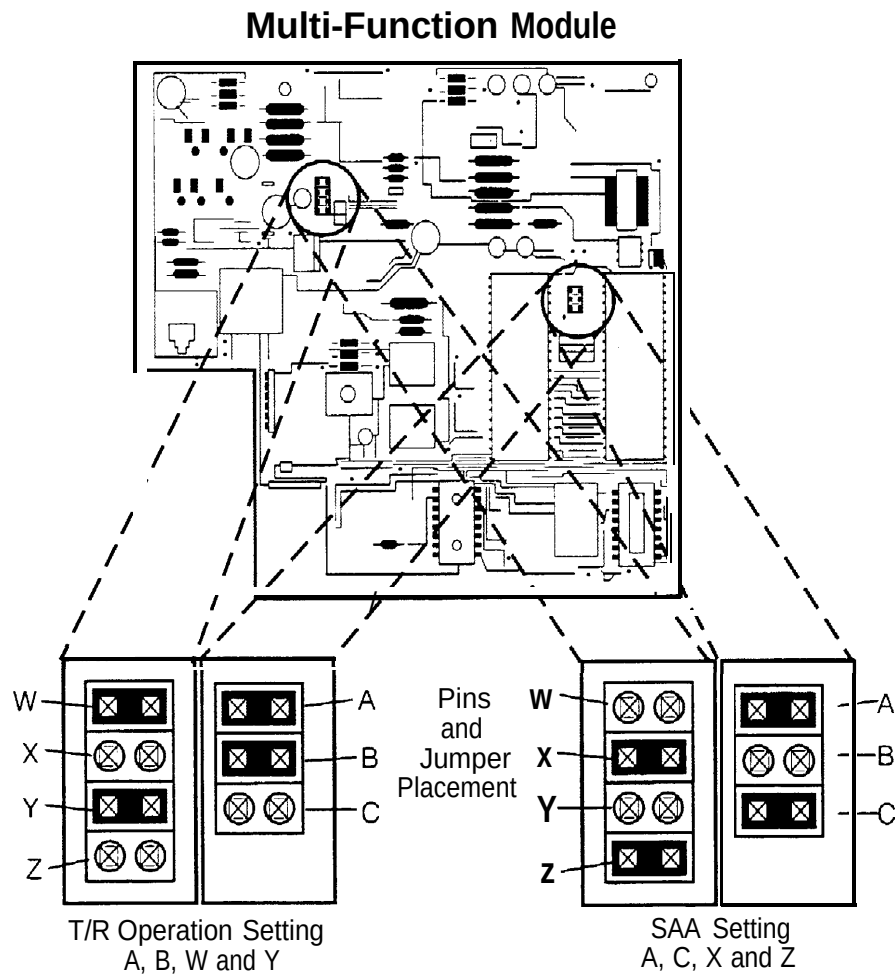


Figure 3-10. Setting and Adjusting the MFM Jumpers

6 Set or adjust the MFM jumpers for either a T/R device or a supplemental alert device. See Figure 3-10.

- a Pull the four connectors off of the MFM module.
- b Place the connectors over the appropriate pins for the required operation, and push down to secure into place.

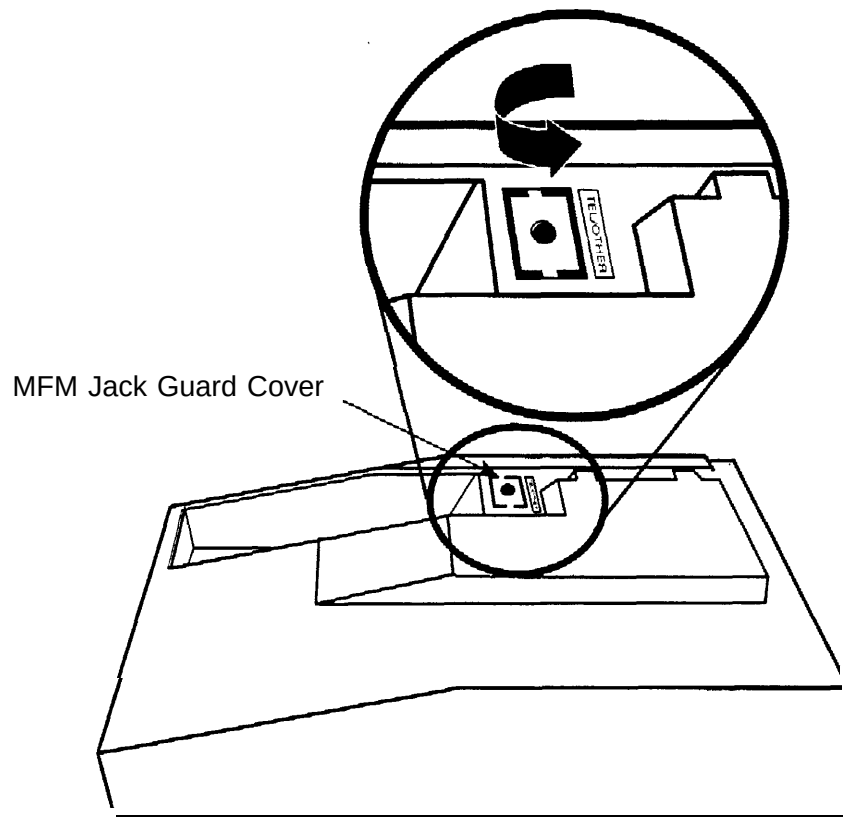


Figure 3-11. Removing the Jack Guard

7 To remove the jack guard, see Figure 3-11.

- a If the module cover has a square jack guard that protects the TEL/OTHER jack area, grasp and twist the guard to remove it.
Save the jack guard if you are wall-mounting an MLX-10 or MLX-10D telephone.

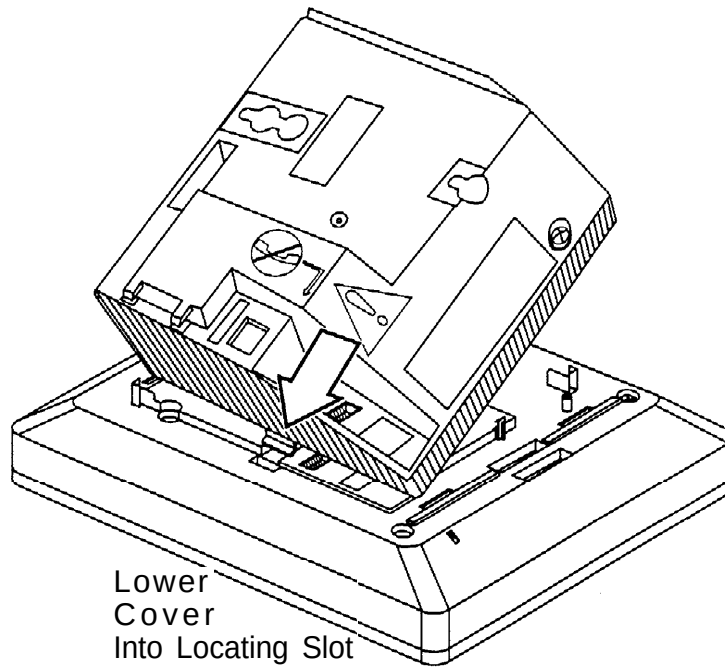


Figure 3-12. Placing the Module Cover into the Locating Slot

8 To replace the module cover, see Figure 3-12, Figure 3-13, and Figure 3-14.

- a Place the locking tab on the module cover into the slot on the left side of the telephone.

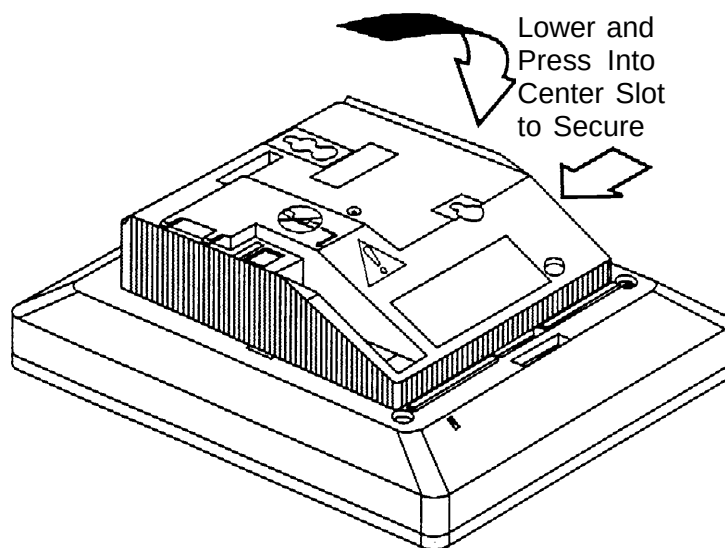


Figure 3-13. Lowering and Locking the Module Cover

- b Lower the cover to the right and press firmly into the center slot to lock the tab in place. *The tab must be secure.*

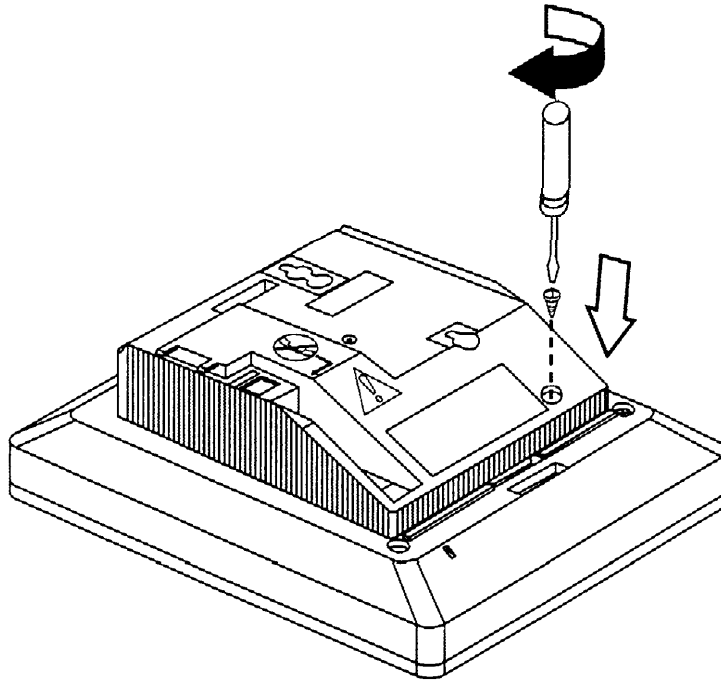


Figure 3-14. Replacing and Tightening the Module Cover Screw

- c Replace and tighten the module cover screw that you removed in Step 3.

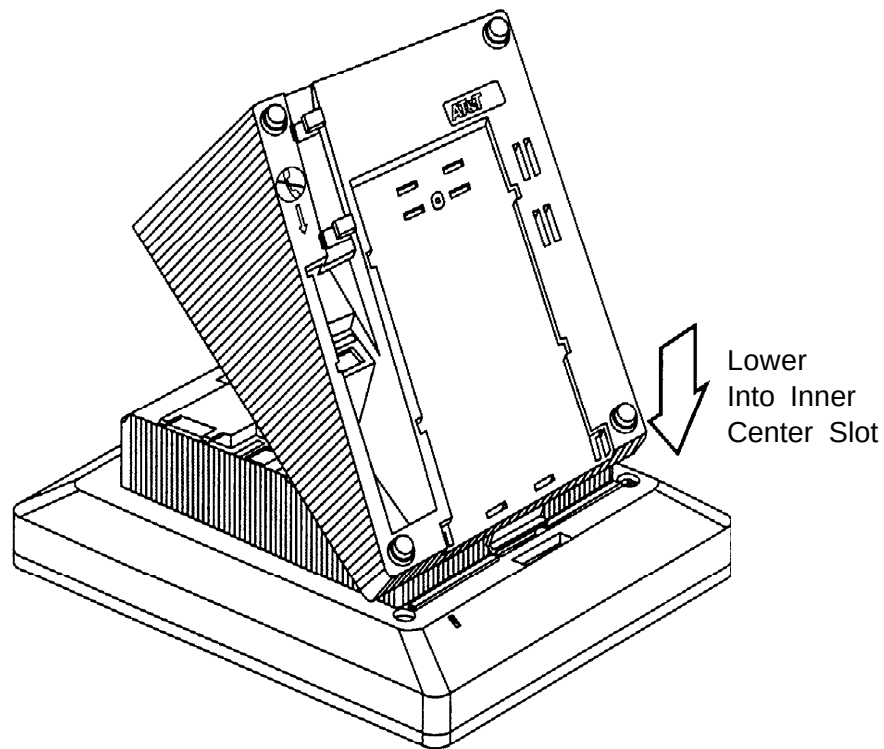


Figure 3-15. Replacing the Deskstand

9 Replace the deskstand. See Figure 3-15. If you are wall-mounting an MLX-10, MLX 10D, or MLX-10DP telephone, go to Step 11; otherwise, continue with Step 9a.

- a Place the tab on the narrow edge of the deskstand, into the locating slot on the telephone base.

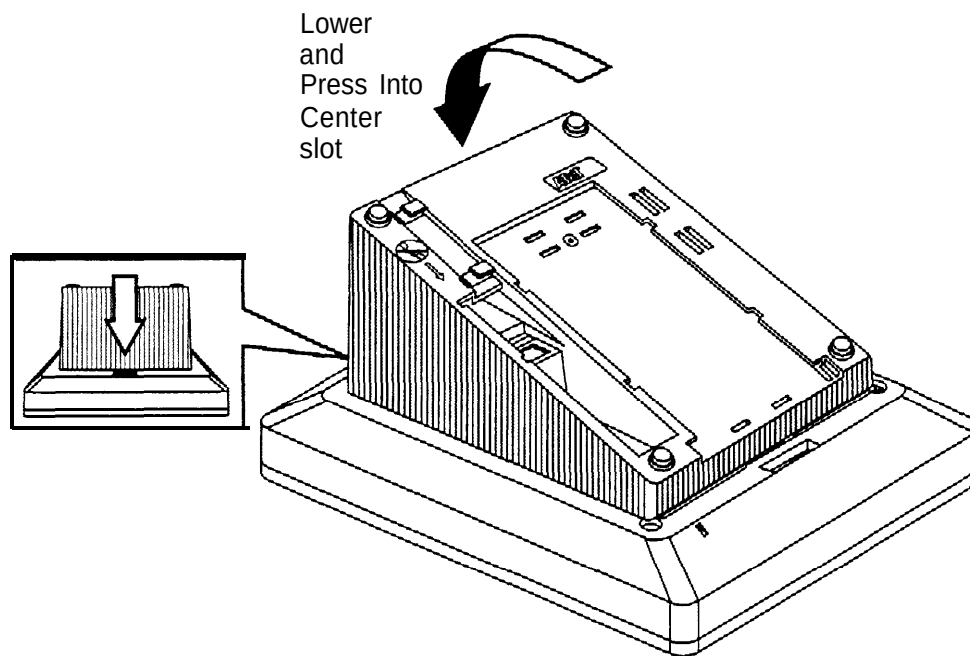


Figure 3-16. Lowering the DeskStand and Locking into Place

- b Lower the deskstand and lock into place.

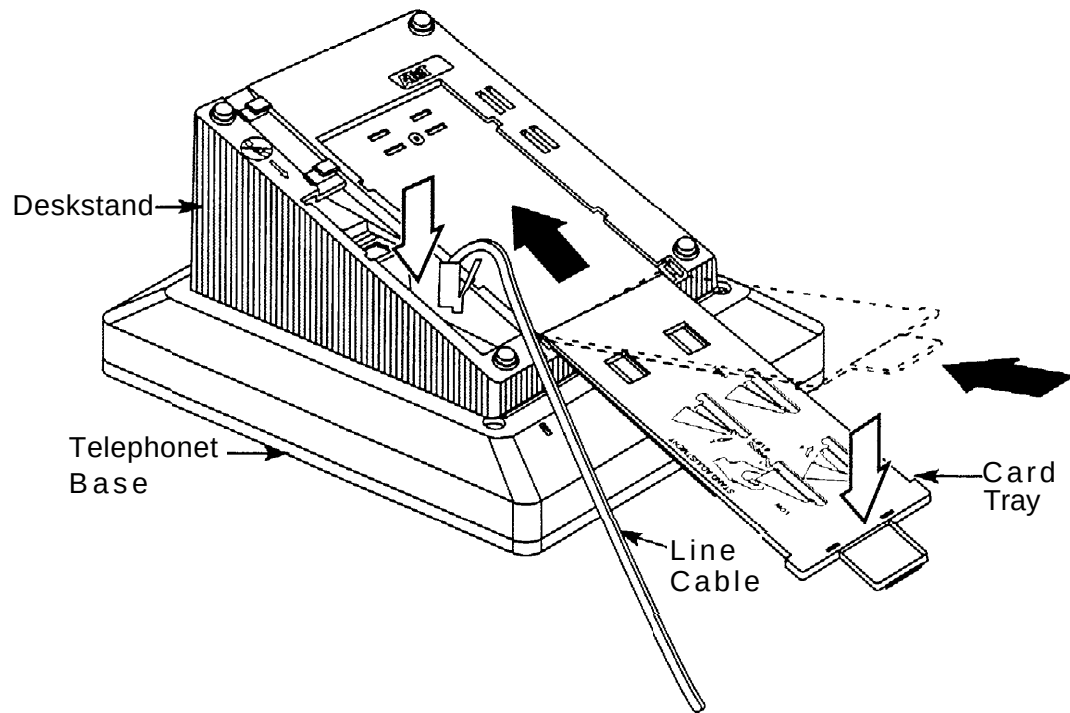


Figure 3-17. Replacing the User Card Tray and Line Cable

10 Replace the user card tray and line cable. See Figure 3-17.

- a Insert the user card tray at an angle, then lower and slide into the deskstand.
- b Replace the line cable into the line jack in the deskstand.

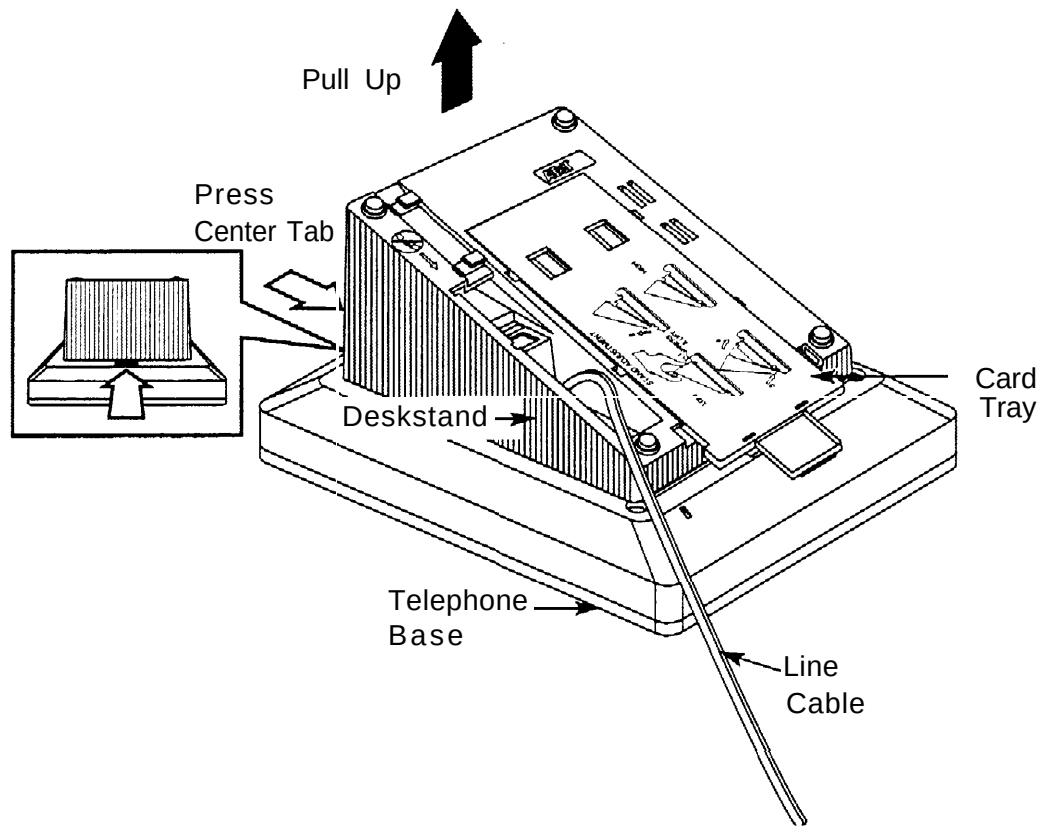


Figure 3-18. Adjusting the Deskstand Height

11 Adjust the deskstand height. See Figure 3-18.

- a To change the deskstand's height from low to high, press the top rear center of the deskstand to release the tab.
- b Pull the deskstand up and insert the tab into the slot in the module cover.
- c To readjust the stand, see the instructions on the bottom of the card tray.

12 Power up the telephone. See Figure 3-19.

- a Plug the D8W cord from the telephone into the 8-conductor (large) modular jack of the 400B or 400B2 adapter.

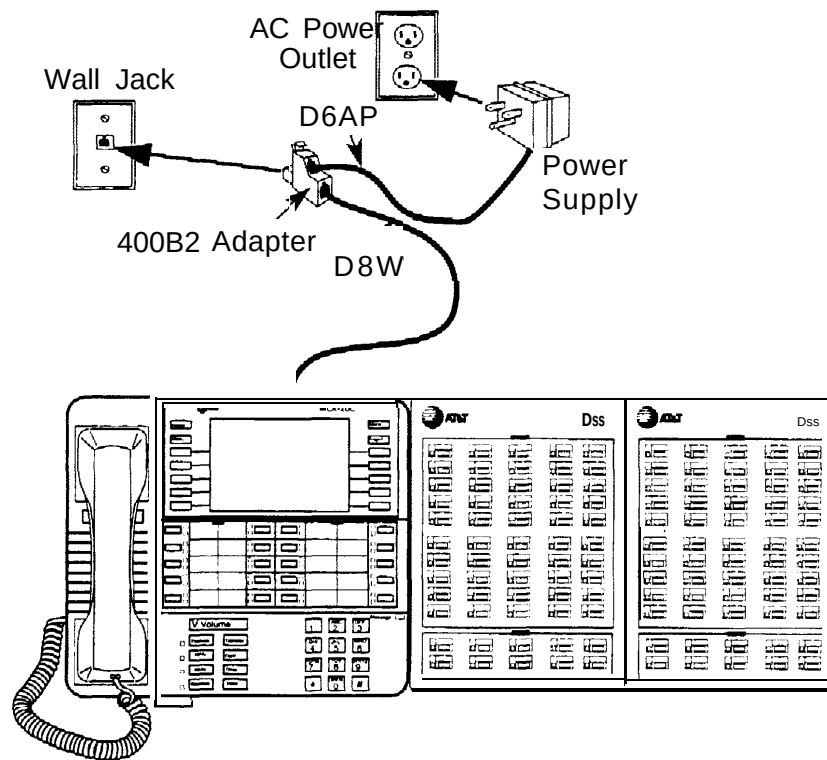


Figure 3–19. Powering Up the Telephone after Installing the MFM

- b Connect one end of the D6AP cord to the 2-conductor (small) modular jack on the 40013 or 40092 adapter, and plug the other end into the modular jack of the 406943837 power supply. *The total length of the cords connecting the power supply to the MLX telephone must be less than or equal to 50 ft. (15 m).*



CAUTION:

Do not plug the D6AP cord into the 8-conductor (large) modular jack on the 400B or 400B2 adapter; doing so can cause electrical damage to the control unit and to the telephone.

- c Plug the power supply into a 117-V AC outlet that is not controlled by a wall switch.
- d Insert the plug end of the 400B or 400B2 adapter into the wall jack.

13 Test the MFM for T/R operation.

See “Testing MLX Telephones with MFMs” in Chapter 7.

14 Attach the adjunct to the MFM. See “Installing Adjuncts.”

Installing Adjuncts

This section provides general instructions for connecting most adjuncts.

NOTE:

If you need to connect the adjuncts differently from the instructions on the system forms, record each jack and adjunct change on the appropriate system numbering form. See Appendix A, “System Numbering Forms. ”

1 Connect one end of the cord packaged with the adjunct (usually a D4BU cord) to the adjunct.

See the documentation packaged with the adjunct for instructions.

2 Check the system form for the adjunct you want to connect. Then refer to the appropriate step below.

- To connect an adjunct to an MLX telephone, go to Step 3.
- To connect an adjunct to a single-line telephone, go to Step 4.
- To connect an adjunct to an analog multiline telephone, go to Step 5.
- To connect an adjunct to a 012 module, go to Step 6.

When you connect adjuncts to telephones, make sure you route the adjunct and D8W telephone cords through the cord channel. See Figure 3–20.

3 Insert the other end of the adjunct cord into the TEL/OTHER jack on the back of the MLX telephone. Go to Step 7.

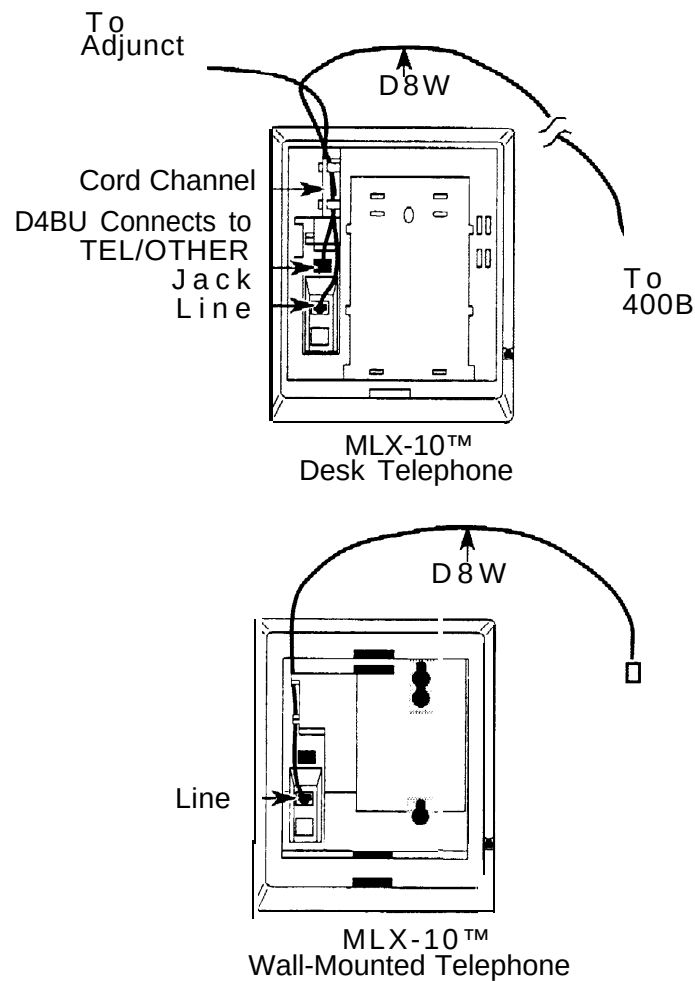


Figure 3–20. Routing the Cord(s) Through the Cord Channel

4 To connect an adjunct to a single-line telephone:

- Connect a 26A2 bridging adapter to the telephone.
- Connect the cord from the adjunct to the bridging adapter.
- Reconnect the cord from the control unit to the bridging adapter.
- Go to Step 7.

5 To connect an adjunct to an analog multiline telephone:

- a Connect a 4-pair cord to the OTHER jack on the telephone.
- b Connect the other end to the VT jack on a General Purpose Adapter (GPA).
- c Connect the cord from the adjunct to the TEL/EQUIP jack on the GPA.
- d Go to Step 7.

Refer to “General Purpose Adapter” below for additional information.

6 Insert the other end of the adjunct cord directly into the port for the logical ID on the 012 module as indicated on the system form. Go to Step 7.

7 Test the adjunct by dialing its associated extension.

General Purpose Adapter

A General Purpose Adapter (GPA) lets you connect a T/R device--such as a single-line telephone or modem—to an analog multiline telephone. The device must be touch-tone, not rotary.

NOTES:

1. The GPA is intended for answer-only service, unless the telephone has direct access to a line. It does not have touch-tone receivers or pulse dial detectors; therefore, the associated analog multiline telephone must dial calls.
2. The GPA cannot be used with a MERLIN II System Display Console.
3. When the system forms indicate a GPA for installation of an adjunct, follow the steps below.

1 Plug one end of a 4-pair adjunct D8AC cord into the VT jack on the back of the GPA.

2 Plug the other end into the OTHER jack on the underside of the analog multiline telephone.

3 Plug the cord from the adjunct into the TEL EQUIP jack on the GPA.

4 Slide the switch on the back of the GPA to the setting that provides the required service.

- **Basic.** This setting is used to dial and answer calls from an analog multiline telephone or to attach a T/R adjunct such as a single-line telephone or answering machine. Incoming calls ring only on the analog multiline telephone. This setting also allows the user to originate and receive calls on the telephone while using a computer with a modem that is attached to the GPA. However, if this setting is used, data calls cannot be answered automatically.
- **Join.** This setting is used to add a recording device or a single-line telephone to a call that is in progress on the telephone. You cannot originate or answer calls on this setting,
- **Automatic.** Use this setting when a GPA connects a modem to an analog multiline telephone for answering calls or answering machine.

Dial Dictation Devices

You can connect a dial dictation device to one of the following, as described earlier in this chapter:

- 012 module
- MLX telephone with an MFM
- GPA and analog multiline telephone

You can also connect a dial dictation device through a commercially available trunk adapter or a Universal Paging Access Module (UPAM) on a loop-start line/trunk jack with an external power supply unit.

NOTE:

Using any of the devices listed above, you cannot connect dial dictation devices that require contact closure. You *can* connect such equipment through a UPAM, however, since it provides contact closure for the device.

Fax Machines

You can connect a fax machine to one of the following, as described earlier in this chapter:

- 012 module
- MLX telephone with an MFM

The fax machine can send and receive fax calls independently of the telephone. Dial calls either from the fax machine's dialpad or from an associated single-line telephone.

Do not use a GPA to connect a fax machine to the system, because the fax machine cannot dial out through the GPA.

Group Calling Delay Announcement Devices

You can connect a group calling delay announcement device to one of the following, as described earlier in this chapter:

- 012 module
- MLX telephone with an MFM
- GPA and analog multiline telephone

An industry-standard announcement device, such as a Digital Announcer Unit, provides Night Service information or announces to a caller that calling groups are busy.

Credit Card Verification Terminals

You can connect a credit card verification terminal to one of the following, as described earlier in this chapter:

- 012 module
- MLX telephone with an MFM

If you connect a credit card verification terminal to an MFM, the terminal can place and receive calls independently of the MLX telephone.

Do not use a GPA to connect a credit card verification terminal to the system, because the terminal cannot dial out through the GPA.

Headsets

Headsets are designed for hands-free telephone use and consist of several components, depending upon whether manual or one-touch operation is used. Any AT&T headpiece works in either mode.

Headpieces

Six different headpieces are available. Each is light, comfortable, and uses a transparent voice tube to eliminate a cumbersome large microphone. Each comes with a 10-ft. (305-cm) coiled cord and a quick-disconnect latch.

- **Mirage®.** This is a small, almost unnoticeable, monaural headset that uses a disk-shaped receiver. It can be worn on either ear, instead of a headband or ear tip. This headset is not useful in noisy environments.
- **StarSet®.** This monaural headset is worn without a headband. It uses a soft, pliable ear tip that provides high-quality sound yet allows you to hear other conversations or instructions in the workplace.
- **Supra® Monaural.** This monaural headset has an adjustable headband. It offers a soft, comfortable ear cushion that reduces surrounding noise, making it easier to understand the caller.
- **Supra Monaural Noise-Canceling (NC).** Same as above with noise-canceling microphone to reduce background noise by up to 75 percent.
- **Supra Binaural.** Sound in both ears with soft ear cushion and adjustable headband.
- **Supra Binaural Noise-Canceling (NC).** Same as above with noise-canceling microphone on flexible boom features windscreen and reduces background noise transmission by up to 75 percent.

Manual Operation (Analog Multiline Telephones Only)

Manual operation is appropriate when a headset is used occasionally. You pick up the handset to answer a call and replace it to hang up. The headset consists of the headpiece, and a modular base unit. The headpiece plugs into the modular base unit, and the modular base unit connects to the telephone through the HANDSET jack on the side of the telephone. The telephone handset is plugged into the modular base unit. The modular base unit allows you to adjust the incoming volume, switch between the headset and handset as needed, and temporarily mute the line. (See Figure 3–21.)

One-Touch Operation (All Telephones)

One-touch operation allows you to touch a button to answer a call. On analog multiline telephones, use a headpiece with a plug prong base unit and an adapter (502C). The headpiece connects to the plug prong' base unit, which in turn connects to the adapter. The adapter plugs into the OTHER jack on the underside of the telephone. The plug prong unit provides switchhook control for answering calls by pressing a button. You can also adjust the incoming volume. On MLX telephones, the headpiece is attached to a modular base unit, which is attached to the telephone. The handset is also attached to the modular base unit. (See Figure 3-21.)

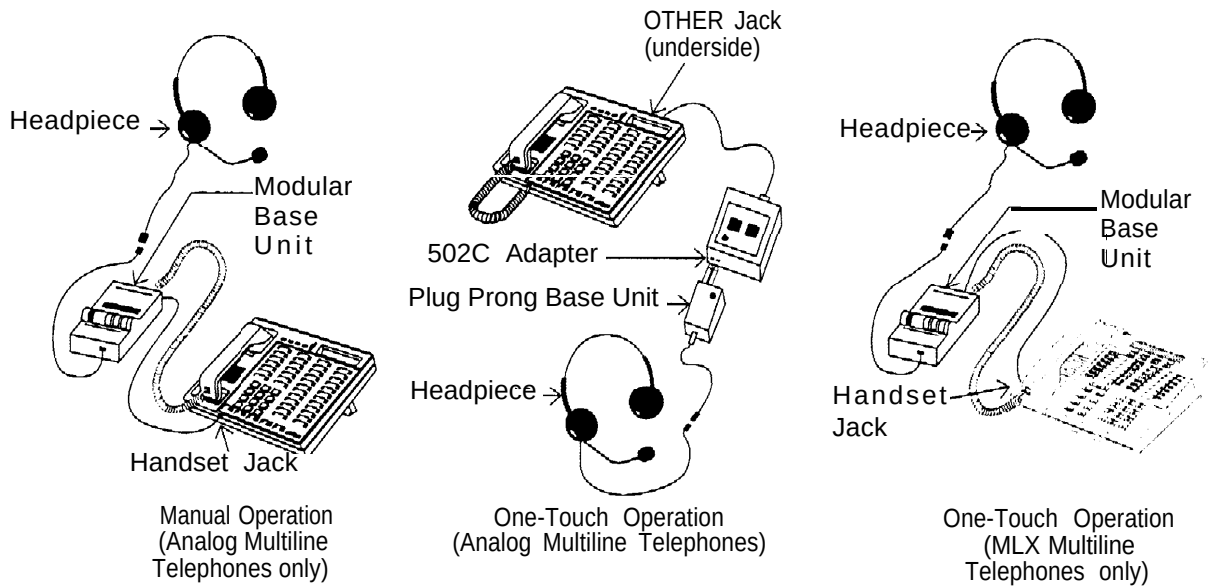


Figure 3-21. Manual and One-Touch Headset Operation

Loudspeaker Paging Systems

Use a loudspeaker paging system to page co-workers and make announcements. You connect the paging system to the jack of an LS or GS line/trunk that is programmed for paging.

Figures 3-22, 3-23, and 3-24 show various configurations for single-zone paging. Figures 3-25 and 3-26, later in this chapter, show single-zone and multizone paging configurations that include background music through a Magic on Hold audio source. Bidirectional paging, also called *talk-back*, is shown in Figure 3-26.

Dual-Tone Multifrequency (DTMF) Signaling

You can connect external paging systems that use dual-tone multifrequency (DTMF) signaling, such as PagePac® Plus with Zone Expansion Unit paging systems, to an LS or GS line/trunk jack programmed for paging operation, including bidirectional paging operation (talk-back). PagePac Plus does not require an adapter.

Zone paging systems, such as the PagePac series, require one LS or GS jack. You can use any zone once the paging jack is activated.

You must use a Universal Paging Access Module (UPAM), or PagePal (for PagePac series systems other than PagePac Plus) to connect a paging system that requires contact closure, an impedance-matching transformer, or both.

Use a Loop Start Trunk Adapter when a customer-supplied paging system does not require contact closure.

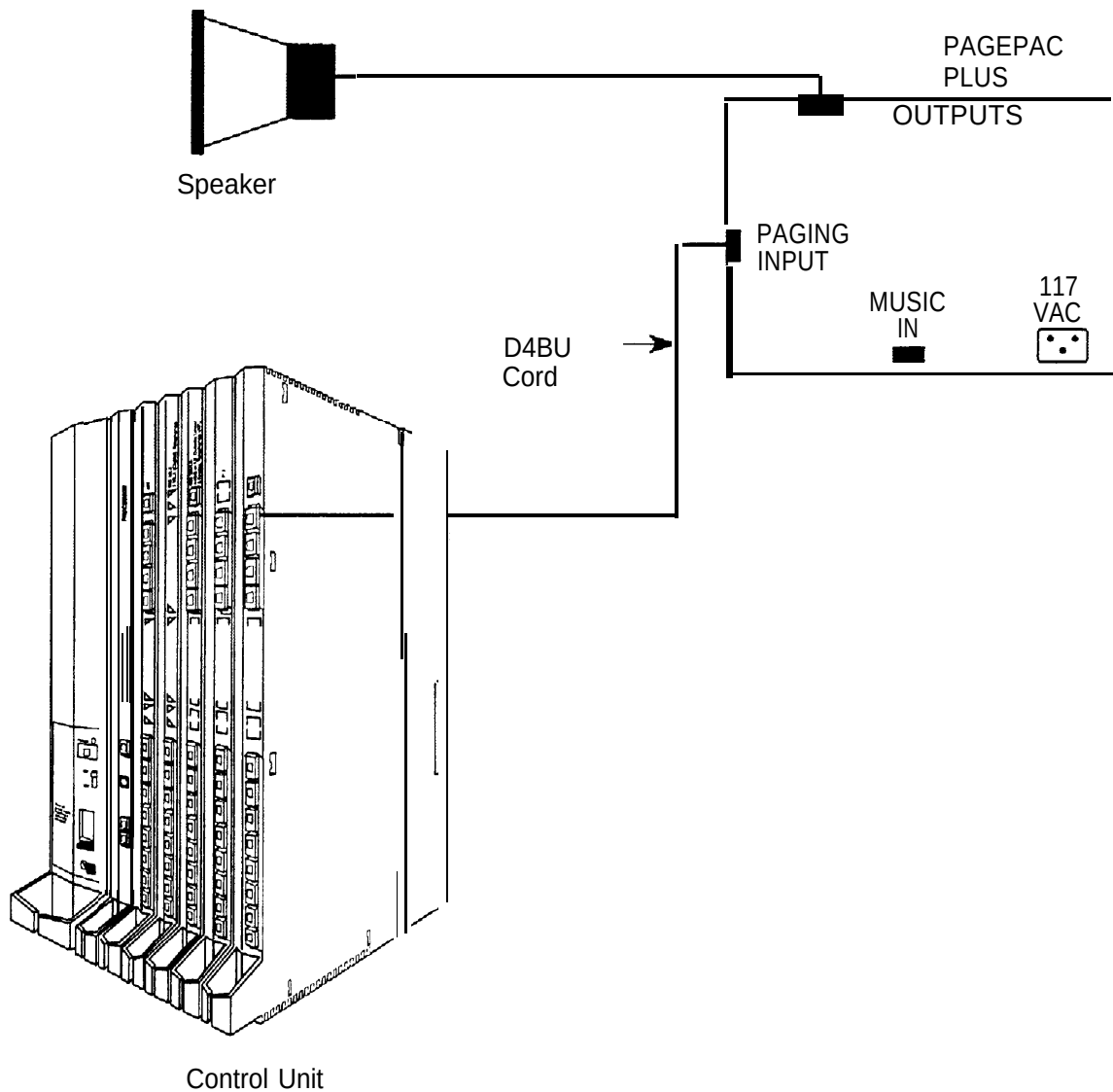
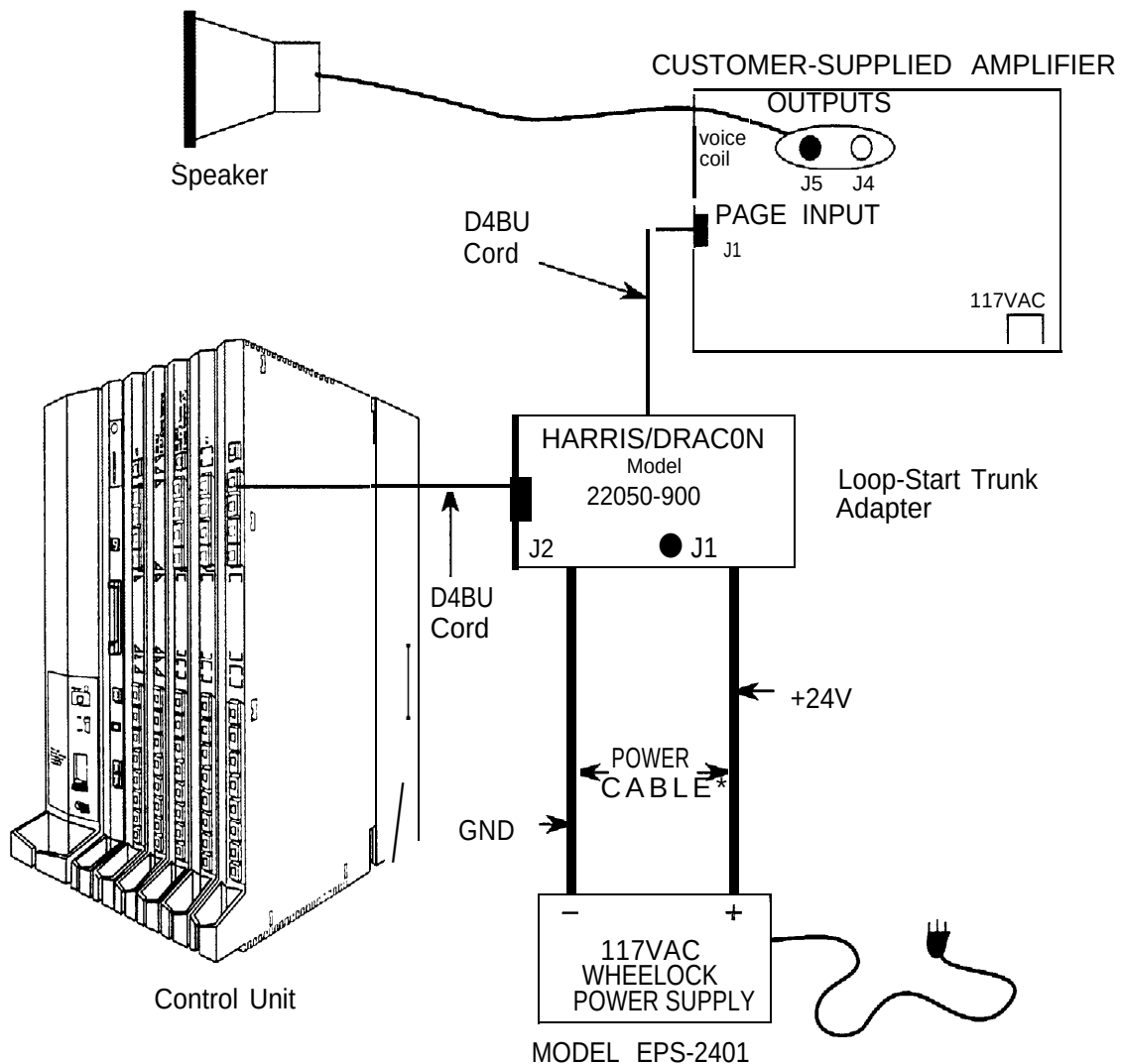


Figure 3-22. Single-Zone Paging with PagePac Plus



WARNING! The black wire from the LS trunk adapter power cable must be connected to the + (positive) input of the Wheelock PS. The grey on black wire must be connected to the - (negative) input.

Figure 3-23. Single-Zone Paging with Customer-Supplied Amplifier

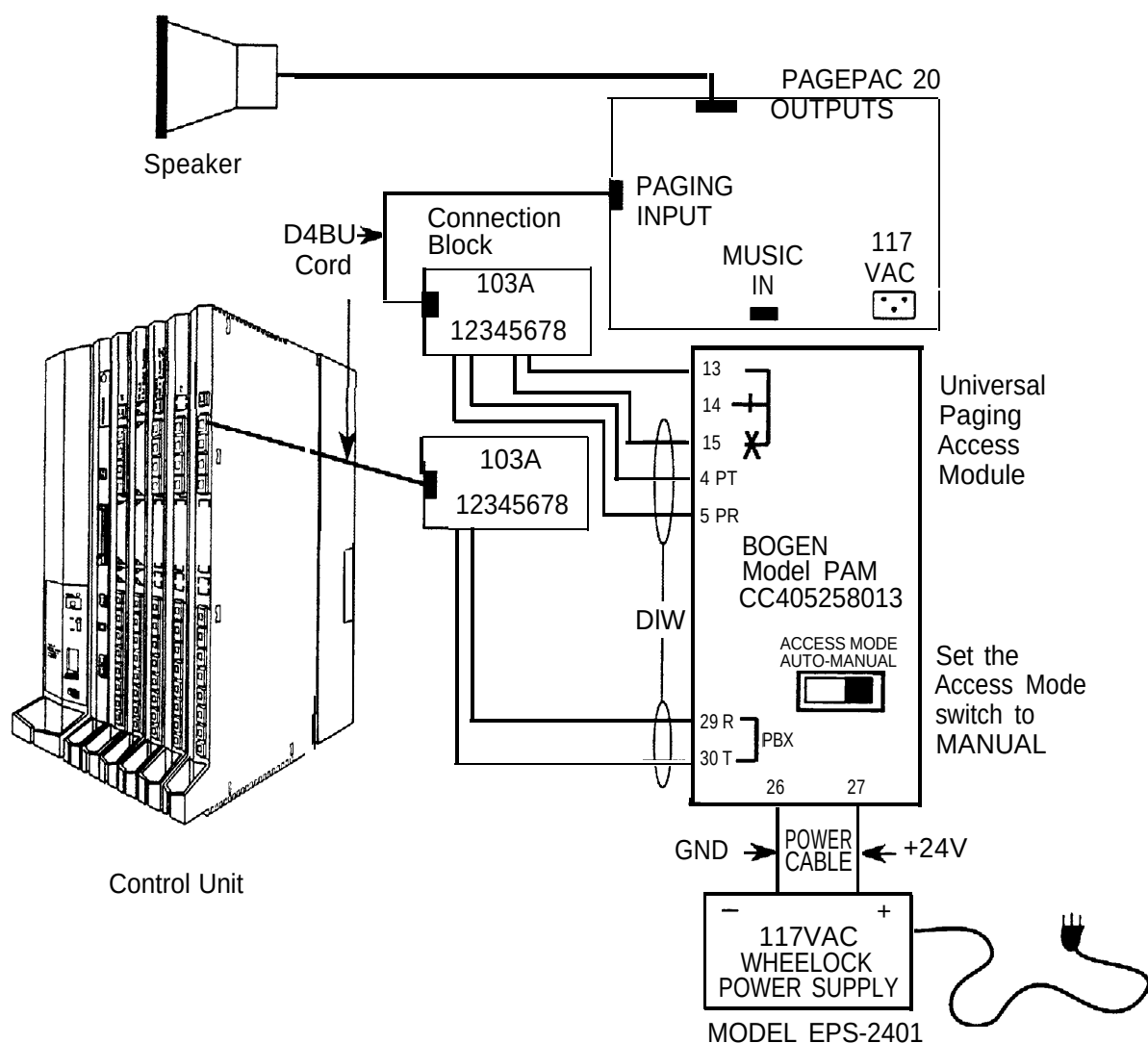


Figure 3-24. Single-Zone Paging with UPAM

MERLIN Identifier

MERLIN Identifier™ allows the use of local telephone company caller identification services to receive, store and use calling party number information. Before installation, verify that this service provided by the Central Office is available on the lines to be connected. Each MERLIN Identifier consists of the following:

- A control unit, which must be located near the MERLIN LEGEND control unit
- Up to four individual display units, which can be mounted on analog multiline telephones or wall-mounted for both analog and MLX telephones
- An administrative keyboard

Optional equipment includes an administrative display, a PC, and a serial printer.

For detailed instructions, see *MERLIN Identifier Installation and Administration*.

When MERLIN Identifier is used with MLX telephones, a pair of installer-wired 104A termination outlets are required for each MLX set that is connected to a MERLIN Identifier display unit.

Modems

You can connect a modem to one of the following:

- Single-line telephone
- MLX telephone with an MFM
- GPA and analog multiline telephone

NOTE:

When a modem is connected to the TEL/OTHER jack on the MLX telephone equipped with an MFM, data calls can be made from the modem independently of the MLX telephone. Users dial data calls from the data terminal keyboard.

See Chapter 6, "Connecting Data Equipment," for complete information on connecting data equipment.

Music On Hold and Magic on Hold

You can connect a Music On Hold device to an LS or GS line/trunk jack programmed for Music On Hold. The system supports one such connection, either Magic on Hold® or a customer-owned music source. The external music coupler (PEC 61398) uses an 8-ohm music source and two attenuation controls for setting the music level.

NOTES:

1. PagePac Plus equipment can be used with a loudspeaker system to provide music. Or it can provide paging without a music coupler.
2. If the equipment uses rebroadcasted music or other copyrighted materials, the customer is required to obtain a copyright release and may also require a copyright license from, and pay license fees to, a third party, such as the American Society of Composers, Artists, and Producers (ASCAP), or Broadcast Music Incorporated (BMI). To bypass the release and license requirement, the customer can purchase a Magic on Hold system from AT&T, which does not require such a license.

Figures 3-25 and 3-26 show different background music configurations with single-zone and multizone paging.

Installing Adjuncts

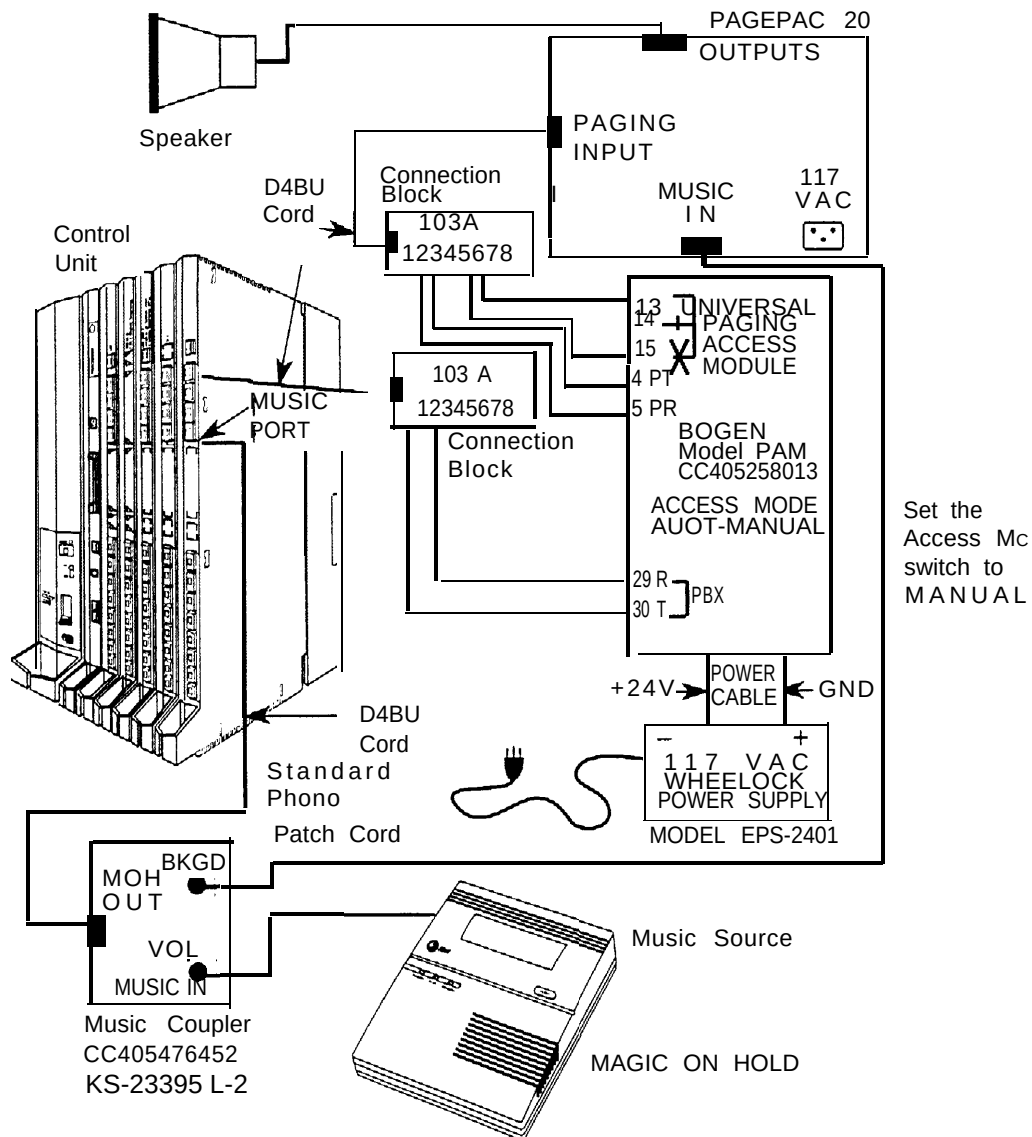


Figure 3-25. Single-Zone Paging with Background Music and Magic on Hold

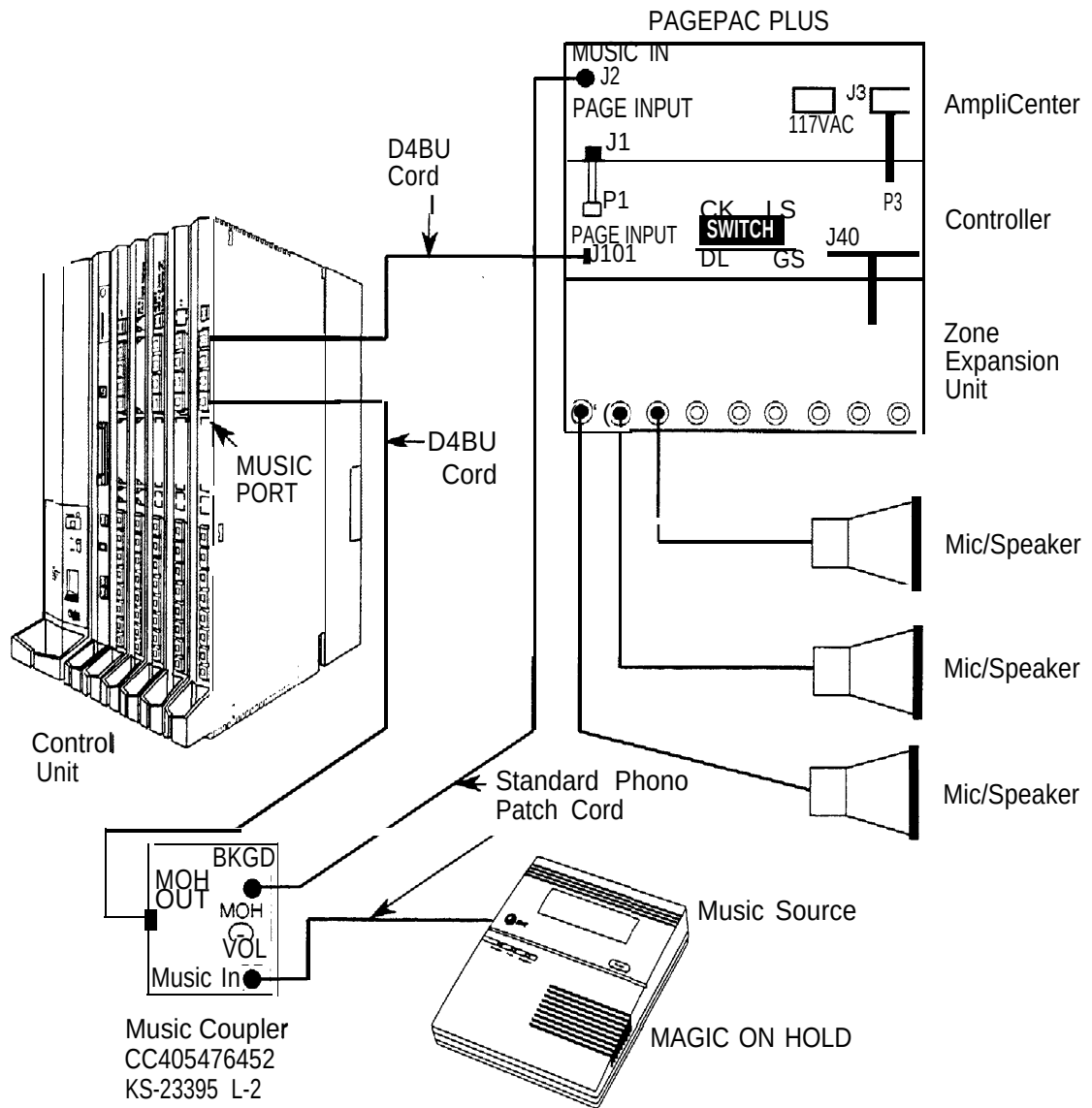


Figure 3–26. Multizone Paging with Background Music, Magic on Hold, and Bidirectional Paging (Talk-Back)

Supplemental Alerts

Alerting devices notify people working in noisy areas of outside, transferred, and intercom calls. Connect an alert to one of the following:

- Single-line telephone
- MLX telephone with an MFM
- Supplemental Alert Adapter (SAA) and analog multiline telephone

Alerts compatible with the SAA include horns, bells, chimes, and strobes. See “Supplemental Alert Adapter” for installation instructions.

NOTE:

The MFM in SAA mode and SAA support devices operate on 48 V DC. You can connect alerts operating on 20 through 30 Hz to an MFM in tip/ring mode or a single-line telephone jack.

Supplemental Alert Adapter

If the system forms indicate a bell, horn, chime, or strobe with an analog multiline telephone, follow the steps below to install an SAA. See Figure 3–27.

- 1 Plug the telephone cord into the TELEPHONE jack on the SAA.**
- 2 Plug the cord from the alert device into the ALERTER jack on the SAA.**
- 3 Plug the cord from the telephone wall jack into the CONTROL UNIT jack on the SAA.**

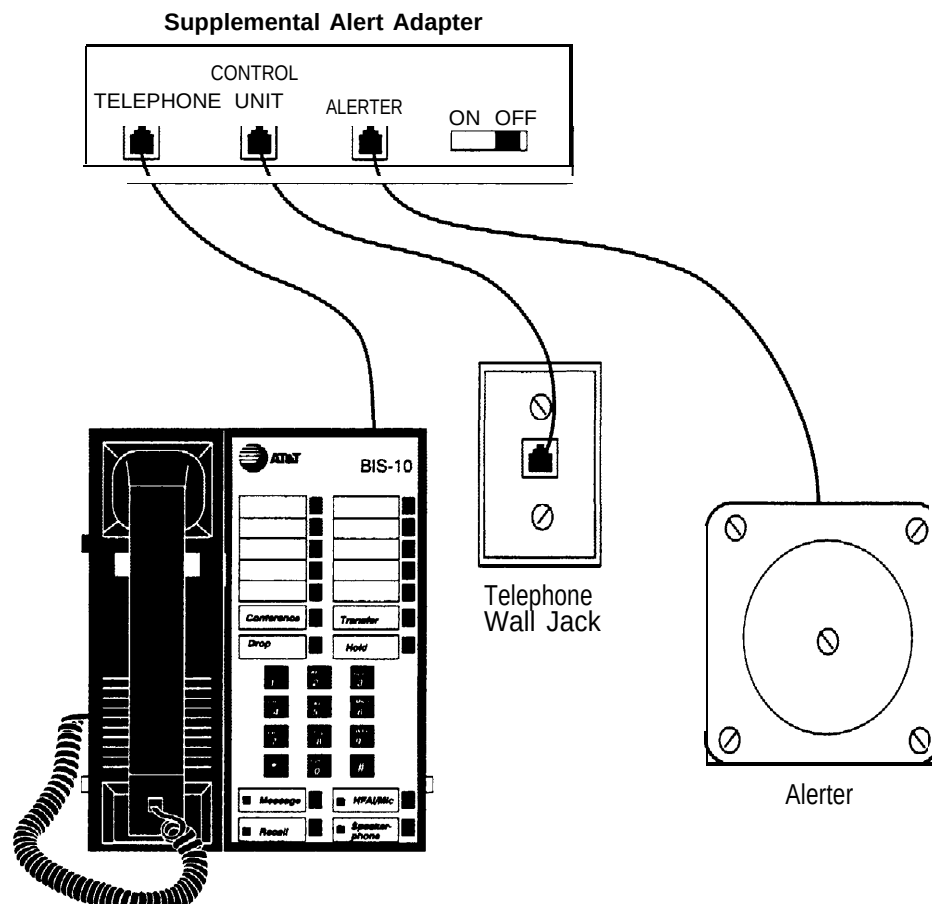


Figure 3-27. Installing the Supplemental Alert Adapter

Unsupported Telephones, Adjuncts, and Adapters

Do not connect the following analog telephone adjuncts and adapters to the system. Doing so may cause damage to the device or the system.

- Basic Telephone and Modem Interface (BTMI)
- Basic Telephone and Modem Interface 2 (BTMI-2)
- ATR Interface (ATRI)

- MTR Interface (MTRI)
- Off-Premises Extension Unit (OPX)
- System 25 Direct Extension Selector (DXS)

See Table 3-1 for additional notes on unsupported telephones and adjuncts.

Table 3–1. Unsupported Telephones and Adjuncts

Model	Notes
51013 Personal Terminals	Digital Communications Protocol (DCP)
DCP telephones	7400 telephones and adjuncts (asynchronous data units and multiple asynchronous data units) that use DCP and are supported on the MERLIN II Communications System
MET telephones	Multibutton electronic telephones (METs) and adjuncts used with the Dimension PBX and Horizon systems
Single-line telephones (with neon message-waiting lights)	Message light does not work.
Analog telephone adjuncts	Basic telephone modem interface (BTMI); BTMI-2; off-premises extension (OPX) unit; System 25 Direct Extension Selector (DXS); DSS attached to a 34-button Deluxe membrane

Single-Line Telephones

Releases prior to Release 3.0 system support the single-line telephones listed in Table 3–2.

Table 3-2. Single-Line Telephones

Model	Description
2500MMGB	Basic desk telephone
2554MMGJ	Basic wall telephone
2500YMGK*	Basic desk telephone with Message light and Recall button; Recall button used instead of switchhook for features that require a switchhook flash.
2500SM	Basic desk telephone used with 4A speakerphone
2514BMW	Basic desk telephone with built-in headset jack
2526BMG	Outdoor telephone used with weatherproof enclosure
7101A*	Basic desk telephone with Message light and Recall and Disconnect buttons. No adjuncts supported.
7102A	Basic desk telephone with Message light lamp and Recall button. The 101 and 201 speakerphones and the 500 headsets are supported. Can be used for Dower-failure transfer (PFT) extensions.
CS6402UO1A*	Basic desk telephone, Feature Phone Model 420. Has built-in speakerphone, memory, and redial.
2500MMGJ	Basic desk telephone
2500MMGK	Basic desk telephone with Recall button; Recall button used instead of switchhook for features that require switchhook flash.
8102†	Basic desk telephone with jack to support headset adapters and speakerphone adjuncts.
8110	Basic desk telephone with a built-in speakerphone with volume control and Mute button with LED indicator.
500MM 554BMPA 500SM	Basic telephones equipped with rotary dials so no system features requiring * and # can be used. Telephones with neon Message lights are not supported.

★

Vintage telephone, no longer available for sale or lease

†

Although the 8102 can be connected to a speakerphone and the 8110 has a speakerphone, they cannot be used for group paging (not supported on single-line telephones). The auto answer function on the 8110 must be disabled.

Single-Line Telephones in Release 3.0 and Later

In Release 3.0 and later, only single-line telephones with positive disconnect are fully supported as system telephones (any single-line telephones, equipped with a ground-start button if necessary, can be used as PFT telephones). Older single-line telephones can be used with Release 3.0, but their operation is slightly different. Table 3-3 lists the single-line telephones supported in Release 3.0 and later.

Table 3-3. Single-Line Telephones Supported by Release 3.0 and Later

Model	Description
2500 YMGL	Basic desk telephone with Message light and Flash button; Flash button is used instead of the switchhook for features that require a switchhook flash, such as Transfer and Hold.
8101	Basic desk telephone with Message light and Flash button; Flash button is used instead of the switchhook for features that require a switchhook flash, such as Transfer and Hold.
VideoPhone 2500	Provides interactive, small-screen video when both parties use one
Picasso Still-Image Phone	Allows 2 parties with Picasso Still-Image Phones to transmit and simultaneously discuss full-color images which they view over customer-supplied TV monitor or flat-panel LCD (liquid crystal display) monitor
3129-V(TVVA	Touch-tone outdoor telephone equipped with cast aluminum housing, armored handset cord with bell ringers
3129-WRWA	Rotary dial outdoor telephone equipped with cast aluminum housing, armored handset cord with bell ringers
3129-WAWA	Auto dial outdoor telephone equipped with cast aluminum housing, armored handset cord with bell ringers
3129-WNWA	Non-dial, automatic ringing on dedicated circuit outdoor telephone equipped with cast aluminum housing, armored handset cord with bell ringers

Installing Direct Station Selectors

The Direct Station Selector (DSS) is an optional piece of telephone equipment. You can connect up to two DSSs to an MLX-28D or MLX-20L telephone that is programmed as an operator console.

Considerations

Review the following items before you begin the installation procedure.

- Connect the DSSs before you assemble the MLX telephones.
- Auxiliary power is required under the following circumstances:
 - An MLX telephone with an MFM and two DSSs requires a 406743419 power unit.
 - An MLX telephone without an MFM, but with two DSSs, requires a 406943837 power unit, 400B adapter, and the D6AP cord that is provided with the MFM.
 - An MLX telephone with one DSS and an MFM requires a 406943837 power unit, 400B adapter, and the D6AP cord that is provided with the MFM.
 - If one carrier has three or more MLX telephones, each with a DSS attached, use a 406943837 power unit, 4006 adapter, and D6AP cord for each MLX telephone and DSS after the first two.
- The total length of cords between the KS22911-L2or406743419 power supply and the MLX telephone must not be more than 50 ft. (15 m).
- Do not replace the 2-ft. (61 -cm) D8AC cord (packaged with the DSS) with a longer cord. Improper operation may result.
- Connect each KS22911-L2 power supply to an AC outlet that is not controlled by a wall switch.

To connect a DSS, follow the steps below. If you are connecting two DSSs to the telephone, unpack the second DSS before you start.

1 Adjust the angle of the DSS.

- The DSS is packed fully assembled with the deskstand in the low position. If you prefer the low position, go to Step 2.
- To adjust the angle of the DSS to the high position:
 - a Place the DSS face down, on a flat surface.
 - b Press on the top rear center of the stand to release the tab, then pull the stand toward you and away from the DSS.
 - c Insert the tab at the bottom of the stand into the other slot.
 - d Lower the stand and press the tab at the top into the corresponding slot on the DSS.

2 Install the D8AC cord on the DSS.

- a Plug one end of the D8AC cord into the IN jack on the DSS.
 - b Route the D8AC cord through the cord channel on the left side of the DSS.
 - c If you are installing only one DSS, go to Step 4.
- If you are installing two DSSs, repeat Steps 1 and 2 for the second DSS, then go to Step 3.

3 Wire the two DSSs. See Figure 3-28.

- a Place the two DSSs side by side and face down.
- b Route the D8AC cord from the IN jack on the second DSS (DSS2) through the cord channel on the first DSS (DSS1).
- c Plug this D8AC cord into the OUT jack on DSS1.

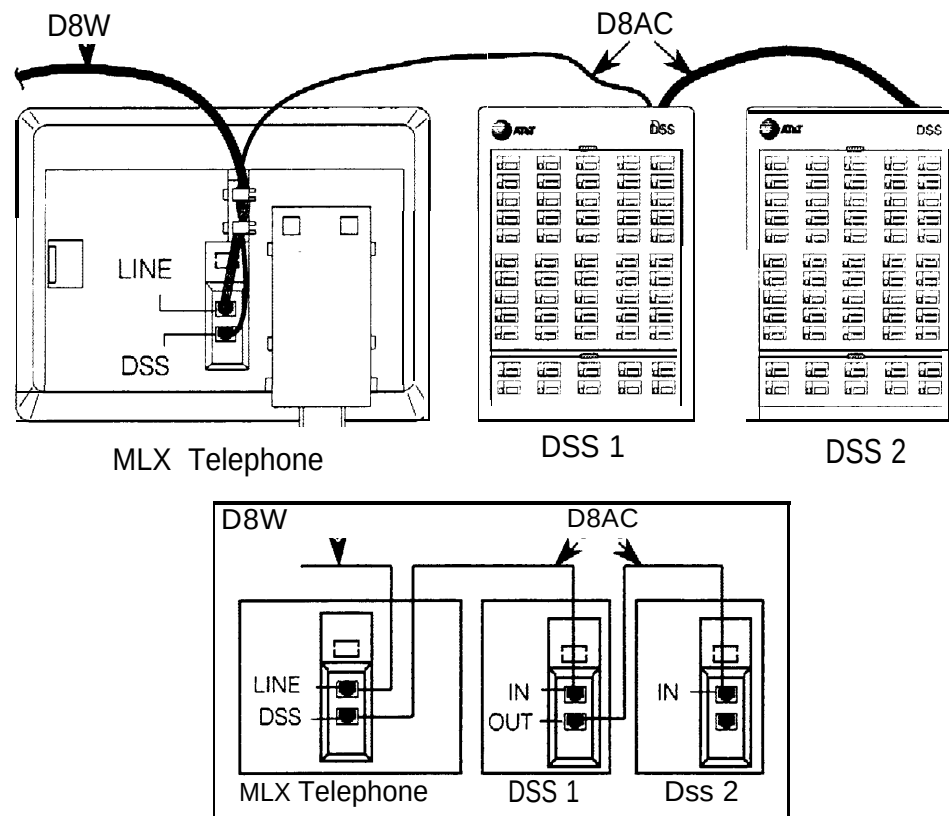


Figure 3–28. Connecting One or More DSSs

4 Wire the telephone to the DSS unit(s). See Figure 3-28.

- Remove the handset from the telephone, then place the telephone face down on a flat surface to the right of the upside-down DSS unit(s).
- Plug the D8AC cord from the IN jack on the DSS1 into the DSS jack on the telephone; then route the cord through the cord channel.
- Plug the D8W line cord into the LINE jack on the MLX telephone. The D8AC and D8W cords share the cord channel on the telephone.

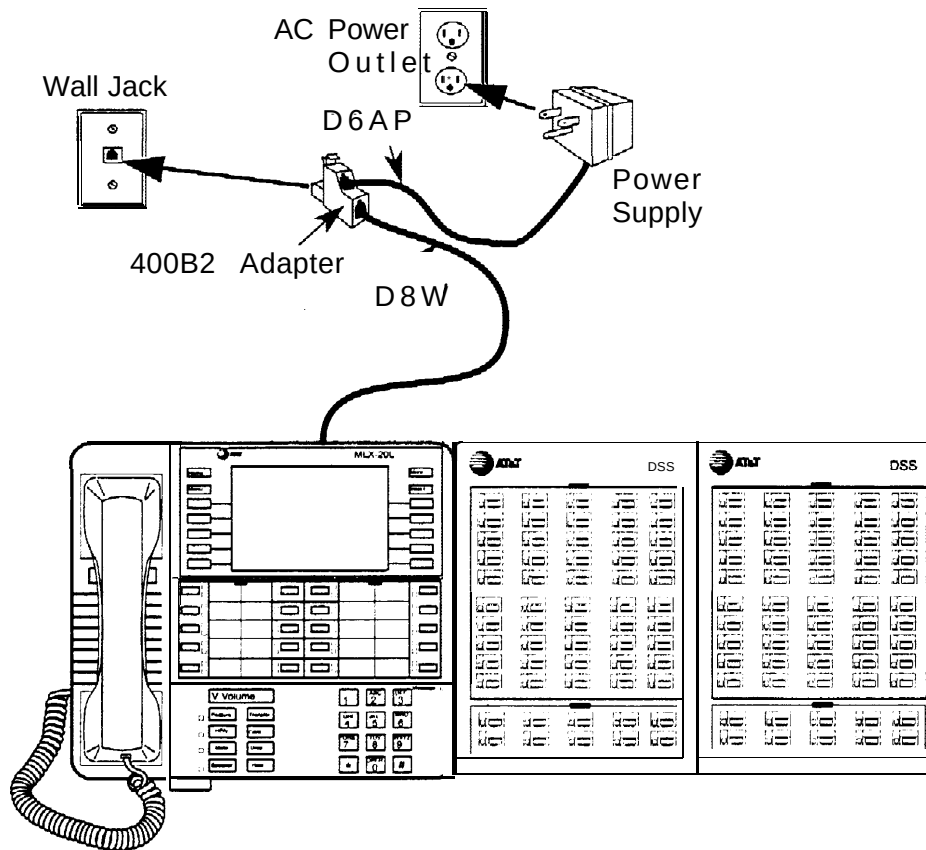


Figure 3–29. Wiring for Auxiliary Power

- 5 Turn the telephone and the DDS unit(s) faceup with the telephone now to the left of the DDS unit(s). See Figure 3-29.
- 6 Insert one end of the coiled H4DU handset cord into the handset and the other end into the jack on the side of the telephone.
- 7 If auxiliary power is *not* required, plug the D8W cord into the wall jack and then go to Step 9.
- 8 If auxiliary power is required, refer to the following steps and Figure 3-29. The combined total length of the D6AP and D8W cords you use must not be more than 50 ft. (15 m).
 - a Plug the D8W cord from the telephone into the 8-conductor modular jack of the 400B or 400B2 adapter.

- b Connect one end of the D6AP cord to the 2-conductor (small) modular jack on the 400B or 400B2 adapter, and plug the other end of the D6AP cord into the modular jack of the 406943837 or 406743419 power supply.



CAUTION:

Do not plug the D6AP cord into the 8-conductor (large) modular jack of the 400B or 40052 adapter. Doing so can cause electrical damage to the control unit and to the telephone.

- c Insert the plug end of the 4008 or 400B2 adapter into the wall jack.
- d Plug the power supply into a 117-V AC outlet.

9 Label the DSS designation cards.

- a Pull the tab at the top of the large plastic cover and rotate the cover towards you.
- b Remove the cover and the large designation card.
- c Write or type the button assignments on the card, (For DSS1, use the side that is labeled *00-49* for DSS2, use the side labeled *50-99*.)
The button assignments on the designation card should be by dial plan extension number, not by logical ID port number.
- d Replace the card and the plastic cover; make sure the coated side of the cover is facing up.
- e Repeat this step to remove the small plastic cover and to label the small designation card.

NOTE:

If the MLX telephone attached to the DSS is unplugged from the control unit and then plugged in again, the display on the telephone may disappear. Press the **Home** button to bring back the display.

Assembling MLX Telephones

You will need to assemble an MLX telephone before connecting it to the control unit. For all other telephones, skip to “Connecting Telephones to the Control Unit.”

Considerations

Review the following items before you begin the procedure:

- MLX telephones are packed with the deskstand in the low position. You can use the deskstand as is, raise it to a higher angle, or remove it. To adjust or remove the stand, see Step 1 of the following instructions. (The diagram on the bottom of the user card tray also shows how to adjust the stand.)
- You cannot wall-mount MLX-20L and MLX-28D telephones.
- If you wish to wall-mount an MLX-10, MLX-10D, or MLX-10DP telephone, you must remove the deskstand first. (Wall-mounting an MLX-10D or 10DP telephone can make the display hard to read.)
- A 630B Phonemount (not included) is also required to mount an MLX-10, MLX-10D, or MLX-10DP telephone on the wall.
- To connect an adjunct (such as an alert, modem, or fax machine) to an MLX telephone, the telephone must have an MFM installed in it. If you have not already done so, refer to “installing Multi-Function Modules, ” earlier in this chapter.

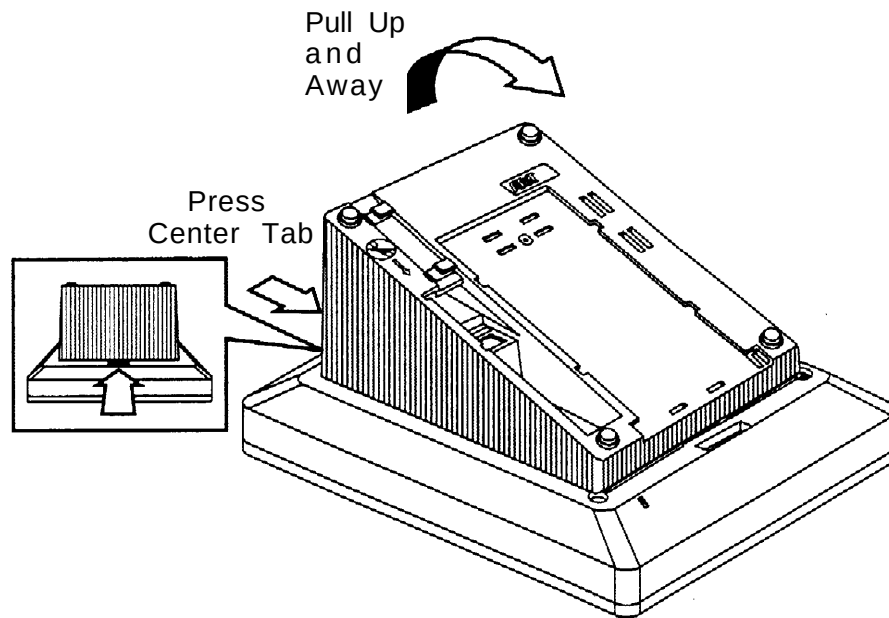


Figure 3-30. Adjusting or Removing the Deskstand

To assemble an MLX telephone, follow the steps below.

1 Remove or adjust the deskstand. See Figure 3-30.

- If you want to leave the deskstand in the low position, go to Step 2.
- If you want to adjust the angle of the deskstand, or remove it in order to wall-mount the telephone:
 - a Place the telephone face down on a flat surface.
 - b Press on the top rear center of the deskstand to release the tab, then pull it up towards you.
 - c Insert the tab into the slot in the module cover to adjust the height.
 - d To remove the deskstand, continue to pull it up and away from the telephone.
 - e Release the deskstand from the front slot.

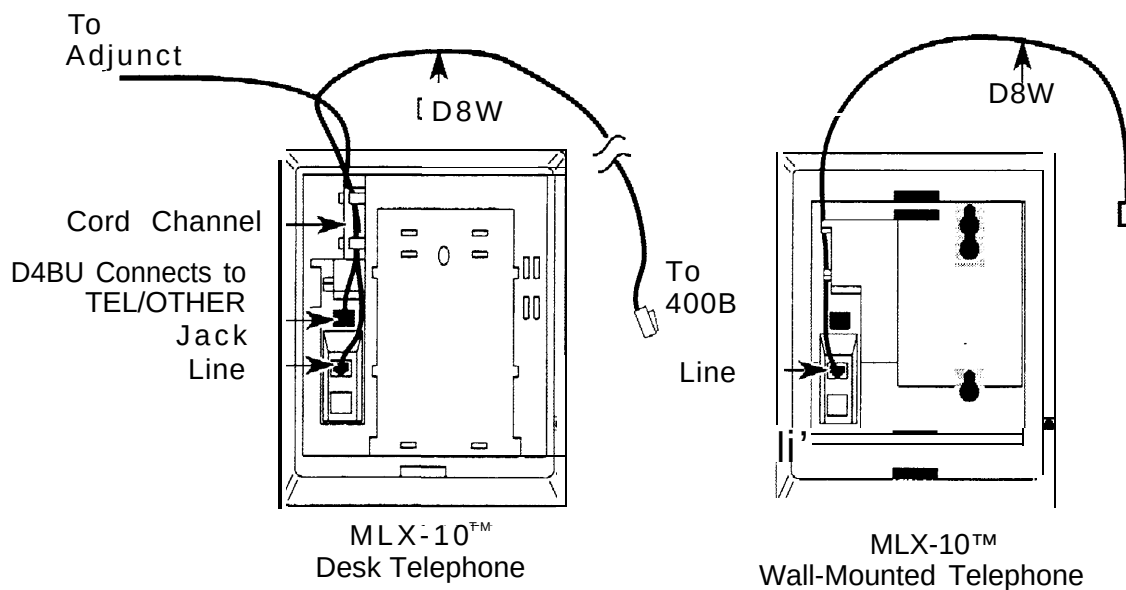


Figure 3-31. Connecting the Line Cords

2 Connect the line cords. See Figure 3-31.

- a Plug one end of the D8W cord into the LINE jack on the bottom of the phone.
- b Route the D8W cord through the cord channel on the back of the telephone.
- c If the telephone is for desktop use, turn it face up and plug the D8W cord into the wall jack.
- d Insert the other end of the coiled H4DU handset cord into the jack on the side of the telephone.

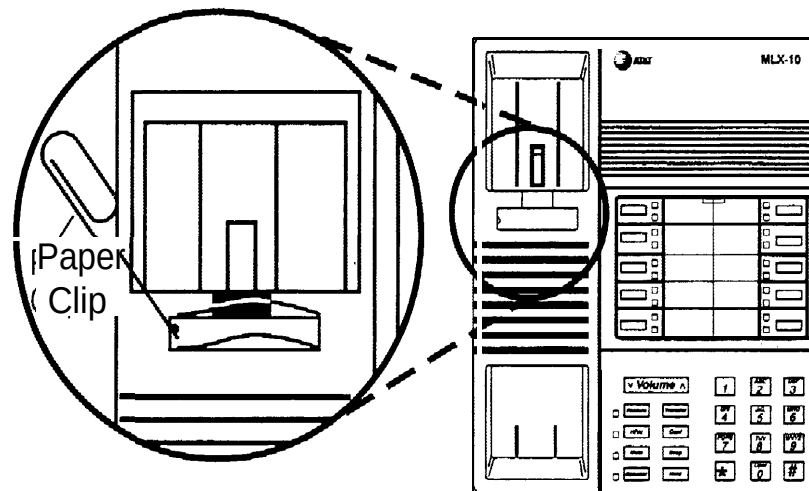


Figure 3–32. Removing the Extension Label

3 Connect the handset.

Insert one end of the coiled H4DU handset cord into the handset.

4 Label the extension identification card.

- a Insert a straightened paper clip into the hole on the side of the plastic cover while holding your finger on the opposite edge; use the paper clip to push and lift the cover. See Figure 3-32.

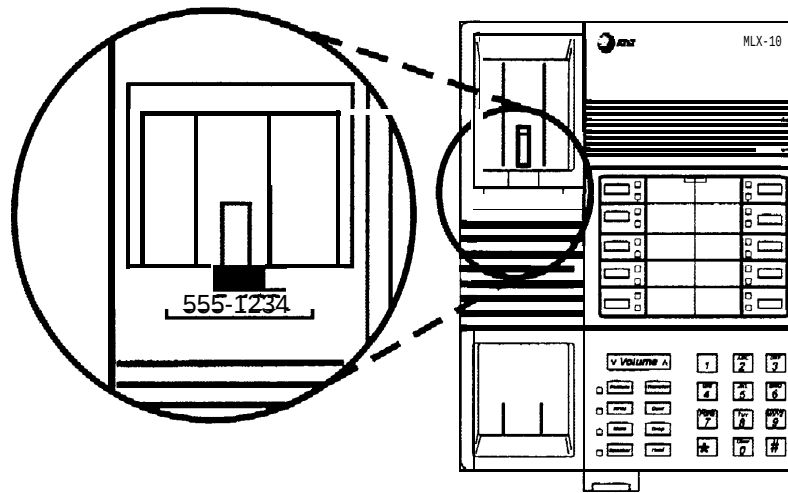


Figure 3-33. Labeling the Extension

- b Type or write the assigned extension number on the card. See Figure 3-33.
- c If you are wall-mounting an MLX-10, MLX-10D, or MLX-10DP telephone, go to Step 5. If you are assembling a desk telephone, go to Step 6.

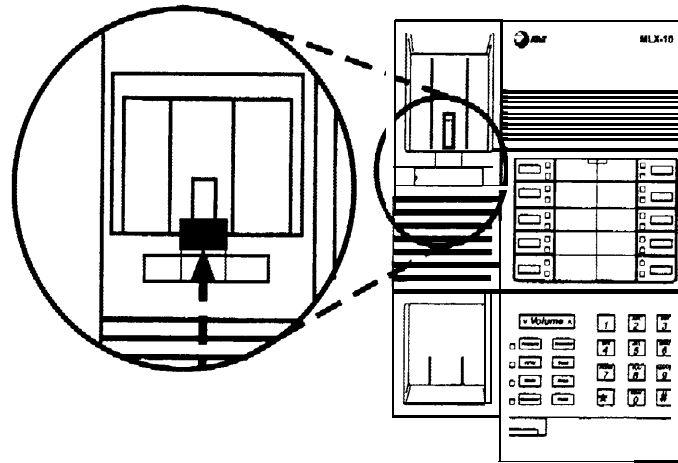


Figure 3-34. Removing the Handset Holder

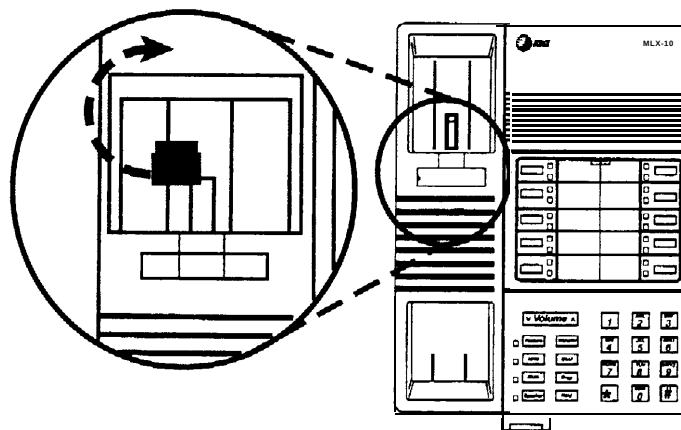


Figure 3-35. Rotating the Handset Holder

5 Prepare the handset holder for wall-mounting.

- a Remove the handset holder by pushing it up and pulling it out. See Figure 3-34.
- b Rotate the handset holder 180 degrees and replace it in its slot. See Figure 3-35.

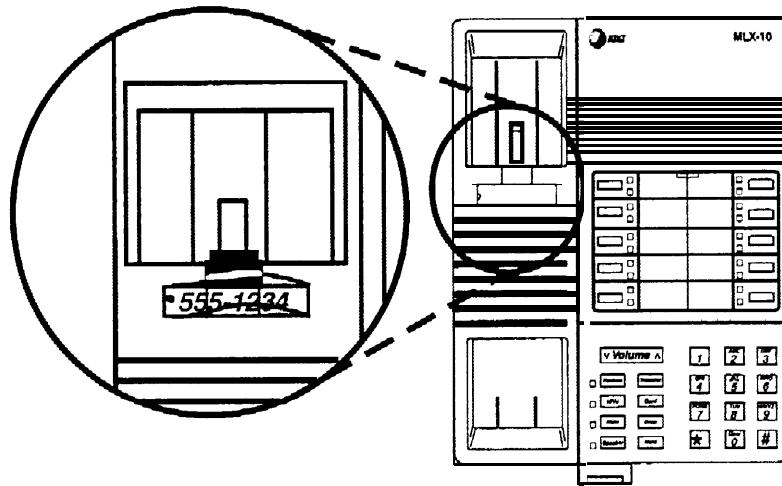


Figure 3–36. Replacing the Extension Label

6 Replace the extension label and plastic cover.

- a Insert one end into the slot and snap the other end into place. See Figure 3-36.
- b If you are mounting an MLX-10, MLX-10D, or MLX-10DP wall telephone, go to Step 7. If you are assembling a desk telephone, go to Step 8.

7 Wall mounting an MLX-10, MIX-10DP, or MIX-10D telephone.

- a Turn over the telephone and remove the jack guard from the TEL/OTHER jack area; set the telephone aside.
- b Unpack the 630B Phonemount and remove the modular jack from the backplate.
- c Route the D8W cord (or DIW cable) through the hole in the backplate and have it exit at the top of the backplate; leave 10 in. (25 cm) of cord to connect the telephone. See Figure 3–37.

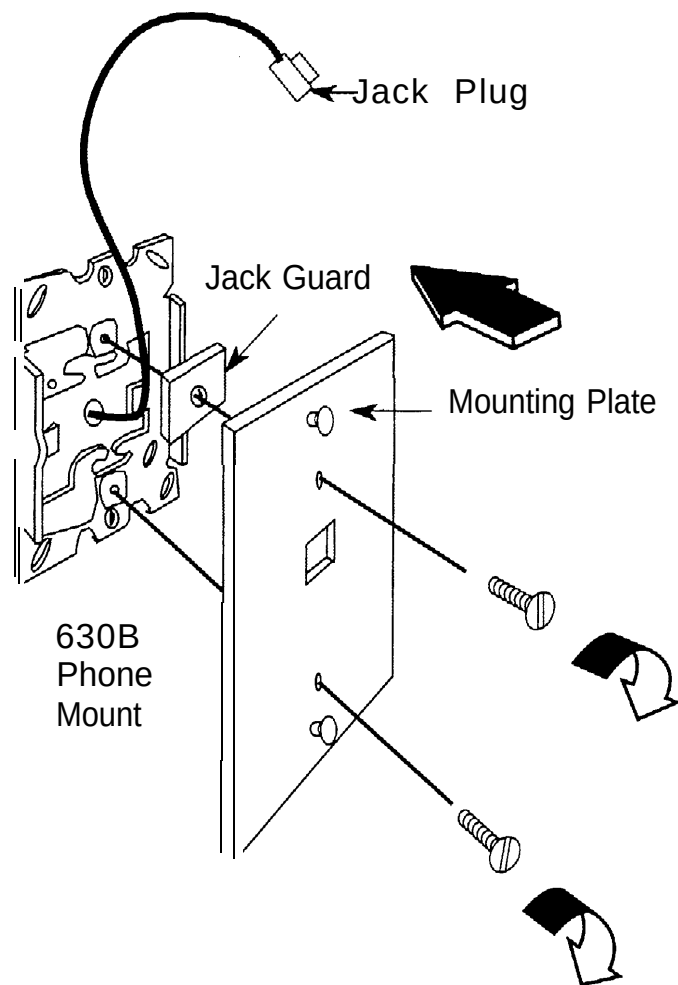


Figure 3-37. Mounting the Backplate

- d Attach the backplate to the wall; see the instructions provided with the 6306 Phonemount.
- e Insert the two short screws provided with the Phonemount into the mounting plate. Be sure to thread the upper screw through the jack guard. See Figure 3-37.

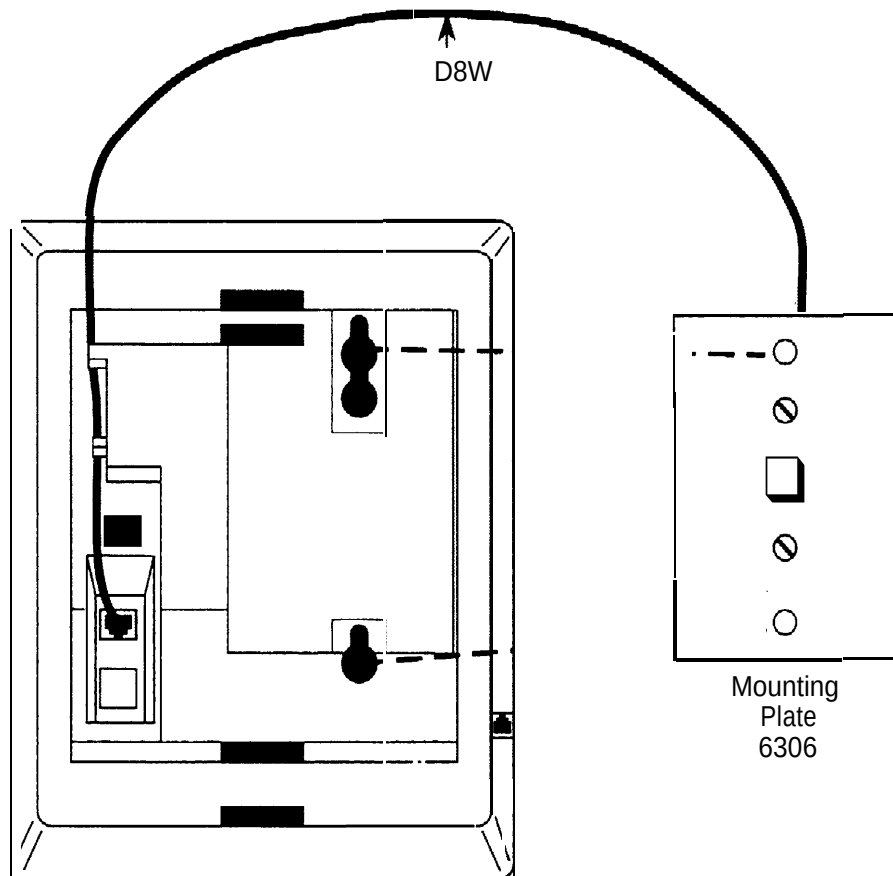


Figure 3-38. Routing the Cord Through the Backplate

- f Plug the free end of the cord into the LINE jack on the back of the telephone. Route the cord through the cord channel above the jack. See Figure 3-38.
- g Position the telephone on the mounting plate studs and then slide the telephone down to lock it in place. To remove the telephone, slide it up and off.

8 Label the button assignment card.

- a Pull the tab at the top of the plastic cover toward you.

- b Type or write the button assignments on the card.
- c Insert the card and replace the plastic cover. Be sure the textured side of the cover is facing you.

9 Adjust the contrast on the telephone% display.

- For an MLX-20L telephone, slide the lever on the top of the telephone.
- For an MLX-10D, MLX 10DP, or MLX-28D telephone, press the **Menu** button and select `Cntrst`; follow the display prompts.

Installing Cordless or Cordless/Wireless Telephones

The sections below describe the ways you can connect MDC 9000 cordless or MDW 9000 cordless and wireless telephones to the system.

MDC 9000 Cordless Telephone

You can connect the base unit of the MDC 9000 to an analog extension jack.

MDW 9000 Cordless/Wireless Telephones

The following is a brief overview of procedures and considerations for installation of the MDW 9000 telephone. For more detailed information, see the installation guide that comes with the telephone.

- If possible, place the radio module of a wireless telephone in the same room and on the same wall as the MERLIN LEGEND Communications System control unit.

A minimum distance of 3 ft. is required between the radio base and the control unit. The radio module must be within 24 ft. of a properly grounded 3-prong AC outlet that is *not* controlled by a wall switch and connects to the control unit through an analog multiline jack with a line connector.

- The charging base station requires only a three-prong AC outlet that is *not* connected to a wall switch.
- The telephone handset must be within range of the radio base. The indoor range is 400 through 600 ft. and the outdoor range is up to 1000 ft.
- Except while charging, the handset does not need to be located near the charging base.

Connecting Telephones to the Control Unit

The way you connect telephones to the control unit depends on the number of telephones you are connecting. For 24 telephones or less, use a direct connection. For 25 telephones or more, use cross-connect fields.

For building cross-connect fields, use one of the following wiring kits:

- **Interconnect Wire.** This complete wiring kit contains 110 jack-panel blocks, a template, wiring troughs, D-rings, and D8W cords.
- **Systimax.** This complete wiring kit contains 110 termination blocks with modular jacks, a 110A field-termination block, a template, wiring troughs, D-rings, and patch cords.

Considerations

Review the following items before you begin the procedure:

- If the way you connect the telephones differs from the instructions on the system forms, record each jack and telephone change on Form 2a, System Numbering: Extension Jacks. See Appendix A, "System Numbering Forms."
- If you use staples to attach the cords to walls or baseboards, make sure you do not pierce the cords.

- If an MLX telephone or analog multiline telephone is in a different building from the control unit, and *is within 1000 ft. (305 m)* of the control unit, connect the telephone to the control unit, using two In-Range Out-of-Building (IROB) protectors.

Make sure you use an MLX-specific IROB protector for an MLX telephone, and an analog multiline-specific IROB protector for an analog multiline telephone.

See the documentation packaged with the IROB protector for complete installation instructions.

- If the single-line or T/R telephone is 1000 ft. (305 m) or further from the control unit, connect the telephone to the control unit using an Off-Premises Range Extender (OPRE).

See the documentation packaged with the OPRE for complete installation instructions.



CAUTION:

Take extreme care to make sure that you connect MLX phones only to MLX modules; a mismatch could damage the ports and cause them to stop functioning.

Incorrect wiring can result in users not being able to place outgoing calls. Make sure you use the proper cord. For all GS/LS modules:

- *Use a D2R cable from an RJ11 jack.*
- *Do not use the Brand-Rex Quad cable from an E66 block.*

If you cannot avoid using the Brand-Rex Quad cable, reverse the tip and ring leads at the E66 block to correct the mismatch.

- *To avoid introducing power supply noise into system wiring, allow at least 3 in. (7.62 cm) of clearance between the basic carrier's power supply and any wiring or termination hardware located to the left of the control unit.*

**WARNING:**

National and local building codes specify the type of cable required for telecommunication wiring. For example, indoor wiring (DIW cable) cannot be used inside or on top of air plenums or ducts, along hot pipes, or across walkways.

Consult your local ordinances and regulations for proper cable selection.

Wiring a Telephone for Two Voice Pairs

If an analog telephone requires either the Voice Announce to Busy feature or voice and data operating independently, use a bridging adapter to assign two adjacent odd/even telephone jacks (for example, 01 and 02, 13 and 14) on an analog telephone module to that telephone. This provides the telephone with the two voice pairs needed to use these features. See Figure 3-39.

NOTE:

The numbers of these telephone jacks are boxed on the system forms. In Figure 3–39, the label on the bridging adapter refers to the default dial plan extension number, not the telephone port number.

The even jack on the bridging adapter should be connected to the odd-numbered telephone port, and the odd jack on the bridging adapter should be connected to the even-numbered telephone port.

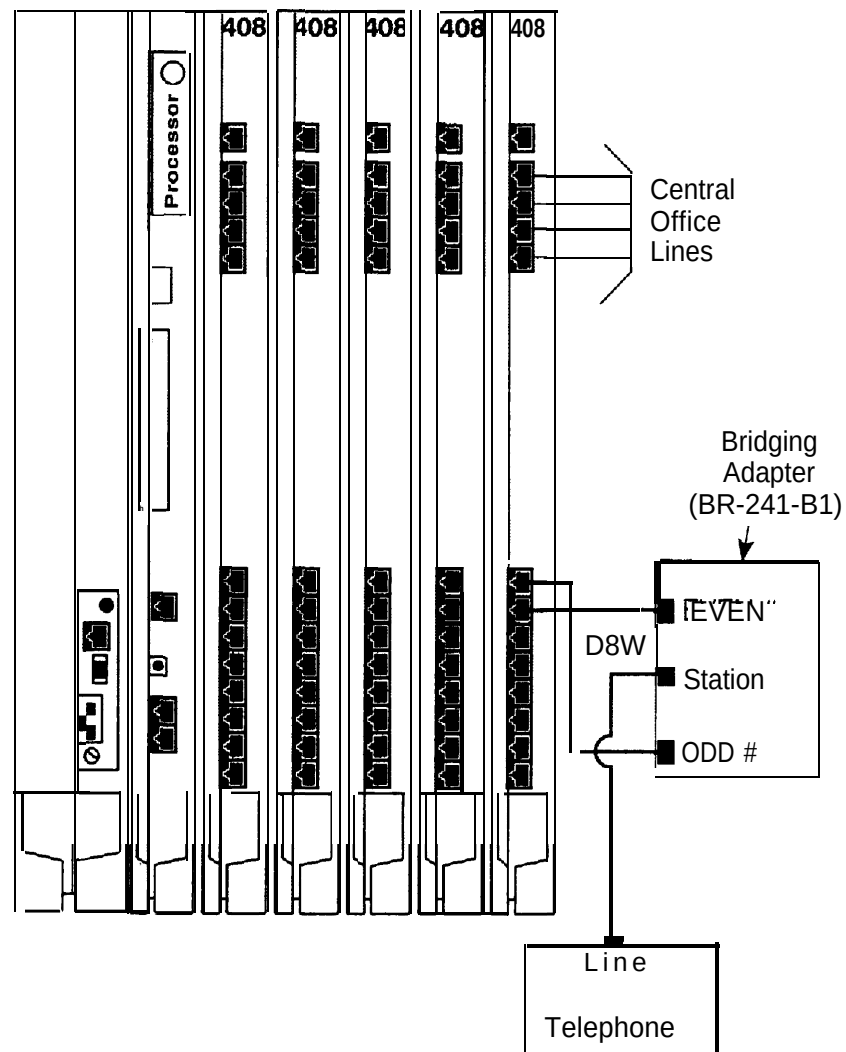


Figure 3-39. Connecting Two Voice Pairs to a Telephone Using a Bridging Adapter (BR-241-B1)

Removing Damaged Connecting Blocks

In some cases, a connecting block becomes damaged and must be removed.

To remove a damaged connecting block, follow the steps below:

1 Remove the wires or the patch cord from the connecting block.

- If you have Interconnect Wiring, use long-nosed pliers to remove the telephone wires, and tag the wires with tape to identify their positions.
- If you have Systimax wiring, pull off the patch cord.

2 Place a 788K1 retainer tool against the conductor pairs beneath the connecting block to be removed. See Figure 3-40.

3 Use pliers to grip the connecting block in the center. See Figure 3-40.

4 Move the block gently up and down and pull it out.

5 If a conductor wire is accidentally pulled from a block, pull it with the long-nosed pliers to get some slack.

Use your fingers to lay the conductor wire back in its slot in the index strip, and then reseal it with the D-impact tool.

6 Seat the new connecting block by using the 788J1 impact tool.

7 Replace the telephone wire onto the connecting block.

- If you have Interconnect Wiring, remove the tag from the telephone wires and use the D-impact tool to reseal the wires.
- If you have Systimax wiring, attach the patch cord to the connecting block.

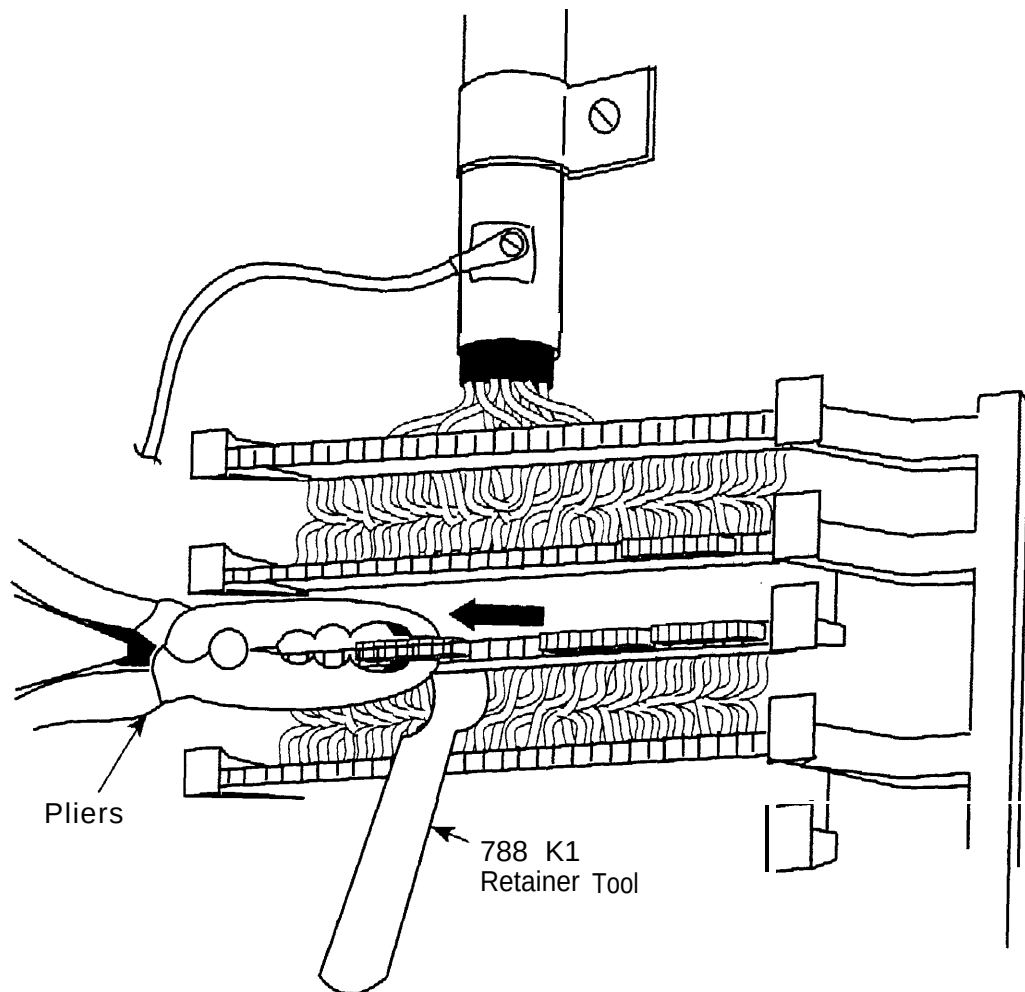


Figure 3-40. Removing the Connecting Block

Connecting the Control Unit to the Network Interface

4

The way you connect the control unit to the network interface depends on the type of network interface that is installed. While there are many ways you can do this, the methods discussed in this chapter are usually best.



