AT&T

MERLIN® II
COMMUNICATIONS SYSTEM

Installation, Administration,
and Maintenance Manual
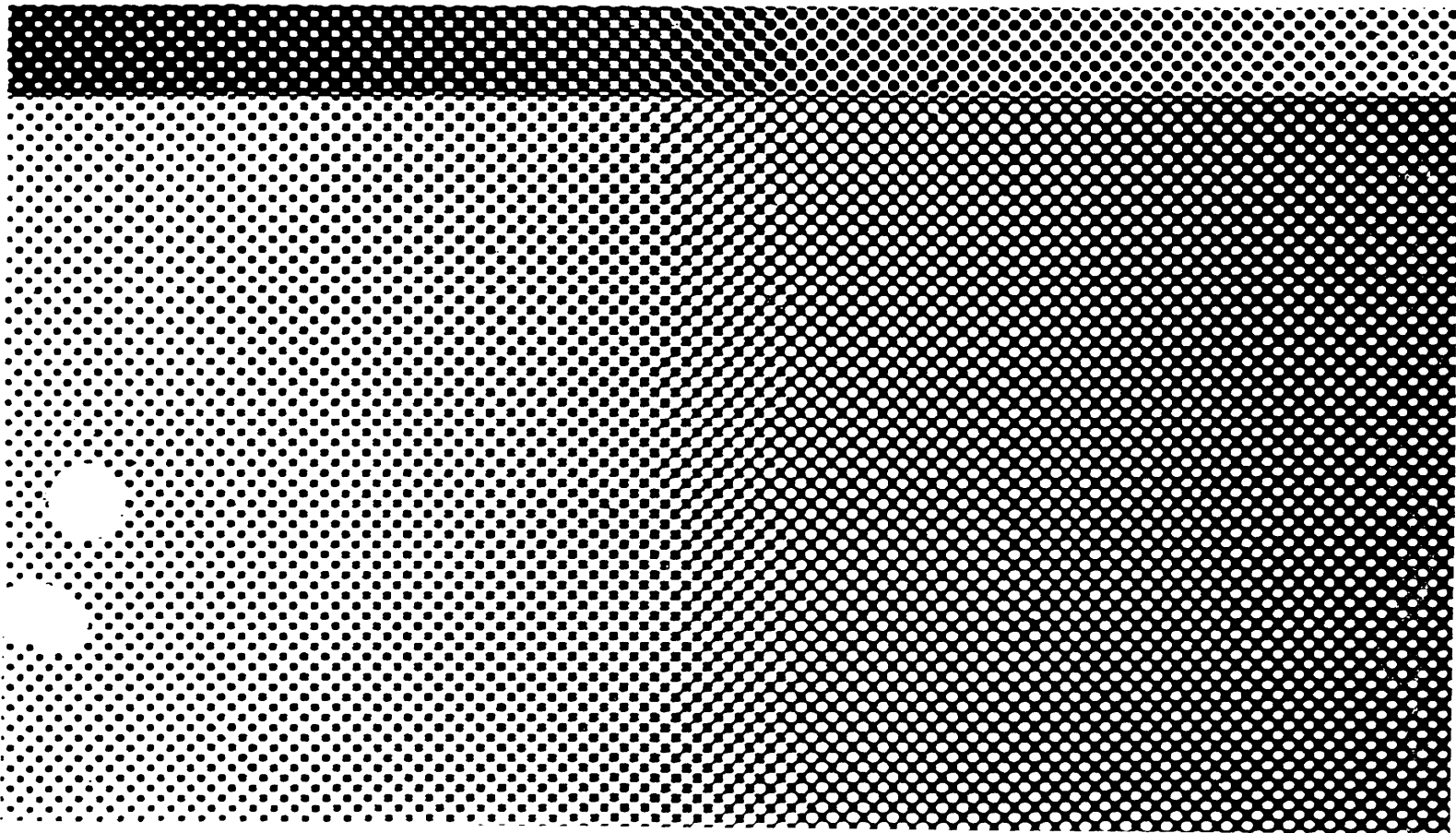
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Section 1: System Description

What's in This Manual

This manual provides information about how to install and maintain a MERLIN II Communications System. It covers the MERLIN II System Feature Module 1, Feature Module 2, and Release 3. For further information on specific features and options, see the *MERLIN II Communications System System Manual* for that release. For information on data communications options with the MERLIN II system, refer to the *MERLIN II Communications System Data Communications Guide* for the release.