CAUTION:

The telephone company is responsible for providing appropriate protection for central office trunks. Do not connect the central office trunks until you are certain that they are properly protected. See “Central Office Trunk Protection” in Chapter 2 for details.

To avoid coupling power supply noise onto system wiring, allow at least 3 in. (7.62 cm) of clearance between the basic carrier’s power supply and any wiring or termination hardware located to the left of the control unit.

If the network interface is greater than 25 ft. (7.62 m) from the control unit, connect the control unit to the network interface, using an Off-Premises Range Extender (OPRE). See the documentation packaged with the OPRE for complete installation instructions.

If you use staples to attach the cords to walls or baseboards, make sure you do not pierce the cords.

National and local building codes specify the type of cable required for telecommunication wiring. For example, you cannot use indoor wiring (DIW) cable inside or on top of air plenums or ducts, along hot pipes, or across walkways. Consult your local ordinances and regulations for proper cable selection.

Wiring

The local telephone company should have installed the network interface (the central office trunks) already. Before you install the system, verify that the network interface is the proper type and that it is within 25 ft. (7.6 m) of the control unit. If the network interface is more than 25 ft. (7.6 m) from the control unit, make sure you have an OPRE.

The adapter you need to connect the central office trunks to the control unit depends on the type of network interface installed, as shown in Table 4-1.

Table 4-1. Network Interfaces

Network Interface	Description	Adapter
RJ11	Connects one outside ground-start (GS), loop-start (LS), or Direct Inward Dial (DID) trunk to one modular jack.	
RJ14	Connects two outside trunks to one modular jack (GS, LS, or DID).	2-line adapter (267C-type)
RJ21X	50-pin connector connects 25 110AB1 jack-panel block to outside trunks (GS, LS or DID)	110AB1 jack-panel block
RJ2GX	50-pin connector for up to eight tie trunks	356A for eight or fewer tie trunks; 259A for one tie trunk
RJ48C/X	Connects DS1 facilities to a four-pair jack (two active pairs).	Z601A if modular cords are used

After installing the adapter, label each jack that connects a central office trunk to the control unit with the trunk’s number. Use the list provided by the local telephone company or System Form 2c, System Numbering: Line/Trunk Jacks for outside trunks as a reference.

4-2 Connecting the Control Unit to the Network Interface

NOTE:

If you need to connect the trunk cords differently from the instructions on the system forms, record each change on Form 2c, System Numbering: Line/Trunk Jacks. See Appendix A, "System Numbering Forms. "

Also, you may need to know the interface codes for network facilities, These codes are shown in Table 4-2, by trunk type and adapter type.

Table 4-2. Central Office Network Interface Codes

Trunk Type	Federal Interface Code for Trunk	Network Interface
LS central office trunk	02LS2	RJ11C, RJ14C, RJ21
GS central office trunk	02GS2	RJ11C, RJ14C, RJ21
DID	02 RV2-T	RJ11C, RJ14C, RJ21
OPS	0L13C	RJ11C
Tie trunk	TL31M	RJ2GX
DS1	04DU9-B	RJ48C/X
	04DU9-C	See note below.

NOTE:

The preferred network interface is the RJ48X. If a customer's site uses the RJ48X interface and the customer's equipment does not provide connection, the T1 trunk's receive pair is looped back to the transmit pair. This simplifies troubleshooting the T1 trunk from the central office.

In most installations, the network interface is connected through a cross-connect field to the control unit. However, for systems with fewer than 24 extensions, you can connect the trunk wires directly to the control unit.

When constructing wiring fields between the network interface and the control unit, you must order hardware as individual parts, Do not use Interconnect Wiring or Systimax wiring kits.

RJ21X Interface

The RJ21X network interface has a female 50-pin (25-pair) amphenol connector, as shown in Figure 4–1.

To connect the RJ21X interface to the control unit, you must build a wiring field between the RJ21X interface and the control unit using a 66-type block (RJ21). This field converts the female amphenol connector to sets of four 1-pair modular jacks.

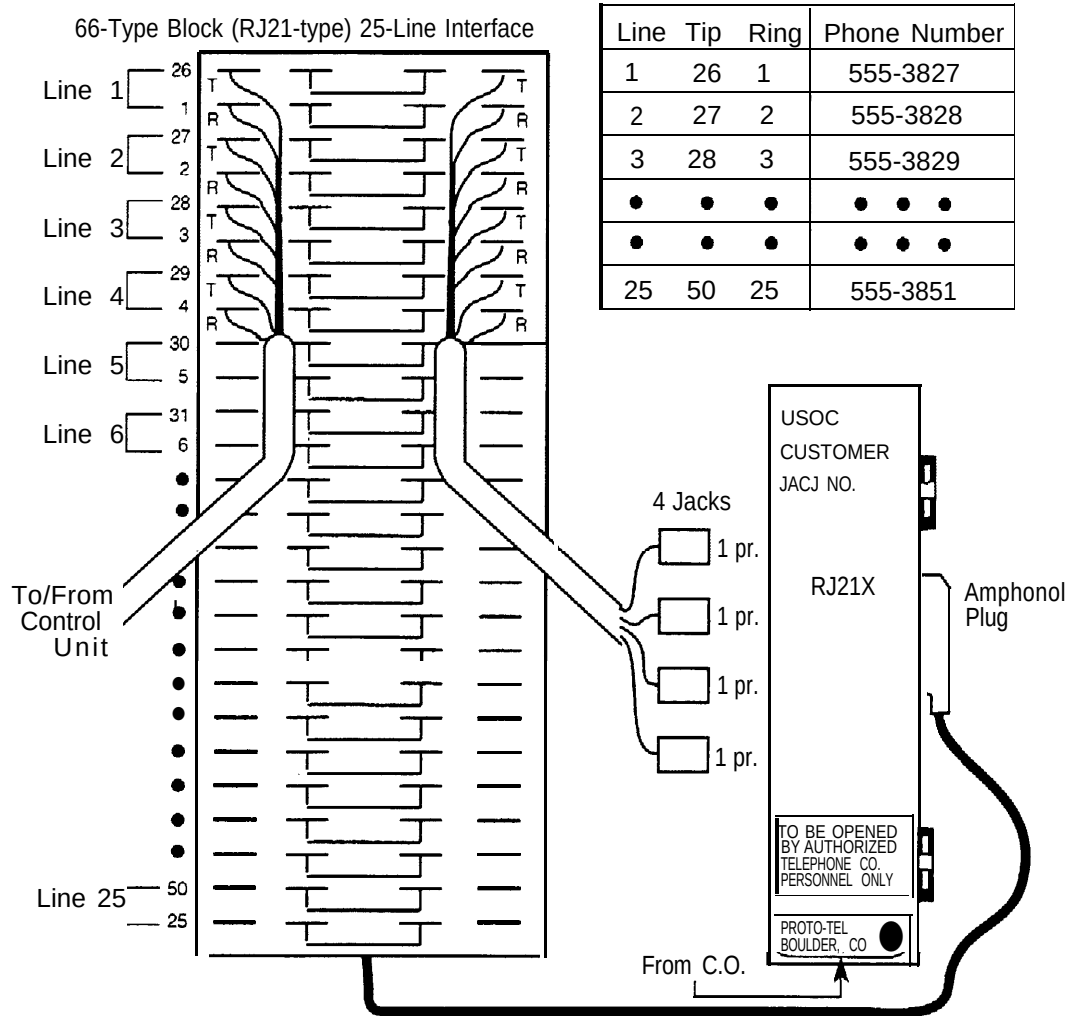


Figure 4-1. RJ21X Network Interface Connector

Building the Wiring Field

Build the wiring field between the network interface and the control unit using 110AB1-100JP12 termination blocks with modular jacks and associated hardware. Figure 4-2 shows the hardware you need, including 110AB1-100JP12 termination blocks with modular jacks, 110A1 wire troughs, D-rings, and D2R cords.

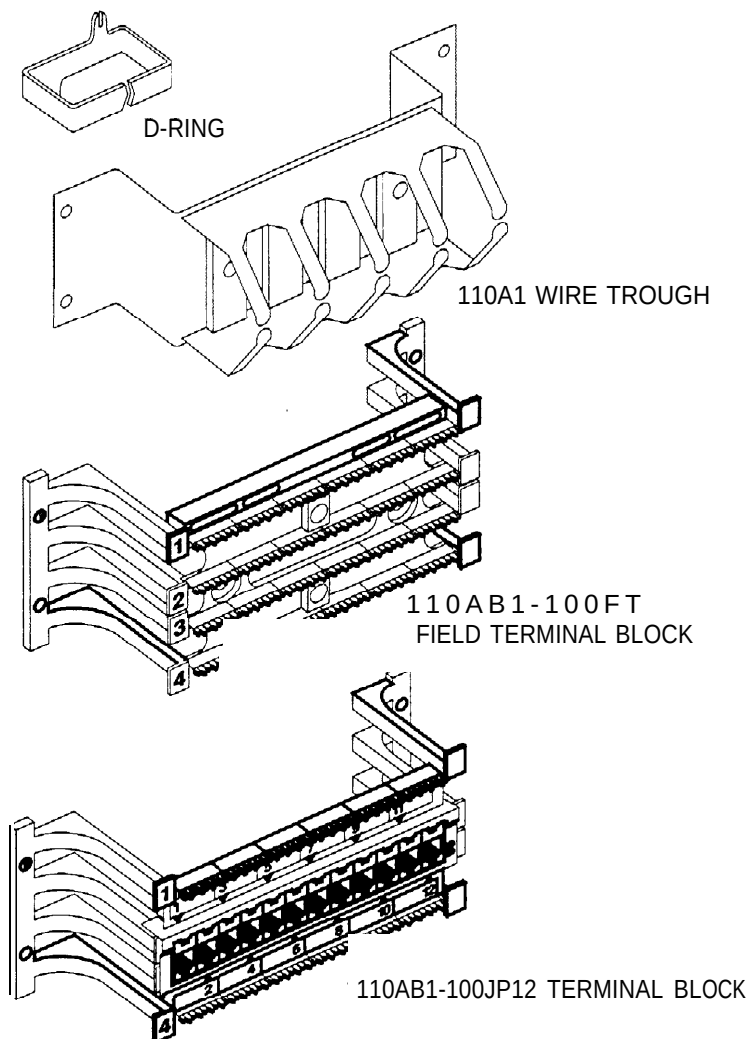


Figure 4-2. RJ21X Wiring Field Hardware

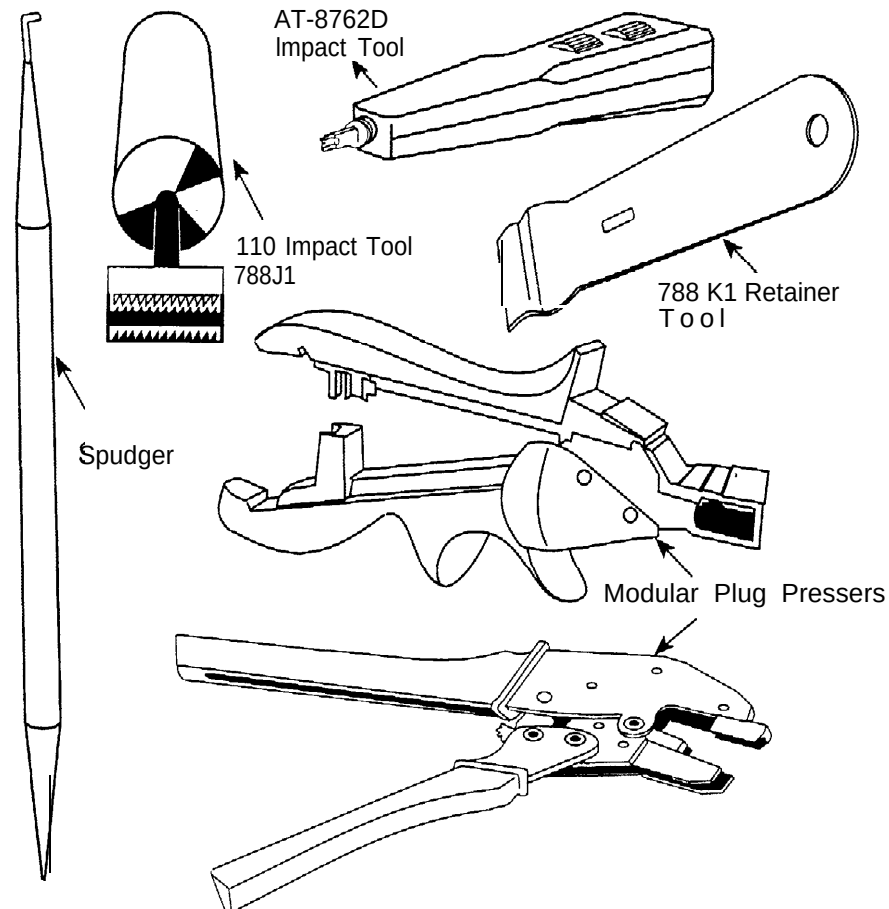


Figure 4-3. RJ21X Wiring Field Tools

To connect the RJ21 X network interface to the control unit, follow the steps below. Figure 4–3 shows the tools you need.

- 1 For each piece of hardware, drill two diagonally opposite holes into the backboard, allowing for a 1/16-inch (1.6 mm) space between each piece of hardware.**
- 2 Mount the wire troughs and the termination blocks.**

There is a wire trough above and below each termination block.

3 If necessary, repeat Steps 1 and 2 for a second column.

4 Run the 25-pair amphenol cable on the RJ21X interface to the termination blocks.

If more length is needed, use an A25D male-connector, single-ended, 25-pair, nonplenum cable.

5 Mount the D-rings to properly dress the wires, as needed.

6 Cutoff the amphenol connector nearest to the cross-connect field and strip the wires for each of the 25 pairs.

7 Punch down the 25-pair wires to the termination block.

- a Route the wires through the fanning slots on the termination block.
- b Insert the conductors into the designated 110 connecting blocks already on the termination block.
- c Use the D-impact tool to seat the conductors. See Figure 4-4.
- d Remove any insulation fragments with a spudger.

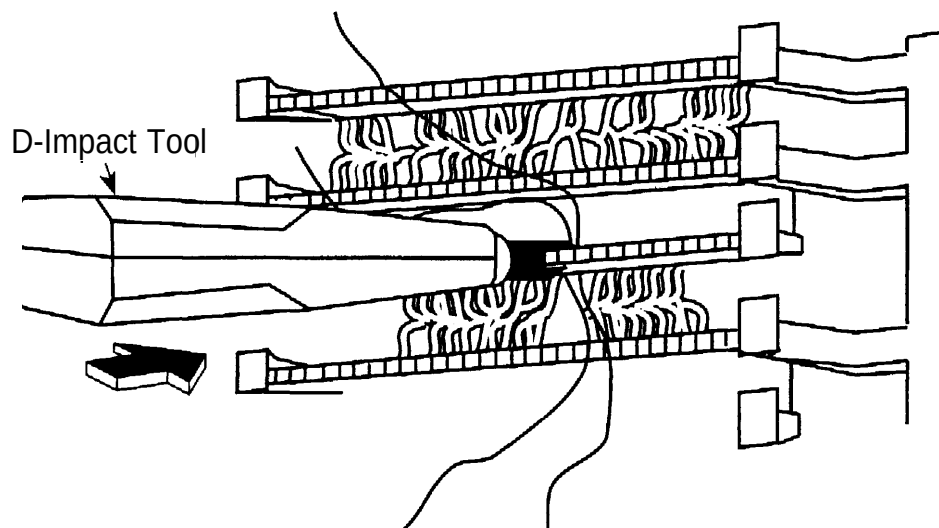


Figure 4-4. Using the D-Impact Tool to Seat the Conductors

8 Test the central office trunks for proper connection.

See “Testing Trunks,” later in this chapter, for instructions.

9 Label the network interface jacks, control unit module jacks, termination blocks, and D2R cords.

See “Labeling Trunks,” later in this chapter, for instructions.

10 For each trunk, plug one end of a D2R cord into the designated jack on the termination block and the other end into the line/trunk jack on the proper control unit module.

NOTE:

The modular jacks on the termination block are 8-wire jacks. The D2R cords, which are 6-wire, also plug into the 8-wire jacks.



CAUTION:

Do not plug an analog multiline telephone, an MLX telephone, or anything else that should be plugged into an extension jack into this wiring field.” doing so will busy-out the trunk.

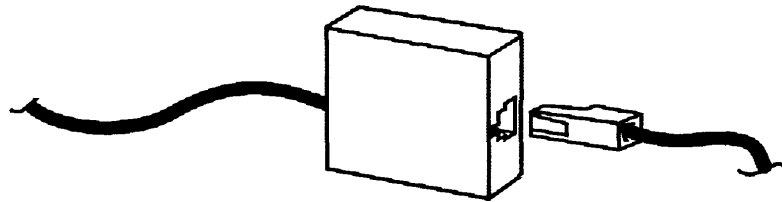
RJ11 and RJ14 Interfaces

RJ11 and RJ14 interfaces are connected to the control unit similarly. However, note the following differences:

- RJ11 connects *one* central office trunk per jack.
- RJ14 connects *two* trunks per jack.

Plug a 267C-type adapter into each RJ14 jack. You need D2R cords for RJ11 jacks. See Figure 4-5.

Single-Line Adapter (RJ11)



2-Line Adapter (RJ14)

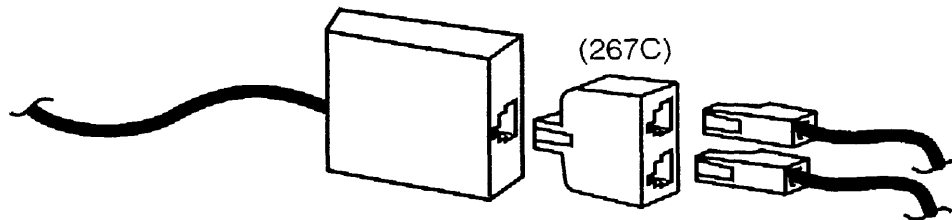


Figure 4-5. RJ11 and RJ14 Interfaces

**CAUTION:**

Incorrect wiring can damage the ports and cause them to stop functioning. Make sure you use the proper cords. For all GS/LS modules, do the following:

- *Use a D2R cable from an RJ11.*
- *Do not use the Brand-Rex Quad cable from an E66 block.*

If you cannot avoid using the Brand-Rex Quad cable, reverse the tip and ring leads at the E66 block to correct the mismatch.

To connect the RJ11 and RJ14 network interfaces to the control unit, follow the steps below:

1 Test the central office trunks for proper connection.

See “Testing Trunks,” later in this chapter, for instructions.

2 Label the network interface jacks, the control unit module jacks, and the D2R cords properly.

See “Labeling Trunks,” later in this chapter, for instructions.

3 Plug one end of a D2R cord into the jack at the network interface and the other end into the appropriate line/trunk jack on the control unit.**4 Dress the wires properly.**

RJ2GX Interface

The RJ2GX is a 25-pair amphenol interface that connects up to 8 tie trunks. Construct the cross-connect field in the same way you did for the RJ21X interface.

RJ21X and RJ2GX interfaces do not require separate termination blocks. If there is room on the termination block for the trunk wires, you can punch down both the RJ21X and the RJ2GX on the same 110AB1 -100JP12 block. Leave any unused wires unterminated.

**CAUTION:**

Be careful not to connect tie trunks to GS, LS, or DID ports. Since all the jacks on the termination block are 8-wire jacks, it is possible to interchange tie trunk wires with GS, LS, or DID wires accidentally.

RJ48C/X Interface

The RJ48C/X interface terminates a DS1 trunk at the customer's premises. Both RJ48C and RJ48X interfaces have 8-wire modular jacks. However, the RJ48X interface includes shorting bars that loop the DS1 trunk's receive pair to the transmit pair. This helps in testing the DS1 trunk from the central office.

Testing Trunks

Before you connect the central office trunks to the control unit, verify that there is dial tone and that you can dial out on every trunk. DID trunks can be tested only through the control unit. *Do not* test DID trunks at this time.

**CAUTION:**

Do not use analog multiline telephones or MLX telephones for testing. They do not work for these tests and can be damaged if you use them for this purpose.

Testing Loop-Start Trunks

To perform this test, you need a single-line telephone or an installer's test telephone (craft set). If you are installing rotary-dial trunks, use a rotary telephone to perform this test.

To test loop-start trunks, follow the steps below:

- 1 Plug the single-line telephone or the craft set into each central office line/trunk jack (either at the network interface or at the cross-connect field) and listen for dial tone.**

2 If you find a central office trunk that does not have dial tone, check for a bad adapter or loose connection.

If adapters and wiring are in working order but you still do not hear a dial tone, notify the AT&T Service Center acting as the customer's agent.

3 When you hear a dial tone, dial a known telephone number to verify dialing.

After the central office completes the connection, check that you have good two-way transmission.

4 If you cannot dial out on any of the trunks, notify the AT&T Service Center acting as the customer's agent.

It is the customer's responsibility (or that of the customer's agent) to report service outages to the local telephone company.

Testing Ground-Start Trunks

To perform this test, you need a single-line telephone with a ground key or a ground-start button.

NOTE:

If a single-line telephone with a ground key or ground-start button is not available, ground one side of the trunk.

To test ground-start trunks, follow the steps below:

1 Plug the single-line telephone into each central office line/trunk jack (either at the network interface or at the cross-connect field).

2 Pick up the handset.

You should hear a dial tone.

3 Ground the ring lead by pushing the ground key or ground button, or by grounding one side of the trunk.

4 Remove the ground from the ring lead.

5 Dial a telephone number to verify dialing.

Also, check that you have good two-way transmission after the central office completes the connection.

- 6 If you find a central office trunk that does not have dial tone, check for a bad adapter or loose connection.**

If adapters and wiring are in working order but you still do not hear dial tone, notify the AT&T Service Center acting as the customer's agent.

- 7 If you cannot dial out on any of the trunks, notify the AT&T Service Center acting as the customer's agent.**

Labeling Trunks

You can have up to 80 central office line/trunk jacks on the system. This procedure describes how to label each D2R or D8W cord, network interface jack, and control unit module jack.

To label trunks, follow the steps below:

- 1 Review System Form 2c, System Numbering: Line/Trunk Jacks to determine each central office trunk assignment on the control unit.**

- 2 Place a green cord label at each end of every D2R or D8W cord. (These labels are packaged with the basic carrier.)**

The green label indicates the number of the central office line/trunk jack to which the cord is connected.

- 3 Label the jacks on the termination blocks,**

- 4 Leave a copy of System Form 2c in a secure place near the control unit.**

Installing the Channel Service Unit

The Channel Service Unit (CSU) provides the interface between the 100D module and the DS1 facilities. The system supports three basic models:

- ACCULINK 3150 CSU (You may also install an ACCULINK 3160 or 3164 CSU; these provide 2- or 4-data ports, respectively.)
- ESF (Extended Superframe format) T1 CSU
- 551 T1 CSU

only the ACCULINK CSUs are available for installation. For more information about the ESF T1 CSU and the 551 T1 CSU, see *Maintenance and Troubleshooting*.

The operator's guides shipped with the ACCULINK CSUs provide detailed installation, set-up and operation, and maintenance and troubleshooting information. Refer to one of these guides if your installation calls for an ACCULINK channel service unit.

NOTE:

Before you can install a CSU, the local telephone company must provide information such as services available, equipment options, and 48-V DC power on the trunk.

ACCULINK CSUs

The AT&T Paradyne ACCULINK CSUs replace the ESF T1 CSU. They are fully compatible with the ESF units.

The ACCULINK CSUs differ from the ESF T1 CSU in the following ways:

- The ACCULINK front panels include an LCD display and 7-button keypads composed of three functional and four directional keys.
- They contain integral 2400-bps modems for remote access and alarm reporting.
- The front-panel LEDs are labeled and colored differently from the ESF T1 CSU.
- The NETWORK connectors on the rear of the ACCULINK models are 8-pin modular jacks (RJ48C) instead of male 15-pin D-connectors. Cables are shipped with the units for the CSU-to-Smart Jack connection.

- There are no DIP switch options. All options are set via software commands. Access the options in the following ways:
 - Locally, from the front panel
 - Remotely, using the integral 2400-bps modem. The front panel of a local ACCULINK, in Passthrough mode, can access and option a remote CSU
 - Locally and remotely, through the COMPORT connector on the rear and a PC loaded with a Windows™ software package (available at an extra charge from Paradyne)

The ACCULINK CSUs come equipped with two factory-set option configurations: Factory 1 (Fact 1) and Factory 2 (Fact 2). They leave the factory set at Fact 1. Two of the default parameters in Fact 1 are ESF/B8ZS. In the Fact 2 setting, two of the default parameters are D4/AMI.

The CSUs offer a number of front-panel alarms and monitor alarm conditions occurring either on the network interface or on the DTE interface. If an ACCULINK CSU detects two alarm conditions at the same time, it reports the higher priority alarm. Alarms remain active until the alarm condition is cleared.

Network performance is continually monitored and maintained by internal memory registers when the network interface is configured for ESF operation. The registers collect performance data for the previous 24-hour period.

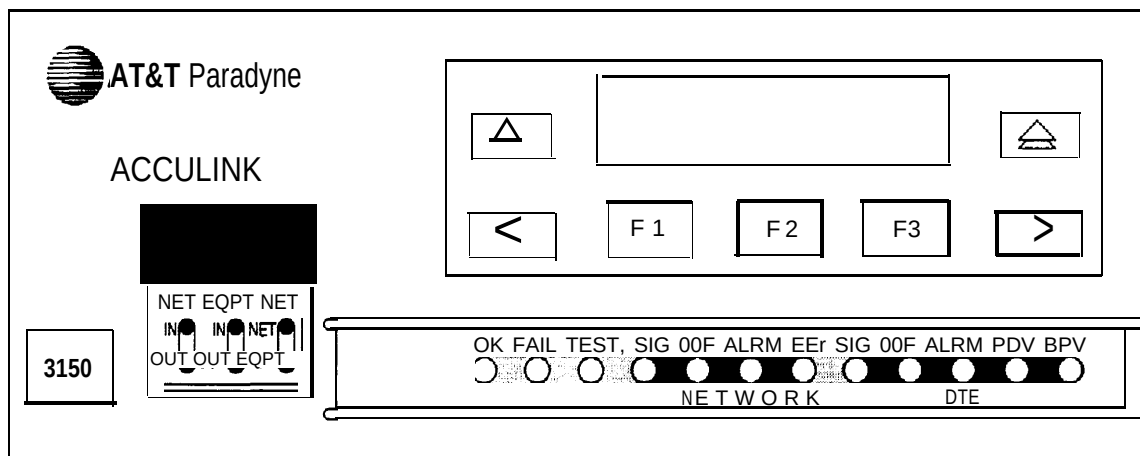


Figure 4-6.3150 Front Panel

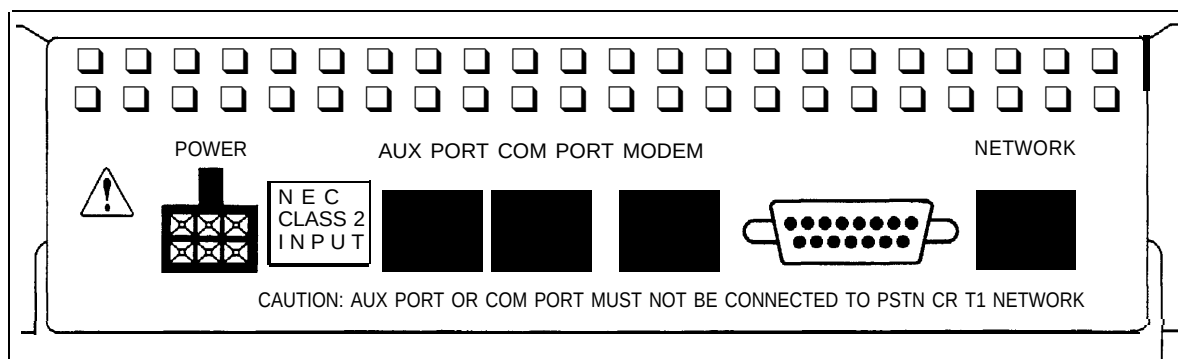


Figure 4-7.3150 Back Panel

Installing the PC, CAT, or Printer

5

Once you complete the installation procedures presented in the previous chapters, you can connect a Station Message Detail Recording (SMDR) or Call Accounting Terminal (CAT) printer and a personal computer (PC), or a CAT and CAT printer, to the system.

Connecting a PC to the Control Unit

You can use a PC with MS-DOS 3.3 or higher and SPM 3.XX for SMDR, system programming, or maintenance. The method you use to connect the PC to the control unit depends on the distance between the hardware:

- If the PC is within 50 ft. (15.2 m) of the control unit, see “Connecting a PC Within 50 Feet” on the following page.
- If the PC is more than 50 ft. (15.2 m) from the control unit, see “Connecting a PC More Than 50 Feet Away” later on this chapter.



CAUTION:

To prevent damage from electrostatic discharge (ESD), avoid touching leads, connectors, pins, and other components. Use a properly grounded wrist strap.

Connecting a PC Within 50 Feet

Use this procedure to connect a PC to the control unit when the PC is within 50 ft. (15.2 m) of the control unit.

You need the following hardware for this procedure:

- 355AF adapter
- D8W cord
- EIA-232-D cable (optional)

To connect a PC within 50 ft. (15.2 m) of the control unit, follow the steps below. See Figure 5-1.

1 Connect the D8W cord.

- For system programming or maintenance, plug one end of a D8W cord into the ADMIN jack on the control unit.
- For SMDR, plug one end of a D8W cord into the SMDR jack on the control unit.

2 Plug the other end of the D8W cord into a 355AF adapter.

3 Connect the 355AF adapter.

- If you are using an EIA-232-D cable, plug one end of the cable into the 355AF adapter and plug the other end into the COM1 port on the PC.
- If you are not using an EIA-232-D cable, plug the 355AF adapter directly into the COM1 port on the PC.

Connecting a PC to the Control Unit

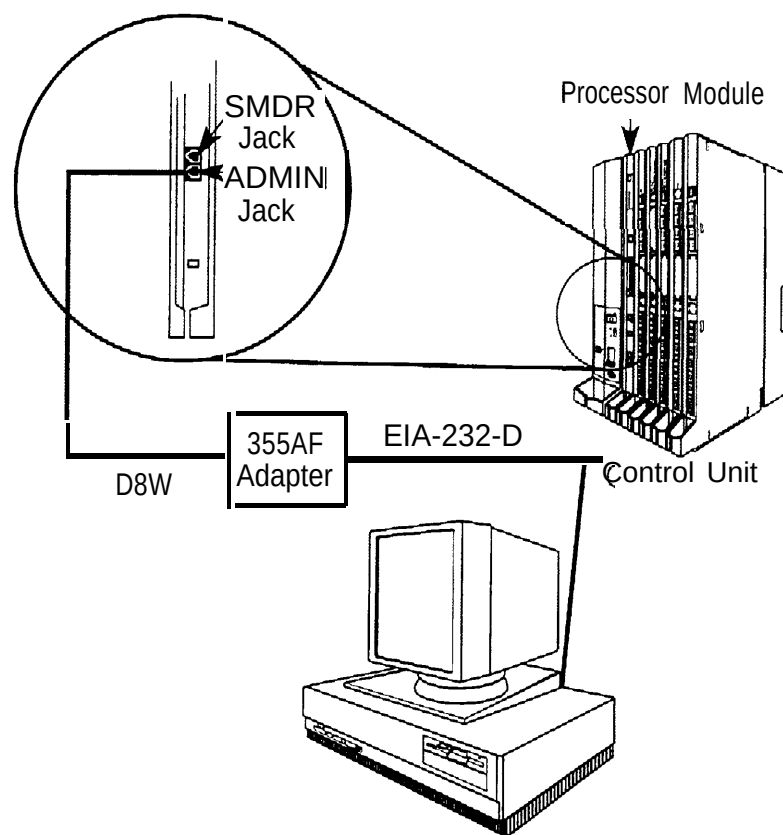


Figure 5-1. Connecting a PC Within 50 ft. (15.2 m)

Connecting a PC More Than 50 Feet (15.2 m) Away

Use this procedure to connect a PC to the control unit when the distance is 50 ft. (15.2 m) or more.

NOTE:

If you are installing the PC in a different room than the control unit, make sure that both locations have working wall outlets and wall jacks. Also make sure that the building wiring has been connected so that the wall jacks in each location connect to each other.

You need the following hardware for this procedure:

- 355AF adapter
- EIA crossover cable
- Two Z3A2 Asynchronous Data Units (ADUs)
- ADU crossover cable
- 400B2 power adapter
- 2012D transformer
- BR1A-4P adapter and 102 connecting block or 103 connecting block
- 248B adapter
- 8-position wall jacks
- 4-pair plug-ended cable
- D8W cords
- D6AP power cord
- EIA-232-D cables

Connecting a PC to the Control Unit

To connect a PC 50 ft. (15.2m) or more distant, follow the steps below.
See Figure 5-2.

- 1 Plug one end of a D8W cord into the ADMIN jack on the control unit.**
- 2 Plug the other end of the D8W cord into a 355AF adapter.**
- 3 Connect an EIA crossover cable to the 355AF adapter.**
- 4 Connect one end of an EIA-232-D cable to the EIA crossover cable and plug the other end into the 25-pin male connector on the Z3A2 ADU.**



CAUTION:

if the PC is in a building outside the main building (control unit location), you must install an ADU and an additional protector in each building. The ADUs and protectors provide both the control unit and the PC with additional protection against lightning, inadvertent contact with power lines, and power currents induced by nearby power lines. For more information, see the installation notes packaged with the ADU.

- 5 Plug one end of a D8W cord into the WALL jack on the Z3A2 ADU and connect the other end to an ADU crossover cable.**
- 6 Plug the other end of the ADU crossover cable into one of the jacks on a 400B2 power adapter.**
- 7 Plug one end of a D6AP cord into the 400B2 power adapter.**
- 8 Plug the other end of the D6AP cord into a 2012D-50M transformer.**
- 9 Plug the 400B2 power adapter into a wall jack, BR1A-4P adapter, 102 connecting block, or 103 connecting block.**

- If you plug the 400B2 into a wall jack, make sure the building wiring has been set up so that the wall jack near the control unit is connected to the wall jack near the PC.
- If you plug the 400B2 into a BR1A-4P adapter, 102 connecting block, or 103 connecting block, use 4-pair plug-ended cable to connect the BR1A-4P adapter (or connecting block) to the wall jack near the PC.

Connecting a PC to the Control Unit

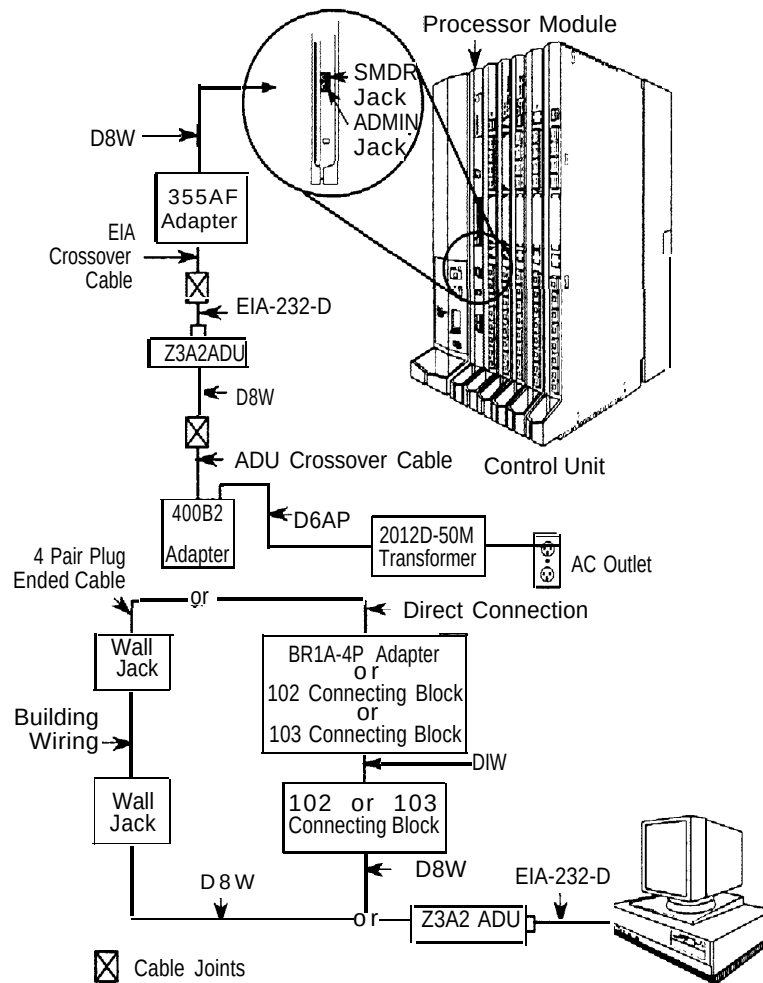


Figure 5–2. Connecting a PC More Than 50 ft. (15.2 m) Away

- 10 On the PC side, plug one end of a D8W cord into a wall jack and the other end into the WALL jack on the Z3A2 ADU.
- 11 Plug one end of an EIA-232-D cable into the 25-pin male connector on the Z3A2 ADU and the other end into the COM1 port on the PC.
- 12 Plug the 2012D-50M transformer into a wall outlet.

Connecting a CAT to the Control Unit

The Call Accounting Terminal (CAT) is a stand-alone unit that provides call accounting information. It connects to the SMDR jack on the control unit and links the control unit to the CAT printer. The connection of the CAT to the control unit depends on the distance and whether the CAT and control unit share the same AC outlet.

The CAT and CAT printer are connected at the same time. For more information, see “Call Accounting Terminal” in Chapter 8.

- If the CAT is grounded to the same AC outlet as the control unit and the CAT and CAT printer are within 14 ft. (4.27 m) and 50 ft. (15.2 m), respectively, of the control unit, refer to “Connecting a CAT and Printer on the Same AC Outlet.”
- If the CAT is either not grounded to the same AC outlet as the control unit or is more than 14 ft. (4.27 m) from the control unit, refer to “Connecting a CAT and Printer on a Different AC Outlet.”



CAUTION:

To prevent damage from electrostatic discharge (ESD), avoid touching leads, connectors, pins, and other components. Wear a properly grounded wrist strap.

Connecting a Printer to the Control Unit

You can connect any 1200-bpi serial printer set at no parity and one stop bit. If necessary, consult the printer's manual to ensure that these settings are in effect. The system supports the following AT&T printers:

- AT&T 572 Printer
- AT&T 475/476 Printer

- AT&T Call Accounting Terminal (CAT) Printer
- AT&T Call Accounting System Printer
- AT&T Applications Printer

NOTE:

The AT&T 570 printer is not compatible with the system.

Printer connection varies depending on the printer model, whether the printer is grounded on the same AC outlet as the control unit, and whether the printer is within 50 ft. (15.2 m) of the control unit. The procedures covered in this chapter are described below:

- If the CAT serial printer is used with a CAT and is grounded to the same AC outlet as the control unit and is *within* 50 ft. (15.2 m) of the control unit, refer to “Connecting a CAT and Printer on the Same AC Outlet.”
- If the CAT serial printer is used with a CAT and is either *not* grounded to the same AC outlet as the control unit or is *more* than 50 ft. (15.2 m) from the control unit, refer to “Connecting a CAT and Printer on a Different AC Outlet.”
- If the SMDR or CAT printer is *within* 50 ft. (15.2 m) of the control unit and is connected to the same 117-V AC branch as the control unit, refer to “Connecting a Printer Within 50 Feet (15.2 m).”
- If the SMDR or CAT printer is *more* than 50 ft. (15.2 m) from the control unit and is *not* connected to the same 117-V AC branch as the control unit, refer to “Connecting a Printer 50 Feet (15.2 m) or More Away.”



CAUTION:

Before touching leads, connectors, pins, and other components, wear a properly grounded wrist strap, to prevent damage from electrostatic discharge (ESD).

Connecting a CAT and Printer on the Same AC Outlet

Use this procedure to connect a CAT and CAT serial printer into the same AC outlet as the control unit, provided the CAT is fewer than 14 ft. (4.27 m) and the printer is fewer than 50 ft. (15.2 m) from the control unit.

You need the following hardware for this procedure:

- Z200A EMI filter
- D8W cord
- 355A adapter

To connect a CAT and CAT printer on the same AC outlet, follow the steps below. See Figure 5-3.

- 1 Plug the short end of the Z200A EMI cord into the SMDR jack on the control unit.**
- 2 Plug the other end of the Z200A EMI cord into the SMDR jack on the back of the CAT.**
- 3 Plug one end of a D8W cord into the PRINTER jack on the back of the CAT.**
- 4 Plug the other end of the D8W cord into a 355A adapter.**
- 5 Plug the 355A adapter into the serial port on the back of the printer.**
- 6 Set the appropriate printer options for SMDR.**

See “Setting Printer Options and DIP Switches,” later in this chapter, for instructions.

Connecting a Printer to the Control Unit

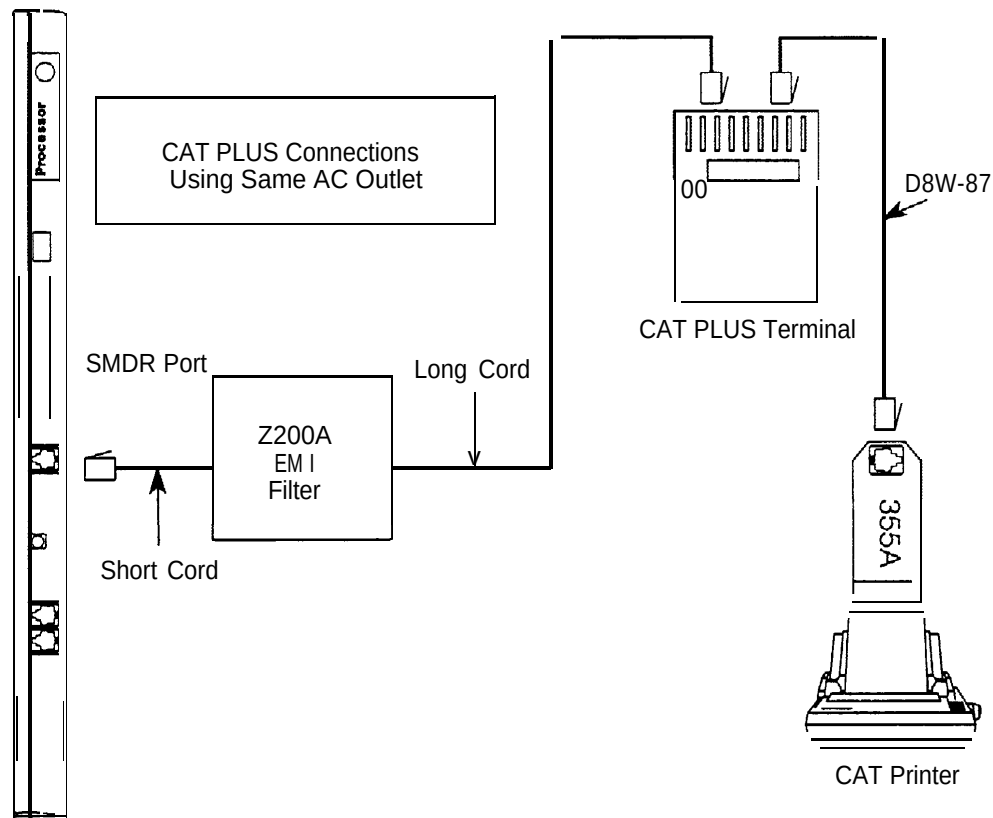


Figure 5-3. Connecting a CAT and Printer on the Same AC Outlet

Connecting a CAT and Printer on a Different AC Outlet

If the printer is not grounded to the same AC outlet as the control unit or CAT or if the printer is more than 50 ft. (15.2 m) from the control unit, use the following procedure to connect a CAT serial printer to the control unit.

NOTE:

If you are installing the printer in a different room than the control unit, make sure that both locations have working wall outlets and wall jacks, and that the building wiring has been connected so that the wall jacks in each location connect with each other.

You need the following hardware for the following procedure:

- 248B adapters
- 355AF, 355A adapters
- 400B2 power adapters
- D8W cords
- D6AP power cords
- D8AM modular crossover cable
- M7U null modem cable (25 pin cable)
- Z3A2, Z3A4 ADUs
- 2012D transformer
- Z200A EMI filter

To connect a CAT printer on a different AC outlet, first make the connections at the control unit, then at the printer.

Follow the steps below to make the connections at the control unit. Refer to Figure 5–4 throughout the procedure.

- 1 Plug the short end of a Z200A EMI cord into the SMDR jack on the control unit.**
- 2 Plug the other end of the Z200A EMI cord into a 355AF adapter.**
- 3 Plug the 355AF into one end of an M7U null modem cable.**
- 4 Plug the other end of the M7U null modem cable into the 25-pin female connector on a Z3A4 ADU.**
- 5 Plug one end of a D8W cord into the WALL jack on the Z3A4 ADU.**
- 6 Plug the other end of the D8W cord into a modular jack on the D8AM modular crossover cable.**
- 7 Plug the other end of the D8AM modular crossover cable into the top jack on the 400B2 power adapter.**
- 8 Plug the 400B2 power adapter into the wall jack for the control unit.**

Make sure the building wiring is set up so that the wall jack for the control unit can communicate with the wall jack for the printer.

- 9 Plug one end of a D6AP cord into the 2012D-50M transformer.**

If you are using a 248B adapter and 2012D transformer instead of a 2012D-50M transformer, plug the D6AP cord into the jack on the 248B adapter, and then connect the spade-tip wires on the 248B adapter to the screws on a 2012D transformer.

Connecting a Printer to the Control Unit

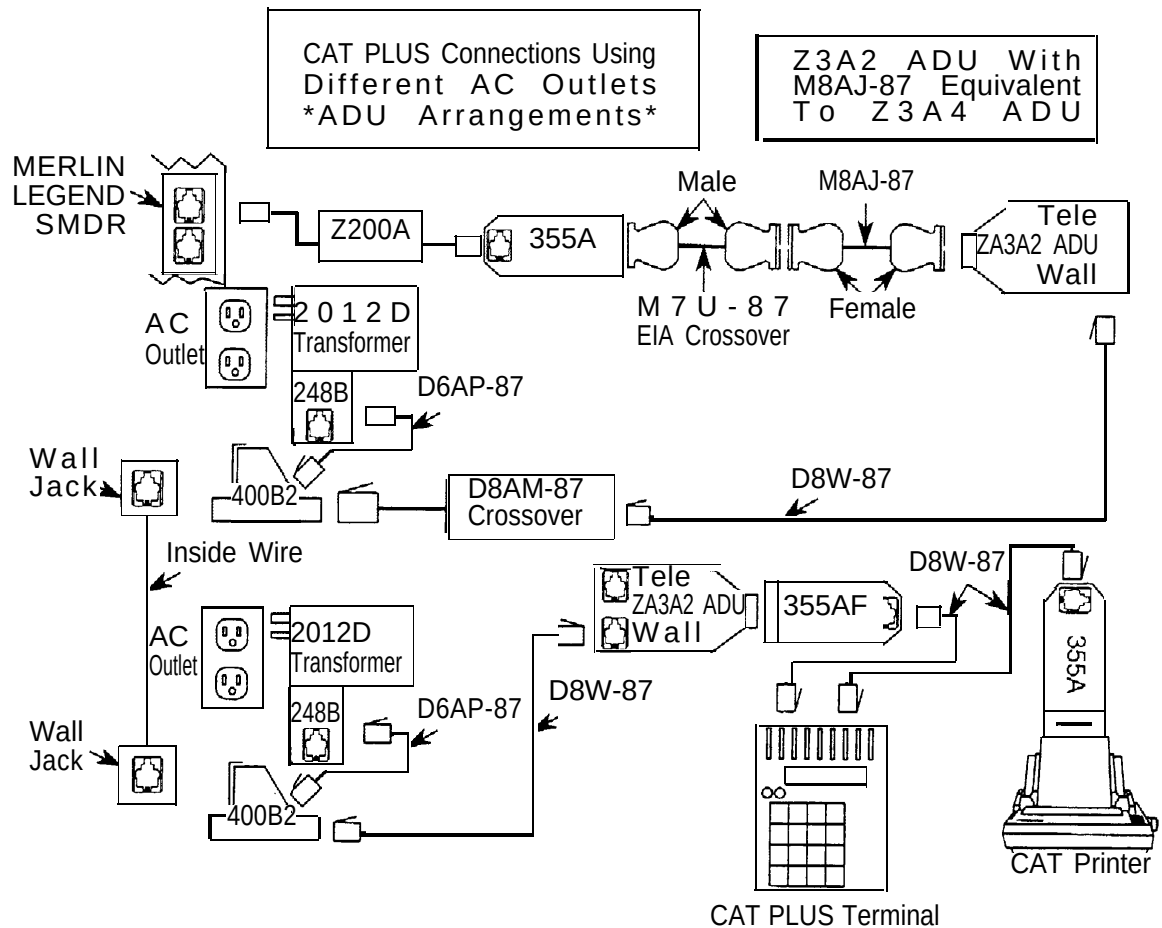


Figure 5-4. Connecting a CAT and Printer on Different AC Outlets: Control Unit Connections

- 10 Plug the other end of the D6AP cord into the lower jack on the 40062 power adapter.
- 11 Plug the 2012D-50M (or 201213) transformer into the wall outlet for the control unit.

Connecting a Printer to the Control Unit

To make the connections at the printer, follow the steps below. See Figure 5-4.

- 1 At the printer location, plug one end of a D6AP cord into a 2012D-50M transformer, or follow the instructions in Step 9 above.**
- 2 Plug the other end of the D6AP cord into the lower jack on a 400B2 power adapter.**
- 3 Plug the 400B2 power adapter into the wall jack.**
- 4 Plug the 2012D-50M (or 201213) transformer into the wall outlet for the printer.**
- 5 Plug one end of a second D8W cord into the top jack on the second 400B2 power adapter.**
- 6 Plug the other end of the second D8W cord into the WALL jack on the Z3A2 ADU.**
- 7 Connect the 25-pin male connector on the Z3A2 ADU to the 25-pin female end on a second 355AF adapter.**
- 8 Plug one end of a third D8W cord into the second 355AF adapter.**
- 9 Plug the other end of the third D8W cord into the SMDR jack on the back of the CAT.**
- 10 Plug one end of a fourth D8W cord into the PRINTER jack on the back of the CAT.**
- 11 Plug the other end of the fourth D8W cord into a third 355A adapter.**
- 12 Slide the third 355A adapter into the serial port on the back of the printer.**
- 13 Set the appropriate printer options for SMDR.**

See "Setting Printer Options and DIP Switches" for instructions.

Connecting a Printer Within 50 Feet (15.2 m)

If the printer is within 50 ft. (15.2 m) of the control unit and is connected to the same 117-V AC branch as the control unit, use this procedure to connect a printer to the control unit.

You need the following hardware for this procedure:

- Z200A EMI filter
- Adapter for the connector on the interface cable
 - 355A for a male connector
 - 355AF for a female connector

Connecting a Printer to the Control Unit

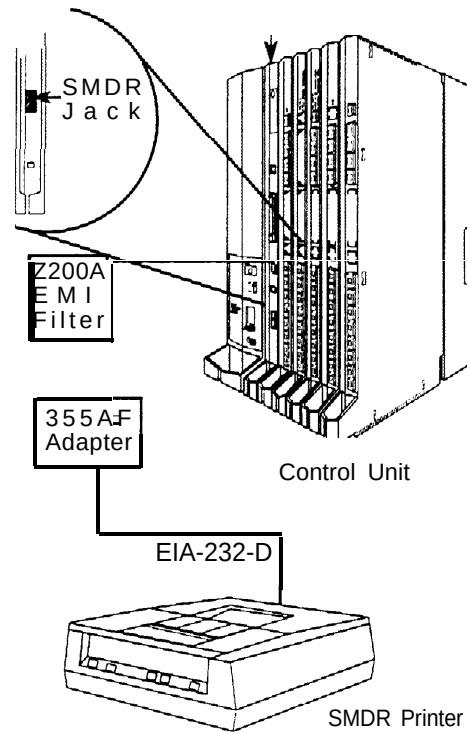


Figure 5-5. Connecting a Printer Within 50 ft. (15.2 m)

To connect a printer within 50 ft. (15.2 m), follow the steps below. Refer to Figure 5-5.

- 1 Plug the short end of a Z200A EMI cord into the SMDR jack on the control unit.**
- 2 Plug the other end of the Z200A EMI cord into a 355AF or 355A adapter.**
- 3 Plug the female end of the adapter into the 25-pin male connector on the printer's interface cable, or into the serial port on the printer.**
- 4 Set the appropriate printer options for SMDR.**

See "Setting Printer Options and DIP Switches" for instructions.

Connecting a Printer 50 Feet (15.2 m) or More Away

Use this procedure to connect a printer to the control unit if the following conditions apply:

- The printer is not a CAT printer connected to a CAT.
- The printer is 50 ft. (15.2 m) or more from the control unit.
- The printer is not grounded to the same AC outlet as the control unit. The printer is not grounded to an outlet that is on the same 117-V AC branch as the control unit and that is 50 ft. (15.2 m) or closer to the control unit.

NOTE:

If you are installing the printer in a different room than the control unit, make sure that both locations have working wall outlets and wall jacks, and that the building wiring has been connected so that the wall jacks in each location communicate with each other.

You need the following hardware for this procedure:

- Z200A EMI filter
- Adapter for the interface cable connector
 - 355A for the male connector
 - 355AF for the female connector
- 400B2 power adapter
- Z3A2 ADUs
- BR1A-4P adapter or 102 connecting block or 103 connecting block
- 8-position wall jacks
- EIA crossover cable
- ADU crossover cable
- 2012D transformer

- 248B adapter
- D8W cords
- D6AP power cord
- EIA-232-D cable
- 4-pair plug-ended cable

To connect a printer 50 ft. (15.2 m) or more away from the control unit, follow the steps below. See Figure 5-6.

- 1 Plug the short end of a Z200A EMI cord into the SMDR jack on the control unit.**
- 2 Plug the other end of the Z200A EMI cord into a 355AF adapter.**
- 3 Plug the female end of the 355AF adapter into one end of an EIA crossover cable.**
- 4 Plug the other end of the EIA cable into the 25-pin male connector of the Z3A2 ADU.**



CAUTION:

If the printer is in a building outside the main building (control unit location), you must install an ADU and an additional protector in each building. The ADUs and protectors provide both the control unit and the printer with additional protection against lightning, inadvertent contact with power lines, and power currents induced by nearby power lines. See the installation notes packaged with the ADU for more information.

- 5 Plug one end of a D8W cord into the WALL jack on the Z3A2 ADU.**
- 6 Plug the other end of the D8W cord into an ADU crossover cable.**
- 7 Plug the other end of the ADU crossover cable into one of the jacks on a 400B2 power adapter.**
- 8 Plug one end of a D6AP cord into the other jack of the 400132 adapter.**



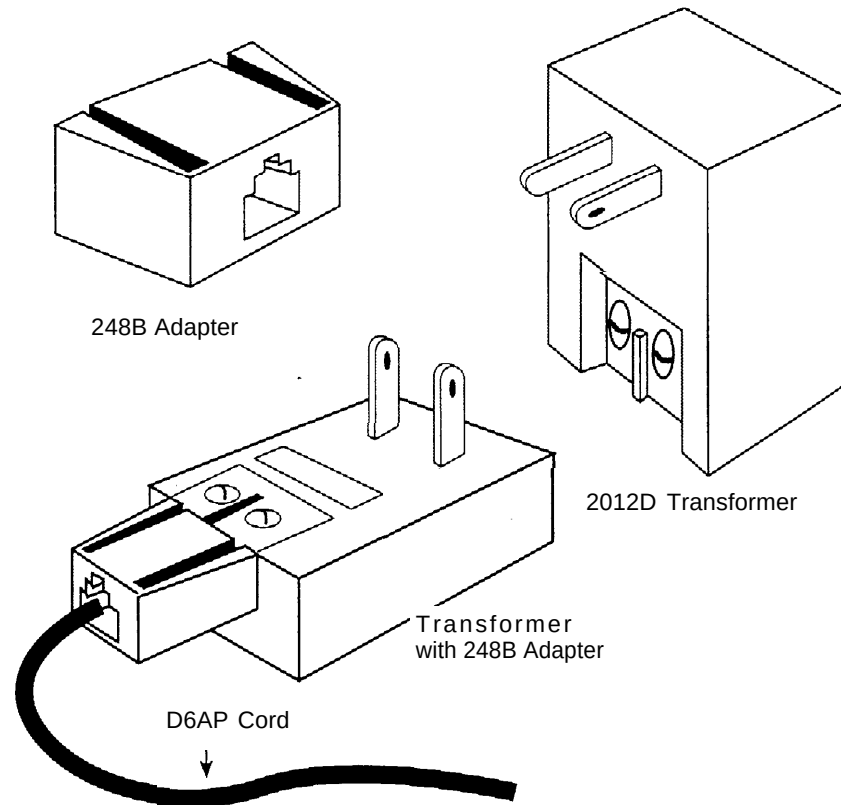


Figure 5-7. Connecting the 24813 Adapter and the 201213 Transformer

9 Plug the other end of the D6AP cord into the 2012D-50M transformer.

If you are working with a 248B adapter and 2012D transformer instead of a 2012D-50M transformer, plug the D6AP cord into the jack on the 248B adapter, and then connect the spade-tip wires on the 248B adapter to the screws on a 2012D transformer. See Figure 5–7.

10 Plug the 40092 adapter into a wall jack, BRI A-4P adapter, 102 connecting block, or 103 connecting block.

11 Complete the 400B2 connection.

- If the 400B2 is plugged into a wall jack, make sure that building wiring has been set up so that the wall jack for the control unit can communicate with the wall jack for the printer.
- If the 400B2 is plugged into a BRIA-4P adapter, 102 connecting block, or 103 connecting block, use 4-pair plug-ended cable to connect the BRIA-4P adapter (or connecting block) to the wall jack for the printer.

12 On the printer side, plug one end of a D8W cord into the wall jack and the other end into the WALL jack on the Z3A2 ADU.

13 Plug one end of an EIA-232-D cable into the 25-pin male connector on the Z3A2 ADU and the other end into the serial port on the printer.

14 Plug the 2012D-50M (or 2012D) transformer into a wall outlet.

15 Set the appropriate printer options for SMDR.

See “Setting Printer options and DIP Switches” for instructions.

Setting Printer Options and DIP Switches

If the customer has an AT&T 572, AT&T 475/476, CAT, or AT&T Applications printer, use this section to set up printer options. If another type of serial printer is being used, review these setup options for guidance and consult the manual for the printer. Use the information below to determine the correct printer setting for the printer:

- For the 572 printer, set the options on the printer according to Table 5-1. (See the user’s guide supplied with the printer for more information.)
- For the 475/476 printer, set the DIP switches on the printer according to Table 5–2. (See the user’s guide supplied with the printer for more information.)
- For the CAT printer, set the DIP switches on the printer according to Table 5–3. (See the user’s guide supplied with the printer for more information.)
- For the Applications printer, set all the DIP switches on the printer to *off*. (See the user’s guide supplied with the printer for more information.)

Table 5–1. AT&T 572 Printer Options

No.	Function	Menu	Status
01	FORM LENGTH	09	11
02	LPI	01	6
03	CPI	01	10
04	LQ or NLQ	01	LQ
05	BUZZER	01	ON
06	FONT	01	BUILT-"IN"
07	RESOLUTION	01	144
11	BUFFER	02	ON-"LINE"
13	PW ON MODE	01	ON-"LINE"
14	DIRECTION	01	BI-DIR.1
15	BUFFER FULL	02	LF + CR
16	P. E.	01	ACTIVE
77	AUTO CR	01	CR + LF
18	ZERO	01	0
22	AUTO LF	01	CR ONLY
31	1" SKIP	01	OFF

Continued on next page

Table 5-1, Continued

No.	Function	Menu	Status
32	CHAR. SET (GO, GL)	02	USA
33	CHAR. SET (G1 , GR)	01	UK
34	CHAR. SET (G2)	03	GE
35	CHAR. SET (G3)	0	"LINE" DRAWING
81	OFF-"LINE" STATE	01	ALL RECEIVE
82	DSR	02	OFF
83	RTS TIMING	01	RTS
84	CD	02	OFF
85	CTS	02	OFF
91	OVER RUN	02	256
92	DATA BIT	02	8
93	PROTOCOL	03	XON/XOFF*
94	STOP BIT	01	2
95	PARITY	01	NON
96	BPS	04	1200

*

This is the default status, but the system cannot read the character sent by the printer.

Table 5–2. AT&T 475/476 Printer DIP Switch Settings*

Switch 1	Switch 2	Switch 21
DIP 1-Open	DIP 1-Open	DIP 1-Open
DIP 2-Closed	DIP 2-open	DIP 2-Open
DIP 3-Open	DIP 3-Open	DIP 3-Open
DIP 4-Open	DIP 4-Open	DIP 4-Closed
DIP 5-Closed	DIP 5-Open	DIP 5-Open
DIP 6-Closed	DIP 6-Open	DIP 6-Open
DIP 7-Closed	DIP 7-Closed	DIP 7-Open
DIP 8-Open	DIP 8-Open	DIP 8-Closed
Switch 22	Switch 23	Switch 24
DIP 1-Open	DIP 1-Closed	DIP 1-Open
DIP 2-Closed	DIP 2-Open	DIP 2-Closed
DIP 3-Closed	DIP 3-Open	DIP 3-Closed
DIP 4-Open	DIP 4-Open	DIP 4-Open
	DIP 5-Closed	DIP 5-Open
	DIP 6-Open	DIP 6-Closed
		DIP 7-Open
		DIP 8-Closed

* Open = off; Closed = on

Table 5-3. AT&T CAT Printer DIP Switch Settings*

Switch 1	Switch 2	Control Switch
DIP 1-On	DIP 1-On	DIP 1-Off
DIP 2-On	DIP 2-On	DIP 2-CM
DIP 3-On	DIP 3-Off	DIP 3-Off
DIP 4-On	DIP 4-Off	DIP 4-Off
DIP 5-On	DIP 5-On	DIP 5-On
DIP 6-On	DIP 6-On	DIP 6-Off
DIP 7-On	DIP 7-On	DIP 7-On
DIP 8-On	DIP 8-Off	DIP 8-Off

* Open = off; Closed = on

Applications Printer DIP Switch Settings

For the Applications Printer, the only DIP switch setting is the control switch. Set all control switch DIP switches (1 through 8) to Off (open),

Connecting Data Equipment

6

This chapter explains how to set up data stations. A data station sends and/or receives data. If the data station includes a telephone, the station can also send and receive voice. If the system includes both modem and 7500B data stations that need to communicate with each other, then you need to set up a modem pool for those data stations. Modem pools are described in the applications note entitled *MERLIN LEGEND Communication System Modem Pooling*.

Data Stations

A data station is a combination of equipment that can include a telephone and a PC, printer, optical scanner, or fax machine. If the data station is connected to a tip/ring, analog, or MLX extension jack for data communications over analog trunks, it requires a modem to convert the signal from digital to analog or from analog to digital. If, however, the data station is connected to an MLX extension jack for data communications over a DS1 (Digital Signal Level 1) Primary Rate Interface (PRI) facility, it requires an ISDN 750013 Data Module instead of a modem.

Table 6-1 provides a detailed comparison of data station configurations.

Table 6-1. Data Station Configurations

Type of Station	Telephone (for voice)	GPA or MFM	DCE	DTE
Analog voice and modem data	Analog multiline telephone and BR-241-B1 bridging adapter	GPA	Modem	Terminal, PC, fax (cannot dial), optical scanner, or host computer
Modem data-only*	None	None	Modem	Terminal, PC, fax, credit card verification, optical scanner, or host computer
MLX voice and modem data	Any MLX telephone	MFM	Modem	Terminal, PC, fax, credit card verification, optical scanner, or host computer
MLX voice and 7500B data	Any MLX telephone	None	75006 Data module	Terminal, PC, fax, credit card verification, optical scanner, host computer, or video codec
7500B data-only	None	None	7500B Data module and a 440A4 terminating resistor adapter	Terminal, PC, fax, credit card verification, optical scanner, host computer, or video codec

* A single-line telephone may be attached for dialing purposes.

NOTES:

1. The analog voice and modem data station requires a bridging adapter to connect the telephone to the two adjacent analog extension jacks.
2. The 7500B data-only station requires a terminating resistor adapter to connect the 75006 data module to the MLX extension jack.
3. See “Video Conferencing Data Stations,” later in this chapter, for configuration details on stations including video codecs.
4. The cord length from the 7500B data module to the telephone cannot be more than 80 ft. (24 m).
5. Do not connect two 7500B data modules on one line.

Modem Data Stations

A modem data station uses a modem to convert digital signals so that it can send and receive analog signals. This type of station allows data communication without PRI facilities.

The system supports the types of modem data stations listed below.

- **Analog Voice and Modem Data.** This station includes a data terminal and an analog multiline telephone.
- **Modem Data-Only.** This station includes a data terminal and modem. If this station’s modem has a phone jack, you can connect a single-line telephone; however, voice and data at the same time are not possible.
- **MLX Voice and Modem Data.** This station includes a data terminal, modem, and an MLX telephone.

See Form 2a, System Numbering: Extension Jacks for your customer’s specifications. Then refer to the appropriate section later in this chapter for instructions on setting up modem data stations.

7500B Data Stations

A 7500B data station uses a 7500B data module to convert MLX voice signals and DTE digital signals to the digital transmission signaling standard, so that it can send and receive digital signals. This type of station requires PRI facilities to send and receive data to and from digital data stations that are outside the system.

The system supports the following types of data stations connected to 7500B modules:

- **MLX Voice and 7500B Data.** This station includes a 7500B data module, data terminal, and an MLX telephone.
- **7500B Data-Only.** This station includes a 7500B data module, data terminal, and no telephone.

For your customer's specifications, see Form 2a, System Numbering: Extension Jacks and Form 2b, System Numbering: Digital Adjuncts. Then refer to the appropriate section later in this chapter for instructions on setting up 7500B data stations.

NOTE:

A video conferencing data station is a synchronous 7500B data station. Refer to "Video Conferencing Data Stations" for more information.

Analog Voice and Modem Data Stations

Figure 6-1 shows the equipment configuration for an analog voice and modem data station.

GPA Settings

The switch on the back of the General Purpose Adapter (GPA) used in Step 4, provides two settings, Automatic and Basic (Join is not used).

Use the Basic setting to:

- Originate modem calls
- Originate telephone calls while using the modem

When the GPA is connected to an analog multiline telephone and configured using the Automatic setting, you can:

- Answer calls (if this is the case, an Auto Answer All button must be programmed so that calls can be answered automatically).
- Make and receive calls on the telephone while using the modem, The speakerphone must not be used.

Setting Up

To setup an analog voice and modem data station, follow the steps below:

- 1 If Using an external modem use an EIA-232-D cable to connect the SERIAL portion the data terminal to the modem. If using an internal modem, it should already be connected to the correct serial port.**

If the data terminal has both COM1 and COM2 ports, make sure you use the one designated for data transmission. See the customer's system manager if you are not sure.

2 Make sure that the modem has settings for speed and parity that are compatible with those of the data terminal.

If you are not sure, see the customer's system manager or the documentation packaged with the modem, data communications software, and data terminal.

3 Connect the modem to the GPA.

- a Plug one end of a D4BU cord into the TEL/EQUIP jack on the GPA.
- b Plug the other end into the modem as indicated in the modem's documentation.

4 Connect the GPA to the analog multiline telephone.

- a Plug one end of a D8AC cord into the VT jack on the back of the GPA.
- b Plug the other end into the OTHER jack on the bottom of the telephone.
- c Slide the switch on the back of the GPA to Automatic or Basic. See "GPA Settings" above for your options.

5 Use a D8W cord to connect the STATION jack on the BR-241-B1 bridging adapter to the LINE jack on the analog multiline telephone.

6 Use two D8W cords to connect the EVENI and ODD jacks on the BR-241-B1 bridging adapter to the extension jacks indicated on Form 2a, System Numbering: Extension Jacks.

Connect the EVEN jack on the bridging adapter to the extension jack that is associated with the even-numbered extension, *not* the logical ID.

7 Connect all power cords to an AC outlet that is not controlled by a wall switch.

Analog Voice and Modem Data Stations

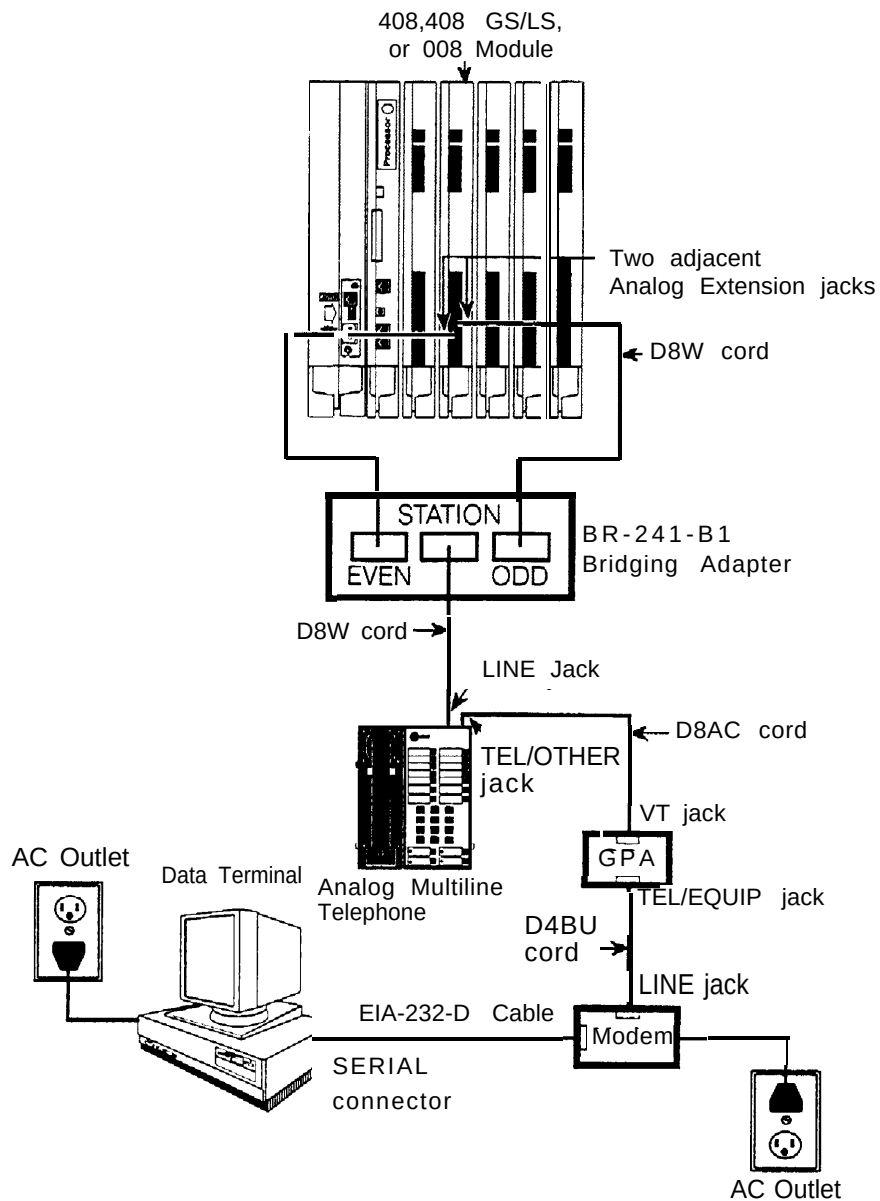


Figure 6-1. Analog Voice and Modem Data Equipment Configuration

Modem Data-Only Stations

Figure 6–2 shows the equipment configuration for a modem data-only station.

To setup a modem data-only station, follow the steps below:

- 1 If using an external modem, use an EIA-232-D cable to connect the modem to the serial port on the data terminal. If using an internal modem, it should already be connected.**

For a data terminal that has both COM1 and COM2 ports, make sure you use the one designated for data transmission. See the customer's system manager if you are not sure.

- 2 Make sure that the modem has settings for speed and parity that are compatible with those of the data terminal.**

If you are not sure, see the customer's system manager or the documentation packaged with the modem, data communications software, and data terminal.

- 3 Connect the modem to the control unit.**

- a Plug one end of a D4BU cord into the appropriate modem jack; see the modem's documentation if you are not sure.
- b Plug the other end into the appropriate basic extension jack on the 012 or 008 OPT module. See Form 2a, System Numbering: Extension Jacks for the appropriate module and extension jack.

- 4 Connect all power cords to an AC outlet that is not controlled by a wall switch.**

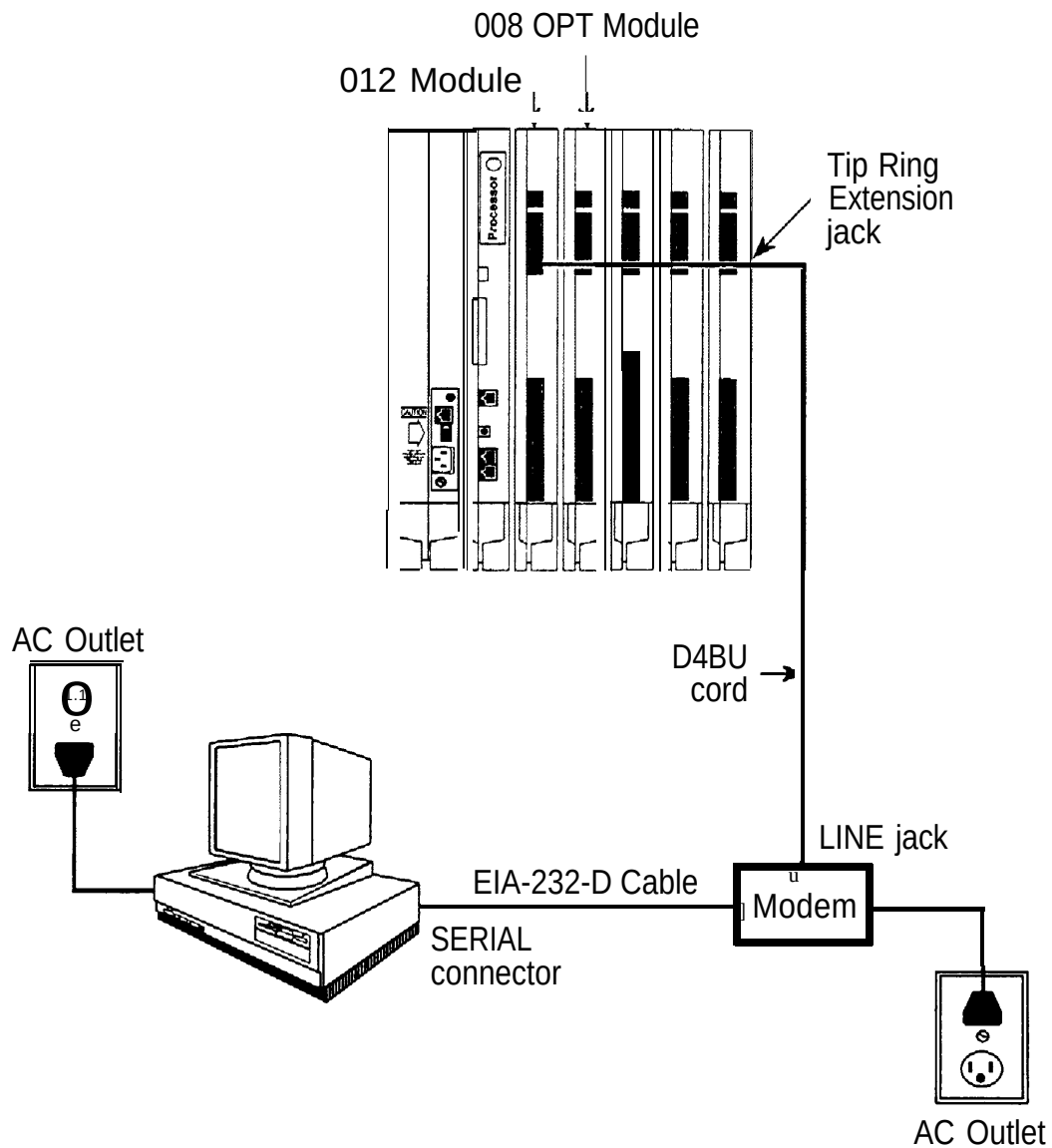


Figure 6-2. Modem Data-Only Equipment Configuration

MLX Voice and Modem Data Stations

Figure 6-3 shows the equipment configuration for an MLX voice and modem data station.

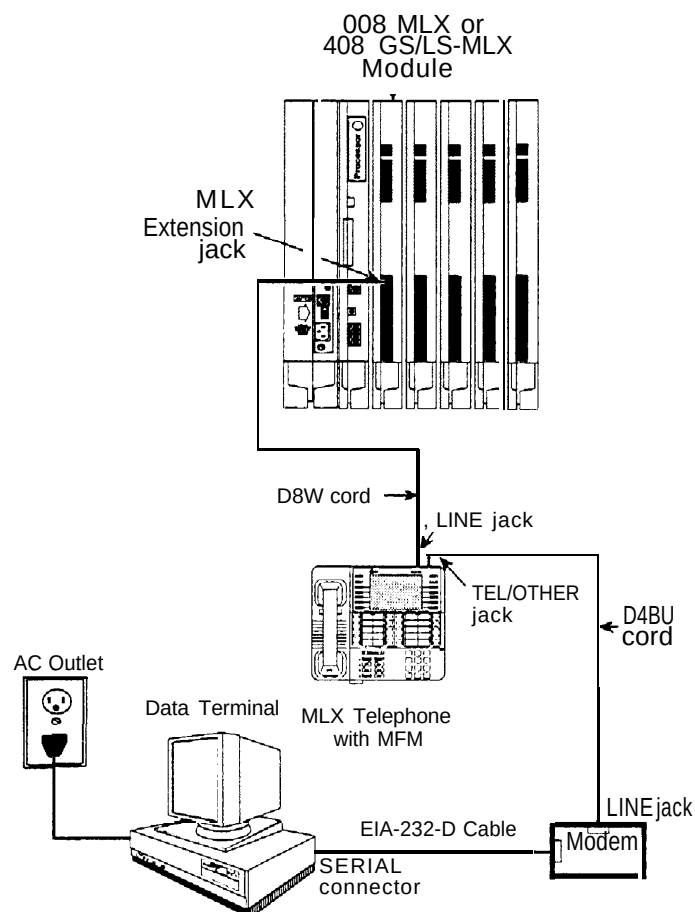


Figure 6-3. Modem Data and MLX Voice Equipment Configuration

To set up a modem data and MLX voice station, follow the steps below:

1 Use an EIA-232-D cable to connect the serial port on the data terminal to the modem.

For a data terminal that has both COM1 and COM2 jacks, make sure you use the one designated for data transmission. See the customer's system manager if you are not sure.

2 Make sure that the modem has settings for speed and parity that are compatible with those of the data terminal.

If you are not sure, see the customer's system manager or the documentation packaged with the modem, data communications software, and data terminal.

3 Connect the modem to the MFM in the MLX telephone.

If the MFM is not installed already, refer to "Installing Multi-Function Modules" in Chapter 3.

- a Plug one end of a D4BU cord into the appropriate modem jack, as described in the modem's documentation.
- b Plug the other end into the TEL/OTHER jack on the bottom of the MLX telephone.
- c Route the D4BU cord through the telephone's cord channel.

4 Connect the MLX telephone to the control unit.

- a Plug one end of a D8W cord into the LINE jack on the bottom of the MLX telephone.
- b Plug the other end into the appropriate MLX extension jack. See Form 2a, System Numbering: Extension Jacks for the appropriate module and extension jack.

5 Connect all power cords to an AC outlet that is not controlled by a wall switch.

MLX Voice and 7500B Data Stations

Figure 6-4 shows the equipment configuration for MLX voice and 7500B data station.

The configuration shown in Figure 6-4 is for *asynchronous* 7500B data transmission. For information on setting up *synchronous* 7500B data stations, see “Video Conferencing Data Stations,” later in this chapter.

The maximum cord length from the 7500B data module to the telephone is 80 ft. (24.38 m).

Setting Up

To set up an MLX voice and 7500B data station, follow the steps below:

- 1 Use an EIA-232-D cable to connect the serial port on the data terminal to the 7500B data module.**

If the data terminal that has both COM1 and COM2 connectors, make sure you use the one designated for data transmission. See the customer’s system manager if you are not sure.

- 2 Make sure the 7500B data module option settings for parity and speed are compatible with the data terminal. (Speed is synchronized automatically if the factory setting has not changed.)**

If you are not sure about the speed and parity of the data terminal, see the customer’s system manager or the documentation packaged with the 7500B data module and data terminal.

- 3 Plug the other end of the EIA-232-D cable into PORT 1 on the 7500B data module.**

- 4 Plug the WP90110-L7 power supply cord into the POWER receptacle on the 7500B data module.**

- 5 Connect the 7500B data module to the MLX telephone.**

- Plug one end of a D8W cord into the PHONE jack on the 7500B data module.
- Plug the other end into the LINE jack on the MLX telephone.

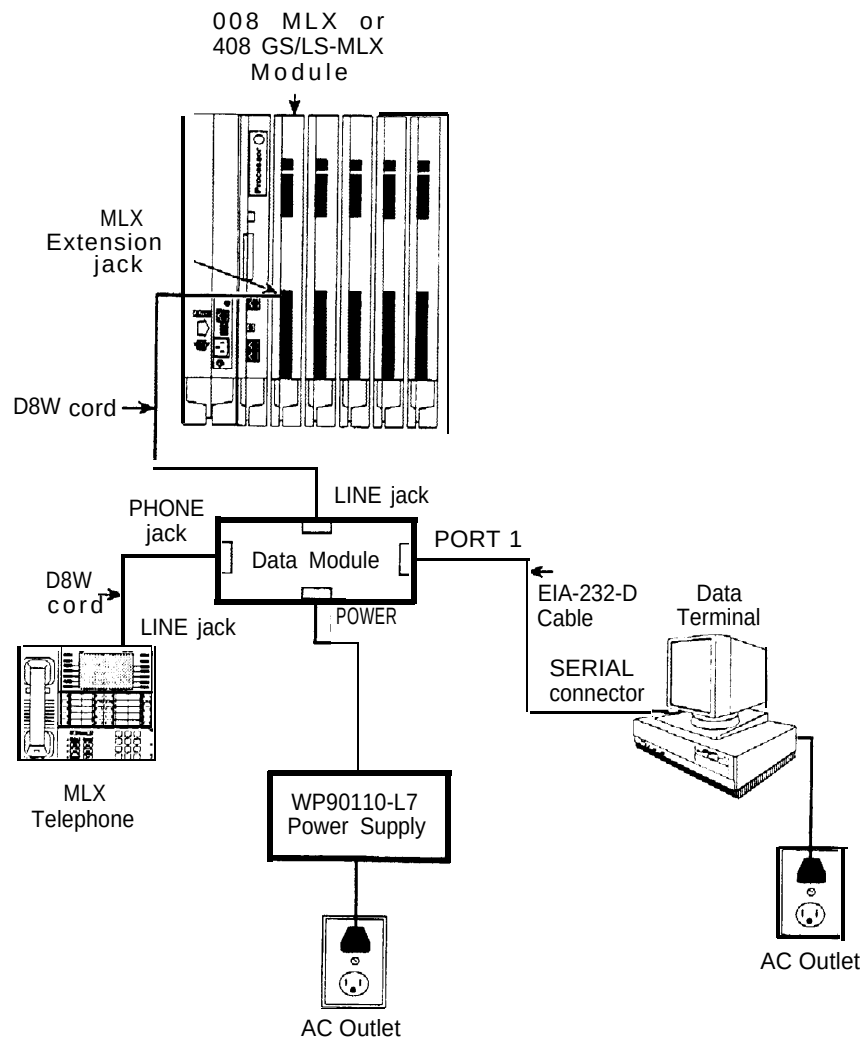


Figure 6-4. MLX Voice and 7500B Data Equipment Configuration

6 Connect the 7500B data module to the control unit.

- Plug one end of a D8W cord into the LINE jack on the 7500B data module
- Plug the other end into the appropriate MLX extension jack. See Form 2a, System Numbering: Extension Jacks for the appropriate module and extension jack.

7 Connect all power cords to an AC outlet not controlled by a wall switch.

7500B Data-Only Stations

Figure 6-5 shows an equipment configuration for a 7500B data-only station.

To set up a 7500B data-only station, follow the steps below:

- 1 Use an EIA-232-D cable to connect the SERIAL port on the data terminal to the 7500B data module.**

For any data terminal that has both COM1 and COM2 connectors, make sure you use the one designated for data transmission. See the customer's system manager if you are not sure.

- 2 Make sure that the 7500B data module option settings for parity and speed are compatible with the data terminal. (Speed is synchronized automatically if the factory setting has not been changed.)**

If you are not sure about the speed and parity of the data terminal, see the customer's system manager or the documentation packaged with the 7500B data module and the data terminal.

- 3 Plug the other end of the EIA-232-D cable into PORT 1 on the 7500B data module.**

- 4 Plug the WP90110-L7 power supply cord into the POWER receptacle on the 7500B data module.**

- 5 Use a 440A4 terminating resistor adapter to connect the 7500B data module to the control unit.**

- Use a D8W cord to connect the 440A4 terminating resistor adapter to the LINE jack on the 7500B data module.
- Use a second D8W cord to connect the other end of the adapter to the appropriate MLX extension jack. See Form 2b, System Numbering: Digital Adjuncts for the appropriate module and extension jack.

- 6 Connect all power cords to an AC outlet not controlled by a wall switch.**

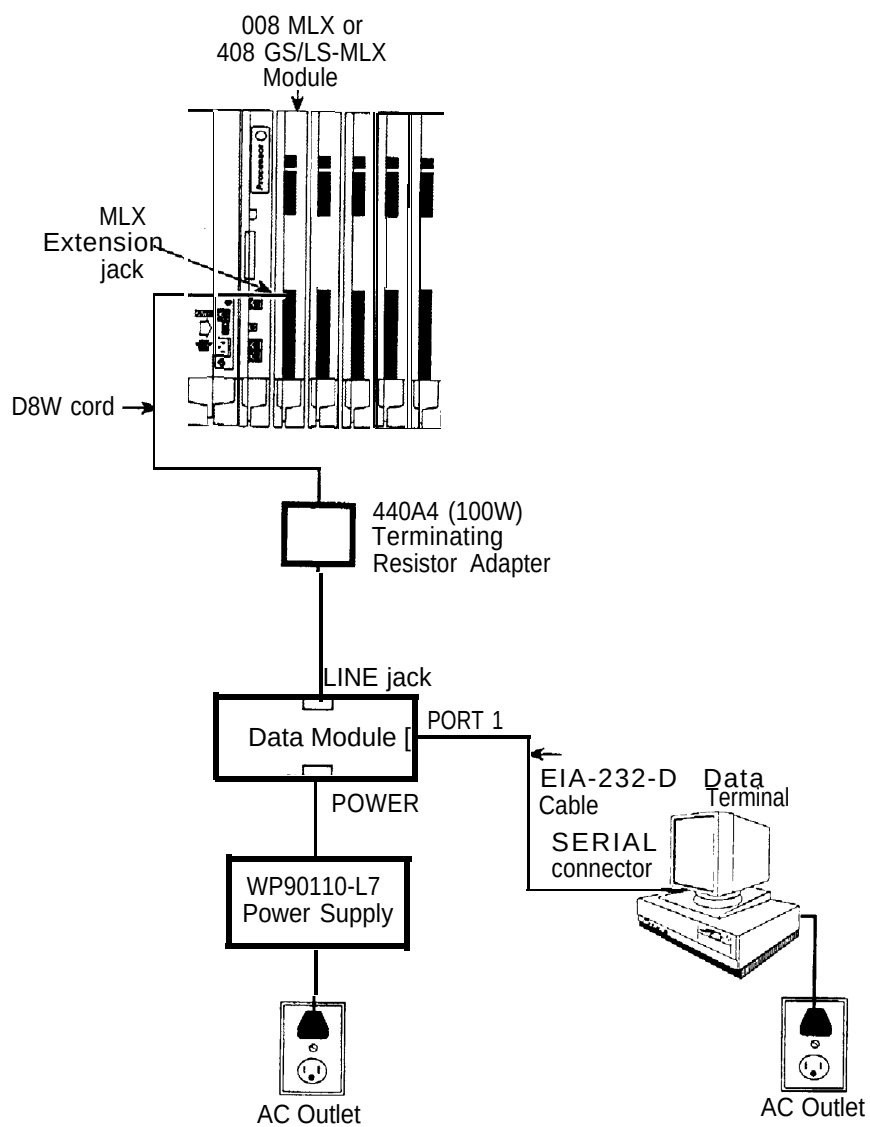


Figure 6-5. 7500B Data-Only Equipment Configuration

Video Conferencing Data Stations

You can use the 7500B data module with a Multipurpose Enhancement Board for synchronous data communication. This type of station allows data transmission at speeds of 56 or 64 kbps.

This section is only a guideline for connecting video conferencing equipment to the system. For additional information, refer to the documentation packaged with the video codec.

Also, for instructions on using the Multipurpose Enhancement Board or for additional information on setting up the 75006 data module, see the documentation packaged with the 75006 data module.

You need the following hardware:

- 008 MLX module or 408 GS/LS-MLX module and a 100D module in the control unit
- ACCULINK 3150 CSU
- Two 7500B data modules with two 7500B data module feature package 2 upgrades (user manuals included)
- Two Multipurpose Enhancement Boards [install one of these in each 7500B data module for synchronous communication and an RS-366 Automatic Calling Unit (ACU) interface]
- Two WP901 10-L7 power supplies (one per stand-alone 7500B)
- Two 440A4 terminating resisting adapters
- Z77A multiple mounting (mounting for multiple 7500B data modules)
- PictureTel video codec unit
- Two Shore Microsystems SM-100EIA-232/V.35 converters (or equivalent)

■ Cables:

- Two male/male EIA-232-D cables, 8 ft. (24 m), to connect the PORT 1 connectors on the 7500B data modules to the EIA-232/V.35 converters
- Two male/male V.35 DB-37 cables, 8 ft. (24 m), to connect the V-35 communication ports on the video codec to the EIA-232/V.35 converters
- Two male/male RS-366 DB-25 cables, 8 ft. (24 m), to connect the RS-366 dialing port of the video codec to PORT 2 on the 7500B data module

Figure 6–6 shows an example of a video conferencing configuration.

NOTES:

1. If you are connecting MLX telephones, omit both 440A4 terminating resistors.
2. The maximum cord length from the 7500B data module to the telephone is 80 ft. (24.38 m).



To set up the video conferencing configuration, follow the steps below. See Figure 6-6.

1 Plug one end of a D8W cord into the LINE jack on each of the 7500B data modules.

2 Connect the other end of each D8W cord.

- If Data Form 1 b indicates that you are to install MLX telephones, plug the D8W cords into the MLX extension jacks specified on Data Form 1b, then go to Step 4.
- If Data Form 1b does not indicate that you are to install MLX telephones, plug each D8W cord into a 440A4 terminating resistor.

3 Using two more D8W cords connect each 440A4 terminating resistor to the MLX extension jacks specified on Data Form 1b, then go to Step 6.

4 Connect the MLX telephones to the 7500B data modules.

- a Plug a D8W cord into the LINE jack on each MLX telephone.
- b Plug the other end of each D8W cord into the PHONE jack on each 7500B data module.

5 Plug each WP901 10-L7 power supply cord into the POWER jacks on the 75006 data modules.

Do not plug the power supplies into the outlets until the end of this procedure,

6 Connect each 7500B data module to the video conferencing data station.

- a Use the DB-25 cables to connect the PORT 2 jacks on each 7500B data module to the dialing ports in the video codec's automatic calling unit. See the documentation packaged with the video codec for instructions.
- b Use the EIA-232-D cables to connect the PORT 1 jacks on each 7500B data module to the EIA-232/V.35 converters.
- c Use the DB-37 cables to connect the EIA-232/V.35 converters to the video codec's V.35 communication ports. See the documentation packaged with the video codec for instructions.

- 7 If it is not already connected, connect the CSU to the 100D module on the control unit and to the 5ESS or 4ESS exchange switch,**

See “Installing the Channel Service Unit” in Chapter 4.

- 8 When you are ready to power up the system, plug the power supplies, CSU, video conferencing equipment, and control unit into the AC outlets.**

7500B Data Module and CSU Settings

You need to set the 7500B data modules and the CSU as indicated in Table 6-2. If the customer's system is running at 56 kbps, set the CSU line-coding DIP switches according to the instructions in “Setting the CSU DIP Switches” in Chapter 4.

Table 6-2. 7500B Data Module Settings

Settings	56 Kbps	64 Kbps
Auto-dial	Off	Off
Busy out	Off	Off
Datarest	On	Off
DTR	Follow	Follow
Duplex	Full	Full
Mode	Cs	Cs
Speed	56,000	64,000

Initializing and Testing the System

7

When you have finished installation, you are ready to initialize the system as described in this chapter.

Initializing the System

To initialize a Release 3.0 system, use one of the following methods:

- Restore from a 3.0 system programming disk or Translation memory card.
- Upgrade to Release 3.0 from Release 1.0, 1.1, 2.0, or 2.1. See Chapter 9, “Upgrading the System.”
- Use system programming forms and the procedures from one of the guides listed in the next section, “Programming Guides”.

This section describes how to restore the system from the Translation memory card or the system programming disk.

NOTE:

On initial installations, make sure you perform a System Erase (frigid start), as described in *Maintenance and Troubleshooting*, immediately before you restore from a disk or memory card or before you program the system. Failure to perform the System Erase (frigid start) can result in incorrect programming.

Programming Guides

The following guides are available to assist you:

- *Programming Summary* for quick-reference procedures (document number 555-630-111)
- *System Programming* for detailed procedures (document number 555-630-140, in the binder accompanying this one)
- *System Programming and Maintenance (SPM)* for detailed SPM procedures (document number 555-630-140, in the binder accompanying this one)

Restoring from the Translation Memory Card

If you received the Release 3.0 Translation memory card, follow the steps below to initialize the system:

1 Perform a System Erase (frigid start).

See *Maintenance and Troubleshooting* for detailed instructions.

Console Procedure: **Menu** → Maintenance → Slot → Dial or Type 00 → Enter → Demand Test → System Erase (Line 5, left button) twice → Yes

2 Use the programming console and the translation memory card to perform the Restore procedure.

See Appendix D of *Maintenance and Troubleshooting* for instructions.

Restoring from the System Programming Disk

If you received the Release 3.0 system programming disk, follow the steps below to initialize the system:

1 Perform a System Erase (frigid start).

See *Maintenance and Troubleshooting* for detailed instructions.

Console Procedure: **Menu** → Maintenance → Slot → Dial or Type 00 → Enter → Demand Test → System Erase (Line 5, left button) twice → Yes

2 Use SPM and the system programming disk to perform the Restore procedure.

See *System Programming and Maintenance (SPM)* for instructions.

NOTE:

You must restore the system using the system programming (or backup) disk or memory card whenever a frigid start (System Erase) occurs.

Setting the Time and Date

If the Control Unit Diagram indicates that you should set the time and date, do so before you test the system.

Follow this procedure:

Menu → SysProg → System → Date → Drop → Dial current date → Enter

See *System Programming* if you need additional instructions.

Testing the System

Once you have initialized the system, it is ready for system acceptance testing. Perform the basic tests below to test trunks, telephones, and features.

If any equipment is not working properly, see *Maintenance and Troubleshooting* for troubleshooting instructions.

Testing MLX Telephones

This switch-based software test verifies that the LEDs, ringer, buttons, switchhook, and B-channel operation for MLX telephones are working correctly. You cannot run this test when the telephone is in programming, forced-idle, or maintenance mode. When an MLX telephone is in test mode, the system considers it busy and therefore not available for use.

If you hang up during any of these procedures, test mode ends automatically.

Keep the following in mind when using the speakerphone:

- If the **Mute** button is pressed before the **Speaker** button, the Mute LED cannot be turned off; it winks.
- The Mute and Speaker LEDs remain steady during test mode.
- The pressing of the **Mute** button is processed within the telephone.
- When the telephone test is originated from the **Speaker** button, every second press of the **Mute** button causes the Mute LED to flash off momentarily. Also, both the Mute and Speaker LEDs may occasionally remain on after disconnecting with the **Speaker** button.
- Press the fixed-feature buttons repeatedly to toggle the LEDs on and off.

To test the basic features of an MLX telephone, follow the steps below:

1 Pick up the handset of the telephone you are testing and push an ICOM button in Key or Behind Switch mode or an SA button in Hybrid/PBX mode.

2 When you hear dial tone, dial *00 to activate test mode.

You should hear a steady test tone over the handset and a ring burst over the speaker. The telephone's red and green LEDs should be on.

3 To test the line buttons, press any line button with two LEDs (red and green).

The diagnostic tone should stop, and the LEDs for that button should go off.

4 Press the same line button repeatedly to toggle between the green and red LEDs. For a QCC, the display should show the name of the feature programmed on the button.

5 To test a fixed-feature button with one LED, press the button.

The Feature and HFAI LEDs should turn off. The first press of the **Speaker** button should turn off the Mute LED. The second press of the **Speaker** button should turn off the Speaker LED.

- 6 To test the red Message light, press a fixed-feature button without an LED (such as Transfer, Conf, or Drop) or any dialpad button.**

The Message light should turn off.

- 7 Hang up the handset to leave test mode.**

Testing MLX Display Telephones

While the MLX display telephone is in test mode, follow the steps below to test the display buttons:

- 1 Press each fixed display button (Home, Menu, Inspct, and More).**

The display should spell out these button labels.

- 2 Press the unlabeled display buttons.**

The display should indicate Display Button n , where n is the number of the display button, 1 through 4.

Testing MLX Telephones with MFMs

You should test MLX telephones with MFMs for proper channel operation and test the MFM circuitry for the TTR, the ring generator, and the Message light.

To test an MLX telephone with an MFM installed and configured as a T/R adapter, follow the steps below:

- 1 Connect a working 2500-type single-line telephone with a Message light to the MFM adapter (the 2500 telephone also must have a mechanical ringer).**

- 2 Pick up the handset and listen for dial tone. Dial *09.**

You should hear another dial tone.

- 3 Press any button.**

This will deactivate the test tone.

- 4 Dial 123456789*0#. Press the switchhook quickly.**

You should hear a confirmation tone.

5 Hang up.

The control unit should send a ring burst, and the Message light on the 2500 telephone should turn on.

6 Turn off the Message light.

Dial the appropriate feature code.

Testing Telephones for Dial Tone

To test for dial tone, follow the steps below:

1 Press an ICOM or SA button (depending on the mode of operation).

The red LED next to this button should go on.

2 Press the Speaker button.

The green LED next to **ICOM** or **SA** button should turn on; you should hear a dial tone, and the green LED next to the **Speaker** button should turn on.

3 Press the Speaker or ICOM or SA button again to disconnect intercom.

The green LEDs next to **ICOM** or **SA** and Speaker buttons should turn off, and the dial tone should stop. The red LED remains on in some cases.

Testing Telephones for Outside Dial Tone

To test for outside line dial tone, follow the steps below:

1 Without lifting the handset, press one of the outside line buttons.

The red LED next to this button should turn on.

2 Pickup the handset or press the Speaker button.

The green LED next to the line button should turn on, and you should hear a dial tone.

3 Hang up and repeat Steps 1 and 2 for each line button on the telephone.

Testing Analog Multiline and Single-Line Telephones

To test the basic operation of analog multiline and single-line telephones, follow the steps below:

1 If you are testing a multiline telephone, press an ICOM or SA button.

2 Pick up the handset and wait for dial tone.

3 Dial the extension number of another working telephone.

You should hear ringback on your telephone and ringing at the called telephone.

4 At the called telephone, have someone pickup the handset; verify that you have good two-way communication.

5 At both telephones, hang up.

If you are testing a single-line telephone, this is the end of the procedure.

6 If you are testing a multiline telephone, press an outside line or SA button.

In Hybrid/PBX mode, make sure that the destination telephone has a personal line or is a DLC operator.

a Pick up the handset and wait for the dial tone.

b If you pressed an **SA** button, dial the dial-out code.

c Dial the destination telephone.

You should hear ringback on your telephone and ringing at the destination telephone.

d Have someone pick up the handset at the destination telephone; verify that you have good two-way communication.

e At both telephones, hang up.

7 If the extension is toll-restricted, place a toll call.

You should hear a reorder tone.

Testing Ground-Start and Loop-Start Trunks (Hybrid/PBX Systems Only)

To test the GS and LS outgoing and incoming trunks at a telephone, follow the steps below:

1 Dial *03 followed by the trunk ID number (01 through 80).

You should hear dial tone for a working trunk, a reorder tone for a DID trunk or an invalid trunk number, or a busy tone if the trunk is in use.

NOTE:

Dialing *03 a single-line telephone works only if telephone has a touch-tone dialpad and the trunk accepts touch-tone dialing.

2 Repeat Step 1 for all outgoing trunks.

3 Dial an incoming trunk on the system.

4 Have someone answer the call at another telephone; verify that you have good two-way communication.

5 Repeat Steps 3 and 4 for all incoming trunks.

6 Hang up to exit test mode.

Testing DID Trunks

To test DID trunks, follow the steps below:

1 Have someone at the central office check all DID trunks, or have someone call from the outside to check each DID trunk.

2 When the first trunk rings, answer it.

3 Instruct the caller to put the call on hold or put down the handset while making the next call.

4 When the next trunk rings, put the previous call on hold and repeat this procedure until all eight DID trunks have been connected successfully.

5 When all trunks are connected with good communication, disconnect each call and have the caller do the same.

Testing Tie Trunks

Before you test tie trunks, make sure that the tie trunks for the system are connected and properly programmed. Have someone at the far end ready to place and receive calls throughout the testing procedures listed below.

The tie trunk testing procedures in this section areas follows:

- Automatic-start two-way (both incoming and outgoing)
- Automatic-start incoming only
- Automatic-start outgoing only
- Dial-repeating two-way (both incoming and outgoing)
- Dial-repeating incoming only
- Dial-repeating outgoing only

NOTE:

Dial-repeating tie trunks are also called *wink-*, *immediate-*, and *delay-type* tie trunks. These terms are used in system programming to describe the type of signaling used on the trunk.

Testing Two-Way Automatic-Start Tie Trunks

For two-way automatic-start tie trunks, perform both the incoming and outgoing automatic-start tie trunk tests.

NOTE:

Before testing outgoing or two-way automatic-start tie trunks, have someone ready to take your call at the receiving telephone.

Testing Incoming Automatic-Start Tie Trunks

Perform this test for automatic-start tie trunks that are two-way or incoming only. If you are testing two-way automatic-start tie trunks, perform the outgoing test as well.

To test incoming automatic-start tie-trunks, follow the steps below:

- 1 At the far-end tie-trunk site, have someone pickup the handset and dial a tie trunk assigned to a button on your telephone.**

Your telephone should ring, and the LEDs next to the tie-trunk button should respond as follows: the red LED should turn on, and the green LED should flash.