The information in this manual is divided into five sections, as described below.

SECTION 1: SYSTEM DESCRIPTION

This section provides a general overview of the system and its components.

SECTION 2: INSTALLATION

This section describes how to wire and install a MERLIN II system.

SECTION 3: ADMINISTRATION

This section tells you how to customize and administer the system to meet specific business needs.

SECTION 4: TROUBLESHOOTING

This section can help you isolate and solve technical problems that may cause the system to malfunction.

SECTION 5: ORDERING INFORMATION

This section tells you how to order MERLIN II system components and accessories.

System Overview

The MERLIN® II Communications System is a programmable digital telephone system with many features to make voice and data easy to manage. It supports up to 56 outside lines and 120 stations, depending on the configuration. Voice terminals allow access to the system for conversations, feature programming, or system administering. By connecting an optional printer to the system, the user can receive a detailed call report of each station's activity and a printout of all system administration.

The MERLIN II System is designed to handle integrated voice and data calls without reducing system capacity. It can support various terminal types: analog voice terminals, digital voice terminals, and digital data terminals. It also supports the new 7102A single-he voice terminal, Touch-Tone (2500) telephones, and rotary (500) telephones.

Data and voice options are implemented by selecting the appropriate station module. There are three types of station modules: analog modules for analog voice terminals, basic telephone modules for 7102A, 2500, or 500 sets, and digital modules for digital voice terminals and data devices. Station modules, used with system accessories, allow the user to select from the simplest method of voice and data communication to complex arrangements such as data calls between two digital stations and modem pooling. Refer to Figure 1-1 for an example of MERLIN II system configuration.
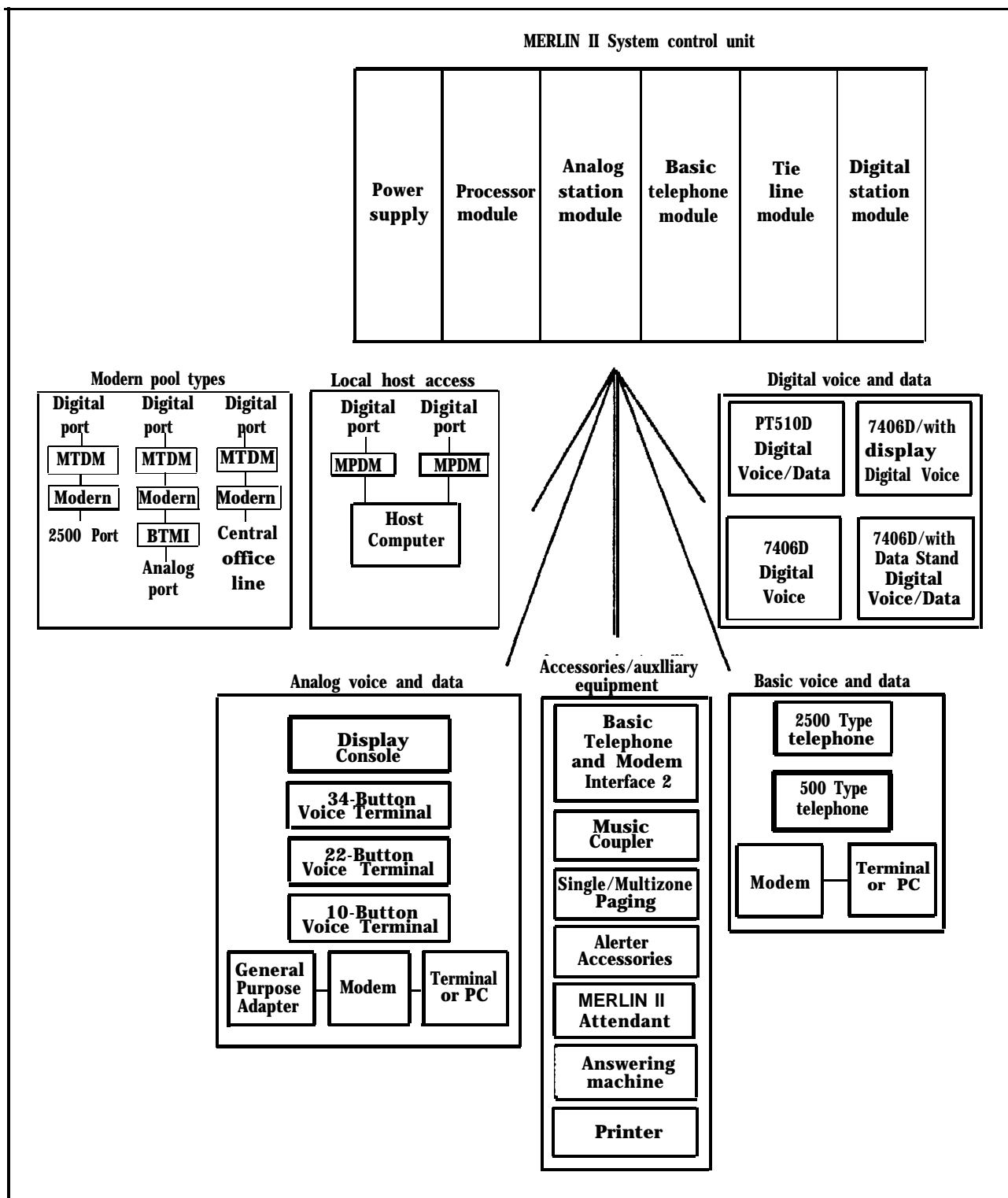
FIGURE 1-1 MERLIN II system configuration.

SYSTEM CONFIGURATION

The size, type, and features of a MERLIN II system are determined using system planning forms.

System Size

A MERLIN II system can be as small as four outside lines and eight analog voice terminals, or as large as 56 outside lines and *72* stations. A MERLIN II system with as many as eight lines and 20 stations is considered a small system for administration purposes.

Basic and expanded system capabilities are determined by these system hardware maximum limitations:

- Thirty-six analog stations with the Simultaneous Voice and Data feature

- Sixty-four digital stations with the Simultaneous Voice and Data feature

- Eleven line pools

- Seventy-one off-premises devices or Basic Telephone and Modem Interfaces

System Type

A system can be configured for pooled, square, or behind-switch operation. The MERLIN II system default configuration is pooled with button access.

- In a square system, each outside line has a dedicated position on a voice terminal. This arrangement is also known as a key system. In a standard square configuration, outside lines appear on the same buttons on each voice terminal. In a customized square system, different groups of outside lines are assigned to the same buttons on selected groups of voice terminals.

- In a pooled system, outside lines can be grouped into line pools (groups of interchangeable lines). To get an outside line in a pooled system, the user must dial an access number or use a dedicated pool button on the voice terminal. Access to outside line pools can also be had through Automatic Route Selection (ARS).

- In a behind-switch system, the MERLIN II system operates behind a larger system such as a System 25, 75, or 85 PBX. In this configuration, most features of both systems are available to the MERLIN II system user. Refer to Figure 1-2 for an example of a MERLIN II system operating behind a digital PBX.
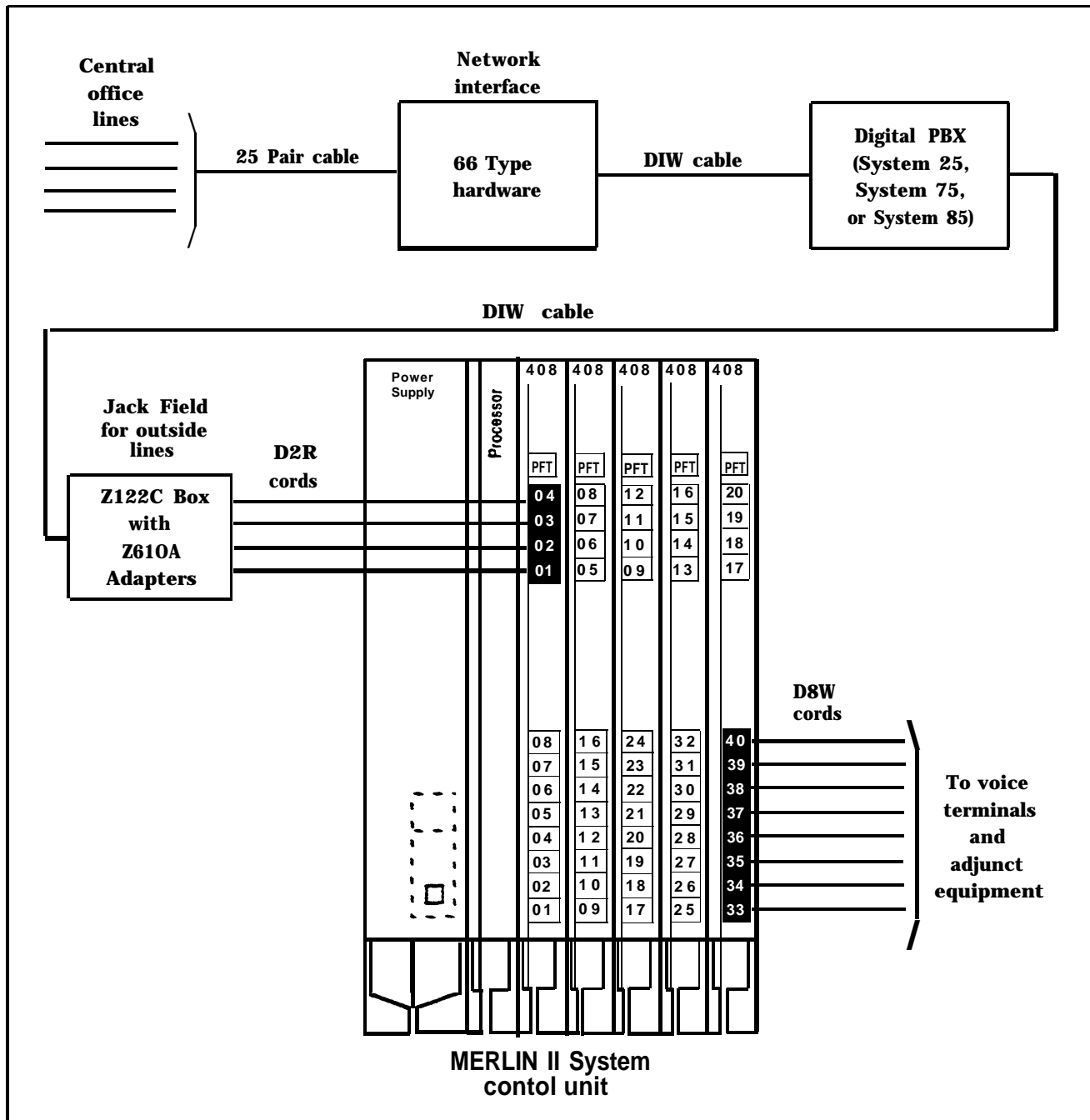
FIGURE 1-2 A MERLIN II system behind-switch operation.

SYSTEM FEATURES   Table 1-1 lists the features that are available for
MERLIN II System Feature Modules 1 and 2, and
Release 3.

NOTE: The features in Table 1-1 are described fully in
the *MERLIN II Communications System System
Manual.*

The following paragraphs describe feature that are either
new in Release 3 or have been significantly modified for
Release 3.

- **Disallowed List.** Using a Disallowed List, you can
  create up to eight lists of numbers, area codes, or
  exchanges that selected users will not be permitted to
  dial. Each list can have up to 10 numbers. The
  administrator may assign one or more of these lists to
  any station in the system. If a station is assigned so a
  disallowed list any attempt to dial a number contained
  in the list wiIl be denied.