- 2 Pick up your handset and verify that you have good two-way communication.**

The green LED should change from flashing to steady.

- 3 At both telephones, hang up.**

The green LED should turn off, the red LED should turn off, and another red LED may turn on.

- 4 Repeat Steps 1 through 3 for all incoming and two-way automatic-start tie trunks.**

Testing Outgoing Automatic-Start Tie Trunks

Perform this test for automatic-start tie trunks that are two-way or outgoing only. If you are testing two-way automatic-start tie trunks, perform the incoming test as well.

To test outgoing automatic-start tie trunks, follow the steps below:

- 1 At any telephone that has access to an automatic-start tie trunk, press the first tie-trunk button.**

The red LED next to the tie-trunk button just pressed turns on.

- 2 Pick up the handset. (In Hybrid/PBX systems with pooled tie trunks, press an SA button and dial the pool dial-out code.)**

The green LED next to the selected button turns on, and you hear ringing.

- 3 When the person answers, verify that you have good two-way communication and hang up.**

The green LED should turn off, the red LED should turn off, and another red LED may turn on.

- 4 Repeat Steps 1 through 3 for each outgoing and two-way automatic-start tie trunk.**

Testing Two-Way Dial-Repeating Tie Trunks

For two-way dial-repeating tie trunks, perform both the incoming and outgoing dial-repeating tie trunk tests.

Testing Incoming Dial-Repeating Tie Trunks

Perform this test for dial-repeating tie trunks that are two-way or incoming only. If you are testing two-way dial-repeating tie trunks, perform the outgoing test as well.

To test incoming dial-repeating tie trunks, follow the steps below:

- 1 Have the person at the far end place a dial-repeating call to your telephone by dialing the proper tie-trunk number.**

Your telephone rings, and the green LED next to **ICOM** (or **SA** for Hybrid/PBX systems) flashes.

- 2 Pick up the handset.**

The red LED next to the ringing button turns on, and the green LED changes from flashing to steady.

- 3 Verify that you have good two-way communication and hang up.**

The green LED should turn off, the red LED should turn off, and another red LED may turn on.

- 4 Repeat Steps 1 through 3 for each incoming or two-way dial-repeating tie trunk.**

Testing Outgoing Dial-Repeating Tie Trunks

Perform this test for dial-repeating tie trunks that are two-way or outgoing only. If you are testing dial-repeating two-way tie trunks, perform the incoming test as well.

To test outgoing dial-repeating tie trunks, follow the steps below:

- 1 At any telephone that has access to a dial-repeating tie trunk, press the first tie-trunk button.**

The red LED next to the pressed tie-trunk button lights.

- 2 Pick up the handset. (In Hybrid/PBX systems with pooled tie trunks, press an SA button and dial the pool dial-out code.)**

The green LED next to the selected button lights.

- 3 Dial the tie-trunk number of the extension where someone is waiting for your call.**

You should hear ringing,

- 4 When the person answers, verify that you have good two-way communication, then hang up.**

The green LED should turn off, the red LED should turn off, and another red LED may turn on.

- 5 Repeat Steps 1 through 4 for each outgoing or two-way dial-repeating tie trunk.**

Testing Selected System Features

This section provides procedures to test the following system features:

- **Automatic Route Selection (ARS).** For Hybrid/PBX mode only. Use the same test for Idle Line Preference, a similar feature used in Key mode only. Use the same test for Station Message Detail Recording (SMDR) as explained in the test procedure. Refer to Planning Forms 3e, 3f, and 3g for ARS information.
- **Group Calling.** Use the same test for the Listed Directory Number (the QCC queue), which is for Hybrid/PBX only. Use the same test for Group Paging. Refer to Planning Form 7d for Group Calling information.
- **Coverage.** Refer to Planning Form 7c for Group Coverage information.

If any feature does not work properly, check system programming. You can run these tests easily from an MLX telephone or an analog multiline telephone.

ARS and SMDR Tests

If ARS patterns have been programmed, you can test routing by placing toll calls and checking the trunk indicated on the SMDR printout. Check the report to see which line/trunk the system selected for an outgoing call.

The length of each toll call must be equal to or greater than the minimum SMDR recording time. Otherwise, SMDR will not recognize the attempt as a call. To determine the minimum SMDR recording time, check with the customer's system manager (the factory setting is 40 seconds).

To verify ARS patterns, follow the steps below:

- 1 In Hybrid/PBX mode, determine which toll numbers to call by examining the system manager's ARS patterns.**
- 2 At any multiline telephone, pickup the handset and dial the ARS access code and one of the toll numbers.**
Make sure the call is completed before hanging up.
- 3 Repeat Step 2 for additional toll numbers.**
- 4 At the SMDR printer, verify that the call was made on the correct trunk group and check the number of seconds before the call is reported on the SMDR printout.**

If there are errors, check system programming.

Group Calling Test

To test Group Calling features, follow the steps below:

- 1 Make sure that each group member is logged into the group.**
To log in, each member dials #44.
- 2 At any telephone, pickup the handset and dial the trunk that is programmed to ring for a particular calling group.**
- 3 At the ringing telephone, have someone pickup the handset and verify that you have good two-way communication.**
- 4 Repeat Steps 2 and 3 for each calling group.**
- 5 Make additional calls to check each member of each calling group.**

- 6 At any telephone, pickup the handset and dial the group extension number.**
- 7 Test the calling group delay announcement (if provided) for each group.**
 - a Make the group busy or have all members log out of the group (by dialing **#*44** at each group extension).
 - b Repeat Step 2.
 - c After listening to the delay announcement, hang up.
 - d Repeat these steps for each group.
- 8 At the ringing telephone, have someone pickup the handset and verify that you have good two-way communication.**

System Speed Dial Test

To test System Speed Dial numbers, follow the steps below:

- 1 Find out which numbers have been programmed for System Speed Dial.**

See the system manager or use Form 10b as a reference for System Speed Dial numbers.

- 2 From the test telephone, pickup the handset and dial a System Speed Dial code.**

Verify that you have good two-way communication and that the correct party was reached.

Coverage Test

To verify that coverage is in effect, follow the steps below:

- 1 Have someone call the covered telephone.**
- 2 Count the number of rings at the covered telephone before the covering telephone starts ringing.**

This should be the same as the programmed number of rings.
- 3 Pick up the handset at the covering telephone and verify that you have good two-way communication.**
- 4 Hang up the handset at the covering telephone.**
- 5 Check both Individual and Group Coverage.**

Testing the DSS

At each Direct Station Selector (DSS), check that all lights are operational. Then use the DSS to call a telephone in the system. Test the **Page** buttons on the DSS.

Testing Night Service

To test the Night Service feature on the system operator console, follow the steps below:

1 At the system operator console, press the Night Service button.

If Night Service with Outward Restriction is programmed, you must also enter the password. (You can also activate Night Service on a DLC by pressing the **Feature** button and dialing 39.)

The Night Service LED turns on.

2 Pick up the handset and press a button for an outside trunk.

3 Dial the outside number that reaches an operator console that is programmed to receive Night Service coverage.

4 Verify that the telephones assigned to the Night Service group are ringing.

5 Have someone pick up the handset at a telephone in the Night Service group.

Verify that you have good two-way communication.

6 At both telephones, hang up.

7 Repeat Steps 2 through 6 for each operator console that is programmed to receive Night Service coverage.

8 Test telephones that are programmed for Night Service with Outward Restriction.

- a Pick up a handset on a restricted telephone and verify that outside calls are not allowed.
- b Using the password, make an outside call.

- c Hang up the handset.
- d Press the **Recall** button and dial the password. (On an MLX telephone without a programmed Recall button, press the **Feature** button and dial 775 and the password before picking up the handset.)
- e Pick up the handset and make an outside call.
- f Verify that you have good two-way communication and hang up.

9 At the operator console, press the Night Service button again. If you used a password in Step 1, enter the password again. Verify that the Night Service LED turns off.

Testing the Dictation System

If dictation equipment has not been installed, skip this test. Place a call to verify that you can access the dictation system.

To access the dictation system, follow the steps below:

- 1 At the test telephone, pickup the handset.**
- 2 Dial the access code and the number associated with the dictation equipment.**
- 3 Verify that the ready tone is transmitted.**
- 4 Test the transmission in both directions; make a recording and play it back.**
- 5 Hang up.**

Testing the Paging System

To test the paging system, follow the steps below:

- 1 Pick up the handset at the test telephone and dial the number for a particular zone**

If ZoneMate 9 paging equipment is in use with PagePac 20, get an acknowledge tone first and then dial the zone code to make an announcement. You may hear a confirmation tone.

2 Make an announcement into the handset.

You should hear the announcement over the loudspeaker(s).

3 Hang up.

4 Repeat Steps 1 through 3 for all paging zones.

Testing Music On Hold

To verify that music is provided to outside callers placed on hold, follow the steps below. Inside callers do not hear Music On Hold.

1 Pick up the handset at the test telephone.

2 Dial the central office trunk access code and the system's published directory number; or, if you are using a DID trunk, dial any extension.

3 At the destination extension, answer the incoming call.

4 At the destination extension, press the Hold button.

The line button's green LED should flash.

5 Verify that music is heard at the destination extension and adjust the volume as required.

6 Hang up.

NOTE:

If the customer uses equipment that rebroadcasts music or other copyrighted materials, the customer may be required to obtain a copyright license and pay license fees from a third party such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI). Or the customer can purchase a Magic on Hold system, which does not require the customer to obtain such a license, from an AT&T representative.

Testing the Power Failure Transfer Jacks

To test a power failure transfer (PFT) jack for proper operation, the outside line numbers to the module's line/trunk jacks must be assigned and the trunks must be operational. A PFT telephone on a GS line must have a GS button attached to the telephone. See Figure 7–1.

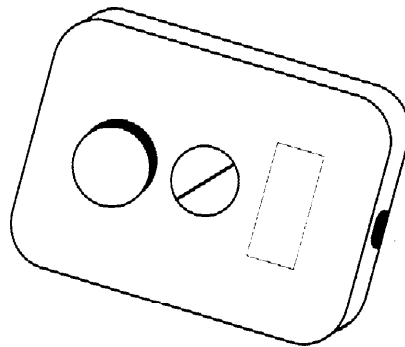


Figure 7–1. Ground-Start Button

To test PFT jacks, follow the steps below:

- 1 Plug a touch-tone or rotary dial telephone into a PFT jack.**
- 2 Note the outside line number assigned to the lowest line/trunk jack on the module and be sure that the outside trunk is connected to the system.**
- 3 Turn off power to the control unit.**
Follow the procedure in “Powering Down the System” in Chapter 9.
- 4 If the telephone is connected to a GS trunk, push the GS button attached to the telephone.**
- 5 Pick up the handset on the touch-tone or rotary dial telephone.**

You should hear a dial tone.

6 If the telephone is connected to a GS trunk, push the GS button attached to the telephone again.

7 Dial an outside number—make sure someone can answer the call.

8 After the call is answered and you have verified that you have good two-way communication, tell the person the telephone number assigned to the outside line bridged by the PFT jack to which you are connected.

This is the number noted in Step 2.

9 Have that person call the number after you hang up.

Your phone should ring after the caller completes dialing the number.

10 Answer the phone and verify that you have good two-way communication. Hang up.

11 Repeat Steps 1 through 2 and 4 through 10 to test all PFT jacks.

12 Turn the power back on.

Follow the procedure in “Powering Up the System” in Chapter 2.

Testing Touch-Tone Receivers

The 400 and 400 GS/LS modules each provide four touch-tone receivers (TTRs). The 008 OPT module, 800 DID module, 012 basic telephone modules, and 800 GS/LS-ID modules each provide two TTRs.

To test TTRs, follow the steps below:

1 Pick up the handset of a touch-tone single-line telephone that is connected to a 012 or 008 OPT module.

2 Dial *04 and the 2-digit number (starting with 01) of the TTR that you want to test.

You should hear a busy tone if the receiver is in use, or a reorder tone if you misdialled or addressed a receiver not in your system. (This can happen if you dialed 07 and your system has only a 012 module and one 400 module, for a total of six TTRs)

3 If you hear reorder tone, try again.

If you hear dial tone after one to three seconds of silence, proceed with this test.

4 Dial *12345678*0#*.

You should hear a dual-tone multifrequency (DTMF) signal as each button is pressed. When you finish dialing, you should hear a 3-beep confirmation tone.

5 Repeat the test for each TTR.

Installing the Control Unit's Housing

After you complete system acceptance testing and if you are confident that the system is completely installed, you can install the control unit's housing.

NOTE:

Beginning with Release 2.1 or later, the control unit covers are identical to those on the MERLIN II Communications System. If you need to install control unit covers on a system prior to Release 2.1, see Chapter 9, "Upgrading the System."

Installing the Top Cover

To install the top cover, see Figure 7-2 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 the legs lock into the vents on the module.**

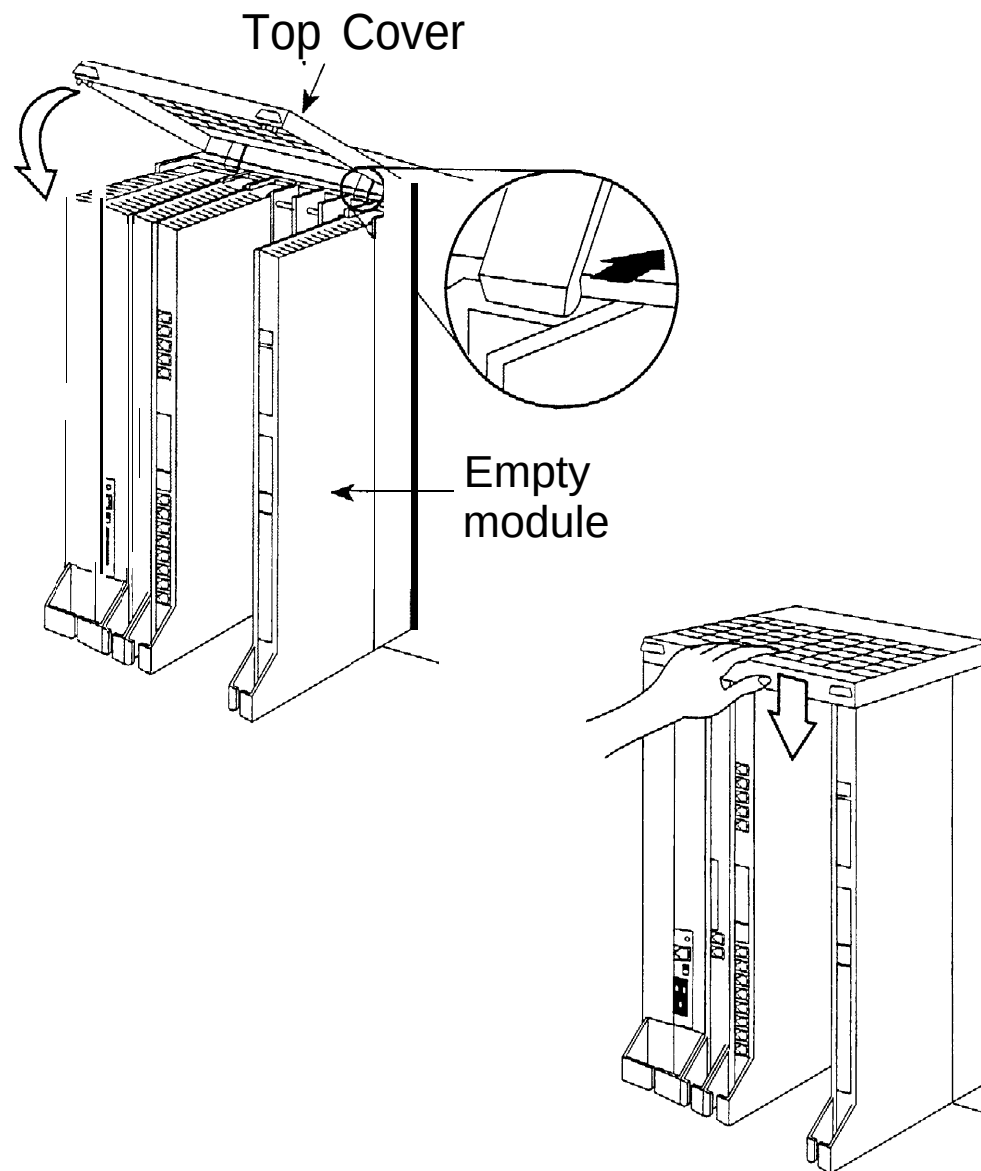


Figure 7-2. Installing the Control Unit Top Cover

Installing the Front Cover

To install the front cover, see Figure 7-3 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.**

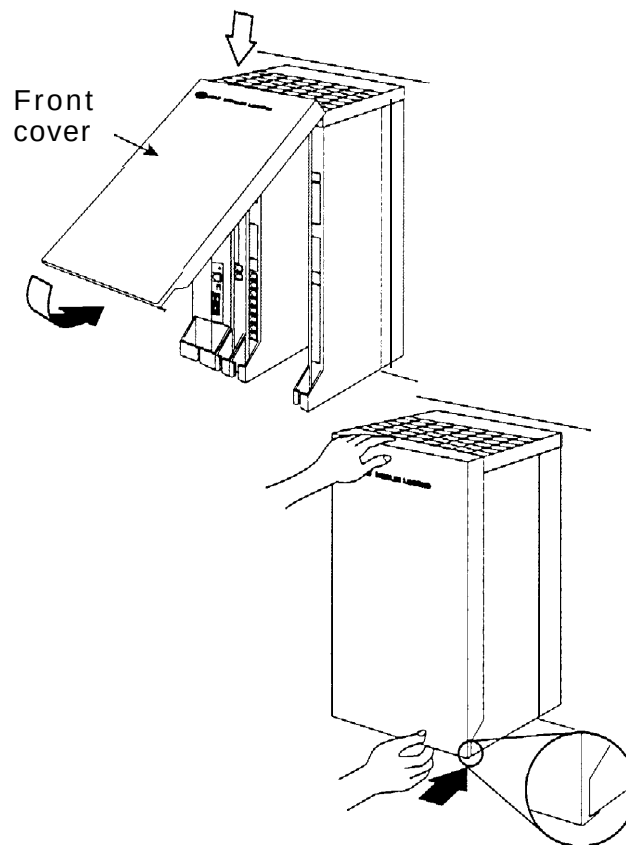


Figure 7–3. Installing the Control Unit Front Cover

Installing Applications

8

This chapter provides installation guidelines and documentation references for the applications that the system supports. You can install the following software and hardware products on the system. *See the documentation packaged with each application for detailed installation instructions.*

■ Stand-alone products

- Call Accounting Terminal (CAT)
 - CAT Business (CAT/B)
 - CAT Hospitality (CAT/H)
- MERLIN PFC Telephone
- AT&T Attendant™
- MERLIN MAIL™
- CONVERSANT®

■ DOS-based products

- Call Accounting System (CAS) for the MERLIN LEGEND Communications System
 - CAS Plus V3 Business
 - HackerTracker™ System for CAS Plus V3
 - CAS for Windows

- Call Management System (CMS)
 - PassageWay™ Direct Connect Solution for Microsoft® Windows
- System Programming and Maintenance (SPM)
- Integrated Solution III (IS III) UNIX System-based products
 - AUDIX Voice Power™ IS III
 - Call Accounting System (IS CAS)
 - System Programming and Maintenance (SPM) IS III
 - Fax Attendant System™ IS III

Voice Messaging Systems and Touch-Tone Receivers

The following applications are voice messaging systems (VMSs):

- MERLIN MAIL Voice Messaging System
- AT&T Attendant
- AUDIX Voice Power IS III
- Automated Document Delivery System (ADDS)

Considerations

You must connect applications that use mode codes to integrated VMI ports. Applications that do not use mode codes, such as AT&T Attendant, connect to generic VMI ports. The T/R ports on 012 basic telephone modules are programmed as either generic VMI or integrated VMI.

A VMS requires a certain number of touch-tone receivers (TTRs), depending on the number of VMS ports—see Table 8–1. The following modules supply TTRs: 012, 400, 400 GS/LS/TTR, and 008 OPT (but the 008 OPT module does not support VMS applications).

Table 8-1. TTRs Required by VMS

No. of VMS Ports	No. of TTRs Required	No. of 012 Modules	No. of 400 or 400 GS-LS/TTR Modules
1	1	1	0
2	1	1	0
3	2	1	0
4	2	1	0
6	3	1or2	0or1
8	4	1or2	0or1
12	6	2or3	0or1

Automated Document Delivery System

Automated Document Delivery System (ADDS) is a computer-based system for faxing documents. ADDS stores the documents in a database and automatically faxes them on request 24 hours a day.

Prompts guide a caller using a touch-tone telephone through the process of selecting a document and indicating the fax number where he or she will receive the information. The caller then receives the requested information in minutes.

Considerations

Using one line for fax transmission limits ADDS to approximately 100 calls per day. Businesses anticipating more than 100 calls per day may need more than one system to handle the call volume efficiently.

Use ADDS in a two-line configuration to maximize performance and minimize busy signals. ADDS can work behind an automated attendant. ADDS does not function with an MFM.

Hardware Requirements

To set up ADDS, a business must have the following:

- Automated Document Delivery System unit
- Touch-tone telephone
- Group III (G3) fax machine with an integrated handset

To request and receive information, a caller must have a touch-tone telephone and a Group III (G3) fax machine.

For backup, one of the following is required:

- AT&T 705 MT Multitasking Terminal
- AT&T 6386/SX WGS (or compatible) with ProComm Plus[®] software.

See the *AT&T Automated Document Delivery System (ADDS) Administrator's Guide* for installation instructions.

Call Accounting System

Call Accounting System (CAS) is ideal for medium and large companies that want to manage telephone usage and control costs by tracking calls placed from and received by the system.

NOTE:

CAS is also available as part of the UNIX System-based Integrated Solution H (IS II) and Integrated Solution III (IS III) software applications.

CAS runs on an approved DOS PC. Two versions of the product are offered: CAS for Windows and CAS Plus V3.

HackerTracker System for CAS Plus V3 is a software enhancement designed to help detect fraudulent use of the communication system. The HackerTracker software can detect abnormal calling activity by monitoring facilities and account code usage. It then logs the activity and issues a real-time alarm.

Considerations

You can connect only one CAS to the system. CAS operates on a dedicated PC running DOS.

Hardware and Software Requirements

A typical CAS Plus V3 system consists of the following:

- An approved DOS PC with:
 - 640K RAM
 - Hard disk drive with at least 3 MB of available space for the application software
 - Parallel printer output
 - Serial SMDR input
- One parallel printer
- D8W cord and 355AF adapter connecting the SMDR port on the communications system to the COM1 serial port on the PC
- DOS version 3.3 or later

- CAS software

To use CAS for Windows with the system, the following components are recommended:

- For a single-site system, an NCR 3315 PC (20-MHz 386) with 6 MB of RAM and a 120-MB hard disk
- For a multi-site system, an NCR 3332 PC (66-MHz 486) with 16 MB of RAM and a 340-MB hard disk

MS-DOS 5.0 or higher

— Windows 3.1 or later

- VGA color monitor
- Bus mouse
- For a single-site system, a 525-MB tape drive
- For a multi-site system, a 120-MB tape drive
- Okidata® Microline 184T dot matrix or OL830 laser parallel printer

For communications using CAS for Windows, the following components are recommended:

- For a single-site system, one parallel port and two built-in serial ports (DB9 for direct switch connection and DB25 for other connections)
- For a multi-site system, one parallel port and a four-port Equinox Mark-IV board with four RJ45 connections for direct switch hookup
- For remote diagnostics, a Remote Maintenance Board
- If a modem is used, an AT&T COMSPHERE 3830 or compatible
- If you are using the 9-pin port on your PC for the direct switch connection, you need a DB9-to-modular adapter.
- An RJ45 modular cable to connect the PC's COM1 port with the control unit's SMDR port

A summary of the installation procedure is provided below:

1 Connect the hardware. See “Connecting a PC to the Control Unit” in Chapter 5.

2 Complete the CAS worksheets.

Make sure that they show all information you need on telephone lines and extensions, calling patterns and processing options, and departments and personnel.

3 Load and test DOS version 3.3 or later and CAS. If you are installing CAS for Windows, load and test DOS version 5.0 or later, Windows version 3.1 or later, and CAS.

4 Use the planning worksheets to program the software to meet the needs of the customer.

CAS Documentation

Call Accounting System Plus V3 Installation

Call Accounting System Plus V3 Administration and Operation

Call Accounting System for Windows Installation, Administration, and Operation

Call Accounting Terminal

Call Accounting Terminal (CAT) Plus is a stand-alone application that provides accurate and flexible call accounting at a low cost. Two versions of this product are offered: CAT Plus Hospitality for hotels and health care facilities and CAT Plus Business for other types of businesses. For more information, see “Connecting a Printer to a Control Unit” in Chapter 5.

Considerations

You can connect only one CAT to the system. You must use a serial printer such as the CAT printer. You must locate the CAT Plus within the distances noted below:

- Control unit
 - 14 ft. (4.27 m) direct connection
 - 1000 ft. (305 m) using building wiring
- Serial printer, 50 ft. (15.2 m)
- Power supply-grounded wall outlet, 4 ft. (1.22 m)

Hardware Requirements

The following hardware is required for CAT installation:

- Call Accounting Terminal, CAT Plus
- Serial printer (AT&T CAT Printer is recommended) connected by a Z200A EMI cable to the PRINTER jack of the CAT
- D8W cord and 355AF adapter connecting the SMDR port on the communications system to the SMDR jack of the CAT

A summary of the installation procedure is provided below:

- 1 Before connecting the CAT, set the 10 CAT switches to establish the speed or baud rate for the CAT and its associated printer.**
- 2 Connect the control unit, CAT, printer, and power supply. See Chapter 5, “Connecting a Printer to the Control Unit.” Do not use an outlet that is controlled by a wall switch.**
- 3 Test the CAT Plus, following the instructions provided in the documentation packaged with the application.**

CAT Documentation

Call Accounting Terminal, CAT Plus V3 for Business Installation and Use

Call Accounting Terminal, CAT Plus V3 for Hospitality Installation and Use

Call Management System

Call Management System (CMS) is a DOS-based software application that simulates the actions of a system operator by answering calls and distributing them to individual telephones.

Considerations

You cannot connect a CMS in Behind Switch mode.

If a business requires more than 28 lines or employs more than 28 agents, you can install up to two CMSs on a system to handle a second set of lines.

CMS operates on a dedicated PC with DOS, version 3.3 or higher.

The CMS supervisor's console is a Direct-Line Console.

CMS agents can use any MLX or analog multiline telephone that the system supports.

You must connect agent telephones to the first 58 telephone jacks on the control unit. (CMS allows only a 2-digit method to specify an extension number; jacks 59 to 144 are designated by 4 digits.)

Because CMS is compatible only with 2-digit dialing, do not use flexible numbering on any telephone associated with CMS.

The two CMS interface card ports on the PC must be connected to two analog multiline telephone jacks on the same analog multiline telephone module; these jacks must be operator positions. If two operator position jacks are not available on the same module, another analog multiline telephone module must be installed in the control unit to provide these jacks.

CMS trunks can be loop-start, ground-start, T1 emulated ground-start, or Primary Rate Interface (PRI).

Up to four CMS external alerts can be used for agents and supervisors. For example, an alert sounds if the number of calls waiting to be answered nears a programmed threshold.

AT&T Attendant can be used to direct callers to the appropriate CMS group.

To play music for waiting callers, you must attach a Music On Hold (MOH) product that is compatible with an MOH coupler.

NOTE:

If the customer uses equipment that rebroadcasts music or other copyrighted materials, the customer may be required to obtain a copyright license from and pay license fees to a third party such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI). Or the customer can purchase a Magic-on-Hold system, which does not require that you obtain such a license, from AT&T.

Hardware and Software Requirements

The following hardware and software are required for CMS installation:

- An approved PC with 640K RAM, 3.5-inch floppy disk drive, and a 20-MB hard disk drive
- An approved monochrome or color monitor
- CMS interface card with two 14-ft. (4.27-m), 4-pair modular plug telephone cords and one 14-ft. (4.27-m) DIN connector cord for connection to Digital Announcement Unit.

- CMS software
- Digital Announcement Unit for CMS
- Parallel printer and cable to connect the printer to the PC
- Supervisor console (MERLIN II System Display Console)
- Agent telephones (any MLX or analog multiline telephones supported by the system)
- Two analog multiline modules (008 or 408); one to connect the two PC ports to the operator positions, and one to connect the CMS supervisor console
- DOS, version 3.3 or higher

See the CMS documentation for a list of optional hardware that you can use with CMS.

CMS comes with a hardware installation checklist and information on installing the CMS software, creating an agent directory, programming lines and groups, and testing and managing calls. The control unit permits the connection of two CMS applications, and each application can have one PC.

CMS Documentation

Call Management System (CMS) for the MERLIN LEGEND Communications System Installation and System Programming Guide

Call Management System for MERLIN LEGEND Communications System User's Quick Reference

Call Management System for MERLIN LEGEND Communications System Supervisor's Guide

Call Management System for MERLIN LEGEND Communications System Planning Guide and Forms

CONVERSANT

CONVERSANT is an entry-level voice response system that enables you to run integrated voice response (IVR) applications. CONVERSANT can automatically answer and route calls and execute telephone transactions. CONVERSANT consists of the hardware and software that supports transaction processing, data retrieval, and data entry using a touch-tone telephone connected to a public telephone network.

Consideration

CONVERSANT supports a maximum of 24 channels of analog ports, or up to 6 IVP4 boards. In a co-resident environment, such as CONVERSANT and AUDIX Voice Power, the system supports a maximum of 16 channels. The number of channels assigned to AUDIX Voice Power can never exceed 12.

Hardware Requirements

The platform for CONVERSANT is the Master Controller III (Tower). The Master “Controller III is a desktop 20 MHz, 486-SX PC with six available EISA bus slots (with the tape drive installed). It has 8 MB of RAM. It includes a system unit, a monitor, and a keyboard. The Master Controller III has the following components:

- 500-MB fixed disk drive
- 250-MB tape drive
- 3.5-inch floppy disk drive
- Two serial ports and one parallel port are integrated on the main board with connectors on the back panel of the system unit. A diskette drive controller and fixed disk drive interface also are integrated on the main board.
- A Video Graphics Array (VGA) video display controller and a tape drive controller are provided on separate add-in boards.
- AT&T UNIX System V version 3.2.2

CONVERSANT Intro Documentation

CONVERSANT Intro Application Support Software Installation Guide

CONVERSANT Intro Application Support Software User's Guide

Integrated Solution III

Integrated Solution III (IS III) is a complete package of UNIX System-based voice processing and call analysis software that helps to manage telephone usage and costs. IS III offers a single interface and can include:

- Call Accounting (IS CAS)
- AUDIX Voice Power IS III R 2.1.1
- System Programming and Maintenance (SPM) IS III Release 3.xx or higher
- Fax Attendant (FA)

The number of incoming lines and subscribers programmed for AUDIX Voice Power and the number of busy-hour calls determine how many voice channels are required for the customer's system.

Considerations

IS III uses AT&T UNIX System V, Release 3.2.2.

For AUDIX Voice Power, program the loop-start ports for reliable far-end disconnect.

For AUDIX Voice Power, you cannot use an 008 OPT module.

If IS III includes AUDIX Voice Power (or Fax Attendant) when users receive voice mail (or fax mail) messages, the Message LEDs on their telephones light (as long as a mailbox or fax mailbox has been assigned to each of those telephones).

The system may need more touch-tone receivers if:

- Single-line telephone users do not get dial tone.
- AUDIX Voice Power fails to transfer calls.
- Calls fail to ring or go to coverage prematurely.
- Message-waiting lights fail to light.

CAS IS III uses the call information provided by the system's built-in SMDR feature to process calls.

SPM IS III reports can be printed out or can be written to a disk (hard or floppy).

SPM IS III reports should not be printed while the system is handling more than 100 calls per hour.

Only the CAS IS III and the SPM IS III applications can be connected to a system operating in Behind Switch mode.

Hardware Requirements

The Master Controller II+ (Desktop) and the Master Controller III (Tower) are the PC platforms for IS III. The Master Controller II+ is a desktop 20-MHz, 386-SX PC with three available AT bus slots (with the tape drive installed). It has 8 MB of RAM memory, either a 100-MB or a 200-MB hard disk drive, 3.5-inch floppy drive, and a 125-MB streaming tape drive.

The Master Controller III is a tower 20-MHz 486-SX PC with six available EISA bus slots (with the tape drive installed). It has 8 MB of RAM memory, either 200- or 500-MB hard disk drive, and a 250-MB streaming tape drive.

The following hardware is also required:

- A 355AF adapter for connecting the Master Controller to the serial port on the control unit if they are within 50 ft. (15.2 m) of each other and are on the same AC branch circuit
- ADUs for connecting the Master Controller to the serial port on the control unit, if they are not within 50 ft. (15.2 m) of each other and/or they are not on the same AC branch circuit
- Any additional hardware required by the individual applications included in IS III, including the cables and adapters for connecting the applications to the system
- IVP4 boards or IVP6 cards for AUDIX Voice Power and FAX Attendant
- 012 basic telephone module to provide the tip/ring interface for AUDIX Voice Power
- TR114 boards for FAX Attendant

A summary of the installation procedure is provided below:

- 1 Setup the equipment and identify the hardware for IS III.**
- 2 Connect the hardware as shown in the instructions.**
- 3 Install the software and test the IS III application.**

If a voice application is installed, you will need two 125-MB tape cartridges for system backup.

For more information, consult *Integrated Solution III Installation and Maintenance Guide*.

AT&T Attendant

AT&T Attendant is a stand-alone application that provides operator-like services through the use of prerecorded messages and electronic switching.

Considerations

You cannot connect AT&T Attendant to a system that operates in Behind Switch mode.

You cannot connect AT&T Attendant to a system that has an AUDIX application or a voice mail system installed.

You can connect a maximum of four Attendants to the system.

You should program all lines to AT&T Attendant for reliable far-end disconnect.

The system may need more touch-tone receivers if:

- Single-line telephone users do not get a dial tone.
- AT&T Attendant fails to transfer calls.
- Calls fail to ring or go to coverage prematurely.

When Attendant is set up for both daytime and after-hours operation, the time on each Attendant's clock must match the system clock so that the system recognizes the end of the business day.

Hardware Requirements

AT&T Attendant requires connection to a 012 basic telephone module. You can use up to eight jacks on a 012 basic telephone module for AT&T Attendants. When using fewer than eight jacks, you can use the remaining jacks for tip/ring devices.

The following hardware is also required:

- AT&T Attendant unit and cords
- Some AC power strips may be needed, since the Attendant is powered by wall-mounted transformers (10 V AC).
- Powering and grounding procedures must follow those established for T/R telephones that require auxiliary power.

For more information, consult *AT&T Attendant Installer's Guide*.

MERLIN MAIL

MERLIN MAIL Voice Messaging System provides the following integrated call management services:

- Automated Attendant
- Call answering
- Voice-mail

The number of incoming trunks and subscribers programmed for Automated Attendant service and the number of busy-hour calls determine how many MERLIN MAIL Voice Messaging System jacks are required for the user's system. See Table 8-2.

Table 8-2. MERLIN MAIL Ports Required

Number of Jacks Required	2	4
Incoming Trunks	1to6	7 to 18
Number of Subscribers or Busy-Hour Calls	1 to 20	21 to 60

Considerations

You cannot connect MERLIN MAIL Voice Messaging System to a system operating in Behind Switch mode.

MERLIN MAIL Voice Messaging System is available in 2-port and 4-port configurations. Both models have four hours of message storage capacity.

You can use up to eight jacks on a 012 basic telephone module for MERLIN MAIL. If you use all eight jacks for MERLIN MAIL, you cannot connect any other devices to the module.

When using fewer than eight jacks, you can use the remaining jacks for tip/ring devices.

When a mailbox user receives voice mail messages, the Message LEDs on his or her telephone is on, provided that a physical telephone has been assigned to that mailbox.

Trunks to be answered by MERLIN MAIL should be programmed for reliable far-end disconnect.

Callers who dial from rotary telephones cannot use MERLIN MAIL features.

The system may need more touch-tone receivers if:

- Single-line telephone users do not get a dial tone.
- MERLIN MAIL fails to transfer calls.
- Calls fail to ring or go to coverage prematurely.
- Message-waiting lights fail to light.

MERLIN MAIL and AT&T Attendant should not be used on the same system.

Programming of MERLIN MAIL is through a touch-tone interface.

MERLIN MAIL has an EIA-232-D serial port and an external modem to support remote diagnostics.

You cannot use the first four logical IDs on a 008 OPT module to physically connect telephone equipment; however, you can use the extension numbers of these logical IDs for phantom extensions.

Additional touch-tone receivers (TTRs) may be needed for the 012 module. to handle a large number of voice connections.

The MERLIN MAIL unit can be desk- or wall-mounted and should be placed in an area with low humidity and proper ventilation.

Follow the power and ground procedures for T/R telephones that require auxiliary power.

Hardware Requirements

The following hardware is required for MERLIN MAIL installation:

- MERLIN MAIL Voice Messaging System unit and power cords
- Remote maintenance device (with a wall-mount transformer)
- Modem cable with a 9-pin connector at one end and a 25-pin connector at the other end to connect the remote maintenance device to the serial port on the MERLIN MAIL Voice Messaging System unit
- D4BU modular cords (two for a 2-port system or four for a 4-port system, plus one for the remote maintenance device)
- 012 basic telephone module

For more information, consult *MERLIN MAIL Voice Messaging System for the MERLIN LEGEND Communications System, Installation, System Programming, and Maintenance*.

MERLIN PFC

The MERLIN PFC (Phone-Fax-Copier) telephone is a 34-button display telephone with a built-in fax and personal copier that provides the convenience of a fax machine and personal copier in one compact unit. The MERLIN PFC allows the user to make and receive inside and outside calls using the built-in speakerphone, and to send and receive faxes or make quick copies while using the telephone.

Considerations

The fax machine component of the MERLIN PFC telephone does not transmit date, time, and fax number.

In Behind Switch mode, a dedicated fax line for incoming fax calls is also required; in Hybrid/PBX or Key mode, the system can have either a dedicated fax line or Direct Inward Dialing (DID).

You cannot install the MERLIN PFC telephone outside a building.

You must remove all button assignments except the one for the fax line from the fax extension.

You should remove the Voice Announce feature from the fax extension.

If the dedicated fax line is shared for outgoing calls only, you must program the Ringing option to No Ring at every extension except the MERLIN PFC fax extension.

The MERLIN PFC can operate in Hybrid/PBX mode, Behind Switch mode, or in Key mode. The following sections list differences in operation between the two modes.

Hybrid/PBX and Key Modes

The dedicated fax line for incoming fax calls from the central office must be connected to a line jack on the control unit, and the line cannot be assigned to a pool.

If DID is used, a DID number must be assigned to the fax extension.

If a dedicated private line is used, assign a fax line to the voice extension.

No lines or pools can be programmed to the fax extension. At the fax extension, the dedicated fax line should be programmed to Immediate Ring and any other lines should be programmed to No Ring.

Behind Switch Mode

The dedicated fax line should be programmed to the MERLIN PFC fax extension.

The dedicated fax line should be assigned as a secondary (no ring) line at the voice extension.

Hardware Requirements

The MERLIN PFC telephone requires two analog ports: one for the voice line and one for the fax line.

The telephone wiring between the control unit and the MERLIN PFC telephone must be installed in the same building.

For more information, consult *MERLIN PFC Telephone Phone-Fax-Copier Installation and Maintenance Guide*.

PassageWay Direct Connect Solution

PassageWay Direct Connect Solution is a collection of five software applications that provide an interface between an approved DOS PC and the system through an MLX-28D, MLX-20L, or MLX-10DP telephone:

- **AT&TCall.** A card file application that enables a user to maintain names, addresses, telephone numbers and other information.
- **AT&TSet.** A telephone programming application that enables users to program telephone features for their MLX-28D, MLX-20L, or MLX-10DP telephones from the PC. Multiple button programming files can be created, saved, and exchanged with other users.
- **Log Viewer.** An application that enables users to access information from the call log, which stores a record of every call made while using AT&TCall.
- **AT&TConnect.** Management software that provides the basis for all the other PassageWay applications. AT&TConnect also provides autodialing using the command set used by most modems.
- **AT&T Buzz.** An application that enables users to manage incoming calls (answer, hold, or drop) and view the calling party number (Caller ID) for each incoming call at their telephones.

Considerations

MERLIN LEGEND Communications System Release 3.0 or later is required for caller identification display capabilities.

Local telephone power is required if the MLX telephone is not wired with 4-pair extension wiring or if you use a MLX-20L or MLX-28D with a Direct Station Selector (DSS).

The MLX telephone must have Idle Line Preference activated.

The Automatic Line Selection on the MLX telephone should be programmed so that Idle Line Preference is on an **ICOM** button (in Key and Behind Switch modes) or an **SA** button (Hybrid/PBX mode).

Hardware Requirements

The following hardware is required:

- An approved DOS PC with the following
 - An 80286 or higher processor (80386 or higher recommended)
 - An available serial port
 - A minimum of 2 MB of RAM
 - A 3.5-inch, 1.44-MB, high-density drive or a 5.25-inch, 1.2-MB, high-density drive
 - A hard disk drive with 2 MB of space available
 - A Windows-compatible color video monitor
 - A Windows-compatible pointing device (a mouse or trackball is recommended)
- Microsoft Windows, version 3.1 or later
- PassageWay adapter
- 9-pin to 25-pin adapter for 9-pin serial ports
- 4-ft., 4-pair, keyed modular telephone cord (D8AC)

For more information, consult *Passage Way Solution User's Guide*.

System Programming and Maintenance (SPM)

System Programming and Maintenance (SPM) is a DOS-based software application that allows you to use a PC to program and maintain the system. SPM performs the same functions as an MLX-20L telephone used as a system programming console and has some additional features, such as the ability to back up and restore files and print reports. The PC display shows the same button and screen layout as an MLX-20L telephone.

Considerations

SPM operates with DOS version 3.3 or later.

Unless the system is being backed up or restored, a remote user takes priority over a local user. If the local user is programming when a remote user connects to the system, the system sends a message to the local user that a remote connection has been made and disconnects the local user.

The PC with SPM connects to the EIA-232-D ADMIN jack on the processor of the control unit. The EIA-232-D baud rate is 1200/2400 bps with autobaud adjust.

A printer connected to the PC with SPM can print system programming reports. Reports can also be sent to the printer that is connected to the SMDR port on the control unit.

However, SMDR information may be lost while system programming reports are printed through the SMDR jack.

A UNIX System-based version of System Programming and Maintenance is available as part of Integrated Solution III, as discussed earlier in this chapter.

Hardware Requirements

The following hardware is required:

- An approved PC or other DOS-compatible PC with:
 - At least 512K of RAM
 - A double-sided floppy disk drive (either 5.25-inch or 3.5-inch)
 - A serial port assigned to COM1 or COM2. The serial port can use either a DB-9 or DB-25 connector. If a DB-9 connector is used, a 9-pin to 25-pin adapter is also required. The 9-pin side must be female.
- Video monitor (monochrome or color)
- D8W cord and 355AF adapter if the PC is within 50 ft. (15.2 m) of the control unit. Distances of greater than 50 ft. (15.2 m) require back-to-back ADUs.

See *System Programming and Maintenance (SPM)* for installation instructions.

Upgrading the System

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To upgrade the control unit, follow the steps below:

1 Remove the control unit housing.

See “Removing the Control Unit Housing,” next in this chapter.

2 If the current system programming is to be used in the upgraded system, back up system programming.

See “Completing the Upgrade,” later in this chapter, for details.

3 Power down the system.

See “Powering Down the System, ” later in this chapter, for instructions.

Removing the Control Unit Housing

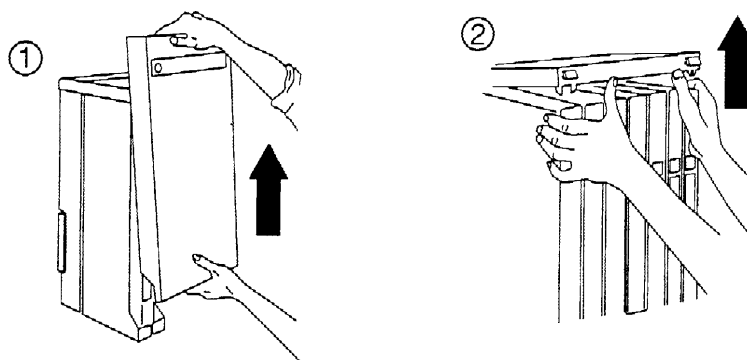
Remove the control unit housing as described below. See Figure 9-1.

- For a MERLIN II or a MERLIN LEGEND (Release 2.1 or later) Communications System:
 1. Remove the front housing from each carrier by pulling the bottom-front towards you, and lifting it up as shown in Figure 9-1.
 2. Remove the top from each carrier in the system by pushing it straight up from the front.
 3. Do not discard the housing unless new housing is provided. You will reassemble the housing when installation is complete.

- For a MERLIN LEGEND (Release 2.0 or earlier) Communications System:
 1. From both sides of the control unit, pry the clips free from the housing, using a screwdriver if they are difficult to reach.
 2. Carefully pull the housing towards you.
 3. If the system has more than one carrier, make sure you remove the housing only from the basic carrier side, otherwise the housing may disassemble.
 4. If the housing clips need to be replaced, follow the procedure in "Replacing the Housing Clips."
 5. Discard the housing only if upgraded housing has been provided.

Removing the Control Unit Housing

MERLIN II and
MERLIN LEGEND 2.1 and later
Communications System



MERLIN LEGEND 2.0
and earlier
Communications System

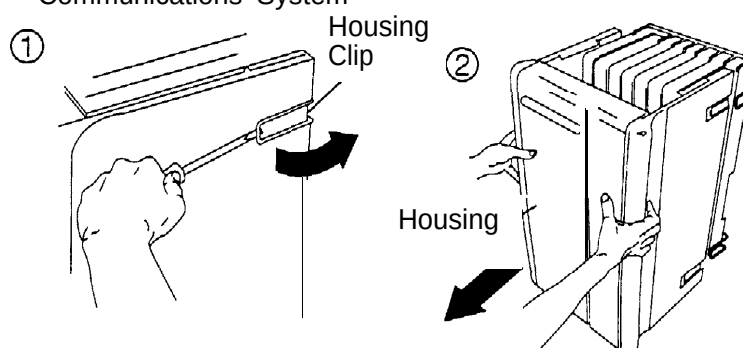


Figure 9–1. Removing the Control Unit Housing

Powering Down the System

You may need to power down the system to add upgraded equipment to the carrier.



CAUTION:

Follow these steps in the exact sequence.

To power down the system, follow the steps below and see Figure 9–2:

- 1 Turn off the power supply on the basic carrier.**
- 2 Turn off the power supplies on the expansion carriers.**
- 3 Unplug any auxiliary power units.**

Because the power supplies are already off, the sequence for removing auxiliary power cords is not important.

- 4 Unplug the system from the AC outlet.**

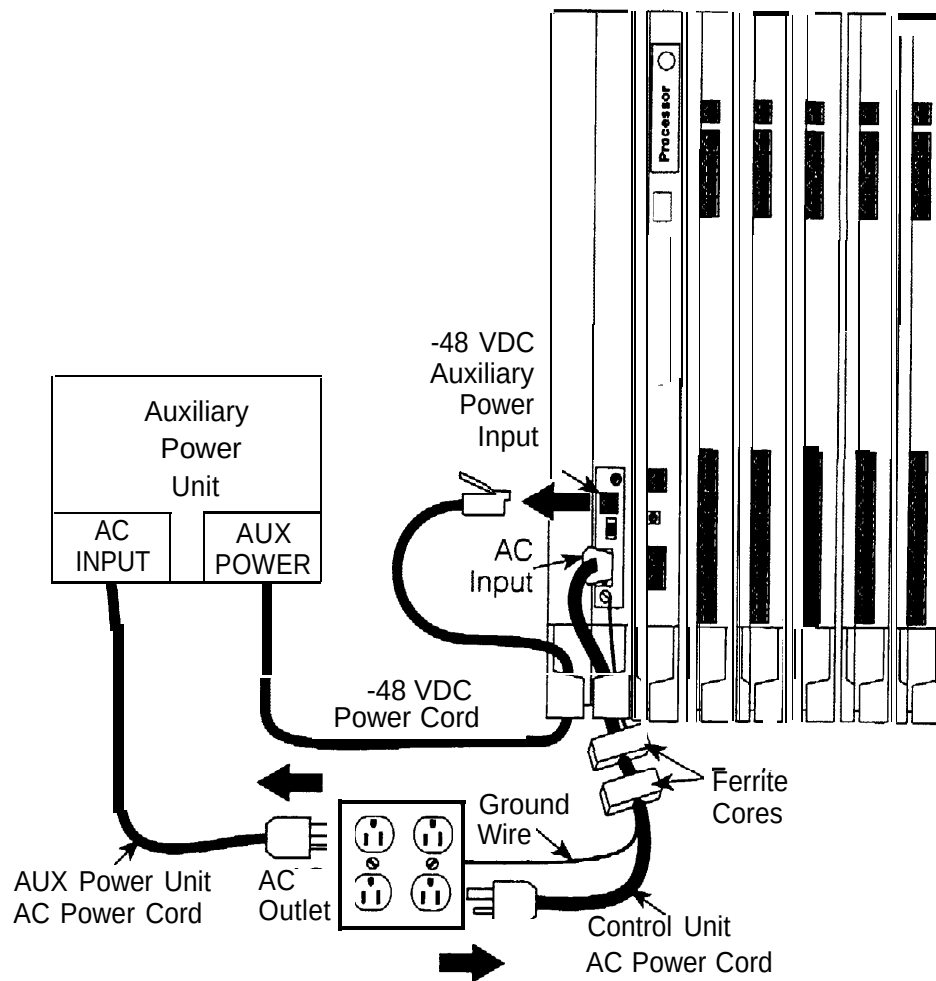


Figure 9–2. Powering Down the System

Upgrading the Control Unit

1 Do not remove any of the existing carriers.

2 Refer to the Control Unit Diagram on the flip side of System Planning Form 1.

If you are installing an expansion carrier, remove the rightmost module from the control unit and put it aside. See Figure 9-3.



CAUTION:

Before removing any cords from the module, make sure they are labeled first for easier replacement.

3 Install any expansion carriers.

See “Installing Expansion Carriers” in Chapter 2.

4 Install or replace any modules.

See “Installing the Modules” in Chapter 2.

5 Replace the processor module. See Figure 9-3.

- a Press up on the tab at the bottom rear of the old processor module.
- b While the tab is unlocked, pull the processor module towards you, and then lift it straight up.
- c Install a Release 3.0 processor module. See “Installing the Processor” in Chapter 2.

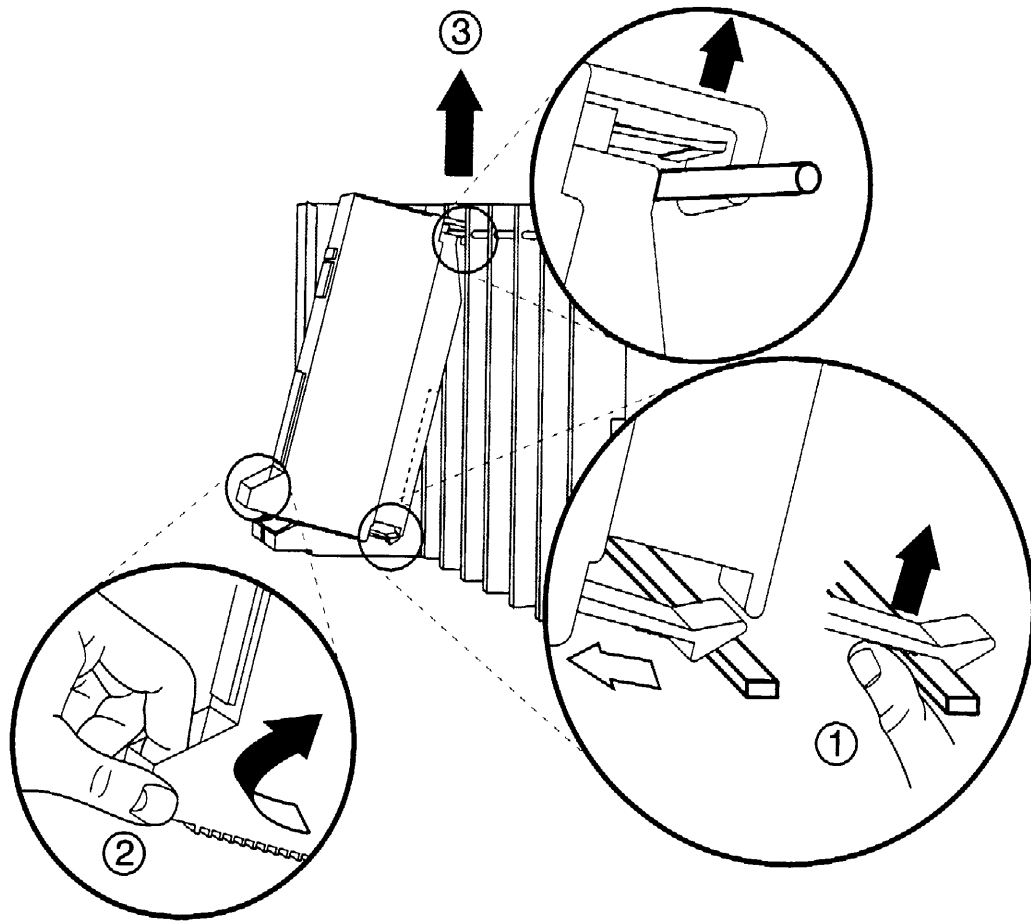


Figure 9-3. Removing a Module from the Carrier

Replacing the Housing Clips

1 Remove the housing clips from the right side of the module.

- a Remove the rightmost module from the control unit. See “Removing a Module” in Chapter 2 for instructions.
- b Using a flat-blade screwdriver, unscrew the upper-right corner of the carrier only far enough to free the clip.
- c Pull the top-right corner of the carrier toward you while grasping the housing clip and pushing it away from you (to free it from the carrier).
- d When the clip is free enough to clear the screw molding on the back of the carrier, slide the clip out and discard it.
- e Compare the Control Unit Diagram with the existing control unit. If you are installing an additional expansion carrier in this upgrade, do not replace the clips on the right side until the last expansion carrier is installed. If no more carriers are to be installed, replace the clip now, making sure the clip is as far to the right as possible.
- f Secure the screw, and then repeat Steps b, c, and d for the lower right corner of the carrier.

2 Remove the power supply module to access the housing clips on the leftmost side of the carrier. See Figure 9-3.

- a Press up on the tab at the bottom rear of the power supply.
- b While the tab is unlocked, pull the power supply towards you, and then lift it straight up.



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.

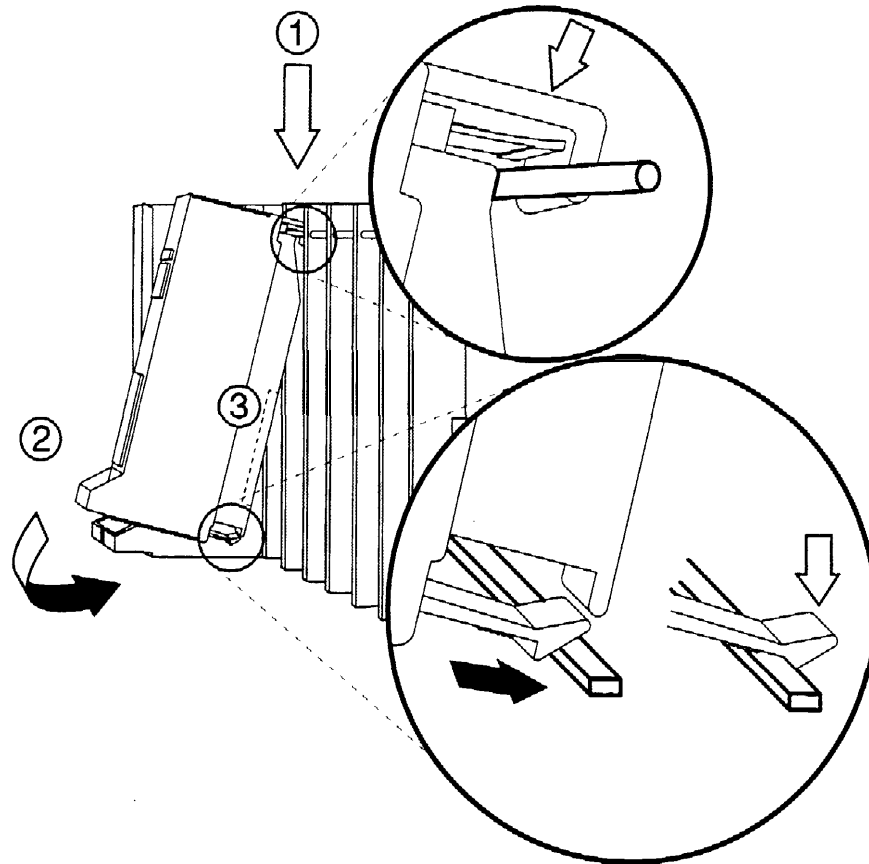


Figure 9-4. Replacing a Module in the Carrier

- 3 Remove the clips from the left side of the control unit as you did in Step 1; however, make sure you replace the clips before securing the screws again.**
- 4 Reinstall the power supply module by hooking it onto the rod at the top of the carrier and then swinging it down into place. See Figure 9-4.**
- 5 Push the power supply module firmly until you hear it lock.**

Modifying the Processor for Key Mode

To modify the processor for Key mode in Release 3.0, follow the steps below. For earlier releases, see Appendix E in *Maintenance and Troubleshooting*.

Prepare a non-metallic surface, such as a table, on which to work.



WARNING:

Do not touch the gold connectors on the rear of the processor module. Electrostatic discharge (ESD) can damage the circuitry, as can the oil from your fingertips. Use a properly grounded wrist strap to prevent damage from electrostatic discharge.

Only a qualified technician should perform this procedure.

- 1 Remove the control unit housing. See Figure 9-1.**
- 2 Power down the system as described earlier in this chapter. See Figure 9-2.**
- 3 Remove the processor module from the carrier. See Figure 9-3.**
- 4 Place the processor module on a flat surface with the wiring manager on your left.**
- 5 Unclip and remove the left side panel. See Figure 9-5.**

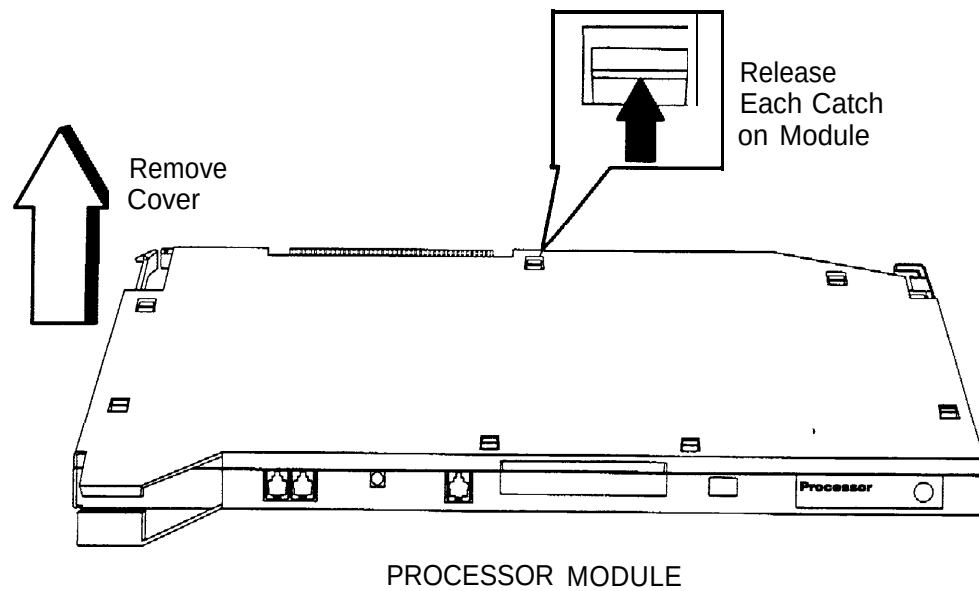


Figure 9–5. Removing the Processor Module Cover

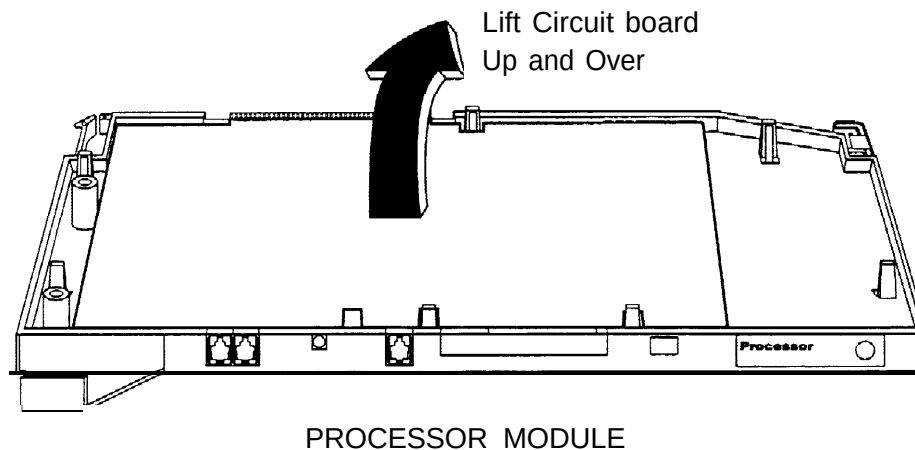


Figure 9-6. Removing the Processor Module Circuit Board

- 6 Holding the processor circuit board at each end, lift it up and turn it over and away from you. See Figure 9-6.
- 7 Place the processor circuit board on a flat *non-metallic* surface.
- 8 Carefully support the dip switch assembly with the index finger, while moving the switch to the closed position. See Figure 9-7.
- 9 Replace the processor circuit board face (components) down into the module housing.
- 10 Replace the processor module side panel and clip into place.
- 11 Replace the processor module into the carrier. See Figure 9-4.
- 12 Power up the system.

Modifying the Processor for Key Mode

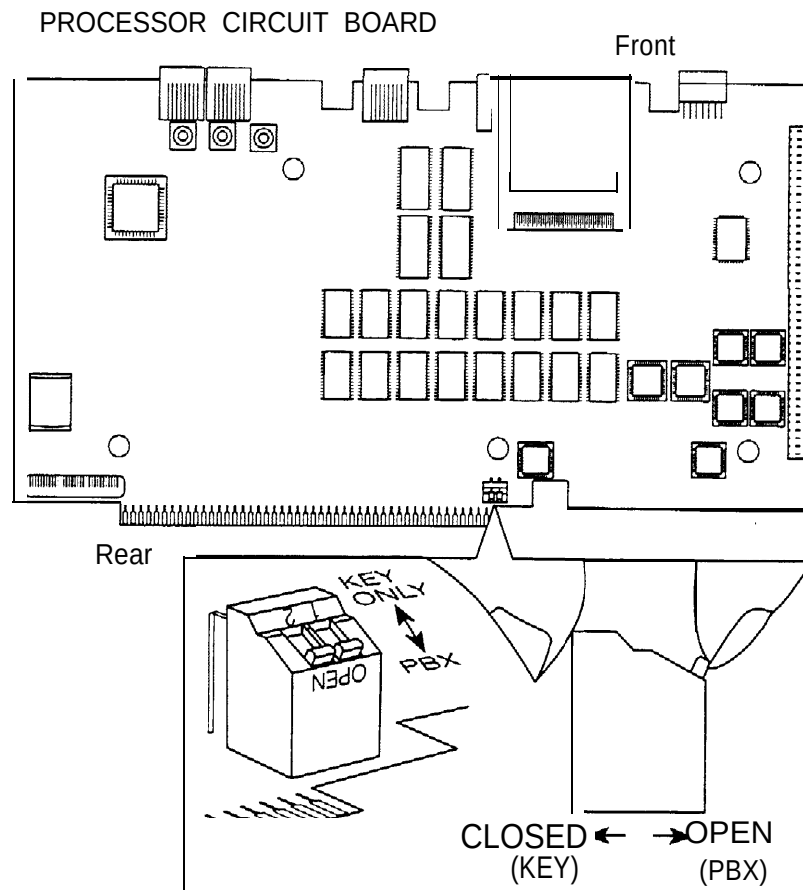


Figure 9–7. Changing the Key Mode Switch Position to Closed

Completing the Upgrade



WARNING:

The following procedures are for qualified technicians or service personnel only. Installation or maintenance of this product by anyone other than qualified personnel may damage or impair the product—the limited warranty does not cover such damage. See the limited warranty for details. Hazardous electrical voltages are present inside this product.

To upgrade to Release 3.0, you need:

- SPM Version 3.xx or higher
- The version number of the SPM software currently installed (if any)
- Release 3.0 processor module and forced installation PCMCIA card
- DOS-formatted disk

NOTE:

You cannot upgrade system programming for the MERLIN II Communications System; *it must be reprogrammed*. To upgrade a MERLIN II Communications System, see “Upgrading from the MERLIN II Communications System,” later in this chapter.

Use the following procedure to upgrade to release 3.0 from Release 1.0, 1.1, 2.0, or 2.1:

1 Install SPM.

2 Backup system programming.

- *To back up system programming from Release 1.0 or 1.1, you can use any version of SPM (1.16 is recommended).*
- *To back up system programming from Release 2.0, you must use version 2.09 or higher of SPM.*

- To back up system programming from Release 2.1, you must use version 2.16 or higher of SPM.

3 Install a Release 3.0 processor module. See Chapter 2, “installing the Processor.”

4 Perform a frigid start (System Erase) to ensure that all system programming is returned to default values.

Use System Erase from the SPM Maintenance menu:

Maintenance → Slot → 00 → Demand Test-System Erase (Line 5, left button)
twice → Yes

See *Maintenance and Troubleshooting* for more information on System Erase.

5 Convert the backup file.

This converts the backup file created in Step 2 to Release 3.0 format.

6 Restore system programming; this puts the system in an idle state, and it cannot be used for the duration of the procedure. Refer to “Restoring from the System Programming Diskette” in Chapter 7 for more information.

Use version 3.xx or higher of SPM and restore the file you converted in Step 5.

7 If applicable, program new features.

See *System Programming* for detailed programming procedures.

Upgrading from the MERLIN II Communications System

To upgrade from the MERLIN II Communications System to Release 3.0, follow the steps below.

1 Install SPM.

Install (or upgrade to) version 3.xx or higher of SPM.

2 Remove the control unit housing.

See “Installing the Control Unit” in Chapter 2 if you need instructions.

3 Replace old modules and add new modules as specified on the Control Unit Diagram of Form 1, System Planning.

See “Installing the Control Unit” in Chapter 2 if you need instructions.

4 Install the Release 3.0 processor module in the carrier.

See “Installing the Processor” in Chapter 2.

5 Perform a frigid start (System Erase) to ensure that system programming is returned to default values.

Use system Erase from the SPM Maintenance menu:

Maintenance → Slot → 00 → Demand Test → System Erase (Line 5, left button)
twice → Yes

See *Maintenance and Troubleshooting* for more information on System Erase.

6 Program the system.

- Restore the system programming from a system programming disk or Translation Memory Card (Release 3.0 only), if available.

See “Restoring from the System Programming Disk” or “Restoring from the Translation Memory Card,” in Chapter 7.

- If a disk or memory card is not available, see *System Programming* for details on programming the system.

7 If applicable, program new features.

See *System Programming* for detailed programming procedures.

8 Replace the control unit housing.

See Chapter 2, “Installing the Control Unit,” for additional instructions.

Release 2.0 or Earlier

To install the control unit’s housing, follow the steps below.

1 Place 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 9-8.

- 3 Connect the side panels to the front panel(s) in the same way.**
 - 4 Pickup 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.
-

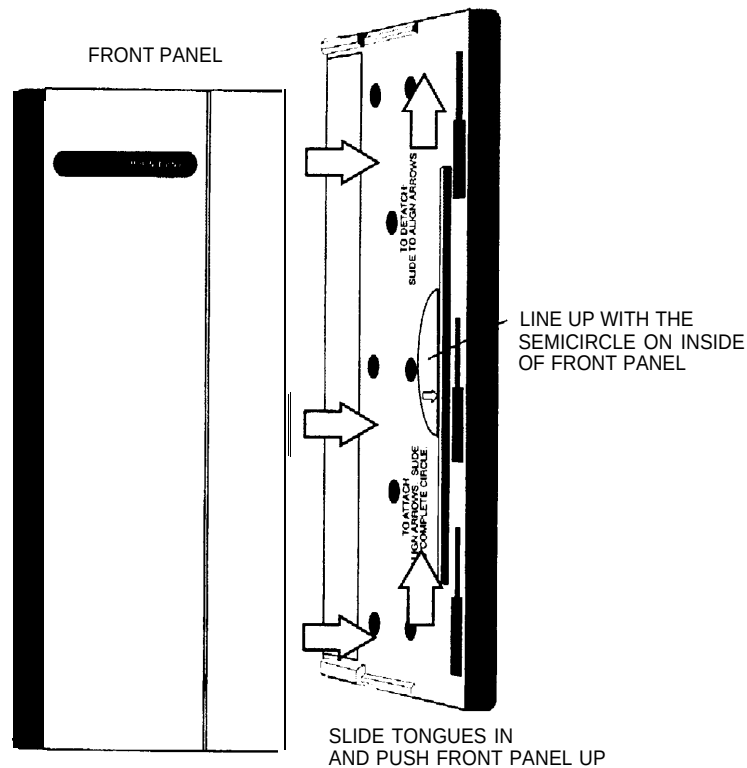


Figure 9-8. Installing the Control Unit Housing

System Numbering Forms



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 A-1)
- Form 2b, System Numbering: Digital Adjuncts (Figure A-2)
- Form 2c, System Numbering: Line/Trunk Jacks (Figure A-3)
- Form 2d, System Numbering: Special Renumbers (Figure A-4)

See *System Planning* for completed forms that 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			Eqpt.	2-Dig Ext. No. u	3-Dig Ext. No.	Set Up Space	Renumber to	Label	Old Ext. No.	Wire No.	Person, Location or Function	VEX R1.1	AUDIX Voice Power™
	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

† Use Form 2b for adjuncts connected via MFM or ISDN 7500B Data Module

* The system capacity for Personal Directories is decreased by one whenever an MLX-20L telephone is connected to an MLX port

Figure A-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

Maximum 127 Adjuncts

Log, ID	Factory-Set			Renumber to	MFM		7500B	MLX Telephone Ext. No.	Person, Location, Function, and Equipment Type
	2-digit	3-digit	Set-Up Space		SAA	T/R			
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	710	308	7308						
10	719	303	7308						
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	728	319	7319						
21	730	320	7320						
22	731	321	7321						
23	732	322	7322						
24	733	323	7323						
25	724	324	7324						
26	735	325	7325						
27	736	326	7326						
28	737	327	7327						
29	738	328	7328						
30	738	329	7329						
31	740	330	7330						
32	741	331	7331						
33	742	332	7332						
34	743	333	7333						
35	744	334	7334						
36	745	335	7335						
37	746	336	7336						
38	747	337	7337						
39	748	338	7338						
40	749	339	7338						

Figure A-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 Queue Priority Level† (4+)	QCC Operator to Receive Calls† (No ♦)	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 A-3. Form 2c, System Numbering: Line/Trunk Jacks

Form 2d, System Numbering: Special Renumbers

Pools* (Forml 2c) Description	Factory-Set Number	Renumber to
	70	
	890	
	891	
	892	
	893	
	894	
	895	
	896	
	897	
	898	
	888	

Group Paging (Form 7b) Group ID	Factory-Set Number	Renumber to
	793	
	784	
	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) Grow 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
	869	

◆ 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 A-4. Form 2d, System Numbering: Special Renumbers

Unit Load Calculation Worksheet

B

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.

Unit Load Worksheet

1. Number of modules in carrier (excluding power supply and processor:

■ If fewer than five, auxiliary power is not required. _____

■ 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, auxiliary power is not required

■ 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.

Unit Load Calculation Worksheet

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	
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 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, auxiliary power is not required.
- If the total is greater than 54, continue to Step 6.

Unit Load Calculation Worksheet

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	
<i>Continued</i>				

* Unit loads are computed per trunk for trunk-type network access lines.

Unit Load Calculation Worksheet

	Qty	x	Unit Load	= Total
Equipment			Hybrid/PBX or Modified	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, auxiliary power is not required.
- 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, 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, auxiliary power is not required.
 - If the exchange does not reduce the unit load to 54 or less, auxiliary power is required. Continue to Step 8.

NOTE:

Empty slots are not permitted between modules.

Unit Load Calculation Worksheet

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

	Qty	x	Unit Load	= Total
Equipment			Hybrid/PBX or Modified	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
<i>Continued</i>				

* Unit loads are computed per trunk for trunk-type network access lines.

Unit Load Calculation Worksheet

	Qty	x	Unit Load	= Total
Equipment			Hybrid/PBX or Modified	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, auxiliary 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 to 27. (Remember that the 100D, 400, 400 GS/LS/TTR, 800 GS/LS-ID, 800, 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 to 27 or less, auxiliary power is sufficient.
 - If the exchange does not reduce the unit loads for slots 5 and 6 to 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.

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MERLIN LEGEND[®]
Communications
System
Release 3.0

Maintenance and
Troubleshooting

Notice

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

See Appendix A, "Customer Support Information," for important information.

Security of Your System: Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there exists 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. 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 prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Trademarks

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UNIX is a registered trademark of UNIX System Laboratories, Inc.

Ordering Information

The ordering number for this document is 555-630-140. To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800-255-1242). For more information about AT&T documents, refer to the section entitled, "Related Documents" in "About This Book." The *Pocket Reference*, listed in that section, provides full ordering information for replacement parts, accessories, and other compatible equipment; or, contact your AT&T representative.

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 1800628-2888 if you need assistance when installing or using your system. Outside the continental U. S., contact your local AT&T representative.

Warranty

AT&T provides a limited warranty on this product. Refer to "Limited Warranty and Limitation of Liability" in Appendix A, "Customer Support Information."

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

IMPORTANT SAFETY INSTRUCTIONS

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

- Read and understand all instructions.
- Follow all warnings and instructions marked on or packed with the product.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Use only 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	7500B data station
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	7500S data only station
digital voice and digital data station	MLX voice and 7500B data station

Typographical Conventions

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

Example	Purpose
It is <i>very</i> important that you follow these steps. You <i>must</i> 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 <i>headpiece</i> .	Italics also set off special terms.
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.

Continued on next page

Typographical Conventions *Continued*

Example	Purpose
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."

Related Documents

In addition to this book, the following list of documents are part of the documentation set. Within the continental United States, these documents can be ordered from the AT&T Customer Information Center by calling 1-800-432-6600.

Document No.	Title

	System Documents
555-630-117	<i>Introduction</i>
555-630-118	<i>System Manager's Guide</i>
555-630-110	<i>Feature Reference</i>
555-630-115	<i>Equipment and Operations Reference</i>
555-630-116	<i>Pocket Reference</i>
555-630-111	<i>System Programming</i>
555-630-112	<i>System Planning</i>
555-630-113	<i>System Planning Forms</i>
	Telephone User Support
555-630-122	<i>MLX-10D™, MLX-10DP™, MLX-28D™, and MLX-20L™ Display Telephones User's Guide</i>
555-630-150	<i>MLX-10D Display Telephone Tray Cards (5 cards)</i>
555-630-153	<i>MLX-28D and MLX-20L Telephone Tray Cards (5 cards)</i>
555-630-124	<i>MLX-10™ Nondisplay Telephone User's Guide</i>
555-630-151	<i>MLX-10 Nondisplay Telephone Tray Cards (6 cards)</i>
555-630-120	<i>Analog Multiline Telephones User's Guide</i>
555-630-126	<i>Single-Line Telephones User's Guide</i>
	System operator Support
555-630-134	<i>MLX Direct-Line Consoles Operator's Guide</i>
555-630-132	<i>Analog Direct-Line Consoles Operator's Guide</i>
555-630-136	<i>MLX Queued Call Console Operator's Guide</i>

Document No.	Title

	System Operator Support (Cont.)
555-630-138	<i>MDC 9000 and MDW 900 Telephones User's Guide</i>
	Miscellaneous User Support
555-630-130	<i>Calling Group Supervisor's Guide</i>
555-630-129	<i>Data User's Guide</i>
	Documentation for Qualified Technicians
555-630-140	<i>Installation, Programming, & Maintenance (IP&M) Binder.</i>

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Date: **August 1994**

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THIS FORM MAY BE PHOTOCOPIED

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 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 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 III (IS III).

Setting Up the MLX-20L Console

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

- 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.

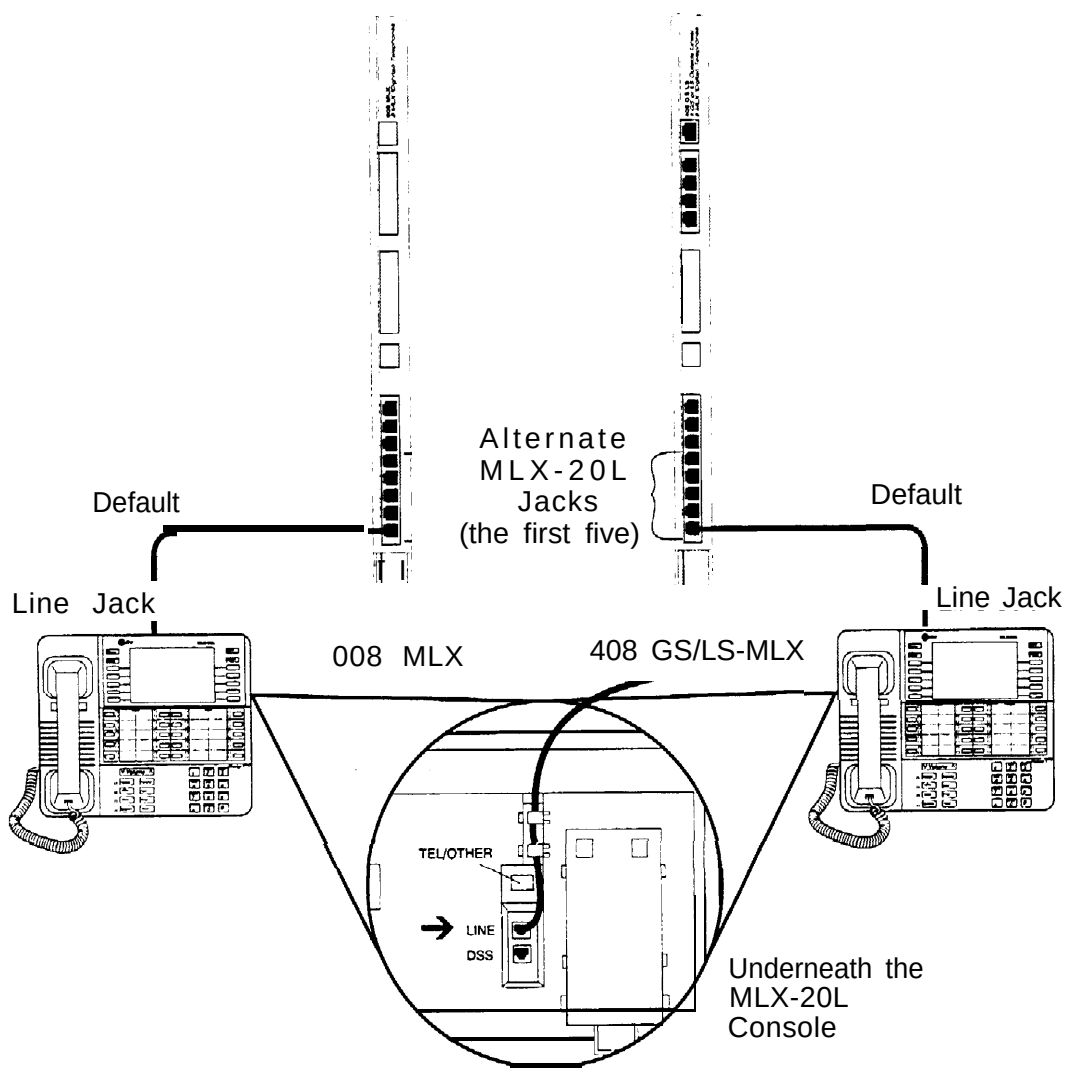


Figure I-1. Setting Up the MLX-20L Console

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.”

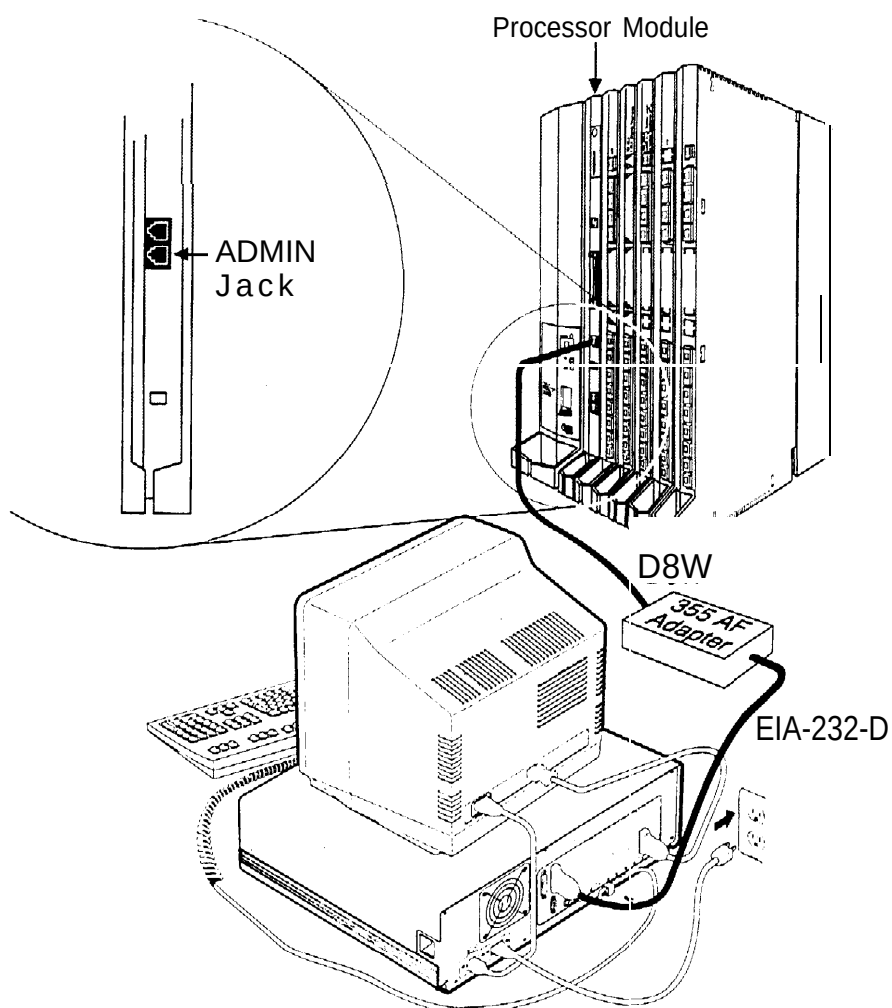


Figure 1-2. Setting Up the PC

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 setup 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.

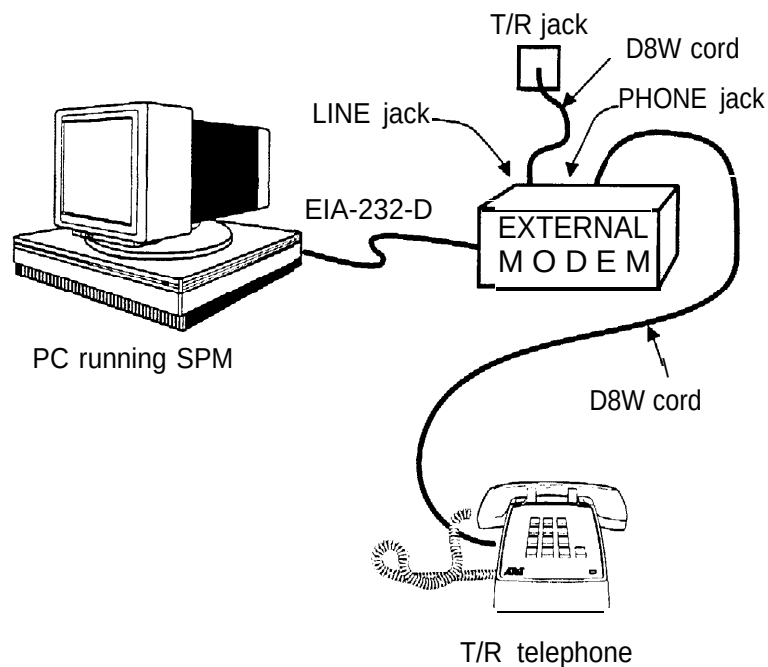


Figure 1-3. External Modem Setup

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 *10.

- 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).

V2	QUIT MENU	Home End F1 F2 F3 F4 F5	Welcome to SPM The MERLIN LEGEND System Programming & Maintenance Utility Please press any key to continue. Version 2.09				PgUp PgDn F6 F7 F8 F9 F10	MORE INSP	Drop ALT-P
Shift F5	LINE 05	LINE 10	Shift F10	Alt F5	LINE 15	LINE 20	Alt F10		Flash ALT-F
Shift F4	LINE 04	LINE 09	Shift F9	Alt F4	LINE 14	LINE 19	Alt F9		TopSP ALT-C
Shift F3	LINE 03	LINE 08	Shift F8	Alt F3	LINE 13	LINE 18	Alt F8		Pause ALT-H
Shift F2	LINE 02	LINE 07	Shift F7	Alt F2	LINE 12	LINE 17	Alt F7		CONVERT ALT-U
Shift F1		LINE 06	Shift F6	Alt F1	LINE 11	LINE 16	Alt F6		HELP CTL-F1
									RESET CTL-F5
									BROWSE CTL-F8

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
<u>(Home)</u>	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.
<u>(End)</u>	Menu	Return to the SPM Main Menu.
<u>(PgUp)</u>	More	Display more menu items (when there is an additional screen and the > symbol appears next to the key.)
<u>(PgDn)</u>	Inspct	Show the current information that has been programmed for a feature or button.
<u>(Alt) + (P)</u>	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.
<u>(Alt) + (F)</u>	Conf	Flash. Enter a switchhook flash in a speed dialing sequence.
<u>(Alt) + (C)</u>	n/a	TopSP. Return to the top of the System Programming menu.
<u>(Alt) + (H)</u>	Hold	Pause. Enter a Pause in a speed dialing sequence.
<u>(ALT) + (U)</u>	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

<u>(Ctrl)</u> + <u>(F1)</u>	n/a	Help. Display a help screen about SPM operations. To exit from Help, press <u>(End)</u> .
<u>(Ctrl)</u> + <u>(F5)</u>	n/a	Reset. Reset the communications port. For example, if the information on the screen is garbled, try exiting from and then recentering the screen. If the screen remains garbled, use <u>(Ctrl)</u> + <u>(F5)</u> to clear the screen and return to the SPM Welcome screen. Note that using <u>(Ctrl)</u> + <u>(F5)</u> drops the modem connection.
<u>(Ctrl)</u> + <u>(F8)</u>	n/a	Browse. View print reports saved with Print Opts.
<u>(Ctrl)</u> + <u>(F9)</u>	n/a	Escape to shell. To use this key in sequence, you must set <code>DEBUG=1</code> in the SPM configuration file <code>ams.cfg</code> . You can then use this key sequence to execute DOS (or UNIX system) commands. To return to SPM, type <i>exit</i> .
<u>(Enter ↵)</u>	Enter	This key on your PC can be used instead of <u>(F10)</u> (Enter) when <i>Enter</i> appears as a choice in the 7-by-24 console simulation window.
<u>(←Bksp)</u>	Backspace	The <u>(←Bksp)</u> can be used instead of <u>(F9)</u> when it appears as a choice in the 7-by-24 console simulation window.
<u>(Del)</u>	Delete	The <u>(Del)</u> key on your PC can be used instead of <u>(F8)</u> (Delete) when it appears as a choice in the 7-by-24 console simulation window.
<u>(↑)(↓)(←)(→)</u>	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.		

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

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.

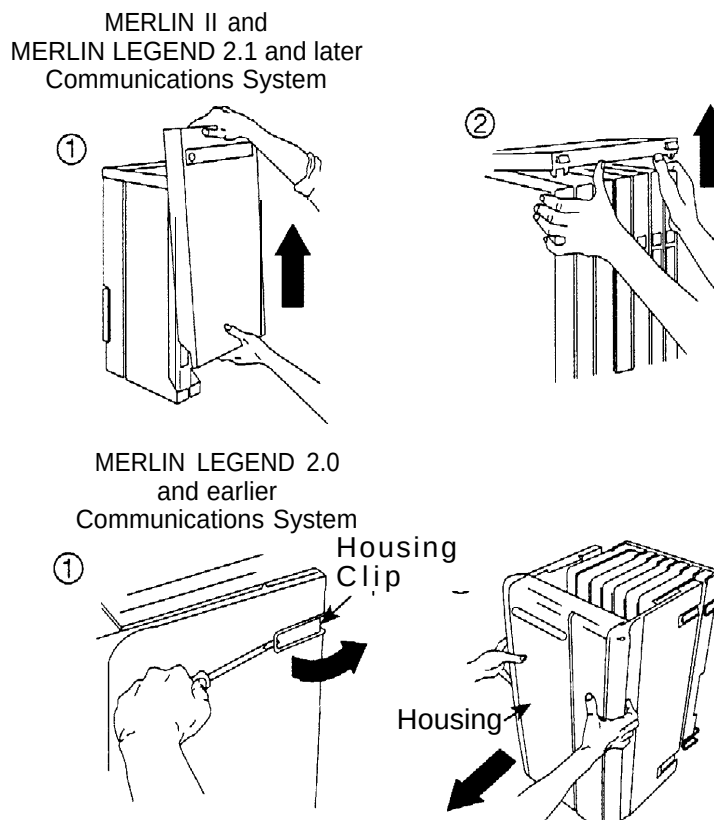


Figure 1-5. Removing the Control Unit Housing

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.**
-

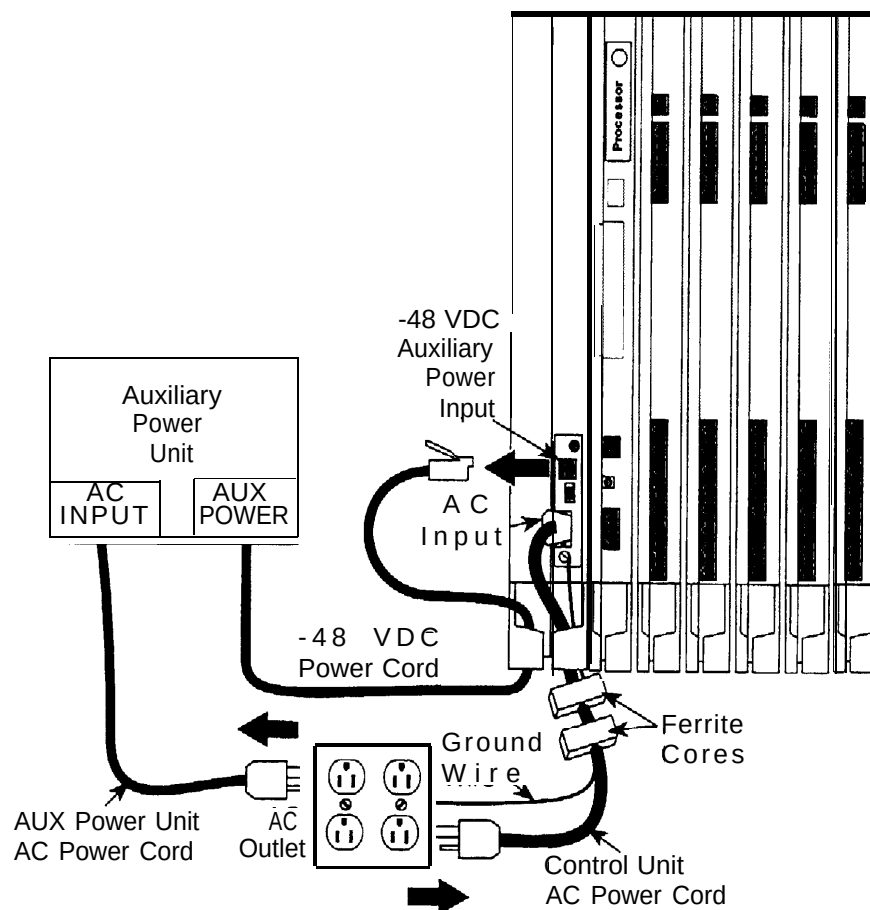


Figure 1-6. Disconnecting AC Power

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.

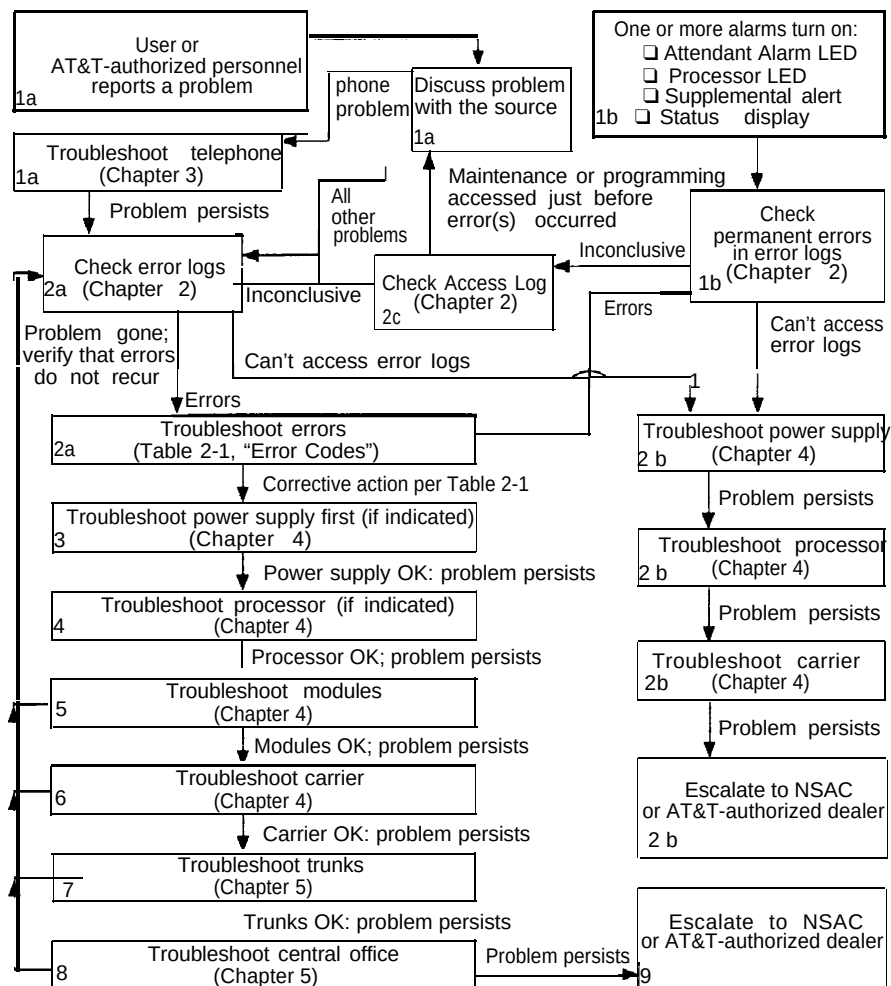


Figure 1-7. Maintenance Strategy

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, 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) + (P) 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	<u>(F6)</u> → ~~(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	<u>(F6)</u> → <u>(F1)</u> →Type 00 → <u>(F2)</u> → <u>(F3)</u> → <u>(F3)</u> → <u>(F2)</u>

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, system programming can be backed up to a memory card, and later, 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 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.

Auxiliary Power Units

The power supply provides 54 unit loads (102.6 watts) to each carrier. If the unit load requirement for a carrier exceeds 54 (102.6 watts), an auxiliary power unit is needed to allow that carrier to support an additional 27 unit loads (51.3 watts).



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.

An auxiliary power unit redirects the power requirements from the last two slots on the carrier. Any extension connected to the modules in the last two slots receives power from the auxiliary power unit instead of from the power supply. If an auxiliary power unit 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

Checking the Error Logs

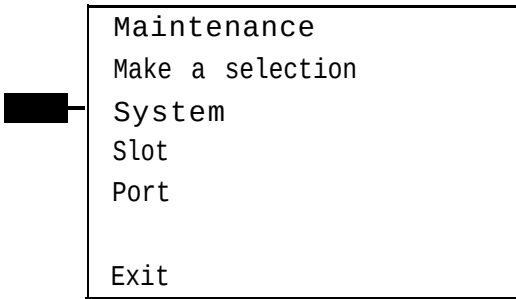
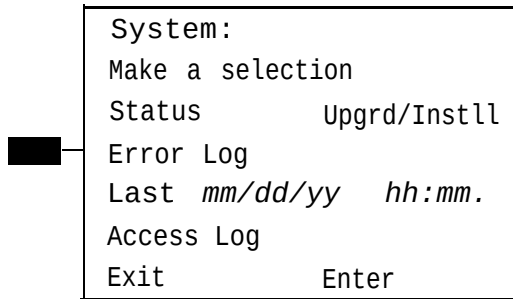
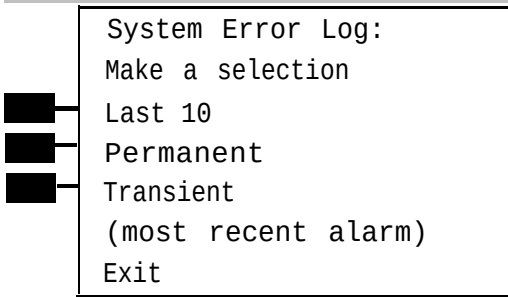
Once you have reviewed the error logs, you should print the error information. This will help you determine whether your work has resolved each problem. (Refer to “Summary” below or *System Programming* for additional information about printing.)

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	System Programming →Exit → More →Print → More → More →Error Log
Printing from PC	(F1) →(F5) →(PgUp) →(F3) →(PgUp) →(PgUp) →(F6)

Error Logs

To check the error logs, follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the System option.		
		(F1)
2 Select Error Log.		
		(F2)
3 Select an error log option.		
	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

```
Permanent Errors: >
XXXXXXXXXXXXXXXXXXXXX
Slot xx Port xx count xxx
First mm/dd/yy hh:mm
Last mm/dd/yy hh:mm
Code xxxx
Exit
```

Additional Information

PC

Press the **More** button to page (PgUp)
through the permanent errors.

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

Line 2 provides a brief description of the error code identified on Line 6. For more information 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: >
XXXXXXXXXXXXXXXXXXXXX
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 (PgUp)
through the transient errors.

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

Line 2 provides a brief description of the error code identified on Line 6. For more information 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

```
Last 10 System Errors>

XXXXXXXXXXXXXXXXXXXXX
Slot xx Port xx
Last   mm/dd/yy  hh:mm
Code   xxxx
Exit
```

Additional Information

PC

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.
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 <i>System Programming and Maintenance (SPM)</i> , 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.
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
1C03	FW UPGRADE COMPLETE	No action required.
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.
6C01	DS1 LOSS OF SIGNAL ALARM: Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, check the 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.
6C03	DS1 RED ALARM: Incoming signal does not have valid framing information. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
6C04	DS1 YELLOW ALARM: The far end of the network interface has lost frame synchronization. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, check the CSU and the DS1 configuration (the framing format). If problem persists, escalate to your technical support organization.
6C05	DS1 LOSS OF MULTIFRAME: Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
6C06	DS1 REMOTE MULTIFRAME: The far end of the network interface is experiencing loss of multiframe. Service on the link has been lost.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization.
6C07	DS1 MAJOR ALARM: Average bit error rate exceeds 10E-3. Service on the link has been lost.	Troubleshoot the T1 trunk, If problem persists, escalate to your technical support organization, Maintenance →Slot →Error Events → Current hr
6C08	DS1 MINOR ALARM: Average bit error rate exceeds 10E-6.	Troubleshoot the T1 trunk. If problem persists, escalate to your technical support organization. Maintenance →Slot →Error Events → Current hr
6C09	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

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
6C0A	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
6C0B	DS1 HARDWARE INOPERATIVE: DS1 hardware is not operating properly. If this is the only 100D (DS1) 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.
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.
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 RELEASED:	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
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.
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% <i>maintenance busy limit</i> 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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
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
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
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 COMPLETER 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.
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
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 4 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.
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
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. [f 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.
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
840B	NO LOOP CURRENT: communication problems between the module and the central office. No loop current. 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.	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.
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.

Continued on next page

Table 2-2 Continued

Error Codes	Description	Action
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 PCMC1A 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.

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).

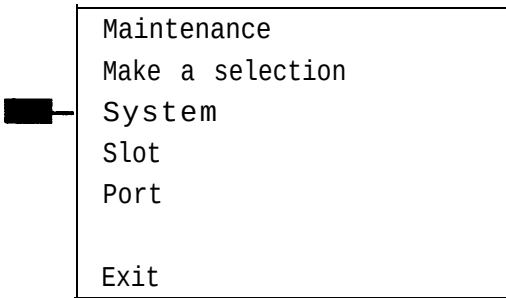
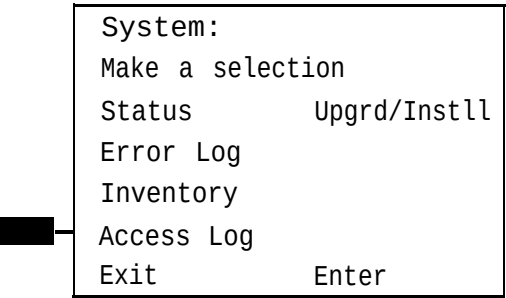
Scanning the Log

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.		
		<u>(F1)</u>
2 Display the first screen of the Access Log.		
		<u>(F4)</u>

The screen below shows the access log.

Console Display/Instructions

```
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
```

Additional Information

PC

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.