- **Extended Station Status.** Extended Station Status (ES
  Status) indicates the operating status of other stations
  to the administrator. When ES Status is administered
  for Hotel/Motel mode, the attendant can put voice
  terminals into different categories to indicate whether
  the room is occupied. With Release 3, if the voice
  terminal is off-hook, the attendant can't change its
  status. This ES Status Inhibit feature helps prevent
  hotel guests from making calls from their room after
  they have checked out.

  N O T E: The alternative to Hotel/Motel mode is Call
  Management System (CMS) mode. CMS is
  the automatic call distributor (ACD) for the
  MERLIN II system, and is available only with
  Feature Module 1 or 2, *not* Release 3. The
  CMS component of the MERLIN II system
  answers calls and connects them to available
  agents. CMS is not a system feature and
  requires a separate software package.

- MERLIN II Attendant. The MERLIN II Attendant automatically answers and routes incoming calls. The feature is available only when the optional MERLIN II Attendant accessory is installed. Also, to gain access to this feature, you *must* use the517C13 Basic Telephone (012) Module.

  The MERLIN II Attendant performs two major functions (Figure 1-3):

  > Immediate call handling, in which all incoming calls are received and routed by the MERLIN II Attendant. Multiple MERLIN II Attendants can be used to handle call groups.

  > Backup call handling, in which incoming calls are directed to the MERLIN II Attendant if the receptionist (Station 10) does not answer within a predetermined number of rings.

  Each of these functions includes night service call handling in which the MERLIN II Attendant maybe used for call coverage only after normal business hours.

- **On-Line Module Swap.** The On-Line Module Swap feature allows you to replace a module in the control unit without powering the system down. The replacement module must be the same as the one removed (i.e., a 408 module must be replaced with a 408 module). To use this feature, it is necessary to follow the exact procedures described in "On-- Module Swap," on page 4-7.

- **Page All.** This feature allows you to page all telephones in the system at once over voice terminal speakers.

- **Posted Message.** The Posted Message feature provides a method of sending one of 20 user-defined messages to another terminal. Each message can be up to 16 characters long and will appear on the caller's display.

- **System Speed Dial.** System Speed Dial allows the caller to store frequently used numbers as three-digit codes. For Release 3, the feature has been enhanced to accommodate 130 speed dial numbers.