1 From the Maintenance menu, select the System option.

```
Maintenance
Make a selection
System
Slot
Port

Exit
```

(F1)

Console Display/Instructions	Additional Information	PC
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 3.0 Vx.x
xxxxxxxxxxx
Exit
    
```

Press the **More** button to review information for each subsequent slot. When you reach the display for the last slot, pressing the **More** button redisplay the slot 00 information.

(PgUp)

Reviewing the Screen

Lines 4, 5, and 6 indicate information that maybe 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 release number for the system 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

System Inventory:
Slot xx
Board *boardname*
Hardware Vintage: vv
Firmware Vintage: vv

Exit

Additional Information

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 redisplay the Slot 00 information.

P C

(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.

3–2 Telephone Problems

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 123456789*0#.

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

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

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

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

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

Call Forwarding Problems

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

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

- On multiline telephones, press the **Feature** button and dial *34*.
- 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 Pickup 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 *123456789*0#*

The LEDs should toggle on and off.

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

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

Each button name should display in the upper-left corner as described in Table 3-2 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 *123456789*0#*; wait for silence, and then quickly press the **Recall** button to perform a switchhook flash.

You should hear a confirmation tone (three beeps).

- e Hang up.

You should hear a ring burst, and the Message LED should turn on.

- f Dial *#54* to turn off the Message LED and resume normal operations.

11 If these tests fail, replace the MFM.

Table 3–2. MLX Telephone Display Buttons

Button	Display
Home	HOME
Menu	MENU
More	MORE
Inspct	INSPECT
Each unlabeled display button	DISPLAY BUTTON <i>nn</i> ; where <i>nn</i> 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
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 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.

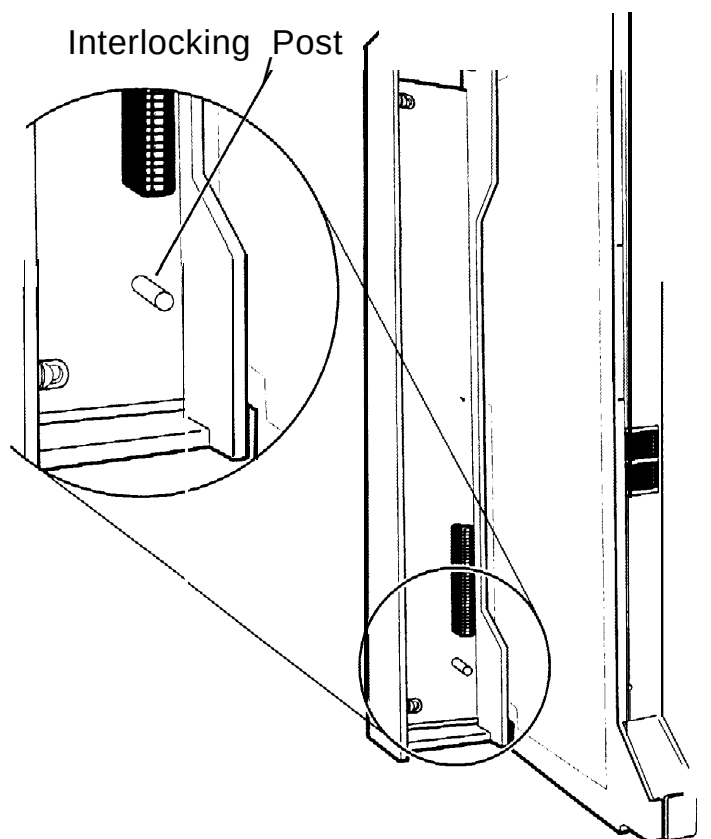


Figure 4-1. Power Supply Interlocking Post

- 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.

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 517FI 3 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 14 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 PI 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.

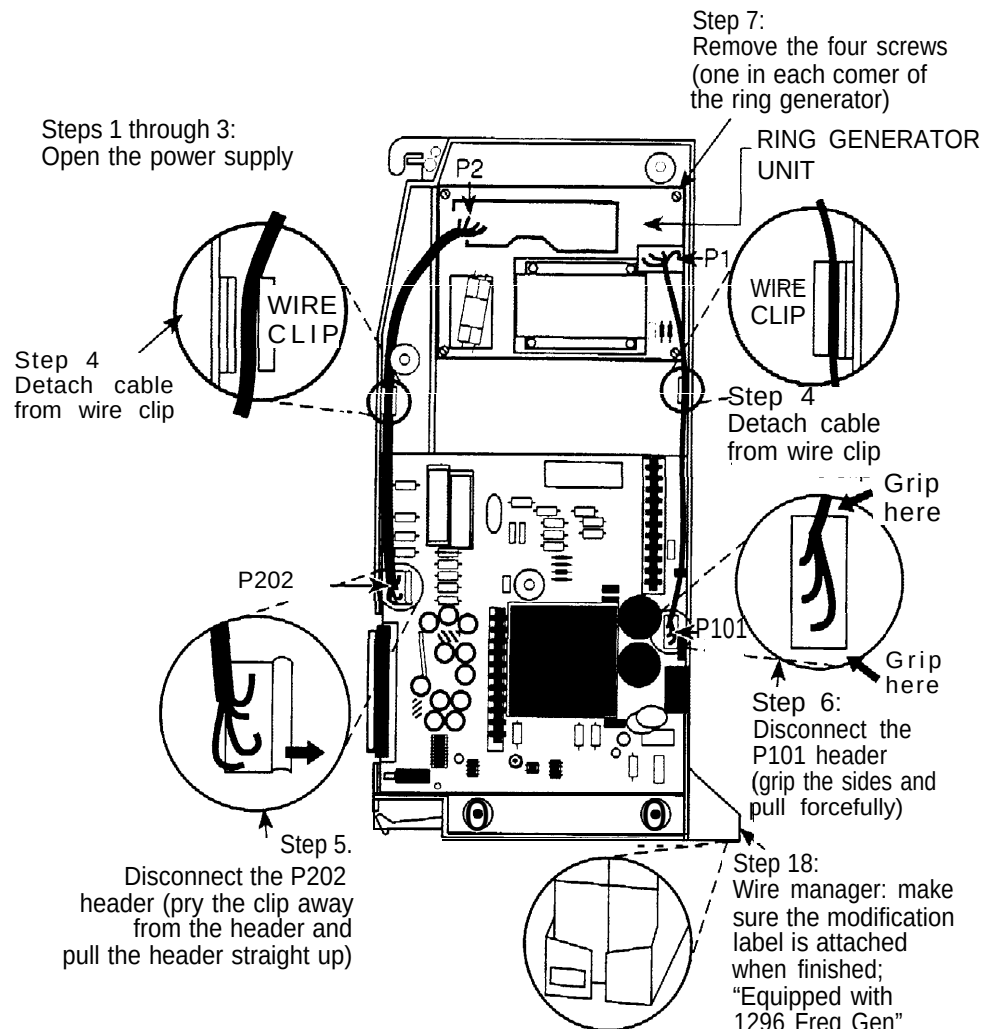


Figure 4-2. Replacing a Ring Generator

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.**

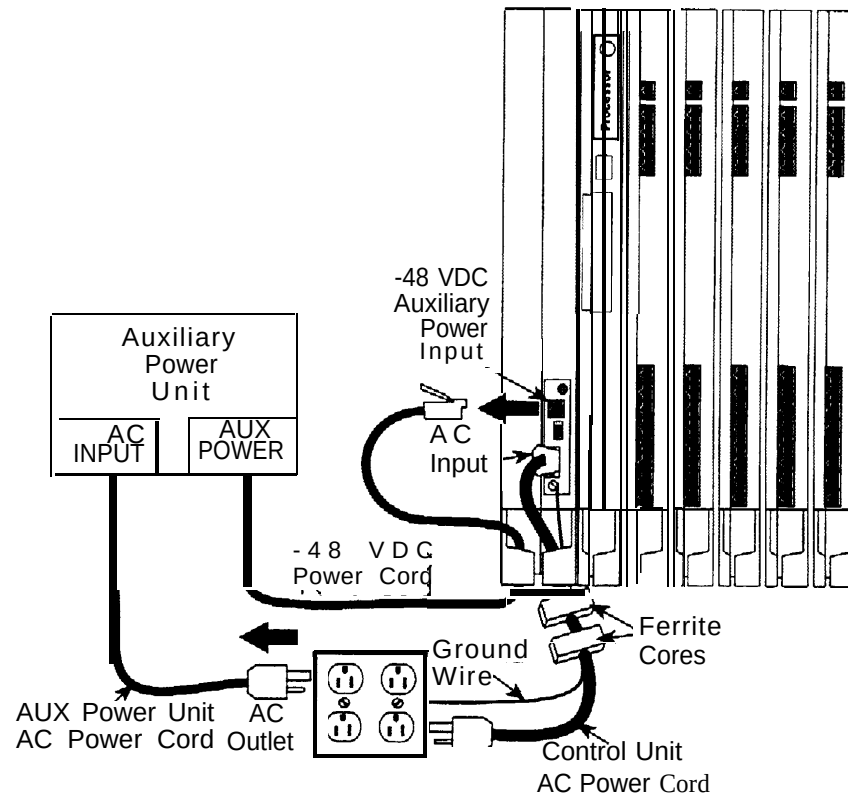


Figure 4-3. Replacing an Auxiliary Power Supply



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, backup system programming on a memory card (Release 3.0 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 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.



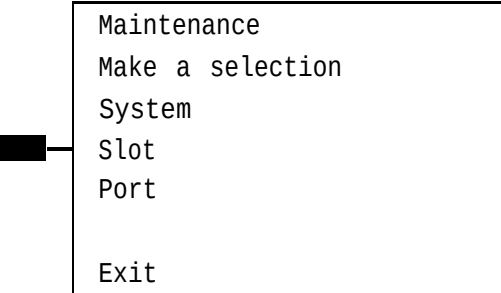
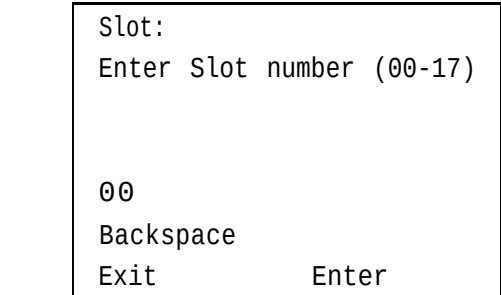
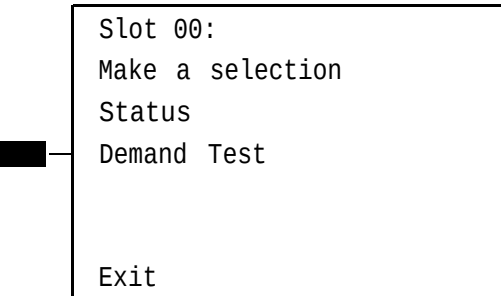
CAUTION:

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:	<u>(F6)</u> → <u>(F2)</u> → Type 00 → <u>(F2)</u> → <u>(F1)</u> → Type Address → <u>(PgUp)</u>

To perform Peek, follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Slot option.		
 <pre>Maintenance Make a selection System Slot Port Exit</pre>		<u>(F2)</u>
2 Specify Slot 00.		
 <pre>Slot: Enter Slot number (00-17) 00 Backspace Exit Enter</pre>	Dial or type 00, then select Enter.	
3 Select the Demand Test.		
 <pre>Slot 00: Make a selection Status Demand Test Exit</pre>	For all MLX modules, BchLoopback is also displayed as an option on this screen. For 100D modules, su-lpbk, Error Events, and clock are also displayed as options on this screen.	<u>(F2)</u>

Console Display/Instructions	Additional Information	P C
4 Select the Peek option.		
Demand Test Slot 00: Make a selection Peek [Poke] [System Erase] Exit	Poke and System Erase are not displayed, which prevents customers from accidentally changing the processor memory.	(F1)
5 Dial a memory address.		
Slot 00 Enter Hex Address nnnnnnnn Enter Backspace Exit A B C D E F	Dial [nnnnnnnn], then select Enter .	
The screen below shows the details of the address you specified.		
Peek Address0xaaaaaaaa> 0xaaaa 0xaaaa 0xaaaa 0xaaaa 0xaaaa 0xaaaa 0xaaaa 0xaaaa Exit	aaaaaaaa = address entered in Step 5 Press the More button to review the next address.	(PgUp)

Poke



CAUTION:

Do not perform Poke unless you are following instructions from your technical support organization.

Summary

Console Procedure:	Menu →Maintenance →Slot →Dial 00 → Enter →Dernand Test →Poke (Line 4, left button) →Poke (Line 4, left button) → Continue
PC Procedure	(F6) →(F2) →Type 00 →(F10) →(F2) →(F2) →(F2) →(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 .	

Console Display/Instructions	Additional Information	PC
3 Select the Demand Test.		
Slot 00: Make a selection Status Demand Test Exit		(F2)
4 Select Poke two times.		
Demand Test Slot 00: Make a selection Peek [Poke] [System Erase] Exit	Poke and System Erase are not displayed, which prevents customers from accidentally changing the processor memory. Press the Poke button (the left button for Line 4) twice.	(F2) (F2)
5 Select Continue.		
Poke - WARNING!! SYSTEM MEMORY WILL BE MODIFIED! Continue Cancel Exit		(F1)
6 Follow the instructions from your technical support organization.		
Slot 00 EnterHexAddress aaaaaaaa Enter Backspace A C E Exit E D F		

Console Display/Instructions	Additional Information	PC
Dxaaaaaaaa Enter data: aa Enter Backspace Exit A B C D E F		

System Erase (Frigid Start)

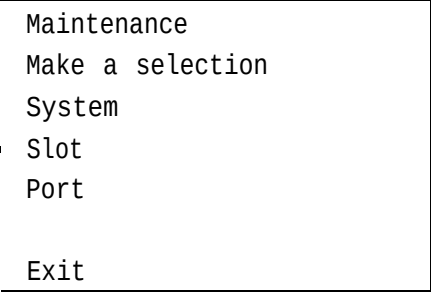
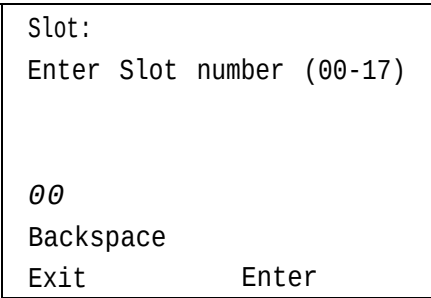
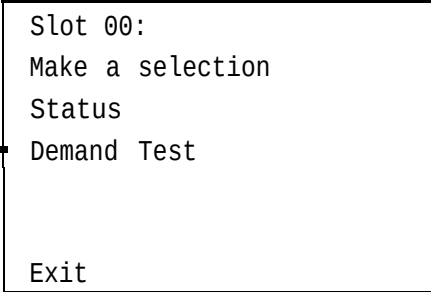
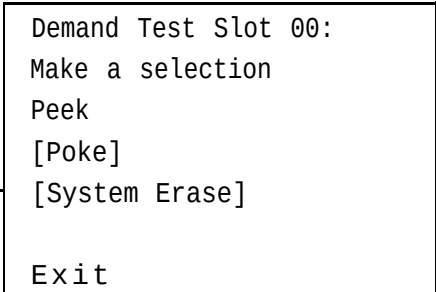


CAUTION:

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.		
		(F2)
2 Specify Slot 00.		
	Dial or type 00, then select Enter .	
3 Select the Demand Test.		
		(F2)
4 Select System Erase twice.		
	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.		
Slot 00 System Erase: System will be down... Do you want to continue? Yes No Exit		(F2)
System Erase: Full-default Restarting		

Forced Installation 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. If 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.

Summary

Console Procedure:	Menu →Maintenance →System → Upgrd/Instll →Exit →Exit →Yes
PC Procedure	(F6) →(F1) →(F5) →(F2)

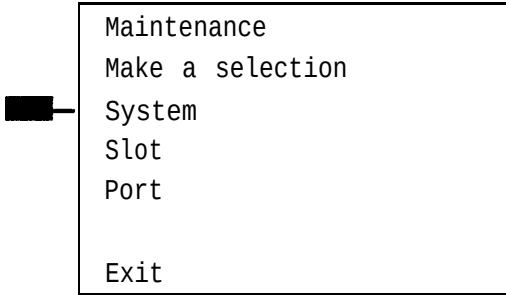
1 Backup system programming.

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 memory card into the PCMCIA interface slot on the processor module. See Figure 4-4.

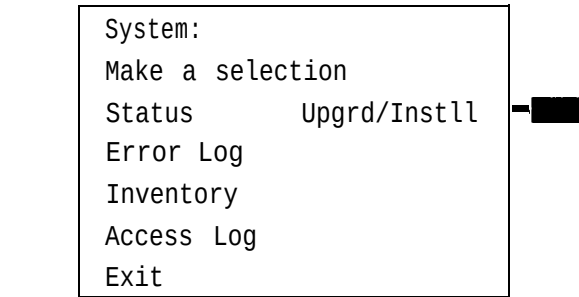


Console Display/Instructions	Additional Information	PC
3 Initiate the software installation.		

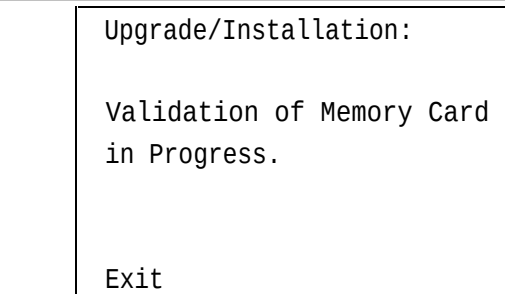
		(F1)

- 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.

Upgrade:

MemCard Rel: 3.y Vnn.mm

Current Rel: 3.y Vnn.mm

Releases are compatible.

Exit

(F5)

If the releases are incompatible, the following screen appears.

Upgrade:

MemCard Rel: 3.y Vnn.mm

Current Rel: 3.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 one of the following:

- XRAY monitor ROM failure
- SYS software ROM failure

These indicate a ROM failure and unsuccessful installation.

If the forced installation was performed due to corrupt system software, it is possible that the backup of system programming might also be corrupt. 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 Corrupt

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

```
Exit
```

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

System Busy

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

System Busy - Pls Wait

Dial Code:xxxx S/P:ss/pp

Exit

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

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 the SPM or PCMCIA translation card.

Console Display/Instructions	Additional Information	P C

If the releases are incompatible, the following screen appears.

```
Upgrade:
MemCard Rel: 3.y Vnn.mm
Current Rel: 3.y Vnn.mm
Incompatible releases.
```

Exit

Pressing hidden key two times
will delete 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: 3.y Vnn.mm
Current Rel: 3. 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*.)

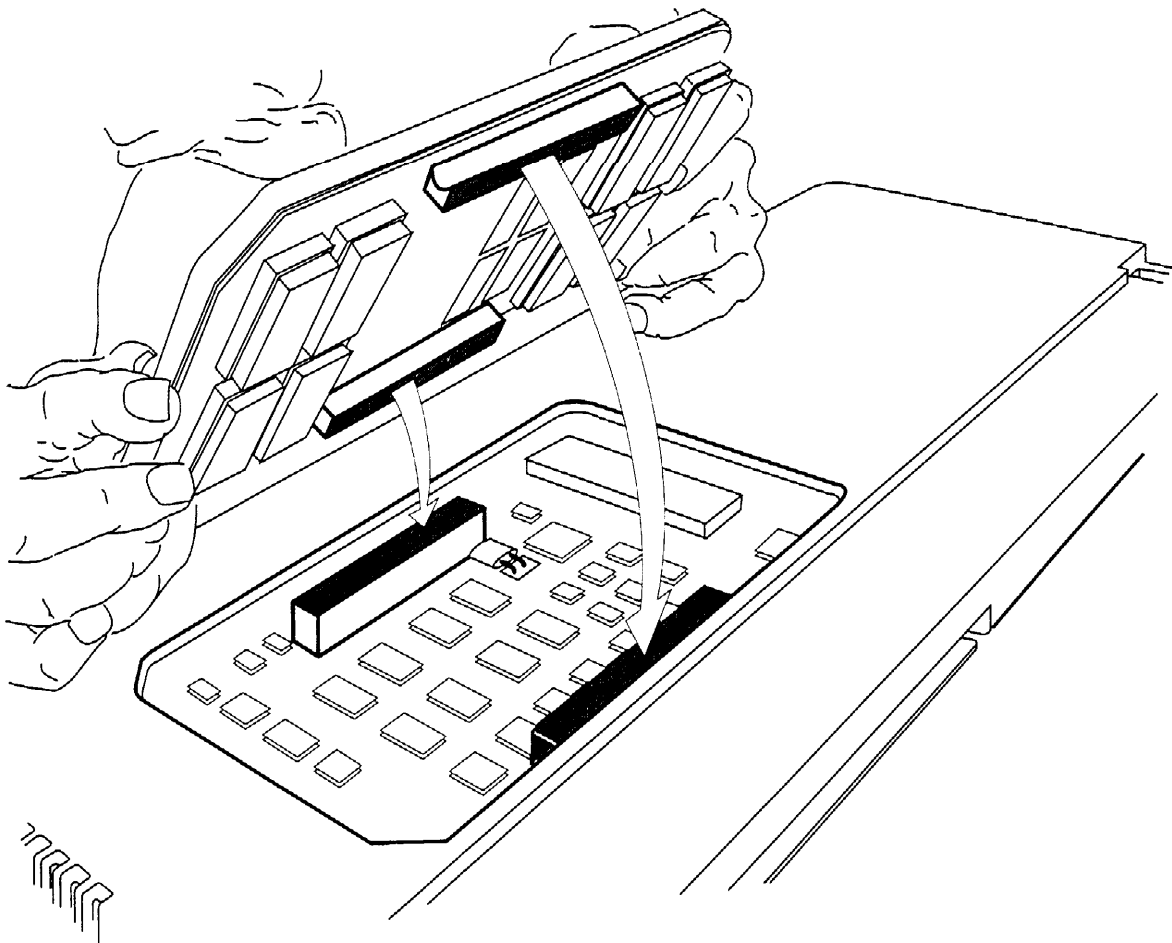


Figure 4-5. Replacing the Feature Module

- 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.

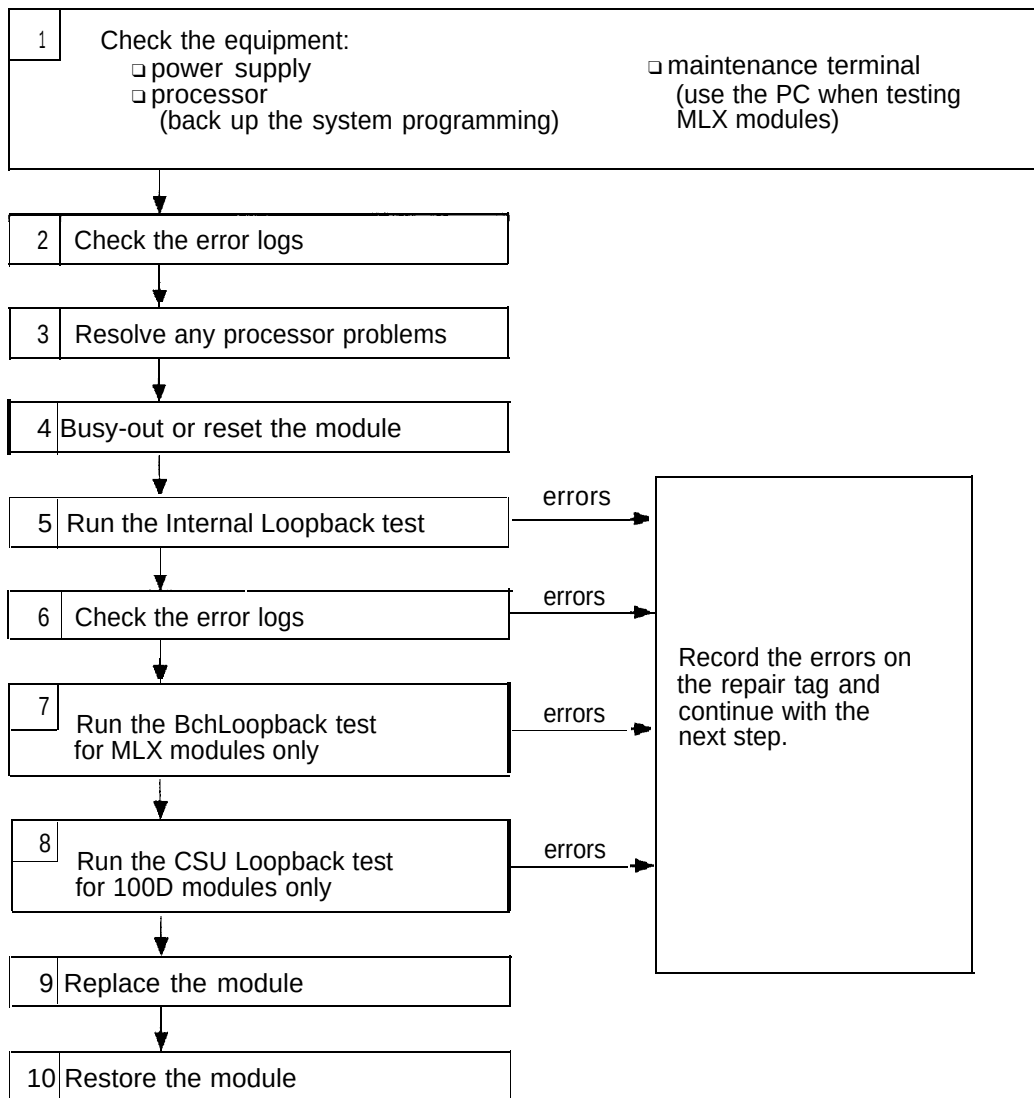


Figure 4-6. Module Test Process

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), 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 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.

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

9 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	<u>(F6)</u> → <u>(F2)</u> →Type the slot no. → <u>(F10)</u> → <u>(F2)</u> → <u>(F1)</u>
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		<u>(F2)</u>
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 .	

Console Display/Instructions	Additional Information	PC
3 Select Busy-Out.		
Slot xx: Make a selection Status Busy-out Restore Exit Demand Test Reset Upgrade	xx = slot number entered in Step 2	For all MLX modules, BChLoopbck is also displayed as an option on this screen. For 10OD modules, CSU-1pbk, Error Events, and Clock are also displayed as options on this screen <u>(F2)</u>
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.		
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.

Console	Display/Instructions	Additional Information	P C
	Busy-Out Slot xx: Busy-out FAILED Exit	xx = slot number entered in Step 2	

Reset

Summary

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.

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 select Enter .	
3 Select Reset.		
Slot xx: Make a selection Status Demand Test Busy-out Reset Restore Upgrade Exit	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.	[F7]
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.

Console Display/Instructions

```
Reset Slot xx:

Reset in Progress

Exit
```

Additional Information P C

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	<u>(F6)</u> → <u>(F2)</u> →Type the slot no. → <u>(F10)</u> → <u>(F3)</u> → <u>(F1)</u>
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	<u>(F2)</u>

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

Slot: Enter Slot number (00-17) <i>nn</i> Backspace Exit Enter	Dial or type [<i>nn</i>], then select Enter .

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

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. (F3)

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 smears when the module successfully restored.

```
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.

Console Display/Instructions

Additional Information

P C

Restore Slot xx:

xx = slot number entered in Step 2

Restore FAILED

Board Mismatch

Exit

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 <code>Test Once</code> and <code>Repetitive</code>) by selecting <code>Exit</code>.
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. <code>Restore</code> 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 (<i>nn</i> = 00 to 17).		
Slot: Enter Slot number (00-17) <i>nn</i> Backspace Exit Enter	Dial or type [<i>nn</i>], then press Enter .	
3 Select Demand Test.		
Slot <i>xx</i>: Make a selection Status Demand Test Busy-out Reset Restore Upgrade Exit	<i>xx</i> = 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. <u>(F5)</u>	
4 Select Internal Loopback Test.		
Demand Test Slot <i>xx</i>: Make a selection Note: Busy out slot first BoardCntrlr IntLoopback Exit	<i>xx</i> = slot number entered in Step 2 <u>(F3)</u>	
5. To run the test once or run it repeatedly, select Test Once or Repetitive.		
Demand Test Slot <i>xx</i>: Board aaaaaaaaaaaaaaaaaa Internal Loopback Test Once Repetitive Exit	<i>xx</i> = slot number entered in Step 2 Select Test Once or <u>(F2)</u> Repetitive <u>(F3)</u>	

The screen below appears while the test is running. At the same time, if the module has a green LED, it flashes.

Console Display/Instructions

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
in Progress

Exit
```

Additional Information

P C

xx = slot number entered in Step 2

If you are running the repetitive test, the screen remains until the test fails. To interrupt repetitive testing, select Exit.

(F5)

The screen below appears only if you selected Test once and the module passes the test.

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
Successfully Completed

Exit
```

xx = slot number entered in Step 2

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

```
Demand Test Slot xx:
Board aaaaaaaaaaaaaaaaaa
Internal Loopback Test
FAILED
xxxxxxxxxxxxxxxxxxxxxxxxxxxx
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 DSE port. There are 16 DSE 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 DSE 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	<u>(F6)</u> → <u>(F2)</u> →Type the slot no. → <u>(F10)</u> → <u>(F6)</u> → <u>(F3)</u> → <u>(F2)</u> or <u>(F3)</u>
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 (<i>nn</i> = 00 to 17).		
Slot: Enter Slot number (00-17) <i>nn</i> Backspace Exit Enter	Dial or type [<i>nn</i>], then select Enter .	
3 Select Demand Test.		
Slot <i>xx</i>: Make a selection Status Demand Test Busy-Out Reset Restore Upgrade Exit	<i>xx</i> = slot number entered in Step 2 For all MLX modules, BchLoopback is also displayed as an option on this screen. For 10OD modules, CSU-1pbk, Error Events, and Clock are also displayed as options on this screen.	(F6)
4 Select the Board Controller Test.		
Demand Test Slot <i>xx</i>: Make a selection Note: Busy out slot first BoardCntrlr IntLoopback Exit	<i>xx</i> = slot number entered in Step 2	(F2)

Console Display/Instructions	Additional Information	PC
5 Select Test Once or Repetitive.		
Demand Test Slot xx: Board aaaaaaaaaaaaaaaaaa Board Controller: Test once Repetitive Exit	xx = slot number entered in Step 2	(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 aaaaaaaaaaaaaaaaaa 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 aaaaaaaaaaaaaaaaaa 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 aaaaaaaaaaaaaaaaaa Board Controller Test FAILED xxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxx 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 module 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 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 MLX 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 .

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)

The screen below appears while the test is running.

```
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.

Console Display/Instructions	Additional Information	P C
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 xxxxxxxxxxxxxxxxxxxxxxxxxxxx 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. 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, cutoff 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 Release 3.0 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. The first circuit module to include this feature is the 800 GS/LS-ID.

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	<u>(F6)</u> → <u>(F2)</u> →Type the slot no. → <u>(F10)</u> → <u>(F8)</u> →or <u>(F10)</u> → <u>(F4)</u>
Appropriate Modules	This procedure can be run only on the 800 LS-ID module 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 <i>Reset</i> .
Restore	Restore the module after the upgrade successfully completes. <i>Restore</i> 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.

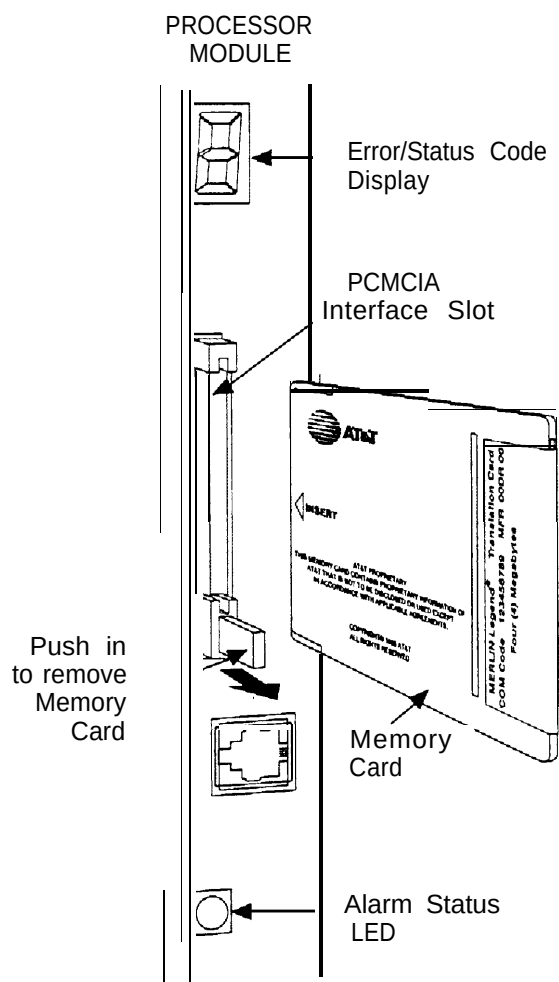


Figure 4-7. Inserting the Upgrade Memory Card

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 smears for all modules except the 100D and MLX boards.

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

Exit
```

xx = slot number entered in Step 3

For all MLX modules, BchLoopback is also displayed as an option on this screen.

(F8)

The screen below appears if the module is a 100D.

```
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)

Module Problems

The screens below appear during the procedure.

Console Display/Instructions

Additional Information

PC

Module Upgrade:

Validation of MemoryCard
in Progress.

Module Upgrade:

Validation of MemoryCard
Successfully Completed.

Exit

(F5)

When completed, select Exit to continue.

5 Select the firmware to be programmed.

Upgrade Slot xx:

aaaaaaaaaaaaaaaa Ver: aa

Select one

aaaaaaaaaaaaaaaa Ver: aa

aaaaaaaaaaaaaaaa Ver: aa

aaaaaaaaaaaaaaaa Ver: aa

Exit

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

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

(F7)

(F8)

(F9)

6 Select Yes.

Upgrade Slot xx:

Slot will be Busied Out.

Do you want to continue?

Yes

No

Exit

xx = slot number entered in Step 3

(F3)

If the firmware selected provides functionality that is different from the circuit module's current firmware, the Maintenance display indicates that a Board Renumber will be required once the installation is complete.

Console Display/Instructions

Additional Information

P C

```
Upgrade Slot xx:
Slot will be Busied Out.
Renum board when done.
Do you want to continue?
Yes
No
Exit
```

xx = slot number entered in Step 3

(F3)

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

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.

Console	Display/Instructions	Additional Information	P C
	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.

	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

Console	Display/Instructions	Additional Information	PC

Module Upgrade: Verify that Memory Card has been inserted correctly.

Exit

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

Memory Card Is Corrupt

Module Upgrade: Information on the Memory Card is corrupted. Please remove the Memory Card.

Exit

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

Module Cannot Be Upgraded

Upgrade Slot <code>xx</code> : Module can not be upgraded.

`xx` = slot selected in Step 3.

Exit

This procedure can only be run on the 800 GS/LS-ID module or 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	P C
<pre>Upgrade Slot xx: Module error Exit</pre>	xx = slot selected in Step 3.	
<pre>Upgrade Slot xx: Module error Upgrade CANCELLED. Upgrade INCOMPLETE. Exit</pre>	xx = slot selected in Step 3.	

Select **Exit** and reinitiate the upgrade procedure.

Select **Exit** and reinitiate the upgrade procedure.

Console Display/Instructions

PC

xx = slot selected in Step 3.

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

xx = slot selected in Step 3.

Exit

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.

Upgrade Slot xx:

xx = slot selected in Step 3.

Exit

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

Console Display/Instructions

```
Upgrade Slot xx:
No module in slot.

Exit
```

Additional Information

xx = slot selected in Step 3.

PC

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

Board Memory Programming Failure

```
Upgrade Slot xx:
Board Memory Programming
Failure.
Upgrade CANCELED.
Upgrade INCOMPLETE.

Exit
```

xx = slot selected in Step 3.

Repeat the upgrade procedure. If the upgrade continues to fail after several attempts, the module should be replaced. See “Replacing the Module.”

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-1pbk
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 <code>Exit</code> .
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. <code>Restore</code> 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 ACCULINK3150 CSU, Press F2 on the front panel to select “Test” from the menu screen. From the Test screen, press F2 to select “Lpbk”. From the Loopback screen, press the right arrow once to display additional loopback tests. Press F3 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.

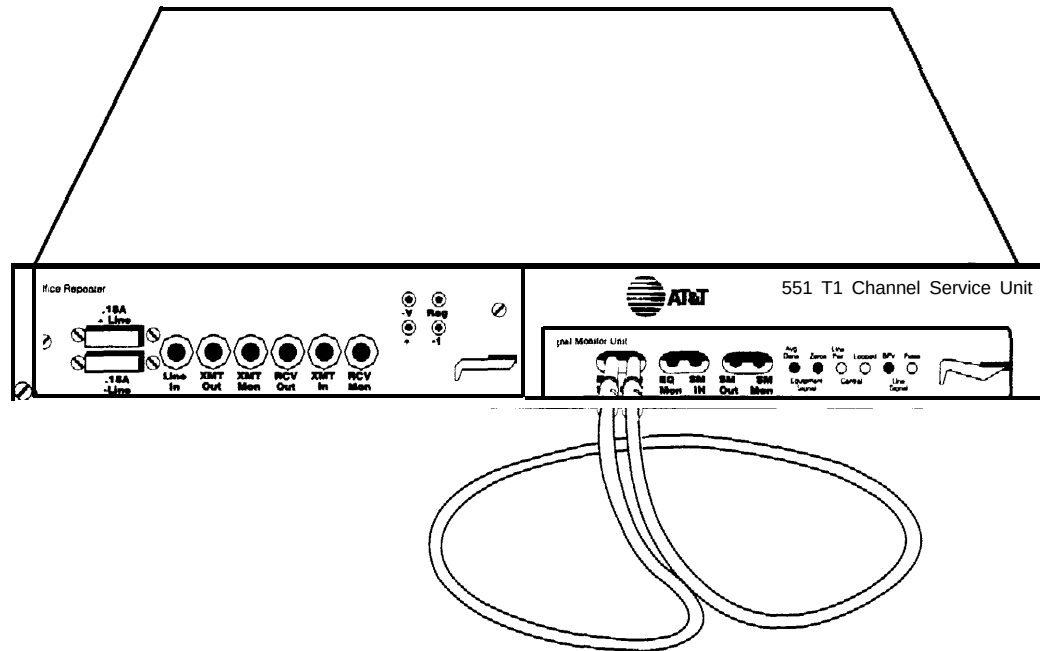


Figure 4-8.551 T1 CSU Loopback Connection

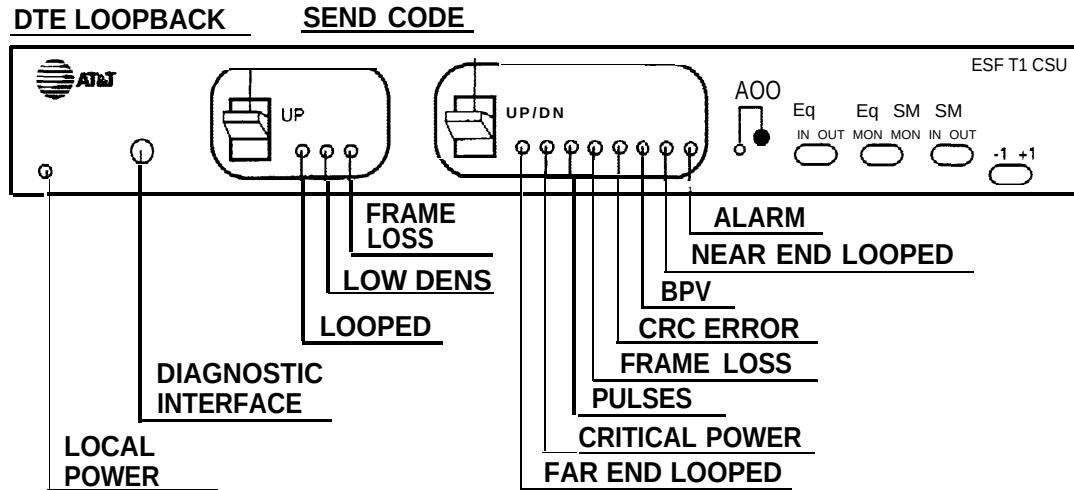


Figure 4-9. ESF T1 CSU DTE Loopback Connection

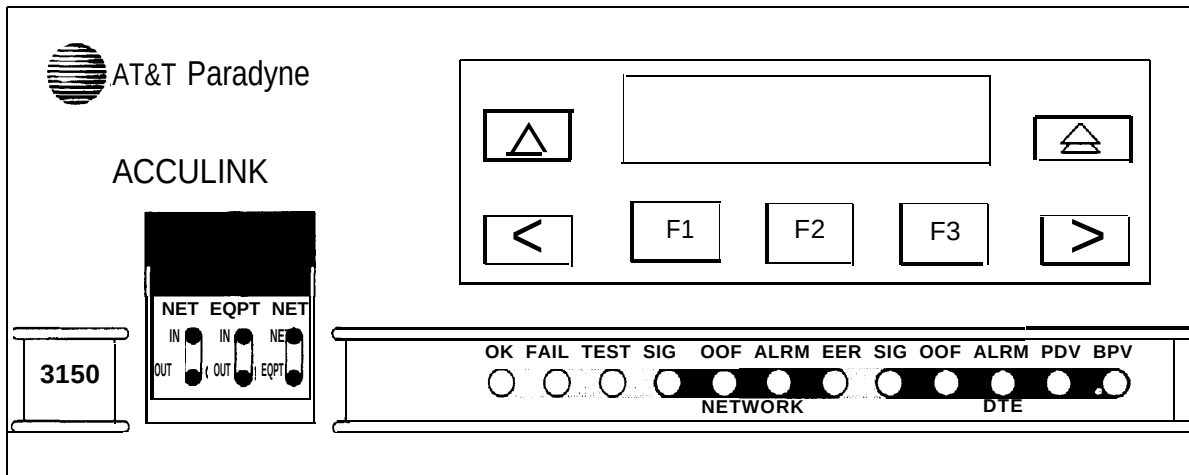


Figure 4-10. ACCULINK 3150 CSU Front Panel

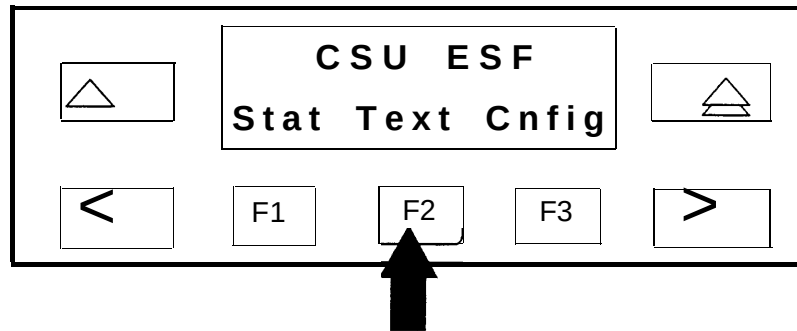


Figure 4-11. ACCULINK 3150 CSU DTE Loopback Command 1

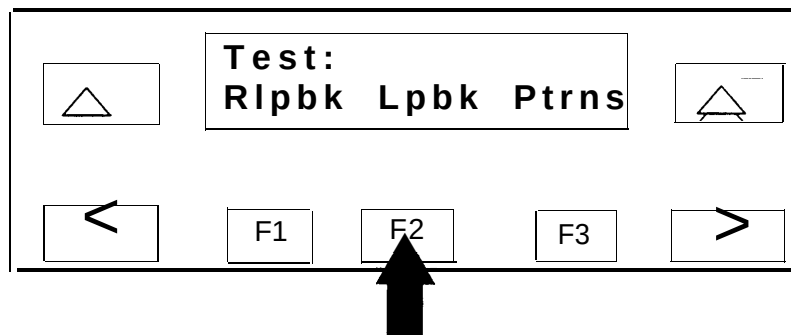


Figure 4-12. ACCULINK 3150 CSU DTE Loopback Command 2

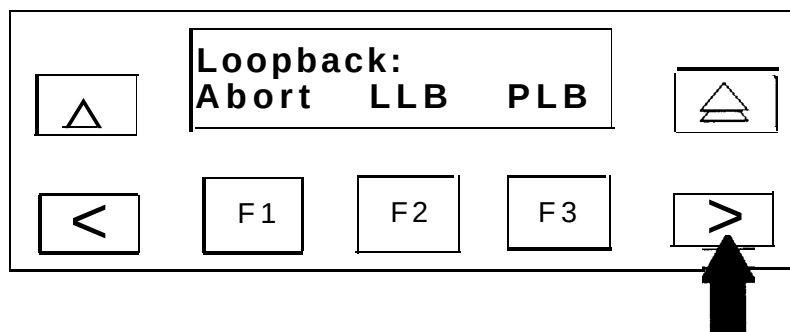


Figure 4-13. ACCULINK 3150 CSU DTE Loopback Command 3

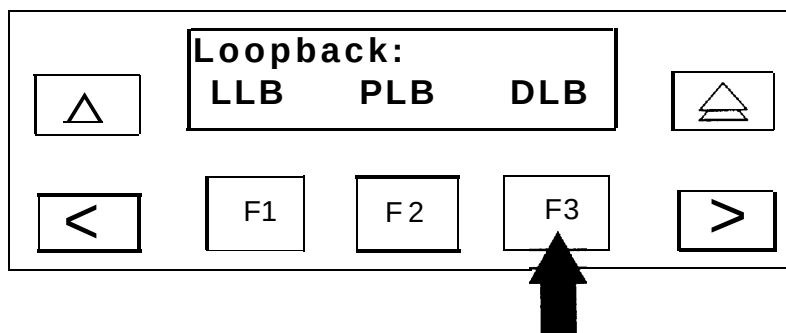
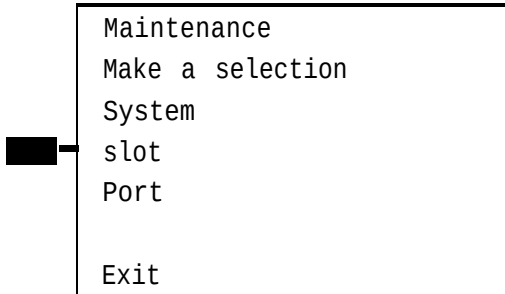
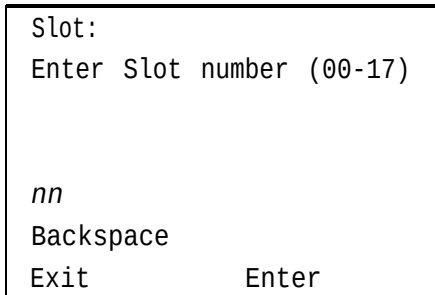
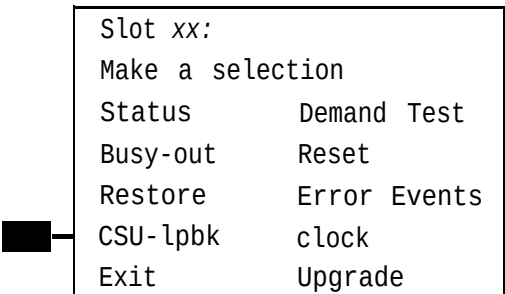


Figure 4-14. ACCULINK 3150 CSU DTE Loopback Command 4

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

Console Display/Instructions	Additional Information	P C
1 From the Maintenance menu, select the Slot option.		
		(F2)
2 Specify the 2-digit slot number (<i>nn</i> = 00 to 17).		
	Dial or type [<i>nn</i>], then select Enter .	
3 Select the CSU Loopback Test.		
	xx = slot number entered in Step 2 Error Events and Clock are also 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

```
CSU-lpbk Slot xx:

CSU-lpbk in Progress

Exit
```

Additional Information**PC**

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
XXXXXXXXXXXXXXXXXXXXX
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 4-6 and proceed as indicated.

Table 4-6. 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 Node	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 F3 to select Ctrl. Press the right arrow key twice to display the reset selection. Now press F1 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 clocks.

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		<u>(F2)</u>

Console Display/Instructions	Additional Information	PC
2 Specify the 2-digit slot number (<i>nn</i>= 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:
Hake a selection
Current hr
Previous hr

Exit
```

xx = slot number entered in Step 2

Select Current hr
or Previous hr

(F1)

(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

```

Current hr Slot xx:

mm/dd/yy      hh00-hh:mm
CurAlm aaaa  MaxAlm aaaa
MIS SLP ES    BS SEC FS
xxx xxx xxx  xxx xxx xxx
Exit

```

Additional Information**PC**

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.

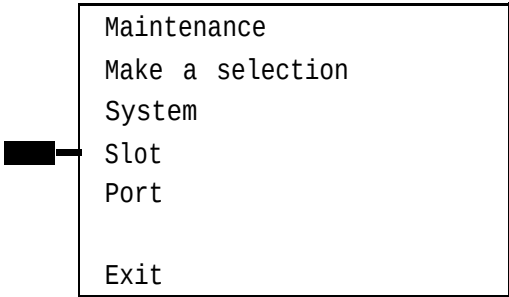
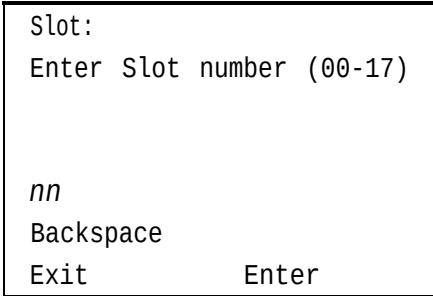
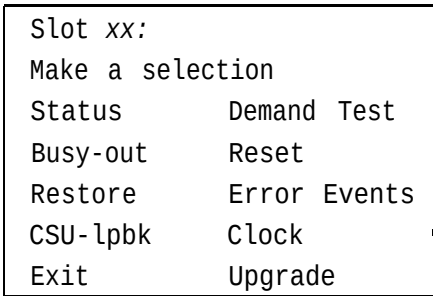
Summary

Console Procedure

Menu →Maintenance →Slot →Dial slot no. →
Enter →Clock →Exit

PC Procedure

(F6) →(F2) →Type 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 [<i>nn</i>], then select Enter .	(F10)
3 Select Clock.		
	xx = slot number 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 Backup 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.**

- Power supply on the basic carrier
- Power supply on each expansion carrier
- 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.		
■ Maintenance Make a selection System Slot Port Exit		(F1)
2 Select Status.		
■ System: Make a selection Status Upgrd/Instll Error Log Inventory Access Log Exit Enter		(F1)

Interpreting the System Status Screen

Console Display/Instructions

```
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 aaa Y aaa G aaa

Exit
```

Additional Information

PC

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.

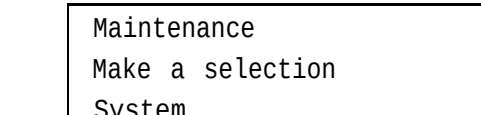
- LED status
- Errors (yes or no)
- Mode (initialization, standby, test, or normal)
- Alarms (yes or no)
- Maintenance busy (yes or no)

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.		
		(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*] and select Enter .

(F10)

3 Select the Status option.

```
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
CSU-lpbk, Error Events, and Clock
appear *only* when the 100D module
occupies the selected slot. If an MLX
module occupies the selected slot,
BchLoopback appears in place of
CSU-lpbk .

(F1)

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:      R aaa Y aaa G aaa
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 100D 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 ethos 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 seize outgoing trunks, try the following procedure.

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.

2 Pick up the handset of a test telephone to check for system dial tone.

For a Hybrid/PBX system, dial *03.

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 maintenance-busy 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

Permanent Errors

A permanent error is entered in the error logs when more than 50 percent of the 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 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.

TieTrunk

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

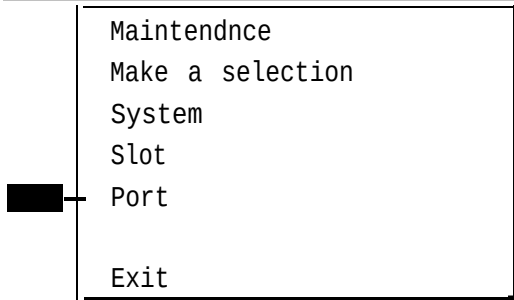
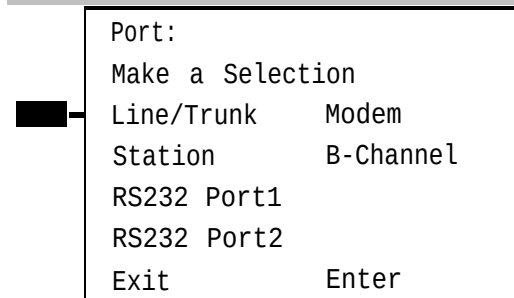
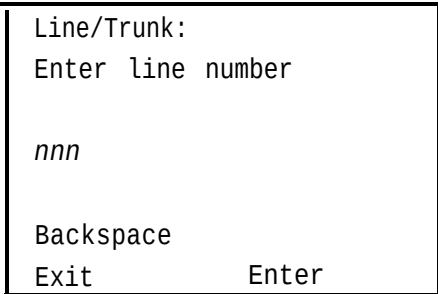
Menu →Maintenance →Port →Line/Trunk →
Dial the dial plan no. →Enter →Status

PC Procedure

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

To check a trunk's maintenance-busy status, follow the steps below.

Checking Ports

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 (<i>nnn</i> = 801 to 880).		
	Dial or type [<i>nnn</i>], then select Enter .	

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	
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: xxxxxxxx Maintenance Busy xxx Exit Next	xxx = line number entered in Step 3 Select Next to see the status of the next trunk.	(F1) (F10)

Checking Extension Maintenance-Busy Status

Summary

Console Procedure

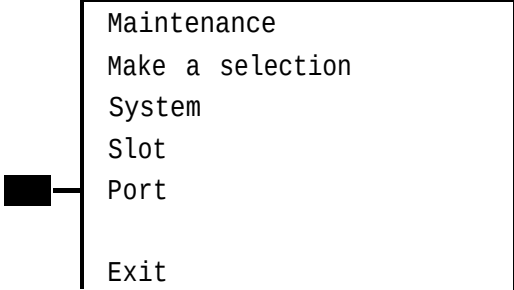
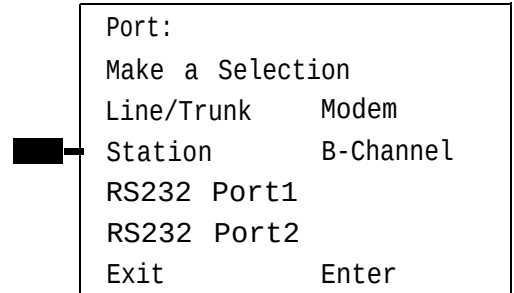
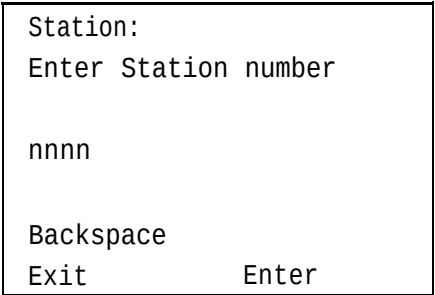
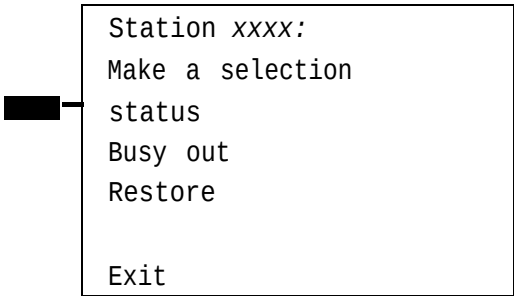
Menu →Maintenance →Port →Extension →Dial
the dial plan no. →Enter →Status

PC Procedure

(F6) →(F3) →(F2) →Type the dial plan no. →(F10) →(F1)

To check an extension's maintenance busy status, follow the steps below.

Checking Ports

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 .	
4 Select Status.		
	xxxx = extension number entered in Step 3	(F1)

Checking Ports

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

```
Station: xxxx
Dial Plan: xxxx
SlotPort: sspp
LogicId: xxx
Profile: xxxxxxxxxxxx
Maintenance Busy:
Exit           Next
```

Additional Information

Select Next to see the status of the next extension.

PC

(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)

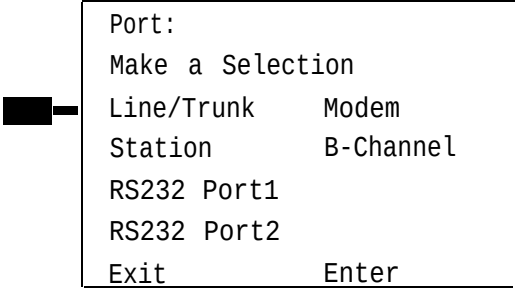
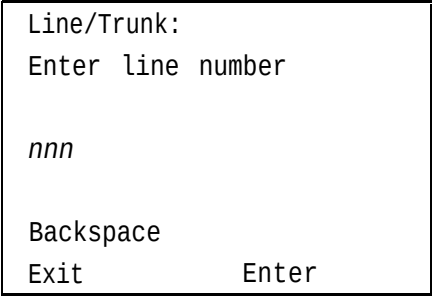
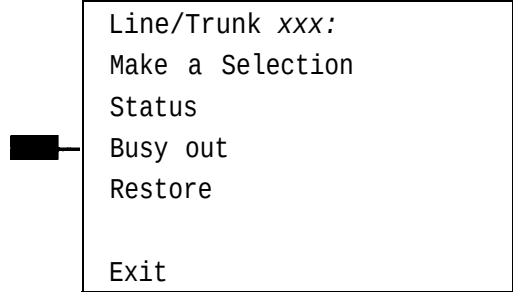
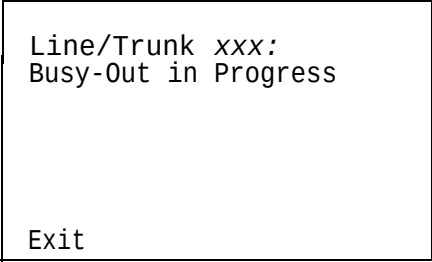
To busy-out a trunk, follow the steps below.

1 From the Maintenance menu, select the Port option.

```
Maintenance
Make a selection
System
Slot
Port
Exit
```

(F3)

Checking Ports

Console Display/Instructions	Additional Information	PC
2 Select the Line/Trunk option.		
 <pre>Port: Make a Selection Line/Trunk Modem Station B-Channel RS232 Port1 RS232 Port2 Exit Enter</pre>		(F1)
3 Specify the dial plan number (line) for the trunk (nnn = 801 to 880).		
 <pre>Line/Trunk: Enter line number nnn Backspace Exit Enter</pre>	Dial or type [<i>nnn</i>], then select Enter .	
4 Select Busy-Out.		
 <pre>Line/Trunk xxx: Make a Selection Status Busy out Restore Exit</pre>	xxx = line number entered in Step 3	(F2)
The screen below is shown until Busy-Out finishes or fails.		
 <pre>Line/Trunk xxx: Busy-Out in Progress Exit</pre>	xxx = line number entered in Step 3	
The screen below appears when Busy-Out is completed successfully.		

Console Display/Instructions

Line/Trunk xxx:

Busy-Out Successfully
Completed

Exit

Additional Information

xxx = line number entered in Step 3

PC

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.

Checking Ports

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
RS232 Port2
Exit Enter

(F2)

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 .

Console Display/Instructions	Additional Information	PC
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 xxx: 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	

Restoring a Trunk

Summary

Console Procedure

Menu →Maintenance →Port →Line/Trunk →
Dial the dial plan no. →Enter →Restore

PC Procedure

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

To restore a trunk, follow the steps below.

Console Display/Instructions

Additional Information

PC

1 From the Maintenance menu, select the Port option.

```
Maintenance
Make a selection
System
Slot
Port
Exit
```

(F3)

2 Select the Line/Trunk option.

```
Port:
Make a Selection
Line/Trunk   Modem
Station      B-Channel
RS232 Port1
RS232 Port2
Exit         Enter
```

(F1)

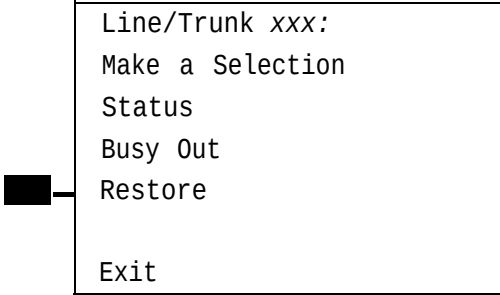
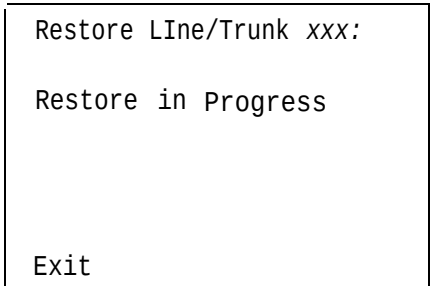
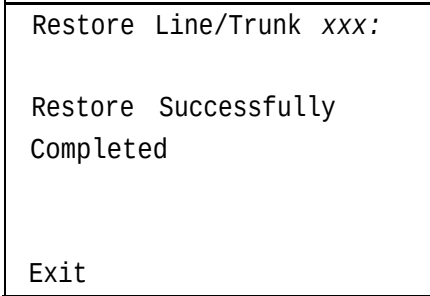
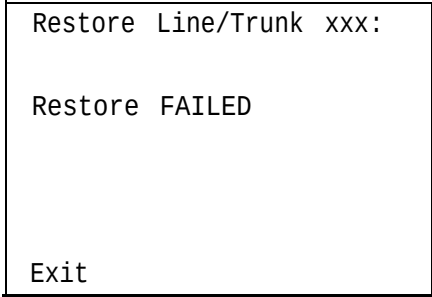
3 Specify the dial plan number (line) for the trunk (nnn = 801 to 880).

```
Line/Trunk:
Enter line number

nnnn

Backspace
Exit         Enter
```

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

Console Display/Instructions	Additional Information	PC
4 Select Restore.		
	xxx= line number entered in Step 3	
The screen below is shown until Restore finishes or fails.		(F3)
	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)

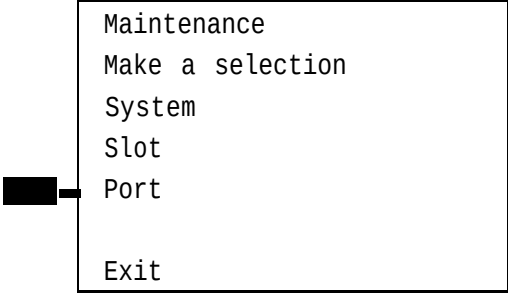
To restore an extension, follow the steps below.

Console Display/Instructions

Additional Information

PC

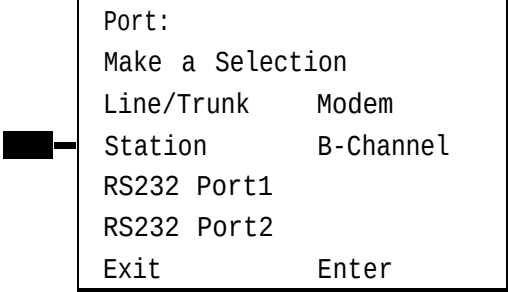
1 From the Maintenance menu, select the Port option.



```
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
RS232 Port2
Exit            Enter
```

(F2)

Console Display/Instructions	Additional Information	PC
3 Specify the dial plan extension number (<i>nnnn</i> = 1- to 4-digit number).		
Station: Enter station number <i>nnnn</i> Backspace Exit Enter	Dial or type [<i>nnnn</i>], then select Enter .	
4 Select Restore.		
Station: xxxx Make a Selection Status Busy Out Restore Exit	xxxx = extension number entered in Step 3	
The screen below is shown until Restore finishes or fails.		(F3)
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.

Console Display/Instructions

Restore Station: xxxx

Restore FAILED

Exit

Additional Information

PC

xxxx = extension 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 Port 1 or RS232
Port2 →Dial the dial plan no. →Enter →Reset →Yes

PC Procedure

(F6) → (F3) → (F3) or → Type the dial plan no. → (F10)
→ (F1) → (F3)

To reset an RS-232 port, follow the steps below.

1 From the Maintenance menu, select the Port option.

Maintenance
Make a selection
System
Slot
Port

Exit

(F3)

Checking Ports

Console Display/Instructions	Additional Information	P C
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)
4 Select Yes.		
RS232 Port x Reset: Do you want to continue? Yes Cancel Exit	x = port selected in Step 2	(F2)
The screen below is shown until Reset finishes or fails.		
RS232 Port x Reset: Reset in Progress Exit	x = port selected in Step 2	

Checking Ports

The screen below appears when Reset is completed successfully.

Console	Display/Instructions	Additional Information	PC
	RS232 Port x Reset: Reset Successfully Completed Exit	x = port selected in Step 2	
	RS232 Port x Reset: Reset FAILED Exit		

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

Resetting the Processor's Internal Modem

Summary

Console Procedure

Menu →Maintenance →Port →Modem →Reset →Yes

PC Procedure

~~(F6)~~ →~~(F3)~~ →~~(F6)~~ →~~(F1)~~ →~~(F2)~~

Checking Ports

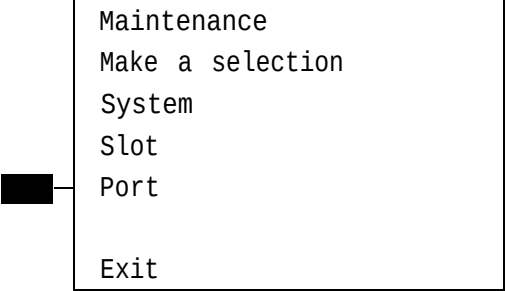
To reset the processor's internal modem, follow the steps below.

Console Display/Instructions

Additional Information

PC

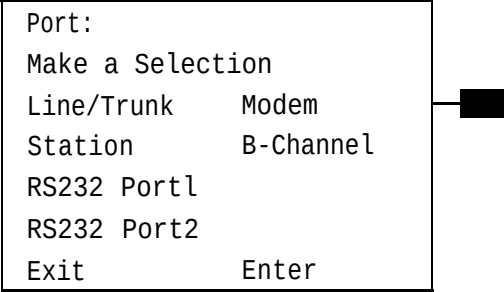
1 From the Maintenance menu, select the Port option.



```
Maintenance
Make a selection
System
Slot
Port
Exit
```

(F3)

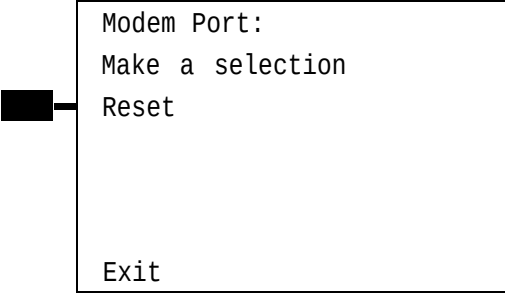
2 Select the Modem option.



```
Port:
Make a Selection
Line/Trunk   Modem
Station      B-Channel
RS232 Port1
RS232 Port2
Exit         Enter
```

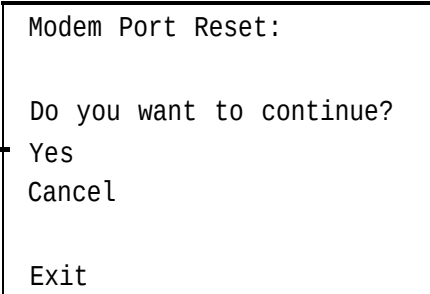
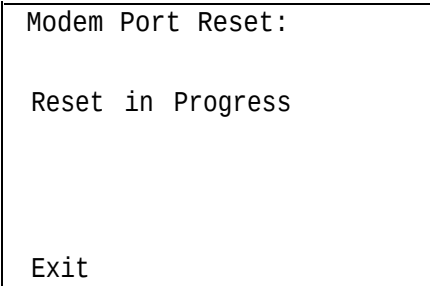
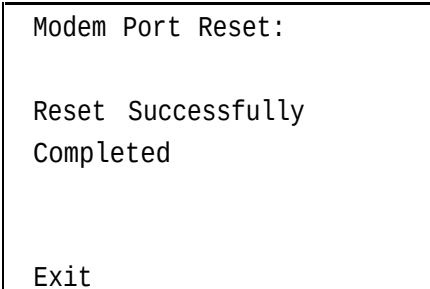
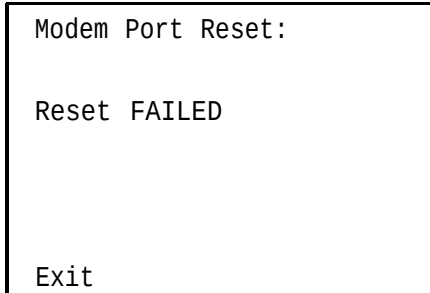
(F6)

3 Select Reset.



```
Modem Port:
Make a selection
Reset
Exit
```

(F1)

Console Display/Instructions	Additional Information	PC
4 Select Yes.		
		(F2)
The screen below is shown until Reset finishes or fails.		
		
The screen below appears when Reset is completed successfully.		
		
The screen below appears when Reset fails. If this occurs, exit and try again.		
		

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.

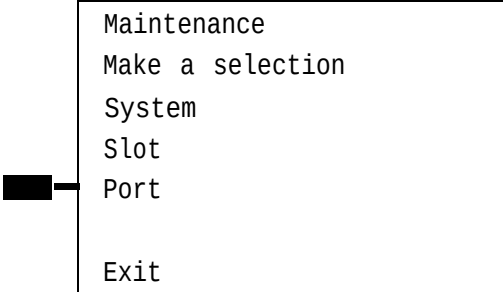
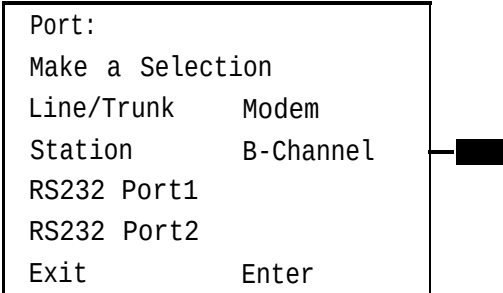
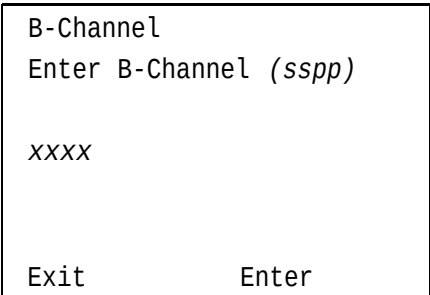
Auditing Lines

Summary

Procedure	Menu →Maintenance →Port →B-Channel →Dial the slot and port no. →Enter →Audit Lines
PC Procedure	<u>(F6)</u> → <u>(F3)</u> → <u>(F7)</u> →Type the slot and Port no. → <u>(F10)</u> → <u>(F1)</u>
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

Checking Ports

To audit lines, follow the steps below.

Console Display/Instructions	Additional Information	PC
1 From the Maintenance menu, select the Port option.		
 <pre>Maintenance Make a selection System Slot Port Exit</pre>		(F3)
2 Select the B-Channel option.		
 <pre>Port: Make a Selection Line/Trunk Modem Station B-Channel RS232 Port1 RS232 Port2 Exit Enter</pre>		(F7)
3 Specify the slot and port number (ss=2-digit slot number; pp= 2-digit port number).		
 <pre>B-Channel Enter B-Channel (sspp) xxxx Exit Enter</pre>	Dial or type [<i>sspp</i>] and select Enter .	

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 representative acting as the customer's agent should ask the CO to clear the problem from that end. If the problem is not at the CO end, select the correct B-channel and repeat the Audit Lines procedure.

Auditing Calls

Summary

Console Procedure	Menu → Maintenance → Port → B-Channel → Dial the slot and port no. → Enter → Audit Call
PC Procedure	<u>(F6)</u> → <u>(F3)</u> → <u>(F7)</u> → Type the slot and port no. → <u>(F10)</u> → <u>(F2)</u>
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

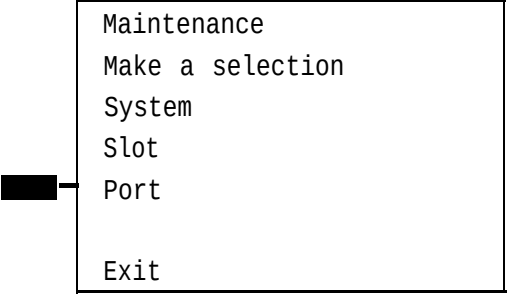
To audit calls, follow the steps below.

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 .	
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.	

Conclusion of Hardware Maintenance

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
<pre>BChannel xxxx Audit call Audit Failed Exit</pre>	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.

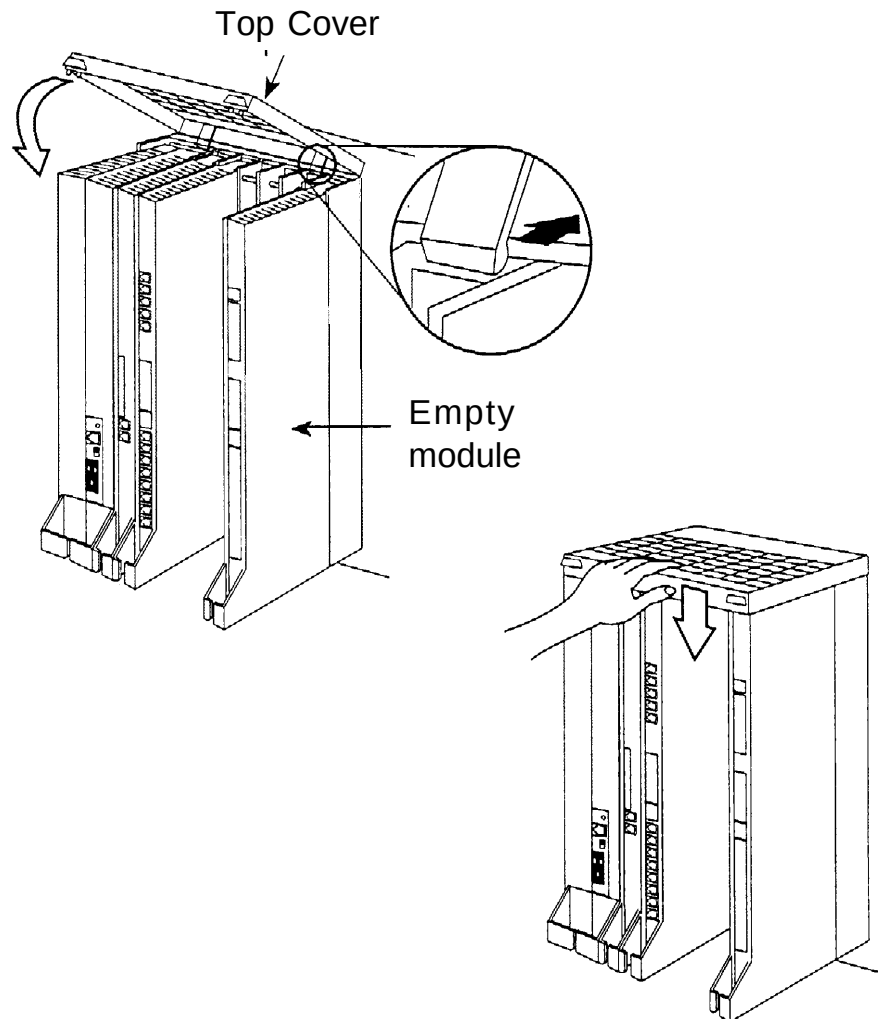


Figure 5–1. Installing the Control Unit Top Cover (Release 2.1 and Later)

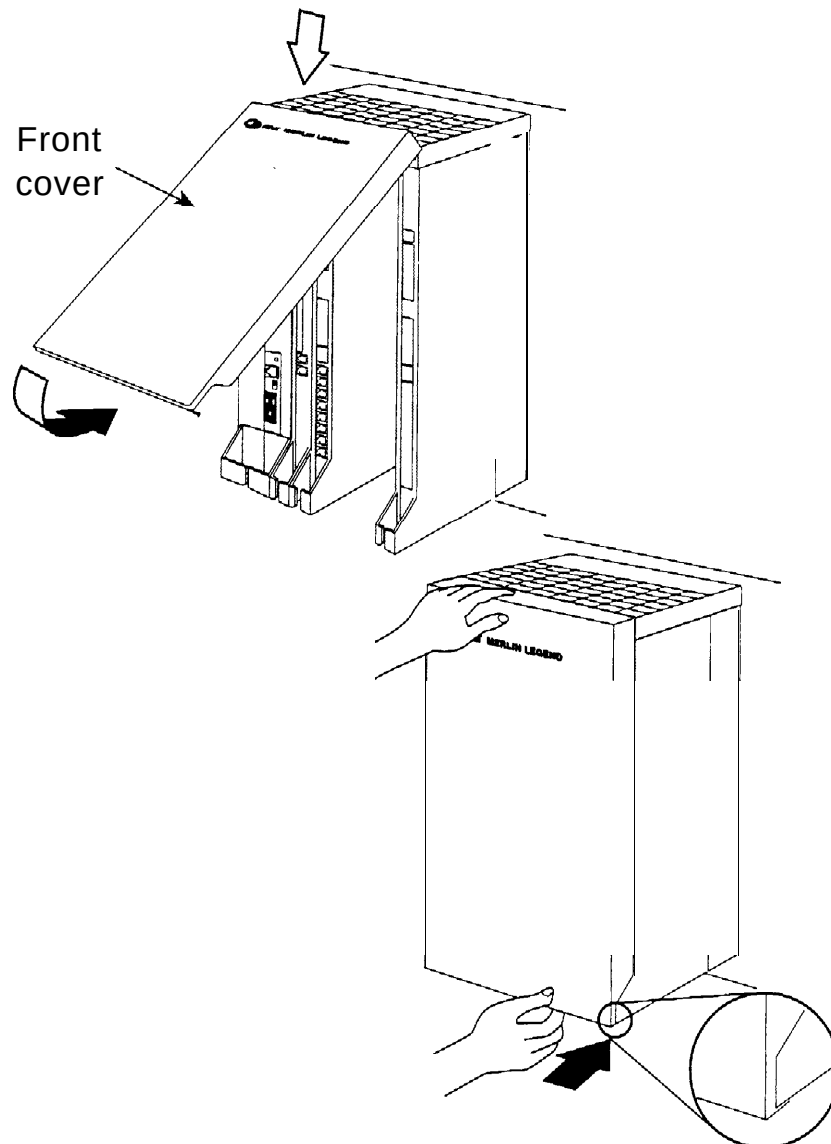


Figure 5-2. Installing the Control Unit Front Cover (Release 2.1 and Later)

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.

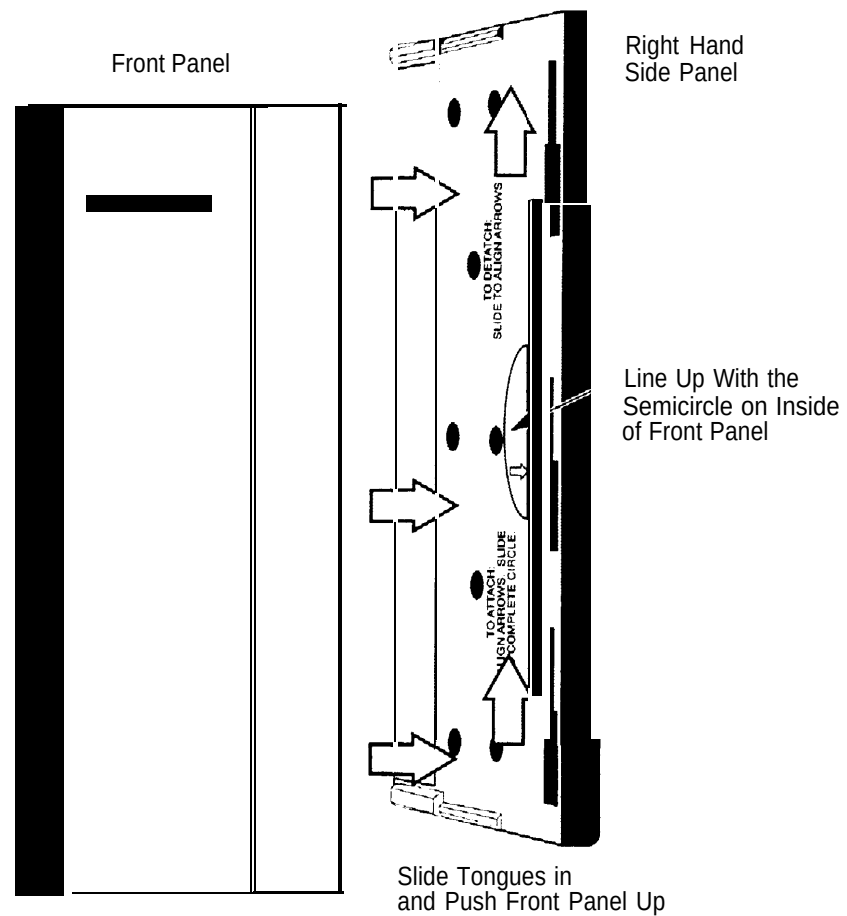


Figure 5-3. Assembling the Control Unit Housing (Release 2.0 and Earlier)

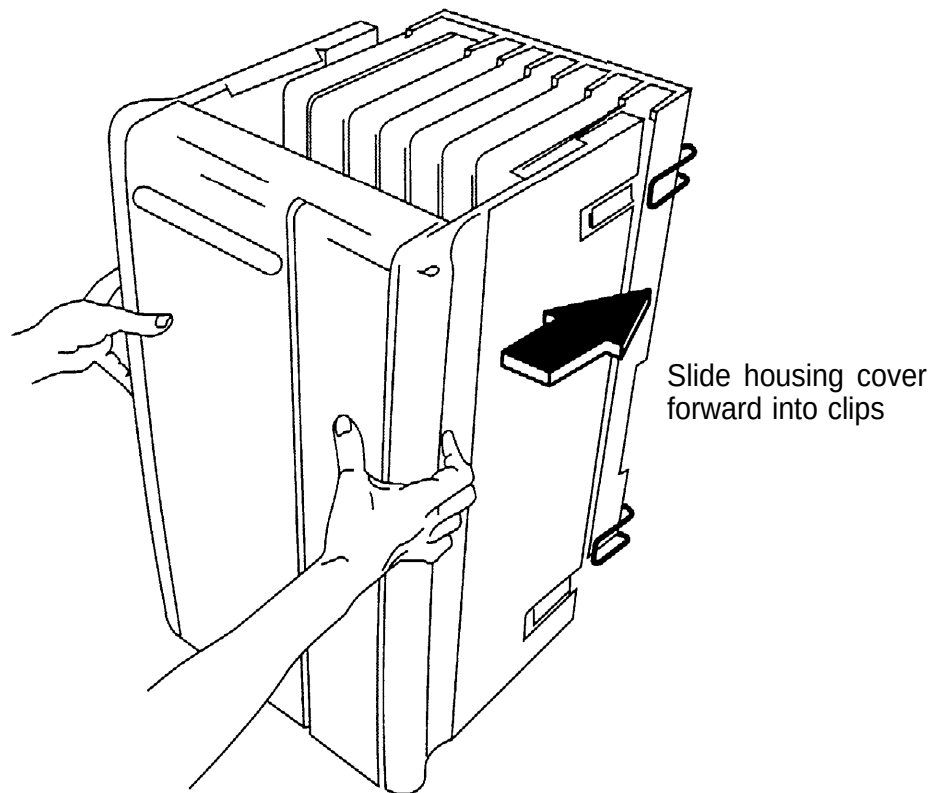


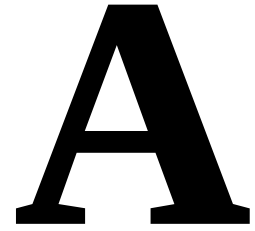
Figure 5-4. Installing the Control Unit Housing (Release 2.0 and Earlier)

- 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



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.

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 radioélectriques dépassant les limites applicable aux appareils numériques de la class A prescribes dans le reglement sur le brouillage radioélectrique edicté par le ministère des Communications du Canada.

FCC Notification and Repair Information

This equipment is registered with the FCC in accordance with Part 68 of its rules. In compliance with those rules, you are advised of the following:

- **Means of Connection.** Connection of this equipment to the telephone network shall be through a standard network interface jack, USOC RJ11C, RJ14C, RJ21X. Connection to E&M tie trunks requires a USOC RJ2GX. Connection to off-premises extensions requires a USOC RJ11C or RJ14C. Connection to 1.544-Mbps digital facilities must be through a USOC RJ48C or RJ48X, Connection to DID requires a USOC RJ11C, RJ14C, or RJ21X. These USOCs must be ordered from your telephone company.
- **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 Equivalency Number) for all three systems is 1.5A.
 - For tie line connection, the facility interface code (FIC) is TL31M and the service order code (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 1.544-Mbps digital service, the FIC is 04DU9-B for D4 framing format or 04DU9-C for extended framing format, and the SOC is 6. OP.
 - For equipment to be connected to DID facilities, the FIC is 02RV2-T and the SOC is 9.0F.
 - 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.
-
- **Disconnection.** You must also notify your local telephone company if and when this equipment is permanently disconnected from the line(s).
 - **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 telephone company to determine the maximum REN for the calling area.

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.

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'entreprise 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 aux jacks d'abonné, sauf dans les cas précis prévus par 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 particulièrement 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 electrician, selon le cas.

L'indite de charge (IC) assigné à chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordée à un circuit téléphonique bouclé utilisé par ce dispositif. La terminaison du circuit bouclé peut être constituée de n'importe quelle combinaison de dispositifs, pourvu que la somme des indices de charge de l'ensemble des dispositifs ne dépasse pas 100.

No d'homologation: 230 4095A

No de certification: CSA LR 56260

L'indite de charge: 6

MERLIN LEGEND D.O.C. Location Label Placement

Ministère des Communications du Canada emplacement de l'étiquette

 MERLIN LEGEND Model 511A Control Unit  MADE IN U.S.A. LISTED 538E TELEPHONE EQUIPMENT  LR 56260 This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Complies with Part 68, FCC Rules. See the System Reference Manual for proper FCC Classification. FCC Reg. Nos. MF: AS593M-72682-MF-E KF: AS593M-72914-KF-E PF: AS5USA 65646-PF-E REN: 1.5A	WARNING: If equipment is used for out-of-building applications, approved secondary protectors are required. See Installation Manual. AVERTISSEMENT: Si l'équipement est utilisé pour des applications extérieures, l'installation d'un protecteur secondaire est requise. Voir le manuel d'installation. CANADA DRID Use only AT&T manufactured MERLIN LEGEND circuit modules, carrier assemblies, and power units, as specified in the Installation Manual, in this product. There are no user serviceable parts inside. Contact your authorized agent for service and repair. This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications. Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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 remote access features.

The Remote Access feature of your system, if you choose to use it, permits 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. 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.
- 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, and Disallowed List capabilities.
- 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.

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 FOR PERSONAL INJURY, DIRECT DAMAGES TO TANGIBLE PERSONAL PROPERTY PROXIMATELY CAUSED BY AT&T, AND LIABILITY OTHERWISE EXPRESSLY ASSUMED IN A WRITTEN AGREEMENT SIGNED BY AT&T, THE LIABILITY OF AT&T, ITS AFFILIATES, SUPPLIERS, AND AUTHORIZED RESELLERS 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 AN AMOUNT EQUAL TO THE LESSER OF THE DIRECT DAMAGES PROVEN OR THE PURCHASE PRICE OF THE SYSTEM. IN NO EVENT SHALL AT&T OR ITS AFFILIATES, SUPPLIERS, OR AUTHORIZED RESELLERS BE LIABLE FOR INCIDENTAL, RELIANCE, CONSEQUENTLY, OR ANY OTHER INDIRECT LOSS OR DAMAGE (INCLUDING LOST PROFITS OR REVENUES) INCURRED IN CONNECTION WITH THE SYSTEM. THIS LIMITATION OF LIABILITY SHALL SURVIVE FAILURE OF THE EXCLUSIVE REMEDY SET FORTH IN THE LIMITED WARRANTY ABOVE.

Voice Mail Systems

Your voice mail system permits callers to leave verbal messages for system users or gain access to the backup position in an emergency as well as create and distribute voice messages among system users.

The voice mail system, through proper administration, can help you reduce the risk of unauthorized persons gaining access to the network. However, phone numbers and authorization 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 (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, 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 your voice mail system, please observe the following procedures:

- Employees who have voice mailboxes should be required to use the passwords to protect their mailboxes.
 - Have them use random sequence passwords.
 - Impress upon them the importance of keeping their passwords a secret.
 - Encourage them to change their passwords regularly.
- The administrator should remove any unneeded voice mailboxes from the system immediately.
- AUDIX Voice Power™ has the ability to limit transfers to subscribers only. You are strongly urged to limit transfers in this manner.
- Use the Hybrid/PBX or Key system administration capability to do the following:
 - Block direct access to outgoing lines and force the use of account codes/authorization codes.
 - Disallow trunk-to-trunk transfer unless required.

- Assign toll restriction levels to all AUDIX Voice Power ports or other voice mail ports.
- If you do not need to use the Outcalling feature, completely restrict the outward calling capability of the AUDIX Voice Power ports. Use voice mail application features to do this.
- Monitor SMDR reports or Call Accounting System reports for outgoing calls that might be originated by AUDIX Voice Power ports or other voice mail ports.

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			Eqpt.	2-Dig Ext. No. ♦	3-Dig. Ext. No.	Set Up Space	Renumber to	Label	Old Ext. No.	Wire No.	Person Location, or Function	VEX R1.1	AUDIX Voice Power™
		ID	DT	B											
	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

† Use Form 2b for adjuncts connected via MFM or ISDN 7500B Data Module.

* The system capacity for Personal Directories is decreased by one whenever an MLX-20L telephone is connected to an MLX port

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

Maximum: 127 Adjuncts

Log. ID	Factory-Set			Renumber	to	M F M SAA T/R	7500B	MLX Telephone Ext. No.	Person, Location Function, and Equipment Type
	2-digit	3-digit	Set Up Source						
1	710	300	7300						
2	711	301	7301						
3	712	302	7302						
4	713	303	7303						
5	714	304	7304						
6	715	305	7305						
7	716	306	7306						
8	717	307	7307						
9	718	308	7308						
10	719	309	7309						
11	720	310	7310						
12	721	311	7311						
13	722	312	7312						
14	723	313	7313						
15	724	314	7314						
16	725	315	7315						
17	726	316	7316						
18	727	317	7317						
19	728	318	7318						
20	729	319	7319						
21	730	320	7320						
22	731	321	7321						
23	732	322	7322						
24	733	323	7323						
25	734	324	7324						
26	735	325	7325						
27	736	326	7326						
28	737	327	7327						
29	738	328	7328						
30	739	329	7329						
31	740	330	7330						
32	741	331	7331						
33	742	332	7332						
34	743	333	7333						
35	744	334	7334						
36	745	335	7335						
37	746	336	7336						
38	747	337	7337						
39	748	338	7338						
40	749	339	7339						

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

Form 2c, System Numbering: Line/Trunk Jacks

Music-on-Hold, Line/Trunk No. _____ Source _____

Loudspeaker Page, Line/Trunk No(s). _____

Maintenance Alarm, Line/Trunk No. _____

Loop-Start Reliable Disconnect

☐ No ☐ Yes

Module Type and Slot No	Log. ID	Jack Type (LS, GS, Line/ DID, Tie, etc.)	Pool Dial- Out Code†‡	Re- number To	Incoming Line/Trunk Type (Main No., Persona Line, WATS, FX, etc.)	Telephone Number or Equipment	Label	Ourmode Signaling		Toll Type Prefix Req'd for LD		Hold Disc. Interval		QCC Queue Priority Level† (4 ♦)	QCC Operator to Receive Calls † (No ♦)	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-m tie).

Figure B-3. Form 2c, System Numbering: Line/Trunk Jacks

Form 2d, System Numbering: Special Renumbers

Pools* (Form 2c) Description	Factory-Set	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) 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
	888	

*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.

Unit Load Worksheet

1. Number of modules in carrier (excluding power supply and processor:

■ If fewer than five, auxiliary power is not required. _____

■ 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, auxiliary power is not required

■ 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.

Unit Load Calculation Worksheet

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	
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 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, auxiliary power is not required.
- If the total is greater than 54, continue to Step 6.

Unit Load Calculation Worksheet

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
<i>Continued</i>				

* Unit loads are computed per trunk for trunk-type network access lines.

Unit Load Calculation Worksheet

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

† 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, auxiliary power is not required.
- 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, 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, auxiliary power is not required.
 - If the exchange does not reduce the unit load to 54 or less, auxiliary power is required. Continue to Step 8.

NOTE:

Empty slots are not permitted between modules.

Unit Load Calculation Worksheet

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

	Qty	x	Unit Load	= Total
Equipment			Hybrid/PBX or Modified	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
BE-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
<i>Continued</i>				

* Unit loads are computed per trunk for trunk-type network access lines.

Unit Load Calculation Worksheet

	Qty x Unit Load			= Total
Equipment		Hybrid/PBX or Modified	Square	
Optional Equipment				
Direct Station Selector*		0.7	0.9	
General Purpose Adapter		0.8	1.0	
Hands-Free Unit		0.8	1.0	
Headset Adapter		0.8	1.0	
Total 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, auxiliary 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, 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, auxiliary 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.

Unit Load Calculation Worksheet

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

Summary information is included for the following procedures:

- 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.

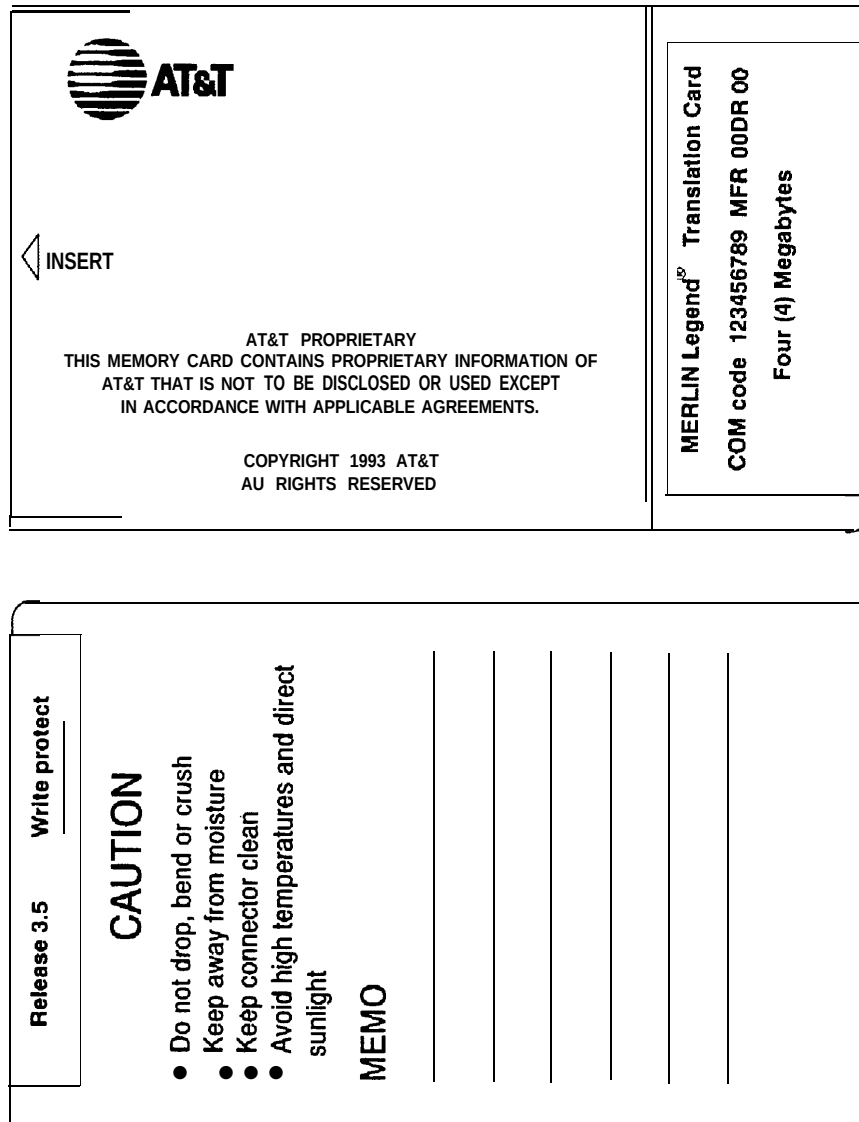


Figure D-1. PCMCIA Transition Memory Card

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

	Memory Card Backup
	Inserted Memory Card is
	not the correct type.
	Do you want it formatted?
☐	Yes
☐	No
☐	Exit

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

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

NOTES:

1. Only 4-MB Series I or Series II PCMCIA memory cards may be formatted, except those already formatted as translation cards.
2. If a memory card cannot be formatted, a message appears on screen. These messages are noted in the procedures as appropriate.

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

Format Memory Card:
All data on card will be
DELETED.
Do you want to continue?

Yes

No

Exit

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 → <u>(F1)</u> → <u>(F9)</u> → <u>(F1)</u> → Select backup file → Type the new backup file name → <u>(F6)</u> → <u>(F1)</u> → <u>(F5)</u> → <u>(F5)</u> → <u>(F5)</u>

Procedure: Backup

- 1 Insert the memory card into the PCMCIA interface slot on the processor module.

Console Display/Instructions	Additional Information	P C
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 <i>Mode</i> Time Board Renum Back/Restore Exit 		(F9)
4 Select Backup.		
 Memory Card: Make a selection Backup Restore Auto Backup Exit		(F1)

Console Display/Instructions

Additional Information PC

5 Select the backup filename.

```

Memory Card Backup:
Make a selection
BACK1.  ***** AUTO.BACK1
BACK2.  ***** AUTO.BACK2
BACK3.  *****
Exit
  
```

If you select AUTO.BACK1 or AUTOBACK2, go to Step 8. You cannot rename either of these two files.

If you select BACK1., BACK?., or BACK3. and do not want to rename the file, go to Step 8. Press the button or function key next to your selection.



6 Rename the backup file (n = 1 to 11 characters).

```

Backup File: Enter name
BACK x.mmdd
Punctuation          Enter
Backspace            Exit
A      '              ,      B
C      -              &      D
E      .              Space  F
  
```

x = backup file selected in Step 5
mm/dd = current month and day

Use Punctuation to toggle between the letters and punctuation.

Dial or type [n].



Use the buttons next to the display to specify the letters A through I and punctuation. Use the line/feature buttons to specify additional 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.

Backup *filename*:

Do you want to continue?

Yes

No

Exit

filename = file selected in
Step 5 or entered in Step 6

Select No to abort the backup. (F2)
Go to Step 11.

Select Yes to continue the backup. (F1)

9 Observe the backup progress screen.

Backup *filename*:

Backup in Progress,
Please Wait.

xx% completed

Exit

filename = file selected in Step 5
or
entered in Step 6

xx% = percentage of backup
completed



10 Observe the backup completion screen.

Backup *nnnnnnnnnnnn*:
Backup Successfully
Completed.

Exit

nnnnnnnnnnnn = 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 → Weekly → Drop → Dial day and time → Enter → Exit → Exit
PC Procedure	To program daily backup: Insert memory card → <u>(F1)</u> → <u>(F9)</u> → <u>(F3)</u> → <u>(F2)</u> → <u>(Alt)</u> + <u>(P)</u> → Type time → <u>(F10)</u> → <u>(F5)</u> → <u>(F5)</u> To program weekly backup: Insert memory card → <u>(F1)</u> → <u>(F9)</u> → <u>(F3)</u> → <u>(F3)</u> → <u>(Alt)</u> + <u>(P)</u> → Type day and time → <u>(F10)</u> → <u>(F5)</u> → <u>(F5)</u>

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  
SysRenumbr Options  
Operator    Tables  
LinesTrunks AuxEquip  
Exit        NightSrvc
```

(F1)

3 Select Back/Restore.

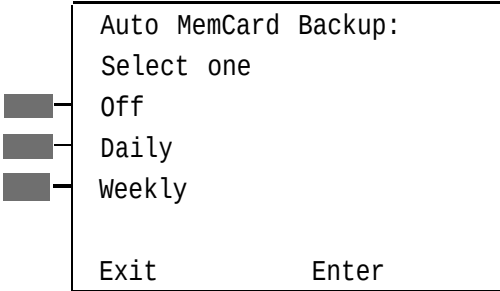
```
System:  
Make a Selection  
Restart      MaintenBusy  
SProg Port   Date  
Mode         Time  
Board Renum  Back/Restore  
Exit
```

(F9)

4 Select Auto Backup.

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

(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 (CID-57) HHMM xxxx Backspace Exit Enter	Press Drop .	(Alt) + (P)
2 Enter the time when you want the automatic backup to run everyday (hh= 00 to 23, mm= 00 to 59).		
Daily MemCard Backup: Enter hour (00-P2) and minutes (00-57) HHMM Backspace Exit Enter	Dial or type [<i>hhmm</i>].	
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
xxxxxx

Backspace
Exit Enter

Press **Drop**. (Alt) + (P)

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**

```
Backup x:
BACKUP IS CANCELED.
File has been DELETED.

Exit
```

Additional Information PC

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

Memory Card Backup:
Verify that Memory Card
has been inserted
correctly.

Exit

The memory card is either not inserted or is inserted incorrectly. The backup is aborted. You must reinsert the memory card and repeat the backup procedure. This screen may also appear if the wrong type of memory card is inserted and a backup or automatic backup is requested within one minute of insertion. Verify that the card is a translation memory card.

Card Is Write-Protected

Memory Card Backup:
Memory Card is Write-
Protected.
Reset Write-Protect Tab
on Memory Card.

Exit

The memory card is write-protected. You must remove the memory card, flip the write-protect tab, reinsert the memory card, and repeat the backup procedure.

**CAUTION:**

The memory card may be write-protected to avoid the accidental erasure of the backup files. Make certain this is not the case before you change the write-protect tab.

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 →(<u>F1</u>) →(<u>F9</u>) →(<u>F2</u>) →Select restore file →(<u>F3</u>)

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  
SysRenumbr Options  
Operator    Tables  
LinesTrunks AuxEquip  
Exit        Night Srvce
```

(F1)

3 Select Back/Restore.

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

(F9)

4 Select Restore.

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

(F2)

Console Display/Instructions

Additional Information PC

5 Select the restore file.

Memory Card Restore:	
Select one	
☐ BACK1. <i>mdd</i>	AUTO.BACK1
☐ BACK2. <i>mdd</i>	AUTO.BACK2
☐ BACK3. <i>mdd</i>	
Exit	Enter

mdd = month and day of backup

Press the button or function key next to your selection.



6 Observe the restore file validation screen.

Memory Card Restore:
File is being validated.

7 Respond to the prompt.

Restore <i>n</i> :
System will be down . . .
Do you want to continue?
☐ Yes
☐ No
Exit

n = filename selected in Step 5

Select **Yes** to continue the restore. (**F3**)

Select **No** to abort the restore. Go back to Step 5. (**F2**)

8 Observe the restore progress screen.

Restore <i>n</i> :
Restore in Progress _a
Please Wait.

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

```
Restore n :  
Change Sys Programming  
Port to Extension xxxx  
before Restoring.  
  
Exit
```

Additional Information PC

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

```
Memory Card Restore:  
Restore Failure.  
Try a different file  
or a new Memory Card.  
  
Exit
```

Additional Information PC

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

```
Restore x:
Restore Failure
RESTORE IS CANCELED.
Board mismatch between
control unit and file.

Exit
```

Additional Information PC

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



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 Permanent Key mode, follow the steps below. Refer to Figure E-1.

- 1 Remove the processor from its packaging.**
- 2 Place the processor on a flat surface.**
- 3 If the feature module is installed, remove it.**

See “Replacing the Feature Module” in Chapter 4 for instructions.

Modifying a Release 2.1 or Earlier Processor for Key Mode

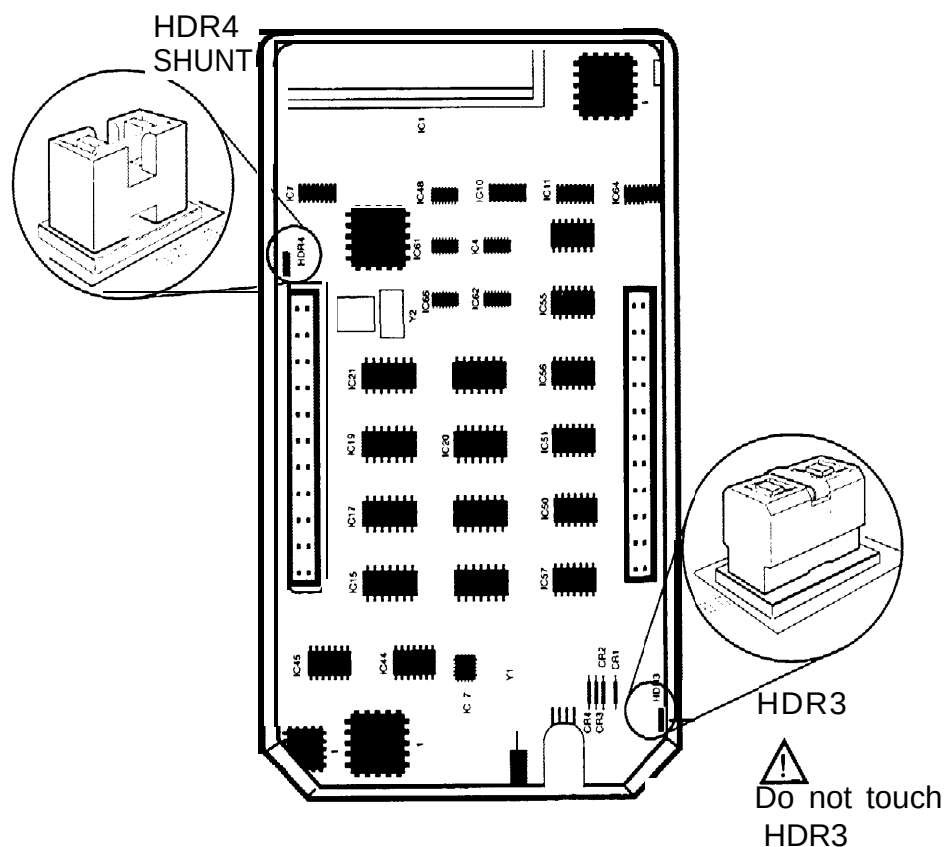


Figure E-1. Modifying the Processor for Key Mode



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.

Modifying a Release 2.1 or Earlier Processor for Key Mode

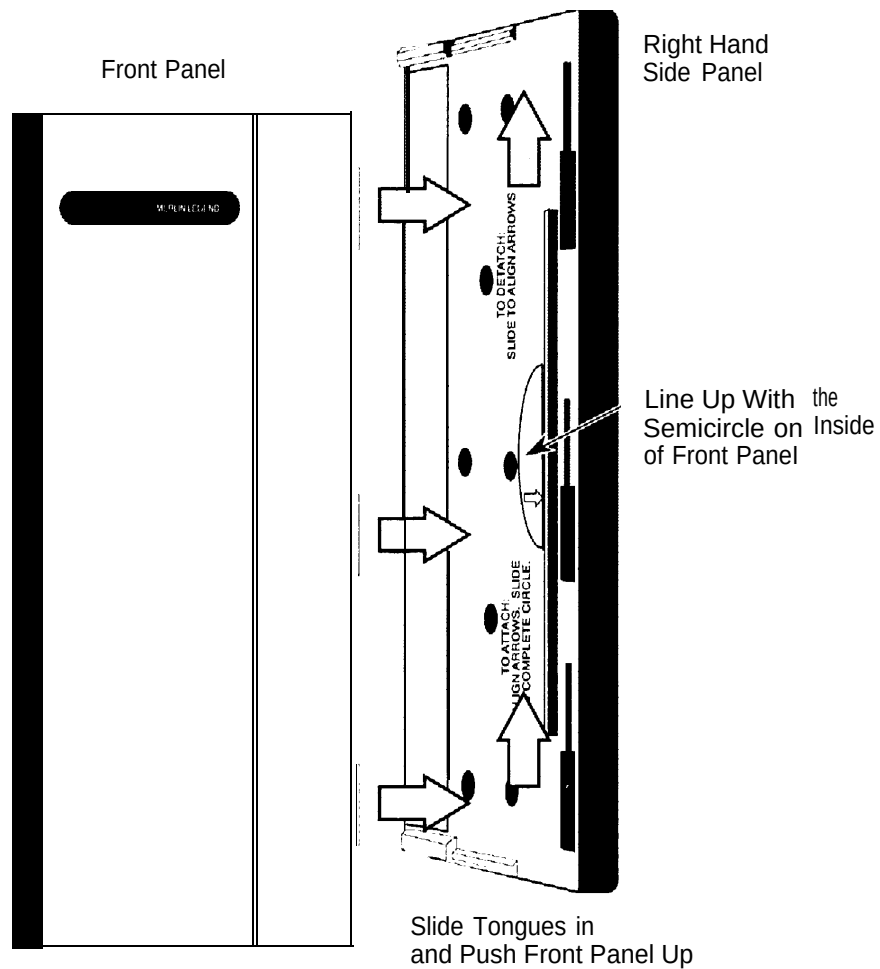


Figure E-2. Installing the Control Unit Housing

Glossary

#

7500B data module	See <i>ISDN 7500B Data Module</i> .
7500B data station	A type of data station that includes an <i>ISDN 7500B Data Module</i> as its DCE and connects to an MLX extension jack for <i>digital transmission</i> of data over a DS1 facility. It may also include an MLX telephone for simultaneous voice and data.

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 <i>modem</i> 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 <i>bipolar violation</i> occurs. AMI is used in the <i>DS1</i> 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 <i>digital transmission</i> .
analog data station	See <i>modem data station</i> .
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, Accunet switched digital service, Megacom, <i>Megacom 800</i> , 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- <i>bit</i> 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 <i>synchronous data transmission</i> .
AT&T Attendant	Application with equipment that connects to one or more <i>tip/ring</i> extension jacks and automatically answers incoming calls with a recorded announcement; directs calls in response to touch tones.
AT&T Switched Network	See <i>ASN</i> .
AUDIX Voice Power	A voice-processing application, part of <i>IS II/III</i> , that provides Automated Attendant, Call Answer, Information Service, Message Drop, Voice Mail, and, optionally, <i>Fax Attendant System</i> for use with the system.
Automated Attendant	<i>IS II/III</i> , <i>MERLIN MAIL</i> , and <i>AT&T Attendant</i> 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 <i>ALS</i> .
Automatic Number Identification	See <i>ANI</i> .
automatic ringdown tie-trunk	See <i>automatic-start tie trunk</i>
Automatic Route Selection	See <i>ARS</i> .

automatic-start tie trunk	<i>Tie trunk</i> 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 <i>bipolar violation</i> . See also <i>bipolar signal</i> .
backup	Procedure for saving a copy of system programming onto a floppy disk or <i>memory card</i> . See also <i>restore</i> .
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 <i>Remote Access</i> feature of the system.
basic carrier	Hardware that holds and connects the <i>processor</i> , <i>power supply</i> , and up to five modules in the system. See also <i>expansion carrier</i> .
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 <i>bit rate</i> and <i>bps</i> .
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 <i>B-channel</i> .
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 <i>Centrex</i> or <i>DEFINITY</i> , which provides features and services to telephone users. See also <i>Hybrid/PBX mode</i> and <i>Key mode</i> .
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 <i>B8ZS</i> .
bipolar signal	Digital signal in which pulses (ones) alternate between positive and negative. See also <i>AMI</i> , <i>B8ZS</i> , and <i>bipolar violation</i> .
bipolar violation	Condition occurring when two positive or two negative pulses are received in succession. See also <i>AMI</i> and <i>B8ZS</i> .
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 <i>bps</i> . Also called "data rate." See also <i>baud rate</i> .
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 <i>glare</i> .
BMI	(Broadcast Music Incorporated)
board	A <i>module</i> , 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	<i>SPM</i> procedure for assigning <i>line/trunk and extension</i> modules to slots on the <i>control unit</i> .
board renumbering	System programming procedure for renumbering <i>line/trunk and extension</i> modules that have already been assigned to specific <i>slots</i> on the <i>control unit</i> .
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 <i>bits</i> (usually eight) processed together. Also called "octet."

C

Call Accounting System	See <i>CAS</i> .
Call Accounting Terminal	See <i>CAT</i> .
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 <i>ANI</i> .
Calling group	Team of individuals who answer the same types of calls.
Call Management System	See <i>CMS</i> .

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 <i>channels</i> 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 <i>system manager</i> . See also <i>system programming</i> and <i>extension programming</i> .
central office	See <i>CO</i> .
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 <i>CSU</i> .
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 <i>data stations</i> .
class of restriction	See <i>COR</i> .

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 <i>carriers</i> 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	<i>Processor module, power supply modules, line/trunk and extension modules, carriers, and housing of the system.</i>
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 <i>modem pool</i> .
COR	(class of restriction) Various types of restrictions that can be assigned to <i>remote access</i> trunks or barrier codes. These restrictions consist of calling restrictions, ARS Facility Restriction Levels (<i>FRLs</i>), 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 (<i>ESF</i>).
CSU	(channel service unit) Equipment used on customer premises to provide <i>DS1</i> facility terminations and signaling compatibility.
cyclic redundancy check	See <i>CRC</i> .

D

D4 framing format	<i>Framing format</i> consisting of a sequence of individual frames of 24 eight- <i>bit</i> slots and one signal bit(193 bits) in a 12-frame superframe. See also <i>ESF</i> .
Data-channel	See <i>D-channel</i> .
data communications equipment	See <i>DCE</i> .
data hunt group	See <i>DHG</i> .

data module	See <i>ISDN 7500B Data Module</i> .
data rate	See <i>bps</i> .
data station	Special type of extension where data communications take place; includes <i>DTE</i> and <i>DCE</i> ; sometimes a telephone is also part of a data station.
data terminal	An input/output (I/O) device (often a personal computer) that can be connected to the control unit via an interface.
data terminal equipment	See <i>DTE</i> and <i>data terminal</i> .
DCE	(data communications equipment) Equipment such as <i>modems</i> or data modules used to establish, maintain, and terminate a connection between the system and data terminal equipment (<i>DTE</i>), 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 <i>PRI</i> or 16-kbps channel to carry signaling information on <i>BRI</i> .
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 <i>dial-repeating tie trunk</i>
DFT	(direct facility termination) See <i>personal line</i> .
DHG	(data hunt group) Group of modem or 7500B <i>data stations</i> that share a common access code. Calls are connected in a round-robin fashion to the first available data station in the group.
dial access	See <i>feature code</i> .

Dialed Number identification Service	See <i>DNIS</i> .
dial-out code	Digit (usually a 9) or digits dialed by telephone users to get an outside line.
dial plan	Numbering scheme for system extensions, lines, and trunks.
dial-repeating tie trunk	<i>Tie trunk</i> 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, <i>calling group</i> , or outgoing trunk <i>pool</i> , 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 <i>analog transmission</i> .
Digital Communications Protocol	See <i>DCP</i> .
digital data station	See <i>7500B data station</i> .
Digital Signal 0	See <i>DS0</i> .
Digital Signal 1	See <i>DS1</i> .
digital switch element	See <i>DSE</i> .

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 <i>analog transmission</i> .
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 <i>personal line</i> .
Direct Inward Dialing	See <i>DID</i> .
Direct-Line Console	See <i>DLC</i> .
Direct Station Selector	See <i>DSS</i> .
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 (<i>ASN</i>); 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 <i>channel</i> .

DS1	(Digital Signal Level 1) <i>Bit</i> -oriented signaling interface that multiplexes twenty-four 64-kbps channels into a single 1.544-Mbps stream.
DSS	(Direct Station Selector) 60-button <i>adjunct</i> that enhances the call-handling capabilities of an <i>MLX-20L</i> or <i>MLX-28D</i> 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 <i>bits</i> for digital applications, See also <i>tie trunk</i> .
EIA	(Electronic Industries Association)
EIA-232-D	Physical interface, specified by the <i>HA</i> , 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 <i>ESS</i> .
endpoint	Final destination in the path of an electrical or telecommunications signal.

ESF	(extended superframe format) <i>Framing format</i> consisting of individual frames of 24 eight- <i>bit</i> slots and one signal bit (193 bits) in a 24-frame extended superframe. See also <i>D4 framing format</i> .
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	<i>Carrier</i> 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 <i>data station</i> .
extension jack	An analog, digital, or <i>tip/ring</i> 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 <i>centralized telephone programming</i> and <i>system programming</i> .
extended superframe format	See <i>ESF</i> .

F

facility	Equipment (often a <i>trunk</i>) constituting a telecommunications path between the system and the telephone company central office (CO).

Facility Restriction Level	See <i>FRL</i> .
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 <i>AUDIX Voice Power</i> .
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 <i>processor</i> 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 <i>processor module</i> , 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 <i>FX</i> .

frame	One of several segments of an analog or digital signal that has a repetitive characteristic. For example, a <i>DS1</i> frame consists of a framing <i>bit</i> and 24 bytes, which equals 193 bits.
framing format	Pattern of <i>frames</i> used in transmissions.
frequency generator	See <i>ring generator</i> .
FRL	(Facility Restriction Level) <i>ARS</i> 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 Adap	See <i>GPA</i> .
glare	Condition that occurs when a user tries to call out on a <i>loop-start</i> 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 (<i>CO</i>).
Group IV (G4) fax mach	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	<i>Tie trunk</i> on which no start signal is necessary; dialing can begin immediately after the trunk is seized.
in-band signaling	See <i>robbed-bit signaling</i> .
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 <i>IS III</i> that simplifies the programming of common information for the system, <i>AUDIX Voice Power</i> , and, if it is also installed, <i>Fax Attendant System</i> .
Integrated Services Digital Network	See <i>ISDN</i> .
Integrated Solution II/III	See <i>IS II/III</i> .
Integrated Voice Power Automated Attendant	<i>IS II</i> 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 <i>network interfaces</i> ; provides digital circuit-switched or packet-switched connections within the network and to other networks for national and international digital connectivity.
ISDN 7500B Data Module	Data communications device that allows connection between an RS-232 <i>DTE</i> device and the control unit via MLX extension jacks on the 008 MLX or 408 GS/LS-MLX module.

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 <i>personal lines</i> on line buttons for outside calls, with a separate interface (ICOM buttons) for internal calling, See also <i>Behind Switch mode</i> and <i>Hybrid/PBX mode</i> .

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 <i>trunk</i> .
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 (<i>CSU</i>) or other far-end connection point.
line/trunk	Refers to inside system lines and outside trunks in general terms. See also <i>line</i> and <i>trunk</i> .
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 <i>modem</i> or data module.
local loop	See <i>access line</i> .
logical ID	Unique numeric identifier for each extension and <i>line/trunk jack</i> 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 <i>WATS</i> 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 <i>tip/ring</i> 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 <i>Passageway Direct Connect Solution</i> 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 <i>modems</i> and data modules with interconnected RS-232 interfaces that converts digital signals to analog, or analog signals to digital, thereby allowing users with 7500B <i>data stations</i> to communicate with users who have analog <i>modem data stations</i> .
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 <i>line/trunk</i> jacks it contains; the last digit indicates the number of <i>extension jacks</i> it contains. If no letters appear after the number, a line/trunk module provides <i>loop-start trunks</i> or an extension jack module provides analog or <i>tip/ring</i> 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 <i>ground-start (GS)trunks</i> . There are also modules for the processor and power supply.
Multi-Function Module	See <i>MFM</i> .
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 <i>Magic On Hold</i> connected to the system through a <i>loop-start</i> 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 <i>OPT</i> .
ones density	Requirement for channelized <i>DS1</i> 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) <i>Single-line telephone</i> or other <i>tip/ring</i> 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 <i>Hybrid/PBX mode</i> , 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 <i>ARS</i> feature when choosing the least expensive route for a call.
port	See <i>jack</i> . Also, refers to <i>extension</i> or <i>line jacks</i> before these are numbered according to the <i>dial plan</i> during programming. The lowest jack on a module is always Port 1.
Power Failure Transfer	See <i>PFT</i> .
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 <i>auxiliary power unit</i> 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 <i>B-channels</i> for voice and/or data and one 64-kbps <i>D-channel</i> , 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 <i>logical ID</i> in the system.
prime line	Individual extension number assigned to a telephone in a system operating in <i>Behind Switch mode</i> . 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 <i>power supply module</i>). <i>Includes</i> 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 <i>memory card</i> . <i>See also backup</i> .
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 (<i>EIA</i>), that transmits and receives <i>asynchronous</i> data at distances of up to 50 feet (15 m).
robbed-bit signaling	Signaling in which the least significant <i>bit</i> 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 <i>extension jack</i> on a basic 012 or 008 OPT module.
slot	Position in a <i>carrier</i> for a module; numbered from 0 (<i>processor module</i>).
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 <i>processor</i> module.
Software Defined Network	See <i>SDN</i> .
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) <i>DOS</i> or <i>UNIX</i> system-based application for programming and maintaining the system.
square key	Configuration in <i>Key mode</i> operation in which all outside lines appear on all telephones.
station	See <i>extension</i> .
station jack	See <i>extension jack</i> .
Station Message Detail Recording	See <i>SMDR</i> .

Supplemental Alert Adapter	See <i>SAA</i> .
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 <i>host</i> 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 <i>bit</i> is synchronized with a master clock. See also <i>asynchronous data transmission</i> .
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 <i>SA buttons</i> .
system date and time	Date and time that appear on MLX display telephones and <i>SMDR</i> reports.
system programming	Programming of system functions and features that affect most users, performed from an <i>MLX-20L telephone</i> or a <i>PC</i> using <i>SPM</i> . See also <i>extension programming</i> and <i>centralized telephone programming</i> .
System Programming and Maintenance	See <i>SPM</i> .
system renumbering	Procedure used to change the numbers assigned to telephones, adjuncts, <i>calling groups</i> , paging groups, park zones. <i>remote access</i> , and lines/trunks.

T

T1	Type of digital transmission facility that in North America transmits at the <i>DS1</i> 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 <i>automatic-start tie trunk</i> , <i>delay-dial-start tie trunk</i> , <i>immediate-start tie trunk</i> , and <i>wink-start tie trunk</i> .
timed flash	See <i>switchhook flash</i> .
tip/ring	Contacts and associated conductors of a <i>single-line telephone</i> plug or jack.
touch-tone receiver	See <i>TTR</i> .
T/R	See <i>tip/ring</i> .
trunk	A telecommunications path between the communications system and the telephone company central office (CO) or another switch. Often used synonymously with <i>line</i> .
trunk jack	See <i>line/trunk jack</i> .
trunk pool	See <i>pool</i> .
TTR	(touch-tone receiver) Device used to decode <i>DTMF</i> touch-tones dialed from <i>single-line telephones</i> or <i>Remote Access</i> telephones.

U

uninterruptible power supply	See <i>UPS</i> .
unit load	Measure of the power load drain of a module, telephone, or <i>adjunct</i> .

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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MERLIN LEGEND[®]
Communications
System
Release 3.0

Programming
Summary

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.

Security of Your System: Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there exists 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. 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 prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Ordering Information

The ordering number for this document is 555-630-140. To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800-255-1242). For more information about AT&T documents, refer to the section entitled, "Related Documents" in "About This Book." The Pocket Reference, listed in that section, provides full ordering information for replacement parts, accessories, and other compatible equipment; or, contact your AT&T representative.

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 if you need assistance when installing or using your system.

Outside the continental U. S., contact your local AT&T representative.

Warranty

AT&T provides a limited warranty on this product. Refer to "Limited Warranty and Limitation of Liability" in Appendix A, "Customer Support Information."

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

IMPORTANT SAFETY INSTRUCTIONS

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

- Read and understand all instructions.
- Follow all warnings and instructions marked on or packed with the product.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Use only AT&T-manufactured MERLIN LEGEND Communications System circuit modules, carrier assemblies, and power units in the MERLIN LEGEND Communications System (511 A) control unit.
- Use only AT&T-recommended/approved MERLIN LEGEND Communications System accessories.
- If equipment connected to the analog station 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 three-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. The system's power and versatility is due in part to its many options and features. This book is a reference, containing summaries of all the programming procedures you need to enable the system to function at peak efficiency. The material is presented in the order in which you would program a new system.

Intended Audience

This book is intended for qualified service personnel and technicians. Additional information is available as follows:

- More detailed procedures for system programming, along with information on how to program on the system programming console and on a PC, can be found in *System Programming*.
- Complete instructions on using SPM can be found in *System Programming and Maintenance (SPM)*.
- Detailed information about all of the features described here can be found in the *Feature Reference*.
- Detailed instructions on how to choose among the many options provided for each feature can be found in *System Planning*.

“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	7500B data station
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	7500B data only station
digital voice and digital data station	MLX voice and 7500B data
station	

Typographical Conventions

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

Example	Purpose
It is <i>very</i> important that you follow these steps. You <i>must</i> 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 <i>headpiece</i> .	Italics also set off special terms.
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 <i>*11</i> .	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."

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 Customer Information Center by calling 1-800-432-6600.

Document No.	Title
	System Documents
555-630-117	<i>Introduction</i>
555-630-118	<i>System Manager's Guide</i>
555-630-110	<i>Feature Reference</i>
555-630-115	<i>Equipment and Operations Reference</i>
555-630-116	<i>Pocket Reference</i>
555-630-111	<i>System Programming</i>
555-630-112	<i>System Planning</i>
555-630-113	<i>System Planning Forms</i>
	Telephone User Support
555-630-122	<i>MLX-10D™, MLX-10DP™, MLX-28D™, and MLX-20L™ Display Telephones User's Guide</i>
555-630-150	<i>MLX-10D Display Telephone Tray Cards (5 cards)</i>
555-630-153	<i>MLX-28D and MLX-20L Telephone Tray Cards (5 cards)</i>
555-630-124	<i>MLX-10™ Nondisplay Telephone User's Guide</i>
555-630-151	<i>MLX-10 Nondisplay Telephone Tray Cards (6 cards)</i>
555-630-120	<i>Analog Multiline Telephones User's Guide</i>
555-630-126	<i>Single-Line Telephones User's Guide</i>
	System Operator Support
555-630-134	<i>MLX Direct-Line Consoles Operator's Guide</i>
555-630-132	<i>Analog Direct-Line Consoles Operator's Guide</i>
555-630-136	<i>MLX Queued Call Console Operator's Guide</i>
555-630-138	<i>MDC 9000 and MDW 900 Telephones User's Guide</i>
	Miscellaneous User Support
555-630-130	<i>Calling Group Supervisor's Guide</i>
555-630-129	<i>Data User's Guide</i>
	Documentation for Qualified Technicians
555-630-140	<i>Installation, Programming, & Maintenance (IP&M) Binder.</i>

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Programming Basics

1

This chapter covers the information you need to know before you begin system programming.

It describes the following:

- How to use the system programming console, buttons, and overlay
- Types of programming
- Programming summary contents
- Programming basics
- Programming menu options
- What system components require idle states for programming

System Programming Console

The system programming console is an MLX-20L telephone connected to the system programming jack. When you begin system programming on a new system for the first time, the console must be connected to the first jack on the first 008 MLX module or 408 GS/LS-MLX module (Release 2.0 and later versions). This jack is factory set as the system programming jack and as an operator position. When you program for the first time, you can change the system programming jack to any one of the first five jacks on the first 008 MLX module or 408 GS/LS-MLX module (Release 2.0 and later versions). This allows you to program without interfering with the operator's call handling.

You can also have one or two Direct Station Selectors (DSSs) connected to the system programming console. Each DSS adds 50 extension buttons to the console, which facilitates assigning features to telephones.

An MLX-20L telephone with a DSS is shown in Figure 1–1.

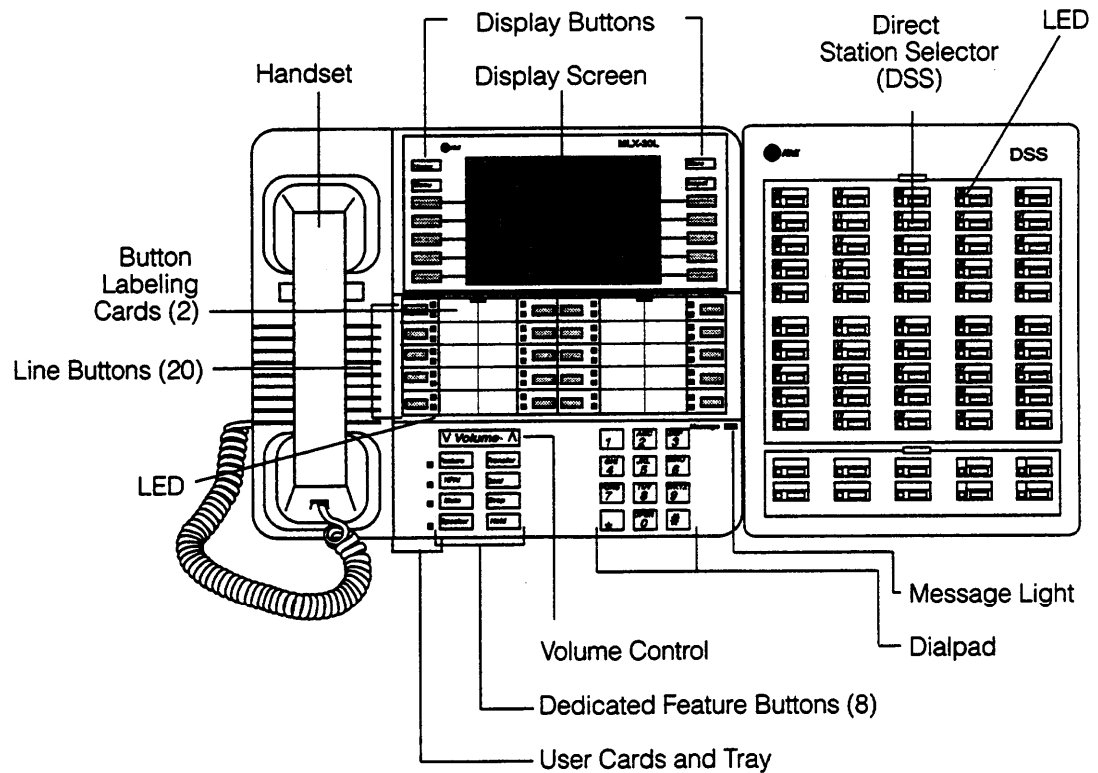


Figure 1-1. MLX-20L Telephone with Direct Station Selector (DSS)

Console Buttons

System programming is performed using the console's 14 display-area buttons. These buttons are arranged in two columns of seven buttons. The top two buttons in each column have the same labels and functions regardless of the screen display. This type of button is called a *fixed display button*. Table 1-1 describes the functions of the fixed display buttons.

Table 1-1. Fixed Display Buttons

Button	Function
Home	Return to normal call-handling mode after you finish programming.
Menu	Display the main menu shown in Figure 1–2.
More	Display more items when a menu is continued on more than one screen, indicated by an angle bracket (>) on the upper right of the screen.
Inspct	(Inspect) View a list of lines or extensions on which a feature is programmed.

Console Overlay

The programmable line buttons are on the main part of the console. There are actually 20 line buttons on the console, but you can use the console overlay to program up to 34 line buttons through centralized telephone programming. Select **Page 1** to access line buttons 1 through 20 and **Page 2** to access line button 21 to 34. You can also use the dialpad for entering feature and programming codes.

Figure 1–2 illustrates the system console overlay.

Line 1
Line 21
Line 14
Line 34

☐	☐	G 5 / 25 5 25 45 65	10 / 30 H 10 30 50 70	☐	☐	☐	I 15 / 35 15 35 55 75	20 / J 20 40 60 80	☐	☐
☐	☐	K 4 / 24 4 24 44 64	/ 29 L 29 49 69	☐	☐	☐	M 14 / 34 14 34 54 74	19 / N 19 39 59 79	☐	☐
☐	☐	O 3 / 23 3 23 43 63	8 / 28 P 8 28 48 68	☐	☐	☐	Q 13 / 33 13 33 53 73	18 / R 18 38 58 78	☐	☐
☐	☐	S 2 / 22 2 22 42 62	7 / 27 T 7 27 47 67	☐	☐	☐	U 12 / 32 12 32 52 72	17 / V 17 37 57 77	☐	☐
☐	☐	W 1 / 21 1 21 41 61	6 / 26 X 6 26 46 66	☐	☐	☐	Y 11 / 31 11 31 51 71	16 / Z 16 36 56 76	☐	☐

☐

☐

☐

☐

Top Sys Prog

Switchhook Flash

Stop/Drop Entry

Pause

Figure 1-2. Console Overlay

Appendix E shows the button diagrams for the telephones used in the communications system. Refer to this appendix when programming buttons for other telephones.

Programming Information

This section covers basic system programming information. See *System Programming* for more information.

Types of Programming

Listed below are the three types of programming available for the communications system.

- **System Programming.** This type of programming enables the system manager to program features that affect all or most system users, and requires one of the following:
 - An MLX-20L™ telephone connected to one of the first five jacks of the first MLX module in the control unit.
 - A PC with System Programming and Maintenance (SPM) software. SPM emulates a system programming console on your PC. The PC should be connected to the lower port (labeled ADMIN) on the processor module. A PC with a modem can perform system programming remotely through the public network or by connecting to a tip/ring extension jack (012 or 008 OPT module) on the communications system. A built-in modem in the processor allows the PC and the communications system to communicate.
- **Extension Programming.** This type of programming enables individual telephone users and system operators (except for QCC operators) to change their telephone features to meet individual needs. For details about extension programming, see the appropriate user and operator guides.

- **Centralized Telephone Programming.** This type of programming enables the system manager to program any feature that can be programmed by individual telephone users or system operators. Some features can be programmed only in centralized telephone programming. Centralized telephone programming can be done on the programming console or on a PC with the SPM software. See Chapter 5 in *System Programming*.

NOTE:

If your system has the AT&T Integrated Solution II or AT&T Integrated Solution III (IS II/III) UNIX® application, see Chapter 2 in *System Programming* for more information.

Procedure Summary Contents

Each programming summary contains a general description of the feature and provides the following programming information.

Programmable by	Indicates who has permission to use the procedure.
Mode	Specifies which system mode supports the procedure: Key, Hybrid/PBX, Behind Switch, or a combination
Idle condition	Specifies the idle state required before the procedure can be performed.
Planning form	Indicates the planning forms that provide information for the procedure.
Factory setting	Shows the default settings, if any, for equipment or features affected by the procedure.
Valid entries	Specifies the characters, numbers, or values accepted during data entry.
Inspect	Specifies whether or not the feature status can be verified using the Inspect feature.
Copy option	Indicates whether or not the feature programmed with the procedure can be copied to another system component.
Console Procedure	Provides a summary of the procedure steps using the system console.
PC Procedure	Provides a summary of the procedure steps using SPM.

Programming Basics

To begin programming, do the following:

On the console	Select Menu → Sys Program → Exit : The System Programming menu is displayed.
On the PC	Type SPM → <u>[Enter]</u> → Press any key → <u>[F1]</u> → <u>[F5]</u> : The System Programming menu is displayed.

In most cases, to exit from a screen without making any changes, press **Exit** or [F5]. Exceptions are noted as part of a procedure.

Ordinarily you complete a procedure by pressing **Enter** ([F10]) to save the information you have programmed. Occasionally you press **Exit** ([F5]) and go back to the previous screen.

If you are programming sequentially numbered extensions or trunks, you may have the option of pressing **Next** ([F8]) to save your entry and automatically provide the number of the next extension or trunk in the sequence, thus saving you a couple of steps.

When you have completed a procedure, pressing **Exit** ([F5]) takes you up one screen in the menu hierarchy.

In most cases, you will be at an intermediate step in the procedure you have just completed. At that point, you can select one of the options shown on the screen and continue programming, or you can press **Exit** again. This usually takes you back to the system Programming menu. If not, you again have the option of continuing to program from the current screen or pressing **Exit** again.

In a few cases, pressing **Exit** brings you back to the System Programming menu where you can select another option to program or exit from system programming.

Table 1-2. Programming Menu Options

Option	Description
System	Set system operating conditions.
SysRenumbr	Select the system numbering plan and/or reassign extension numbers with 1- to 4-digit numbers that are more appropriate or convenient for your company.
Operator	Assign or remove operator positions and program operator features (such as Operator Hold Timer or QCC options).
LinesTrunks	Program line/trunk options.
Extensions	Program features for extensions (such as restrictions and line assignments).
Options	Program systemwide features (such as Transfer Return and Delay Ring).
Tables	Program features that require entering information in a table (such as Allowed Lists and Disallowed Lists).
AuxEquip	Program auxiliary equipment connected to the system (such as loudspeaker paging and fax).
NightSrvce	Program Night Service features.
Labeling	Program the labels shown on display telephones (such as entries in the System Directory and Posted Messages).
Data	Specify extensions that need voice and data capability.
Print	Print system programming reports (such as system configuration and extension assignments).
Cntrl-Prog	Perform centralized telephone programming (assign features to specific buttons on telephones).
Language	Select the language that your console uses to display text on the screens [English (default), French, and Spanish].

Exiting System Programming

Use the information in Table 1–3 to return to the System Programming menu, the main menu (Menu Mode screen), or to the Home screen from within a programming screen.

Table 1-3. Exiting System Programming

To return to ...	On the console press:	On the PC press:
Previous menu	Exit	<u>[F5]</u>
Main Menu	Menu	<u>[End]</u>
Normal call handling	Home	<u>[Home]</u>

Idle States

Some programming procedures can be started only when the entire system, or some part of it, such as a trunk or an extension, is idle (not in use). Some procedures require that a trunk or extension be idle only at the instant of programming. Lengthy procedures require the system, trunk, or extension to remain idle until programming is completed. These procedures wait for the system, trunk, or extension to become idle and then prevent the initiation of any new calls. This condition is called *forced idle*.

NOTE:

If a procedure requires an idle condition, do the programming outside of normal business hours.

If a procedure requires that the system be idle and the system is busy when you begin, you see the screen shown in Figure 1-3.

System Busy	Pls Wait
Dial Code:	<i>nnnn</i>
Slot/Port:	<i>ss/pp</i>
Exit	Enter

nnnn = a previously entered extension
ss/pp = the slot and port number of the busy extension

Figure 1-3. System Busy Screen

The screen changes to the appropriate programming screen when the system is no longer busy.

System Forced Idle

When the entire system is forced idle, no calls can be made or received. The following procedures can be performed only when the entire system (every line and every extension) is idle:

- Select system mode.
- Identify system operator positions.
- Renumber system.
- Renumber boards.
- Identify telephones with voice signal pairs for the Voice Announce to Busy feature.
- Identify telephones that need voice and data features.
- Restore system programming information.
- Identify the Music On Hold jack.

When the system is forced idle, the following occurs: multiline telephone users hear a signal, indicating that the telephone cannot be used; display telephone users see the message **Wait: System Busy**; single-line telephone users do not hear a dial tone.

Line or Trunk Idle

Since these procedures require the line or trunk to be idle *only at the instant of programming*, the line or trunk is not forced idle (as described in the previous paragraph). The following procedures can be performed only when the line or trunk being programmed is idle:

- Identify loudspeaker paging extension jack.
- Assign trunks to pools.
- Specify incoming or outgoing DID or tie trunk type.
- Specify tie trunk direction.
- Specify tie trunk E&M signal.

Extension Forced Idle

When a telephone or data terminal is forced idle, no calls can be made or received on that telephone or data terminal. The following procedures can be performed only when the telephone or data terminal being programmed is idle:

- Assign call restrictions.
- Assign pool dial-out restrictions.
- Copy extension assignments.
- Assign lines, trunks, or pools to extensions.
- Assign labels to a personal directory.
- Use centralized telephone programming.

When the telephone is forced idle, the following occurs: multiline telephone users hear a signal, indicating that the telephone cannot be used; display telephone users see the message **Wait: System Busy**; single-line telephone users do not hear a dial tone.

100D Module Idle

The following procedures can be performed only when the 100D module is idle:

- Specify board type.
- Specify frame format.
- Specify board signaling format.
- Specify board suppression format.
- Specify board facility compensation.

Forced Idle Reminder Tones

The forced idle reminder tone is a high-low “doorphone” tone—400 ms of 667 Hz tone followed by 400 ms of 571 Hz. The tone is provided under the following circumstances:

- At the extension, to remind the user that the system or the extension is in the forced idle state
- At the programming console or at a PC running SPM, to remind the system manager that the system (or at least one extension) is in the forced idle state because of administrative activity

In Release 1.1 and higher of the communications system, forced idle reminder tones occur every 20 seconds. You can adjust the volume of these tones with the volume control.

Basic System Operating Conditions

2

The procedures in this section are all related to the system rather than to the operation of telephones, operator positions, lines, or trunks. These are operating conditions that must be set only once, when the system is new, or when you reset the system defaults.

NOTE:

You must reset the system time when Daylight Savings Time begins and ends.

System Restart



CAUTION:

This procedure is for qualified support personnel only.

Use this procedure to perform a System Restart (cold start). All calls are dropped when you perform this procedure. System programming is saved. Telephones with the Extension Status feature may lose toll restrictions as a result of a System Restart.

Summary: System Restart

Programmable by	Qualified support personnel
Mode	All
Idle Condition	Not required
Planning Form	Not applicable
Factory Setting	None
Valid Entries	None
Inspect	No
Copy Option	No
Console Procedure	System → Restart → Yes
PC Procedure	[F1] → [F1] → [F1]

System Programming Position Assignment

Use this procedure to reassign the extension used for system programming. This extension should not be the same extension as that used for the operator position. The system programming position can be reassigned only to one of the first five extension jacks on the first MLX module. Only one system programming console is allowed per system.

If you are programming on the console, be aware of the following:

- The console must be connected to the extension currently assigned for system programming.
- As soon as you change the system programming extension, the system programming session is terminated. To proceed with system programming, you must connect the system programming console to the newly assigned extension and enter system programming again.

NOTE:

The telephone used for system programming must be an MLX-20L.

Summary: System Programming Position Assignment

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	First extension jack on the first MLX module (also set as an operator position)
Valid Entries	Extension number of one of the first five extension jacks on the first MLX module
Inspect	No
Copy Option	No
Console Procedure	System → SProg Port → Drop → Dial ext. no. → Enter → Exit
PC Procedure	[F1] → [F2] → [Alt] + [P] → Type ext. no. → [F10] → [F5]

System Language

Your communications system offers you a choice of three languages (English, French, and Spanish) for the following options:

- System language.
- Station Message Detail Recording (SMDR) reports. See “System Features.”
- Print reports. See “Printing Reports.”
- Extensions. See “Optional Telephone Features.”

Use this procedure to set the system language. See the sections listed above to set a different language for an MLX display telephone, SMDR reports and printer reports.

NOTE:

MERLIN LEGEND Communication System Release 1.0 does not offer a choice of languages.

Summary: System Language

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	English
Valid Entries	English, French, Spanish
Inspect	No
Copy Option	No
Console Procedure	More → Language → SystemLang → Yes → Select a language → Enter
PC Procedure	[PgUp] → [F6] → [F1] → [F3] → Select a language → [F10]

Board Renumbering



CAUTION:

This procedure is to be performed by qualified support personnel only.

Use this procedure to renumber boards that have already been installed. This procedure restarts the system (system programming is not lost). Note that this is not the same procedure used with the Boards option, which is available to qualified service personnel with SPM only.

Summary: Board Renumbering

Programmable by	Qualified support personnel only
Mode	All
Idle Condition	System idle
Planning Form	Not applicable
Factory Setting	None
Valid Entries	Not applicable
Inspect	Not applicable
Copy Option	Not applicable
Console Procedure	System → Board Renum → Yes
PC Procedure	[F1] → [F4] → [F2]

Mode of Operation

The system mode—Key, Behind Switch, or Hybrid/PBX—determines how the system operates and directly affects the following operations:

- How lines and/or trunks are provided to users
- Types of operator consoles allowed
- Features available

Changing this option causes a system restart and terminates the programming session. You must enter system programming again to program other features.

NOTE:

The Hybrid/PBX option is not available if the control unit processor module has been modified to operate in Permanent Key mode only. See the *Equipment and Operations Reference*.

The following options cannot be programmed for Behind Switch or Key mode systems:

- Automatic Route Selection (ARS)
- Pools
- Queued Call Consoles (QCCs) and associated features
- Direct Inward Dialing (DID) Trunks
- System Access buttons
- Dial Plan Routing (PRI)
- Call by Call Services

The Ground-Start trunks option cannot be programmed if the processor module has been modified for Permanent Key mode operation only.

Mode of Operation

Summary: Mode of Operation

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 1, System Planning
Factory Setting	Hybrid/PBX
Valid Entries	Key, Behind Switch, Hybrid/PBX
Inspect	No
Copy Option	No
Console Procedure	System → Mode → Select mode → Enter
PC Procedure	<u>[F1]</u> → <u>[F3]</u> → Select mode → <u>[F10]</u>

Automatic Maintenance Busy

Automatic Maintenance Busy allows the system to take a malfunctioning trunk out of service for outgoing calls (incoming calls are never blocked). This prevents faulty outside facilities from causing disruptions in outgoing calling patterns.

For optimal performance, enable Automatic Maintenance Busy for Hybrid/PBX systems with pooled trunks.

NOTE:

No more than 50 percent of the trunks in a trunk pool are allowed to be placed in the maintenance busy state at one time unless: the central office has failed to disconnect a trunk (which prevents anyone from using that trunk); or an entire trunk module is manually taken out of use (a maintenance-busy state deliberately caused by the user).

Summary: Automatic Maintenance Busy

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	Disabled
Valid Entries	Enabled, Disabled
Inspect	No
Copy Option	No
Console Procedure	To disable Automatic Maintenance Busy: System → MaintenBusy → Disable → Enter → Exit To enable Automatic Maintenance Busy excluding tie trunks: System → MaintenBusy → Enable → Enter → Exit To enable/disable with tie trunks: System → MaintenBusy → Enable → Enter → Enable or Disable → Enter → Exit
PC Procedure	To disable Automatic Maintenance Busy: <u>[F1]</u> → <u>[F6]</u> → <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u> To enable Automatic Maintenance Busy excluding tie trunks: <u>[F1]</u> → <u>[F6]</u> → <u>[F1]</u> → <u>[F10]</u> → <u>[F5]</u> To enable/disable with tie trunks: <u>[F1]</u> → <u>[F6]</u> → <u>[F1]</u> → <u>[F10]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u>

Set System Date

The System Date feature allows you to set the month, day, and year that appear on MLX display telephones and on Station Message Detail Recording (SMDR) reports.

NOTE:

If you are planning to use the SMDR feature, make sure the current date is set.

Summary: Set System Date

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	01-01-00
Valid Entries	Month: 01 to 12 Day: 01 to 31 Year: 00 to 99
Inspect	No
Copy Option	No
Console Procedure	System → Date → Drop → Dial current date → Enter → Exit
PC Procedure	[F1] → [F7] → [Alt] + [P] → Type current date → [F10] → [F5]

Set System Time

The System Time feature allows you to set the time that appears on MLX display telephones and on SMDR reports.

NOTE:

If you are planning to use the SMDR feature, make sure the system time is set accurately. If you change the system time while the system is in Night Service mode, Night Service is deactivated and must be manually reactivated. If you have installed applications such as Call Management System (CMS) or AUDIX Voice Power®, you may need to set the time in the applications software whenever you reset the system time.

Summary: Set System Time

Programmable by	System manager
Mode	All
Idle Condition	Not Required
Planning Form	Form 1, System Planning
Factory Setting	0000
Valid Entries	0000 to 2359
Inspect	No
Copy Option	No
Console Procedure	System → Time → Drop → Dial current time → Enter → Exit
PC Procedure	[F1] → [F8] → [Alt] + [P] → Type current time → [F10] → [F5]

System Renumbering

3

The procedures in this section are used to assign the 2-digit, 3-digit, and Set Up Space numbering plans.

NOTE:

System Renumbering is called Flexible Numbering in the MERLIN® II Communications System. This is *not* the same as Board Renumbering, an option used when modules in the control unit are changed.

Do not attempt to assign a numbering plan without Planning Forms 2a, System Numbering: Extension Jacks; 2b, System Numbering: Digital Adjuncts; and 2d, System Numbering: Special Renumbers. Form 6a, Optional Operator Features, is needed to assign a DSS **Page** button.

This section contains the following programming procedures:

- Select System Numbering Plan
- Single Renumbering
- Block Renumbering
- Direct Station Selector (DSS) **Page** Button Assignment

You select only one of the numbering plans (2-digit numbering, 3-digit numbering, or Set Up Space numbering). In addition, you may need to perform single and/or block renumbering. You do not need to assign DSS **Page** buttons unless the system programming console or one of the operator positions is connected to a DSS. No matter which procedures you need to perform, assign the numbering plan first, then do single and/or block renumbering, and finally, assign DSS **Page** buttons (if necessary).

Use the single renumbering procedure any time the extension numbers you are changing *from* or *to* are not sequential.

Block renumbering is quicker, but you can use block renumbering only when the extension numbers you are changing *from* and *to* are sequential.

When trunk or extension modules are removed from the control unit, the remaining modules must be rearranged so that no empty slots remain. The system does not acknowledge any modules installed after an empty slot; therefore, if the system is renumbered, extensions are not assigned to extension jacks after the empty slots.

Select System Numbering Plan



WARNING:

To avoid possible loss of system programming information, renumber the system before you program the rest of the options described in this chapter.

The three available system numbering plans listed below appear on System Planning Form 2a.

- **2-Digit.** This plan is for systems with fewer than 50 extensions and no plans to exceed that number in the foreseeable future. Each of the first 58 extension jacks is assigned a 2-digit extension number, beginning with 10 and ending with 67. Any remaining extensions are assigned 4-digit numbers, starting with 6800 and ending with 6885.
- **3-Digit.** This plan is for systems with 50 or more extensions or plans to grow to that number in the foreseeable future. All extensions are assigned a 3-digit number, starting with 100 and ending with 243.
- **Set Up Space.** This plan is for systems with a need to customize extension numbers or use extension numbers of varying lengths (one to four digits). All extensions are assigned 4-digit numbers in the 7000 range. Extension numbers 1000 through 6999 are also available for use when you renumber.

In all three numbering plans, the system assigns 3-digit extension numbers to pools (Hybrid/PBX only), calling groups, paging groups, remote access codes, the Listed Directory Number, park codes, and Idle Line Access (Key and Behind Switch modes). In addition, the system assigns 9 for Automatic Route Selection (Hybrid/PBX only) and Idle Line Access (Key and Behind Switch modes only). Zero (0) represents a special extension number—actually a fixed dial code—for the primary operator or QCC queue. Any extension number except 0 can be renumbered.

Select System Numbering Plan

Extension numbers can be composed of any combination of digits; however, no number can begin with 0. Trunk numbers (801 to 880) are considered to be extensions and can be renumbered.

The system does not provide a message to indicate a successful renumber when either the 2-digit or 3-digit numbering plan is selected. For the Set Up Space numbering plan, the system provides a message indicating that all extensions are in the 7000 range.



CAUTION:

*Select **Exit** on the console or [F5] on the PC when you have finished selecting the numbering plan. If you press **Home**, extensions may remain in the forced idle condition (indicated when the LED next to each DSS button is on). To restore extensions to their normal operating state, restart the system.*

Summary: Select System Numbering Plan

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks
Factory Setting	2-digit
Valid Entries	2-digit, 3-digit, Set Up Space
Inspect	No
Copy Option	No
Console Procedure	SysRenumber → Default Numbering → Select numbering plan → Exit → Exit
PC Procedure	[F2] → [F1] → Select numbering plan → [F5] → [F5]

Single Renumbering

Use this procedure to assign a specified extension number to a telephone, accessory, line, pool (Hybrid/PBX only), calling group, paging group) or Listed Directory Number. Single renumbering is also used for Remote Access, Park, Idle Line Access (Key and Behind Switch only), and Automatic Route Selection (Hybrid/PBX only).



CAUTION:

Select **Exit** on the console or **[F5]** on the PC after renumbering extensions. If you press **Home**, extensions may remain in the forced idle condition (indicated when the LED next to each DSS button is on). To restore extensions to their normal operating state, restart the system.

When required, this procedure should be performed immediately following the selection of a system numbering plan.

Summary: Single Renumbering

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks Form 2b, System Numbering: Digital Adjuncts Form 2d, System Numbering: Special Renumbers
Factory Setting	Not applicable
Valid Entries	Old and new extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	SysRenumber → Single → Select item → Dial old ext. no. → Enter → Dial new ext. no. → Enter → Exit → Exit
PC Procedure	[F2] → [F2] → Select item → Type old ext. no. → [F10] → Type new ext. no. → [F10] → [F5] → [F5]

Block Renumbering

Use this procedure to assign extension numbers to a group of extensions, accessories, or lines. Both the original numbers and the numbers they are being changed to must be sequentially numbered.

When required, this procedure should be performed immediately following the selection of a system numbering plan.



CAUTION:

*Select **Exit** on the console or [E5] on the PC when you have finished renumbering extensions. If you press **Home**, extensions may remain in the forced idle condition (indicated when the LED next to each DSS button is on). To restore extensions to their normal operating state, restart the system.*

Summary: Block Renumbering

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks Form 2b, System Numbering: Digital Adjuncts Form 2d, System Numbering: Special Renumbers
Factory Setting	Not applicable
Valid Entries	Old and new extension numbers
Inspect	Yes
Copy Option	Yes
Console Procedure	SysRenumber → Block → Select type of group → Dial no. of first group member → Enter → Dial no. of last group member → Enter → Dial new beginning no. → Enter → Exit → Exit → Exit
PC Procedure	<u>[F2]</u> → <u>[F3]</u> → Select type of group → Type no. of first group member → <u>[F10]</u> → Type no. of last group member → <u>[F10]</u> → Type new beginning no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

Direct Station Selector (DSS) Page Buttons

Use this procedure to set the three **Page** buttons on the DSS to correspond to the system numbering plan. This procedure assigns extension numbers to DSS buttons. You cannot program individual buttons on a DSS; this is the only method for programming DSS buttons.

Page button assignment should be sequential. If only one DSS is attached, each **Page** button assignment sets the console for a range of 50 extension numbers: Page 1: 0 to 49; Page 2: 50 to 99; Page 3: 100 to 149.

If two DSSs are attached, each **Page** button assignment sets the console for a range of 100 extension numbers. If two DSSs are attached to the console, change the factory setting so that the difference between extension numbers assigned to the range is at least 100. For example, assign Page 1 to begin with extension 10, Page 2 to begin with extension 110, and Page 3 to begin with extension 210.

Operator Park Zone codes must be included in the extension number range specified for one of the **Page** buttons.



CAUTION:

Select **Exit** on the console or **[F5]** on the PC when you have finished this procedure. If you press **Home**, extensions may remain in the forced idle condition (the LED next to each DSS button is on), and the system may have to be restarted.

Summary: Assign Direct Station Selector Page Buttons

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Page 1=0; Page 2=50; Page 3=100
Valid Entries	1, 2, 3
Inspect	Yes
Copy Option	No
Console Procedure	SysRenum → Single → More → DSS Buttons → Dial page no. → Enter → Dial first ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F2]</u> → <u>[F2]</u> → <u>[PgUp]</u> → <u>[F1]</u> → Type page no. → <u>[F10]</u> → Type first ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

System Operator Positions

4

A system operator position, for a Queued Call Console (QCC) operator or a Direct-Line Console (DLC) operator, should be programmed before you program lines or trunks.

The Queued Call Console (QCC) operator position is available only for Hybrid/PBX systems. The Direct-Line Console (DLC) operator position is available in any mode and must be programmed if you have Call Management Systems connected to any operator extension jacks.

Table 4-1 shows the maximum number of operator positions allowed for any one system.

Table 4-1. Maximum Number of Operator Positions

Position Type	Type of Telephone	Maximum Positions
QCC	MLX-20L	4
DLC	MLX-20L	8
	MLX-28D	
	Analog multiline telephones	
	MERLIN II Display Consoles	
Total QCC + DLC		8

Any combination of operator positions can be assigned as long as no more than four operator positions are QCCs and the total number of operator positions does not exceed eight.

If you want to designate a new operator position and the system already has the maximum number of operator positions, you must change an existing operator position to a nonoperator position before you designate a new operator position.

NOTE:

When you change an extension to an operator position, or vice versa, the system returns the port (extension jack) type of that extension to the factory setting. You must reprogram lines and any features for that telephone or console. You may also need to change any attached accessory equipment and optional features.

Primary Operator Positions

The primary operator position is the extension to which your call is directed when 0 is dialed on a System Access button. The first extension jack on the first MLX module in your system is assigned as the primary operator position. If your system has QCC operator positions, this position must be changed from the factory setting (DLC) to a QCC operator position. (The primary operator extension cannot be changed from the first extension on the first MLX module.)

QCC Operator Position

The QCC operator position is available only for Hybrid/PBX systems. The DLC operator position is available in any mode and must be programmed if you have Call Management Systems connected to any operator extension jacks. QCC System Operator Positions.

This procedure applies to Hybrid/PBX systems only.



IMPORTANT:

If you want to add or remove QCC operator positions, the following conditions apply:

- *If other QCC positions remain in your system, the primary QCC operator position cannot be removed.*
- *When QCC operator positions are added, the primary QCC operator position should be the first one added.*
- *If QCC operator positions are being removed, the primary QCC operator position must be the last one removed.*

Summary: QCC Operator Positions

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks
Factory Setting	Type: DLC
Valid Entries	First or fifth extension jack on MLX module (maximum: two per module; maximum: four QCCs per system)
Inspect	Yes
Copy Option	No
Console Procedure	Operator → Positions → Queued Call → Dial ext.no. → Enter → Store All
PC Procedure	[F3] → [F1] → [F2] → Type ext. no. → [F10] → [F3]

DLC Operator Positions

DLC operator positions can be assigned to the first and fifth extension jacks on the first modules with digital or analog multiline extension jacks. A maximum of eight DLC operator positions can be assigned. Any combination of operator positions can be assigned as long as there are no more than four QCC operator positions and no more than a total of eight operator positions.

Use this procedure to specify extensions that serve as central answering positions for all incoming calls, for Call Management Systems (CMSs) connected to operator extension jacks, or as calling group supervisor extensions. (You do not need to use this procedure in a Key or Behind Switch system unless you have more than one DLC position.) For a new system, remove the factory-set DLC operator position assignment for any telephone not used as an operator position.

Lines and trunks are assigned on individual buttons.

The system programming console can have several incoming calls ringing simultaneously.

Each CMS requires two DLC operator positions to connect the equipment and one position to serve as CMS supervisor.

Summary: Identify or Remove DLC Operator Positions

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks
Factory Setting	Type: DLC
Valid Entries	First or fifth extension jack on MLX module (maximum: two per module; maximum: eight DLCs per system)
Inspect	Yes
Copy Option	No
Console Procedure	Operator → Positions → Direct Line → Dial ext. no. → Enter → Store All
PC Procedure	[F3] → [F1] → [F1] → Type ext. no. → [F10] → [F3]

The procedures in this section are used to assign optional features to individual lines and trunks. The following optional features can be assigned:

- Type of Trunk
- Outmode Signaling for Loop- or Ground-Start Trunks
- Rotary Trunk Digit Transfer
- Disconnect Signaling Reliability
- Toll Type
- Hold Disconnect Interval
- Principal User for Personal Line
- QCC Queue Priority
- QCC Operator to Receive Calls
- Incoming Call Line Identification Delay
- Trunks to Pools Assignment

The Copy Options feature (described at the end of this section) allows you to copy several optional features from an idle trunk. This option eliminates the need to individually enter each feature.

Separate sections cover “DS1 Facilities,” “Tie Trunks,” “DID Trunks,” and “PRI Facilities.”

A slot is the physical location of the individual module on the control unit. There is a maximum of 17 slots which are numbered as follows:

- Basic carrier: slots 1 through 5
- First expansion carrier: slots 6 through 11
- Second expansion carrier: slots 12 through 17

A port is a line or trunk jack on the module. Individual modules support different numbers of ports. On any module, port 1 is the lowest physical jack position. Lines connect equipment to the switch and trunks connect a switch to a switch. Lines and trunks have logical IDs, a unique numeric identifier for each extension and trunk jack in the communications system control unit. Lines are numbered from 1 to 144, while trunks are numbered from 801 to 880. An MLX extension port has 2 logical IDs per 1 physical jack.

Type of Trunk

Use this procedure to specify the type of trunk, loop-start (LS) or ground-start (GS), for each outside trunk connected to one of the following modules:

- 400 GS/LS
- 408 GS/LS
- 800 GS/LS
- 408 GS/LS-MLX
- 800 GS/LS-ID (loop-start trunks only)

Any combination of trunk types (all loop-start, all ground-start, or some of each) is permissible.

This procedure is not used for a system registered with a KF registration number (Key or Behind Switch). Ground-start trunks are allowed only for systems with an MF (Hybrid) or PF (PBX) registration number.

Summary: Type of Trunk

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	All loop-start
Valid Entries	All Ground, All Loop, Ground-Start, Loop-Start
Inspect	Yes
Copy Option	Yes
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Select trunk type → Dial port no. → Enter → Exit → Exit
PC Procedure	[F4] → [F1] → Type slot no. → [F10] → Select trunk type → Type port no. → [F10] → [F5] → [F5]

Outmode Signaling for Loop- or Ground-Start Trunks

Use this procedure to identify either touch-tone signaling or rotary-dial signaling for outgoing calls placed by using the specified loop- or ground-start trunk.

NOTE:

Since the factory setting is touch-tone, this procedure is not required if your system has only touch-tone lines/trunks.

Summary: Outmode Signaling for Loop- or Ground-Start Trunks

Programmable by	System manager
Mode	Loop-Start: All; Ground-Start: Hybrid/PBX only:
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Touch-tone
Valid Entries	Touch-tone, Rotary
Inspect	No
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → TT/LS Disc → Outmode → Select entry mode → Dial no. of the line/trunk → Enter → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → TT/LS Disc → OutMode → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [F3] → [F1] → [F6] → Type no. of the line/trunk → [F10] → [F5] → [F5] → [F5] To program a block of lines/trunks: [F4] → [F3] → [F1] → Select block of lines/trunks → Toggle letter G On/Off → [F10] → [F5] → [F5] → [F5]

Rotary Trunk Digit Transfer

Use this procedure to designate whether dialed digits on rotary dial lines/trunks are sent one by one as they are dialed (no delay), or are stored and sent when dialing is completed (delay). Contact your service provider for more information about the appropriate setting.

Summary: Rotary Trunk Digit Transfer

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	No Delay
Valid Entries	Delay, No Delay
Inspect	No
Copy Option	No
Console Procedure	Options → More → Rotary → Select option → Enter → Exit
PC Procedure	[F7] → [PgUp] → [F4] → Select option → [F10] → [F5]

Disconnect Signaling Reliability

Use this procedure to classify the disconnect signal sent by the central office on loop-start trunks as one of the following:

- **Reliable.** Signal sent within a short time.
- **Unreliable.** Signal may not be provided.

The setting selected applies to all trunks in the system because trunks cannot be programmed individually. The reliable/unreliable setting does not apply to loop-start trunks emulated on a T1 facility. If you specify a reliable disconnect for trunks programmed with a short hold disconnect interval (see “Hold Disconnect Interval”), active calls as well as trunks on hold maybe disconnected. For more information about reliable and unreliable disconnect and its implications, see the *Feature Reference*.

NOTE:

Certain features (Remote Call Forwarding and Transfer to outside numbers) and applications (CMS, AUDIX Voice Power, and MERLIN MAIL[®]) are not recommended with loop-start trunks. See “Hold Disconnect Interval.”

Summary: Disconnect Signaling Reliability

Programmable by	System manager, Integrated Administration
Mode	All
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Unreliable
Valid Entries	Unreliable, Reliable
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → TT/LS Disc → LS Disconnect → Yes or No → Enter → Exit → Exit
PC Procedure	[F4] → [F3] → [F2] → [F1] or [F2] → [F10] → [F5] → [F5]

Toll Type

Use this procedure to specify whether users have to dial a toll prefix (1 or 0) before dialing an area code and telephone number. (Your local telephone company should verify toll prefix requirements for each line/trunk.)

This setting is used by the system to classify calls as local or long distance so that appropriate toll restrictions can be applied.

NOTE:

This option applies only to loop- and ground-start trunks; it does not apply to tie trunks or DID trunks.

Summary: Toll Type

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Toll prefix required
Valid Entries	Required, Not required
Inspect	No
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → Toll Type → Select entry mode → Dial no. of the line/trunk → Enter → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → Toll Type → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit → Exit
PC Procedure	To program a single line/trunk: <u>[F4]</u> → <u>[F10]</u> → <u>[F6]</u> → Type no. of the line/trunk → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u> To program a block of lines/trunks: <u>[F4]</u> → <u>[F10]</u> → Select block of lines/trunk → Toggle letter G On/Off → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

Hold Disconnect Interval

Use this procedure to specify the number of milliseconds before a loop-start line/trunk is released when a caller on hold hangs up and abandons the call. This can be specified as either a long interval (450 ms) or a short interval (50 ms). The hold disconnect interval applies to loop-start trunks connected to 400, 408, or 800 modules; it does not apply to emulated loop-start trunks (T1 facility).

NOTES

1. If the disconnect interval is longer than the telephone company setting, the line is not released when a caller on hold hangs up.
2. Do not program a short interval unless the local telephone company's central office is the crossbar type.
3. Do not program a reliable disconnect for lines/trunks with a short hold disconnect interval. This can cause active calls as well as the lines/trunks on hold to be disconnected. See "Disconnect Signaling Reliability."

For more information on Hold Interval Disconnect and Reliable and Unreliable Disconnect, see the *Feature Reference*.

Summary: Hold Disconnect Interval

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Long interval (450 ms)
Valid Entries	Long interval, Short interval
Inspect	No
Copy Option	No
Console Procedure	To program a single line/trunk: LinesTrunks → More → HoldDiscnct → Select entry mode → Dial no. of the line/trunk → Enter → Exit → Exit To program a block of lines/trunks: LinesTrunks → More → HoldDiscnct → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [PgUp] → [F1] → [F6] → Type no. of the line/trunk → [F10] → [F5] → [F5] To program a block of lines/trunks: [F4] → [PgUp] → [F1] → Select block of lines/trunks → Toggle letter G On/Off → [F10] → [F5] → [F5]

Principal User for Personal Line

Use this procedure to assign or remove one telephone as principal user for a personal line. When a telephone with Remote Call Forwarding activated is assigned as principal user, calls received on the personal line are forwarded to an outside telephone number. In addition, calls received on that line are sent to that telephone's individual and/or Group Coverage receivers unless the personal line button is set to No Ring.

The principal user assignment must be removed before the trunk can be removed from a button on the telephone.

When no principal user is assigned for a personal line, calls received on the personal line are not forwarded to outside telephone numbers; calls received on the personal line follow the coverage patterns for all users who share the line.

Summary: Principal User for Personal Line

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC
Factory Setting	No principal user
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → More → PrncipalUsr → Dial line/trunk no. → Enter → Dial ext. no. → Enter 0 Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[PgUp]</u> → <u>[F2]</u> → Type line/trunk no. → <u>[F10]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

QCC Queue Priority Level

Use this procedure to assign QCC queue priority level values (1 to 7) to each loop-start, ground-start, and automatic-in tie trunk in your system. The value assigned determines the order in which calls are sent to the QCC operator positions. Call priority 1 is the highest priority, and 7 is the lowest priority.

NOTE:

This procedure applies to Hybrid/PBX mode only in a system that includes QCC operator positions.

Summary: QCC Queue Priority Level

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	4
Valid Entries	1 to 7
Inspect	Yes
Copy Option	No
Console Procedure	To program a single line/trunk: LinesTrunks → More → QCC Prior → Dial priority level → Enter → Select entry mode → Dial trunk no. → Enter → Exit → Exit To program a block of lines/trunks: LinesTrunks → More → QCC Prior → Dial priority level → Enter → Select block of lines → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: <u>[F4]</u> → <u>[PgUp]</u> → <u>[F3]</u> → Type priority level → Select entry mode → Type trunk no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> To program a block of lines/trunks: <u>[F4]</u> → <u>[PgUp]</u> → <u>[F3]</u> → Type priority level → <u>[F10]</u> → Select block of lines → Toggle letter G On/Off → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

QCC Operator to Receive Calls

Use this procedure to specify whether or not incoming calls on each line/trunk ring into the QCC queue, and to identify the QCC system operator positions that receive incoming calls on each line/trunk.

NOTES:

1. This procedure applies to Hybrid/PBX mode only in a system that includes QCC operator positions.
2. Each ground-start, loop-start, or automatic-in tie trunk programmed to ring into the QCC queue can be associated with one or more QCC operator positions.
3. If a trunk assigned to ring into the QCC queue is also used for shared remote access, see “Remote Access Trunk Assignment.” You must assign remote access before you assign a QCC system operator to receive calls (see “QCC Operator to Receive Call Types.”)
4. Do not change the factory setting of a QCC Operator Assigned to Receive Calls for trunks dedicated to incoming calls for calling groups, trunks used as personal lines, DID trunks, unequipped DS1 trunks, or dial-in tie trunks.

Summary: QCC Operator to Receive Calls

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	No QCC operator is assigned to receive calls.
Valid Entries	Extension number of first or fifth extension jack
Inspect	Yes
Copy Option	No
Console Procedure	To program a single line/trunk: LinesTrunks → More → QCC Oper → Dial ext. no. → Enter → Select entry mode → Dial line/trunk no. → Enter → Enter → Enter To program a block of lines/trunks: LinesTrunks → More → QCC Oper → Dial ext. no. → Enter → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [PgUp] → [F4] → Type ext. no. → [F10] → [F6] → Type line/trunk no. → [F10] → [F5] → [F5] To program a block of lines/trunks: [F4] → [PgUp] → [F4] → Type ext. no. → [F10] → Select block of lines/trunks → Toggle letter G On/Off → [F10] → [F5] → [F5]

Incoming Call Line Identification (ICLID) Delay

Use this procedure to delay the alerting (ringing) of LS-ID calls to all extensions until approximately six seconds have elapsed since the port module informed the system software that the line was ringing, or the system software has been informed that ICLID information is available, whichever comes first.

This option can be programmed on a per trunk basis. It gives the appearance to the users that the ICLID information is available the moment the call arrives at the extension, and prevents applications or adjuncts from answering the call too soon.

The LS-ID Delay option appears on the Ground-Start/Loop-Start Trunk Information report.

Any extension or adjunct that answers an incoming CO line on the first ring causes the ICLID information associated with the call to be lost. The adjunct must be programmed to either answer the call on the second (or later) ring, or the call must be delayed. The call can be delayed by setting the ring option on the buttons associated with the adjunct or by using the LS-ID Delay option.

NOTE:

Caller ID is available only on loop-start lines/trunks.

Summary: Incoming Call Line Identification (ICLID) Delay

Programmable by	System manager
Mode	AH
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	No delay
Valid Entries	Trunk numbers
Inspect	Yes
Copy Option	Yes, but only to the same trunk type
Console Procedure	To program a single line/trunk: LinesTrunks → More → LS-ID Delay → Select entry mode → Dial no. of the line/trunk → Enter → Exit → Exit To program a block of lines/trunks: LinesTrunks → More → LS-ID Delay → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: <u>[F4]</u> → <u>[PgUp]</u> → <u>[F6]</u> → Type no. of the line/trunk → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> To program a block of lines/trunks: <u>[F4]</u> → <u>[PgUp]</u> → <u>[F6]</u> → Select block of lines/trunks → Toggle letter G On/Off → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Trunks to Pools Assignment

Use this procedure to create trunk pools (groups of outside lines/trunks connected to the system). Trunk pools are used to specify preferred routes for Automatic Route Selection (ARS). In addition, trunk pools enable users to select a line/trunk by dialing a pool dial-out code or by pressing a single button on the telephone. (A separate button for each line/trunk is not needed.) Each pool should contain trunks of the same type (for example, loop- or ground-start or WATS); however, ground- and loop-start trunks of the same type can be included in the same pool. Ground-start trunks must be manually assigned. A maximum of 11 trunk pools are allowed. A trunk can be assigned to only one pool.

Do not mix different service areas of WATS (Wide Area Telecommunications Service) trunks or FX (Foreign Exchange) lines to different cities. Do not include both incoming only and outgoing only lines/trunks in a pool.

If you want to reassign a line/trunk to a different pool, you must remove it from the current pool before you assign it to the new pool. Once you assign a line/trunk to a pool, it can be assigned to a button only on a direct-line console operator position; individual lines intended for personal use on telephones other than the DLC console should not be assigned to pools.

DID trunks cannot be grouped in pools. Loop-start are automatically placed in pools and must be removed manually if used for paging loudspeakers, Music on Hold, or maintenance alarms.

Dial-in tie trunks should not be grouped in pools if you intend to assign **Pool** buttons on telephones.

If you are using Automatic Route Selection, the main pool (factory-set dial-out code 70) must contain loop- or ground-start trunks.

The system provides an error tone when a line/trunk is in use or if a loudspeaker paging system, Music on Hold, or maintenance alarm is already assigned; however, the system does not indicate the reason for the error tone.

NOTE:

This procedure applies to Hybrid/PBX mode only.

Summary: Trunks to Pools Assignment

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Trunk idle
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	All loop-start trunks are assigned to the main trunk pool (factory-set extension number 70); all tie trunks are assigned to the trunk pool with the factory-set extension number 891; no factory-set extensions numbers are assigned to ground-start trunks.
Valid Entries	Line numbers
Inspect	Yes
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → Pools → Dial pool dial-out code → Select entry mode → Dial no. of the line/trunk → Enter → Exit → Exit To program a block of lines/trunks: LinesTrunks → Pools → Dial pool dial-out code → Select block of lines/trunks → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [F9] → Type pool dial-out code → [F10] → [F6] → Type no. of the line/trunk → [F10] → [F5] → [F5] To program a block of lines/trunks: [F4] → [F9] → Type pool dial-out code → [F10] → Select block of lines/trunks → Toggle letter R On/Off → [F10] → [F5] → [F5]

Copy Options for Lines/Trunks

Use this procedure to copy options assigned to loop-start or ground-start trunks, Tie trunks, or DID trunks. Note that many of these options apply to Hybrid/PBX systems only. The following information is copied for each line/trunk type:

- **Loop-Start or Ground-Start Trunks** (including those emulated on T1 facilities). Toll type, signaling type, and trunk pool assignment (Hybrid/PBX only.)
- **Tie Trunks.** Direction, Tie trunk type, E&M signal, dial mode, dial tone, answer supervision time, disconnect time, and trunk pool assignment (Hybrid/PBX only).
- **DID Trunks** (Hybrid/PBX only). Block assignment and disconnect time.

To find out whether there is an optional feature assigned that you would like to copy, use **Inspt** from the system programming console or [PgDn] on a PC.

NOTES:

1. You can copy options to a block of lines/trunks only if they are all the same type (loop-start, ground-start, Tie, or DID). If you attempt to copy assignments and there is mismatch in line/trunk type, information is copied to that point only. You receive no error message.
2. If you are copying options to a block of lines/trunks, they must be sequentially numbered.
3. If the block you are copying to includes an invalid line/trunk type, the copying process stops at the invalid type. Only the lines/trunks that were copied to before the invalid type was found are copied successfully.

4. If you are copying assignments to a block of lines/trunks and one of the lines or trunks is in use, you see the message **Trunk Busy - Pls wait** on your display. The copying for the rest of the lines/trunks in the block is delayed until the busy line/trunk becomes idle. If you exit without waiting for the copying to complete, the copying done up to that point is not canceled.

Summary: Copy Options for Lines/Trunks

Programmable by	System manager
Mode	All (but note differences)
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks Form 3c, Incoming Trunks: TIE Form 3d, Incoming Trunks: DID
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	Not applicable
Console Procedure	To copy individual lines/trunks: LinesTrunks → Copy → Single → Dial copy from trunk no. → Enter → Dial copy to trunk no. → Enter → Exit → Exit → Exit To copy blocks of lines/trunks: LinesTrunks → Copy → Block → Dial copy from trunk no. → Enter → Dial first copy to trunk no. in block → Enter → Dial last copy to trunk no. in block → Enter → Exit → Exit → Exit
PC Procedure	To copy individual lines/trunks: [F4] → [F7] → [F1] → Type copy to trunk no. → [F10] → Type copy from trunk no. → [F10] → [F5] → [F5] → [F5] To copy blocks of lines/trunks: [F4] → [F7] → [F2] → Type copy from trunk no. → Type first copy to trunk no. in block → [F10] → [F5] → Type last copy to trunk no. in block → [F10] → [F5] → [F5] → [F5]

DS1 Facilities

6

Use the procedures in this section to program the following options for DS1 facilities (T1 or PRI) connected to a 100D (DS1) module:

- Type of DS1 facility
 - T1
 - PRI
- Frame Format
- Zero Code Suppression
- Signaling Mode
- Line Compensation
- Clock Synchronization
- Channel Service Unit

Type of DS1 Facility

Use this procedure to specify the type of facility (T1 or PRI) connected to a 100D (DS1) module. If T1 type is programmed, and the channels are used for emulation and/or AT&T Switched Network (ASN), you must specify the type of channel emulation. If the type is T1 and the type of channel emulation is tie trunk, you must specify the transmit/receive loss parameter settings are also selected. The two valid settings are as follows:

- **TIE-PBX.** Select when emulated tie trunks are used to connect to another communications system (such as PBX or Centrex). The transmit/receive parameter is set to 0/4.
- **Toll.** Select when emulated tie trunks are used for ASN services (such as Megacom®, Megacom 800, or Software Defined Network). The transmit/receive parameter is set to 0/6.

If you select T1, channels can emulate ground-or loop-start trunks, tie trunks, or DID trunks in any combination. Note that unused channels must be specified as unequipped.

If either T1 or PRI is selected, channels can be used for ASN services. When T1 channels are used for ASN services, each channel must be programmed for tie trunk emulation.

If you select PRI, you must also perform additional procedures. At a minimum, the Framing Mode and Zero Code Suppression procedures must be performed. See “PRI Facilities” for more information.

Summary: Type of DS1 Facility

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	T1
Valid Entries	T1, PRI
Inspect	Yes
Copy Option	No
Console Procedure	To select PRI: LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Type → PRI → Enter → Exit → Exit → Exit → Exit To select T1: All Ground, All Loop, All DID, All Unequip: LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Type → T1 → Enter → More → Select type of emulation → Enter → Exit → Exit → Exit → Exit To select T1 - Tie: LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Type → T1 → Enter → TIE-PBX or Toll → Enter → Dial channel no. → Enter → Exit → Exit → Exit → Exit To select T1: Ground-Start, Loop-Start, All Tie, DID, or Unequip: LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Type → T1 → Enter → More → Select type of emulation → Enter → Dial channel no. → Enter → Exit → Exit → Exit → Exit

PC Procedure

To select PRI:

[F4] → [F1] → Type slot no. → [F10] → [F1] → [F2] → [F10] → [F5] → [F5] → [F5] → [F5]

To select T1: All Ground, All Loop, All DID, All Unequip:

[F4] → [F1] → Type slot no. → [F10] → [F1] → [F1] → [F10] → [PgUp] → Select type of emulation → [F10] → [F5] → [F5] → [F5] → [F5]

To select T1 - Tie:

[F4] → [F1] → Type slot no. → [F10] → [F1] → [F1] → [F10] → Select facility → [F10] → Type channel no. → [F10] → [F5] → [F5] → [F5] → [F5]

To select T1: Ground-Start, Loop-Start, All Tie, DID or Unequip:

[F4] → [F10] → Type slot no. → [F10] → [F1] → [F1] → [F10] → [PgUp] → Select type of emulation → [F10] → Type channel no. → [F10] → [F5] → [F5] → [F5] → [F5]

Frame Format

Use this procedure to specify the framing format for the 100D module as D4-compatible or Extended Superframe. Your selection must match the framing mode at the far end of the DS1 facility.

Summary: Frame Format

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	D4 compatible
Valid Entries	D4, ESF
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → FrameFormat → Select format type → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F1]</u> → Type slot no. → <u>[F10]</u> → <u>[F2]</u> → Select format type → <u>[F10]</u> → <u>[F1]</u> → <u>[F5]</u>

Zero Code Suppression

Use this procedure to specify zero code suppression for the 100D module as AMI zero code suppression (AMI-ZCS) or bipolar 8 zero suppression (B8ZS). Your selection must match the suppression at the far end of the DS1 facility.

Summary: Zero Code Suppression

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	AMI-ZCS
Valid Entries	AMI-ZCS, B8ZS
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks Œ LS/GS/DS1 Œ Dial slot no. Œ Enter Œ Suppression Œ AMI-ZCS or B8ZS Œ Enter Œ Exit Œ Exit
PC Procedure	<u>[F4]</u> → <u>[F1]</u> → Type slot no. → <u>[F10]</u> → <u>[F3]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Signaling Mode

Use this procedure to specify the signaling for the 100D module as robbed-bit or common-channel signaling.

NOTE:

This procedure is needed only for T1 facilities; common-channel signaling is set automatically for PRI facilities.

Summary: Signaling Mode

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Robbed bit
Valid Entries	Robbed Bit, Common Channel
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Signaling → Select type of signaling → Enter → Exit → Exit
PC Procedure	[F4] → [F1] → Type slot no. → [F10] → [F4] → Select type of signaling → [F10] → [F5] → [F5]

Line Compensation

Use this procedure to specify the amount of cable loss in decibels. Cable loss is based on the length of cable between the 100D module and the Channel Service Unit, as shown below:

- 1 = 0.6 dB loss
- 2 = 1.2 dB loss
- 3 = 1.8 dB loss
- 4 = 2.4 dB loss
- 5 = 3.0 dB loss

Summary: Line Compensation

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	1 (0.6 dB loss)
Valid Entries	1 to 5
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → Line Comp → Drop → Dial line compensation value → Enter → Exit → Exit
PC Procedure	[F4] → [F1] → Type slot no. → [F10] → [F6] → [Alt] + [P] → Type line compensation value → [F10] → [F5] → [F5]

Clock Synchronization

Use this procedure to specify the modules that provide primary, secondary, and tertiary clock synchronization. (Contact your service provider for more information about the appropriate setting.) You can also specify whether the clock is synchronized to the external endpoint (loop) or to the clock reference source (local). This procedure is also used to activate or deactivate the clock.

NOTE:

This procedure is necessary only if your system includes more than one 100D module.

Summary: Clock Synchronization

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Primary clock: the first 100D module in the control unit carrier; source: loop; activation: active
Valid Entries	Primary, Secondary, Tertiary, Loop/Local
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → ClockSync → Priority → Select clock synchronization → Enter → Source → Select source of synchronization → Enter → Activation → Select clock activation → Enter → Exit → Exit → Exit
PC Procedure	[F4] → [F1] → Type slot no. → [F10] → [F7] → [F1] → Select clock synchronization → [F10] → [F2] → Select source of synchronization → [F10] → [F3] → Select clock activation → [F10] → [F5] → [F5] → [F5]

Channel Service Unit

Use this procedure to specify the type of equipment provided by the local telephone company as foreign exchange or special access.

NOTE:

You do not need to use this procedure unless your system emulates loop-start or ground-start with the T1 type of DS1 facility.

Summary: Channel Service Unit

Programmable by	System manager
Mode	All
Idle Condition	100D module idle
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Foreign Exchange
Valid Entries	Foreign Exchange, Special Access
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → LS/GS/DS1 → Dial slot no. → Enter → ChannelUnit → Foreign Exchange or Special Access → Enter → Exit → Exit
PC Procedure	[F4] → [F1] → Type slot no. → [F10] → [F8] → [F1] or [F2] → [F10] → [F5] → [F5]

This section covers programming procedures for the following tie trunk options:

- Direction
- Trunk Seizure Type
- E&M Signal
- Dial Mode
- Trunk Dial Tone
- Trunk Answer Supervision Time
- Disconnect Time

Direction

Use this procedure to specify whether tie trunks operate in a one-or two-way direction. For one-way tie trunks, you must also specify whether the direction is out or in.

Summary: Direction

Programmable by	System manager
Mode	All
Idle Condition	Tie trunk idle
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	Two-way
Valid Entries	Two-way, Outgoing, Incoming
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → TIE Lines → Direction → Dial trunk no. → Enter → Specify direction → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F2]</u> → <u>[F1]</u> → Type trunk no. → <u>[F10]</u> → Specify direction → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Tie Trunk Seizure Type

Use this procedure to specify whether the seizure type of incoming or outgoing tie trunk is wink, delay, immediate, or automatic.

The following settings are recommended when T1 facilities are programmed for tie-trunk emulation to provide special network services [such as Megacom, Megacom 800, or Software Defined Network (SDN)]:

- If Automatic Route Selection (ARS) is used for all outgoing calls and no personal line or **Pool** buttons are used, assign the wink signaling type. Set the network to wink.
- If personal line or **Pool** buttons (pool or dial-out codes) are used for outgoing calls, assign the immediate signaling type. Set the network to dial. Contact your service provider for more information about the dial setting.
- If Dialed Number Identification Service (DNIS) is used for incoming calls, assign the wink signaling type. The network is also set to wink. (Setting both ends to immediate also works.) Contact your service provider for more information about the appropriate setting.
- When DNIS is not used for incoming calls, assign the automatic signaling type. The network is set to automatic.

Summary: Tie Trunk Type

Programmable by	System manager
Mode	All
Idle Condition	Tie trunk idle
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	Wink
Valid Entries	Wink, Delay, Immediate, Automatic
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → TIE Lines → Intype or Outtype → Dial trunk no. → Enter → Specify seizure type → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F2]</u> → <u>[F2]</u> or <u>[F3]</u> → Type trunk no. → <u>[F10]</u> → Specify seizure type → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

E&M Signal

Use this procedure to specify the type of tie trunk signal, as follows:

■ **E&M Mode**

- **1S.** Type 1 Standard. Tie trunks that are connected through the local telephone company.
- **1C.** Type 1 Compatible. Tie trunks that are connected directly to a system that uses 1S signaling.

■ **Simplex Mode**

- **5.** Type 5 Simplex. Tie trunks that are connected to a system using type 5 signaling.

Summary: E&M Signal

Programmable by	System manager
Mode	All
Idle Condition	Tie trunk idle
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	1S
Valid Entries	1S, 1C, 5
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → TIE Lines → E&M Signal → Dial trunk no. → Enter → Specify signaling type → Enter → Exit → Exit
PC Procedure	[F4] → [F2] → [F4] → Type trunk no. → [F10] → Specify signaling type → [F10] → [F5] → [F5]

Dial Mode

Use this procedure to specify whether an incoming or outgoing tie trunk is touch-tone or rotary.

Touch-tone cannot be programmed for incoming immediate signaling tie trunks. Users of touch-tone single-line telephones cannot make calls by using individual trunks programmed for rotary operation. The touch-tone signals generated from the telephone while dialing are transmitted to the central office at the same time the rotary signals are sent to the system. The central office receives both signals and cannot process the call.

Summary: Dial Mode

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	Rotary
Valid Entries	Rotary, Touch-tone
Inspect	Yes
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → TIE Lines → Inmode or Outmode → Entry Mode → Dial line/trunk no. → Enter or Delete → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → TIE Lines → Inmode or Outmode → Select block of lines → Toggle LED On/Off → Exit → Exit → Exit

PC Procedure

To program a single line/trunk:

[F4] → [F2] → [F6] or [F7] → [F6] → Type line/trunk no. → [F10]
or [F8] → [F5] → [F5] → [F5]

To program a block of lines/trunks:

[F4] → [F2] → [F6] or [F7] → Select block of lines → Toggle
letter **G** On/Off → [F5] → [F5] → [F5]

Tie Trunk Dial Tone

Use this procedure to specify whether the system provides dial tone for people calling in on a tie trunk. Settings are remote (system provides dial tone) and local (system does not provide dial tone).

Summary: Tie Trunk Dial Tone

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	Remote
Valid Entries	Remote, Local
Inspect	Yes
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → TIE Lines → Dialtone → Entry Mode → Dial trunk no. → Enter or Delete → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → TIE Lines → Dialtone → Select block of lines/trunks → Toggle LED On/Off → Exit → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [F2] → [F8] → [F6] → Type trunk no. → [F10] or [F8] → [F5] → [F5] To program a block of lines/trunks: [F4] → [F2] → [F8] → Select block of lines → Toggle letter G On/Off → [F5] → [F5] → [F5]

Tie Trunk Answer Supervision Time

Use this procedure to specify the tie trunk answer supervision time in milliseconds. This is the time limit for the called system to respond.

Summary: Tie Trunk Answer Supervision Time

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	300 ms
Valid Entries	20 to 4800 ms, in increments of 20 ms
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → TIE Lines → AnsSupvr → Dial trunk no. → Enter → Drop → Dial no. of ms → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F2]</u> → <u>[F9]</u> → Type trunk no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. of ms → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Disconnect Time

Use this procedure to specify the tie trunk disconnect time limit in milliseconds.

Summary: Disconnect Time

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3c, Incoming Trunks: Tie
Factory Setting	300 ms
Valid Entries	140 to 2400 ms
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → TIE Lines → Disconnect → Dial trunk no. → Enter → Drop → Dial no. of ms → Enter → Exit → Exit
PC Procedure	[F4] → [F2] → [F10] → Type trunk no. → [F10] → [Alt] + [P] → Type no. of ms → [F10] → [F5] → [F5]

This section covers programming DID trunks and includes procedures for the following:

- Block Assignment
- DID Trunk Type
- Disconnect Time
- Expected Digits
- Delete Digits
- Add Digits
- Signaling
- Invalid Destination

NOTE:

These procedures apply to Hybrid/PBX mode only.

Block Assignment

Use this procedure to assign each DID trunk connected to the system to either Block 1 or Block 2.

Summary: Block Assignment

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	Block 1
Valid Entries	Block 1, Block 2
Inspect	Yes
Copy Option	Yes
Console Procedure	To program a single line/trunk: LinesTrunks → DID → Block → Dial trunk block no. → Enter → Entry Mode → Type the line/trunk no. → Enter or Delete → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → DID → Block → Dial trunk block no. → Enter → Select trunk lines → Toggle LED On/Off → Enter → Exit → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [F4] → [F1] → Type trunk block no. → [F10] → Type the line/trunk no. → [F10] or [F8] → [F5] → [F5] → [F5] To program a block of lines/trunks: [F4] → [F4] → [F1] → Type trunk block no. → [F10] → Select trunk lines → Toggle letter G On/Off → [F10] → [F5] → [F5] → [F5]

DID Trunk Type

Use this procedure to specify the DID trunk type as either immediate-start or wink-start. Wink-start is more reliable if the local telephone company supports it.

Summary: DID Trunk Type

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	DID trunk idle
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	Wink-start
Valid Entries	Immediate-start, Wink-start
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → Type → Dial trunk block no. → Enter → Immed or Wink → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F4]</u> → <u>[F2]</u> → Type trunk block no. → <u>[F10]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Disconnect Time

Use this procedure to specify the DID trunk disconnect time limit in milliseconds.

Summary: Disconnect Time

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	500 ms
Valid Entries	10 to 2400 ms, in increments of 10 ms
Inspect	No
Copy Option	Yes
Console Procedure	LinesTrunks → DID → Disconnect → Dial trunk no. → Enter → Drop → Dial no. of ms → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F4]</u> → <u>[F3]</u> → Type trunk no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. of ms → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Expected Digits

Use this procedure to tell the system how many digits are sent by the local telephone company.

Summary: Expected Digits

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	3 digits
Valid Entries	1 to 4 digits
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → ExpectDigit → Dial trunk block no. → Enter → Drop → Dial no. of digits → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F4]</u> → <u>[F4]</u> → Type trunk block no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. of digits → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Delete Digits

Use this procedure to specify the number of leading digits to be deleted from the digits sent by the local telephone company. Use this procedure when the number of digits sent by the telephone company is greater than the number in the system numbering plan.

Summary: Delete Digits

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	0 digits
Valid Entries	0 to 4 digits
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → DeleteDigit → Dial trunk block no. → Enter → Drop → Dial no. of digits → Enter → Exit → Exit
PC Procedure	[F4] → [F4] → [F6] → Type trunk block no. → [Alt] + [P] → Type no. of digits → [F10] → [F5] → [F5]

Add Digits

Use this procedure to specify the number of leading digits that must be added to the digits sent by the local telephone company. Use this procedure when the number of digits sent by the telephone company is fewer than the number in the system numbering plan.

Summary: Add Digits

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, Incoming Trunks: DID
Factory Setting	0
Valid Entries	1 to 9999
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → Add Digits → Dial trunk block no. → Enter → Drop → Dial added digits → Enter → Exit → Exit
PC Procedure	[F4] → [F4] → [F7] → Type trunk block no. → [Alt] + [P] → Type added digits → [F10] → [F5] → [F5]

Signaling

Use this procedure to specify whether the type of dialing signal from the local telephone company is touch-tone or rotary. Touch-tone dial mode cannot be programmed for immediate-start DID trunks.

Touch-tone single-line telephone users cannot make calls by using individual trunks programmed for rotary operation. The touch-tone signals generated from the telephone while dialing are transmitted to the central office at the same time the rotary signals are sent to the system. The central office receives both signals and cannot process the call.

Summary: Signaling

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not Required
Planning Form	Form 3d, incoming Trunks: DID
Factory Setting	Rotary
Valid Entries	Rotary, Touch-tone
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → Signaling → Dial trunk block no. → Enter → Rotary or TouchTone → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F4]</u> → <u>[F8]</u> → Type trunk block no. → <u>[F10]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Invalid Destination

Use this procedure to specify whereto direct outside calls (received on DID trunks) for unassigned extension numbers. Calls can be directed to a backup position (normally the primary system operator) or given a fast busy signal. See “QCC Operator to Receive Call Types” in Chapter 13 for information on assigning a backup position.

Summary: Invalid Destination

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3d, incoming Trunks: DID
Factory Setting	Backup (calls are sent to the primary system operator)
Valid Entries	Backup, Fast Busy
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → DID → InvalDstn → Send to Backup Extension or Return Fast Busy → Enter → Exit → Exit
PC Procedure	[F4] → [F4] → [F9] → [F1] or [F2] → [F10] → [F5] → [F5]

Invalid Destination

The procedures in this section provide the steps for programming the following options for Primary Rate Interface (PRI) facilities connected to a 100D (DS1) module:

- Telephone Number
- B-Channel Groups
- Network Service
- Copy Telephone Number to Send
- Incoming Routing
- Telephone Number to Send
- Test Telephone Number
- Timers and Counters
- Terminal Equipment Identifier
- Dial Plan Routing
- Outgoing Tables
- Network Selection Tables
- Special Services Tables
- Call-by-Call Service Table

NOTE:

If you are adding PRI facilities to an existing system, certain values must be set correctly. To inspect or change these values, see “DS1 Facilities.” Do not start these procedures until you have checked the following:

- Type of DS1 Facility must be set to PRI.
- Frame format must be specified correctly.
- Zero code suppression must be specified correctly.
- Clock synchronization source must be set to loop (derived from the T1 line).

The settings for frame format and zero-code suppression must be consistent with the options selected when the PRI connection was ordered.

If you are using ARS in connection with PRI, make sure you select voice, data, or voice and data, as appropriate, when you perform the ARS “Voice and/or Data Routing” procedure found in “Automatic Route Selection.”

Telephone Number

Use this procedure to assign a string of up to 12 digits to each PRI channel. This string must match the number sent by the network (that is, the number provided by the PRI service provider) to indicate the number dialed by an outside caller. The system uses this number to route the call to the correct destination, which means that the number assigned to each channel in the same B-channel group must be unique. Note also that the number cannot be the same as the associated test telephone number.

Summary: Telephone Number

Programmable by	System manager
Mode	Hybrid/PBX, Key
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	No digits
Valid Entries	Up to 12 digits (any combination of 0 to 9)
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → PhoneNumber → Dial trunk no. → Enter → Drop → Dial telephone no. → Enter → Exit → Exit
PC Procedure	[F4] → [F6] → [F1] → Type trunk no. → [F10] → [Alt] + [P] → Type telephone no. → [F10] → [F5] → [F5]

B-Channel Groups

Use this procedure to perform the following:

- Assign B-channels to a group.
- Associate individual ISDN channels (that can place and receive calls) on the B-channels in each group.

B-channels are partitioned into trunk groups when PRI service is ordered. The trunk groups defined when service is ordered must match the B-channel groups defined when MERLIN LEGEND is programmed.

Each B-channel can be assigned to only one group, and each ISDN channel can be associated with only one group. Up to 80 B-channel groups can be established.

Each group can contain up to 23 channels; however, all channels assigned must signal through the same D-channel (that is, must be connected to the same 100D module).

B-channels must be assigned in the order of system search (through the group) for an available channel. To minimize call attempts on the same line or trunk, arrange B-channels in the opposite order of the hunting arrangement provided by the network service provider.

B-channels must be identified by control unit slot and port numbers since they are not associated with a line/trunk number or a logical ID.

PRI B-channel groups programmed for line routing perform similarly to loop-start trunks. PRI B-channel groups programmed for dial plan routing perform similarly to DID trunks.

NOTE:

If more lines than B-channels are assigned to a B-channel group, users may experience situations where a line that is idle is not able to seize a B-channel. The user will receive a fast busy tone.

Summary: B-Channel Groups

Programmable by	System manager
Mode	Hybrid/PBX, Key
Idle Condition	Not required
Planning Form	Form 3b, incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Not applicable
Valid Entries	Group numbers (1 to 80)
Inspect	Yes
Copy Option	No
Console Procedure	To program a single line/trunk: LinesTrunks → PRI → B-ChannlGrp → B Channels → Dial group no. → Enter → Dial B-channel slot and port no. → Enter → Lines → Dial group no. → Enter → Entry Mode → Dial line/trunk no. → Enter → Exit → Exit → Exit To program a block of lines/trunks: LinesTrunks → PRI → B-ChannlGrp → B Channels → Dial group no. → Enter → Dial B-channel slot and port no. → Enter → Lines → Dial group no. → Enter → Select specific lines/trunks → Toggle LED On/Off → Exit → Exit → Exit
PC Procedure	To program a single line/trunk: [F4] → [F6] → [F2] → [F1] → Type group no → Type B-channel slot and port nos. → [F5] → Type group no. → [F10] → [F6] → Type line/trunk no. → [F10] → [F5] → [F5] → [F5] To program a block of lines/trunks: [F4] → [F6] → [F2] → [F1] → Type group no → Type B-channel slot and port nos. → [F5] → Type group no. → [F10] → Select specific lines/trunks → Toggle letter G On/Off → [F5] → [F5] → [F5]

Network Service

Use this procedure to specify the type of outgoing service provided by each B-channel group (Megacom WATS and 800, MultiQuest® Service, ACCUNET® Switched Digital Service (SDS), or Software Defined Network (SDN).

NOTE:

You can enter a service not shown on the Network Service screen by using the five-digit binary code that represents the service in the Network Facilities Information Element of ISDN PRI signaling protocol. For information on these codes, contact your service provider. See “Miscellaneous Procedure.”

Summary: Network Service

Programmable by	System manager
Mode	Hybrid/PBX, Key
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Not applicable
Valid Entries	AT&T Toll, Local, Miscellaneous
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → B-ChannlGrp → NetworkServ → Dial group no. → Enter → Specify network service → Enter → Exit → Exit → Exit → Exit
PC Procedure	[F4] → [F6] → [F2] → [F3] → Type group no. → [F10] → Specify network service → [F10] → [F5] → [F5] → [F5] → [F5]

Copy Telephone Number to Send

Use this procedure to indicate whether or not the telephone number to send to the network (for calls going out over ISDN lines assigned to a B-channel group) is copied from the number assigned to that channel.

Select **Do not Copy Phone Number** when a telephone number to send is assigned to each channel in the B-channel group or when no telephone number is to be sent to the network. In the latter case, make sure that there are no telephone numbers assigned to any channels in the B-channel group by using the “Telephone Number to Send” procedure.

Summary: Copy Telephone Number to Send

Programmable by	System manager
Mode	Hybrid/PBX, Key
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity
Factory Setting	Do not copy
Valid Entries	Do not copy, Copy
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → B ChannlGrp → Copy Number → Dial group no. → Enter → Specify copy or no copy → Enter → Exit → Exit → Exit
PC Procedure	[F4] → [F6] → [F2] → [F4] → Type group no. → [F10] → Specify copy or no copy → [F10] → [F5] → [F5] → [F5]

Incoming Routing

Use this procedure to specify whether incoming routing is by line appearance or according to dial plan. Dial Plan Routing is available in Hybrid/PBX mode only.

Summary: Incoming Routing

Programmable by	System manager
Mode	Line appearance: Hybrid/PBX, Key; Dial Plan Routing: Hybrid/PBX Only
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Line appearance
Valid Entries	Dial Plan Routing, Routing by Line Appearance
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → B-ChannlGrp → Incoming Rtg → Dial B-channel group no. → Enter → Specify method of routing → Enter → Exit → Exit → Exit
PC Procedure	[F4] → [F6] → [F2] → [F6] → Type B-Channel group no. → [F10] → Specify method of routing → [F10] → [F5] → [F5] → [F5]

Telephone Number to Send

Use this procedure to assign the telephone number to send to the network when outgoing calls are made on an ISDN line. If the person being called subscribes to an automatic number identification service, the number indicates who is calling.

The number assigned to each channel does not have to be unique because it is not used for routing.

Summary: Telephone Number to Send

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	No digits are assigned
Valid Entries	Up to 12 digits (any combination of 0 to 9)
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → NumbrToSend → Specify type of no. → Enter → Drop → Dial base no. → Enter → Dial line no. → Enter → Drop → Dial telephone no. → Enter → Exit → Exit
PC Procedure	[F4] → [F6] → [F3] → Specify type of no. → [F10] → [Alt] + [P] → Type base no. → [F10] → [Alt] + [P] → Type telephone no. → [F10] → [F5] → [F5]

Test Telephone Number

Use this procedure to assign a test line or trunk telephone number for each 100D module installed in the control unit.

The number assigned to the test line/trunk must be different from the numbers assigned to other channels in the same B-channel group. It must be the same number as that provided by the PRI service provider.

Summary: Test Telephone Number

Programmable by	System manager
Mode	Hybrid/PBX, Key
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Not applicable
Valid Entries	Telephone number of up to 12 digits
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → Test TelNum → Dial slot no. → Enter → Drop → Dial telephone no. → Enter → Exit → Exit
PC Procedure	[F4] → [F6] → [F4] → Type slot no. → [F10] → [Alt] + [P] → Type telephone no. → [F10] → [F5] → [F5]

Timers and Counters

Use this procedure to set timer and counter thresholds.



CAUTION:

The factory settings for these thresholds are standard and rarely need to be changed. If you are not sure of the correct timer and threshold settings for your PRI lines and trunks, check with your authorized support representative before you make a change. Incorrect settings can cause your PRI lines and trunks to malfunction.

If the network does not respond before the programmed time or count, the system takes the appropriate corrective action.

The timers and counters are listed below.

- **T200 Timer.** Times the delay in the link layer acknowledgement of a message sent from the system to the network over a D-channel.
- **T203 Timer.** Times the interval between each exchange of messages between the system and the network on the D-channel.
- **N200 Counter.** Counts the number of times the system has transmitted a message on a D-channel because no link layer acknowledgement is received from the network.
- **N201 Counter.** Counts the maximum number of layer three octets the system can send or receive in a single D-channel message.
- **K Counter.** Counts the number of layer three unacknowledged messages sent from the system to the network on a D-channel.
- **T303 Timer.** Times the delay in network response when the system sends a setup message to initiate an outgoing call.
- **T305 Timer.** Times the delay in network response when the system sends a disconnect message to clear a call.

- **T308 Timer.** Times the delay in network response when the system sends a release message to clear a call.
- **T309 Timer.** Times the duration of a D-channel data link failure (a loss of signaling for the entire PRI connection).
- **T310 Timer.** Times the network delay following the receipt of a call preceding message on an outgoing call.
- **T313 Timer.** Times the delay in network response when the system sends a connect message that indicates the completion of an incoming call.
- **T316 Timer.** Times the delay in network response when the system sends a restart message to clear a B-channel.

NOTE:

If you enter an invalid timer value, the number you enter is truncated to the closest valid value. For example, if you enter 45 for a counter that ranges from 0 to 30, 4 is recorded as the counter value.

Table 9-1 shows the factory setting for each timer and counter and the valid range for each threshold.

Summary: Timers and Counters

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	See Table 9-1
Valid Entries	See Table 9-1
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → Protocol → Timers → Dial slot no. → Enter → Select timer/counter → Drop → Dial no. of ms/octets/and so on → Enter → Exit → Exit → Exit → Exit
PC Procedure	[F4] → [F6] → [F6] → [F1] → Type slot no. → [F10] → Select timer/counter → [Alt] + [P] → Type no. of ms/octets/and so on → [F10] → [F5] → [F5] → [F5] → [F5]

Table 9-1. Timers and Counters

Timer/Counter	Purpose	Factory Setting	Valid Range
T200 Timer	Maximum response time	1 second	1000 to 3000 ms
T203 Timer	Maximum time	30 seconds	1 to 60 seconds
N200 Counter	Maximum transmissions	3 transmissions	1 to 5 transmissions
N201 Counter	Maximum octets	260 octets	16 to 260 octets
K Counter	Maximum outstanding I-frames	7 frames	1 to 15 frames
T303 Timer	Set up timeout	4 seconds	4 to 12 seconds
T305 Timer	Disconnect timeout	4 seconds	4 to 30 seconds
T308 Timer	Release timeout	4 seconds	4 to 12 seconds
T309 Timer	Signal loss	90 seconds	30 to 120 seconds
T310 Timer	Call Proc. timeout	10 seconds	2 to 10 seconds
T313 Timer	Connect timeout	4 seconds	4 to 12 seconds
T316 Timer	Restart timeout	120 seconds	30 to 120 seconds

Terminal Equipment Identifier

Use this procedure to assign the link layer address of a piece of equipment connected to each D-channel. Normally, only one piece is connected and the system assumes that the Terminal Equipment Identifier (TEI) is 0.



CAUTION:

The value of the TEI rarely has to be changed. Check with your authorized support representative before changing this value.

Summary: Terminal Equipment Identifier

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	0
Valid Entries	0 to 63
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → Protocol → TEI → Dial slot no. → Enter → Drop → Dial new ID no. → Enter → Exit → Exit → Exit
PC Procedure	[F4] → [F6] → [F6] → [F2] → Type slot no. → [F10] → [Alt] + [P] → Type new ID no. → [F10] → [F5] → [F5] → [F5]

Dial Plan Routing

Dial plan routing provides a way to route incoming calls on a “per B-channel group” basis. An incoming call is routed by matching the incoming number (by service, number of digits, and pattern) and then optionally deleting and/or adding digits to direct the call to a specific endpoint. A service must be specified; the number of digits and pattern are optional. For example, you can specify that calls received from a particular area code should be routed to the specific individual or group responsible for accounts in that area.

Dial plan routing is available in Hybrid/PBX mode only. Key systems route incoming calls on a per-line basis.

NOTE:

You can enter a service not shown on the Network Service screen by using the five-digit binary code that represents the service in the Network Facilities Information Element of ISDN PRI layer three signaling protocol. (Contact your service provider for more information about the codes.) See “Miscellaneous Procedures.”

IMPORTANT:

You must program a service before you program any other Dial Plan Routing function. If you have not programmed a service, complete the procedure below for the **Service** option and then repeat the procedure for each optional function that you want to program.

Summary: Dial Plan Routing

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Service: empty; Patterns: blank; Total Digits: 0; Delete Digits: 0; Add Digits: 0
Valid Entries	Service: Toll, Local, Miscellaneous Entries: 0-15 Digits per Pattern: 0-8 Total Digits: 1-14 Delete Digits: 0-14, 0=wildcard Add Digits: 0-4 (valid digits: 0-9)
Inspect	No
Copy Option	No
Console Procedure	To specify Service: LinesTrunks → PRI → DialPlanRtg → Service → Dial entry no. → Enter → Select service → Exit → Exit → Exit To specify Patterns: LinesTrunks → PRI → DialPlanRtg → Patterns → Dial entry no. → Enter → Drop → Dial pattern → Enter → Exit → Exit → Exit To specify Total Digits: LinesTrunks → PRI → DialPlanRtg → Total Digits → Dial entry no. → Enter → Drop → Dial digits → Enter → Exit → Exit → Exit To specify Delete Digits: LinesTrunks → PRI → DialPlanRtg → Delete Digits → Dial entry no. → Enter → Drop → Dial delete digits → Enter → Exit → Exit → Exit

PC Procedure

To specify Add Digits:

LinesTrunks → **PRI** → **DialPlanRtg** → **Add Digits** → Dial entry no. → **Enter** → **Drop** → Dial add digits → **Enter** → **Exit** → **Exit** → **Exit**

To specify Service:

[F4] → [F6] → [F7] → [F2] → Type entry no. → [F10] → Select service → [F10] → [F5] → [F5] → [F5]

To specify Patterns:

[F4] → [F6] → [F7] → [F2] Type entry no. → [F10] → [Alt] + [P] → Type pattern → [F10] → [F5] → [F5] → [F5]

To specify Total Digits:

[F4] → [F6] → [F7] → [F3] Type entry no. → [F10] → [Alt] + [P] → Type digits → [F10] → [F5] → [F5] → [F5]

To specify Delete Digits:

[F4] → [F6] → [F7] → [F4] Type entry no. → [F10] → [Alt] + [P] → Type delete digits → [F10] → [F5] → [F5] → [F5]

To specify Add Digits:

[F4] → [F6] → [F7] → [F5] Type entry no. → [F10] → [Alt] + [P] → Type add digits → [F10] → [F5] → [F5] → [F5]

Outgoing Tables

PRI provides tables that work in conjunction with personal lines, pools, and ARS tables to route calls. The following tables specify services for outgoing calls:

- **Call-by-Call.** Selects an outgoing service, based on routing digits and the bearer capability (voice, data, or both) of the calling extension. It allows a single group of B-channels to carry a variety of services, such as ACCUNET, SDN, and Megacom WATS.
- **Network Selection.** Selects a long-distance carrier. Calls that match Network Selection tables can be routed to a specific service by the Call-by-Call tables.
- **Special Services.** Selects services such as international dialing and operator assistance. Calls that match these tables are not routed by the Call-by-Call tables.

NOTE:

PRI tables that work with pools and ARS apply to Hybrid/PBX mode only.

Network Selection Tables

Dialed prefixes for selecting long-distance carriers are matched to entries in the four Network Selection tables. Eight default tables are provided, specifying 10*** and 101****. The asterisks are wildcards that represent the various long-distance carrier codes. (10*** is the current U.S. standard for specifying long-distance carriers; 101**** is provided for future use.)

NOTE:

U.S. customers rarely need to program additional Network Selection tables because long-distance carrier codes match 10*** or 101****.

Summary: Network Selection Tables

Programmable by	System manager
Mode	Key and Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Not applicable
Valid Entries	Prefix for long distance carrier
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → PRI → OutgoingTbl → NetwkSelect → Dial entry no. → Enter → Drop → Dial prefix → Enter → Exit → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F6]</u> → <u>[F8]</u> → <u>[F1]</u> → Type entry no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type prefix → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

Special Services Tables

Eight tables provide for international calling and for operator-assisted calls. Default tables include the special prefixes 0 and 00 for operator-assisted calls. Dialed numbers are matched against entries in these tables for patterns (011, 010, 01, 00, 0, and 1); for operator assistance (operator-assisted, presubscribed common carrier operator, and none); and for type of number (national or international). Up to four digits can be deleted.