- **Tie Lines.** The MERLIN II system interfaces to a tie line with E&M signaling through a Tie Line Module. This feature permits the interconnection of a MERLIN II system to another MERLIN II system or to other switches such as a System 25,75, or 85 PBX. (See "E&M Signaling" on page 1-45 for a description of E&M signaling.)
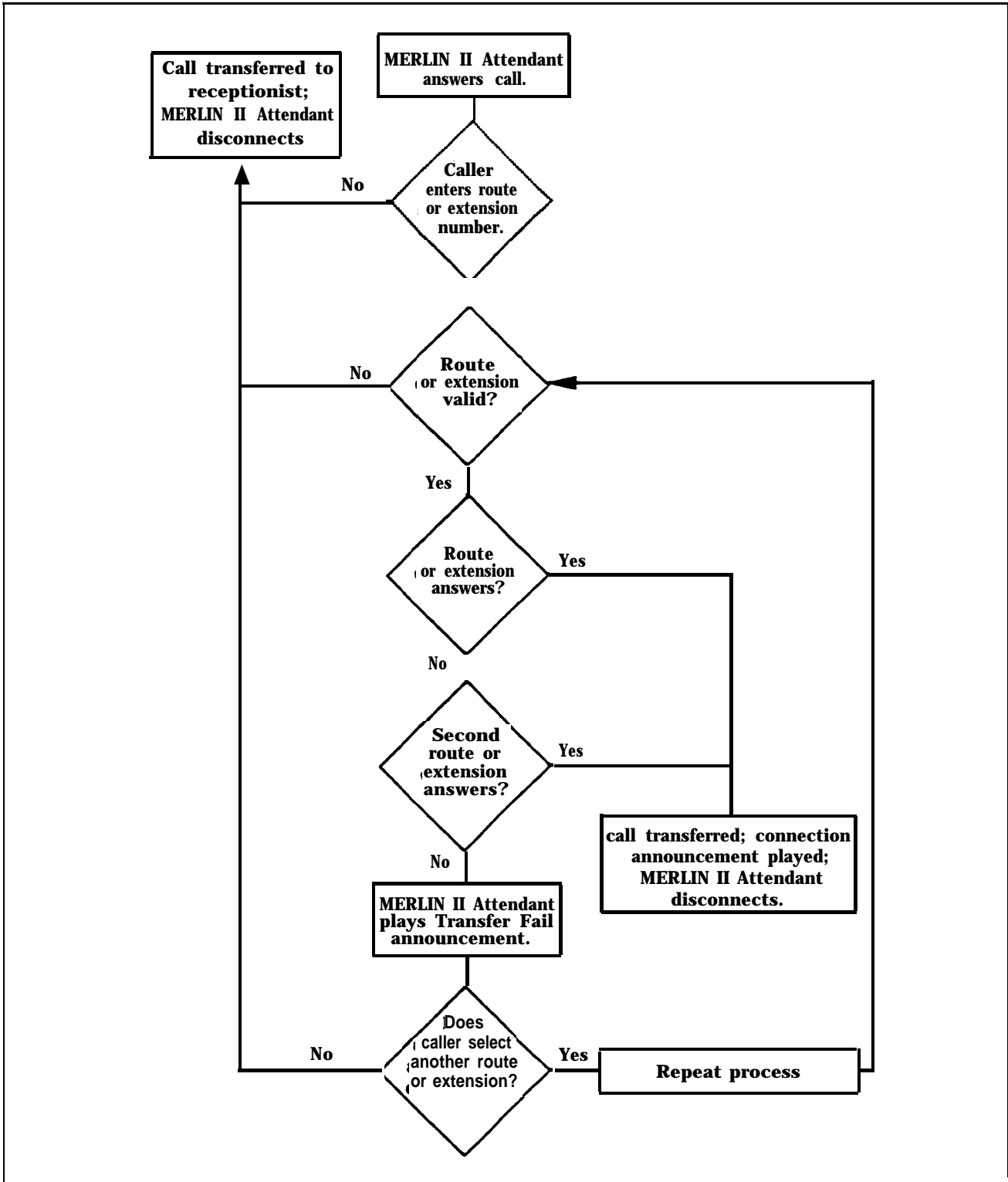
FIGURE 1-3 MERLIN II Attendant operation.

TABLE 1-1 MERLIN II System Features

Feature	FM1	FM2	Release 3
Account Code Entry	x [1]	x	x
Allowed List	x	x	x
Attendant (Automatic) [MERLIN II Attendant]			x
Attendant Barge-in		x	x [2]
Attendant Position Setting	x	x	x
Auto Answer All	x	x	x
Auto Answer-Intercom	x	x	x
Auto Intercom	x	x	x
Automatic Line Selection (ALS)	x	x	x
Automatic Route Selection (ARS)	x	x	x
Basic Telephones	x	x	x
Behind-Switch Operation		x	x
Bridging on Shared Lines	x [3]	x [3]	x
Call Coverage	x	x	x

---

1 The feature name is "Account Number Entry" for Feautre Module 1.

2 The feature name is 'Executive Barge-In' for Release 3 and can be used from any voice terminal.

3 The feature name is "Bridging" for Feature Module 1 and Feature Module 2

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Call Forwarding and Follow Me		x	x
Call Park	x	x	x
Call Pickup	x [4]	x [4]	x [4]
Call Pickup Groups		x	x
Call Report (SMDR)	x	x	x
Call Restriction	x	x	x
Camp On		x	x
Centralized Programming	x	x	x
Conference	x	x	x
Coverage Inhibit	x	x	x
Dialing Timeout Internal for Rotary Lines	x	x	x
Direct Inward System Access (DISA)		x	x
Disallowed List			x
Display	x	x	x
Do Not Disturb	x	x	x
Drop	x	x	x