Summary: Special Services Tables

Programmable by	System manager
Mode	Key and Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	See Table 9-2
Valid Entries	Prefix for international or operator-assisted calls
Inspect	No
Copy Option	No
Console Procedure	To specify Pattern: LinesTrunks → PRI → OutgoingTbl → SpecialServ → Pattern → Dial entry no. → Enter → Drop → Dial pattern → Enter → Exit → Exit → Exit → Exit To specify Operator: LinesTrunks → PRI → OutgoingTbl → SpecialServ → Operator → Dial entry no. → Enter → Select type of operator → Enter → Exit → Exit → Exit → Exit To specify Type of Number: LinesTrunks → PRI → OutgoingTbl → SpecialServ → TypeOfNumbr → Dial entry no. → Enter → Select type → Enter → Exit → Exit → Exit → Exit

PC Procedure

To specify Delete Digits:

LinesTrunks → **PRI** → **OutgoingTbl** → **SpecialServ** → **DeleteDigit** → Dial entry no. → **Enter** → **Drop** → Dial pattern → **Enter** → **Exit** → **Exit** → **Exit** → **Exit**

To specify Pattern:

[F4] → [F6] → [F8] → [F2] → [F1] → Type entry no. → [F10] → [Alt] + [P] → Type pattern → [F10] → [F5] → [F5] → [F5] → [F5]

To specify Operator:

[F4] → [F6] → [F8] → [F2] → [F2] → Type entry no. → [F10] → Select type of operator → [F10] → [F5] → [F5] → [F5] → [F5]

To specify Type of Number:

[F4] → [F6] → [F8] → [F2] → [F3] → Type entry no. → [F10] → Type number type → [F10] → [F5] → [F5] → [F5] → [F5]

To specify Delete Digits:

[F4] → [F6] → [F8] → [F2] → [F4] → Type entry no. → [F10] → [Alt] + [P] → Type digits to be deleted → [F10] → [F5] → [F5] → [F5] → [F5]

Table 9-2. Special Services Table

Table	Pattern (up to 4 digits)	Operator	Delete Digits (0 to 4)
0	011	none	3
1	010	Local Operator	3
2	01	Local Operator	2
3	00	Local Operator/ Presubscribed Carrier	2
4	0	Local Operator	1
5	1	none	1

Call-by-Call Service Table

When a call is placed on a Call-by-Call B-channel group, a specific service is selected. The selected service depends on the match between the dialed digits and the table entries. A service must be specified; otherwise the entry is ignored.

The Call-by-Call table can contain up to 10 entries. Each entry can contain up to 10 patterns, each with a maximum of eight digits. If a dialed number matches two patterns, the longer pattern takes precedence. For example, 212555 matches both 212555 and 212, but the system will match the longer pattern. In addition to patterns, the Call-by-Call table can be used to specify from 0 through 8 digits to be deleted (the default is 0).

If the last entry in the table is empty (that is, no pattern is specified), this entry is used as a default and matches any pattern and type of call.

If ARS (Hybrid/PBX only) is used, ARS selects the route. If the route points to a Call-by-Call B-Channel group, Call-by-Call service selects the network service. ARS Call-by-Call service is integrated according to the specified bearer capability (voice, data, or both) for each feature. In addition, ARS digit deletion/addition may help specify the service selected by the Call-by-Call feature. See “Automatic Route Selection” for more information.

Summary: Call-by-Call Service Table

Programmable by	System manager
Mode	Key and Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3b, Incoming Trunks: DS1 Connectivity (100D module)
Factory Setting	Not applicable
Valid Entries	Pattern: up to eight digits Call Type: voice, data, both Service: AT&T Toll, Local, Miscellaneous Delete Digits: 0 to 8
Inspect	No
Copy Option	No
Console Procedure	To specify Patterns: LinesTrunks → PRI → OutgoingTbl → CBC Service → Patterns → Dial list no. → Enter → Drop → Dial pattern → Enter → Exit → Exit → Exit → Exit To specify Voice/Data: LinesTrunks → PRI → OutgoingTbl → CBC Service → Voice/Data → Dial list no. → Enter → Select voice, data, or both → Enter → Exit → Exit → Exit → Exit To specify Network Service: LinesTrunks → PRI → OutgoingTbl → CBC Service → NetwkServ → Dial list no. → Enter → Select service → Enter → Exit → Exit → Exit → Exit To specify Delete Digits: LinesTrunks → PRI → OutgoingTbl → CBC Service → DeleteDigit → Dial list no. → Enter → Drop → Dial no. of digits → Enter → Exit → Exit → Exit → Exit

PC Procedure

To specify Patterns:

[F4] → [F6] → [F8] → [F3] → [F1] → Type list no. → [F10] →
[Alt] + [P] → Type pattern → [F10] → [F5] → [F5] → [F5] → [F5]

To specify Voice/Data:

[F4] → [F6] → [F8] → [F3] → [F2] → Type list no. → [F10] →
Select voice, data, or both → [F10] → [F5] → [F5] → [F5] →
[F5]

To specify Network Service:

[F4] → [F6] → [F8] → [F3] → [F3] → Type list no. → [F10] →
Select service → [F10] → [F5] → [F5] → [F5]

To Specify Delete Digits:

[F4] → [F6] → [F8] → [F3] → [F4] → Dial list no. → [F10] → [Alt] +
[P] → Dial no. of digits → [F10] → [F5] → [F5] → [F5] → [F5]

Call-by-Call Service Table

This section contains the following summaries:

- Assigning outside lines or trunks to the buttons on a telephone (including lines and trunks used for loudspeaker paging).
- Copying line button assignments from one telephone to an individual telephone or block of telephones.
- Assigning the following buttons on telephones (for Hybrid/PBX systems only):
 - System Access or Intercom Voice
 - System Access or Intercom Ring
 - System Access or Intercom Originate Only
 - Shared System or Intercom Access
- Identifying analog multiline telephones that do not have built-in speakerphones (BIS) or Hands Free Answer on Intercom (HFAI) capability.
- Identifying analog multiline telephones that require pairing of extension jacks to provide the Voice Announce to Busy, or to provide voice and data features.

Assign Trunks or Pools to Telephones

Use this procedure to assign outside lines/trunks (connected to the control unit) to specific buttons on each telephone. The lines/trunks assigned to a button on a telephone are called *personal lines*.

This procedure is used only to change or add personal lines, Loudspeaker Paging, or **Pool** buttons (Hybrid/PBX only) to telephones. See “Assign Intercom or System Access Button” procedures to add or change Intercom (**ICOM**) or System Access (**SA**) buttons.

Individual lines/trunks can be assigned to a maximum of 64 telephones. Individual pools can be assigned as a **Pool** button on a maximum of 64 telephones.

The following lines/trunks cannot be assigned to a button on a telephone:

- Lines/trunks used for Music On Hold
- Lines/trunks used for maintenance alarms

NOTE:

If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party (such as the American Society of Composers, Artists, and Producers or Broadcast Music Incorporated). Magic on Hold® requires no such license and can be purchased from AT&T.

Pool buttons cannot be assigned or removed from extensions unless the pool has trunks assigned. If all trunks are to be removed from a pool, all **Pool** button assignments must first be removed from telephones. Another way of handling this situation is to program another trunk into the pool and then remove the **Pool** button assignments from the extensions.

- **Hybrid/PBX only.** Individual lines/trunks assigned to a pool can be assigned to a button only on a DLC operator position. If one of the lines/trunks in a pool is assigned to a button on a non-DLC telephone, the result is a **Pool** button assignment.
- **Key only.** The system assigns the first eight line numbers to buttons on multiline telephones whether or not an outside line is physically connected. If a line is not connected, the button assignment must be removed so the user can assign a feature to the button.

For the MDC 9000 and MLC-5 cordless multiline telephones and the MDW 9000 wireless multiline telephone, the system assigns the first eight lines connected to the control unit even though the telephone has fewer than eight buttons available. Remove the extra lines in system programming so that the appropriate number of lines are assigned to buttons on these telephones.

Lines and trunks are assigned to buttons in the order in which you press each line button on the system programming console or keyboard. Existing line assignments can be rearranged by removing all current assignments and then pressing the line buttons on the console or keyboard in the order that they should appear on the buttons. For information on the order of the programmed buttons, refer to the button numbers on the applicable planning form for each telephone.

If you want to reserve some blank buttons for features between line buttons, a line must be assigned as a placeholder for each blank button. After all lines are assigned, remove the lines used as placeholders on the buttons reserved for features.

Summary: Assign Trunks or Pools to Telephones

Programmable by	System manager
Mode	All, but note differences in factory settings.
Idle Condition	Telephone idle
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Key Mode. An Intercom Ring (ICOM Ring) button, an Intercom Voice (ICOM Voice) button, and the first eight lines connected to the control unit are assigned to all analog multiline telephones, MLX telephones (excluding operator positions), and MFMs connected to MLX telephones. Two Intercom Ring buttons are assigned to single-line telephones; no outside lines are assigned. Behind Switch Mode. Intercom Ring, Intercom Voice, and prime line buttons are assigned to all analog multiline telephones, MLX telephones (excluding operator positions), and MFMs connected to MLX telephones. Two Intercom Ring buttons are assigned to single-line telephones; no outside lines are assigned. When prime lines are assigned to MLX extensions, lines are not assigned to MFMs used to connect adjuncts. Lines for MFMs must be assigned separately.

Hybrid/PBX Mode. System Access Ring (**SA Ring**), System Access Voice (**SA Voice**), and System Access Originate Only (**SA Orig Only**) buttons are assigned to all analog multiline telephones and MLX telephones (excluding operator positions). Five **Call** buttons are assigned to QCC operator positions. Two System Access Ring buttons and one System Access Originate Only button are assigned to single-line telephones. No personal line or Pool buttons are assigned.

Valid Entries	Extension numbers
Inspect	Yes
Copy Option	Yes
Console Procedure	To program a single line/trunk: Extensions → Lines/Trunks → Dial ext. no. → Enter → Entry Mode → Dial line/trunk no. → Enter → Exit → Exit To program a block of lines/trunks: Extensions → Lines/Trunks → Dial ext. no. → Enter → Select trunk range → Toggle LED On/Off → Enter → Exit → Exit
PC Procedure	To program a single line/trunk: [F6] → [F1] → Type ext. no. → [F10] → [F6] → Type line/trunk no. → [F10] → [F5] → [F5] To program a block of lines/trunks: [F6] → [F1] → Type ext. no. → [F10] → Select trunk range → Toggle letter G On/Off → [F10] → [F5] → [F5]

Copy Line/Trunk Assignments

Use this procedure to copy outside line/trunk button assignments, pool dial-out code restrictions (Hybrid/PBX only), and (for operator positions only) Night Service information from one extension to another extension or block of extensions with identical requirements.

If you are copying assignments to a block of extensions and one of the extensions in the block is in use, the display shows the **Station Busy - Pls Wait** message. Copying for the rest of the extensions in the block is delayed until the busy extension becomes idle. The number of the busy extension is not shown. If a DSS is attached, the LED associated with the busy extension is on. If you exit instead of waiting for the busy extension to become idle, copying for the rest of the extensions is canceled; however, the assignments that have already been copied are not canceled.

If you are copying assignments from an operator position to a block of extensions that includes both operator and nonoperator extensions, the information is copied only to the operator positions; the nonoperator positions are not affected. Similarly, if you are copying assignments from a nonoperator position to a block of extensions that includes both operator and nonoperator extensions, the information is copied only to the nonoperator positions; the operator positions are not affected. The system does not provide an error tone to signal that the copy did not work for all of the extensions in the block.

Summary: Copy Line/Trunk Assignments

Programmable by	System manager
Mode	All
Idle Condition	Telephone idle
Planning Form	4a, Extension Copy: Analog Multiline Telephone Template 4c, Extension Copy: MLX Telephone Template
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	Yes: lines/pools assigned to an extension
Copy Option	Not applicable
Console Procedure	To copy to a single extension: Extensions → Line Copy → Single → Dial copy from ext. no. → Enter → Dial copy to ext. no. → Enter → Exit → Exit To copy to a block of extensions: Extension → Line Copy → Block → Dial copy from ext. no. → Enter → Dial ext. no. of first telephone in block → Enter → Dial ext. no. of last telephone in block → Enter → Exit → Exit
PC Procedure	To copy to a single extension: <u>[F6]</u> → <u>[F2]</u> → <u>[F1]</u> → Type copy from ext. no. → <u>[F10]</u> → Type copy to ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> To copy to a block of extensions: <u>[F6]</u> → <u>[F2]</u> → <u>[F2]</u> → Type copy from ext. no. → <u>[F10]</u> → Type ext. no. of first telephone in block → <u>[F10]</u> → Type ext. no. of last telephone in block → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Assign Intercom or System Access Buttons

Use this procedure to assign or change the assignments for Intercom (**ICOM**) buttons used to make and receive inside calls. This includes the following types of Intercom buttons:

- Ring
- Voice
- Originate Only (Ring or Voice)

In Hybrid/PBX mode only, use this procedure to assign or change assignments for System Access (**SA**) buttons used to make or receive inside and outside calls. This procedure includes the following types of System Access buttons:

- Ring
- Voice
- Originate Only (Ring or Voice)
- Shared (Ring or Voice)

NOTES:

1. You cannot change the factory setting for **Call** buttons assigned to QCC operator positions, and you cannot assign Ring, Voice, Originate Only, or Shared buttons to QCC operator positions.
2. System Access or Intercom buttons can be assigned only to the first 10 buttons on a telephone.
3. You can assign a combination of up to 10 System Access or Intercom buttons to each telephone (excluding QCC operator positions).
4. You can remove System Access or Intercom buttons, but at least one must remain on the telephone.

5. Each System Access Ring or Voice on an individual telephone can be assigned as a Shared System Access **(SSA)** button on up to 27 other telephones.

Release 2.1 and earlier

Each System Access Ring or Voice on an individual telephone can be assigned as a Shared System Access **(SSA)** button on up to 16 other telephones.

6. System Access and Intercom buttons are centrally programmed and cannot be programmed by individual telephone users.

Summary: Assign Intercom or System Access Buttons

Programmable by	System manager
Mode	All, but note differences in factory settings
Idle Condition	Telephone idle
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjuncts: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct (DLC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Key Mode. An Intercom Ring (ICOM Ring), an Intercom Voice (ICOM Voice), and the first eight lines connected to the system are assigned to all analog multiline and MLX telephones, excluding operator positions. Two Intercom Ring buttons are assigned to tip/ring equipment connected on an 012 module. An Intercom Ring and an Intercom Originate Only (ICOM Orig Only) button are assigned to tip/ring equipment connected by an MFM. No outside lines are assigned. Behind Switch Mode. An Intercom Ring, an Intercom Voice, and a prime line button are assigned to all analog multiline and MLX telephones, excluding operator positions. Two Intercom Ring buttons and a prime line button are assigned to tip/ring equipment connected to an 012 module. An Intercom Ring and an Intercom Originate Only Ring button are assigned to tip/ring equipment connected by an MFM. No outside lines are assigned.

Hybrid/PBX Mode. System Access Ring (**SA Ring**), System Access Voice (**SA Voice**), and System Access Originate Only Ring (**SA Orig Only**) buttons are assigned to all analog multiline and MLX telephones, excluding operator positions. Two System Access Ring buttons and a System Access Originate Only Ring button are assigned to tip/ring equipment (for example, single-line telephones or fax machines connected to an 012 module). No personal line or pool buttons are assigned.

All Modes. System Access Ring (Hybrid/PBX mode) or Intercom Ring (Key and Behind Switch modes), System Access Voice (Hybrid/PBX mode) or Intercom Voice (Key and Behind Switch modes), and the first 18 through 29 lines connected to the control unit are assigned to all DLC operator positions. The number of lines assigned depends on the type of telephone used as a DLC operator position. Refer to the appropriate telephone planning form for details.

Valid Entries

Not applicable

Inspect

Yes: specific button options.

Copy Option

Yes (You can copy additional **SA** buttons to another extension, but you cannot overwrite **SA** buttons that are already assigned.)

Console Procedure

To program extension:

More → **Cntr-Prg** → **Program** Ext. → Dial ext. no. → **Enter** → **Start** → **Program extension** → **Enter** → **Exit** → **Exit**

To copy extension programming:

More → **Cntr-Prg** → Copy ext. → Dial copy from ext. no. → **Enter** → Dial copy to ext. no. → **Enter** → **Exit** → **Exit**

PC Procedure

To program extension:

[PgUp] → [F4] → [F1] → Type ext. no. → [F10] → Program extension → [F10] → [F5] → [F5]

To copy extension programming:

[PgUp] → [F4] → [F2] → Type copy from ext. no. → [F10] → Type copy to ext no. → [F10] → [F5] → [F5]

Analog Multiline Telephone Without Built-in Speakerphone (BIS) or Hands Free Answer Intercom (HFAI) Capability

Use this procedure to identify analog multiline telephones with flat membrane buttons that do not have built-in speakerphones (BIS) or Hands Free Answer Intercom (HFAI) capability. The models that must be identified are 5-Button, 10-Button, 34-Button, and 34-Button Deluxe analog multiline models with flat membrane buttons.

Keep the factory setting for analog multiline models with raised plastic buttons, including the following models: 10-Button HFAI, 34-Button with speakerphone (SP-34), 34-Button with speakerphone and display (SP-34D), BIS-10, BIS-22, BIS-34, BIS-22D, and BIS-34D.

This procedure is not necessary for MLX or single-line telephones.

Analog Multiline Telephone Without Built-in Speakerphone
(BIS) or Hands Free Answer Intercom (HFAI) Capability

**Summary: Analog Multiline Telephones
Without BIS or HFAI Capability**

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 5a, Direct-Line Console (DLC): Analog Data Form 1a, Modem Data Stations
Factory Setting	All models of analog multiline telephones (except the analog multiline display console) have BIS/HFAI capability.
Valid Entries	Extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → BIS/HFAI → Dial ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F6]</u> → <u>[F8]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Analog Multiline Telephones with Voice Announce to Busy

Use this procedure to dedicate a voice or voice pair to be used to provide the Voice Announce to Busy feature to an analog multiline telephone.

The extension number associated with the first (odd-numbered) extension jack in the pair is the telephone's extension number. The extension number for the second (even-numbered) extension jack is dedicated to the Voice Announce to Busy feature. Calls cannot be placed to the extension jack reserved for the Voice Announce to Busy feature.

Voice Announce to Busy must be disabled at data stations.

NOTE:

This procedure does not apply to MLX telephones (Voice Announce to Busy is automatically provided) and cannot be programmed for single-line telephones.

**Summary: Analog Multiline Telephones with
Voice Announce to Busy**

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 4b, Analog Multiline Telephone Form 5a, Direct-Line Console (DLC) Analog Data Form 1a, Modem Data Station
Factory Setting	Not applicable
Valid Entries	Extension numbers
Inspect	Yes
Copy Option	Yes
Console Procedure	Extensions → VoiceSignl → Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F6] → [F10] → Type ext. no. → [F10] → [F5] → [F5]

Analog Multiline Telephones in Data Stations

See Chapter 19, “Data Features.”

Auxiliary Equipment

11

The procedures in this section describe the steps needed to perform the following:

- Identify the line/trunk jacks used for Music on Hold, loudspeaker paging, and maintenance alarms.
- Identify the extension jacks used for fax, MERLIN MAIL, Voice Messaging System, Automated Attendant, and AUDIX Voice Power.

Music on Hold

Use this procedure to identify the line/trunk jack reserved for connection of a music source, such as a radio, tape player, or stereo system.

NOTES:

1. If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party [such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI)]. Music on Hold® requires no such license and can be purchased from your authorized dealer.
2. Only one Music on Hold line/trunk jack is allowed per system.

Music on Hold

3. You cannot assign the line/trunk identified for Music on Hold to a line/trunk pool. If the line/trunk is currently assigned to a pool, you must remove it before you program this option.
4. You cannot assign the line/trunk identified for use with Music on Hold to a button on any telephone or as a Remote Access trunk, and you cannot use the line/trunk jack identified for Music on Hold for a loudspeaker paging system or maintenance alarm.

Summary: Music on Hold

Programmable by	System manager
Mode	All, but in Hybrid/PBX mode the line/trunk designated for Music on Hold cannot be assigned to a line/trunk pool.
Idle Condition	System idle
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Not Applicable
Valid Entries	Line/trunk number
Inspect	No
Copy Option	No
Console Procedure	AuxEquip → MusicOnHold → Dial line/trunk no. → Enter → Exit
PC Procedure	[F9] → [F1] → Type line/trunk no. → [F10] → [F5]

Loudspeaker Paging

Use this procedure to identify the line/trunk jack reserved for connection of loudspeaker paging equipment.

NOTES:

1. If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party (such as the American Society of Composers, Artists, and Producers or Broadcast Music Incorporated). Music on Hold requires no such license and can be purchased from your authorized dealer.
2. A maximum of three single-zone or multizone loudspeaker paging systems can be connected to the system.
3. You cannot assign the line/trunk identified for loudspeaker paging equipment use to a line/trunk pool. If the line/trunk is currently assigned to a pool, you must remove it before you program this option.
4. You cannot assign the line/trunk identified for loudspeaker paging equipment use as a Remote Access line/trunk, and you cannot use its jack for Music on Hold or maintenance alarm.

Summary: Loudspeaker Paging

Programmable by	System manager
Mode	All, but in Hybrid/PBX mode the line/trunk designated for loudspeaker paging cannot be assigned to a line/trunk pool.
Idle Condition	Line/trunk idle
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Not Applicable
Valid Entries	Line/trunk numbers
Inspect	Yes
Copy Option	No
Console Procedure	AuxEquip → Ldspkr Pg → Dial line/trunk no. → Enter → Exit
PC Procedure	[F9] → [F2] → Type line/trunk no. → [F10] → [F5]

Fax

Use this procedure to add a fax machine by assigning the extension jack used to connect the fax machine. To remove a fax machine and free the extension jack for another use, you must remove the extension jack assignment.

In addition, you can specify the extensions to receive a message-waiting indication (MWI) when a fax transmission is received, and specify the length of time before the system registers that a fax has arrived and sends the message-waiting indication.

NOTE:

Do not use this procedure for fax machines connected to analog multiline telephones with a General Purpose Adapter (GPA). In a GPA configuration features cannot be assigned to the fax independently of the telephone.

A maximum of 16 fax machines can have the Fax Message Waiting feature. Additional fax machines (more than 16) can be installed, but these machines cannot have this feature.

You can specify up to four telephones to receive the message-waiting indication when a fax transmission is received. Note that fax machines can only send and not receive message-waiting indications.

Summary: Fax

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC
Factory Setting	10 seconds
Valid Entries	0 to 30 seconds
Inspect	Yes
Copy Option	No
Console Procedure	AuxEquip → Fax → Extension → Dial ext. no. → Enter → Exit → Msg Waiting → Dial fax machine ext. no. → Enter → Dial MWI ext. no. → Enter → Threshold → Drop → Dial no. of seconds → Enter → Exit → Exit
PC Procedure	[F9] → [F3] → [F1] → Type ext. no. → [F10] → [F5] → [F2] → Type fax machine ext. no. → [F10] → Type MWI ext. no. → [F10] → [F3] → [Alt] + [P] → Type no. of seconds [F10] → [F5] → [F5]

Maintenance Alarms

Use this procedure to identify the line/trunk jack that connects an external alerting device that sounds or flashes when major maintenance problems occur.

You cannot assign the line/trunk identified for the maintenance alarm to a button on any telephone or as a Remote Access trunk, and you cannot use its line/trunk jack to connect a loudspeaker paging system or Music on Hold.

Summary: Maintenance Alarms

Programmable by	System manager
Mode	All, but in Hybrid/PBX mode, the line/trunk designated for the maintenance alarm cannot be assigned to a line/trunk pool.
Idle Condition	System idle
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Not Applicable
Valid Entries	Line/trunk number
Inspect	No
Copy Option	No
Console Procedure	AuxEquip → MaintAlarms → Dial line/trunk no. → Enter → Exit → Exit
PC Procedure	[F9] → [F4] → Type line/trunk no. → [F10] → [F5] → [F5]

Voice Messaging System and Automated Attendant

Use this procedure to specify the touch-tone duration and the interval between digits in codes sent between a voice messaging system and the communications system. The touch-tone duration and interval between digit assignment must be the same as those programmed on the voice messaging system.

This procedure specifies the integrated voice messaging ports (line/trunk jacks) used to connect voice messaging systems such as MERLIN MAIL Voice Messaging System or the AUDIX Voice Power-Integrated Solution II/III application. It also specifies the generic VMI ports (line/trunk jacks) used for automated attendants, such as MERLIN Attendant or Integrated Voice Power Automated Attendant IS II/III.

In addition, this procedure can be used to specify the number of rings before a call transferred by the voice messaging system is sent to the backup position for both integrated and generic VMI ports. The number of rings cannot be programmed for individual voice messaging systems; the single setting applies for all. Use the Group Type procedure in “Optional Group Features” to assign VMI ports as either integrated or generic.

Summary: Voice Messaging System and Automated Attendant

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	(See forms packaged with application.)
Factory Setting	Touch-tone duration: 100 ms Interval between digits: 50 ms Number of rings before transfer: 4
Valid Entries	Touch-tone duration: 50 to 200 ms, in increments of 25 ms Interval between digits: 50 to 200 ms, in increments of 25 ms Number of rings before transfer: 0 to 9
Inspect	No
Copy Option	No
Console Procedure	AuxEquip → VMS/AA → TransferRtn → Drop → Dial no. of rings → Enter → TT Duration → Drop → Dial no. of ms → Enter → TT Interval → Drop → Dial no. of ms → Enter → Exit → Exit
PC Procedure	[F9] → [F6] → [F1] → [Alt] + [P] → Type no. of rings → [F10] → [F2] → [Alt] + [P] → Type no. of ms → [F10] → [F3] → [Alt] + [P] → Type no. of ms → [F10] → [F5] → [F5]

Optional Telephone Features

12

The summaries in this section detail the steps in programming the following optional features:

- Extension Language
- Pool Dial-Out Code
- Call Restrictions
- Copy Call Restrictions
- Forced Account Code Entry
- Microphone Operation
- Remote Call Forwarding

Extension Language

Use this procedure to change the language for an MLX telephone. It applies to Releases 1.1 and later only.

Summary: Extension Language

Programmable by	Users and system manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4d, MLX Telephone Form 5b, Direct-Line Console (DLC): Digital Data Form 1b, 7500B Data Station
Factory Setting	English
Valid Entries	English, French, Spanish
Inspect	No
Copy Option	No
Console Procedure	To program a single extension: More → Language → Extensions → Single → Dial ext. no. → Enter → Select a language → Enter → Exit → Exit To program a block of extensions: More → Language → Extensions → Block → Dial starting ext. no. → Enter → Dial ending ext. no. → Enter → Select a language → Enter → Exit → Exit
PC Procedure	To program a single extension: [PgUp] → [F6] → [F2] → [F1] → Type ext. no. → [F10] → Select a language → [F10] → [F5] → [F5] To program a block of extensions: [PgUp] → [F6] → [F2] → [F2] → Type starting ext. no. → [F10] → Type ending ext. no. → Select a language → [F10] → [F5] → [F5]

Pool Dial-Out Code

Use this procedure to allow or restrict dialing pool dial-out codes and the placing of calls on specific line/trunk pools. Entering a pool dial-out code and then deleting that code restricts the user from using the pool associated with the entered code.

Summary: Pool Dial-Out Code

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Telephone idle
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct (DLC): Digital Form 5d, Queued Call Console (QCC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Main pool: 70; All other pools: 890 to 899. All telephones can dial any line/trunk pool dial-out code.
Valid Entries	Pool numbers
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → Dial OutCd → Dial ext. no. → Enter → Dial pool dial-out code → Enter → Exit → Exit
PC Procedure	[F6] → [F3] → Type ext. no. → [F10] → Type pool dial-out code → [F10] → [F5] → [F5]

Call Restrictions

Use this procedure to change individual telephone calling restrictions to one of the following:

- Unrestricted
- Restricted from making all outgoing calls
- Restricted from making toll calls

Summary: Call Restrictions

Programmable by	System manager
Mode	All
Idle Condition	Telephone idle
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Form 5d, Queued Call Console (QCC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Unrestricted
Valid Entries	Unrestricted, Outward restricted, Toll 'restricted
Inspect	No
Copy Option	Yes
Console Procedure	Extensions → Restriction → Dial ext. no. → Enter → Select restriction → Enter → Exit
PC Procedure	<u>[F6]</u> → <u>[F4]</u> → Type ext. no. → <u>[F10]</u> → Select restriction → <u>[F10]</u> → <u>[F5]</u>

Copy Call Restrictions

Use this procedure to copy calling restrictions, allowed lists, and disallowed lists. Feature assignment must be completed for the “copy from” extension. These features can then be copied to an individual extension or block of extensions with identical calling restriction requirements.

If you are copying restrictions to a block of extensions and one of the extensions in the block is in use, the display shows the **Station Busy - Pls Wait** message. Copying for the rest of the extensions in the block is delayed until the busy extension becomes idle. The number of the busy extension is not shown. If a DSS is attached, the LED associated with the busy extension is on. If you exit instead of waiting for the busy extension to become idle, copying for the rest of the extensions in the block is canceled; however, the restrictions that have already been copied are not canceled.

If you are copying restrictions to a block of extensions, they must be sequentially numbered.

The extensions you are copying to and from can be both operator and nonoperator positions.

NOTE:

Dial-out code restrictions are not copied.

Summary: Copy Call Restrictions

Programmable by	System manager
Mode	All
Idle Condition	"Copy to" telephone(s) idle
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Form 5d, Queued Call Console (QCC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	Not applicable
Console Procedure	To copy to a single extension: Extensions → RestrctCopy → Single → Dial copy from ext. no. → Enter → Dial copy to ext. no. → Enter → Exit → Exit → Exit To copy to a block of extensions: Extensions → RestrctCopy → Block → Dial copy from ext. no. → Enter → Dial first no. in copy to block → Enter → Dial last no. in copy to block → Enter → Exit → Exit → Exit
PC Procedure	To copy to a single extension: <u>[F6]</u> → <u>[F6]</u> → <u>[F1]</u> → Type copy from ext. no. → <u>[F10]</u> → Type copy to ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u> To copy to a block of extensions: <u>[F6]</u> → <u>[F6]</u> → <u>[F2]</u> → Type copy from ext. no. → <u>[F10]</u> → Type first copy no. in copy to block → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

ARS Restriction Level for Extensions

Use this procedure to assign an ARS restriction level to an extension. Only outgoing calls are affected; users can receive inside, local, and toll calls on restricted telephones and can join any type of call in progress. In order to use a route a caller at an extension must have a Restriction Level that is equal to or greater than the Facility Restriction Level (FRL) for the route. The restriction level assigned to extensions is opposite to the FRL assigned to routes, where 0 is the most and 6 is the least restrictive.

Summary: Assigning ARS Restriction Level For an Extension

Programmable by	System manager
Mode	Hybrid/PBX only
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Form 6g, Call Restriction Assignments and Lists
Factory Setting	3
Valid Entries	0-6, (0 is most restrictive and 6 is least restrictive)
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → ARS Restrict → Dial ext. no. → Enter → Drop → Dial restriction level → Enter → Exit
PC Procedure	[F6] → [PgUp] → [F6] → Type ext. no. → [F10] → [Alt] + [P] → Type restriction level → [F10] → [F5]

Forced Account Code Entry

Use this procedure to assign or remove Forced Account Code Entry. When this feature is programmed on individual telephones, the user must enter a 1- to 16-digit account code before making an outside call.

Summary: Forced Account Code Entry

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Form 5d, Queued Call Console (QCC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Not assigned
Valid Entries	Assigned, not assigned
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → Account → Toggle LED On/Off or Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F6] → [F7] → Toggle letter R On/Off or Type ext. no. → [F10] → [F5] → [F5]

Microphone Operation

Use this procedure to enable or disable microphones on MLX telephones (except QCC operator positions). When the microphone is disabled, users cannot use the speakerphone to conduct conversations.

NOTE:

The microphone cannot be disabled on analog multiline telephones or on MLX telephones used as QCC operator positions.

Summary: Microphone Operation

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4d, MLX Telephone Form 5b, Direct-Line Console (DLC): Digital
Factory Setting	Enabled
Valid Entries	Enabled, Disabled
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Mic Disable → Toggle LED On/Off or Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F7] → Toggle letter R On/Off or Type ext. no. → [F10] → [F5] → [F5]

Authorization Code

The Authorization Code feature allows you to pickup someone else's telephone, enter your authorization code, and complete a call with the restrictions that apply to your own telephone (*home extension*). This includes toll restrictions, outward restriction, Facility Restriction Level (FRL), Allowed Lists, Disallowed Lists, Forced Account Code Entry (FACE), Night Service Exclusion List, and Dial Access to Pools.

Use this procedure to assign or remove an authorization code to an extension. The authorization code can range from 2 to 11 characters (0-9, *) and must be unique for each extension. An authorization code cannot begin with a “*.”

If you are assigning authorization codes for a group of sequential extensions, begin programming the lowest extension number to take advantage of the **Next** screen key (see “Standard Procedures”).

Summary: Authorization Codes

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6h, Authorization Codes
Factory Setting	Not assigned
Valid Entries	2-11 characters (0-9, *)
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Auth Code → Dial ext. no. → Enter → Dial authorization code → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F9] → Type ext. no. → [F10] → Type authorization code → [F10] → [F5] → [F5]

Remote Call Forwarding

Use this procedure to allow or disallow the Remote Call Forwarding capability, which allows users to forward calls to an outside number.

NOTE:

This feature is not recommended unless you have ground-start trunks. See “Disconnect Signaling Reliability” and “Hold Disconnect Interval.”

Summary: Remote Call Forwarding

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 4b, Analog Multiline Telephone Form 4d, MLX Telephone Form 4e, MFM Adjunct: MLX Telephone Form 4f, Tip/Ring Equipment Form 5a, Direct-Line Console (DLC): Analog Form 5b, Direct-Line Console (DLC): Digital Form 5c, MFM Adjunct: DLC Form 5d, Queued Call Console (QCC) Data Form 1a, Modem Data Station Data Form 1b, 7500B Data Station
Factory Setting	Disallowed
Valid Entries	Disallowed, allowed
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Remote Frwd → Toggle LED On/Off or Dial ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F6]</u> → <u>[PgUp]</u> → <u>[F8]</u> → Toggle letter R On/Off or Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Optional Operator Features

13

The summaries in this section affect feature programming for both DLC and QCC operator positions and include the following:

- Operator Hold Timer
- DLC Operator Automatic Hold
- QCC Optional Features
 - Hold Return
 - Automatic Hold or Release
 - Queue over Threshold
 - Elevate Priority
 - Calls-in-Queue Alert
 - QCC Operator to Receive Call Types
 - Call Type Queue Priority Level
 - Message Center Operation
 - Automatic or Manual Extended Call Completion
 - Return Ring
 - Position Busy Backup

NOTE:

QCC options are available in Hybrid/PBX mode only.

Operator Hold Timer

Use this procedure to set the length of the operator hold timer for all DLCs and QCCs. If the system operator does not pick up the call within the time programmed, an abbreviated ring reminds the operator that a call is being held.

This option cannot be programmed for individual operator positions.

Summary: Operator Hold Timer

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	60 seconds
Valid Entries	10 to 255 seconds
Inspect	No
Copy Option	No
Console Procedure	Operator → Hold Timer → Drop → Dial no. of seconds → Enter → Exit
PC Procedure	[F3] → [F3] → [Alt] + [P] → Type no. of seconds → [F10] → [F5]

DLC Operator Automatic Hold

Use this procedure to enable or disable the DLC Operator Automatic Hold feature for DLC operator positions. When this feature is enabled, it prevents accidental call disconnection.

Summary: DLC Operator Automatic Hold

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Disabled
Valid Entries	Disabled, Enabled
Inspect	No
Copy Option	No
Console Procedure	Operator → DLC Hold → Automatic Hold Enable or Automatic Hold Disable → Enter → Exit
PC Procedure	[F3] → [F4] → [F1] or [F2] → [F10] → [F5]

Hold Return

Use this procedure to determine whether calls on hold are returned to the QCC queue or remain on hold, on the QCC operator console, after the hold timer has expired twice. After the hold timer expires the first time, the operator hears an abbreviated ring as a call-on-hold reminder. If another call is received at the same time that the hold timer expires, 10 seconds are added to the programmed operator hold timer interval for the first call. If the QCC operator does not pick up a call by the time the hold timer expires twice, the call can be programmed to either remain on hold or return to the QCC queue.

This option cannot be programmed for individual QCC operator positions. The single setting applies to all QCC operator positions.

Summary: Hold Return

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Calls remain on hold
Valid Entries	Remain on hold, Return to QCC queue
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → Hold Rtrn → Return to Queue or Remain on Hold → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F1] → [F1] or [F2] → [F10] → [F5] → [F5]

Automatic Hold or Release

Use this procedure to specify whether a call in progress (on a call button) is automatically put on hold (Automatic Hold) or disconnected (Automatic Release) when the operator presses another button.

This option cannot be programmed for individual QCC operator positions. The single setting applies to all QCC operator positions.

Summary: Automatic Hold or Release

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Automatic Release
Valid Entries	Auto Hold, Auto Release
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → HoldRelease → Auto Hold or Auto Release → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F2] → [F1] or [F2] → [F10] → [F5] → [F5]

Queue over Threshold

Use this procedure to specify the maximum number of calls (threshold) in the QCC queue before system operators are notified with a tone that the threshold has been reached or exceeded. If the threshold is set to 0, operators are not notified.

Summary: Queue over Threshold

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	0
Valid Entries	0 to 99
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → Threshold → Drop → Dial no. of calls → Enter → Exit → Exit
PC Procedure	<u>[F3]</u> → <u>[F2]</u> → <u>[F3]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. of calls → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Elevate Priority

Use this procedure to specify the length of time before calls waiting in the QCC queue are automatically reprioritized to a higher level. If priority is set to 0, calls are not prioritized.

Summary: Elevate Priority

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	0 seconds
Valid Entries	0 and 5 to 30 seconds
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → ElevatePrior → Drop → Dial no. of seconds → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F4] → [Alt] + [P] → Type no. of seconds → [F10] → [F5] → [F5]

Calls-In-Queue Alert

Use this procedure to specify whether each QCC operator is notified (with a single beep) when a new call enters the QCC queue.

Summary: Calls-In-Queue Alert

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Disable
Valid Entries	Enable, Disable
Inspect	Yes
Copy Option	No
Console Procedure	Operator → Queued Call → InQue Alert → Dial ext. no. → Enter → InQue Alert Enable or InQue Alert Disable → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F6] → Type ext. no. → [F10] → [F1] or [F2] → [F10] → [F5] → [F5]

QCC Operator to Receive Call Types

Use this procedure to specify which QCC operators receive the following types of calls:

- Dial 0 calls (internal calls to the system operator)
- DID calls to invalid destinations (unassigned extension numbers)
- Calls to the Listed Directory Number (extension for the QCC queue)
- Calls programmed to return to the QCC queue (returning from directing, camped-on, held calls, and operator parked calls)
- Group Coverage calls
- Forward/Follow Me calls

The QCC queue can be a receiver for the maximum number of coverage groups (30).

NOTES:

1. If you want a QCC operator position to operate as a message center (receiving returning parked and directed calls, Group Coverage calls, and calls to unassigned DID numbers), program the Message Center option before you assign the operator to receive call types.
2. This procedure does not include use of the menu options **Follow/Frwd** or **QCC Ext**. These two options are used to assign queue priorities and are not associated with individual QCC operators. See “Call Type Queue Priority Level.”
3. This procedure does not include programming the operator position to receive calls on individual lines or trunks. See “QCC Operator to Receive Calls.”

4. Programming an operator position to receive DID calls to invalid destinations does not cause the calls to ring into the QCC queue unless you program such calls to be sent to a backup extension. See “Invalid Destination.” When no operator is assigned to receive the call types, the call does not ring into the QCC queue, and the caller hears an error tone.
5. If a trunk assigned to ring into the QCC queue is to be assigned shared remote access, assign that trunk remote access before performing this procedure. See “Remote Access Trunk Assignment.”

Summary: QCC Operator to Receive Call Types

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	QCC operator receives the following calls: Dial 0 Unassigned DID Listed Directory Number Returning
Valid Entries	Not applicable
Inspect	Yes
Copy Option	No
Console Procedure	Operator → Queued Call → Call Types → Select a call type → Operator → Dial coverage group no. → Enter → Dial ext. no. → Enter → Exit → Exit → Exit → Exit → Exit
PC Procedure	[F3] → [F2] → [F7] → Select a call type → [F2] → Type coverage group no. → [F10] → Type ext. no. → [F10] → [F5] → [F5] → [F5] → [F5]

Call Type Queue Priority Level

Use this procedure to assign a priority value (1 to 7) that determines the order in which calls programmed to ring into the QCC queue are sent to QCC system operator positions. A value of 1 is the highest priority. The QCC queue priority level is assigned for the following types of calls:

- Dial 0 calls (internal calls to the system operator)
- DID calls to invalid destinations (unassigned extension numbers)
- Calls to the Listed Directory Number (extension for the QCC queue)
- Calls programmed to return to the QCC queue (returning from extending, camped-on, held calls, and operator parked calls)
- Group Coverage calls
- Calls signed in (Follow) or forwarded to the system operator
- Calls to a system operator extension number

This procedure does not include programming the QCC queue priority level for individual lines or trunks to ring into the queue. See “QCC Queue Priority Level.”

Summary: Call Type Queue Priority Level

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	4
Valid Entries	1 to 7
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → Call Types → Select call type → Priority → Drop → Dial priority level → Enter → Exit → Exit → Exit → Exit
PC Procedure	[F3] → [F2] → [F7] → Select call type → [F1] → [Alt] + [P] → Type priority level → [F10] → [F5] → [F5] → [F5] → [F5]

Message Center Operation

Use this procedure to designate one or more QCC operator positions to operate as a message center. The following options are automatically set for the message center position:

- Incoming calls are not directed to this position.
- Returning calls are directed to this position (return from extending and operator parked calls).
- All group coverage calls are directed to this position.
- All DID calls to invalid destinations are directed to this position.

Designating message center operation does not change any call type option programming, except that the call types mentioned above are added to the calls received at the QCC Message Center.

Summary: Message Center Operation

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Not applicable
Valid Entries	QCC extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	Operator → Queued Call → Msg Center → Dial ext. no. → Enter → Exit → Exit → Exit
PC Procedure	[F3] → [F2] → [F8] → Type ext. no. → [F5] → [F5] → [F5]

Extended (Directed) Call Completion

Use this procedure to specify one of the two basic options shown below for QCC operator positions with a DSS only:

- **Automatic Completion.** Allows one-touch call transfer; that is, calls are transferred by touching only an extension button on the DSS. The operator does not have to press the **Release** button.
- **Manual Completion.** QCC operators must press the **Release** button to direct a call using a DSS.

This option cannot be programmed for individual QCC operator positions. The setting applies to all QCC operator positions.

Summary: Extended Call Completion

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	Automatic Extended Completion
Valid Entries	Automatic, Manual
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → ExtndComplt → Automatic Complete or Manual Complete → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F9] → [F1] or [F2] → [F10] → [F5] → [F5]

Return Ring

Use this procedure to specify the number of rings before an unanswered directed call is returned to the QCC queue or QCC Message Center position.

This option cannot be programmed for individual QCC operator positions. The setting applies to all QCC operator positions.

NOTE:

If you want unanswered calls to proceed to voice mail, lengthen the return ring setting.

Summary: Return Ring

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	4 rings
Valid Entries	1 to 15 rings
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → Return Ring → Drop → Dial no. of rings → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [F10] → [Alt] + [P] → Type no. of rings → [F10] → [F5] → [F5]

Position Busy Backup

Use this procedure to designate the calling group to provide the backup position for the QCC queue. The specified calling group will receive incoming calls when all QCC operator positions are in position-busy mode.

Position Busy Backup is programmed for the QCC queue rather than for individual QCC operator positions. The calling group designated as the QCC queue backup serves as the backup for the Remote Access feature and as backup when the QCC is being used as the system programming console.

Only one Position Busy Backup can be programmed per system.

Summary: Position Busy Backup

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 6a, Optional Operator Features
Factory Setting	No backup
Valid Entries	Calling group number
Inspect	No
Copy Option	No
Console Procedure	Operator → Queued Call → More → QCC Backup → Drop → Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F3] → [F2] → [PgUp] → [F1] → [Alt] + [P] → Type ext. no. → [F10] → [F5] → [F5]

Optional Group-Assigned Features

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This section contains programming summaries for the following optional features:

- Call Pickup Groups
- Group Paging
- Group Coverage Member Assignments
- Group Coverage Delay Interval
- Group Calling Member Assignments
- Group Calling Line/Trunk or Pool Assignments
- Optional Group Calling Features
 - Hunt Type
 - Group Calling Delay Announcement
 - Group Coverage Receiver
 - Group Calling Overflow and Threshold
 - Group Calling Message-Waiting Indicator
 - Group Calling Calls-in-Queue Alarm Threshold
 - Group Calling External Alert for Calls-in-Queue Alarm
 - Group Type

Call Pickup Groups

Use this procedure to assign or remove an extension from a call pickup group. A call pickup group consists of telephone users who can answer one another's calls by pressing a button or by dialing a code.

NOTES:

1. A maximum of 30 call pickup groups, with a maximum of 15 extensions per group, are allowed.
2. An extension can belong to only one group.
3. Before reassigning an extension to a new group, you must remove it from its current group.

Summary: Call Pickup Groups

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7a, Call Pickup Groups
Factory Setting	Not applicable
Valid Entries	Call pickup group number, extension number
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → Call Pickup → Dial pickup group no. → Enter → Dial ext. no. → Enter → Enter → Exit → Exit
PC Procedure	<u>[F6]</u> → <u>[F9]</u> → Type pickup group no. → <u>[F10]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Group Paging

Use this procedure to assign or remove an extension from a paging group. A paging group consists of telephone users who hear common announcements over the telephone speakerphone. Only MLX telephones and analog multiline telephones with speakerphones can be members of a paging group.

A maximum of six paging groups with a maximum of 10 extensions per group is allowed. A seventh paging group, called the Page All group includes all telephones connected to the system. Extensions cannot be added to or removed from the Page All group.

To reassign an extension to a new paging group, just assign it; the extension is automatically removed from its old paging group.

Summary: Group Paging

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7b, Group Paging
Factory Setting	Not applicable
Valid Entries	Extension number
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Group Page → Dial paging group no. → Enter → Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F2] → Type paging group no. → [F10] → Type ext. no. → [F10] → [F5] → [F5]

Group Coverage Member Assignments

Use this procedure to assign or remove an extension from a coverage group. A coverage group is a group of senders. Coverage is an arrangement in which calls from a group of senders are redirected to one or more receivers.

NOTE:

This procedure assigns *senders*. Before you begin, make certain that the *receivers* for the coverage group are also programmed. Receivers can be assigned through individual or centralized telephone programming. You can also use the Integrated Solution III/IV feature, Integrated Administration, to assign coverage receivers.

A maximum of 30 coverage groups are allowed, each with an unlimited number of members. Up to eight receivers can be assigned per coverage group.

An extension can be a sender in only one group; it can be a receiver for more than one coverage group. A calling group can be assigned as a receiver for a coverage group (see “Group Coverage Receiver”). In Hybrid/PBX mode only, the QCC queue can be a receiver for up to 30 coverage groups. See “QCC Operator to Receive Calls.”

If the sender’s extension has one or more personal lines assigned, the sender can be assigned as the principal user so that calls received on the personal line are sent to receivers programmed for Individual or Group Coverage. See “Principal User for Personal Line.”

To reassign an extension to a new coverage group, just make the assignment; the extension is automatically removed from its old group.

Summary: Group Coverage Member Assignments

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7c, Group Coverage
Factory Setting	Not applicable
Valid Entries	Extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Group Cover → Dial group no. → Enter → Dial ext. no. → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F3] → Type group no. → [F10] → Type ext. no. → [F10] → [F5] → [F5]

Group Coverage Delay Interval

Use this procedure to specify the number of rings before a call is sent to group coverage receivers.

Summary: Group Coverage Delay Interval

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7c, Group Coverage
Factory Setting	Not applicable
Valid Entries	Extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	Options → More → Cover Delay → Drop → Enter → Dial the number of rings → Enter → Exit
PC Procedure	[F7] → [PgUp] → [F6] → [Alt] + [P] → Type the number of rings → [F10] → [F5]

Group Calling Member Assignments

Use this procedure to assign or remove an extension from a calling group. A calling group is used to direct calls to a group of people who all handle the same type of call. A single extension number is assigned to the group and is used by both inside and outside callers to reach the group.

To reassign an extension to a new calling group, you must remove it from its old group before programming the new assignment.

NOTES:

1. If a linear hunting pattern is indicated on the back of the system planning form (6d), be sure to assign extensions to the group in the exact order that they are shown on the form. The system searches for an available member in the order in which you assign the extensions to the group.
2. A maximum of 32 calling groups with a maximum of 20 extensions per group is allowed.
3. An extension can belong to only one calling group. A QCC cannot be a member of a calling group. The delay announcement device should not be programmed as a calling group member.
4. The extension status feature must be set to the Calling Group or CMS mode before you assign members to the group. See "Extension Status."

Group Calling Member Assignments

Summary: Group Calling Member Assignments

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7c, Group Coverage
Factory Setting	Not applicable
Valid Entries	Extension numbers
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Members → Dial calling group ext. no. → Enter → Dial ext. no. → Enter → Exit → Exit → Exit
PC Procedure	<u>[F6]</u> → <u>[PgUp]</u> → <u>[F4]</u> → <u>[F9]</u> → Type calling group ext. no. → <u>[F10]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

Group Calling Line/Trunk or Pool Assignments

Use this procedure to assign or remove lines, trunks, or pools (Hybrid/PBX only) that ring directly into a calling group.

Incoming calls on each line/trunk or pool can be directed to only one calling group.

To reassign a line/trunk or pool to a new calling group, you must remove it from its old group before making the new assignment.

Summary: Group Calling Line/Trunk or Pool Assignments

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	Not applicable
Valid Entries	Line, trunk, or pool number
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Line/Pool → Dial calling group ext. no. → Enter → Dial line/trunk no. → Enter → Exit → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F10] → Type calling group ext. no. → [F10] → Type line/trunk no. → [F10] → [F5] → [F5] → [F5]

Hunt Type

Use this procedure to assign one of the following hunt-type patterns to calling groups:

- **Circular Hunting Pattern.** The system distributes calls to group members by hunting in a circular pattern for the first available extension after the one that received the last call to the group.
- **Linear Hunting Pattern.** The system searches for an available group member in the order in which the extensions were assigned to the calling group.

Summary: Hunt Type

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	Circular hunting pattern
Valid Entries	Circular, Linear
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Hunt Type → Dial calling group ext. no. → Enter → Circular or Linear → Enter → Exit → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F1] → Type calling group ext. no. → [F10] → [F1] or [F2] → [F10] → [F5] → [F5]

Group Calling Delay Announcement

Use this procedure to designate the announcement device used to play messages to callers while they are waiting in the queue.

Only one announcement device can be designated for each calling group; however, more than one calling group can use the same announcement device. The extension to which the delay announcement device is connected should not be programmed as a calling group member.

If the extension jack or MFM was previously programmed as a regular extension, you must remove all line/trunk button assignments before you designate the extension jack as a delay announcement device.

Summary: Group Calling Delay Announcement

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	No delay announcement devices are assigned
Valid Entries	Announcement, No announcement
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → DelayAnnce → Dial calling group ext. no. → Enter → Dial ext. no. of announcement device → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F2] → Type calling group ext. no. → [F10] → Type ext. no. of announcement device → [F10] → [F5] → [F5]

Group Coverage Receiver

Use this procedure to assign or remove a calling group as receiver for a coverage group.

Calling group member assignments must be made before you assign the group as a receiver for a coverage group.

NOTE:

Integrated Administration uses calling group 30 as the default group to cover AUDIX Voice Power.

Summary: Group Coverage Receiver

Programmable by	System manager, Integrated Administration
Mode	All
Idle Condition	Not required
Planning Form	Form 7c, Group Coverage
Factory Setting	Not applicable
Valid Entries	Group numbers
Inspect	Yes
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Grp Coverage → Dial calling group ext. no. → Enter → Dial coverage group no. → Enter → Exit → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F3] → Type calling group ext. no. → Type coverage group no. → [F10] → [F5] → [F5] → [F5]

Group Calling Overflow and Threshold

Use this procedure to designate either another calling group or the QCC queue (Hybrid/PBX only) to receive calls when the number of calls waiting in the queue for a calling group is equal to or greater than the programmed threshold.

Overflow coverage can be provided only by calling groups or the QCC queue (Hybrid/PBX only), not by individual extensions. Group members can be notified when the number of calls waiting in the queue reaches the threshold.

A calling group or the QCC queue (Hybrid/PBX only) can provide overflow coverage for more than one calling group; however, which group's calls go to an available member in the overflow calling group is unpredictable.

The factory-set extension number for the QCC Listed Directory Number is 800.

Summary: Group Calling Overflow and Threshold

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	Overflow coverage: none Threshold: 1 call
Valid Entries	Backup extension number: 1 to 99 calls
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Overflow → Dial calling group ext. no. → Enter → Dial ext. no. → Enter → Drop → Dial no. of calls → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F8] → Type calling group ext. no. → [F10] → Type backup ext. no. → [F10] → [Alt] + [P] → Type no. of call → [F10] → [F5] → [F5]

Group Calling Message-Waiting Indicator

Use this procedure to designate the extension that will receive message-waiting indications (MWIs) for the calling group.

Only one extension can be designated as a message-waiting receiver for each calling group; however, more than one calling group can use the same message-waiting receiver. The extension assigned as a message-waiting receiver does not have to be a member of the calling group.

Message-waiting indications cannot be sent to the extension assigned to the group unless this option is programmed. The message-waiting receiver cannot distinguish between messages left for the calling group and personal messages.

Summary: Group Calling Message-Waiting Indicator

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	No message-waiting receiver assigned
Valid Entries	Extension number
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Message → Dial calling group ext. no. → Enter → Dial ext. no. for MWI receiver → Enter → Exit → Exit
PC Procedure	<u>[F6]</u> → <u>[PgUp]</u> → <u>[F4]</u> → <u>[F4]</u> → Type calling group ext. no. → <u>[F10]</u> → Type ext. no. for MWI receiver → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Group Calling Calls-In-Queue Alarm Threshold

Use this procedure to specify the number of unanswered calls that wait in the calling group queue before group members are notified with either an external alert or a light on the telephone. Group members are notified when the number of calls waiting in the queue is equal to or greater than the programmed threshold.

Summary: Group Calling Calls-In-Queue Alarm Threshold

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	1 call
Valid Entries	1 to 99
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Queue Alarm → Dial calling group ext. no. → Enter → Drop → Dial no. of calls → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F6] → Type calling group ext. no. → [F10] → [Alt] + [P] → Type no. of calls → [F10] → [F5] → [F5]

Group Calling External Alert for Calls-In-Queue Alarm

Use this procedure to designate the external alert device used to notify calling group members when the number of calls in the queue reaches the programmed threshold.

Only one external alert device can be designated for each calling group. Since the external alert signal is continuous, it is recommended that only light-type external alert devices be designated for the Calls-in-Queue alarm.

Summary: Group Calling External Alert for Calls-In-Queue Alarm

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	Not applicable
Valid Entries	Extension number
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → Xtnl Alert → Dial calling group ext. no. → Enter → Drop → Dial ext. no. for alert → Enter → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [F7] → Type calling group ext. no. → [F10][Alt] + [P] → Type ext. no. for alert → [F10] → [F5] → [F5]

Group Type

Use this procedure to determine whether or not the system automatically logs in members of a calling group after a power failure. This setting also determines the type of voice messaging interface when the calling group is used to connect voice messaging or automated attendant applications. The settings are listed below.

- **Automatic Log Out.** Used for calling groups to specify that the system does not automatically log in calling group members after a power failure. Calling group members must manually log themselves into the group.
- **Automatic Log In.** Used for calling groups that consist of fax machines or data stations (also called data hunt groups) to specify that the system automatically logs in calling group members after a power failure. This setting can also be used for calling groups consisting of telephones.
- **Integrated VMI.** Used when a voice messaging system that requires special signaling for integrated operation (for example, AUDIX Voice Power, IS II/III, or MERLIN MAIL Voice Messaging System) is connected to one or more extension jacks assigned to a calling group. The system automatically logs in the group members after a power failure.
- **Generic VM.** Used when a voice messaging system that does not need special signaling (for example, MERLIN Attendant) is connected to one or more extension jacks assigned to a calling group. The system automatically logs in the group members after a power failure.

Summary: Group Type

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7d, Group Calling
Factory Setting	Automatic Log Out
Valid Entries	Automatic log in, Automatic log out, Integrated VMI, Generic VMI
Inspect	No
Copy Option	No
Console Procedure	Extensions → More → Grp Calling → More → Group → Type Dial calling group ext. no. → Enter → Specify login type → Enter → Enter → Exit → Exit → Exit
PC Procedure	[F6] → [PgUp] → [F4] → [PgUp] → Type calling group ext. no. → Specify login type → [F10] → [F5] → [F5] → [F5]

Group Type

This section contains programming summaries for the optional system features that affect all or most system users and includes the following:

- Transfer Return Time
- One-Touch Transfer/Hold
- Transfer Audible
- Type of Transfer
- Camp-On Return Time
- Call Park Return Time
- Delay Ring Interval
- Automatic Callback Interval
- Extension Status
- SMDR Language
- SMDR Call Report Format
- SMDR Call Length
- SMDR Calls Recorded on Call Report
- SMDR Account Code Format
- Inside Dial Tone

- Reminder Service Cancel
- Redirect Outside Calls to Unassigned Extension Numbers
- Host System Dial Codes for Behind Switch Mode
- Recall Timer
- Allowed Lists
- Assign Allowed Lists to Telephones
- Disallowed Lists
- Assign Disallowed Lists to Telephones
- Remote Access Trunk Assignment
- Remote Access Automatic Callback
- Remote Access without Barrier Codes
- Remote Access Barrier Codes
- Remote Access with Barrier Codes

Transfer Return Time

Use this procedure to specify the number of times the telephone rings before a call transferred to another inside telephone is returned to the originator. A setting of 0 means that transferred calls are never returned to the originator.

NOTE:

The transfer return time should not be set to 0 in a system with single-line telephones.

Summary: Transfer Return Time

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	4 rings (Integrated Administration: 6 rings)
Valid Entries	0 to 9 rings
Inspect	No
Copy Option	No
Console Procedure	Options → Transfer → Return Time → Drop → Dial no. of rings → Enter → Exit → Exit
PC Procedure	<u>[F7]</u> → <u>[F1]</u> → <u>[F1]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. of rings → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

One-Touch Transfer/One-Touch Hold

Use this procedure to assign the One-Touch Transfer or One-Touch Hold feature.

One-Touch Transfer allows users to initiate transfers to another extension by pressing an Auto Dial or DSS button for that extension. If the One-Touch Transfer feature is assigned, you must also specify whether the transfer completion is manual (the user has to press another button to complete the transfer) or automatic (the transfer is completed automatically).

The One-Touch Transfer feature is not available on single-line telephones.

One-Touch Hold applies to incoming central office calls only. When the user presses an Auto Dial or DSS button to initiate a transfer, the outside caller is put on hold. The system automatically selects an intercom facility and dials the transfer destination. There is no transfer return function with this method. Consequently, if the transfer destination does not answer or is busy, the user who initiates the transfer must notify the outside caller, or the outside caller will remain on hold.

One-Touch Hold is the factory setting in Behind Switch mode only.

Summary: One-Touch Transfer/Hold

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	One-Touch Transfer, automatic completion (One-Touch Hold is the factory setting in Behind Switch mode.)
Valid Entries	Transfer, Hold
Inspect	No
Copy Option	No
Console Procedure	To program One-Touch Transfer: Options → Transfer → One Touch → Transfer → Enter → Manual or Automatic → Enter → Exit → Exit To program One-Touch Hold: Options → Transfer → One Touch → Hold → Enter → Exit → Exit
PC Procedure	To program One-Touch Transfer: [F7] → [F1] → [F2] → [F1] → [F10] → [F1] or [F2] → [F10] → [F5] → [F5] To program One-Touch Hold: [F7] → [F1] → [F2] → [F2] → [F10] → [F5] → [F5]

Transfer Audible

Use this procedure to specify whether an outside caller hears ringing (also called ringback) or Music On Hold while being transferred. Inside callers always hear ringback during a transfer.

NOTE:

If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party (such as the American Society of Composers, Artists, and Producers or Broadcast Music Incorporated). Music on Hold requires no such license and can be purchased from your authorized dealer.

Summary: Transfer Audible

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Music On Hold
Valid Entries	Music On Hold, Ringback
Inspect	No
Copy Option	No
Console Procedure	Options → Transfer → Audible → Music On Hold or Ringback → Enter → Exit → Exit
PC Procedure	[F7] → [F1] → [F3] → [F1] or [F2] → [F10] → [F5] → [F5]

Type of Transfer

Use this procedure to specify whether the system automatically selects an Intercom or System Access Ring or Voice button when the **Transfer** button, or an Auto Dial or DSS button (for One-Touch Transfer) is pressed.

Summary: Type of Transfer

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Ring button (Intercom or System Access) is automatically selected
Valid Entries	Voice Announce, Ring
Inspect	No
Copy Option	No
Console Procedure	Options → Transfer → Type → Voice Announce or Ring → Enter → Exit → Exit
PC Procedure	[F7] → [F1] → [F4] → [F1] or [F2] → [F10] → [F5] → [F5]

Camp-On Return Time

Use this procedure to specify the number of seconds before a camped-on call (a call transferred to a busy telephone with the Camp-On feature) is returned to the originator.

Summary: Camp-On Return Time:

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	90 seconds
Valid Entries	30 to 300 seconds, in 10-second increments
Inspect	No
Copy Option	No
Console Procedure	Options → CampOn → Drop → Dial no. of seconds → Enter → Exit
PC Procedure	[F7] → [F2] → [Alt] + [P] → Type no. of seconds → [F10] → [F5]

Call Park Return Time

Use this procedure to specify the number of seconds before a call put on hold with the Park feature is returned to the originator.

Summary: Call Park Return Time

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	180 seconds
Valid Entries	30 to 300 seconds, in 10-second increments
Inspect	No
Copy Option	No
Console Procedure	Options → CallParkRtn → Drop → Dial no. of seconds → Enter → Exit
PC Procedure	[F7] → [F3] → [Alt] + [P] → Type no. of seconds → [F5] → [F5]

Delay Ring Interval

Use this procedure to specify the number of rings for the delay ring interval. The delay ring interval is applied when a primary, secondary, or group cover button is set to delayed ring.

Summary: Delay Ring Interval

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 7c, Group Coverage
Factory Setting	2 rings
Valid Entries	1 to 6 rings
Inspect	No
Copy Option	No
Console Procedure	Options → Delay Ring → Drop → Dial no. of rings → Enter → Exit
PC Procedure	[F7] → [F4] → [Alt] + [P] → Type no. of rings → [F10] → [F5]

Automatic Callback Interval

Use this procedure to specify the number of times the telephone rings at the originator's telephone before the system cancels a Callback request.

Summary: Automatic Callback Interval

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	3 rings
Valid Entries	1 to 6 rings
Inspect	No
Copy Option	No
Console Procedure	Options → Callback → Drop → Dial no. of rings → Enter → Exit
PC Procedure	[F7] → [F6] → [Alt] + [P] → Type no. of rings → [F10] → [F5]

Extension Status

Use this procedure to specify whether the Extension Status (ES) feature is used in Hotel mode or Group Calling/Call Management System (CMS) mode.

The calling mode affects the meaning of the LEDs and the use of Auto Dial or DSS buttons when the DLC operator position is in Extension Status mode.

In Hotel mode, telephones are restricted from making calls in Extension Status states 1 and 2 (ES1 and ES2). In Group Calling/CMS mode, ES states reflect member or agent status without restricting the telephones. In the Group Calling/CMS mode, the Extension Status feature is used by the agents to log in and out, and by the supervisor to see agent status.

Summary: Extension Status

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Group Calling/CMS mode
Valid Entries	Group Calling/CMS mode, Hotel mode
Inspect	No
Copy Option	No
Console Procedure	Options → Ext Status → Hotel or GrpCall/CMS → Enter → Exit
PC Procedure	[F7] → [F7] → [F1] or [F2] → [F10] → [F5]

SMDR Language

Use this procedure to change the language of the SMDR reports. It applies to Releases 1.1, 2.0, 2.1 and 3.0 only. The default report language is the same as that set for the system language. See “System Language.”

Summary: SMDR Language

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	English (matches System Language setting)
Valid Entries	English, French, Spanish
Inspect	No
Copy Option	No
Console Procedure	More → Language → SMDR → Select language → Enter → Exit
PC Procedure	[PgUp] → [F6] → [F3] → Select language → [F10] → [F5]

SMDR Call Report Format

Use this procedure to specify whether the SMDR call reports are printed in Basic format or ISDN format. In ISDN format, automatic number identification (ANI) information appears in the Calling Number field in place of IN (which appears in the Basic report format). The call recording type for these calls is I in ISDN format and C in Basic format.

ISDN format should be used only in conjunction with automatic number identification (ANI) or Caller ID service subscription.

Summary: SMDR Call Report Format

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Basic format
Valid Entries	Basic, ISDN
Inspect	No
Copy Option	No
Console Procedure	Options → SMDR → Format → Basic SMDR or ISDN SMDR → Enter → Exit → Exit
PC Procedure	[F7] → [F8] → [F1] → [F1] or [F2] → [F10] → [F5] → [F5]

SMDR Call Length

Use this procedure to set the minimum time length of a call before it is recorded on SMDR call reports.

NOTE:

If the majority of lines/trunks are PRI, the recommended call length is 1. See *Feature Reference* for more information.

Summary: SMDR Call Length

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	40 seconds
Valid Entries	0 to 255 seconds
Inspect	No
Copy Option	No
Console Procedure	Options → SMDR → Call Length → Drop → Dial no. of seconds → Enter → Exit → Exit
PC Procedure	[F7] → [F8] → [F2] → [Alt] + [P] → Type no. of seconds → [F10] → [F5] → [F5]

SMDR Calls Recorded on Call Report

Use this procedure to specify whether SMDR information should be recorded for both incoming and outgoing calls or for outgoing calls only.

Summary: SMDR Calls Recorded on Call Report

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Incoming and outgoing
Valid Entries	In/Out, Out Only
Inspect	No
Copy Option	No
Console Procedure	Options → SMDR → Call Report → In/Out or Out Only → Enter → Exit → Exit
PC Procedure	[F7] → [F8] → [F3] → [F1] or [F2] → [F10] → [F5] → [F5]

SMDR Account Code Format

For calls made using an authorization code, SMDR can be programmed to either have the “home extension” or the actual authorization codes recorded in the Account Code field if no Account Code is entered. Account Code overrides the Authorization Code entry in the SMDR record when both features are used.

Summary: SMDR Account Code Format

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Home Extension Number
Valid Entries	Home Extension Number, Authorization Code
Inspect	No
Copy Option	No
Console Procedure	Options → SMDR → Auth Code → Home Extension Number or Authorization Code → Enter → Exit → Exit
PC Procedure	[F7] → [F8] → [F6] → [F1] or [F2] → [F10] → [F5] → [F5]

Inside Dial Tone

Use this procedure to set the inside (system) dial tone to be either different from, or the same as, the outside line/trunk dial tone.

NOTE:

The inside dial tone must be the same as the outside dial tone when the internal dial tone is not recognized by software applications or modems.

Summary: Inside Dial Tone

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Inside dial tone is different from outside dial tone
Valid Entries	Inside, Outside
Inspect	No
Copy Option	No
Console Procedure	Options → InsideDial → Inside or Outside → Enter → Exit
PC Procedure	<u>[F7]</u> → <u>[F9]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u>

Reminder Service Cancel

Use this procedure to set the time of day when all programmed Reminder Service calls are automatically canceled.

To deactivate Reminder Service Cancel, erase the currently programmed time and do not enter a new time.

Summary: Reminder Service Cancel

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Not applicable
Valid Entries	0000 to 2359
Inspect	No
Copy Option	No
Console Procedure	To deactivate Reminder Service Cancel: Options → Reminder Srv → Drop → Enter → Exit To set Reminder Service Cancel time: Options → Reminder Srv → Drop → Dial time → Enter → Exit
PC Procedure	To deactivate Reminder Service Cancel: [F7] → [F10] → [Alt] + [P] → [F10] → [F5] To set Reminder Service Cancel time: [F7] → [F10] → [Alt] + [P] → Type time → [F10] → [F5]

Redirect Outside Calls to Unassigned Extension Numbers

Use this procedure to specify the extension number to receive redirected calls. Redirected calls include calls made to unassigned numbers by remote access users, by users on DID trunks (Hybrid/PBX only), or by users on dial-in tie trunks. Calls can be redirected to the following locations:

- The QCC queue (Hybrid/PBX only)
- Another extension number
- A calling group

Hybrid/PBX Mode Only

This setting does not affect calls received on DID trunks if you have specified that calls to unassigned DID extensions are to receive a fast busy signal. See “Invalid Destination.”

Summary: Redirect Outside Calls to Unassigned Extension Numbers

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	Extension number of primary operator
Valid Entries	QCC queue extension number, other extension number
Inspect	No
Copy Option	No
Console Procedure	To select QCC queue: Options → More → Unassigned → QCC Queue → Enter → Exit To select extension or calling group: Options → More → Unassigned → Extension or Grp Calling → Enter → Dial ext. no. or group no. → Enter → Exit
PC Procedure	To select QCC queue: <u>[F7]</u> → <u>[PgUp]</u> → <u>[F1]</u> → <u>[F1]</u> → <u>[F1]</u> → <u>[F10]</u> → <u>[F5]</u> To select extension or calling group: <u>[F7]</u> → <u>[PgUp]</u> → <u>[F1]</u> → <u>[F2]</u> or <u>[F3]</u> → Type ext. no. or group no. → <u>[F10]</u> → <u>[F5]</u>

Host System Dial Codes for Behind Switch Mode

Use this procedure to assign the host system dial codes for the Transfer, Conference, and Drop features.

When multiline telephone users press the **Transfer**, **Conference**, or **Drop** button, a signal is sent to the host service and the communications system features are not accessed. Assigning dial codes to these features ensures that users can take advantage of them through the host system.

NOTE:

This procedure applies to Behind Switch mode only.

Summary: Host System Dial Codes for Behind Switch Mode

Programmable by	System manager
Mode	Behind Switch
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	No host dial codes are assigned
Valid Entries	Host system dial code of up to 6 digits
Inspect	No
Copy Option	No
Console Procedure	Options → More → BehndSwitch → Select feature → Drop → Dial host system dial code → Enter → Exit → Exit
PC Procedure	<u>[F7]</u> → <u>[PgUp]</u> → <u>[F2]</u> → Select feature → <u>[Alt]</u> + <u>[P]</u> → Type host system dial code → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Recall Timer

Use this procedure to designate the length of the timed flash that is sent when Recall is used to disconnect a call and get a new dial tone without hanging up. Both the interval of the timed flash and how Recall works depend on the type of telephone and system operating mode.

The recall timer should be reset if multiline telephone users experience either of the following problems:

- Nothing happens when the user presses the Recall button on an outside call. This indicates that the interval is too short and should be increased to 650 milliseconds or 1 second.
- In a system operating in Behind Switch mode, the call is disconnected when the user presses the Recall button on an outside call. This indicates that the interval is too long and should be decreased to 350 milliseconds.

Summary: Recall Timer

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, System Features
Factory Setting	450 ms
Valid Entries	350 ms, 450 ms, 650 ms, 1 second
Inspect	No
Copy Option	No
Console Procedure	Options → More → RecallTimer → Select time → Enter → Exit
PC Procedure	[F7] → [PgUp] → [F3] → Select time → [F10] → [F5]

Allowed Lists

Use this procedure to establish Allowed Lists. These lists are telephone numbers that can be dialed from specified telephones, regardless of any calling restrictions that are assigned to the telephones.

A maximum of eight lists (numbered 0 through 7) with a maximum of 10 numbers each (numbered 0 through 9) are allowed. Each allowed number can be no more than six digits (an area code plus an exchange) or six digits with a leading 1, where required.

If you program 0 as the first digit of a list entry, any toll restriction assigned to the extension is removed for calls that can be placed by a toll operator.

Special characters (such as Pause) are not permitted in Allowed List entries.

Summary: Allowed Lists

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6g, Call Restriction Assignments and Lists
Factory Setting	Not applicable
Valid Entries	Area code/exchange (1- to 6-digits with leading 1 if necessary)
Inspect	No
Copy Option	No
Console Procedure	Tables → AllowList → Dial list no. and entry no. → Enter → Drop → Dial no. → Enter → Exit
PC Procedure	[F8] → [F1] → Type list no. and entry no. → [F10] → [Alt] + [P] → Type no. → [F10] → [F5]

Assign Allowed Lists to Telephones

Use this procedure to assign individual telephones access to established Allowed Lists. More than one Allowed List can be assigned to a telephone.

Summary: Assign Allowed Lists to Telephones

Mode	All
Idle Condition	Not required
Planning Form	Form 6g, Call Restriction Assignments and Lists
Factory Setting	Not applicable
Valid Entries	0 to 7
Inspect	Yes
Copy Option	Yes
Console Procedure	Tables → AllowTo → Dial list no. → Enter → Dial ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F2]</u> → Type list no. → <u>[F10]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Disallowed Lists

Use this procedure to establish Disallowed Lists. These lists are telephone numbers that cannot be dialed from specified telephones (including unrestricted telephones).

A maximum of 8 lists (numbered 0 through 7) with 10 entries each (numbered 0 through 9) are allowed. Each number can have a maximum of 11 digits, including a wildcard.

Summary: Disallowed Lists

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6g, Call Restriction Assignments and Lists
Factory Setting	Not applicable
Valid Entries	1- to 11-digits with 1 wildcard
Inspect	No
Copy Option	No
Console Procedure	Tables → Disallow → Dial list no. and entry no. → Enter → Drop → Dial no. → Enter → Exit
PC Procedure	[F8] → [F3] → Type list no. and entry no. → [F10] → [Alt] + [P] → Type no. → [F10] → [F5]

Assign Disallowed Lists to Telephones

Use this procedure to assign established Disallowed Lists to individual telephones. Each restricted telephone can be assigned to more than one list.

Summary: Assign Disallowed Lists to Telephones

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 6g, Call Restriction Assignments and Lists
Factory Setting	Not applicable
Valid Entries	0 to 7
Inspect	Yes
Copy Option	Yes
Console Procedure	Tables → DisallowTo → Dial list no. → Enter → Dial ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F4]</u> → Type list no. → <u>[F10]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Remote Access Features

This section covers the following Remote Access features:

- Remote Access Trunk Assignment
- Remote Access Automatic Callback
- Remote Access without Barrier Codes
- Remote Access Barrier Codes
- Remote Access with Barrier Codes



Security Alert:

As a customer of a new telephone system, you should be aware that there exists 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 onto 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 remote access features.

The Remote Access feature of your system, if you choose to use it, permits off-premises callers to access the system from a remote telephone by using an 800 number or a 7- or 10-digit telephone number. 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. If you do not program specific 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 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 (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 follow these basic rules:

- Use a nonpublished remote access number.
- Assign barrier 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 barrier codes, which are less likely to be broken.
- Deactivate all unassigned codes promptly.
- Ensure that remote access users are aware of their responsibility to keep the telephone number and any barrier codes secure.
- When possible, restrict the off-network capability of off-premises callers using the Call Restrictions and Disallowed List capabilities.

- 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 forward to persons on a need-to-have basis.

Remote Access Trunk Assignment

Use this procedure to assign or remove the trunks used for remote access. You can also use this procedure to specify whether the Remote Access feature is dedicated (always used for remote access) or shared (used for remote access only when Night Service is activated).

Trunks used for dedicated remote access must not be assigned to ring into a calling group or the QCC queue (Hybrid/PBX mode only).

In Hybrid/PBX mode, if a trunk assigned to ring into the QCC queue is also used for shared remote access, perform the procedure below before you perform the “QCC Operator to Receive Calls” procedure.

NOTE:

A loop start trunk must be programmed for Reliable Disconnect if it is to be used for remote access (see “Disconnect Signaling Reliability”).

Summary: Remote Access Trunk Assignment

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3a, Incoming Trunks: Remote Access
Factory Setting	Remote Access is not assigned
Valid Entries	Dedicated, Shared, No Remote
Inspect	Yes
Copy Option	No
Console Procedure	LinesTrunks → RemoteAccss → LinesTrunks → Dial line/trunk no. → Enter → Specify how trunk is used → Enter → Exit → Exit
PC Procedure	<u>[F4]</u> → <u>[F8]</u> → <u>[F1]</u> → Type line/trunk no. → <u>[F10]</u> → Specify how trunk is used → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Remote Access Automatic Callback

Use this procedure either to allow remote access users to use the Automatic Callback feature to request busy lines/trunks or pools or to prevent use of the Automatic Callback feature.

NOTE:

This feature applies to Hybrid/PBX mode only.

Summary: Remote Access Automatic Callback

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3a, Incoming Trunks: Remote Access
Factory Setting	Disable
Valid Entries	Disable, Enable
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → RemoteAccss → AutoQueueing → Enable or Disable → Enter → Exit → Exit
PC Procedure	[F4] → [F8] → [F6] → [F1] or [F2] → [F10] → [F5] → [F5]

Remote Access Without Barrier Codes

Use this procedure to change the class of restriction for one of the following:

- All non-tie lines/trunks
- All tie trunks and DID trunks with Remote Access
- DID remote access code

NOTE:

If barrier code requirements have been established for remote access users, use “Remote Access with Barrier Codes” and not this procedure.

The class of restriction assigned may be one of the following:

- **Restriction.** Determines whether remote access users can make local and/or toll calls and includes the following settings:
 - Unrestricted
 - Toll restricted
 - Outward restricted
- **ARS Facility Restriction Level** (Hybrid/PBX only). Allows or disallows use of outgoing trunks by assigning a facility restriction level from 0 through 6. The FRL ranges from 0 (most restrictive) to 6 (least restrictive). The FRL value assigned here is the opposite of the FRL value assigned to the ARS route, where a value of 0 is the least restrictive, and a value of 6 is the most restrictive.
- **Allowed Lists Assignment.** Assigns Allowed Lists and is used when remote access users are restricted from making local or toll calls.
- **Disallowed Lists Assignment.** Assigns Disallowed Lists and is used when remote access users are not restricted from making local or toll calls.

A maximum of eight Allowed or Disallowed Lists can be assigned to lines/trunks.

Class of restriction settings are assigned either to all non-tie trunks or to all tie trunks and DID trunks. They cannot be assigned to each trunk on an individual basis.

Summary: Remote Access Without Barrier Codes

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3a, Incoming Trunks: Remote Access
Factory Setting	Call restriction: Outward restricted ARS restriction level: 3
Valid Entries	Unrestricted, Toll Restricted, Outward Restricted; 0 to 6
Inspect	No
Copy Option	No
Console Procedure	To change Call Restrictions: LinesTrunks → RemoteAccss → Non-TIE or TIE Lines → Restriction → Select restriction → Enter → Exit → Exit → Exit → Exit To change ARS Facility Restriction Level: LinesTrunks → RemoteAccss → Non-TIE or TIE Lines → ARS Restrict → Drop → Dial FRL value → Enter → Exit → Exit → Exit → Exit To assign/remove Allowed Lists: LinesTrunks → RemoteAccss → Non-TIE or TIE Lines → Allow List → Dial list no. → Enter → Exit → Exit → Exit → Exit

To assign/remove Disallowed Lists:

LinesTrunks → **RemoteAccss** → **Non-TIE** or **TIE Lines** → **DisallowLst** → Dial list no. → **Enter** → **Exit** → **Exit** → **Exit** → **Exit**

PC Procedure

To change Call Restrictions:

[F4] → [F8] → [F2] or [F3] → [F2] → Select restriction → [F10] → [F5] → [F5] → [F5] → [F5]

To change ARS Facility Restriction Level:

[F4] → [F8] → [F2] or [F3] → [Alt] + [P] → Type FRL value → [F10] → [F5] → [F5] → [F5] → [F5]

To assign/remove Allowed Lists:

[F4] → [F8] → [F2] or [F3] → [F4] → Type list no. → [F5] → [F5] → [F5] → [F5]

To assign/remove Disallowed Lists:

[F4] → [F8] → [F2] or [F3] → [F6] → Type list no. → [F10] → [F5] → [F5] → [F5] → [F5]

Remote Access Barrier Codes

Use this procedure to establish or remove barrier code requirements as well as to establish or remove the barrier codes themselves.

Barrier codes are security passwords that restrict users from making unauthorized remote access calls on tie and non-tie lines and trunks. Callers are allowed three attempts per call to enter the correct remote access barrier code. If the caller enters an incorrect barrier code or times out during code entry, the caller hears the retry tone. The caller can erase an entered code by dialing ** (two asterisks). Code erasure is counted as one of the three permitted attempts. After three unsuccessful attempts, the caller hears a reorder tone and the call is disconnected. If this happens, the SMDR will contain sixteen 0's in the Account Code field to flag the three failed attempts.

A maximum of 16 barrier codes are allowed for all lines/trunks. Each of the 16 barrier codes may be programmed with its own class of restriction (COR).

The systemwide barrier code length can range from a minimum of 4 characters to a maximum of 11 characters. The default length is 7. If you enter a length that is less than 4 or greater than 11, the entry is erased and the previous entry displays on the screen. When the barrier code length is changed, all barrier codes are erased and must be reassigned.

The time and date of the most recent change made to the systemwide barrier code length is shown during the system programming procedure as well as on the Remote Access DISA Information report. The SMDR record for incoming remote access trunks includes the barrier code IDs established in this procedure.

Use numbers 0 through 9 and the asterisk (*) to enter the barrier codes. The codes cannot start with an asterisk and cannot contain two consecutive asterisks. (The use of two consecutive asterisks is reserved for users to erase an incorrect barrier code entry.)

See "Remote Access with Barrier Codes: Class of Restriction" to allow or deny use of system features for each barrier code assigned.

Summary: Remote Access Barrier Codes

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3a, Incoming Trunks: Remote Access
Factory Setting	No barrier codes are established
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	To establish or remove code requirements: LinesTrunks → RemoteAccss → Non-Tie or TIE Lines → BarrierCode → Specify whether barrier codes are required → Enter → Exit → Exit → Exit To change barrier code length: LinesTrunks → RemoteAccss → BarrierCode → Code Info → Code Length → Drop → Dial code length → Enter → Yes → Exit → Exit → Exit To change barrier code: LinesTrunks → RemoteAccss → BarrierCode → Code Info → Code Entry → Dial code ID → Enter → Drop → Dial code → Enter → Exit → Exit → Exit
PC Procedure	To establish or remove code requirements: [F4] → [F8] → [F2] or [F3] → [F1] → Specify whether barrier codes are required → [F10] → [F5] → [F5] → [F5] To change barrier code length: [F4] → [F8] → [F4] → [F2] → [F1] → [Alt] + [P] → Type code length → [F10] → [F2] → [F5] → [F5] → [F5] To change barrier code: [F4] → [F8] → [F4] → [F2] → [F2] → Type Code ID → [F10] → [Alt] + [P] → Type code → [F10] → [F5] → [F5] → [F5]

Remote Access with Barrier Codes

Use this procedure to change the class of restriction for individual remote access barrier codes. The class of restriction assigned to each barrier code allows or denies the use of the following system features:

- **Restriction.** Determines whether remote access users can make local and/or toll calls, and includes the following settings:
 - Unrestricted
 - Toll restricted
 - Outward restricted
- **ARS Facility Restriction Level** (Hybrid/PBX only). Allows or restricts use of outgoing trunks by assigning a facility restriction level (FRL) from 0 through 6. The FRL ranges from 0 (most restrictive) to 6 (least restrictive). The FRL value assigned here is the opposite of the FRL value assigned to the ARS route, where a value of 0 is the least restrictive, and a value of 6 is the most restrictive.
- **Allowed Lists Assignment.** Assigns Allowed Lists and is used when remote access users are restricted from making local or toll calls.
- **Disallowed Lists Assignment.** Assigns Disallowed Lists and is used when remote access users are not restricted from making local or toll calls.

A maximum of eight Allowed or Disallowed Lists can be assigned to each barrier code. Class of restriction settings apply to individual barrier codes.

NOTE:

If barrier code requirements have not been established or have been removed for remote access users, do not use this procedure. See “Remote Access Without Barrier Codes.”

Summary: Remote Access with Barrier Codes

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 3a, Incoming Trunks: Remote Access .
Factory Setting	Call restrictions: Barrier Code: outward restricted All other barrier codes: unrestricted ARS restriction level: 3
Valid Entries	Unrestricted, Toll Restricted, Outward Restricted; 0 to 6
Inspect	No
Copy Option	No
Console Procedure	LinesTrunks → RemoteAccss → BarrierCode → Restriction → Dial barrier code no. → Enter → Select restriction → Enter → ARS Restrict → Dial barrier code no. → Enter → Drop → Dial FRL value → Enter → Allow List or Disallow List → Dial barrier code no. → Enter → Dial list no. → Enter → Exit → Exit → Exit → Exit
PC Procedure	[F4] → [F8] → [F4] → [F3] → Type barrier code no. → [F10] → Select restriction → [F10] → [F4] → Type barrier code no. → [F10] → [Alt] + [P] → Type FRL value → [F10] → [F6] or [F7] → Type barrier code no. → [F10] → [F5] → [F5] → [F5] → [F5]

Automatic Route Selection

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This section contains programming procedures for the following Automatic Route Selection (ARS) features:

- 1 + 7-Digit Dialing Requirements
- ARS Tables
- Start and Stop Times for Subpatterns
- Pool Routing
- Facility Restriction Level (FRL)
- Digit Absorption
- Other Digits
- N11 Special Numbers Tables
- Dial 0 Table
- Voice and/or Data Routing

NOTE:

ARS applies to Hybrid/PBX mode only.

1 + 7-Digit Dialing Requirements

Use this procedure for calls placed within the same (home) area code as the system. The procedure allows you to specify whether or not the local telephone company requires a 1 to precede the 7-digit number. The two available settings are:

- **Within Area Code.** Requires that a 1 plus a 7-digit number must be dialed; the system checks the 1 + 7-digit tables for routing.
- **Not Within Area Code.** Does not require that a 1 precede the 7-digit number (the system does this automatically).

Summary: 1 + 7-Digit Dialing Requirements

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables
Factory Setting	Not within area code
Valid Entries	Not within area code, Within area code
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → ARS 1+7Dial → Within Area Code or Not within Area Code → Enter → Exit → Exit
PC Procedure	[F8] → [F6] → [F1] → [F1] or [F2] → [F10] → [F5] → [F5]

ARS Tables

Use this procedure for the following tasks:

- To specify type of table (6-digit, area code, exchange, or 1 + 7-digit number).
- To add or change area codes to be included in each table.
- To add or change exchanges to be included in each table.

A maximum of 16 tables can be established, numbered 1 through 16. Each table can have a maximum of 100 entries, numbered 1 through 100. Tables 17 and 18, the Default Toll and Default Local tables respectively, cannot be changed.

The first entry in a 6-digit table must be the area code. Subsequent entries consist of exchanges within that area code.

Area code tables can contain only area codes.

Exchange and 1 + 7-digit tables can contain only exchanges.

The wildcard character (Pause) cannot be used to enter area codes or exchanges in ARS tables.

Summary: ARS Tables

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	Yes
Copy Option	No
Console Procedure	Tables → ARS → ARS Input → Dial table no. → Enter → Specify table type → Enter → Dial entry no. → Enter → Drop → Dial no. → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F2]</u> → Type table no. → <u>[F10]</u> → Select table type → <u>[F10]</u> → Type entry no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Start and Stop Times for Subpatterns

Use this procedure to specify the time of day that calls are routed using Subpattern B routing information.

Subpatterns are used to provide two different routing patterns according to the time of day. This allows you to take advantage of lower rates that may apply to some or all lines, or to change restrictions on some facilities during off hours.

The stop time for Subpattern B is the start time for Subpattern A.

Enter the time in 4-digit, 24-hour notation, and use leading zeros as necessary.

Summary: Start and Stop Times for Subpatterns

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	No time is specified, thus all calls are routed according to Subpattern A.
Valid Entries	0000 to 2359
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → Sub B Start → Dial table no. → Enter → Drop → Dial start time → Enter → Sub B Stop → Dial table no. → Enter → Drop → Dial stop time → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F6]</u> → <u>[F8]</u> → Type table no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type start time → <u>[F10]</u> → <u>[F8]</u> → Type table no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type stop time → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Pool Routing

Use this procedure to identify the trunk pools on which to route calls to area codes and/or exchanges included in ARS tables.

A maximum of six routes (numbered 1 through 6) can be specified for each subpattern. Pool routing is programmed for Tables 1 through 16. Tables 17 and 18, the Default Toll and Default Local tables respectively, cannot be changed.

Summary: Pool Routing

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → Sub A Pools or Sub B Pool → Dial table no. and pool route no. → Enter → Dial pool dial-out code → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F6]</u> → <u>[F3]</u> or <u>[F10]</u> → Type table no. and pool route no. → <u>[F10]</u> → Type pool dial-out code → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Facility Restriction Level

Use this procedure to assign a Facility Restriction Level (FRL) to each route. The FRL ranges from 0 (least restrictive) to 6 (most restrictive) and is used to restrict user access to the route. The FRL assigned to telephones and remote access users is the opposite of the FRL assigned to routes, where 0 is the most restrictive and 6 is the least restrictive.

NOTE:

Pool routes must be programmed before you assign Facility Restriction Levels.

Facility Restriction Levels are assigned to Tables 1 through 18. Tables 17 and 18, the Default Toll and Default Local tables respectively, cannot be changed.

Summary: Facility Restriction Level

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	3
Valid Entries	0 to 6
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → Sub A FRL or More and Sub B FRL → Dial table no. and pool route no. → Enter → Dial restriction level → Enter → Exit → Exit
PC Procedure	[F8] → [F6] → [F4] or [PgUp] and [F1] → Type table no. and pool route no. → [F10] → Type restriction level → [F10] → [F5] → [F5]

Digit Absorption

Use this procedure to specify how many of the digits dialed (0 through 11) by the caller should be absorbed (not sent to the telephone company's central office) by the system when a call is made on an identified route.

Entries of 1 through 11 indicate that the system should not send the specified number of digits, starting with the first digit dialed by the user after the dial-out code.

Digit absorption is assigned to Tables 1 through 18.

NOTE:

Pool routes must be programmed before you assign digit absorption.

Summary: Digit Absorption

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables
Factory Setting	0
Valid Entries	0 to 11
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → SubA Absorb or More and SubB Absorb → Dial table no. and pool route no. → Enter → Drop → Dial no. of digits to absorb → Enter → Exit → Exit
PC Procedure	[F8] → [F6] → [F6] or [PgUp] and [F2] → Type table no. and pool route no. → [F10] → [Alt] + [P] → Type no. of digits to absorb → [F10] → [F5] → [F5]

Other Digits

Use this procedure to specify other (extra) digits that must be added by the system to the beginning of the number dialed by the caller, when calls are placed on an identified route.

NOTES:

1. Pool routes must be programmed before you assign other digits.
2. A maximum of 20 digits can be added, in any combination of the digits 0 through 9.
3. Special characters such as switchhook flash, Stop, and # cannot be included as extra digits. Pause is allowed in every position but the first.
4. Other digits are assigned to Tables 1 through 18.

Summary: Other Digits

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3f, Automatic Route Selection Tables
Factory Setting	0
Valid Entries	Up to 20 digits (any combination of 0 to 9)
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → Sub A Digit or More and Sub BDigit → Dial table no. and pool route no. → Enter → Drop → Dial digits to be added → Enter → Exit → Exit
PC Procedure	<u>[F8]</u> → <u>[F6]</u> → <u>[F7]</u> or <u>[PgUp]</u> and <u>[F3]</u> → Type table no. and pool route no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type digits to be added → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

N11 Special Numbers Tables

Use this procedure to specify Facility Restriction Level (FRL) and/or digits that must be added when emergency numbers in the N11 Special Numbers table are dialed (for example, 411, 811, or 911).

Subpattern B, absorb, and pool routing cannot be programmed for the N11 Special Numbers tables.

Summary: N11 Special Numbers Tables

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	To change Facility Restriction Level: Tables → ARS → More → SpecNumber → ARS FRL → Drop → Dial FRL value → Enter → Exit → Exit → Exit To program other digits: Tables → ARS → More → SpecNumber → ARS Digit → Drop → Dial digits → Enter → Exit → Exit → Exit
PC Procedure	To change Facility Restriction Level: [F8] → [F6] → [PgUp] → [F4] → [F1] → [Alt] + [P] → Type FRL value → [F10] → [F5] → [F5] To program other digits: [F8] → [F6] → [PgUp] → [F4] → [F2] → [Alt] + [P] → Type digits → [F10] → [F5] → [F5]

Dial 0 Table

Use this procedure to specify pool routing, Facility Restriction Level (FRL), and Other Digits for the Dial 0 table.

Only one route can be specified. The Subpattern B route cannot be specified for this table, and digit absorption cannot be specified.

Summary: Dial 0 Table

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	3
Valid Entries	0 to 6
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → More → Dial 0 → ARS Pool or ARS FRL or ARS Digits → Dial value → Enter → Exit → Exit → Exit
PC Procedure	[F8] → [F6] → [PgUp] → [F6] → [F1] or [F2] or [F3] → Type value → [F10] → [F5] → [F5] → [F5]

Voice and/or Data Routing

Use this procedure to route voice, data, or voice and data. The voice/data specification is used mainly in conjunction with PRI. See Chapter 9, "PRI Facilities," especially its subtopic, "Outgoing Tables."

Voice/data routes can be associated with Subpattern A or Subpattern B.

Summary: Voice and/or Data Routing

Programmable by	System manager
Mode	Hybrid/PBX
Idle Condition	Not required
Planning Form	Form 3g, Automatic Route Selection Default and Special Numbers Tables
Factory Setting	Voice
Valid Entries	Voice Only, Data Only, Voice Data
Inspect	No
Copy Option	No
Console Procedure	Tables → ARS → More → Sub A Data or Sub B Data → Dial table no. and route no. → Enter → Select capability → Enter → Exit → Exit
PC Procedure	[F8] → [F6] → [PgUp] → [F7] or [F8] → Type table no. and route no. → [F10] → Select capability → [F10] → [F5] → [F5]

This section contains summary information for the following optional Night Service features:

- Night Service Group Assignment
- Night Service with Outward Restriction
- Night Service with Time Set

Night Service Group Assignment

Use this procedure to assign extensions and calling groups to a Night Service group for coverage after hours.

A maximum of eight Night Service groups can be assigned (no more than one for each operator position assigned). Any number of extensions can be assigned to a Night Service group, and an extension can belong to more than one group.

A calling group can also be assigned to a Night Service group. This applies only to Release 2.0 or later.

Summary: Night Service Group Assignment

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 9a, Night Service: Group Assignment
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	To assign a calling group to a Night Service group: NightSrvce → GroupAssign → Calling Group → Dial ext. no. of Night Service attendant → Enter → Dial calling group no. → Enter → Exit → Exit To assign an extension to a Night Service group: NightSrvce → GroupAssign → Extensions → Dial ext. no. of Night Service attendant → Enter → Dial ext. no. of telephone → Enter → Exit → Exit
PC Procedure	To assign a calling group to a Night Service group: <u>[F10]</u> → <u>[F1]</u> → <u>[F2]</u> → Type ext. no. of Night Service attendant → <u>[F10]</u> → Type calling group no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> To assign an extension to a Night Service group: <u>[F10]</u> → <u>[F1]</u> → <u>[F1]</u> → Type ext. no. of Night Service attendant → <u>[F10]</u> → Type ext. no. of telephone → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Night Service with Outward Restriction

Use this procedure to prevent unauthorized use of telephones after hours. This feature requires the user to enter a password to make a call when Night Service is activated, unless one of the lists below applies. It also requires an operator to enter a password in order to manually activate Night Service.

This procedure is also used to establish the following lists:

- **Emergency Allowed List.** A list of telephone numbers that can be dialed without a password.
- **Exclusion List.** A list of extensions that are exempt from password requirements.

NOTES:

1. A maximum of six telephone numbers can be included on the Emergency Allowed List, each number with a maximum of 12 digits.
2. Extensions included in the Exclusion List keep normal call restrictions (if any are assigned); however, they are not protected in any other way from unauthorized use after hours.
3. AUDIX Voice Power jacks are automatically included on the Exclusion List.

Summary: Night Service with Outward Restriction

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 9b, Night Service: Outward Restrictions
Factory Setting	No password
Valid Entries	4 digits (any combination of 0 to 9)
Inspect	Yes (Exclusion List)
Copy Option	No
Console Procedure	NightSrvce → OutRestrict → Drop → Dial password → Enter → Emergency → Dial item no. → Enter → Drop → Dial telephone no. → Enter → ExcludeList → Dial ext. no. → Enter → Exit → Exit
PC Procedure	<u>[F10]</u> → <u>[F2]</u> → <u>[Alt]</u> + <u>[P]</u> → Type password → <u>[F10]</u> → <u>[F3]</u> → Type item no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type telephone no. → <u>[F10]</u> → <u>[F4]</u> → Type ext. no. → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

Night Service with Time Set

Use this procedure to specify the time of day and the days of the week when Night Service is to be activated and deactivated.

Enter the time of day as 4 digits, using 24-hour notation. Enter the day of the week as a single digit (0 to 6), with 0 being Sunday. If you enter an invalid number, the system truncates the number.

If you change the system time while Night Service is active, Night Service is deactivated automatically and you must manually reactivate it.

Operators can override the timer and turn Night Service on and off manually. This feature can be deactivated when out-of-the-ordinary situations occur (for example, a midweek holiday).

NOTE:

For Release 2.1 and earlier, after setting Start and Stop time for Night Service the current day of the week for Night Service must be set using the following procedure.

NightSrvce → **Day of Week** → Dial the current day of the week → **Enter** → **Exit**

If system programming information is being loaded into memory from a backup diskette, the current day of the week must be reset.

Night Service can be turned off by using the following procedure:

NightSrvce → **Day of Week** → Dial 9 → **Enter** → **Exit**

Summary: Night Service with Time Set

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 9c, Night Service: Time Set
Factory Setting	Not applicable
Valid Entries	Day: 0 to 6; Time: 0000 to 2359
Inspect	No
Copy Option	No
Console Procedure	To add or change start/stop time: NightSrvce → Start → Drop → Dial start day and time → Enter → Stop → Drop → Dial stop day and time → Enter → Exit To activate/deactivate: NightSrvce → Time Control → Off or On → Enter → Exit
PC Procedure	To add or change start/stop time: <u>[F10]</u> → <u>[F6]</u> → <u>[Alt]</u> + <u>[P]</u> → Type start day and time → <u>[F10]</u> → <u>[F7]</u> → <u>[Alt]</u> + <u>[P]</u> → Type stop day and time → <u>[F10]</u> → <u>[F5]</u> To activate/deactivate: <u>[F10]</u> → <u>[F8]</u> → <u>[F1]</u> or <u>[F2]</u> → <u>[F10]</u> → <u>[F5]</u>

This section contains summaries on adding or changing labels for the following:

- Extension Directory
- Lines or Trunks
- Posted Message
- Group Calling
- System Speed Dial Directory

These procedures can be done using Integrated Administration.

Programming on the system programming console:

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.

Programming with SPM:

Use the PC keyboard for labels. All letters appear on the screen in uppercase.

NOTE:

See the MLX-20L User's Guide for instructions on creating or editing a personal directory.

Extension Directory

Use this procedure to establish alphanumeric system labels for display set telephone users to identify the person calling or leaving a message. This procedure is also used to program the Extension Directory feature for MLX telephones.

A label can have a maximum of seven characters.

Summary: Extension Directory

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 2a, System Numbering: Extension Jacks
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	More → Labeling → Directory → Extension → Dial ext. no. → Enter → Drop → Enter label → Enter → Exit → Exit → Exit
PC Procedure	[PgUp] → [F1] → [F1] → [F2] → Type ext. no. → [F10] → [Alt] + [P] → Type label → [F6] → [F5] → [F5] → [F5]

Lines or Trunks

Use this procedure to establish alphanumeric system labels for display set telephone users to identify the line or trunk being used.

Summary: Lines or Trunks

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 2c, System Numbering: Line/Trunk Jacks
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	More → Labeling → LinesTrunks → Dial line/trunk no. → Enter → Drop → Dial label → Enter → Exit → Exit
PC Procedure	<u>[PgUp]</u> → <u>[F1]</u> → <u>[F2]</u> → Type line/trunk no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type label → <u>[F6]</u> → <u>[F5]</u> → <u>[F5]</u>

Posted Message

Use this procedure to add or change existing posted messages. The posted messages allow callers with display telephones to know why the called extension does not answer.

Each posted message can have a maximum of 16 characters. Messages 2 through 20 can be changed through programming. Message 1, Do Not Disturb, cannot be changed.

Summary: Posted Message

Programmable by	System manager, Integrated Administration
Mode	All
Idle Condition	Not required
Planning Form	Form 8a, Label Form: Posted Message
Factory Setting	First 10 messages
Valid Entries	1 to 20
Inspect	No
Copy Option	No
Console Procedure	More → Labeling → PostMessage → Dial message no. → Enter → Drop → Enter message → Enter → Exit → Exit
PC Procedure	<u>[PgUp]</u> → <u>[F1]</u> → <u>[F3]</u> → Type message no. → <u>[F10]</u> → <u>[Alt]</u> + <u>[P]</u> → Type message → <u>[F6]</u> → <u>[F5]</u> → <u>[F5]</u>

Group Calling

Use this procedure to establish alphanumeric system labels for display telephone users to identify calling groups.

A label can have a maximum of seven characters.

Summary: Group Calling

Programmable by	System manager, Integrated Administration
Mode	All
Idle Condition	Not required
Planning Form	Form 6e, Group Calling
Factory Setting	Not applicable
Valid Entries	Not applicable
Inspect	No
Copy Option	No
Console Procedure	More → Labeling → Grp Calling → Dial calling group ext. no. → Enter → Drop → Enter label → Enter → Exit → Exit
PC Procedure	[PgUp] → [F1] → [F4] → Type calling group ext. no. → [F10] → [Alt] + [P] → Type label → [F6] → [F5] → [F5]

System Speed Dial Directory

Use this procedure to establish System Speed Dial numbers for all system users. You can also use this procedure to enter the alphanumeric labels shown on display telephones (for the System Directory feature of the MLX telephone).

A total of 130 numbers (System Speed Dial plus System Directory) can be entered, with a maximum of 11 characters per label.

Speed dial code assignments are 600 through 729.

Summary: System Speed Dial Directory

Programmable by	System manager, Integrated Administration
Mode	All
Idle Condition	Not required
Planning Form	Form 8b, System Speed Dial
Factory Setting	Not applicable
Valid Entries	600 to 729
Inspect	No
Copy Option	No
Console Procedure	More → Labeling → Directory → System → Dial dial code no. → Enter → Drop → Enter label → Enter → Backspace → Dial telephone no. → Enter → Yes or No → Enter → Exit → Exit → Exit
PC Procedure	[PgUp] → [F1] → [F1] → [F1] → Type dial code no. → [F10] → [Alt] + [P] → Type label → [F6] → [F2] → Type telephone no. → [F6] → [F1] or [F2] → [F6] → [F5] → [F5] → [F5]

Use the procedures in this section to change the language for system reports and to print the system reports.

Report Language

Use this procedure to change the language of the system reports. It applies to Release 1.1 and higher. Unless you change the report language, reports are printed in the language chosen as the system language.

Summary: Report Language

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Form 1, System Planning
Factory Setting	English
Valid Entries	English, French, Spanish
Inspect	No
Copy Option	No
Console Procedure	More → Language → Printer → English or French or Spanish → Enter → Exit
PC Procedure	[PgUp] → [F6] → [F4] → [F1] or [F2] or [F3] → [F10] → [F5]

Printing System Reports

The communications system can be used to print a variety of reports. You can print individual reports or use the **All** option to print the entire set of available reports, including all report sections and options. See Appendix F for samples of the print reports.

Use this procedure to print the reports listed below. With the exception of Trunk Information, the dash lists under the bullets show the sections of each report that automatically print when the report option is selected.

- All
 - Each report
 - All report options
- System Set Up
- System Dial Plan
 - Pools
 - Telephone Paging Zones
 - Direct Group Calling
 - Lines/Trunks
 - Stations (Extensions)
- Label Information
 - Telephone Personal Directory
 - Message Numbers and Posted Messages

- Trunk Information¹
 - TIE
 - DID
 - Loop/Ground
 - General
- T1 Information
- PRI Information
- Remote Access
 - General Options
 - Non-TIE Restrictions
 - TIE Restrictions
 - Barrier Code Restrictions
- Operator Information
 - Position
 - General Options
 - DSS Options
 - QCC Operators
 - Operator Information
- Allowed Lists
- Allowed Lists Assigned to Extensions
- Disallowed Lists
- Disallowed Lists Assigned to Extensions
- Automatic Route Selection
- Tables

¹Trunk option must be specified

- Extension Directory
- System Directory
- Group Page
- Extension information
- Group Coverage
- Group Calling
- Night Service
- Call Pickup Groups
- Error Logs
- Authorization Codes

NOTES:

1. If you select the **All** option, keep in mind that the reports take several minutes to print. You may want to schedule use of the printer during off-peak hours.
2. If you select a report for which there is no information, the report header still prints.
3. Print reports if you cannot backup your system programming information.
4. Do not print reports if your system must handle more than 100 calls per hour.
5. If you are printing from the console, your printer must be connected to the SMDR port. if you are programming on a PC with SPM, you have the following choices:
 - Print reports on the SMDR printer (if available).
 - Print reports on the PC printer.
 - Save reports (on hard disk or floppy).
 - View reports (browse).

See *System Programming and Maintenance (SPM)* for details.

Summary: Printing System Reports

Programmable by	System manager
Mode	All
Idle Condition	Not required
Planning Form	Not applicable
Factory Setting	Not applicable
Valid Entries	Any saved report
Inspect	No
Copy Option	No
Console Procedure	To print trunk information: More → Print → Trunk Info → Select trunk type → Exit To print extension information: More → Print → More → Ext Info → Dial extension number → Enter → Exit To print all other reports: More → Print → Select report → Exit
PC Procedure	To print trunk information: <u>[PgUp]</u> → <u>[F3]</u> → <u>[F6]</u> → Select trunk type → <u>[F5]</u> To print extension information: <u>[PgUp]</u> → <u>[F3]</u> → <u>[PgUp]</u> → <u>[F10]</u> → Type extension number → <u>[F10]</u> → <u>[F5]</u> To print all other reports: <u>[PgUp]</u> → <u>[F3]</u> → Select report → <u>[F5]</u> To save report on disk: <u>[PgUp]</u> → <u>[F3]</u> → Select report → <u>[F10]</u> → GOTO FLOPPY → <u>[F10]</u> To view report: <u>[Ctrl]</u> + <u>[F8]</u>

This section covers the programming procedure for analog multiline telephones connected by a General-Purpose Adapter (GPA) to a data terminal and modem.

Other data programming procedures can be found in earlier sections of this book. Refer to Table 20-1 for specific information.

Table 20-1. Data Features: Programming Procedures

Procedure	Chapter
Assign Trunks or Pools to Data Stations	10: "Telephones"
Copy Trunk Assignments	10: "Telephones"
Assign Intercom or System Access Buttons	10: "Telephones"
Pool Dial-Out Code (Hybrid/PBX only)	12: "Optional Telephone Features"
Call Restrictions	12: "Optional Telephone Features"
Copy Call Restrictions	12: "Optional Telephone Features"
Forced Account Code Entry	12: "Optional Telephone Features"
Ringling Options	<i>System Programming</i> , Chapter 5, "Centralized Telephone Programming"
Assign Data Hunt Group Members	14: "Group Calling Member Assignments" in "Optional Group Features"
Assign Data Hunt Group Trunks or Pools	14: "Group Calling Line/Trunk or Pool Assignments" in "Optional Group Features"
Group Type	14: "Group Type" in "Optional Group Features" (choice restricted to Automatic Log In)

Analog Multiline Telephones at Data Stations

Use this procedure to dedicate a pair of extension jacks to provide voice and data to an analog data station.

The extension number associated with the first (odd-numbered) extension jack in the pair is the telephone's extension number. The extension number for the second (even-numbered) extension jack is dedicated to Data.

NOTES:

1. Calls cannot be placed to the extension jack reserved for Data.
2. Voice Announce to Busy must be disabled at data stations.
3. When you select **Enter** after entering the voice extension number in the data entry screen, the system automatically assigns the data extension.
4. Use the Inspect feature to verify extension pairs.

Summary: Analog Multiline Telephones at Data Stations

Programmable by	System manager
Mode	All
Idle Condition	System idle
Planning Form	Form 2a, System Numbering: Extension Jacks Form 4b, Analog Multiline Telephone Form 5a, Direct-Line Console (DLC): Analog Data Form 2a, Analog Data Station
Factory Setting	Not applicable
Valid Entries	Extension numbers of analog sets
Inspect	Yes
Copy Option	Yes
Console Procedure	More → Data → Voice/Data → Dial ext. no. → Enter → Exit
PC Procedure	[PgUp] → [F2] → [F1] → Type ext. no. → [F10] → [F5]

NOTE:

This feature applies only to Release 2.0 or later of the communications system.

Integrated Administration is available in Hybrid/PBX and Key modes only.

Capabilities

The Integrated Administration capability of Integrated Solution III (IS III) simplifies the programming of common information for the communications system (the switch), AUDIX Voice Power and, if it is installed, the AT&T FAX Attendant System™. Since the AUDIX Voice Power and FAX Attendant applications use some of the same information programmed on the switch, Integrated Administration lets the installer or system manager make changes or additions to this information just once, instead of on both sides of the connection. Using Integrated Administration reduces programming time and effort and ensures that the switch and the applications are in agreement.

Common Information

The switch and the applications share the following information:

- System numbering of extensions, trunks, and pools
- System labeling of the user (or other input name) associated with each extension, trunk, and pool
- The coverage Group that sends its calls to the applications
- The calling group set up for each service of the applications
- The Reliable Disconnect setting for loop-start trunk
- The Delay Ring and Coverage Delay Interval settings
- The Transfer Return Time and VMS Transfer Return Interval settings

Set Up

You cannot program the common information until you have completed basic setup programming for the communications system. Use SPM or the system programming console to program the following:

- Mode of operation
- System numbering
- System operator positions
- Phantom extensions
- Lines/Trunks to pools assignment

NOTE:

If you do not want all lines to have the same application services, you must assign lines with the same services to the same pools

Programmable Options

When you complete the system setup, you can use the information in Table 21-1 to program through Integrated Administration.

Table 21-1. Programming through Integrated Administration

Option	Factory Setting	Range
Automated Attendant Calling Group	770	
Call Answer Calling Group	7926	
FAX Response Calling Group	7924	
Information Service Calling Group	7927	
Message Drop Calling Group	7928	
Voice Mail Calling Group	7925	
Coverage Group	30	1 to 30
Reliable Disconnect	yes	
Delay Ring	2 rings	1 to 6 rings
Coverage Delay Ring	3 rings	1 to 9 rings
VMS Transfer Return Interval	6 rings	0 to 9 rings
Transfer Return Time	6 rings	0 to 9 rings

The information programmed through Integrated Administration is shared with the communications system control unit. The information does not have to be programmed again when you program the communications system.

If extension numbering is changed on the switch (using the MLX-20L console or SPM), the switch and the application database will no longer be in agreement. To reduce the chance that such changes will disrupt communication between the switch and the application(s), Integrated Administration includes an automatic reconciliation program that runs every day at 3:00 a.m. The program compares the application database to the switch programming and brings the two into agreement. The program makes changes, as necessary, only to the application database, according to the rules listed in Table 21-2. The reconciliation program does not change the switch programming.

In a Release 2.0 or earlier system with Integrated Solution III Version 1.0 or 1.1, use the System Renumbering feature cautiously. When this feature is used, all messages and greetings for users that have been renumbered are erased from AUDIX Voice Power when the automatic reconciliation program runs at 3:00 a.m.

NOTE:

The reconciliation program is disabled in IS III Version 1.2.

Table 21-2. Database Reconciliation Rules

Extension appears in ...

Switch	Application Database	Action
yes	yes	None
yes	no	Extension is added to database. Can be added as AUDIX Voice Power or AUDIX Voice Power/FAX Attendant subscriber through Extension Directory screen.
no	yes (regular extension)	Extension is deleted from database and removed as an AUDIX Voice Power or AUDIX Voice Power/FAX Attendant subscriber.
no	yes (special extension)	Extension is retained as special-purpose extension in database,
yes	yes (special extension)	Extension is converted from special-purpose extension to regular extension in database.

When you finish programming the common information, you can complete any remaining system programming procedures. See the Feature Reference for additional information on Integrated Administration.

Complete information on IS III can be found in the *Integrated Solution III System Manager's Guide*, Order No. 555-601-010 and the *AT&T Integrated Solution III Installation and Maintenance Guide*, Order No. 555-601-011.

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.

Summary information is included for the following procedures:

- Memory Card Formatting
- Backup
- Automatic Backup
- Restore

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. See *Maintenance and Troubleshooting* for information about this feature.

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 22–1 shows a sample Translation card.

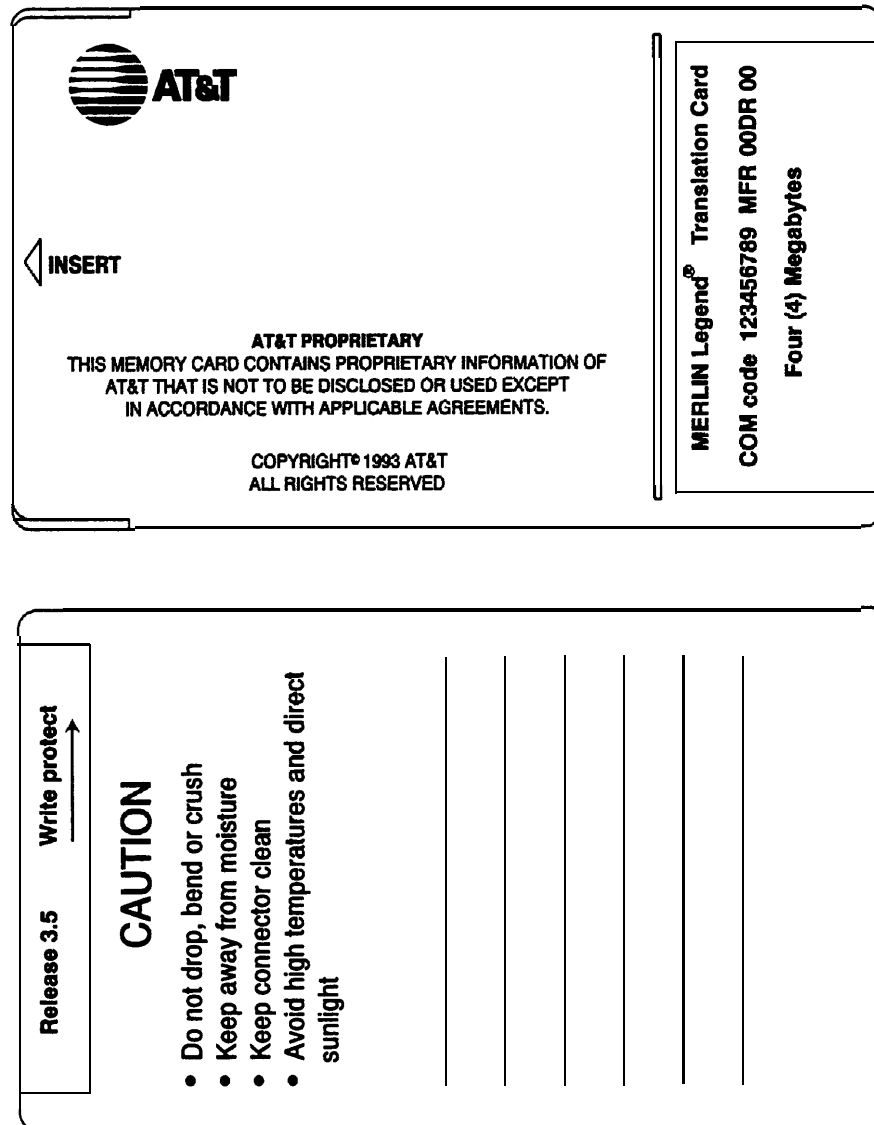


Figure 22-1. PCMCIA Memory Card

Memory Card Formatting

The memory card should 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.

	Memory Card Backup
	Inserted Memory Card is
	not the correct type.
	Do you want it formatted?
☐	Yes
☐	No
☐	Exit

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 maybe formatted, except those already formatted as backup/restore cards.
2. If a memory card cannot be formatted, a message appears on the 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 MERLIN LEGEND Communication System backup files.

Format Warning

Format Memory Card

All data on card will be DELETED.

Do you want to continue?

Yes

No

Exit

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 22-1 lists the screen messages that may appear while formatting is in progress.

Table 22-1. 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.

The Inspect feature (**Inspct** or [PgDn]) is available to view the attributes of the backup files on the memory card prior to initiating the backup procedure. The attributes included on the Inspect screen are the filename, the time and date of the file creation/update, the location of the system programming port, and information about the system software release from which the backup was made.

The list of backup files contains three manual backup filenames and two automatic backup filenames. The default names of the manual backup files are **BACK1.*******, **BACK2.*******, and **BACK3.*******. When you select one of the backup filenames, the system automatically replaces the stars in the filename with the current month and day (**mmdd**). For example, **BACK1.0116** would appear if you selected **BACK1.******* and performed the backup procedure on January 16. You can rename any of the three default files during the backup procedure. The automatic backup filenames are **AUTO.BACK1** and **AUTO.BACK2**. You cannot change the names of these files.

If you enter a filename that currently exists, the message **File already exists** appears. You must enter another filename.

While the backup is in progress, you cannot access system programming functions, your Personal Directory, or alarm clock functions (any programmed alarms are temporarily deactivated). You may terminate the backup procedure at any point prior to receiving confirmation of a successful backup.

If any type of programming is taking place at another extension when you begin the backup procedure, the backup is canceled and the number of the first busy extension appears on the screen. Attempt the backup procedure again when the busy extension becomes idle.

If the system is turned off during a backup procedure, the backup is terminated. The system performs a System Reset (cold start), after which you may repeat the backup procedure.

If **Home** or **Menu** are pressed during a backup procedure, the backup is terminated. This may result in the deletion of an old backup file. See Chapter 1, “Programming Basics,” for detail about these keys.

See Table 22-2, “Memory Card Backup/Automatic Backup Error Messages,” if the backup procedure fails.

Table 22-2. Memory Card Backup/Automatic Backup Error Messages

Message	What it Means
File has been DELETED.	Repeat the backup procedure.
Verify that Memory Card has been Inserted Correctly	Reinsert the memory card and repeat the backup procedure.
Memory Card is Write-Protected	Remove the memory card, flip the write protect tab, reinsert the card and repeat the backup procedure.
System Busy - Pls Wait	Repeat the backup procedure when no extensions are being programmed.
Inserted Memory Card is not the correct type.	Repeat the backup procedure with another card or format the memory card and repeat the backup procedure.
Backup Failure or Card Failure	Repeat the backup procedure with a different file and/or memory card.

Summary: Backup

Programmable by	System manager
Mode	All
Idle Condition	Not required (No extensions are allowed to be in programming mode except system programming console)
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 → <u>[F1]</u> → <u>[F9]</u> → <u>[F1]</u> → Select backup file → Type the new backup filename → <u>[F6]</u> → <u>[F1]</u> → <u>[F5]</u> → <u>[F5]</u> → <u>[F5]</u>

Automatic Backup

To preserve the most recent copy of your customized system data, you can program the system to automatically backup programming information onto the translation memory card. Automatic backups may be set for daily or weekly operation. If automatic backup is activated, the time may be set for daily backup (factory setting is 2:00 am) or the time and day maybe set for weekly backup (factory setting is 2:00 am Sunday).

The system places the automatic backup into one of two designated files: **AUTO.BACK1** and **AUTO.BACK2**. The system places the backup in whichever file is empty. If both files are empty, the system places the backup in **AUTO.BACK1**. If both files already contain backups, the system selects the older of the two files and overwrites it. The system performs this file “toggle” each time it performs an automatic backup.

While the backup is in progress, you cannot access system programming functions, your Personal Directory, or alarm clock functions (any programmed alarms are temporarily deactivated).

If any type of programming is taking place at an extension during the automatic backup procedure, the backup is canceled. The system does not re-attempt the backup.

If an automatic backup fails for any reason (including a system-busy condition), all of the programmed alarm buttons on system operator consoles light and the information is recorded in both the permanent error log and the last 10 error logs.

NOTE:

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 backups. See Table 22-2, “Memory Card Backup/Automatic Backup Error Messages,” to determine the cause of the automatic backup failure and correct the problem.

Summary: Automatic Backup

Programmable by	System manager
Mode	All
Idle Condition	Not required (No extensions are allowed to be in programming mode including the system programming console)
Planning Form	Form 1, System Planning
Factory Setting	Weekly backup (Sunday at 2:00 a.m.) (if daily backup is selected, time is factory set for 2:00 a.m.)
Valid Entries	Daily: hhmm (00 to 23; 00 to 59) Weekly: dhhmm (0 to 6; 00 to 23; 00 to 59)
Inspect	Yes
Copy Option	No
Console Procedure	To program daily backup: Insert memory card → System → Back/Restore → Auto Backup → Daily → Drop → Dial time → Enter → Exit → Exit To program weekly backup: Insert memory card → System → Back/Restore → Auto Backup → Weekly → Drop → Dial day and time → Enter → Exit → Exit
PC Procedure	To program daily backup: Insert memory card → <u>[F1]</u> → <u>[F9]</u> → <u>[F2]</u> → <u>[F2]</u> → <u>[Alt]</u> + <u>[P]</u> → Type time → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u> To program weekly backup: Insert memory card → <u>[F1]</u> → <u>[F9]</u> → <u>[F2]</u> → <u>[F3]</u> → <u>[Alt]</u> + <u>[P]</u> → Type day and time → <u>[F10]</u> → <u>[F5]</u> → <u>[F5]</u>

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.
- 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 date 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.

See Table 22-3, “Memory Card Restore Error Messages” if the restore procedure fails.

Table 22-3. Memory Card Restore Error Messages

Message	What it Means
RESTORE IS CANCELED System is DOWN.	Wait for the System Erase to complete and repeat the restore procedure with a different card or file.
Inserted Memory Card is not the correct type.	Repeat the restore procedure with the correct type of card.
Board Mismatch between control unit and file.	Repeat the restore procedure with another file. OR Modify the system hardware to match the configuration of the backup file and repeat the restore procedure with the same file.
Restore File Mode is Hybrid/PBX. Control Unit strap in place for KEY.	If the processor has been set for Permanent Key mode a restore to Hybrid/PBX is not possible. A qualified service associate should modify the processor and repeat the restore procedure.
Restore Failure Try a different file or a new Memory Card.	Repeat the restore procedure with a different file and/or memory card.
File is not compatible for Release X.Y	Repeat the restore procedure with a compatible file.
Change Sys Programming Port to Extension xxxx before Restoring.	Use the Inspect feature to view the system programming port specified in the backup file. Change the system programming port to match the port shown for the backup file and repeat the restore procedure.
Verify that the Memory Card has been inserted correctly.	Verify that the card is inserted correctly and repeat the procedure.

Summary: Restore

Programmable by	System manager
Mode	All
Idle Condition	System Forced Idle
Planning Form	Not applicable
Factory Setting	Not applicable
Valid Entries	Filenames
Inspect	Yes
Copy Option	No
Console Procedure	Insert memory card → System → Back/Restore → Restore → Select restore file → Yes
PC Procedure	Insert memory card → <u>[F1]</u> → <u>[F9]</u> → <u>[F5]</u> Select restore file → <u>[F3]</u>

Centralized Telephone Programming

23

This chapter describes centralized telephone programming for the system manager and includes the following information:

- Accessing centralized telephone programming
- Programming the features available with this function
- Programming a single telephone
- Copying programmed features from one extension to another extension (Release 2.0 and higher)

See the *Feature Reference* or the appropriate user or operator guide for details about each feature.

NOTE:

Only the system manager should perform the programming procedures described in this chapter.

Introduction

Centralized telephone programming allows the system manager to program any feature that can be programmed by individual telephone users, or by the system operator, onto another telephone in the system. Any feature that can be programmed at an individual telephone can be programmed using centralized telephone programming.

The following features can be programmed only by using centralized programming:

- Barge-In
- Headset Hang Up
- Intercom buttons: all types (Key and Behind Switch mode only)
- System Access buttons: all types (Hybrid/PBX only)

To perform centralized telephone programming, you can use the system programming console (see Chapter 1, “Programming Basics”) or a PC with SPM software (see *System Programming and Maintenance*).

In Release 2.0 and higher, if you are programming several telephones of the same type (that is, all analog or all MLX), program one extension and then use the programmed extension as a template for programming additional extensions. See “Copy Extension” and also refer to the planning forms.

NOTE:

Some programming can be performed only when the entire system or some part of it (such as a trunk or an extension) is idle. See “Idle States” in Chapter 1.

Access to Centralized Telephone Programming

Access the Centralized Programming menu from the System Programming menu. Centralized programming is performed by selecting features from the display or by using programming codes.

Follow the procedure below to access the Centralized Programming menu from the System Programming menu.

Console Procedure	More → Cntr-Prg → Program Ext or Copy Ext
PC Procedure	[PgUp] → [F4] → [F1] or [F2]

NOTE:

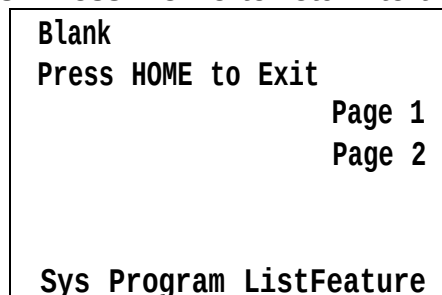
It is recommended that you use the programming codes for centralized programming; however, you may also use the **List Features** option that is available on the programming screen. See “Using the List Feature Menu” for details about this option.

Program Extension

Review the items below before you begin to program extensions.

- Use Table 23-1 to locate the code for the feature that you want to program.
- If you enter a feature code incorrectly, a beep sounds or the message **Programming Error** appears and the red LED next to the button flashes. If this happens, press the button again and repeat the procedure.
- If you make a mistake and program the wrong feature on a button, follow the steps below:
 1. Press the button.
 2. Select Delete (press [F2] on the PC).
 3. Press the button again.

- If you press a line button that is not active, the screen shown here smears. Press **Home** to return to the Home screen.



- You can use the Extension Information (Ext Info) report option on the Print menu to print all of the programmed features for a specific extension.

At the Centralized Programming menu, follow the procedure below to program features onto a single telephone.

Console Procedure **Program Ext** → Dial ext. no. → **Enter** → **Start** → Select **Page 1** or **Page 2** → Dial Programming Code or Select **ListFeature**

PC Procedure [F1] → Type ext. no. → [F10] → [F10] → [F5] or [F6] → Type Programming Code or Select [F10]

NOTE:

If programming a telephone with more than 20 buttons, use the **Page 2** selection on the screen to select the additional buttons. See Appendix E for button diagrams of all telephones.

Programming Codes

Table 23-1 provides a quick reference to the programming codes for the system features.

Table 23-1. Telephone Programming Codes

Feature	Code	Feature	Code
Account Code Entry	*82	Coverage	
Alarm	*759	Receiver Buttons	
Authorization Code	*80	Primary	*40 + ext. no. + Enter
Auto Answer All	*754	Secondary	*41 + ext. no. + Enter
Auto Answer	*753	Group	*42 + group no. + Enter
Auto Dial		Sender Buttons	
Inside (ext., group, zone)	*22 + ext. no. + Enter	Cover in/outside calls	*48
Outside	*21 + tel. no. + Enter	Cover outside calls only	**48
Automatic Line Selection		Coverage Off	*49
Enter	*14	VMS Off	*46
Exit	**14	Data Status	*83 + Enter
Barge-In†§	*58	Direct Voice Mail	*56
Callback		Do Not Disturb	*47
Automatic		Drop	*773
On	*12	Extension Status	
Off	**12	Direct-Line Console§	
Selective	*55	Status Off	*760
Call Waiting		Status 1	*761
On	*11	Status 2	*762
Off	**11	Telephones	
Camp-On	*57	Status 1	*45
Conference	*722	Status 2	*44

Continued on next page

Table 23-1, Continued

Feature	Code	Feature	Code
Feature Button	*20	Receiving Messages	
Forward	*33	Delete Message‡	*26
Group Calling		Next Message‡	*28
In-queue alarm button	*22 group no. + Enter	Return Call‡	*27
Calling group supervisor		Scroll Message‡	*29
Available (ES2)	*762	Night Service§	*39
Unavailable	*760	Notify	
Calling Group Members		Send	*757 + ext. no. + Enter
Sign-in (available)	*44	Receive	*758 + ext. no. + Enter
After work call state	*45	Park	*86
Group Page	*22 + group no. + Enter	Park Zone Auto Dial§	*22 + Park Zone
Headset*		Personal Speed Dial	# + (01-24) + *21 + tel. no.
Auto Answer	*780	Personalized Ring	*32+ ring. no. (1-8)
Hang Up†	*781	Pickup	
Mute	*783	General use	*9
Status	*782	Specific ext.	*9 + ext. no. + Enter
Last Number Dial	*84	Specific line	*9 + line no. + Enter
Messaging		Group	*88
Leave Message	*25	Position Busy§	*750
Message LED Off	*54		
Posted Message	*751		
Send/Remove Message§	*38		

Continued on next page

Table 23-1, Continued

Feature	Code	Feature	Code
Privacy	*31	Send Ring (Shared SA)	
Recall	*775	On	*15
Reminder Service		Off	**15
Set	*81	Saved Number Dial	*85
Cancel	**81	Send/Remove	*38
Missed	*752	Message§	
Ringing Idle Line		Signaling	*23 + ext. no.
Preference			+ Enter
On	*343	System Access	
Off	*344	Intercom/Buttons	
Ringing Options		Assign Buttons †	
Ring Timing		Ring	*16
Individual Lines		Originate Only	*18
Immediate Ring	*37	Shared System Access	*17 + primary ext.
Delay Ring	*36		no. + Enter
No Ring	*35	Change Type of Button	
All Lines		Ring	**19
Immediate Ring	*347	Voice	*19
Delay Ring	*346	System Speed	*24 + code (600-
No Ring	*345		729) + Enter
Abbreviated Ring		Dial	
On	*341	Transfer	*744
Off	*342	Voice Announce	
		On	*10
		Off	**10

* MLX telephones only.

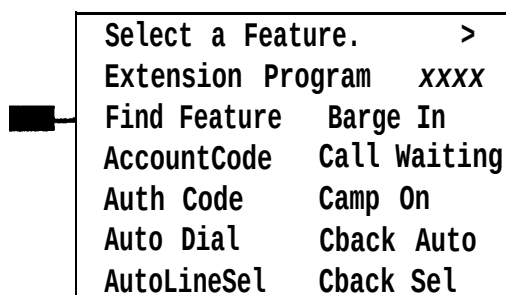
† Centralized telephone programming only.

‡ Analog display telephone only. MLX display telephones use display instead of programmed buttons.

§ System operator only.

Using the List Feature Menu

You can use the List Feature menu to select a feature, instead of using a programming code. When you select **ListFeature** (or press [F10]), the first screen of features appears as shown below.

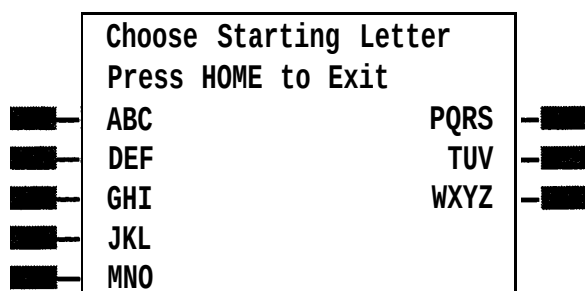


xxxx = previously entered extension

[F1]

There are four feature option screens. Press **More** to move through the screens. Press the button or function key that corresponds to your selection.

You can also use the **FindFeature** option to display alphabetized lists of features that begin with the letter(s) you select. The Find Feature screen is shown below.



Press the button or function key that corresponds to the first letter of the feature you want. The screen displays all of the features that begin with the selected letters. If the list of features for the letters you select does not fill a complete screen, the screen display continues with the next alphabetic feature. Press **Home** to return to the Home screen.

Copy Extension

The system manager uses the copy extension feature to copy an extension's programmed buttons (with some exceptions) to one or more extensions. The features are individually programmed on an extension, creating a template that can then be copied to other extensions in the system.

Only extensions of the same type can be copied to one another (that is, analog to analog, and MLX to MLX) since the two extension types have different button layouts. For a system that has both analog and MLX telephone types, you will need two templates: one for analog and one for MLX.

An MFM can be copied to or from another MFM. A DLC can only be copied to another DLC. Single-line telephones and QCCs *cannot* be copied to or from.

Features That Can Be Copied

Table 23-2 lists the features that can be copied to another extension. Features that can be copied for DLC operator extensions are listed in Table 23-3.

Table 23-2. Features That Can Be Copied All Telephones

Feature	Analog and MLX Telephones	Analog Telephones Only	MLX Telephones Only
Account Code Entry	X		
Authorization Code*	X		
Auto Answer All		X	
Auto Answer Intercom		X	
Auto Dial Inside	X		
Auto Dial Outside*	X		
Barge-In	X		
Callback-Selective	X		
Camp-On	X		
Conference†	X		
Coverage Off	X		
Coverage VMS Off	X		
Data Status	X		
Direct Voice Mail	X		
Do Not Disturb	X		
Dropt	X		
Extension Status 2 (ES2) (Non-operator)	X		
Extension Status 1 (ES1) (Non-operator)	X		
Feature Button		X	
Forward	X		
Group Calling	X		

Continued on next page

Table 23-2, *Continued*

Group Page	X		
Headset Auto Answer			X
Headset Hang Up			X
Group Page	X		
Headset Auto Answer			X
Headset Hang Up			X
Headset Status			X
Headset/Handset Mute			X
Last Number Dial*	X		
Delete Message		X	
Leave Message	X		
Message Light Off	X		
Next Message		X	
Posted Message	X		
Return Call		X	
Scroll		X	
Park	X		
Pickup: Group	X		
Pickup: General	X		
Pickup: Extension	X		
Pickup: Line	X		
Privacy	X		
Recall	X		
Reminder Service: Set	X		
Reminder Service: Cancel	X		
Saved Number Dial*	X		
Signaling	X		
SA/ICOM Ring‡	X		

Continued on next page

Table 23-2, *Continued*

SA/ICOM Voice‡	X		
SA/ICOM Originate Only‡	X		
System Speed Dial	X		
Transfer**	X		

* Number is **not** copied.

† Behind Switch mode only.

‡ Ringing options (No Ring, Delay Ring, and Immediate Ring) are copied with the button

Table 23-3 shows the operator features than can be copied for operator consoles. QCC features cannot be copied.

Table 23-3. Features That Can Be Copied: Direct-Line Consoles Only

Feature	Analog Direct-Line Console (DLC)	MLX Direct-Line Console (DLC)
Alarm	X	X
Extension Status Off	X	X
Extension Status 1	X	X
Extension Status 2	X	X
Missed Reminder	X	X
Night Service	X	X
Operator Park	X	X
Send/Remove Message	X	X

Copy Extension

Use the procedure below to copy programming from one extension to another.

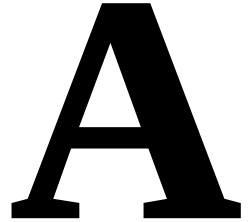
Console Procedure

Copy Ext → Dial copy from ext. no. → **Enter**
→ Dial copy to ext. no. → **Enter** → **Exit**

PC Procedure

[F2] → Type copy from ext. no. → [F10] → Type
copy to ext. no. → [F10] → [F5]

Customer Support Information



Support Telephone Number

In the U.S.A. only, AT&T provides a toll-free 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.

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 radioélectriques dépassant les limites applicable aux appareils numériques de la class A prescrites dans le reglement sur le brouillage radioélectrique edicté par le ministère des Communications du Canada.

FCC Notification and Repair Information

This equipment is registered with the FCC in accordance with Part 68 of its rules. In compliance with those rules, you are advised of the following:

- **Means of Connection.** Connection of this equipment to the telephone network shall be through a standard network interface jack, USOC RJ11C, RJ14C, RJ21X. Connection to E&M tie trunks requires a USOC RJ2GX. Connection to off-premises extensions requires a USOC RJ11C or RJ14C. Connection to 1.544-Mbps digital facilities must be through a USOC RJ48C or RJ48X. Connection to DID requires a USOC RJ11C, RJ14C, or RJ21X. These USOCs must be ordered from your telephone company.
- **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 Equivalency Number) for all three systems is 1.5 A.

- For tie line connection, the facility interface code (FIC) is TL31M and the service order code (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 1.544-Mbps digital service, the FIC is 04DU9-B for D4 framing format or 04DU9-C for extended framing format, and the SOC is 6.0P.
 - For equipment to be connected to DID facilities, the FIC is 02RV2-T and the SOC is 9.0F.
 - 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.
-
- **Disconnection.** You must also notify your local telephone company if and when this equipment is permanently disconnected from the line(s).
 - **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 telephone company to determine the maximum REN for the calling area.

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.

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'entreprise 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 aux jacks d'abonné, sauf dans les cas précis prévus par 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 particulièrement 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 dispositifs ne dépasse pas 100.

No d'homologation: 230 4095A

No de certification: CSA LR 56260

L'indice de charge: 6

**MERLIN LEGEND D.O.C.
Location Label Placement**

**Ministère des Communications
du Canada emplacement de
l'étiquette**

 MERLIN LEGEND	Model 511A Control Unit
 LISTED 538E	TELEPHONE EQUIPMENT
 ® LR 56260	
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Complies with Part 68, FCC Rules. See the System Reference Manual for proper FCC Classification. FCC Reg. Nos. MF: AS93M-72882-MF-E KF: AS93M-72914-KF-E PE: AS5USA-65646-PF-E REN: 1.5A	
Use only AT&T manufactured MERLIN LEGEND circuit modules, carrier assemblies, and power units, as specified in the Installation Manual, in this product. There are no user serviceable parts inside. Contact your authorized agent for service and repair. This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications. Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.	WARNING: If equipment is used for out-of-building applications, approved secondary protectors are required. See Installation Manual. AVERTISSEMENT: Si l'équipement est utilisé pour des applications extérieures, l'installation d'un protecteur secondaire est requise. Voir le manuel d'installation.
CANADA DR ID	

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 remote access features.

The Remote Access feature of your system, if you choose to use it, permits off-premises callers to access the system from a remote telephone by using an 800 number or a 4- to 11-digit telephone number. 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. 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.
- 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, and Disallowed List capabilities.
- 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.

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 FOR PERSONAL INJURY, DIRECT DAMAGES TO TANGIBLE PERSONAL PROPERTY PROXIMATELY CAUSED BY AT&T, AND LIABILITY OTHERWISE EXPRESSLY ASSUMED IN A WRITTEN AGREEMENT SIGNED BY AT&T, THE LIABILITY OF AT&T, ITS AFFILIATES, SUPPLIERS, AND AUTHORIZED RESELLERS 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 AN AMOUNT EQUAL TO THE LESSER OF THE DIRECT DAMAGES PROVEN OR THE PURCHASE PRICE OF THE SYSTEM. IN NO EVENT SHALL AT&T OR ITS AFFILIATES, SUPPLIERS, OR AUTHORIZED RESELLERS BE LIABLE FOR INCIDENTAL, RELIANCE, CONSEQUENTLY, OR ANY OTHER INDIRECT LOSS OR DAMAGE (INCLUDING LOST PROFITS OR REVENUES) INCURRED IN CONNECTION WITH THE SYSTEM, THIS LIMITATION OF LIABILITY SHALL SURVIVE FAILURE OF THE EXCLUSIVE REMEDY SET FORTH IN THE LIMITED WARRANTY ABOVE.

Voice Mail Systems

Your voice mail system permits callers to leave verbal messages for system users or gain access to the backup position in an emergency as well as create and distribute voice messages among system users.

The voice mail system, through proper administration, can help you reduce the risk of unauthorized persons gaining access to the network. However, phone numbers and authorization 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 (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, 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 your voice mail system, please observe the following procedures:

- Employees who have voice mailboxes should be required to use the passwords to protect their mailboxes,
 - Have them use random sequence passwords.
 - Impress upon them the importance of keeping their passwords a secret.
 - Encourage them to change their passwords regularly.
- The administrator should remove any unneeded voice mailboxes from the system immediately.
- AUDIX Voice Power has the ability to limit transfers to subscribers only. You are strongly urged to limit transfers in this manner.
- Use the Hybrid/PBX or Key system administration capability to do the following:
 - Block direct access to outgoing lines and force the use of account codes/authorization codes.
 - Disallow trunk-to-trunk transfer unless required.
 - Assign toll restriction levels to all AUDIX Voice Power ports or other voice mail ports.
 - If you do not need to use the Outcalling feature, completely restrict the outward calling capability of the AUDIX Voice Power ports. Use voice mail application features to do this.

- Monitor SMDR reports or Call Accounting System reports for outgoing calls that might be originated by AUDIX Voice Power ports or other voice mail ports.

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.

Menu Hierarchy

B

The system programming menu hierarchy details the sequence of menu screens that appear when you select the system programming options. The choice of an option on the first menu screen leads to either a second menu screen or a data-entry screen. A secondary menu screen may lead to still another menu screen, and soon up to six screens, as shown in the following pages.

You can use the Inspect feature in system programming to display the telephone or line/trunk numbers that are programmed with a specific feature. Inspect is helpful when you must assign a feature to many lines/trunks or extensions and you do not have a Direct Station Selector (DSS) attached to the system programming console, or when you are programming using a PC with SPM.

Inspect can be used with the menu options on the following pages that have an asterisk (*) next to them. To use Inspect in system programming, choose an eligible option, and press **Inspt** or [PgDn].

System Programming

System	SysRenumber	Operator	Extensions	Options	
Restart SProg Port Mode •Key •Hybrid/PBX •BehindSwitch Board Renum MaintenBusy •Enable - Auto Busy Tie Trunks: - Enable - Disable •Disable Date Time Back/Restore •Backup •Restore •Auto Backup - Off - Daily - Weekly	Default Numbering •2-Digit •3-Digit •SetUp Space Single •Lines* •Extensions* •Pools* •Group Page* •GrpCalling* •Adjuncts* •Park* •ARS DialOut •RemoteAccs •DSS Buttons* •ListDirctNo Block •Lines •Extensions •Adjuncts	Positions •Direct Line* •Queued Call* Queued Call •Hold Rtn - Return to Queue - Remain On Hold •HoldRelease - Auto Hold - Auto Release •Threshold •ElevatePrior •InQue Alert* - InQue Alert Enable - InQue Alert Disable •Call Types - Dial 0 - Priority - Operator* - Follow/Frwd - UnassignDID - Priority - Operator* - ListedNumbr - Priority - Operator* - QCC Ext - Returning - Priority - Operator* - GrpCoverage - Priority - Operator* •Msg Center*	Queued Call (cont.) •ExtndComplt - Automatic Complete - Manual Complete •Return Ring •QCC Backup Hold Timer DLC Hold •Auto Hold Enable •Auto Hold Disable	Transfer •Return Time •One Touch - Transfer - Manual - Automatic - Hold •Audible - Music On Hold Hold - Ringback •Type - Voice Announce - Ring CampOn CallParkRtn Delay Ring Callback Ext Status •Hotel •GrpCall/CMS SMDR •Format - Basic SMDR - ISDN SMDR •Call Length •Call Report - In/Out - Out Only •New Page •Auth Code - Home Extension Number - Authorization Code Inside Dial •Inside •Outside ReminderSrv	Unassigned •QCC Queue •Extension •Grp Calling BehindSwitch •Transfer •Conference •Drop RecallTimer •350 ms •450 ms •650 ms •1 sec Rotary •Delay •No Delay Cover Delay Inter-Digit

* The Inspect feature can be used with this menu option. Press Inspect or PgDn.

† The Inspect feature can be used in entry mode with this menu option. Press Inspect or PgDn while in entry mode.

* The Inspect feature can be used with this menu option. Press Inspect or PgDn.

† The Inspect feature can be used in entry mode with this menu option. Press Inspect or PgDn while in entry mode.

System Programming (cont.)

LinesTrunks															
LSGS/DS1 •(DS1) - Type - T1* - GroundStart* - Loop Start* - TIE - TIE-PBX* - Toll* - Unequipped - All Ground - All Loop - All TIE - TIE-PBX - Toll - All Unequip - DID* - All DID - PRI - FrameFormat - D4 - Compatible - Extended - Super Frame - Suppression - AMI-ZCS - B8ZS - Signaling - Robbed Bit - Common		LSGS/DS1 (cont.) - Channel - Line Comp - Clock Sync - Priority - Primary - Secondary - Tertiary - None - Source - Loop - Local - Activation - Active - Not Active - ChannelUnit - Foreign - Exchange - Special - Access •(4xx GS/LS) - GroundStart* - LoopStart* - All Ground - All Loop •(8xxGS/LS) - GroundStart* - LoopStart* - All Ground - All Loop		TIE Lines •Direction - Two Way - OutGoing - Incoming •Intype - Wink - Delay - Immed - Auto •Outtype - Wink - Delay - Immed - Auto •E&M Signal - Type 1S - Type 1C - Type5 •Inmodet •Outmodet •Dialtone† •AnsSupvr •Disconnect TTILS Disc •OutModet† •LS Disconnect - Yes - No		DID •Block† •Type - Immed - Wink •Disconnect •ExpectDigit† •DeleteDigit† •Add Digits •Signaling - Rotary - TouchTone •InvalidDsn - Send to Backup Extension - Return Fast Busy PRI •PhoneNumber •B-ChannlGrp - B Channels* - Lines*† - NetworkServ - AT&T Toll - Megacom WATS - ACCUNET SDS - Soft DefNetw - Megacom 800		PRI (cont.) - MULTl QUEST - Long Distnce - Local - OUTWATS - 56/64 Digtl - VirtPrivNet - INWATS - Misc - Other - CallByCall - Copy Number - Copy PhnNum - to NumToSend - Do not copy Phone Number - IncomingRtg - Routing by Dial Plan - Route by Line Appearance •NumbrToSend - Extension Only - Base Number with Ext. - Line Telephone Number •Test TelNum		PRI (cont.) •Protocol - Timers - T200 Timer - T203 Timer - N200Counter - N201Counter - K Counter - T303 Timer - T305 Timer - T308 Timer - T309 Timer - T310 Timer - T313 Timer - T316 Timer - TEI •DialPlanRtg - Service - AT&T Toll - Megacom 800 - ACCUNET SDS - SoftDefNetw - MULTl QUEST - Megacom WATS - Long Distnce - Local - INWATS - 56/64 Digtl - VirtPrivNet		PRI (cont.) - OUTWATS - Misc - Other - Any Service - No Service - Patterns - TotalDigits - DeleteDigit - Add Digits •OutgoingTbl - NetwkSelect - SpecialServ - Pattern - Operator Operator - Presubscribed Carrier - No Operator - TypeOfNumber - National - International - Local - DeleteDigit - CBC Service - Patterns - Voice/Data - Voice Only - Data Only - Voice/Data - NetworkServ - AT&T Toll		PRI (cont.) - Megacom WATS - ACCUNET SDS - BarrierCode - Border Code - Required - BarrierCode - Not Required - Restriction - Unrestricted - Outward Restrict - Toll Restrict	

The Inspect feature can be used with this menu option. Press Inspect or PgDn.

* The Inspect feature can be used with this menu option. Press Inspect or PgDn.

† The Inspect feature can be used in entry mode with this menu option. Press Inspect or PgDn while in entry mode.

System Programming (cont.)

Tables	AuxEquip	NightSrvc	Labeling	Data	Print	Cntr-Prg	Language
AllowList AllowTot Disallow DisallowTot ARS •ARS1+7Dial - Within Area Code - Not Within Area Code •ARS Input - 6-Digit - Area Code† - Exchange† - 1+7† •Sub A Pools •Sub A FRL •SubA Absorb •Sub A Digit •Sub B Start •Sub B Stop •Sub B Pool •Sub B FRL •SubB Absorb •Sub B Digit •SpecINumber - ARS FRL - ARS Digit •Dial 0 - ARS Pool - ARS FRL - ARS Digits •Sub A Data - Voice Only - Data Only - Voice/Data •Sub B Data - Voice Only - Data Only - Voice/Data	MusicOnHold Ldspkr Pg* Fax •Extension* •Msg Waiting* •Threshold MaintAlarms VMS/AA •TransferRtn •TT Duration •TT Interval	Group Assign† •Extensions* •Calling_Grp OutRestrict Emergency ExcludeList* Start* Stop* Time Control - On - Off	Directory •System •Extension •Personal LinesTrunks PostMessage Grp Calling	Voice/Data*	All SysSet-up Dial Plan Labels Trunk Info •TIE •DID •Loop/Ground •General T1 Info PR1 Info RmoteAccess Oper Info AllowList AllowListTo DisallowLst DisallowTo ARS Ext Direct Sys Direct Group Page Ext Info Grp Coverage Grp Calling Night Service Call Pickup Error Log Auth Code	Program Ext Copy Ext	SystemLang •English •French •Spanish Extensions •Single - English - French - Spanish •Block - English - French - Spanish SMDR •English •French •Spanish Printer •English •French •Spanish

* The Inspect feature can be used with this menu option. Press Inspect or PgDn.

† The Inspect feature can be used in entry mode with this menu option. Press Inspect or PgDn while in entry mode.

LED Displays

C

Table C-1 indicates LED status on the MLX-20L console. LED status is indicated on the LEDs next to the 20 buttons below the display area on the system programming console. LED status is simulated on the computer screen when you use SPM.

Table C-2 indicates LED status on the DSS console. LED status is indicated on the red LED next to the 50 extension buttons.

Table C-1. Line or Trunk Feature Status

System Programming Menu Option	Option	LED Status*			
		Green LED		Red LED	
		ON	OFF	ON	OFF
Lines Trunks	Tie Lines				
	Inmode	Incoming tie line is touch-tone	Incoming tie line is rotary dial†		
	Outmode	Outgoing tie line is touch-tone	Outgoing tie line is rotary dial†		
	Dialtone	Remote dial tone†	Local dial tone		
Lines Trunks	TT/LS Disc				
	Outmode	Line/Trunk is touch-tone†	Line/trunk is rotary dial		
Lines Trunks	Pools			Trunk is in pool	Trunk is not in pool
Lines Trunks	Toll Type	Must dial 1 + area code †	1 + dialing is not needed		
Lines Trunks	Hold Disconc	Long-450 ms†	Short-50 ms		
Lines Trunks	LS-ID Delay	LS-ID Delay is on	LS-ID Delay is Off†		
Extensions	Lines Trunks	Line/trunk or pool is assigned to button	Line/trunk or pool is not assigned to button	Trunk is assigned to a pool	

* LED Status is indicated on LEDs next to the 20 buttons below the display area of the system programming console or simulated on the computer screen when using SPM.

† This is the factory setting.

Table C-2. Telephone Feature Status for DSS Console Only

System Programming Menu Option	Option	Red LED Status		
		ON	OFF	FLASHING
Extensions	Account (FACE)	Forced Account Code Entry assigned	Forced Account Code Entry not assigned†	
Extensions	BIS/HFAI	Telephone has BIS/HFAI capability (factory setting for analog multiline telephones)	other	
Extensions	Call Pickup	Telephone is assigned to Call Pickup Group	Telephone is not assigned to Call Pickup Group†	
Extensions	VoiceSignl	Voice Announce to Busy assigned	Voice Announce to Busy not assigned†	
Extensions	Ext Status	Extension Status assigned	Extension Status not assigned	Extension Status can be assigned
Extensions	Group Page	Telephone is in group	Telephone is not in group†	
Extensions	Group Cover	Telephone is in coverage group	Telephone is not in coverage group†	
Extensions	Group Calling Members	Telephone is assigned to group	Telephone is not assigned to group†	
Extensions	Mic Disable	Telephone microphone is disabled	Telephone microphone is enabled	
Extensions	Remote Frwd	Telephone can transfer calls to a remote telephone number	Telephone cannot transfer calls to a remote telephone number†	

† This is the factory setting.

Continued on next page

Table C-2, Continued

System Programming Menu	Option	Red LED Status		
		ON	OFF	FLASHING
Night Service	Group Assign	Telephone is in group	Telephone is not in group†	
Night Service	Exclude List	Telephone is excluded	Telephone is not excluded†	
Aux Equip	Msg Waiting	Station is a fax message-waiting station	Station is not a fax message-waiting station	
Aux Equip	Fax Extension	Extension is a fax machine	Extension is not a fax machine	
Tables	AllowTo	Allowed List assigned to telephone	Allowed List is not assigned to telephone†	
Tables	DisallowTo	Disallowed list assigned to telephone	Disallowed list is not assigned to telephone†	
Data	Voice/Data	Voice/Data pair	Not Voice/Data pair†	
Operator	Direct Trunk Queued Call	Operator position	Other	Can be assigned as operator position
Operator	Queued Call Message Center	Message Center position	Other	Can be assigned as Message Center
Operator	In Queue Alert	Position receives In-Queue Alert	Other	Position can receive In-Queue Alert
	Call Types- Dial 0, LDN Unassigned DID, Grp Coverage	Position receives call type	Other	Position can receive call type

† This is the factory setting.

General Feature Use and Telephone Programming

D

This appendix contains information on the general use of features for the MLX, analog multiline, and single-line telephones. It covers telephone and operator features and the acceptable programming codes for each. It also describes how to program these features on MLX and analog multiline telephones.

General Feature Use Information	D-1
Feature Table	D-4
Telephone Programming	D-14

General Feature Use Information

The following provides general instructions for feature use on MLX, analog multiline, and single-line telephones. Features can be used in the following ways:

- By pressing a dedicated feature button
- By pressing a programmed button
- By dialing a feature code
- By selecting the feature from the display (MLX display telephones only)

Dedicated Feature Buttons

All multiline telephones have a group of dedicated feature buttons that are programmed and labeled at the factory. The functions of these buttons, which include **Conference**, **Transfer**, and **Speaker**, cannot be changed. Press the button for the feature you want to use.

Programmed Buttons

Any unlabeled line button on multiline telephones can be programmed with a feature for one-touch activation. See Tables D-1 through D-4 for more information on programming features onto line buttons.

Some features, such as Auto Dial, must be programmed onto line buttons in order to use them. Other features, such as Privacy, are best used if programmed onto line buttons—the LED next to the line button provides visual indication that the feature is in use. The following features must be programmed onto line buttons:

- Auto Answer All
- Auto Answer Headset
- Auto Dial
- Barge-In
- Coverage
 - Group Coverage
 - Primary Coverage
 - Secondary Coverage
 - Coverage Off
- Do Not Disturb
- Extension Status—Agent Login/Logout

- Feature Button (analog multiline telephones only)
- Headset/Handset Mute
- Headset Status
- Headset Hang Up
- Notify
- Posted Messages (available from display on MLX display telephones)
- Saved Number Dial
- Signaling

Feature Codes

Feature codes are 1-, 2-, and 3-digit codes that activate features. A feature code is used by first pressing the dedicated **Feature** button on MLX telephones; pressing a programmed **Feature** button on analog multiline telephones; dialing # on single-line telephones. Each of these methods sends a signal to the system that a feature code is about to be dialed. When the code is dialed, the feature is activated.

NOTE:

Queued Call Console (QCC) system operators cannot use the feature codes.

The following features can be used only by dialing feature codes:

- Call Pickup
- Forward/Follow Me—Cancel One
- Forward/Follow Me—Cancel All
- Message Cancel
- Personal Speed Dial
- System Speed Dial

NOTE:
Pressing the **Conference, Transfer, Speaker,** or **Feature** button while activating a feature cancels the process. Pressing any other button, such as the **Mute, HFAI, Message Status, DSS Page, More, Message, Clock,** analog multiline display keys, or analog multiline disconnect button does not cancel the feature activating process.

Feature Table

Table D-1 lists the telephone and operator features that can be assigned to telephones or consoles through Centralized Telephone Programming or by users from their telephones.

General Feature Use and Telephone Programming

Table D-1. Telephone and Operator Features

Feature	Prog. Code	Display Label	Single -Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Account Code Entry	*82	Account Code	KP	KPB	KPB	KPB	KPB	KPB
Alarm†	*759	Alarm		KPB			KPB	KPB
Authorization Code	*80	Auth Code	KP	KPB	KPB	KPB	KPB	KPB
Auto Answer All	*754	AutoAns All		KPB				
Auto Answer Intercom	*753	AutoAnsIcom		KPB				
Auto Dial Inside Outside	*22 + ext no. *21 + tel. no.	Auto Dial Inside Outside		KPB	KPB	KPB	KPB	KPB
Automatic Line Selection On Off	*14 **14	AutoLineSel		KPB	KPB	KPB	KPB	KPB
Barge-In†‡	*58	Barge In		KPB	KPB	KPB	KPB	KPB
Callback Automatic On Off Selective	*12 **12 *55	Cback Auto On Off Cback Sel	KP	KPB	KPB	KPB	KPB	KPB
Call Waiting On Off	*11 **11	CallWaiting On Off	KPB	KPB	KPB	KPB	KPB	KPB
Camp-On	*57	Camp On		KPB	KPB	KPB	KPB	KPB
Conference	*772	Conference		B	B	B	B	B

† Operator console

‡ Centralized Telephone Programming only

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

General Feature Use and Telephone Programming

Table D-1, Continued

Feature	Prog. Code	Display Label	Single-Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Coverage		Coverage		KPB	KPB	KPB	KPB	KPB
Receiver buttons								
Group	*42 + ext. no.	Group						
Primary	*40 + ext. no.	Primary						
Secondary	*41 + ext. no.	Secondary						
Sender buttons								
Cover inside & outside calls	*48	CoverInside, On	KPB					
Cover outside calls only	**48	CoverInside, Off	KPB					
Coverage off	*49	CoverageOff	KPB					
VMS off	*46		KPB					
Data Status	*83 + ext. no.			KPB	KPB	KPB	KPB	KPB
Directory								
System Directory (system programming)						KPB	KPB	KPB
Extension Directory (display only)						KPB	KPB	KPB
Personal Directory (display only)								KPB
Direct Voice Mail	*56	Direct VoiceMail	KPB	KPB	KPB	KPB	KPB	KPB
Do Not Disturb	*47	DoNotDistrb		KPB	KPB	KPB	KPB	KPB
Drop	*773	Drop		B	B	B	B	B

† Operator console

‡ Centralized Telephone Programming only

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

General Feature Use and Telephone Programming

Table D-1, Continued

Feature	Prog. Code	Display Label	Single-Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Extension Status				KPB			KPB	KPB
Direct Line								
Console								
Status Off	*760	OperatorES, ES0ff						
Status 1	*761	OperatorES, ES1						
Status 2	*762	OperatorES, ES2						
Telephones (rooms or agents)			KPB	KPB	KPB	KPB	KPB	KPB
Status 1	*45	ES Status, ES1						
Status 2	*44	ES Status, ES2						
Feature button	*20	Feature Btn		KPB				
Forward	*33	Forward	KPB	KPB	KPB	KPB	KPB	KPB
Forward (Inside)								
Remote Call Forward (Outside)								
Group Calling	*22 + calling group ext no.	Group Call		KPB	KPB	KPB	KPB	KPB
In-Queue Alarm button				KPB			KPB	KPB
Calling group supervisor	*762	OperatorES, ES2						
Available (ES Status 2)	*760	OperatorES, ES Off						
Unavailable (ES Status Off)								
Calling group members			KPB	KPB	KPB	KPB	KPB	KPB
Sign (Available)	*44	ES Status, ES2						
After-call work state (CMS only)	*45	ES Status, ES1						

† Operator console
‡ Centralized Telephone Programming only

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

General Feature Use and Telephone Programming

Table D-1, Continued

Feature	Reg. Code	Display Label	Single-Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Group Page Auto Dial button	<i>*22 + paging group ext. no.</i>	Group Page		KPB	KP8	KPB	KPB	KPB
Headset Auto Answer Hang Up† Mute (Headset/Handset) Status	<i>*780</i> <i>*781</i> <i>*783</i> <i>*782</i>	Hdset Auto Answer Hang Up Mute Status			KP	KB	KB	KB
Intercom buttons Assign buttons‡ (factory-set type is Ring) Intercom Originate Only Change type of Intercom button Ring Voice	<i>*16</i> <i>*18</i> <i>**19</i> <i>*19</i>	SysAccess SysAcc-00 Voice Annce, Place Ring Voice Annce, Place Voice	KB KB	KB	KB	KB	KB	KB
Last Number Dial	<i>*84</i>	LastnumDial	KP	KPB	KPB	KPB	KPB	KPB
Messaging Leave Message Message LED off Posted Message Send/Remove† Message Receiving messages: Delete Message* Next Message* Return Cal* Scroll*	<i>*25</i> <i>*54</i> <i>*751</i> <i>*38</i> <i>*26</i> <i>*28</i> <i>*27</i> <i>*29</i>	Leave Msg Posted Msg Send/RmvMsg Messages Delete Msg Next Msg Return Call	KPB	KPB KPB KPB KPB KPB KPB KPB KPB	KPB KPB KPB KPB	KPB KPB KPB KPB	KPB KPB KPB KPB KPB KPB KPB KPB	KPB KPB KPB KPB KPB KPB KPB KPB

† Operator console
‡ Centralized Telephone Programming only
* Display telephones only.

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

General Feature Use and Telephone Programming

Table D-1, Continued

Feature	Prog Code	Display Label	Single-Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Night Service†	*39	Night srvc		KPB			KPB	KPB
Notify Send Receive	*757 + ext. no *758 + ext. no	Notify Send Receive		KPB	KPB	KPB	KPB	KPB
Park	*86	Park	KP	KPB	KPB	KPB	KPB	KPB
Park Zone Auto Dial†	*22 + park zone	Park Zone		KPB			KPB	KPB
Personal Speed Dial	# + 01-24 + *21 + tel. no. + #		KP	KPB	KPB	KPB		
Personalized Ringing	*32 + ring (1-8)	PersonalRng, Pattern #1... Pattern #8		KPB	KPB	KPB	KPB	KPB
Pickup General use Specific extension Specific line Group	*9 *9 + ext no. *9 + line no. *88	Pickup General Extension Line Group	KP	KPB	KPB	KPB	KPB	KPB
Privacy	*31	Privacy	KP	KPB	KPB	KPB	KPB	KPB
Recall	*775	Recall		KPB	KPB	KPB	KPB	KPB
Reminder Service Set Cancel Missed†	*81 **81 *752	Reminder Set Cancel Missed	KPB	KPB	KPB	KPB	KPB	KPB
Ringing/Idle Line Preference Cancel	*343 *344	Line Prefer, On Line Prefer, Off		KPB	KPB	KPB	KPB	KPB

† Operator console

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

General Feature Use and Telephone Programming

Table D-1, Continued

Feature	Prog. Code	Display Label	Single-Line	Analog Multi-line	MLX-10	MLX-10D	MLX-28D	MLX-20L
Ringing Options		Ring Options						
Individual Lines		One Line		KPB	KPB	KPB	KPB	KPB
Immediate Ring	*37	Immed Ring						
Delay Ring	*36	Delay Ring						
No Ring	*35	No Ring						
All Lines		All lines						
Immediate Ring	*347	Immed Ring						
Delay Ring	*346	Delay Ring						
No Ring	*345	No Ring						
Abbreviated Ring		Abbreviated						
On	*341	On						
Off	*342	Off						
Send Ring (Shared SA)		SharedSARng	P	P	P	P	P	P
On	*15	On						
Off	**15	Off						
Saved Number Dial	*85	SaveNumDial		KPB	KPB	KPB	KPB	KPB
Send/Remove Message†	*38	Send/RmvMsg		KPB			KPB	KPB
Signaling (manual)	*23 + ext. no.	Signal		KPB	KPB	KPB	KPB	KPB
System Access buttons				P	P	P	P	P
Assign buttons‡								
System Access	*16	SysAccess	P					
Originate Only	*18	SysAcc-00	P					
Shared System Access	*17 + primary ext. no.	ShareSysAcc	P					
Change type of System Access button								
Ring	**19	Voice Annce, Place, Ring						
Voice	*19	Voice Annce, Place, Voice						

‡ Centralized Telephone Programming only

† Operator console

K Key mode
P PBX mode
B Behind Switch mode

Continued on next page

Table D-1, Continued

Feature	Prog. Code	Display Label	Single- Line	Analog Multi- line	MLX-10	MLX- 10D	MLX- 28D	MLX- 20L
System Speed Dial	<i>*24 + code (600 729)</i>	SysSpeedD1	KP	KPB	KPB	KPB	KPB	KPB
Transfer	<i>*774</i>	Transfer		B	B	B	B	B
Voice Announce		Voice Annce Receive		KPB	KPB	KPB	KPB	KPB
On	<i>*10</i>	On						
Off	<i>**10</i>	Off						

K Key mode P PBX mode B Behind Switch mode

Telephone Programming

The following describes how to program features on MLX and analog multiline telephones. Since Personal Speed Dial is the only feature that single-line telephone users can program, general programming instructions for single-line telephones are not provided.

NOTE:

Features cannot be programmed on QCCs in system operator positions. Features assigned to these consoles are fixed and cannot be changed.

Programming Methods

Telephones can be programmed by dialing programming codes or on MLX display phones by selecting features from the display. An analog multiline telephone cannot be programmed by selecting features from the display.

To program a telephone, first enter programming mode:

- On analog multiline telephones, slide the Test/Program (T/P) switch on the side of the telephone to **P**, or lift the handset, or press Speakerphone and dial **#00**.
- On MLX-10 telephones, press the **Feature** button and dial **00**.
- On MLX display telephones, use the same procedures as the MLX-10 or enter programming mode by selecting **Ext Program** from the menu screen on the display.

See the appropriate user or operator guide for more information.

NOTE:

Features can also be programmed onto individual telephones through Centralized Telephone Programming. The steps for using programming codes vary depending on the telephone. Tables D-2 through D-4 list the basic steps for programming each telephone type.

Table D-2. Programming Analog Multiline Telephones

Step	Action
1	Label the button. Note: Skip this step if the feature will not be programmed onto a button. ■ Remove the clear label cover from the telephone by inserting the end of a paper clip in the notch at the top of the cover. ■ Write the feature name on the card next to the button to be programmed. ■ Replace the cover.
2	Begin programming. ■ Slide the T/P switch on the side of the telephone to P.
3	Select the feature. ■ Press the button you labeled. <i>If you have a display, it shows the name of the feature currently programmed on the button. If no feature is programmed, the display indicates that the button is blank.</i> Note: if the feature does not get programmed onto a button, press any line button. This does not affect the button in any way. Dial the programming code. <i>The feature is programmed.</i>
4	End programming. ■ Slide the T/P switch to the center position.

Table D-3. Programming MLX 10 Telephones

Step	Action
1 Label the button. Note: Skip this step if the feature will not be programmed onto a button.	■ Remove the clear label cover from the telephone by pulling upon the tab that extends from the top of the cover. ■ Write the feature name on the card next to the button to be programmed. ■ Replace the cover.
2 Begin programming.	■ Press the Feature button and then dial 00.
3 Select the feature.	■ Press the button you labeled. Note: If the feature does not get programmed onto a button, press any line button. This does not affect the button in any way. ■ Dial the programming code. <i>The feature is programmed.</i>
4 End programming.	■ Press the Feature button and dial *00.

Table D-4. Programming MLX Display Telephones Using the Display

Step		Action
1	Label the button to be programmed. Note: Skip this step if the feature will not be programmed onto a button.	■ Remove the clear label cover from the telephone by pulling upon the tab that extends from the top of the cover. ■ Write the feature name on the card next to the button to be programmed. ■ Replace the cover.
2	Begin programming.	■ Press Menu. ■ Select Ext Program from the display. ■ Select Start from the display.
3	Identify the button to be programmed.	■ Press the button you labeled. Note: If the feature does not get programmed onto a button, press any line button. This does not affect the button in any way. <i>The display identifies the feature currently programmed on the button. If no feature is programmed, the display indicates that the button is blank.</i>

Continued on next page

Table D-4, Continued

Step	Action
To delete the feature currently programmed on the button:	■ Select Delete from the display. <i>The button is now blank.</i> ■ Press the button you labeled again to continue programming. Note: If the currently programmed feature was not deleted from the button, the new feature programmed onto it will replace it.
To continue programming:	■ Select List Feature from the display. <i>The screen lists feature names in alphabetical order</i>
4 Select the feature.	
If the feature name is on the display:	■ Press the button next to or below the name of the feature to be programmed.
If the feature name is not on the display:	■ Press More to move through the list of features page by page.

Continued on next page

Table D-4, Continued

Step	Action
or: To jump to the screen that displays the feature name.	■ Select Find Feature from the display. ■ Select the range of letters from the display that corresponds to the first letter of the feature name (for example, if the feature begins with A, select ABC). ■ If the feature is not displayed on the page that you jumped to, press More. ■ When you find the feature you want, press the button next to or below it.
5 Respond to any additional prompts on the display.	■ Select appropriate prompt (for example, select on or off to turn Inside Coverage on or off), and/or enter required information (for example, dial a phone number for Auto Dial). ■ Select Enter.

Continued on next page

Table D-4, Continued

Step	Action
6	End programming. To return to the Home screen: ■ Press Home or lift and replace the handset. To return to the Menu screen: ■ Press Menu .

NOTE:

MLX display telephones can also be programmed using the method described for MLX-10 telephones. For example, the programming mode can be entered by pressing the **Feature** button and dialing **00**, then referring to the display to continue the programming process. Or, enter programming through the display and then dial a programming code to select the feature rather than selecting it from the display.

General Feature Use and Telephone Programming

Button Diagrams

E

This appendix contains the button diagrams for Hybrid/PBX systems as well as button diagrams for Key and Behind Switch systems.

Button Diagrams

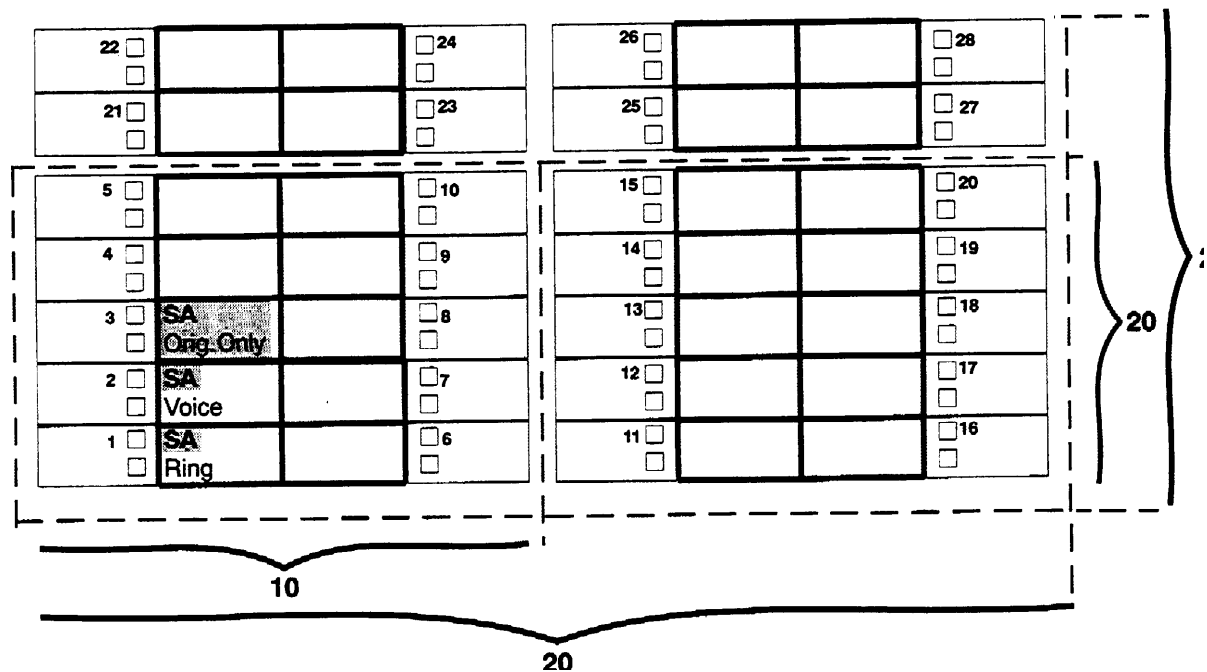
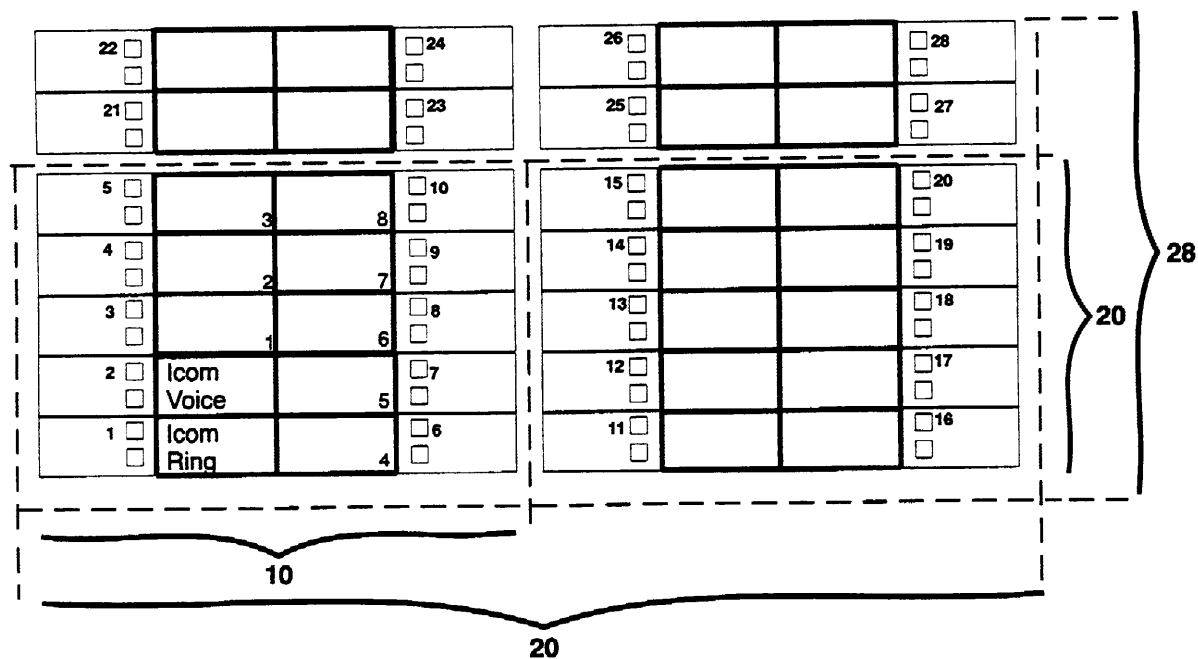


Figure E-1. MLX Telephone Button Diagram (Hybrid/PBX Mode)

Button Diagrams



Key Mode:
Up to 8 personal line
buttons are assigned
beginning at button 3.

Behind Switch Mode:
One prime line button
is assigned to button 3.

Figure E-3. MLX Telephone Button Diagram (Key and Behind Switch Mode)

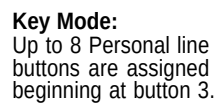


Figure E-4. Analog Multiline Telephone Button Diagram (Key and Behind Switch Mode)

Sample Reports

F

This appendix includes samples of the print reports generated by the communications system. Table F-1 lists the system reports and the pages in this appendix where samples can be found.

Table F-1. Report Contents

For...	See...
System information Report	F-8
Dial Plan Report	F-10
Label information Report	F-12
Tie Trunk Information Report	F-13
DID Trunk Information Report	F-14
GS/LS Trunk Information Report	F-15
General Trunk Information Report	F-16
DS1 Information Report	F-17
PRI Information Report	F-18
Remote Access (DISA) Information Report	F-20
Operator information Report	F-21

Continued on next page

Table F-1, Continued

For...	See...
Allowed Lists Report	F-23
Access to Allowed Lists Report	F-24
Disallowed Lists Report	F-25
Access to Disallowed Lists Report	F-26
Automatic Route Selection Report	F-27
Extension Directory Report	F-29
System Directory Report	F-30
Group Paging Report	F-31
Extension Information Report	F-32
Group Coverage information Report	F-34
Direct Group Calling Information Report	F-35
Night Service Information Report	F-36
Group Call Pickup Report	F-37
Error Log Report	F-38
Authorization Code Information Report	F-39

Table F-2 lists all of the system reports and includes: the print menu option used to print each report; the report name; and a brief description of each report.

The menu options referred to in Table F-2 are accessed by selecting the **Print** option on the System Programming menu. Refer to the “Print Reports” section of this guide for details on the **Print** option.

Table F-2. System Reports

Menu Option	Report Name	Description
All		Prints each of the reports available on the Print menu, from SysSet-up to Error Log. Note: When All is selected, the four Trunk Information reports automatically print. See Trunk Info .
SysSet -up	System Information	Systemwide information such as return intervals, system mode, system programming port, slot assignments, etc.
Dial Plan	Dial Plan	Extensions assigned to pools, paging zones, calling groups, lines or trunks, and stations; labels for lines/trunks and stations.
Labels	Label Information	Labels assigned to stations Posted Messages, and names and telephone numbers included in MLX-20L user's Personal Directory.
Trunk Info		Select to display four trunk options: Tie, DID, Loop/Ground, General.
TIE	TIE Trunk Information	Extensions assigned to and signaling attributes associated with Tie trunks.
DID	DID Trunk Information	Extensions assigned to and signaling attributes associated with DID trunks.
Loop/ Ground	GS/LS Trunk Information	Extensions assigned to and signaling attributes associated with ground- and loop-start trunks.

Continued on next page

Table F-2, Continued

Menu Option	Report Name	Description
General	General Trunk Information	All identified extensions and feature-related attributes of each extension.
T1 Info	DS1 information	Options (line, signal, etc.) assigned to T1 trunks or lines.
PRI Info	PRI Information	PRI trunks/lines assigned to B-channel groups.
Rmote Access	Remote Access (DISA) Information	Remote access dial code, class of restriction, barrier code information.
Oper Info	Operator Information	For each system operator position; the logical ID, extension number, label, type (DLC or QCC); all general system operator options, such as backup position, etc.; call types and priorities.
AllowList	Allowed Lists	Telephone numbers included in Allowed Lists. Lists are numbered 0-7, and entries are numbered 0-9.
AllowListTo	Access to Allowed Lists	Lists are numbered 0-7. If the Allowed List is assigned to Remote Access users and barrier-codes are used, the barrier codes are numbered 0-16. If no barrier codes are used, 17 means the Allowed List is assigned to tie-trunk users, and 18 means the Allowed List is assigned to non-tie-trunk users.

Continued on next page

Table F-2, Continued

Menu Option	Report Name	Description
DisallowLst	Disallowed Lists	Telephone numbers included in Disallowed Lists. Lists are numbered 0-7, and entries are numbered 0-9.
DisallowTo	Access to Disallowed Lists	Telephones to which Disallowed Lists are assigned. Lists are numbered 0-7. If the Disallowed List is assigned to Remote Access users and barrier codes are used, the barrier codes are numbered 0-16. If no barrier codes are used, 17 means the Disallowed List is assigned to tie-trunk users, and 18 means the Disallowed list is assigned to non-tie-trunk users.
ARS	Automatic Route Selection	Access code; table types with area codes and exchanges; routes for sub-patterns A and B, FRL, absorb digit, delete digit, Dial 0, and N11 tables.

Continued on next page

Table F-2, Continued

Menu Option	Report Name	Description
Ext Direct	Extension Directory	Slot/port addresses, extensions, labels and feature-related attributes. Column headings are printed on the first page only and are not carried over to subsequent pages. Column headings 4 through 10 (and 14 through 20) should be read vertically. That is: FACE (Forced Account Code Entry); HBIS (HFAI/BIS); RCFW (Remote Call Forward); MICD (Microphone Disable); SIG (Voice Signal); RSTR (Calling Restrictions); ARSR (ARS Restriction Level).
Sys Direct	System Directory	System Speed Dial number, label and telephone number in System Directory, and whether number should display.
Group Page	Group Paging	Extension number for each group and the extension number of each telephone assigned to the group.
Ext Info	Extension Information	For each specified extension, type of equipment connected, features assigned to station, and features assigned to each button on the station.

Continued on next page

Table F-2, Continued

Menu Option	Report Name	Description
GrpCoverage	Group Coverage Information	Extension number for each group and the extension number for each telephone assigned to the group. Information is printed only for calling groups with members and/or lines/trunks assigned.
GrpCalling	Direct Group Calling Information	Group calling options (hunt, type, message waiting, station, etc.), the extension number for each telephone assigned to the group, and the lines or trunks assigned to the group.
Night Service	Night Service Information	The operator, password required, time-of-day, and Emergency Allowed List extension numbers.
Call Pickup	Group Call Pickup	Extension numbers for telephones assigned to each group. Pickup groups are numbered 1-30.
Error Log	Error Log	Error message and code, time and day error occurred, frequency of error. See the Maintenance and Troubleshooting guide.
Auth Code	Authorization Code Information	Authorization Code and permissions for extensions to which authorization codes are assigned.

System Reports

System Information Report

Print Menu Option: SysSet - up

SYSTEM INFORMATION

Current Date: 01/04/00

Current Time: 00:21:15

System :	Mode	AutoMaintBusy	AutoBusyTie
:	Hybrid/PBX	Disable	Disable

Language:	SystemLang	SMDR	Printer
	English	English	English

Direct Line Operators : 14 18 22 42

Queued Call Operators : 10

SysProg Port : 10 Password : craft

Transfer :	Type	Audible	OneTouch(Complete	ReturnTimer
:	Ring	MusicOnHold	Transfer(Auto)	5 rings

VMS Transfer Return Interval : 4

Paging System Lines :

Music On Hold Line : 804

Camp On Time : 90 sec

Call Park Return Time : 180 sec

Delay Rings : 2

Coverage Delay : 3

Auto Callback Rings : 3

Extension Status (ESS) : Group Call / CMS

ESS Operators :

SMDR :	Min.CallTime	CallReport	Format
:	40 sec	In/Out	Basic

Intercom Dial Tone : Inside

Reminder Service Cancel : :

System Information Report — Continued

Behind Switch Code : Drop Transfer Conference
:

Recall Timer : 450 msec

Rotary Line Cut Through : Delay

Unassigned Extension : 10

Automatic Backup : Weekly - 04:30 Sunday

Slot # 1: 008 MLX

Slot # 2: 408

Slot # 3: 008

Slot # 4: 408

Slot # 5: 800 GS/LS

Slot # 6: 008 GS/LS-MLX

Slot # 7: 800

Slot # 8: 008

Slot # 9: 012

Slot #10: 408 GS/LS

Slot #11: 008

Slot #12: 800

Slot #13: 800 DID

Slot #14: 400 EM

Slot #15: 012

Slot #16: 008 MLX

Slot #17: 408

* Not Present *

Dial Plan Report

Print Menu Option: Dial plan

Sections: Pools; Telephone Paging Zones; Direct Group
Calling Group; Lines/Trunks; Stations

DIAL PLAN FOR POOLS

P00L.# 1:	70
P00L.# 2:	890
P00L.# 3:	891
P00L.# 4:	892
P00L.# 5:	893
P00L.# 6:	894
P00L.# 4:	895
P00L.# 8:	896
P00L.# 9:	897
P00L.# 10:	898
P00L.# 11:	899

DIAL PLAN FOR TELEPHONE PAGING ZONES

TPZ # 1:	793
TPZ # 2:	794
TPZ # 3:	795
TPZ # 4:	796
TPZ # 5:	797
TPZ # 6:	798
TPZ # 7:	799

DIAL PLAN FOR DIRECT GROUP CALLING GROUP

DGCG # 1:	770
DGCG # 2:	771
DGCG # 3:	772
DGCG # 4:	773
DGCG # 5:	774

Dial Plan Report — Continued

DIAL PLAN FOR LINES/TRUNKS

LINE # 1:	801	OUTSIDE	LINE #	2:	802	OUTSIDE
LINE # 3:	803	OUTSIDE	LINE #	4:	804	OUTSIDE
LINE # 5:	805	OUTSIDE	LINE #	6:	806	OUTSIDE
LINE # 7:	807	OUTSIDE	LINE #	8:	808	OUTSIDE
LINE # 9:	809	OUTSIDE	LINE #	10:	810	OUTSIDE

DIAL PLAN FOR STATIONS

STN #: 1	10	OPERATR	STN #:	2	710	
STN #: 3	11		STN #:	4	711	
STN #: 5	12		STN #:	6	712	
STN #: 7	13	EXT 13	STN #:	8	713	
STN #: 9	14	EXT 14	STN #:	10	714	
STN #: 11	15		STN #:	12	715	
STN #: 13	16		STN #:	14	716	
STN #: 15	17		STN #:	16	717	
STN #: 17	18	EXT 18	STN #:	18	19	
STN #: 19	20		STN #:	20	21	
STN #: 21	22	OPERATR	STN #:	22	23	
STN #: 23	24		STN #:	24	25	
STN #: 25	26		STN #:	26	21	
STN #: 27	28		STN #:	28	29	
STN #: 29	30	AUDIXVP	STN #:	30	31	AUDIXVP
STN #: 31	32	AUDIXVP	STN #:	32	33	AUDIXVP
STN #: 33	34		STN #:	34	35	
STN #: 35	36		STN #:	36	31	
STN #: 37	38		STN #:	38	39	
STN #: 39	40		STN #:	40	41	
STN #: 41	42	EXT 42	STN #:	42	742	
•						
•						
•						
STN #: 53	54	EXT 54	STN #:	54	754	AUDIXVP

Label Information Report

Print Menu Option: Labels

Sections: Telephone Personal Directory; Posted
Messages and Numbers

LABEL INFORMATION

Executive Telephone # 10: Personal Directory

Name	Number	Display

Executive Telephone # 14: Personal Directory

Name	Number	Display

Executive Telephone # 15: Personal Directory

Name	Number	Display

MSG #	POSTED MESSAGE

1	DO NOT DISTURB
2	OUT TO LUNCH
3	AT HOME
4	OUT SICK
5	IN A MEETING
6	IN CONFERENCE
7	WITH A CLIENT
8	WITH A CUSTOMER
9	AWAY FROM DESK
10	OUT ALL DAY
11	CUSTM MSG11
12	CUSTM MSG12
13	CUSTM MSG13
14	CUSTM MSG14
15	CUSTM MSG15
16	CUSTM MSG16
17	CUSTM MSG17
18	CUSTM MSG18
19	CUSTM MSG19
20	CUSTM MSG20

Tie Trunk Information Report

Print Menu Option: Trunk Info and TIE

TIE TRUNK INFORMATION

TRUNK 849	Slot/Port : 14/ 1	TIE-PBX
Direction: 2 Way	E&M Signal: Type1S	Dialtone : Remote
InType : Wink	InMode : Rotary	AnsSupvr : 300 ms
OutType : Wink	OutMode : Rotary	Disconnect: 300 ms
TRUNK 850	Slot/Port : 14/ 2	TIE-PBX
Direction: 2 Way	E&M Signal: Type1S	Dialtone : Remote
InType : Wink	InMode : Rotary	AnsSupvr : 300 ms
OutType : Wink	OutMode : Rotary	Disconnect: 300 ms
TRUNK 851	Slot/Port : 14/ 3	TIE-PBX
Direction: 2 Way	E&M Signal: Type1S	Dialtone : Remote
InType : Wink	InMode : Rotary	AnsSupvr : 300 ms
OutType : Wink	OutMode : Rotary	Disconnect: 300 ms
TRUNK 852	Slot/Part : 14/ 4	TIE-PBX
Direction: 2 Way	E&M Signal: Type1S	Dialtone : Remote
InType : Wink	InMode : Rotary	AnsSupvr : 300 ms
OutType : Wink	OutMode : Rotary	Disconnect: 300 ms

DID Trunk Information Report

Print Menu Option: Trunk Info and DID

DID TRUNK INFORMATION

Trk	SS/PP	Blk	DiscTime	Type	ExpDig	DelDig	AddDig	Signal	InvDest
841	13/ 1	1	500ms	Wink	4	3	1	TouchTone	BkupExt
842	13/ 2	1	500ms	Wink	4	3	1	TouchTone	BkupExt
843	13/ 3	2	500ms	Wink	3	0		Rotary	BkupExt
844	13/ 4	2	500ms	Wink	3	0		Rotary	BkupExt
845	13/ 5	1	500ms	Wink	4	3	1	TouchTone	BkupExt
846	13/ 6	1	500ms	Wink	4	3	1	TouchTone	BkupExt
847	13/ 7	2	500ms	Wink	3	0		Rotary	BkupExt
848	13/ 8	1	500ms	Wink	4	3	1	TouchTone	BkupExt

Sample Reports

GS/LS Trunk Information Report

Print Menu Option: Trunk Info and Loop/Ground

GS/LS TRUNK INFORMATION

Trk	SS/PP	Type	OutMode	RelDisc	ChannelUnit	LS-ID Delay
801	2/ 1	Loop	TouchTone	Yes	N/A	N/A
802	2/ 2	Loop	TouchTone	Yes	N/A	N/A
803	2/ 3	Loop	TouchTone	Yes	N/A	N/A
804	2/ 4	Loop	TouchTone	Yes	N/A	N/A
805	4/ 1	Loop	Rotary	Yes	N/A	N/A
806	4/ 2	Loop	Rotary	Yes	N/A	N/A
807	4/ 3	Loop	Rotary	Yes	N/A	N/A
808	4/ 4	Loop	Rotary	Yes	N/A	N/A
809	5/ 1	Ground	TouchTone	N/A	N/A	N/A
810	5/ 2	Ground	TouchTone	N/A	N/A	N/A
811	5/ 3	Loop	Rotary	Yes	N/A	N/A
812	5/ 4	Loop	Rotary	Yes	N/A	N/A
813	5/ 5	Loop	Rotary	Yes	N/A	N/A
814	5/ 6	Loop	Rotary	Yes	N/A	N/A
815	5/ 7	Loop	TouchTone	Yes	N/A	N/A
816	5/ 8	Loop	Rotary	Yes	N/A	N/A
817	6/ 1	Ground	Rotary	N/A	N/A	N/A
•						
•						
879	15/ 7	LS-ID	Rotary	Yes	N/A	Yes
880	15/ 8	LS-ID	Rotary	Yes	N/A	No

General Trunk Information Report

Print Menu Option: Trunk Info and General

GENERAL TRUNK INFORMATION

Trk	SS/PP	RemAccess	Pool	TlPrfx	HldDisc	Principal	QCC	Prty	QCC Oper
801	2/ 1	No Remote	70	Yes	Long		4		
802	2/ 2	No Remote	70	Yes	Long		4		
803	2/ 3	No Remote	70	Yes	Long		4		
804	2/ 4	No Remote		Yes	Long		4		
805	4/ 1	No Remote		Yes	Long		4		
806	4/ 2	No Remote		Yes	Long		4		
807	4/ 3	No Remote		Yes	Long		4		
808	4/ 4	No Remote		Yes	Long		4		
809	5/ 1	No Remote	890	Yes	Long		4		10
810	5/ 2	No Remote		Yes	Long		4		
811	5/ 3	No Remote		Yes	Long		4		
812	5/ 4	No Remote		Yes	Long		4		
813	5/ 5	No Remote		Yes	Long		4		
814	5/ 6	No Remote		Yes	Long		4		
815	5/ 7	No Remote		Yes	Long		4		
816	5/ 8	No Remote		Yes	Long		4		
817	6/ 1	Dedicated		Yes	Long	42	4		

DS1 Information Report

Print Menu Option: T1 info

DS1 SLOT ATTRIBUTES

Slot	Type	Format	Supp	Signal	LineComp	ClkSync	Src	Active
3	T1	D4	ZCS	Rob Bit	1	Prim	Loop	Yes
3	T1	D4	ZCS	Rob Bit	1	None	Local	Yes

PRI Information Report

Print Menu Option: PRI Info
Sections: Network Selection, Special Service,
 Call-by-Call and Dial Plan Routing Tables; PRI
 Information

PRI INFORMATION

System: By line

BchnlGrp #: Slot : TestTelNum: NtwkServ: Incoming Routing:
 1 9 00011 By Line Appearance
 Channel ID: 1

Line PhoneNumber NumberToSend

Network Selection Table

Entry Number:	0	1	2
Pattern to Match:	101****	10***	101****

Special Service Table

Entry Number:	0	1	2	3	4	5	6	7
Pattern to Match:	011	010	01	00	0	1		
Operator:	none	none	OP	OP	OP/P	none	none	none
Type of Number:	I	I	I	N	N	I	I	N
Digits to Delete:	3	1	3	2	1	1	0	0

Call-By-Call Service Table

Entry Number:	0	1	3	4
Pattern 0:	777			
Pattern 1:		212555		
Pattern 2:		212		
Call Type:	BOTH	BOTH	BOTH	BOTH
NtwkServ:		No Service		OUT WATS
DeleteDigits:	0	1	2	0
Entry Number:	5	6	7	8
Call Type:	BOTH	BOTH	BOTH	BOTH
NtwkServ:	No Service		00111	
DeleteDigits:	0	0	0	0

PRI Information Report — Continued

Dial Plan Routing Table

Entry Number:	0	1	2	3
NtwkServ:		OUT WATS	Any service	
11100				
Expected Digits:	0	0	11	0
Pattern to Match:		222		
Digits to Delete:	0	1	0	0
Digits to Add:		22		

Entry Number:	4	5	6	7
NtwkServ:	11100			
Expected Digits:	2	1	0	0
Pattern to Match:	2			
Digits to Delete:	0	1	2	0
Digits to Add:	2			

Entry Number:	8	9	10	11

PRI INFORMATION

NtwkServ:				
Expected Digits:	0	0	0	0
Pattern to Match:				
Digits to Delete:	0	0	0	0
Digits to Add:				

Entry Number:	12	13	14	15
NtwkServ:				
Expected Digits:	0	0	0	0
Pattern to Match:				
Digits to Delete:	0	0	0	0
Digits to Add:				

Remote Access (DISA) Information Report

Print Menu Option: Rmote Access

Sections: General Options; System Default Class of
Restrictions (Non-TIE); System Default Class of
Restrictions (TIE); Barrier Code Administration

GENERAL OPTIONS (ACCESS CODE 889)

Barrier Code required for Non-TIE DISA lines: Yes

Barrier Code required for TIE DISA lines : No

Automatic Queuing enabled for DISA lines : Yes

System Wide Barrier Code Length: 07

Date And Time of Last Barrier Code Length Change: 09:23:94, 09:45 PM

SYSTEM DEFAULT CLASS OF RESTRICTIONS (NON-TIE)

Restriction : UNRESTRICTED

ARS Restriction Level: 3

Allowed Lists :

Disallowed Lists :

SYSTEM DEFAULT CLASS OF RESTRICTIONS (TIE)

Restriction : UNRESTRICTED

ARS Restriction Level: 3

Allowed Lists :

Disallowed Lists :

BARRIER CODE ADMINISTRATION

Barrier Code number : 1

Barrier Digits : 2468345

Restriction : OUTWARD RESTRICTED

ARS Restriction Level: 3

Allowed Lists :

Disallowed Lists :

Barrier Code number : 2

Barrier Digits : 1234693

Restriction : UNRESTRICTED

ARS Restriction Level: 3

Allowed Lists :

Disallowed Lists :

Barrier Code number : 16

Barrier Digits : 9876115

Restriction : OUTWARD RESTRICTED

ARS Restriction Level: 0

Allowed Lists :

Disallowed Lists :

Operator Information Report

Print Menu Option: Oper Info

Sections: Operator Positions; General Options; DSS Options; QCC Operator Options: QCC Call Types

OPERATOR POSITIONS

PORT ADDR.	EXT #	LABEL	TYPE	CALL ALERT (QCC ONLY)
=====	=====	=====	=====	=====
1/ 1	10	OPERATR	QCC	No
1/ 5	14	EXT 14	DLC	N/A
2/ 1	18	EXT 18	DLC	N/A
2/ 5	22	OPERATR	DLC	N/A
6/ 1	42	EXT 42	DLC	N/A

GENERAL OPTIONS

Length of hold reminder timer: 60 sec

DLC Automatic hold enabled : No

DIRECT STATION SELECTOR (DSS) OPTIONS

BUTTON NUMBER	FIRST DIAL CODE
=====	=====

1	0
2	50
3	100

Operator Call Park codes: 881 882 883 884 885 886 884 888

QCC OPERATOR OPTIONS

Listed Directory Number for queue : 800

Held calls return to queue : No

Automatic hold enabled : No

Calls-in-queue alarm threshold : 0

Time until priorities are elevated: 0 sec

Message Center Operators :

One Touch Extend : AUTOMATIC

Rings before extended calls return: 4

Backup operator station :

Operator Information Report — Continued

QCC CALL TYPES:			
CALL TYPE		PRIORITY	OPERATORS
=====		=====	=====
Dial 0 Operator		4	10
Follow Forward		4	N/A
Unassigned DID		4	10
Listed Directory Number		4	10
Operator's Extension		4	N/A
Returning		4	0
Group Coverage			
Group #	1	4	
Group #	2	4	
Group #	3	4	
Group #	4	4	
Group #	5	4	
Group #	6	4	
Group #	7	4	
Group #	8	4	
Group #	9	4	
Group #	10	4	
Group #	11	4	
Group #	12	4	
Group #	13	4	
Group #	14	4	
Group #	15	4	
Group #	16	4	
Group #	17	4	
Group #	18	4	
Group #	19	4	
Group #	20	4	
Group #	21	4	
Group #	22	4	
Group #	23	4	
Group #	24	4	
Group #	25	4	
Group #	26	4	
Group #	27	4	
Group #	28	4	
Group #	29	4	
Group #	30	4	

Allowed Lists Report

Print Menu Option: AllowList
Sections: Lists 1 through 7

ALLOWED LISTS

List : 0

Entry 0: -----
Entry 1: -----
Entry 2: -----
Entry 3: -----
Entry 4: -----
Entry 5: -----
Entry 6: -----
Entry 7: -----
Entry 8: -----
Entry 9: -----

•
•
•

List : 7

Entry 0: -----
Entry 1: -----
Entry 2: -----
Entry 3: -----
Entry 4: -----
Entry 5: -----
Entry 6: -----
Entry 7: -----
Entry 8: -----
Entry 9: -----

Access to Allowed Lists Report

Print Menu Option: AllowListTo

ACCESS TO ALLOWED LISTS

FOR REMOTE ACCESS 17 & 18 MEAN TIE & NON-TIE RESTRICTIONS

List 1	STNS	10		
	RACC	1	17	18
List 3	STNS	33		
	RACC			

Disallowed Lists Report

Print Menu Option: DisallowLst
Sections: Lists 1 through 7

DISALLOWED LISTS

List : 0

Entry 0: -----
Entry 1: -----
Entry 2: -----
Entry 3: -----
Entry 4: -----
Entry 5: -----
Entry 6: -----
Entry 7: -----
Entry 8: -----
Entry 9: -----

•
•
•

List : 7

Entry 0: -----
Entry 1: -----
Entry 2: -----
Entry 3: -----
Entry 4: -----
Entry 5: -----
Entry 6: -----
Entry 7: -----
Entry 8: -----
Entry 9: -----

Access to Disallowed Lists Report

Print Menu Option: DisallowTo

ACCESS TO DISALLOWED LISTS

FOR REMOTE ACCESS 17 & 18 MEAN TIE & NON-TIE RESTRICTIONS

List	1	STNS	33

		RACC	9

List	3	STNS	33

		RACC	

Automatic Route Selection Report

Print Menu Option: ARS
Sections: Tables

AUTOMATIC ROUTE SELECTION

ARS IS: ACTIVE ACCESS CODE: 9

TABLE 17: Default Toll Output Table

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	A
2)----	--	-----	-	-----	--:--	A
3)----	--	-----	-	-----	--:--	A
4)----	--	-----	-	-----	--:--	A
5)----	--	-----	-	-----	--:--	B
6)----	--	-----	-	-----	--:--	B

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	B
2)----	--	-----	-	-----	--:--	B
3)----	--	-----	-	-----	--:--	B
4)----	--	-----	-	-----	--:--	B
5)----	--	-----	-	-----	--:--	B
6)----	--	-----	-	-----	--:--	B

TABLE 18: Default Local Output Table

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	A
2)----	--	-----	-	-----	--:--	A
3)----	--	-----	-	-----	--:--	A
4)----	--	-----	-	-----	--:--	A
5)----	--	-----	-	-----	--:--	B
6)----	--	-----	-	-----	--:--	B

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	B
2)----	--	-----	-	-----	--:--	B
3)----	--	-----	-	-----	--:--	B
4)----	--	-----	-	-----	--:--	B
5)----	--	-----	-	-----	--:--	B

Automatic Route Selection Report—
Continued

TABLE 19: Dial 0 Output Table

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	A

TABLE 20: N11 Output Table

01)411 02)611 03)811 04)911

Pool	Absorb	Other Digits	FRL	Call type	Start	Pattern
1)70--	00	-----	3	BOTH	--:--	A
1)70--	00	-----	3	BOTH	--:--	A

Sample Reports

Extension Directory Report

Print Menu Option: Ext Direct

EXTENSION DIRECTORY

Port Addr	Ext #	Label	F H R M V R A A B C I S S R C I F C I T S E S W D G R R	Port Addr	Ext#	Label	F H R M V R A A B C I S S R C I F C I T S E S W D G R R
1/ 1	10	OPERATR	N N N N U3	1/21	710		N N N N U3
1/ 2	11		N N N N 03	1/22	711		N N N N U3
1/ 3	12		N N N N U3	1/23	712		N N N N U3
1/ 4	13	EXT 13	N N N N U3	1/24	713		N N N N U3
1/ 5	14	EXT 14	N N N N U3	1/25	714		N N N N U3
1/ 6	15		N N N N U3	1/26	715		N N N N U3
1/ 7	16		N N N N U3	1/27	716		N N N N U3
1/ 8	17		N N N N U3	1/28	717		N N N N U3
2/ 1	18	EXT 18	N Y N N U3	2/ 2	19		N Y N N U3
2/ 3	20		N Y N N U3	2/ 4	21		N Y N N U3
2/ 5	22	OPERATR	N Y N N U3	2/ 6	23		N Y N N U3
2/ 7	24		N Y N N U3	2/ 8	25		N Y N N U3
3/ 1	26		N Y N N U3	3/ 2	27		N Y N N U3
3/ 3	28		N Y N N U3	3/ 4	29		N Y N N U3
3/ 5	30	AUDIXVP	N Y N N U3	3/ 6	31		N Y N N U3
3/ 7	32	AUDIXVP	N Y N N U3	3/ 8	33		N Y N N U3
4/ 1	34		N Y N N U3	4/ 2	35	AUDIXVP	N Y N N U3
4/ 3	36	AUDIXVP	N Y N N U3	4/ 4	37		N Y N N U3
4/ 5	38		N Y N N U3	4/ 6	39		N Y N N U3
4/ 7	40		N Y N N U3	4/ 8	41		N Y N N U3
6/ 1	42	EXT 42	N N N N U3	6/21	742		N N N N U3
•							
•							
•							
7/ 1	54	EXT 54	N N N N U3	7/2	754		N N N N U3

System Directory Report

Print Menu Option: Sys Direct

SYSTEM DIRECTORY

Code	Name	Number	Display
600	ABC Company	555-9999	YES
601	Jacques Smith	5551212	YES
605	Travel Agency	912015556677	YES

Group Paging Report

Print Menu Option: Group Page

GROUP PAGING

Group # 793 STNS : 20 21 22 23 24 25

Group # 794 STNS : 15 16 17 18 19

Extension Information Report

Print Menu Option: Ext Info plus extension number

EXTENSION INFORMATION

Extn	SS/PP	Type
10	1/ 1	MLX-20L + 1 DSS
Pool Access	:	70 890 891 892 893 894 895 896 897 898 899
Page Group	:	
Primary Coverage	:	
Secondary Coverage	:	
Coverage Group	:	5
Group Coverers	:	773
NS Groups	:	10
Group Calling Member:	:	
Pickup Groups	:	
Allowed Lists	:	
Disallowed Lists	:	
Restrictions	:	UNRESTRICTED
Auto Callback	:	OFF
Call Waiting	:	ON
Abbreviated Ring	:	ON
Line Preference	:	ON
Shared SA Ring	:	ON
Receive Voice Calls	:	ON
Coverage Inside	:	OFF
Forwarding to	:	
ARS Restriction	:	3
Forced Account Code	:	No
Microphone Disable	:	No
Remote Forward Allow:	:	No
NS Exclusion	:	No
Voice Announce Pair	:	No
Voice/Data Pair	:	No
BIS/HFAI	:	No
Language	:	English
Authorization Code	:	3134

Extension Information Report — Continued

EXTENSION INFORMATION

Extn	SS/PP	Type	Status	
10	1/ 1	MLX-20L + 1 DSS		
Button	34	Blank	Status	None
Button	33	Blank	Status	None
Button	32	Blank	Status	None
Button	31	Blank	Status	None
Button	30	Blank	Status	None
Button	29	Blank	Status	None
Button	28	Blank	Status	None
Button	27	Blank	Status	None
Button	26	Blank	Status	None
Button	25	Blank	Status	None
Button	24	Blank	Status	None
Button	23	Blank	Status	None
Button	22	Blank	Status	None
Button	21	Blank	Status	None
Button	20	Forced Release	Status	None
Button	19	Pool Inspect	Status	None
Button	18	Headset Auto Answer	Status	Off
Button	17	Join	Status	None
Button	16	Cancel	Status	None
Button	15	Alarm Status	Status	Off
Button	14	Night Service	Status	Off
Button	13	Headset Status	Status	Off
Button	12	Destination	Status	None
Button	11	Release	Status	None
Button	10	Position Busy	Status	Off
Button	9	Send/Remove Message	Status	None
Button	8	Handset/Headset Mute	Status	Off
Button	7	Source	Status	None
Button	6	Start	Status	None
Button	5	Call 5	Status	None
Button	4	Call 4	Status	None
Button	3	Call 3	Status	None
Button	2	Call 2	Status	None
Button	1	Call 1	Status	None

Group Coverage Information Report

Print Menu Option: GrpCoverage

GROUP COVERAGE INFORMATION

Group # 2 Senders : 6802 6804
Group # 5 Senders : 10 11 12 13 14 18 19 20 42
44 45 47 6810

DIRECT GROUP CALLING INFORMATION

Group # : 770 Group Type : AutoLogOut
Call Distribution Type : CIRCULAR
Delay Announcement Ext # : 11
Message Waiting Station : 20
Calls_in_queue Threshold : 1
External Alert ext # : 21
Overflow Threshold : 1
Overflow to DGC group # :
Group Coverage : 1

No.	EXT #	LABEL
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Direct Group Calling Information Report

Print Menu Option: Grp Calling
Sections: Each programmed group

DIRECT GROUP CALLING INFORMATION

Group # : 782 Group Type : AutoLogOut
Call Distribution Type : CIRCULAR
Delay Announcement Ext # :
Message Waiting Station :
Calls_in_queue Threshold : 1
External Alert ext # :
Overflow Threshold :1
Overflow to DGC group # :

Group Coverage : 1

No.	EXT #	LABEL
1	12	
2	13	
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

LINES :

Night Service Information Report

Print Menu Option: Night Service

NIGHT SERVICE INFORMATION

OPERATOR	10	DGCG	#:	
		STNS	:	10
OPERATOR	14	DGCG	#:	
		STNS	:	14
OPERATOR	18	DGCG	#:	
		STNS	:	18
OPERATOR	22	DGCG	#:	
		STNS	:	22
OPERATOR	42	DGCG	#:	
		STNS	:	42

Password :

Current Day : OFF

	Turn off at:	Turn on at:
Sunday	:	:
Monday	:	:
Tuesday	:	:
Wednesday	:	:
Thursday	:	:
Friday	:	:
Saturday	:	:

Emergency Allowed List:

- 0)
- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

NS Excluded STNS:

61 62 63 64 65

Group Call Pickup Report

Print Menu Option: Call Pickup

GROUP CALL PICKUP

Group # 1	STNS	:	10	11	12	13	14	15	16						
Group # 2	STNS	:	17	18	19	20									
Group # 3	STNS	:	21	22	23	24	25	26	27	28	29	30			
Group # 4	STNS	:	31												
Group # 5	STNS	:	32												
Group # 6	STNS	:	33												
Group # 7	STNS	:	34												
Group # 8	STNS	:	35												
Group # 9	STNS	:	36												
Group #10	STNS	:	37												

Error Log Report

Print Menu Option: Error Log

ERROR LOG

Last 10 System Errors:

Message	ss/pp	Cnt	First	Last	Code
PRI SVC AUDIT TIMEOUT	00/00	-	-	01/08 00:00:53	7001
TIMEOUT COLD START	00/00	-	-	01/11 00:04:08	0001
PRI SVC AUDIT TIMEOUT	00/00	-	-	01/11 00:04:14	7001
TIMEOUT COLD START	00/00	-	-	01/21 00:22:14	0001
PRI SVC AUDIT TIMEOUT	00/00	-	-	01/03 00:22:14	7001
PRI SVC AUDIT TIMEOUT	00/00	-	-	01/04 00:22:14	7001
SOFTWARE COLD START	00/00	-	-	01/04 00:21:14	0003
SOFTWARE COLD START	00/00	-	-	01/04 00:21:14	0003
PRI SVC AUDIT TIMEOUT	00/00	-	-	01/04 00:21:14	7001
SOFTWARE COLD START	00/00	-	-		

Authorization Code Information Report

Print Menu Option: Auth Code

SMDR Option for the Account Code Field is Home Extension

Extension	Authorization Code
10	3124
15	1357921
20	6578
23	443796

General System Programming Sequence



System Programming Sequence

This appendix lists the basic procedures, in the order in which they must be performed, to program a new system. In some instances, you may need to rearrange the system planning forms to match this order.

Basic System Operating Conditions

- Select the system programming position
System → SProg Port
- Select the system language
More → Language → SystemLang
- Select the system mode
System → Mode
- Enable Automatic Maintenance Busy
System → MaintenBusy

- Set the system time
 System → Time
- Set the system date
 System → Date
- Schedule automatic backups
 System → Backup/Restore → Auto Backup

System Renumbering

- Select the system numbering plan
 SysRenumber → Default Numbering
- Single renumbering
 SysRenumber → Single
- Block renumbering
 SysRenumber → Block
- DSS console page buttons
 SysRenumber → Single → More → DSS Buttons

Identify System Operator Positions

- Identify QCC system operator positions
 Operator → Positions → Queued Call
- Identify DLC system operator positions
 Operator → Positions → Direct Line

Lines and Trunks

- Specify type of trunk on 400 or 800 GL/LS module

LinesTrunks → LS/GS/DS1

- Identify dial signaling for loop-start/ground-start trunks

LinesTrunks → TT/LS Disc → Outmode

- Classify disconnect signaling reliability for loop-start trunks

LinesTrunks → TT/LS Disc → LS Disconnect

- Specify toll prefix requirements

LinesTrunks → Toll Type

- Specify Hold Disconnect interval

LinesTrunks → More → HoldDiscnct

- Assign the QCC queue priority

LinesTrunks → More → QCC Prior

- Identify QCC operator to receive calls

LinesTrunks → More → QCC Oper

- Assign trunks to pools

LinesTrunks → Pools

Complex Lines

- Program DS1 trunks

LinesTrunks → LS/GS/DS1

- Program tie lines

LinesTrunks → TIE Lines

- Program DID trunks

LinesTrunks → DID

- Program PRI trunks

LinesTrunks → PRI

Telephones

Many programmers prefer to program Auxiliary Equipment before programming Telephones.

- Assign trunks to telephones

Extensions → LinesTrunks

- Copy trunk assignments

Extensions → Line Copy

- Identify Principal User for Personal Line

LinesTrunks → More → PrncipalUsr

- Assign ring, voice, outgoing only, shared buttons

More → Cntr-Prg

- Copy telephone button assignments

More → Cntr-Prg

- Identify analog multiline telephones with BIS or HFAI

Extensions → BIS/HFAI

- Identify analog multiline telephones requiring Voice Announce to Busy

Extensions → VoiceSingl

Auxiliary Equipment

- Program Music on Hold

AuxEquip → MusicOnHold

- Program loudspeaker paging

AuxEquip → Ldspkr Pg

- Program a fax port

AuxEquip → **Fax**

- Identify the jack used for maintenance alarms

AuxEquip → **MaintAlarms**

- Program Voice Mail and Automated Attendant

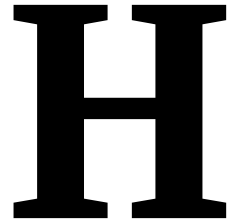
AuxEquip → **VMS/AA** → **TransferRtn**

Print Reports

- Print system reports to simplify checking your work and to provide a paper copy of system configuration

More → **Print**

Programming Special Characters



This appendix provides the special characters used in dialing sequences for numbers dialed automatically. The characters allowed depend on the type of telephone. Ask your system manager which special characters are needed and when to use them.

Single-Line Telephones

Some dialing sequences need special characters. For example, you would press and release either the **Recall** or **Flash** button or the switchhook to insert a pause in a dialing sequence after a dial-out code to allow the system to seize an outside line before dialing the number.

Table H-1. Special Characters for Single-Line Telephones

Press...	Means...
Recall, Flash or switchhook	Pause. Inserts 1.5 second pause in the dialing sequence. Multiple consecutive pauses are allowed.
#	End of Dialing. Used to signal the end of the dialing sequence or to separate group digits, for example, account code from number dialed.

Analog Multiline Telephones

Some dialing sequences need special characters. For example, you would press **Hold** to insert a pause (**p**) after the dial-out code in a dialing sequence to allow the system to seize an outside line before dialing the number. A pause can also be used to separate a phone number from an extension number.

Table H-2. Special Characters for Analog Multiline Telephones

Press...	See*...	Means...
Drop†	s	Stop. Inserts a stop within a sequence of automatically dialed numbers. For example, an outside Auto Dial button may be programmed with a password then a Stop, followed by a phone number. To use Auto Dial with a Stop in the sequence, press the button to dial the password, listen for the dialing and connection, and press the button again to dial the phone number.
Hold	p	Pause. Inserts 1.5 second pause in the dialing sequence. Multiple consecutive pauses are allowed.
Conference†	f	Flash. Sends a switchhook flash. Must be the first entry in the dialing sequence.
##	#	End of Dialing for Auto Dial buttons. Used at the end of a dialing sequence to indicate you have finished dialing or to separate one group of dialed digits from another.
#	#	End of Dialing. Used at the end of a dialing sequence to indicate you have finished dialing or to separate one group of dialed digits from another.

* Display phones only.

† Not available on MLC-5 cordless phones.

MLX Non-Display Telephone

Some dialing sequences need special characters. For example, you would press **Hold** to insert a pause in a dialing sequence after a dial-out code to allow the system to seize an outside line before dialing the number. A pause can also be used to separate a phone number from an extension number.

Table H-3. Special Characters for MLX Non-Display Telephone

Press...	Means...
Drop	Stop. Halts the dialing sequence to allow the system to respond.
Hold	Pause. Inserts 1.5 second pause in the dialing sequence. Multiple consecutive pauses are allowed.
Conf	Flash. Sends a switchhook flash. Must be the first entry in the dialing sequence.
##	End of Dialing for Extension Programming only. Used at the end of a dialing sequence to indicate you have finished dialing or to separate one group of dialed digits from another, for example, account codes from number dialed.
#	End of Dialing. Used to signal the end of the dialing sequence or to separate group digits, for example, account code from number dialed.

MLX Display Telephones

When you program Personal Directory listings, Auto Dial buttons, or Personal Speed Dial codes, you are storing a sequence of numbers to be dialed automatically.

Some dialing sequences need special characters. For example, you would press **Hold** to insert a pause in a dialing sequence after a dial-out code to allow the system to seize an outside line before dialing the number. A pause can also be used to separate a phone number from an extension number.

Table H-4. Special Characters for MLX Display Telephones

Press...	See...	Means...
Drop	s	Stop. Halts dialing sequence to allow for system response.
Hold	p	Pause. Inserts 1.5 sec. pause in dial sequence. Multiple consecutive pauses allowed.
Conf	f	Flash. Sends switchhook flash. Must be first entry in sequence.
##	#	End of Dialing for Extension Programming only. Used at the end of a dialing sequence to indicate you have finished dialing or to separate one group of dialed digits from another, for example, account codes from number dialed.
#	#	End of Dialing. Used to signal end of dial sequences or to separate group digits, for example, account code from number dialed.

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Z

Zero code suppression, 6-6



AT&T 555-630-140
August 1994

MERLIN LEGEND[®]
Communications
System
Release 3.0

System Programming
and
Maintenance (SPM)

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" following *Programming Summary*, for important information.

Security of Your System: Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there exists 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. For important information regarding your system and toll fraud, see Appendix A, "Customer Support Information" following *Programming Summary*.

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" following *Programming Summary*.

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 applicable aux appareils numériques de la class A prescrites clans le reglement sur le brouillage radioélectrique èdicté par le ministère des Communications du Canada.

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Ordering Information

The ordering number for this document is 555-630-140. To order this document, call the AT&T Customer Information Center at 1-800-432-6600 (in Canada, 1-800-255-1242). For more information about AT&T documents, refer to the section entitled, "Related Documents" in "About This Book." The *Pocket Reference*, listed in that section, provides full ordering information for replacement parts, accessories, and other compatible equipment; or, contact your AT&T representative.

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 if you need assistance when installing or using your system.

Outside the continental U. S., contact your local AT&T representative.

Warranty

AT&T provides a limited warranty on this product. Refer to "Limited Warranty and Limitation of Liability" in Appendix A, "Customer Support Information" following *Programming Summary*.

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

IMPORTANT SAFETY INSTRUCTIONS

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

- Read and understand all instructions.
- Follow all warnings and instructions marked on or packed with the product.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Use only 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

System Programming and Maintenance (SPM) is a software tool developed specifically for the MERLIN LEGEND Communication System to allow programming, administration, and maintenance tasks to be done on a PC.

Intended Audience

This book is intended for anyone who uses a PC to perform programming or maintenance tasks for the communication system. It is especially aimed at system managers and support personnel.

"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	7500B data station
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	7500B data only station
digital voice and digital data station	MLX voice and 7500B data station

Typographical Conventions

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

Example	Purpose
It is <i>very</i> important that you follow these steps. You <i>must</i> 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 <i>headpiece</i> .	Italics also set off special terms.
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. "

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 Customer Information Center by calling 1-800-432-6600.

Document No.	Title
	System Documents
555-630-117	<i>Introduction</i>
555-630-118	<i>System Manager's Guide</i>
555-630-110	<i>Feature Reference</i>
555-630-115	<i>Equipment and Operations Reference</i>
555-630-116	<i>Pocket Reference</i>
555-630-111	<i>System Programming</i>
555-630-112	<i>System Planning</i>
555-630-113	<i>System Planning Forms</i>

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	Telephone User Support
555-630-122	<i>MLX-10D™, MLX-10DP™, MLX-28D™, and MLX-20L™ Display Telephones User's Guide</i>
555-630-150	<i>MLX- 10D Display Telephone Tray Cards (5 cards)</i>
555-630-153	<i>MLX-28D and MLX-20L Telephone Tray Cards (5 cards)</i>
555-630-124	<i>MLX- 10™ Nondisplay Telephone User's Guide</i>
555-630-151	<i>MLX-10 Nondisplay Telephone Tray Cards (6 cards)</i>
555-630-120	<i>Analog Multiline Telephones User's Guide</i>
555-630-126	<i>Single-Line Telephones User's Guide</i>
	System Operator Support
555-630-134	<i>MLX Direct-Line Consoles Operator's Guide</i>
555-630-132	<i>Analog Direct-Line Consoles Operator's Guide</i>
555-630-136	<i>MLX Queued Call Console Operator's Guide</i>
555-630-138	<i>MDC 9000 and MD W 900 Telephones User's Guide</i>
	Miscellaneous User Support
555-630-130	<i>Calling Group Supervisor's Guide</i>
555-630-129	<i>Data User's Guide</i>
	Documentation for Qualified Technicians
555-630-140	<i>Installation, Programming, & Maintenance (IP&M) Binder.</i>

How to Comment on This Document

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

Documentation Manager
AT&T
211 Mount Airy Road
Room 2W226
Basking Ridge, NJ 07920.

System Programming and Maintenance

The System Programming and Maintenance (SPM) software package offers an alternate method of programming the MERLIN LEGEND Communication System using a PC. This method frees the system programming console for other uses and also provides the additional functions listed below:

- Backing up system programming information
- Restoring system programming information from a backup
- Converting system programming information from one release to another (part of the upgrade procedure)
- Upgrading your communications system to a newer release
- Printing, viewing, and storing reports
- Programming the communications system remotely
- Programming in surrogate mode

SPM runs on a DOS-based PC as a stand alone program or on a UNIX® System platform as part of Integrated Solution II or Integrated Solution III (IS II/III). It is available on a 3.5-inch diskette for DOS or UNIX, or on a 5.25 inch diskette for DOS.

NOTE:

SPM software can be used directly from the floppy disks on a DOS machine; however, if your PC has a hard disk, you should install SPM onto the hard disk.

This book describes the use of SPM on a PC with a DOS operating system. If your system has the IS II/III application, you have the UNIX System version of SPM.

For information about accessing SPM from the IS II/III application, refer to the following books:

- *Integrated Solution III System Manager's Guide*, order no. 555-601-010
- *Integrated Solution III Installation and Maintenance Guide*, order no. 555-601-011
- *Integrated Solution II System Manager's Guide*, order no. 555-600-726
- *Integrated Solution II Installation and Maintenance Guide*, order no. 555-600-720

System Requirements

To use SPM for system programming, you need the SPM diskette and an approved PC with version 3.3 (or later) of MS-DOS®. At a minimum, your PC should support and include the following items:

- At least 640 kbytes of RAM
- A floppy disk drive that will accommodate the SPM diskette (3.5-inch or 5.25-inch)
- A monochrome or color monitor
- A serial port (either COM1 or COM2) that can use either a DB-9 or DB-25 connector

For a DB-9 connector, use a 9-pin to 25-pin adapter to attach the 25-pin connector of the RS-232 interface cable.

- An RS-232 interface cable of appropriate length for your site connection(s)

Depending on how you connect the PC to the control unit, you will also need the following items:

- Direct local connection, with the PC within 50 feet of the control unit.

Either a 355AF modular adapter (if there is a male connector on the interface cable) or a 355A modular adapter (if there is a female connector on the interface cable)

A 4-pair modular cord (D8W)

- Direct local connection, with the PC more than 50 feet from the control unit.

355AF adapter

EIA crossover cable

Two Z3A2 Asynchronous Data Units (ADUs)

ADU crossover cable

400B2 power adapter

2012D transformer

BRIA-4P adapter and 102 connecting block or 103 connecting block

248B adapter

8-position wall jacks

4-pair plug-ended cable

D8W cords

D6AP power cord

EIA-232-D cables

- Modem (local or remote) connection

A modem that supports 1200- or 2400-bps connections

In addition, a parallel printer is useful for reports (the PC needs a parallel port for the connection).

NOTE:

SPM uses Interrupt 4 and I/O address 3F8 for COM1. It uses Interrupt 3 and I/O address 2F8 for COM2.

Installing the SPM Software

Before you install or run SPM, use **diskcopy** on a DOS PC (see your operating system guide) to make a backup copy of the SPM diskette and store the original in a safe place. Use the backup copy to run the installation program.

For installing SPM on a DOS PC, follow the appropriate instructions in the next section of this book.

NOTE:

If your PC does not have a hard disk, you do not need to run the installation program. Go to "Initializing the SPM Software. "

DOS Installation

Use the following procedure to install SPM on the hard drive of a DOS PC.

NOTE:

If you are updating SPM, you do not need to remove the current SPM files. The new files will overwrite your current SPM files.

Considerations

Review the following items before you begin the installation procedure.

The installation program automatically performs the following:

- Checks available space on the hard disk. If space is insufficient, the installation is terminated and an error message is generated.
- Checks the autoexec.bat and config.sys files. If either file is write-protected, the installation is terminated and an error message is generated. SPM must make changes to these files.
- Saves a copy of autoexec.bat as autoexec.old.
- Saves a copy of config.sys as config.old.
- If autoexec.bat has not already been configured for SPM, performs the following:
 - Adds **c: \spm** to the path statement
 - Adds the line **SET AMS PATH=C:**
 - Adds the background print command
PRINT /D:PRN/B:4096/U:3/M:200/S:1>NUL
- Adds the following line to config.sys if it is not already present
DEVICE=C:\ANSI.SYS.
- Copies the ansi.sys file from the floppy disk to c:\.
- Creates the directory c:\spm.
- Copies the following files from the floppy disk into c:\spm:
 - spm.exe
 - ams_hlp.eng (English language help file)
 - ams_hlp.fre (French language help file)
 - ams_hlp.spa (Spanish language help file)
- Creates the following directories if they do not already exist:
 - c:\spm\backup
 - c:\spm\reports
 - c:\spm\tmp.

- Does one of the following:

Creates the SPM configuration file `c:\spm\ams.cfg`, if it does not already exist. In this case, the `ares.cfg` file consists of only one line, in which the language attribute is specified: **LANG 1** if you specified English or did not specify a language with the install command;

Modifies the `ares.cfg` file, if it already exists, by adding or changing the LANG value.

Follow the steps below to install SPM on the PC'S hard disk.

1 Switch to Drive A, if it is not already the current drive.

A:> appears on the screen.

2 Insert the backup copy of the SPM diskette into Drive A.

3 Type one of the commands shown below and press (Enter ↵) .

- *install*

- *install french*

- *install spanish*

Because English is the default language, `install` and **install english** have the same result. If you do use the language argument (**english**, **french**, or **spanish**), you must type it in lowercase letters as shown. The command `install` may be upper case or lower case.

4 Wait for the message shown below to appear.

```
SPM1 HARD DISK INSTALLATION PROGRAM
Strike a key when ready
```

5 Press any key to begin the installation.

When the installation is finished, the following message appears:

```
SPM HARD DISK INSTALLATION IS NOW COMPLETE
YOU MUST REBOOT YOUR SYSTEM BEFORE USING SPM1
```

6 Remove the SPM diskette from Drive A and reboot your system.

The installation procedure is complete. Go to "Initializing the SPM Software. "

Initializing the SPM Software

To run correctly, the DOS version of SPM requires certain information (transmission speed, type of monitor, and so on). You need to supply this information only once, the first time you run SPM.

The information you provide during the initialization process is written to the SPM configuration file (ams.cfg). If you need to change this information at some later time, you can do so in either of the following ways:

- Use any of the options in Table 1 to change the information in ams.cfg.
- Edit the ams.cfg file, (If you are unsure about editing the file, you can remove it. You are prompted to reinitialize the next time you invoke SPM. The file is created at that time.)

NOTE:

The DEBUG attribute is also specified in ams.cfg as **DEBUG=0** (off), the default setting, or **DEBUG=1** (on). This attribute is used to enable the Escape-to-Shell feature of SPM, activated by pressing (Ctrl) + (F9) . To turn DEBUG on, you must edit the ams.cfg file; it is not part of the initialization process. The DEBUG attribute is for use by qualified service personnel only.

Table 1. SPM Configuration File (ams.cfg) Options

Option	Use
spm -com1	Specifies COM1 as the serial communications port used by SPM
spm -com2	Specifies COM2 as the serial communications port used by SPM
spm -s1200	Specifies modem speed of 1200 bps
spm -s2400	Specifies modem speed of 2400 bps
spm -color	Specifies color monitor
spm -mono	Specifies monochrome monitor
spm -1 english	Specifies English as the PC language
spm -1 french	Specifies French as the PC language
spm -1 spanish	Specifies Spanish as the PC language

Follow the steps below to perform the SPM initialization.

- 1 **Type *spm* and press (Enter ↵) to display the SPM Welcome screen shown in Step 2.**

- Make your entry at the **C:>** prompt if your PC has a hard disk.
- Make your entry at the **A:>** prompt if you are using the floppy drive.

- 2 **Press any key.**

```
Welcome to SPM
The MERLIN LEGEND
System Programing
& Maintenance Utility
Please press any key
to continue
Version X.XX
```

X.XX = current version of SPM

The screens shown in Steps 3 through 7 appear only if the system has not been initialized. Otherwise, the screen shown in Step 8 appears.

- 3 **Select the serial communications port used for SPM and press (Enter ↵).**

```
COMM PORT:
1. Comm 1
2. Comm 2
Enter selection #
```

Type **1** for serial port 1 (COM1).
Type **2** for serial port 2 (COM2).

- 4 **Select the communications port speed and press (Enter ↵).**

```
speed
1. 1200
2. 2400
Enter selection #
```

Type **1** for 1200 bps.
Type **2** for 2400 bps.

5 Respond to the color prompt and press (Enter ↵) .

COLOR
Enter selection (y/n):

Type **y** if you have a color monitor.
Type **n** if you do not have a color monitor.

6 Select a language and press (Enter ↵) .

Language:
1. English
2. French
3. Spanish
Enter selection #:

Type **1** for English.
Type **2** for French.
Type **3** for Spanish.

The language you select here becomes the SPM (PC) language.

7 Review your selections.

SPM CONFIGURATION:
Comm Port: x
Speed: x
Color: x
Desire change (y/n)?

x = the values entered for each
entry in Steps 3 through 6

- To change any of the information shown, type **y** and press (Enter ↵). The screen shown in Step 3 appears. Repeat Steps 3 through 6.
- To save the information shown, type **n** and press (Enter ↵) .

If the PC is connected to the processor, the SPM Main Menu appears as shown in Step 8.

If the PC is not connected, go to "Connecting the PC. "

8 Press the function key that corresponds to the option you want.

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)

NOTE:

The function keys shown on either side of the display are included here for quick reference, See "SPM Screens" for details on using the PC keys in SPM.

Connecting the PC

There are three ways to connect the PC to the control unit. Choose the method below that is most useful for your installation.

- Direct local connection
- Local modem connection
- Remote modem connection

Direct Local Connection

For a direct local connection, you must connect the PC to the system programming jack. This is the lower modular RS-232 jack on the processor module, as shown in Figure 1. (The upper jack is reserved for the SMDR printer.)

To connect a PC more than fifty feet from the control unit, see Figure 2.

For direct local connections, the system supports speeds of 1200 and 2400 bps.

NOTE:

You must use a direct local connection to program in surrogate mode.

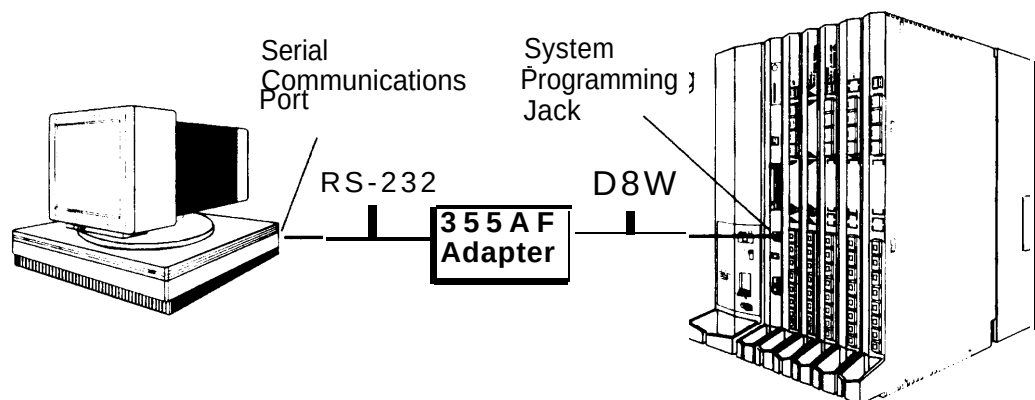


Figure 1. Direct Local Connection, PC Less Than 50 Feet Away

Connecting the PC

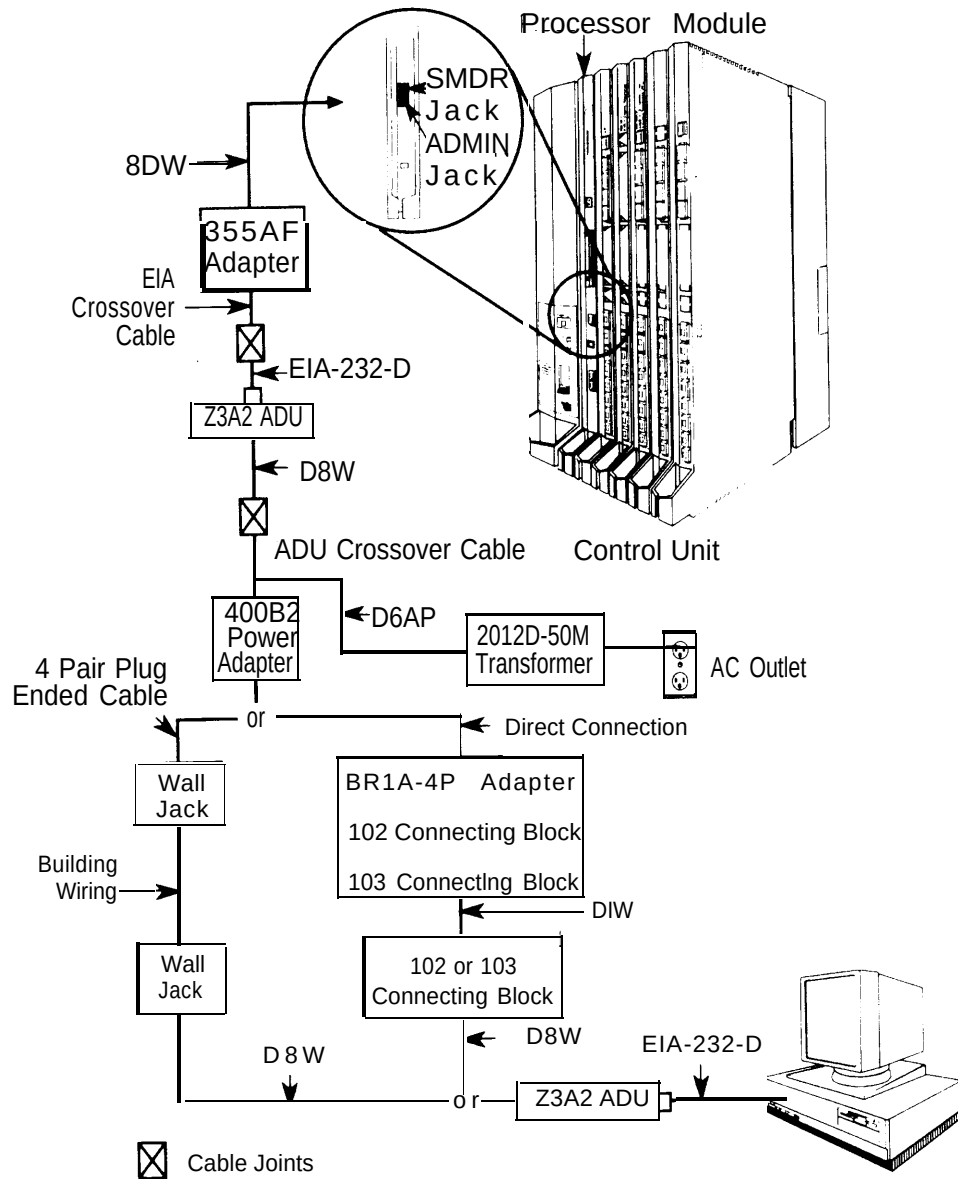


Figure 2. Direct Local Connection, PC More Than 50 Feet Away

Local Modem Connection

For a local modem connection, you must use a modem (either connected to, or built into the PC) to access the internal modem in the control unit. Connect the modem to an 012 module in the control unit, as shown in Figure 3.

The internal modem operates at speeds of 1200 and 2400 bps.

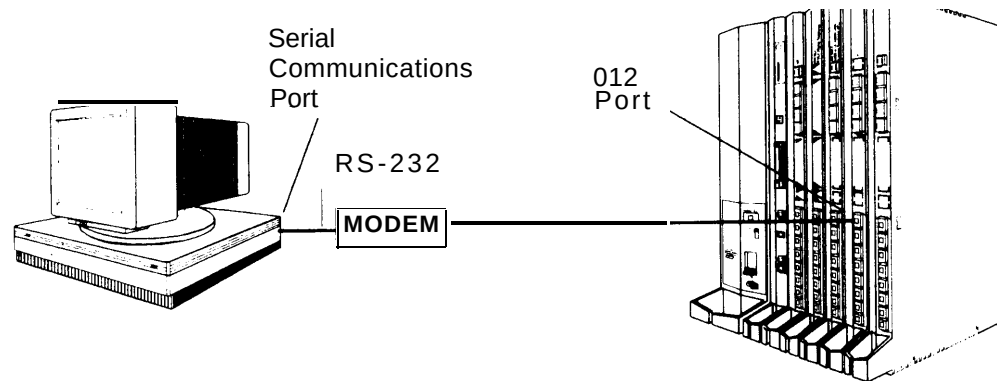


Figure 3. Local Modem Connection

Remote Modem Connection

For a remote modem connection, you must use a modem (either connected to, or built into the PC) to access the internal modem in the control unit. You must also use a dial-up connection, as shown in Figure 4. See “Accessing SPM” for details on accessing SPM with a remote modem connection.

The internal modem operates at speeds of 1200 and 2400 bps.

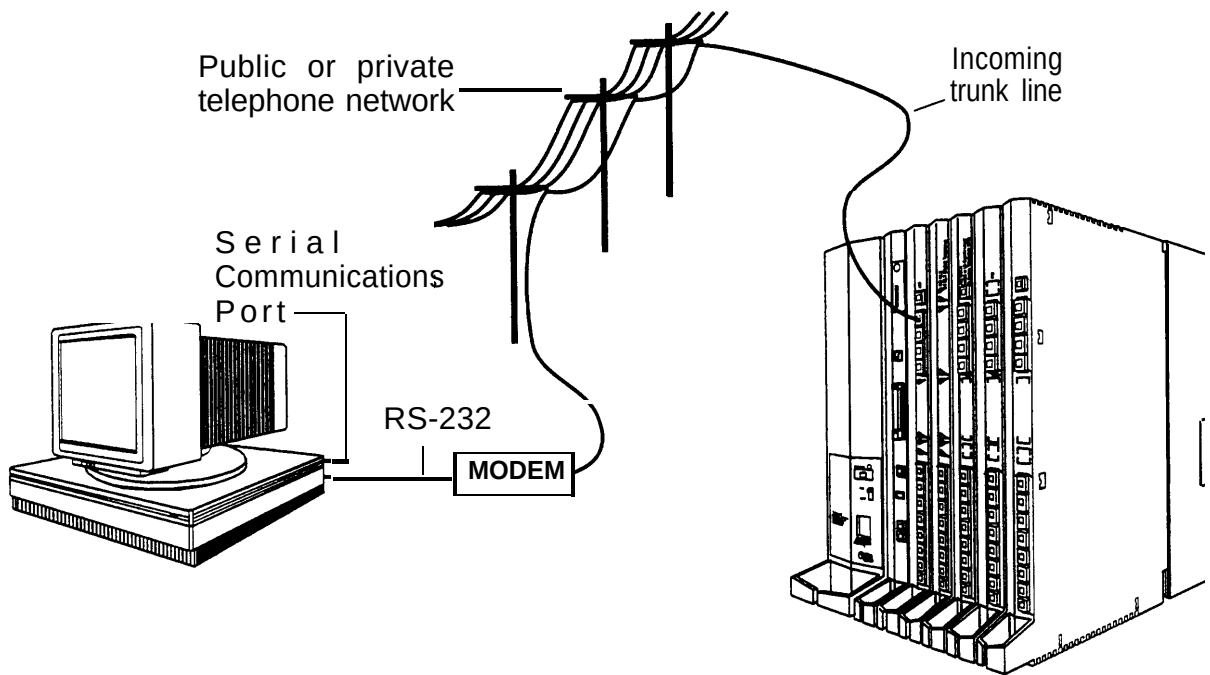


Figure 4. Remote Modem Connection

NOTE:

Remote access (modem connection) has priority over local access (direct connection), unless a backup or restore procedure is in progress through a direct local connection. If a modem connection is attempted while any other type of on-site programming is in progress (either at the system console or at a directly-connected PC), the system sends a message to the on-site programmer. The message indicates that a modem connection is being established and the on-site programming session is terminated.

Accessing SPM

The procedure for accessing SPM depends on whether your PC is connected to the control unit with a modem (either local or remote) or without a modem (direct). This section covers both of these access procedures.

With a Direct Local Connection

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

1 Set up the appropriate physical connections between the PC and the control unit.

See "Connecting the PC."

2 If you installed SPM on the hard disk of the PC, go to Step 5.

3 If the PC does not have a hard disk, insert the SPM diskette into Drive A.

4 Type a: and press (Enter ↵) .

A:> appears on the screen.

5 Type *spm* and press (Enter ↵) to display the SPM Welcome screen shown below.

Welcome to SPM The MERLIN LEGEND System Programming & Maintenance Utility Please press any key to continue Version X.XX	X.XX current version of SPM

6 Press and key to display the SPM Main Menu below.

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)

- If the SPM Main Menu does not appear or if the information on the screen is garbled, press any key again.
- If the COM Port (communications port) screen appears instead of the SPM Main Menu, it indicates that the SPM software has not been initialized. See “Initializing the SPM Software.”

NOTE:

The function keys shown on either side of the display are included here for quick reference. See “SPM Screens” for details on using the PC keys in SPM.

7 To select an option, press the function key that corresponds to the option you want. For example, to select Language press (F10)

With a Local or Remote Modem Connection

The method you use to access SPM by modem depends on whether you are programming on site (locally) or from a remote location.

- If you are on site, the modem must be connected to an 012 module on the control unit. To establish a connection to the control unit's internal modem, dial ***10**.
- If you are at a remote location, do one of the following:

Place a call to the system on a Remote Access line, enter the barrier code (if required), and dial the code for the internal modem (***10**).

Place a voice call to the system using the line to which the modem is connected and ask the operator to transfer you to the modem (by pressing **Transfer**, dialing ***10**, then hanging up the telephone). When you hear the modem answer tone, switch to data mode.

Considerations

Review the following items before you begin the modem connection procedure.

Set the Programming Language

If you prefer to program in a language other than the current SPM language setting, see "Language."

Modem Connections

You must make a data connection to a modem. The following modem dialing commands are for Hayes® and Hayes-compatible modems. These may not be the commands your modem use—refer to the user guide that came with your modem for specific information.

- If the PC is in the same location as the control unit, type ***10**.
- If the PC is in a remote location and your system has activated the Remote Access feature, type the following and press (Enter ↵).

Without barrier codes type:

ATDT; the remote access telephone number; and **W*10**.

For example: **ATDT12015551234 W*10 (Enter ↵)**.

With barrier codes type:

ATDT; the remote access telephone number; the barrier code preceded by a “W” and **W*10**. The barrier code in the example below is 555555.

For example: **ATDT12015551234 W555555 W*10 (Enter ↵)**.

The password prompt appears on the screen when the connection is made. (You may have to press (Enter ↵) more than once to get the password prompt.)

- If the PC is in a remote location and your system has not activated the Remote Access feature, do the following:
 - Use the main telephone number to place a voice call to the system on the line to which the modem is connected.
 - Instruct the operator to transfer you to the modem (by pressing **Transfer**, dialing ***10**, then hanging up the telephone).
 - To put the modem on line, type **ATH1** and press (Enter ↵), then hang up the telephone.

NOTE:

If you enter a telephone number of fewer than 11 digits, you must end it with a pound sign (#).

To access SPM through a local or remote modem connection, follow the steps below.

1 Sep up the appropriate physical connections between the PC and the control unit. See "Connecting the PC."

2 Type spm and press (Enter ↵) to display the SPM Welcome screen shown below.

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

X.XX = current version of SPM

If you wish to program in a language other than the current language set for SPM, see "Set the Programming Language."

3 Press and key to display a blank screen on which you can enter modem commands. (You may have to press the key several times.)

4 Make a data connection to the modem of the control unit.

See "Modem Connections." When the connection is made, the password prompt appears as shown in Step 4.

5 Type the SPM password to display the SPM Main Menu shown in Step 6.

```
Enter Password:
```

The password does not display as you type it.

6 To select an option, press the function key that corresponds to the option you want. For example, to select Language press (F10).

	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)

NOTE:

The function keys shown on either side of the display are included here for quick reference. See "SPM Screens" for details on using the PC keys in SPM.

Using SPM

This section describes how to use the SPM screens, SPM Help, and the SPM options listed below.

- Backup
- Boards
- Browse
- Convert
- Language
- Maintenance
- Monitor
- Pass-Thru
- Password
- Print Options
- Restore
- System Programming

NOTE:

Some of the procedures described in this section should be performed by qualified service personnel only.

SPM Screens

SPM screens simulate the system programming console. 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 that list the keys corresponding to similarly located buttons on the MLX-20L telephone. If you are working with Version 2.0 or higher, the version number appears in the upper left corner of the screen (for example, **V3**). Figure 5 illustrates the SPM display screen.

V3		QUIT MENU		Home End F1 F2 F3 F4 F5		Welcome to SPM The MERLIN LEGEND System Programing & Maintenance Utility Please press any key to continue. Version 3.06				PgUp PgDn F6 F7 F8 F9 F10		MORE INSP		Drop ALT-P			
Shift F5		LINE 05		LINE 10		Shift F10		Alt F5		LINE 15		LINE 20		Alt F10		Flash ALT-F	
Shift F4		LINE 04		LINE 09		Shift F9		Alt F4		LINE 14		LINE 19		Alt F9		TopSP ALT-C	
Shift F3		LINE 03		LINE 08		Shift F8		Alt F3		LINE 13		LINE 18		Alt F8		Pause ALT-H	
Shift F2		LINE 02		LINE 07		Shift F7		Alt F2		LINE 12		LINE 17		Alt F7		CONVERT ALT-U	
Shift F1		LINE 06				Shift F6		Alt F1		LINE 11		LINE 16		Alt F6		HELP CTL-F1	
																RESET CTL-F5	
																BROWSE CTL-F8	

Figure 5. SPM Display

F1 through F5, and F6 through F10 display on either side of the console simulation window. They represent the function keys to use when you select screen options. When a screen contains several choices, press the function key identified by the label next to your choice. (If you were programming on the console, you would press the telephone button next to your choice.)

Below the console simulation window are 20 simulated line buttons. The 20 line buttons can be selected using the arrow keys to position the cursor on the appropriate button. Using [PgDn] (the Inspect feature), you can determine the status of each line and the features programmed on each line according to the letter that appears next to the line number (see below).

On the PC screen, the letters **R** and **G** represent the ON state of the red and green LEDs, respectively, that are on the console. For example, if a line, trunk, or pool is assigned to a line button, on the console a green LED lights next to the button. On the PC screen, the letter **G** (for green) displays next to the button. Similarly, if a line, trunk, or pool is not assigned to a line button, neither **G** nor **R** display next to the button on the PC screen. If a trunk is assigned to a pool, an **R** (for red) displays on the PC screen.

The labels in the column on the right side of the screen show key combinations that correspond to buttons on the MLX-20L telephone. Table 2 describes the function of PC keys in SPM.

Table 2. Function of PC Keys in SPM

PC Key	Console	SPM Function
<u>(Home)</u>	Home	Quit. Exit from SPM and return to the DOS prompt when you finish with system programming. If you are using a modem, the call is disconnected.
<u>(End)</u>	Menu	Return to the SPM Main Menu.
<u>(PgUp)</u>	More	Display more menu items (when there is another screen and the > symbol appears next to the key).
<u>(PgDn)</u>	Inspct	Show the current information that has been programmed for a feature or button.
<u>(Alt) ± (P)</u>	Drop	Enter a stop in a speed dialing sequence. This combination also deletes an entry in a field on any screen except one in which you are entering a speed dialing sequence.
<u>(Alt) ± (F)</u>	Conf	Flash. Enter a switchhook flash in a speed dialing sequence.
<u>(Alt) ± (C)</u>	n/a	TopSP. Return to the top of the System Programming menu.
<u>(Alt) ± (H)</u>	Hold	Pause. Enter a pause in a speed dialing sequence.
<u>(Alt) ± (U)</u>	n/a	Convert. Convert a backup file from its original Release format to a different Release format.
<u>(Alt) ± (N)</u>	n/a	Toggle modem speed between 1200 to 2400 bps.
<u>(Ctrl) ± (F1)</u>	n/a	Help. Display a help screen about SPM operations. To exit from Help, press (End).

Continued on next page

Table 2- Continued

PC Key	Console	SPM Function
<u>(Ctrl) + (F5)</u>	n/a	Reset. Reset the communications port. For example, if the information on the screen is garbled, try exiting from and then recentering the screen. If the screen remains garbled, use <u>(Ctrl) + (F5)</u> to clear the screen and return to the SPM Welcome screen. Note that using <u>(Ctrl) + (F5)</u> drops the modem connection.
<u>(Ctrl) + (F8)</u>	n/a	Browse. View print reports saved with Print opts.
<u>(Ctrl) + (F9)</u>	n/a	Escape to shell. To use this key 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 .
<u>(Enter ↵)</u>	Enter	The <u>(Enter ↵)</u> key on your PC can be used instead of <u>(F10)</u> when Enter appears as a choice in the console simulation window.
<u>(Bksp)</u>	Backspace	The <u>(Bksp)</u> key on your PC can be used instead of <u>(F9)</u> (Backspace) when it appears as a choice in the console simulation window.
<u>(Del)</u>	Delete	The <u>(Del)</u> key on your PC can be used instead of <u>(F8)</u> (Delete) when it appears as a choice in the console simulation window.
<u>(↑) (↓)</u> <u>(←) (→)</u>	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 console simulation window.

SPM Main Menu Options

The SPM Main Menu provides access to system programming and to the SPM functions listed in Table 3.

Table 3. SPM Main Menu Options

SPM Menu	Function
Sys Program	To program the system
Backup*	To make a backup copy of your system programming and store it on diskette or on hard disk
Boards*	Shows which modules (port boards) are in each slot of the control unit and allows you to assign boards to slots
Print Opts*	Directs reports to the printer or to the PC for storage on diskette or hard disk
Monitor*	Restricted to use by your technical support organization
Maintenance	Restricted to use by your technical support organization and qualified technicians
Restore*	To restore your system programming from diskette or hard disk
Pass-Thru*	(IS II/III only) To make a remote connection, through the control unit, to an IS II/III PC to administer applications on the IS II/III PC.
Password*	To change the password for remote entry into the system.
Language	To select a language (English, French, or Spanish) for the console simulation window on the PC. (There is also a Language option available on the System Programming menu that allows you to set the system language.)

* SPM option only. Not available on the MLX-20L system programming console. To be used only by qualified service personnel.

SPM Help

To access the SPM help screens, press (Ctrl) + (F1).

To review the help screens press, (PgUp) and (PgDn).

To return to the first Help screen, press (Home) .

To exit from SPM Help, press (End).

A typical help screen is shown in Figure 6.

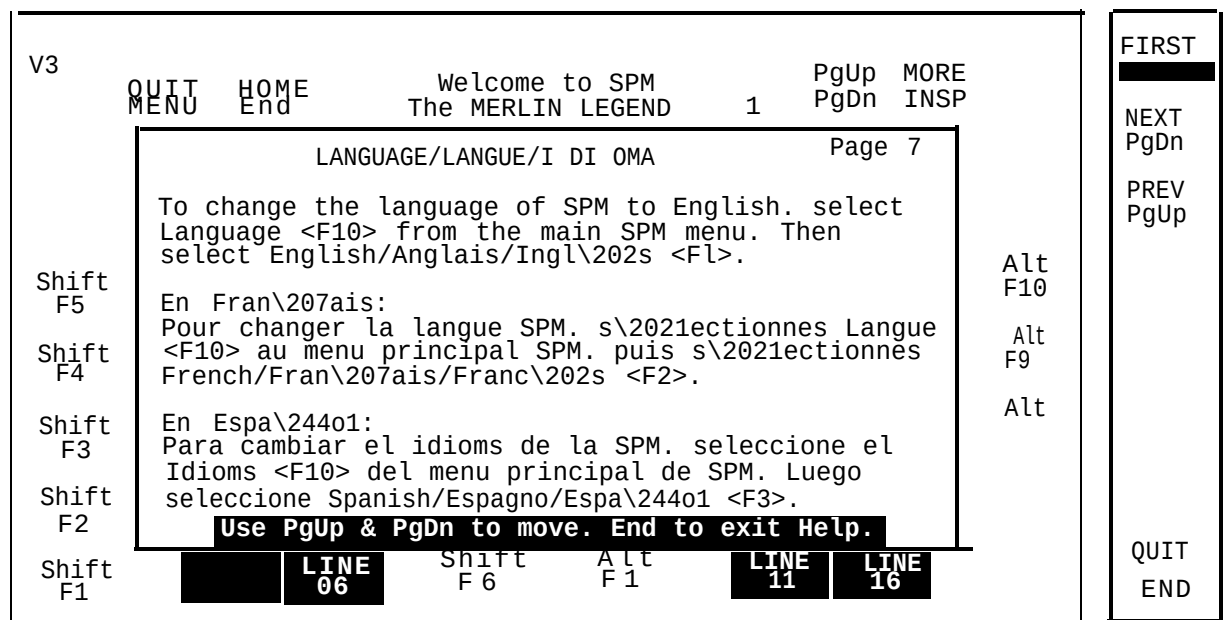


Figure 6. SPM Help

Backup

The Backup procedure is used by qualified service personnel to create a file of system programming information in the \spm\backup directory (on the hard drive of the PC) or in the root directory of a diskette (on the floppy disk drive of the PC).

NOTES:

1. Back up your system programming information on a regular basis. A current backup file allows you to quickly and easily restore your system, if the need arises.
- 2 With Release 3.0 and later, system programming can be backed up or restored from a PCMCIA memory card. See Chapter 22, "Memory Card," for more information.

Determining the Release Number of a Backup File

If you have a backup diskette but do not know its release number, you may be able to find this information in the backup header. Beginning with later versions of Release 1.1, the backup file contains a backup header 128 bytes long. Approximately 59 of these bytes are currently used. Bytes 55 through 59 of the header contain the MERLIN Legend Communication System Release number, as shown in Table 4. (Release 1.0 and early versions of Release 1.1 do not contain this information in readable form.)

Table 4. Backup Header Release Number

	Release No.	Build No.	System Size	Mode
Size	2 bytes	12 bytes	1 byte	1 byte
Examples	03 00	32	01	01, - Key
	02 01			02- Behind Switch
				03- Hybrid/PBX

The release number is found in the first two bytes (four characters) of the identification number. For example, 0300 = 3.0, 0201 = 2.1.

If the backup file is compressed, you can read the header but you cannot read the data area following the header. Use ***type*** *[backup filename]* to read the header on a DOS system or ***cat*** *[backup filename]* to read the header on a UNIX System.

Note that the communication system release number, not the version number of SPM, reflects whether the backup file is compressed or uncompressed. Release 1.0 backups are uncompressed and Release 1.1 and later backups are compressed. Uncompressed files take longer to restore.

Considerations

Review the following items before you begin the backup procedure:

- The communications system does not have to be idle during backup; however, extension programming is blocked.
- Any objects that are in a maintenance-busy state are stored in that state. When you restore system programming, these objects are busied out, even if they have since been released from the maintenance-busy state.
- If you plan to store your backup file on a diskette, format a DOS diskette. (DOS formatting can be done on a UNIX System PC or a DOS PC).
- Uncompressed backup files are 100,000 to 210,000 bytes in size; compressed files are about 70,000 to 85,000 bytes.
- Maintenance data (error logs and other data used by qualified service technicians) is not saved in the backup file.

Follow the steps below to perform the backup procedure.

1 At the SPM Main Menu, press **(F2)** to select backup.

(F2)

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

2 Follow the instructions for a floppy or a hard disk.

A second window appears which displays the **GOTO FLOPPY** and **MAKE NEW FILE** options and a directory listing for the C:\spm\backup directory.

- If you are saving the backup file to a floppy disk, go to Step 3.
- If you are saving the backup file to the hard disk, go to Step 4.

3 Remove the SPM diskette and insert a formatted diskette. Use the arrow keys to highlight **GOTO FLOPPY** and press **(Enter↵)**.

Make a selection for the BACKUP file. MAKE NEW FILE will create a new file on selected device. Press ESC to abort.	GOTO FLOPPY MAKE NEW FILE backup.ams <i>file.1</i> <i>file.2</i>

After you press (Enter ↵), to **GOTO FLOPPY** statement shown above changes to **GOTO HARD DISK** and the directory listing for A:\ is displayed. Continue with Step 4.

The screen displays the default name for the backup file (**backup.ams**).

4 Specify a backup filename.

- To select the default filename use the arrow keys to highlight **backup.ams** and press **(Enter↵)**. Go to Step 6.
- To enter a different filename use the arrow keys to select **MAKE NEW FILE** and press **(Enter↵)**. Go to Step 5.

5 Type the new filename and press (Enter ↵) .

```
Press ESC to Abort.  
  
Enter filename:  
  
(*fault is backup.ams)
```

If you are working from the floppy drive,
A:\ appears on the screen.

You can specify a drive letter with the filename but no path information.

6 Verify that the filename chosen does not already exist.

The following screen appears only if the filename chosen already exists.
Continue with Step 7 if this screen does not appear.

```
The file already exists.  
If you continue, the old  
version will be deleted.  
Press ESC to abort.  
Press "c" to continue.
```

Press (Esc) to abort the backup. Go to
Step 1 to create a different backup file.

Press (C) to continue. Go to Step 7.

7 Observe the backpstaus screen

```
Press ESC to Abort.  
Est. Blocks: xxx - xxxx  
  
filename  
  
BACKUP IN PROGRESS  
Received Block xx
```

filename = the backup filename specified
in Step 5

SPM indicates the status of the backup by displaying the number of the last block received (xx). Line 2 of the display screen shows the estimated number of blocks to be sent from the control unit (xxx-xxxx). This line is blank if you are backing up from Release 1.0.

If you abort the backup, the partial backup file is deleted to prevent restoration from a corrupted file and you see the screen shown in Step 8.

When the backup is complete, you see the screen shown in Step 9.

8 To abort the backup press (Esc) to return to the SPM Main Menu.

```
Backup aborted
Please press Enter
to see the Main Menu:
```

9 When the backup is complete, press (Enter ↵) to return to the SPM Main Menu.

```
Backup successful.
Please press Enter
to see the Main Menu
```

xxx = total number of blocks received

```
Received xxx Blocks.
```

Boards

The Boards option allows qualified service personnel to add a board to the next available slot. The system must be idle to use this option. This option is not available from the system programming console.

The Boards option is also available in surrogate mode. In surrogate mode, you can assign trunk and extension modules (boards) to slots, even though the boards have not actually been installed. This type of board is referred to as a “phantom” or “null” board.

You cannot use the Boards option to change an actual board type. All boards assigned with the Boards option, including phantom boards, are cleared (unassigned) if you perform a board renumber (**System> Board Renum**).

NOTES:

1. You must assign phantom boards to higher slot numbers than any real boards you assign. If you assign a phantom board to a lower slot number than a real board, the control unit does not recognize the real board(s) that follow the phantom board.
2. If you remove a board but do not replace it, and then perform a board renumber, the control unit will not recognize any boards that follow the empty slot. You must reseal all of the boards to fill the empty slot before you perform the board renumber.

The Inspect function ([PgDn]) lets you see which modules have been assigned to slots on the control unit. Note that both phantom boards and real boards display if you use the Inspect function. To see only real board assignments, you must print the System Information report:

System> More> Print>SysSet-up.

Table 5 shows the type of boards that you can select.

Table 5. Board Types

Board Type	Description
400LSR	4 loop-start line jacks with 4 touch-tone receivers
400GLR	4 ground-start/loop-start line jacks with 4 touch-tone receivers
800LS	8 loop-start line jacks
800GLID	8 ground-start/loop-start line jacks with Caller ID capability available on the loop-start lines and 2 touch-tone receivers
800GLS	8 ground-start/loop-start line jacks
408LSA	4 loop-start line jacks and 8 ATL analog extension jacks
408GLA	4 ground-start/loop-start line jacks and 8 ATL analog extension jacks
408GLM	4 ground-start/loop-start line jacks and 8 MLX extension jacks (16 endpoints)
008ATL	8 analog extension jacks
008MLX	8 MLX-20L extension jacks(16 endpoints)
012TR/OPT	12 tip/ring extension jacks with 2 touch-tone receivers or 008 OPT jacks
800DID	8 DID trunk jacks with 2 touch-tone receivers
400E&M	4 E&M tie trunk jacks
100D	1 DS1 jack (24 channels)
517A31	Board with blank downloadable firmware.

Follow the steps below to assign modules.

1 At the SPM Main Menu, press **(F3)** to select Boards .

SPM Main Menu	
Menu: Select Function	
Sys Program Maintenance	
Backup	Restore
(F3) Boards	Pass-Thru
Print Opts	Password
Monitor	Language

2 Press the function key that corresponds to the module you want to select.

4Boards: >		Boards:	
Make a selection		Make a selection	
(F1) 408LSA	800LS	(F6) 400E&M	800GLID (F6)
(F2) 012TR/OPT	008ATL	(F7) 408GLA	517A31 (F7)
(F3) 800DID	008MLX	(F8) 100D	
(F4) 800GLS	400GLR	(F9) 408GLM	
(F5) Exit	400LSR (F10)	(F5) Exit	

If the module you want to assign is not shown on the first screen of the Boards menu, press **(PgUp)** to display the next menu screen.

3 Type the control unit slot number (01 through 17) in which the module is to be installed.

module name	
Enter slot numbers	
(01-17)	
	Delete
Backspace	Next
Exit	Enter

module name = option selected in Step 2

4 Assign or remove the module from the slot entered in Step 3.

<i>module name</i>	
Enter slot numbers	
(01-17)	
<i>nn</i>	
	Delete (F8)
Backspace	Next (F9)
Exit	Enter (F10)

module name = option selected in Step 2
nn = slot entered in Step 3.

- To remove the module type from the specified slot number, press (F8) (Delete). The Boards menu re-appears.
- To assign the module type to the specified slot number and assign that same module type to another slot, press (F9) (**Next**).
- To assign the module type to the specified slot number and assign a different module type to another slot, press (F10) (**Enter**).
- To terminate the procedure and assign a different module, press (F5) (**Exit**) and repeat Steps 2 through 4.
- To view types of modules assigned to all slots, press (PgDn) (**Inspect**).

5 Save your entry.

Select **Exit**.

The programming session (F5)
 terminates and the system
 restarts.

1 At the SPM Main Menu press (Ctrl) + (F8) .

```
graph LR; A[Please enter file name] --> B[GOTO HARD DISK]; B --> C[GOTO FLOPPY];
```

The diagram illustrates the menu flow for the 'GOTO' command. It consists of two rectangular boxes. The left box contains the text 'Please enter file name' at the top and 'Press ESC to Abort.' at the bottom. The right box contains two menu options: 'GOTO HARD DISK' at the top and 'GOTO FLOPPY' below it. A horizontal arrow points from the left box to the right box, indicating the flow of the menu.

A list of the current reports appears.

The report appears.

- To view the next page of a report, press (PgDn).
- To view the previous page of a report, press (PgUp).
- To return to the beginning of a report, press (Home).
- To exit from the Browse option and return to the SPM Main Menu, press (Esc).

Convert

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Convert uses two files: the existing backup file (the “convert from” file) and the converted file (the “convert to” file), which is created when you run the Convert option. The converted file contains system programming information “in an uncompressed form. The “convert from” file is unchanged. Because uncompressed files take longer to process than compressed files, you may want to restore this uncompressed backup to the old control unit and then create a new backup. This new backup is in compressed form and does not have to be converted. For more information about compressed and uncompressed files see “Backup.”

To convert system programming to Release 3.0 format, Version 3.XX of SPM is required. This version can be easily identified by the version number, **V3**, in the upper left corner of the screen.

Help screens are available to guide you through the Convert procedure. See “SPM Help.”

Before you use the Convert option, you must complete the following tasks:

- If your PC has a hard disk, install the appropriate version of the SPM software. See “Upgrading the System.”
- Back up system programming. See “Backup.”
- Make sure you know the name of the backup file that you have created.

IMPORTANT:

Once the actual file conversion begins, you cannot stop the process; pressing

Follow the steps below to perform the conversion.

1 At the SPM Main Menu, press (Alt) + (U) to begin the conversion.

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

A second window appears which displays the `GOTO FLOPPY` option and a directory listing for the `C:\spm\backup` directory.

- If the backup file is stored on a floppy disk, go to Step 3.
- If the backup file is stored on a hard disk, go to Step 4.

3 Use the arrow keys to highlight `GOTO FLOPPY` and press (Enter).

Please select file name to convert from, then press Enter

Press ESC to abort.

GOTO FLOPPY FILENAME.XXX FILENAME. YYY

FILENAME.XXX and
FILENAME. YYY from the
`\spm\backup` directory

After you press (Enter ↵), the **GOTO FLOPPY** statement shown above changes to **GOTO HARD DISK** and a directory listing from the root directory of the floppy disk smears. Go to Step 4.

```
Please select file name
to convert from,
then press Enter
```

```
Press ESC to abort.
```

```
GOTO HARD DISK
FILENAME.XXX
FILENAME.YYY
```

FILENAME.XXX and
FILENAME.YYY from the root
directory of the disk in
Drive A.

4 Use the arrow keys to highlight the name of the backup file to be converted and press (Enter ↵) .

- If the backup file you select is a 3.0 backup, it can not be converted and the following message appears:

```
File has already been converted.
Press Enter to continue.
```

Press (Enter ↵) to select another filename, or press (Esc) to abort the convert procedure.

- If the backup file you select can be converted, go to Step 6.

5 Observe the updated file selection screen and press (Enter ↵) .

```
Please select file name
to convert from,
then press Enter
```

```
N: FILENAME.XXX
```

```
Press ESC to abort.
```

FILENAME.XXX = the backup filename
selected in Step 4

N = drive

6 If converting from Release 1.0 or 1.1, select the CONVERT TO release. To convert from Release 1.2, 2.0 or 2.1 go to Step 7.

The screen below appears when converting from Release 1.0 or 1.1. Release 1.2, 2.0 and 2.1 can only be converted to Release 3.0.

```
Please enter your
CONVERT TO release
and press ENTER.
1.2
2.0          2.1
3.0
Enter number: x.x
```

All characters must be entered as they appear on the screen, including the decimal point.

7 Follow the instruction for a floppy or a hard disk.

- If the CONVERT TO file will be saved to a floppy disk, go to Step 8.
- If the CONVERT TO file will be saved to the hard disk, go to Step 9.

8 Use the arrow keys to highlight GOTO FLOPPY and press (Enter ↵)

```
Please select file name
to convert to, or select
NEW FILE to create a new
file on selected drive.
Enter Filename:
```

```
GOTO FLOPPY
MAKE NEW FILE
FILENAME.XXX
FILENAME.YYY
```

After you press (Enter ↵) the **GOTO FLOPPY** statement shown above changes to **GOTO HARD DISK** and the directory listing from the root directory of the disk in Drive A appears. Continue with Step 9.

```
Please select file name
to convert to, or select
NEW FILE to create a new
file on selected drive.
Enter Filename:
```

Press ESC to abort.

```
GOTO HARD DISK
MAKE NEW FILE
FILENAME.XXX
FILENAME.YYY
```

9 Specify a filename for the converted file.

- Highlight the name of the file you want to convert to, press (Enter ↵) and go to Step 11.
- To enter a different filename, use the arrow keys to select MAKE NEW FILE and press (Enter ↵).

10 Enter the new filename and press (Enter ↵).

```
Please select file name
to convert to, or select
NEW FILE to create a new
file on selected drive.
Enter Filename:
A:\filename.new
(default is RESTORE.NEW)
```

The converted file cannot have the same name as the file you converted from. If you specify the same filename, the following screen appears:

```
The file selected to
convert to is the same
as the file selected to
convert from. Please
choose a different file.

Press Enter to continue
```

Press (Enter ↵) and repeat this step.

11 Check the updated file screen and press (Enter ↵).

```
Please select file mine
to convert to, or select
NEW FILE to create a new
file on selected drive.
Enter Filename.
N:FILENAME.NEW
(default is RESTORE.NEW)
```

FILENAME.NEW = name entered in
Step 10
N = drive

12 Observe the conversion progress screen.

CONVERSION IN PROGRESS

Converting From:

N:FILENAME.XXX

Converting To:

N:FILENAME.NEW

FILENAME.XXX = name entered in Step 4
FILENAME.NEW = name entered in Step 10

N = drive

When the conversion completes, the screen shown in Step 13 appears.

13 Press any key to return to the SPM Main Menu.

Conversion successful.
Please press any key
to continue.

Language

A language attribute in the SPM configuration file `\spm\ams.cfg` (DOS version) or `/usr/ams/ams.cfg` (UNIX System version) specifies whether SPM menus, pop-up windows, and other messages are presented in English, French, or Spanish. A second language selection option affects messages from the control unit to SPM and controls the display on the console simulation window for the duration of the session. These two language options operate independently of each other.

The following discussion refers to the language specified in the SPM configuration file as the *PC language* and the language used by the control unit as the *console window language*.

PC Language

During SPM installation, you select a language that is recorded in the SPM configuration file. Any time thereafter, SPM can be started with the **-1** option to specify a different language, using one of the following command lines:

■ ***spm -1 english***

■ ***spm -1 french***

■ ***spm -1 spanish***

Note that the option is a lowercase letter L and not the number 1.

Use of the **-1** option changes the language attribute in the `ams.cfg` file. The language specified becomes the new PC language, used whenever SPM is started without the **-1** option.

Console Window Language

By default, the language used in the console simulation window is the language specified in the `ams.cfg` file; however, you can select a different language for this window for the duration of the current session. To select a different language, follow the steps below.

1 At the SPM Main Menu press (F10) to select Language .

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

(F10)

2 Press the function key that corresponds to your language selection.

	Display Language
	Make a Selection:
(F1)	English
(F2)	French
(F3)	Spanish
	Exit

The Display language screen re-appears, with the language you selected.

3 press (F5) to return to the SPM Main Menu or select another language.

Maintenance



CAUTION:

This option is for use by qualified technicians only. Maintenance procedures are provided in the documentation for qualified technicians. See "Related Documents."

Monitor



CAUTION:

This is a password-protected option and is for use by your technical support organization only.

Pass-Thru

The Pass-Thru option allows qualified service personnel to administer IS II/III applications on a remote PC. It permits you to establish a remote connection with the control unit to which the IS II/III PC is directly connected. Figure 7 illustrates the relationship of the SPM PC, the communications system control unit, and the IS II/III PC.

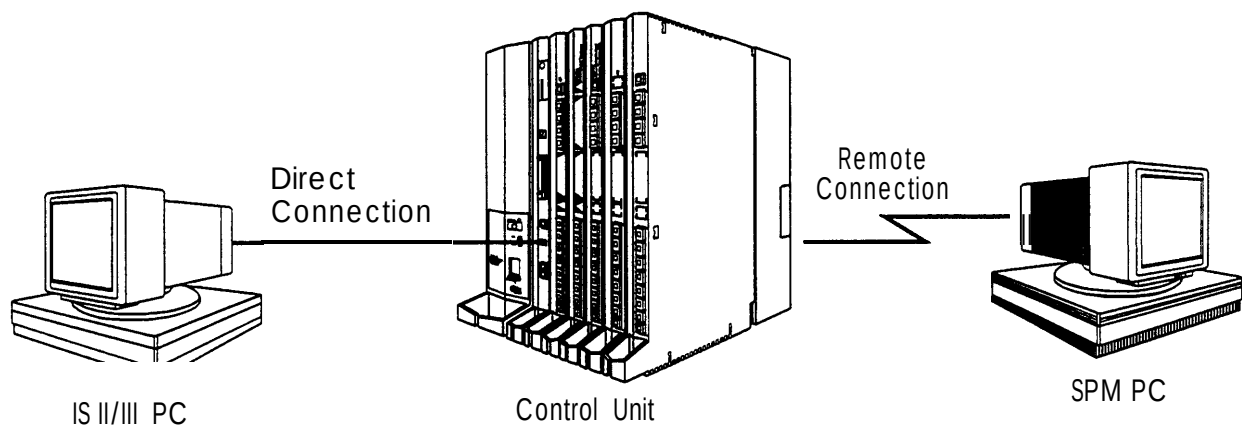


Figure 7. Pass-Thru

A Pass-Thru request must be initiated at a DOS PC. It is not available from a UNIX System PC; that is, Pass-Thru cannot be established between two IS II/III PCs. The local admin PC must be in an idle state.

A Pass-Thru request to a locally connected IS I I/III system causes the modem to fall back to 1200 bps if the speed is set to 2400 bps and the modem call to the control unit is at 1200 bps. If necessary, the communication system will adjust its speed to that of the local SPM PC.

Once the Pass-Thru connection is established, you can program in any of the following IS II/III applications from your SPM PC:

- AUDIX Voice Power™
- Call Accounting System
- Fax Attendant System® (IS III only)
- CONVERSANT Intro® (IS III only)

NOTE:

You cannot program the SPM application on the IS II/III PC because the remote call (from your SPM PC) uses the IS II/III PC's COM1 port; therefore, the system programming jack cannot be used for system programming. For the same reason, a user at the IS II/III PC end of the connection cannot use SPM while your Pass-Thru is in effect. If use of SPM is attempted, the user at the IS II/III end sees the following message:

```
PRE-EMPT IN PROGRESS
Please try again.
```

To initiate Pass-Thru, establish a modem connection between the SPM PC and the control unit.

If the IS II/III PC does not respond to the Pass-Thru request from the control unit (for example, because the PC is turned off), you see the following message:

```
Pass-thru failed.
Please try again.
```

If the connection between the control unit and the IS II/III PC fails, the connection between the control unit and the SPM PC is dropped. You see the following message:

```
Pass-through Session
unexpectedly terminated.
Please press Enter
to continue.
```

When you press (Enter ↵) you return to the SPM Main Menu.

Follow the steps below to initiate the Pass-Thru.

1 At the SPM Main Menu press (F8) to select Pass-Thru.

SPM Main Menu	
Menu: Select Function	
Sys Program Maintenance	
Backup	Restore
Boards	Pass-Thru (F8)
Print Opts	Password
Monitor	Language

The display area changes to 24-lines by 80-characters, which is much larger than the display area on the console simulation window (7-lines by 24-characters).

2 Type your login name and press (Enter ↵).

Welcome to
IS-II/III

login:

3 Type the IS II/III password and press (Enter ↵).

Password

4 Type *ams* for the terminal emulation type and press (Enter ↵).

Unix disk usage
information

T e r m =

- If you are working with IS II, the IS II main menu appears.
- If you are working with IS III , the system prompts you for your login registration. After you enter your login and press (Enter ↵), the IS III main menu appears.

5 To exit from II/III programming press (F5) (Exit) .

The system prompts you for confirmation that you want to exit. After confirmation the following message appears.

Returning to SPM

Password

The Password option is used by qualified service personnel to change the modem connection password. A password is always required to establish a connection with the built-in modem. The password always consists of five characters. You can perform remote system programming only if you enter the password correctly. A default password is set at the factory. You must obtain this password from your system consultant (SC).

Follow the steps below to change the modem connection password.

1 At the SPM Main Menu, press (F9) to select Password .

SPM Main Menu	
Menu: Select Function	
Sys Program Maintenance	
Backup	Restore
Boards	Pass-Thru
Print opts	Password <u>(F9)</u>
Monitor	Language

2 Type the old (current) password. Do not press (Enter ↵) .

Password:

Enter Old Password

If you type the old password incorrectly, the bottom of the screen displays the message Not Equal, Repeat Step 2. If you fail to enter the password correctly after three attempts, the bottom of the screen displays the message Old Password in Use and the procedure terminates. Press (Enter ↵) to return to the SPM Main Menu.

3 Type the new password (any five characters). Do not press (Enter ↵) .

Password

Enter New Password

The password does not appear on the screen as you type it.

4 Type the new password again, Do not press (Enter ↵) .

Password

Enter New Password again

New Password in use

5 Press (F5) to return to the SPM Main Menu.

Print Options

The Print Opts option allows qualified service personnel to direct the output of system programming reports either to the PC (where you can save them, browse through them, or print them with the system programming Print option) or to the SMDR printer.

Follow the procedure below to direct the output of the system programming reports.

1 At the SPM Main Menu press (F4) to select Print Opts .

SPM Main Menu	
Menu: Select Function	
Sys Program Maintenance	
Backup	Restore
Boards	Pass-Thru
<u>(F4)</u> Print Opts	Password
Monitor	Language

2 Select the target device for the reports.

	Printer Options
	Make a selection
<u>(F1)</u>	SMDR Port
<u>(F2)</u>	PC Port
	Exit

3 Press (F5) to return to the SPM Main Menu.

SMDR Port Output

See “Printing System Reports” in *System Programming* for more information about the print procedure using the system console and the SMDR port.

PC Port output

See “Printing Reports” for more information about the print procedure using SPM and the PC port.

Restore

The Restore option allows qualified service personnel to load system programming from a diskette or from the hard disk into the processor module memory.

This procedure is used to program a new system if a disk was created through surrogate mode programming, or to restore information (using a backup disk) lost through system failure. It is also part of the upgrade procedure.

NOTE:

With Release 3.0 and later, system programming can be backed up or restored from a PCMCIA memory card. See Chapter 22, “Memory Card, ” for more information.

Considerations

Review the following items before you begin the restore procedure.

- The system will be forced idle during a restore procedure.
- You must have a backup file containing system programming before you use this procedure, See “Backup.”
- Features that were not programmed when the backup file was created are reset to factory defaults.
- The data restored reflects the number of extensions and lines available on the system at the time the backup was created. The remaining extensions and lines will be set to the default values that are initialized during a Restart (cold start).

- Restore is terminated under the following conditions:
 - If fewer boards are listed on the disk than on the control unit.
 - If any real board is out of sequence with the boards listed on the disk.
 - If phantom boards are not listed last.
 - If the operating mode of the system being restored is Hybrid/PBX, but the control unit processor module has been modified to operate only in Key mode.
- A successful restore is followed automatically by a Restart (cold start).



WARNING:

An unsuccessful or terminated restore results in a System Erase (frigid start). All calls are dropped. The system configuration is erased. All system programming is lost, and the system returns to the factory settings. If the restore is being done remotely, the connection is dropped immediately. If this happens, attempt to reconnect to the control unit and immediately perform another restore. If this is not successful, programming must be restored on site.

Follow the steps below to perform a restore.

1 At the SPM Main Menu, press (F7) to select Restore .

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

(F7)

2 Follow the instructions for a floppy or a hard disk.

A second window appears which displays the **GOTO FLOPPY** option and a directory listing for C:\spm\backup.

- If you are performing a Restore with a file saved on a floppy disk, go to Step 3.
- If you are performing a Restore with a file saved on the hard disk, go to Step 4.

3 Use the arrow keys to highlight **GOTO FLOPPY** and press **(Enter ↵)**.

Make a selection for the RESTORE file. If upgrading, convert files before restoring. Press ESC to Abort.	GOTO FLOPPY backup.ams. file.1 file.2

After you press **(Enter ↵)**, the **GOTO FLOPPY** statement shown above changes to **GOTO HARD DISK**. Go to Step 5.

4 Specify the filename to restore from.

- To select the default backup filename, use the arrow keys to highlight **backup.ams** and press **(Enter ↵)**.
- If you used a different backup filename, use the arrow keys to select one of the other filenames and press **(Enter ↵)**.

If the file you select is not in the same format as the communications system, the screen below appears. Press **(Enter ↵)** to return to the SPM Main Menu. See “Convert” for details about converting a backup file.

File must be converted before restoring. Please press Enter to see the main menu:

5 Observe the restore progress screen.

Press CTRL-F5 to Abort
Est. total time. xx min

filename

RESTORE IN PROGRESS

Blocks sent Remaining

xxxx

xxxx

xx= approximate number of minutes

filename = name entered in Step 5

xxxx = number of blocks

To abort the restore press (Ctrl) + (F5) . You return to the SPM Main Menu.

6 When the restore completes, press (Enter ↵) to return to the SPM Main Menu.

Restore successful.
Please press Enter
to see the Main Menu

xxxx = number of blocks sent

Sent xxxx Blocks

System Programming

A primary function of SPM is to provide a method for programming the communications system. The Sys Program option gives you access to all of the system programming features available from the system programming console. See *System Programming* for information about all of the features.

Basic Programming Information

To begin programming, you must perform one of the following to display the System Programming menu on the console or PC:

On the console:

Menu> Sys Program>Exit

On the PC:

Type **spm> (Enter ↵)>Press any key> (F1) > (F5)**

In most cases, you can press `Exit` or `(F5)` to exit from a screen without making any changes. Exceptions to this are noted as part of a procedure. When you complete a procedure and press `Exit` [`(F5)`], you usually move up one screen in the menu hierarchy. Occasionally, when you press `Exit` [`(F5)`], you return to the previous screen. *In a few cases*, pressing `Exit` brings you back to the System Programming menu where you can select another option to program or exit from system programming.

To complete a procedure and save the information you have programmed, press `Enter` [`(F10)`].

If you are programming a group of sequentially numbered extensions or trunks, you may have the option of pressing `Next` [`(F8)`]. This saves your entry and automatically provides the number of the next extension or trunk in the sequence, thus saving you a couple of steps. If `Next` displays on the screen, you can use it with the current option.

In most cases, you will beat an intermediate step in the procedure you have just completed. At that point, you can select one of the options shown on the screen and continue programming, or you can press `Exit` [`(F5)`] again. This usually takes you back to the System Programming menu. If not, you again can continue programming on the current screen or press `Exit` [`(F5)`] again.

Idle States

A few of the programming procedures can be started only when the entire system or some part of it, such as a trunk or an extension, is idle (not in use). Some procedures require that the trunk or extension be idle only at the instant of programming. Other procedures, which take longer, require the system, trunk, or extension to be forced into remaining idle until programming is completed. These procedures wait for the system, trunk, or extension to become idle and then prevent the initiation of any new calls. This condition is called *forced idle*.

NOTE:

If a procedure requires an idle condition, perform the programming outside of normal business hours.

If a procedure requires that the system be in an idle state and the system is busy when you begin, you see the screen shown below.

System Busy Pls Wait

Dial Code: *nnnn*

Slot/Port: ***ss/pp***

Exit

The screen changes to the appropriate programming screen when the system is no longer busy.

System Forced Idle

When the entire system is forced idle, no calls can be made or received. The procedures listed below can be performed only when the entire system (every line and every extension) is idle:

- Select system mode.
- Identify system operator positions.
- Renumber boards.
- Renumber system.
- Identify telephones with voice signal pairs for the Voice Announce to Busy feature.
- Identify telephones that need the Simultaneous Voice and Data feature.
- Restore system programming information.
- Identify the Music On Hold jack.

When the system is forced idle, the following occurs: multiline telephone users hear a reminder tone that indicates the telephone cannot be used; display telephone users see the message **Wait: System Busy**; single-line telephone users do not hear a dial tone.

Line or Trunk Idle

Since these procedures require the line or trunk to be idle *only at the instant of programming*, the line or trunk is not forced idle. The following procedures can be performed only when the line or trunk being programmed is idle:

- Identify loudspeaker paging line jack.
- Assign trunks to pools.
- Specify incoming or outgoing DID-or tie-trunk type.
- Specify tie-trunk direction.
- Specify tie-trunk E&M signal.

Extension Forced Idle

When an extension or data terminal is forced idle, no calls can be made or received on that extension or data terminal. The following procedures can be performed only when the extension or data terminal being programmed is idle:

- Assign call restrictions.
- Assign pool dial-out restrictions.
- Copy extension assignments.
- Assign lines, trunks, or pools to extensions.
- Assign labels to a personal directory.
- Use centralized telephone programming.

When the extension is forced idle, the following occurs: multiline telephone users hear a reminder tone that indicates the telephone cannot be used; display telephone users see the message Wait: System Busy; single-line telephone users do not hear a dial tone.

Forced Idle Reminder Tone

The forced idle reminder tone is a high-low “door-phone” tone-400 ms of 667 Hz tone followed by 400 ms of 571 Hz tone. The tone is provided under the following circumstances:

- At the extension, to remind the user that the system or the extension is in the forced idle state
- At the programming console or at a PC running SPM, to remind the system manager that the system (or at least one extension) is in the forced idle state because of administrative activity

In Release 1.1 and higher of the communications system, forced idle reminder tones occur every 20 seconds. You can adjust the volume of these tones with the volume control on the system console.

Accessing System Programming

Follow the steps below to access system programming.

1 At the SPM Main Menu press **(F1)** to select Sys Program.

(F1)

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

2 Press the function key next to the option you want.

(F1)	System	Extensions	(F6)	(F1)	System Programming:	
(F2)	SysRenumbr	Options	(F7)	(F2)	flake a selection	
(F3)	Operator	Tables	(F8)	(F3)	Labeling	Language
(F4)	LinesTrunks	AuxEquip	(F9)	(F4)	Data	
(F5)	Exit	NightSrvce	(F10)	(F5)	Print	
					Cntr-Prg	
					Exit	

If the option you want does not appear on the first screen of the System Programming menu, press (PgUp) to display the second screen of the menu.

(F1)
(F2)
(F3)
(F4)
(F5)

Press Esc to Abort.

Exit

Figure 1-10 You can press (F5) to interrupt printing and return to the SPM Main Menu.

Print Hard Copy

- To print a hard copy of the report, use the arrow keys to highlight LPT1: and press (Enter ↵) .

Print to Hard Disk

- To print the reports to the hard disk if the print file does not exist, use the arrow keys to highlight **MAKE NEW FILE** and press (Enter ↵) .
 - To save to the default print filename (print. ares), press (Enter ↵) .
 - To save to the filename of your choice, type *[filename]* and press (Enter ↵) .
- To print the reports to the hard disk if the print file already exists, use the arrow keys to highlight the *[filename]* and press (Enter ↵) .

Print to Floppy Disk

Use the arrow keys to highlight **GOTO FLOPPY:** and press (Enter ↵). Use one of the methods shown below.

- To print the reports to a floppy disk if the print file does not exist, use the arrow keys to highlight **MAKE NEW FILE** and press (Enter ↵) .
 - To save to the default print filename (print. ams), press (Enter ↵) .
 - To save to the filename of your choice, type *[filename]* and press (Enter ↵) .
- To print the reports to a floppy disk if the print file already exists, use the arrow keys to highlight the *[filename]* and press (Enter ↵) .

Upgrading the System



WARNING:

The following procedures are to be used by qualified technicians or service personnel only. Installation or maintenance of this product by anyone other than qualified personnel may damage or impair the product; your limited warranty does not cover such damage. For details, see your limited warranty in the Customer Support Information in the back of this book. Hazardous electrical voltages are present inside this product.

This section describes upgrading your communications system to Release 3.0. You can use this procedure to perform the following upgrades:

- From Release 1.0 to Release 3.0
- From Release 1.1 to Release 3.0
- From Release 2.0 to Release 3.0
- From Release 2.1 to Release 3.0

MERLIN® II Communications System programming cannot be upgraded to this communications system. The new communications system must be completely reprogrammed.

Before You Begin

Before you begin the upgrade to Release 3.0, you will need the items listed below.

- SPM Version 3.XX or later to backup and convert system programming information and to restore system programming information after the Release 3.0 processor module has been installed.
- Release 3.0 processor module
- DOS-formatted diskette

NOTE:

If SPM is already installed, the **Welcome to SPM** screen that appears when you start SPM identifies the version on both the last line of the console simulation window and in the upper left corner of the screen. If you are working with Version 3. XX, **V3** appears in the upper left-hand corner of the screen and **Version 3.XX** appears on the last line of the console simulation window.

Inter-Release Compatibility

It is important to understand compatibility between files created on each of the different versions of SPM, not only for upgrading but also for programming.

Table 6 summarizes programming compatibility. (It is assumed that the majority of the programming is done in surrogate mode and backed up on disk).

Table 6. Programming

SPM Version	Program Backup on	Restore on			
		1.0	1.1	2.0/ 2.1	3.0
1.13	1.0	yes	no	no	no
1.16	1.0	yes	yes	no	no
2.09	1.0	yes	yes	yes*	no
2.16	1.0	yes	yes	yes*	no
3.XX	1.0	yes	yes	yes*	yes*
1.16	1.1	no	yes	no	no
2.09	1.1	no	yes	yes*	no
2.16	1.1	no	yes	yes*	no
3.XX	1.1	no	yes	yes*	yes*
2.09	2.0	no	no	yes	no
2.16	2.0	no	no	yes	no
3.XX	2.0	no	no	yes	yes*
2.16	2.1	no	no	no	no
3.XX	2.1	no	no	no	yes*
3.XX	3.0	no	no	no	yes

* The backup file must be converted before it is restored.

NOTE:

The default barrier code and any programmed barrier codes will be carried over to Release 3.0 with no change and the barrier code length will be four (4). It is the responsibility of the system manager to change the barrier code length and the barrier codes if so desired.

Upgrade Procedure

IMPORTANT:

The upgrade procedure must follow the order of the steps shown below.

1 Install SPM.

To upgrade the system to Release 3.0, you will need to install (or upgrade to) Version 3.XX of SPM. See “Installing the SPM Software.”

2 Back up your system programming.

This step creates a file containing system programming information. See “Backup.”

3 Replace the processor module.

- a. Turn off the AC power switches on the control unit in the following order:
 - (1) Basic carrier
 - (2) Expansion carrier 1, if present
 - (3) Expansion carrier 2, if present.
- b. Unplug the interface cords from the SPM and SMDR printer ports on the processor module.
- c. Remove the processor module from Slot 0.
- d. Install the Release 3.0 processor module in Slot 0.
- e. Plug the interface cords into the SPM and SMDR printer ports on the processor module.
- f. Turn on AC power to the control unit in the following order:
 - (1) Expansion carrier 2, if present
 - (2) Expansion carrier 1, if present
 - (3) Basic carrier.

5 Perform a System Erase (frigid start).

Use the following procedure to ensure that all system programming is returned to default values.

**Maintenance>Slot>00>Demand Test>System Erase (Line 5, left button)>
System Erase (Line 5, left button)> Yes**

The System Erase option is not displayed on the screen to prevent accidental erasure of system programming. See Maintenance and Troubleshooting for additional information about System Erasure.

5 Convert your backup file to Release 3.0 format.

This procedure converts the backup file created in Step 2. See "Convert."

6 Restore your system programming.

The system is forced idle and cannot be used during this procedure. See "Restore."

7 Program new features.

If you wish to use the factory defaults for the new features available with Release 3.0, skip this step.

See Tables 7, 8 and 9 which follow this procedure.

- Table 7. Lists the features added with Release 1.1 of the communications system.
- Table 8. Lists the features added with Release 2.0 or 2.1 of the communications system.
- Table 9. Lists the features added with Release 3.0 of the communications system.
 - When you upgrade from Release 2.0 or 2.1 to Release 3.0, you must program these features as the last step of the upgrade procedure.
 - When you upgrade from Release 1.1 to Release 3.0, you must program the features listed in Table 8, then the features listed in Table 9.
 - When you upgrade from Release 1.0 to Release 3.0, you must first program the features listed in Table 7, then the features listed in Table 8, then the features listed in Table 9.

Table 7. Programming Needed after Upgrade to Release 1.1

Feature	Sequence	
System language	System	Programming>More>Language>SystemLang
Extension language	System	Programming>More>Language>Extensions
SMDR language	System	Programming>More>Language>SMDR
Printer language	System	Programming>More>Language>Printer

Table 8. Programming Needed after Upgrade to Release 2.0

Feature	Sequence
Primary Rate Interface (PRI)	Sys Program>LinesTrunks>LS/GS/DS1>Type>PRI Sys Program>LinesTrunks>LS/GS/DS1>FrameFormat Sys Program>LinesTrunks>LS/GS/DSL>Suppression Sys Program>LinesTrunks>PRI>PhoneNumber Sys Program>LinesTrunks>PRI>B-ChannlGrp Sys Program>LinesTrunks>PRI>NumbrToSend Sys Program>LinesTrunks>PRI>TestTelNum Sys Program>LinesTrunks>PRI>Protocol Sys Program>LinesTrunks>PRI>DialPlanRtg Sys Program>LinesTrunks>PRI>OutgoingTbl Sys Program>Tables>ARS
DID Emulation on T1	SysProgram>LinesTrunks>LS/GS/DSL>Type>More >DID/A11 DID
Night Service Calling Group	Sys Program>NightSrvce>GroupAssign>Calling Group
Coverage VMS Off	Sys Program> More >Cntr-Prg>Program Ext
Data Status	Sys Program> More >Cntr-Prg>Program Ext
Extension Copy	Sys Program> More >Cntr-Prg>Copy Ext
Posted Message button on analog multiline and MLX-10 non-display telephones (for use with Do Not Disturb)	Sys Program> More >Cntr-Prg>Program Ext

Table 9. Programming Needed after Upgrade to Release 3.0

Feature	Sequence
Automatic Backup	Sys Program> System>Back/Restore>Auto Backup
Incoming Call Line Identification Delay	LinesTrunks> More>LS-ID Delay> Drop>Dial trunk no,>Enter
Remote Access Barrier Codes	LinesTrunks>RemoteAccss>BarrierCode>CodeInfo>Code Length LinesTrunks>RemoteAccss>BarrierCode>CodeInfo>Code Entry
Authorization Codes	Extensions> More>Auth Code

Surrogate Mode Programming

Surrogate mode allows qualified service personnel to perform system programming at an off-site service location. The actual communications system hardware does not have to be installed—the programmer needs only a direct connection from the PC to the processor module. By following a customer's set of completed planning forms, the system can be programmed as if the appropriate modules, trunks, and telephones have been installed. When system programming is completed, a system backup is performed to save the information on disk. This backup disk is then taken to the new installation site and used with the Restore option to provide complete system programming for a new communications system.

You do not “select” surrogate mode programming—you enter it automatically under the following conditions:

- The PC is connected to the lower RS-232 port on a control unit (direct local connection).
- Only the processor and power modules are connected.

Once you enter surrogate mode programming, you must follow the sequence of procedures shown below.

- At the service location, perform the following:
 1. System Erase
 2. Program the Boards (except the 10OD module)
 3. System Programming
 4. Backup
- At the installation site, perform the following:
 1. Restore
 2. Program the 10OD module

While you are in surrogate mode, the Pass-Thru and Password options are not available.

NOTE:

Surrogate mode is available only through the local programming port. You cannot access surrogate features through the system programming console.

Glossary

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.
adjunct	Optional equipment used with the communications system, such as an alerting device or <i>modem</i> 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.
analog transmission	Mode of transmission in which information is represented in continuously variable physical quantities such as amplitude, frequency, phase, or resistance. See also <i>digital transmission</i> .
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 Services Digital Network Primary Rate Interface (ISDN-PRI) trunk, <i>Accunet</i> switched digital service, <i>Megacom</i> , <i>Megacom 800</i> , Software Defined Network (SDN), Multiquest, and Shared Access for Switch Services (SASS).
asynchronous data transmission	A method of transmitting a short bitstream of digital data, such as printable characters represented by a 7- or 8-bit ASCII code. Each string of data bits is preceded by a start bit and followed by a stop bit, thus permitting data to be transmitted at irregular intervals. See also <i>synchronous data transmission</i> .
AT&T Attendant	Application with equipment that connects to one or more <i>tip/ring</i> 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 <i>IS II/III</i> , that provides Automated Attendant, Call Answer, Information Service, Message Drop, Voice Mail, and, optionally, <i>FAX Attendant System</i> for use with the system.
Automated Attendant	<i>IS II/III</i> , <i>MERLIN MAIL</i> , and <i>AT&T Attendant</i> 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 <i>ALS</i> .
Automatic Number Identification	See <i>ANI</i> .
automatic ringdown tie-trunk	See <i>automatic-start tie trunk</i> .
Automatic Route Selection	See <i>ARS</i> .
automatic-start tie trunk	<i>Tie trunk</i> 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 <i>bipolar violation</i> . See also <i>bipolar signal</i> .
backup	Procedure for saving a copy of system programming onto a floppy disk or <i>memory card</i> . See also <i>restore</i> .
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 <i>Remote Access</i> feature of the system.
basic carrier	Hardware that holds and connects the <i>processor</i> , <i>power supply</i> , and up to five modules in the system. See also <i>expansion carrier</i> .
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 <i>bit rate</i> and <i>bps</i> .
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 <i>B-channel</i> .

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 <i>Centrex</i> or <i>Definity</i> , which provides features and services to telephone users. See also <i>Hybrid/PBX mode</i> and <i>Key mode</i> .
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 <i>B8ZS</i> .
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 <i>bps</i> . Also called “data rate.” See also <i>baud rate</i> .
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 <i>glare</i> .
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 communication system.
board assignment	SPM procedure for assigning line/trunk and extension modules to slots on the control unit.

board renumbering	System programming procedure for renumbering boards that have already been assigned to specific slots on the control unit.
broadband	Transmission path having a bandwidth greater than a voice-grade channel.
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 <i>bits</i> (usually eight) processed together. Also called "octet."

C

Call Accounting System	See CAS.
Call Accounting Terminal	See CAT.
calling group	Team of individuals who answer the same types of calls.
Call Management System	See CMS.
CAS	(Call Accounting System) DOS- or UNIX system-based application that monitors and manages telecommunications costs.

CAT	(Call Accounting Terminal) Standalone unit with a built-in microprocessor and data buffer that provides simple call accounting at a low cost.
CCITT	(International Telegraph and Telephone Consultative Committee)
CCS	(common-channel signaling) Signaling in which one channel of a group of channels carries signaling information for each of the remaining channels, permitting each of the remaining channels to be used to nearly full capacity. In the system's 100D module, channel 24 can be designated as the signaling channel for channels 1-23.
centralized telephone programming	Programming of features on individual telephones; performed at a central location by the <i>system manager</i> . See also <i>system programming</i> and <i>extension programming</i> .
central office	See <i>CO</i> .
Centrex	Set of system features to which a user can subscribe on telephone trunks from the local telephone company.
channel	Telecommunications transmission path for voice and/or data.
channel service unit	See <i>CSU</i> .
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 <i>data stations</i> .
class of restriction	See <i>COR</i> .

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.
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 <i>carriers</i> 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 LEGEND Communications System.
control unit	<i>Processor, power supply, modules, carriers, and housing of the system.</i>
console	Refers to telephone and adjuncts (if any) at operator or system programmer extension.
CONVERSANT Intro	Entry-level voice response application that automatically answers and routes calls and executes telephone transactions.
conversion resource	See <i>modem pool</i> .

COR	(class of restriction) Various types of restrictions that can be assigned to <i>remote</i> access trunks or barrier codes. These restrictions consist of Calling Restrictions, <i>ARS</i> Facility Restriction Levels (<i>FRLs</i>), Allowed Lists, Disallowed Lists, and Automatic Callback queuing.
Coverage	Set of system features that can determine how extensions' calls are covered when the person at the extension is busy or not available.
CSU	(channel service unit) Equipment used on customer premises to provide <i>DS1</i> facility terminations and signaling compatibility.

D

D4 framing format	<i>Framing format</i> consisting of a sequence of individual frames of 24 eight- <i>bit</i> slots and one signal bit (193 bits) in a 12-frame superframe. See also <i>ESF</i>
Data-channel	See <i>D-channel</i> .
data communications equipment	See <i>DCE</i> .
data hunt group	See <i>DHG</i> .
data module	See <i>ISDN 75008 Data Module</i> .
data rate	See <i>bps</i> .

data station	Special type of extension where data communications take place; includes <i>DTE</i> and <i>DCE</i> ; sometimes a telephone is also part of a data station.
data terminal	An input/output (<i>I/O</i>) device (often a personal computer) that can be connected to the control unit via an interface.
data terminal equipment	See <i>DTE</i> and <i>data terminal</i>
DCE	(data communications equipment) Equipment such as <i>modems</i> or data modules used to establish, maintain, and terminate a connection between the system and data terminal equipment (<i>DTE</i>), such as printers, personal computers, host computers, or network workstations.
D-channel	(Data-channel) 16-or 64-kbps channel that carries signaling information or data on a PRI.
DCP	(Digital Communications Protocol) AT&T proprietary protocol to transmit digitized voice and data over the same communications link. A DCP link is made up of two 64-kbps information (I) channels and one signaling (S) channel to the B- and D-channels used in an <i>ISDN</i> .
dedicated feature buttons	The imprinted feature buttons on a telephone: Conf or Conference , Drop , Feature , HFAI (Hands Free Answer on Intercom), Hold , Message , Mute or Microphone , Recall , Speaker or Speakerphone , and Transfer .

delay-dial-start tie trunk	<i>Tie trunk</i> on which the originating end of the tie trunk transmits an off-hook signal to the receiving end and waits for the receiving end to send an off-hook signal followed by an on-hook signal. Also called “dial-repeating tie trunk.”
DFT	(direct facility termination) See <i>personal line</i> .
dial access	See <i>feature code</i> .
Dialed Number identification Service	See <i>DNIS</i>
dial-out code	Digit (usually a 9) or digits dialed by telephone users to get an outside line.
dial plan	Numbering scheme for system extensions, lines, and trunks.
dial-repeating tie trunk	See <i>delay-dial start tie trunk</i> .
DID	(Direct Inward Dialing) Service that transmits from the telephone company central office and routes incoming calls directly to the called extension, <i>calling group</i> , or outgoing trunk <i>pool</i> , 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 <i>analog transmission</i> .
Digital Communications Protocol	See <i>DCP</i> .
Digital Signal 0	See <i>DS0</i> .

Digital Signal 1	See <i>DS1</i> .
digital switch element	See <i>DSE</i> .
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 <i>analog transmission</i> .
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 <i>personal line</i> .
Direct Inward Dialing	See <i>DID</i> .
Direct-Line Console	See <i>DLC</i> .
Direct Station Selector	See <i>DSS</i> .
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 1) <i>Bit-</i> oriented signaling interface that multiplexes twenty-four 64-kbps channels into a single 1.544-Mbps stream.
DSS	(Direct Station Selector) 60-button <i>adjunct</i> that enhances the call-handling capabilities of an MLX-20L or MLX-28D telephone used as an operator console.
DTE	(data terminal equipment) Equipment that makes the endpoints in a connection over a data connection, for example, a data terminal, personal computer, host computer, or printer.
DTMF signaling	(dual-tone multifrequency signaling) Touch-tone signaling from telephones using the voice transmission path. DTMF signaling provides 12 distinct signals, each representing a dialed digit or character, and each composed of two voiceband frequencies.

E

E&M signaling	Trunk supervisory signaling, used between two communications systems, in which signaling information is transferred through two-state voltage conditions (on the Ear and Mouth leads) for analog applications and through two <i>bits</i> for digital applications. See also <i>tie trunk</i> .
EIA	(Electronic Industries Association)
EIA-232-D	Physical interface, specified by the <i>EIA</i> , that transmits and receives asynchronous data at speeds of up to 19.2 Kbps over cable distances of 50ft(15m) or less.
endpoint	Final destination in the path of an electrical or telecommunications signal.
ESF	(extended superframe format) <i>Framing format</i> consisting of individual frames of 24 eight- <i>bit</i> slots and one signal bit (193 bits) in a 24-frame extended superframe. See also <i>04 framing format</i> .
expansion carrier	<i>Carrier</i> 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 <i>data station</i> .
extension jack	An analog, digital, or <i>tip/ring</i> 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 <i>extension programming</i> and <i>system programming</i> .
extended superframe format	See <i>ESF</i> .

F

facility	Equipment (often a <i>trunk</i>) constituting a telecommunications path between the system and the telephone company central office (CO).
Facility Restriction Level	See <i>FRL</i> .
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 <i>AUDIX Voice Power</i> .
FCC	Federal Communications Commission
feature	Function or service provided by the system.

feature code	Code entered on a dial pad to activate a feature.
feature module	Prior to Release 3.0, a circuit pack inserted into the <i>processor</i> 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.
Flash ROM	Beginning with Release 3.0, a type of memory provided on the <i>processor</i> module,
forced idle	Condition of the system during certain programming or maintenance procedure; system prevents initiation of new calls.
foreign exchange	See <i>FX</i> .
frame	One of several segments of an analog or digital signal that has a repetitive characteristic. For example, a <i>DS1</i> frame consists of a framing <i>bit</i> and 24 bytes, which equals 193 bits.
framing format	Pattern of <i>frames</i> used in transmissions.
FRL	(Facility Restriction Level) <i>ARS</i> 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 <i>GPA</i> .
glare	Condition that occurs when a user tries to call out on a <i>loop-start</i> 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 <i>HFAI</i> .
hands-free unit	See <i>HFU</i> .
headset	Lightweight earpiece and microphone used for hands-free telephone operation.

HFAI	(Hands Free Answer on Intercom) Feature that allows a user to answer a voice-announced call.
HFU	(Hands-Free Unit) Unit for analog multiline telephones that allows users to make and receive calls on the speakerphone without using the handset.
Home screen	Display normally shown on an MLX display telephone; shows time, date, and call information, and shows when some features are in use.
host	Telephone company or other switch providing features and services to the system users, usually when the system is operating in <i>Behind Switch mode</i> .
Hybrid/PBX mode	One of three modes of system operation, in which the system uses trunk <i>pools</i> and <i>ARS</i> in addition to <i>personal lines</i> . Provides a single interface (SA buttons) to users for both internal and external calling. See also <i>Behind Switch mode</i> and <i>Key mode</i> .

I

ICLID	(Incoming Call Line Identification) A service provided by some local telephone companies (if local regulations allow) that supplies the calling party telephone number. In Release 3.0 and later, an 800 GS/LS-ID module on the system can capture this information and display it on the screens of MLX telephones. See also <i>ANI</i> .

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	<i>Tie trunk</i> on which no start signal is necessary; dialing can begin immediately after the trunk is seized.
in-band signaling	<i>See robbed-bit signaling.</i>
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 <i>IS III</i> that simplifies the programming of common information for the system, <i>AUDIX Voice Power</i> , and, if it is also installed, <i>FAX Attendant System</i> .
Integrated Services Digital Network	<i>See ISDN.</i>
Integrated Solution II/III	<i>See IS II/III.</i>
Integrated Voice Power Automated Attendant	<i>IS II</i> application that automatically answers incoming calls with a recorded announcement and directs callers to a department, an extension, or the system operator.
intercom buttons	<i>See ICOM buttons.</i>
interface	Hardware and/or software that links systems, programs, or devices.

I/O device	(input/output device) Equipment that can be attached to a computer internally or externally for managing a computer system's input and output of information.
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 <i>network interfaces</i> ; provides digital circuit-switched or packet-switched connections within the network and to other networks for national and international digital connectivity.
ISDN 7500B Data Module	Data communications device that allows connection between an RS-232 <i>DTE</i> device and the control unit via MLX extension jacks on the 008 MLX or 408 GS/LS-MLX module.

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 <i>Behind Switch mode</i> and <i>Hybrid/PBX mode</i> .

L

LDN	listed directory number
LED	(light-emitting diode) Semiconductor device that produces light when voltage is applied; light on a telephone.
line	Connection between extensions within the communications system; often, however, used synonymously with <i>trunk</i> .
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 <i>line</i> and <i>trunk</i> .
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 <i>modem</i> or data module.
local loop	See <i>access line</i> .
logical ID	Unique numeric identifier for each <i>extension</i> and <i>line/trunk jack</i> 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.
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 ID.
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 <i>tip/ring</i> 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-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.
modem	Device that converts digital data signals to analog signals for transmission over a telephone line, and analog signals received on a telephone line to digital signals.

modem pool	Pair, or group of pairs, of <i>modems</i> and data modules with interconnected RS-232 interlaces that converts digital signals to analog, or analog signals to digital, thereby allowing users with digital <i>data stations</i> to communicate with users who have analog data stations.
module	Circuit pack in the control unit that provides the physical jacks for connection of telephones and/or outside trunks to the communications system. In the name of a module, the first digit indicates the number of <i>line/trunk</i> jacks it contains; the last digit indicates the number of <i>extension jacks</i> it contains. If no letters appear after the number, a line/trunk module provides <i>loop-start trunks</i> or an extension jack module provides analog or <i>tip/ring</i> 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 <i>ground-start (GS)trunks</i> .
Multi-Function Module	See <i>MFM</i> .
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 <i>loop-start</i> 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 <i>OPT</i> .
ones density	Requirement for channelized <i>DS1</i> 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) <i>Single-line telephone</i> or other <i>tip/ring</i> device connected to the system through 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 <i>bit</i> to a bit string so that the total number of ones is odd or even, used to detect and correct transmission errors.
pass-through	Connection from an internal <i>modem</i> to a programming jack 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 <i>memory card</i> .
personal line	Central office trunk that terminates directly on one or more telephones. In <i>Hybrid/PBX mode</i> , a personal line cannot be part of a trunk <i>pool</i> . Also called "DFT" (direct facility termination).

pool	In <i>Hybrid/PBX mode</i> , 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 <i>jack</i> . Also, refers to <i>extension</i> or <i>line jacks</i> before these are numbered according to the <i>dial plan</i> during programming. The lowest jack on a module is always port 1.
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 <i>auxiliary power unit</i> 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 <i>B-channels</i> for voice and/or data and one 16-kbps <i>D-channel</i> , 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 <i>Behind Switch mode</i> . 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 O, to the right of the <i>power supply</i>). 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 <i>byte</i> or range of bytes can be addressed and read or changed without affecting other parts of memory.
read-only memory	See <i>ROM</i> .
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 <i>memory card</i> . See also <i>backup</i> .
RS-232	Physical interface, specified by the Electronics Industries Association (<i>EIA</i>), that transmits and receives <i>asynchronous</i> data at distances of up to 50 feet (15 m).
robbed-bit signaling	Signaling in which the least significant <i>bit</i> 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 internal and external calling.
SDN	(Software Defined Network) AT&T private networking service created by specialized software within the public network.
SID	[station (extension) 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 <i>extension jack</i> on a basic 012 or 008 OPT module.
slot	Position in a <i>carrier</i> for a module; numbered from 0 (<i>processor module</i>).
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 <i>processor</i> module.
Software Defined Network	See <i>SDN</i> .
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) <i>DOS</i> - or UNIX system-based application for programming and maintaining the system.
square key	Configuration in <i>Key mode</i> operation in which all outside lines appear on all telephones.
station	See <i>extension</i> .
station jack	See <i>extension jack</i> .
Station Message Detail Recording	See <i>SMDR</i> .
Supplemental Alert Adapter	See <i>SAA</i> .
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 <i>host</i> 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 <i>bit</i> is synchronized with a master clock. See also <i>asynchronous data transmission</i> .
System Access buttons	See <i>SA buttons</i> .

system date and time	Date and time that appear on MLX display telephones and <i>SMDR</i> reports.
system programming	Programming of system functions and features that affect most users, performed from an MLX-20L telephone or a computer using <i>SPM</i> . See also <i>extension programming</i> and <i>centralized telephone programming</i> .
System Programming and Maintenance	See <i>SPM</i> .
system renumbering	Procedure used to change the numbers assigned to telephones, adjuncts, <i>calling groups</i> , paging groups, park zones. <i>Remote Access</i> , and lines/trunks.

T

T1	Type of digital transmission facility that in North America transmits at the <i>DS1</i> rate of 1.544 Mbps.
tie trunk	Private trunk directly connecting two telephone switches. See also <i>automatic-start tie trunk</i> , <i>delay-dial-start tie trunk</i> , <i>immediate-start tie trunk</i> , and <i>wink-start tie trunk</i> .
timed flash	See <i>switchhook flash</i> .
tip/ring	Contacts and associated conductors of a <i>single-line telephone</i> plug or jack.
touch-tone receiver	See <i>TTR</i> .
T/R	See <i>tip/ring</i> .

trunk	Line creating a telecommunications path between the communications system and the telephone company central office (CO) or another switch. Often used synonymously with <i>line</i> .
trunk jack	See <i>line/trunk jack</i> .
trunk pool	See <i>pool</i> and <i>modem pool</i> .
TTR	(touch-tone receiver) Device used to decode DTMF touch-tones dialed from <i>single-line telephones</i> or <i>Remote Access</i> telephones.

V

VMI	(voice messaging interface) An enhanced <i>tip/ring</i> port.
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 <i>VMI</i> .

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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