---

4 This feature in Feature Module 2 and Release 3 is the same as "Line Pickup" in Feature Module 1.

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Executive Barge-In		X [5]	X
Extended Station Status (ES Status)		X	X
Flexible Numbering		X	X
Follow Me		X	X [6]
Forced Account Code Entry (FACE)		X	X
Group Call Distribution (GCD)	X	X	X
Group Listening	X	X	X [7]
Group Page	X	X	X
Hold	X	X	X
Hold Disconnect Interval	X	X	X
Intercom	X	X	X
Intercom Dial Tone		X	X
Labels for Lines and Stations		X [8]	X
Last Number Redial	X	X	X

---

5 For Feature Module 2, the feature name is "Attendant Barge-In" and it operates only from an attendant station.

6 For Release 3, the feature name is "Call Forwarding and Follow Me"

7 The information for this feature is found in Section 2, "System Components," of the System Manual for Release 3.

8 For Feature Module 2, the feature name is "labels for Stations" and it is limited to stations only.

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Leave Word Calling	x	x	x
Line Assignments in Behind-Switch Systems		x	**x**
Line Assignments in Pooled Systems	x [9]	x	x
Line Assignments in Square Systems	x [10]	x	x
Line Pickup	x [11]		
Line Representation Setting	x	x [12]	x [12]
Line Request	x	x	x
Loudspeaker Page	x	x	x
Manual Signaling	x	x	x
Menu Driven Administration		x	x [13]
Message	x	x	x
Monitor-on-Hold	x	x	x [14]

---

9 The feature name is "Line Pools" for Feature Module 1.

10 The feature name is "Square Line Configuration" for Feature Module 1.

11 This feature is called "Call Pickup" for Feature Module 2 and Release 3.

12 The feature name is "System Type" for Feature Module 2 and Release 3.

13 This is not technically a feature of MERLIN II System with Release 3, since menu-driven is the only administration method for that release. See "Overview" in Section 3, "Reference," of the Release 3 System Manual for information on menu-driven administration.

14 The information for this feature is found in Section 2, "System Components," of the System Manual for Release 3.

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Music-on-Hold	x	x	x
Night Service	x	x	x
Notify	x	x	x
On-Hook Dialing	x	x	x [1,5]
On-Line Module Swap			x
One-Touch Hold with Call Announcement	x	x	x
Outside Auto Dial	x	x	x
Page All			x
PBX, Centrex, or Custom Calling Features		x	x
Personal Speed Dial	x	x	x
Personalized Ringing	x	x	x
Posted Message			x
Privacy	x	x	x
Reed	x	x	x
Recall Timer Interval	x	x	x
Reminder Service		x	x

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15 The information for this feature is found in Section 2, "System Components," of the System Manual for Release 3.

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Ringing/Idle Line Preference	x [16]	x	x
Ringing-on-Transfer	x	x	x
Ringing Options	x	x	x
Saved Number Redial	x	x	x
Send Message	x	x	x
Simultaneous Voice and Data Calls	x	x	x
Special Characters in Programmed Dialing Sequences	x	x	x
Stopwatch	x	x	x
System Renumbering	x	x	x
System Size	x [17]	x	x
System Speed Dial	x	x	x
System Type	x [18]	x	x
Test	x	x	x [19]

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16 The feature name is "Ringing Line Preference" for Feature Module 1.

17 The feature name is "System Size Setting- for Feature Module 1.

18 This feature name is "Line Represention Setting" for Feature Module 1.

19 The information for this feature is found in Section 2, "System Components," of the System Manual for Release 3.

TABLE 1-1 MERLIN II System Features (continued)

Feature	FM1	FM2	Release 3
Tie Lines			x
Tones	x	x	x [20]
Touch-Tone Enable	x	x	x
Touch-Tone or Rotary Signaling	x [21]	x	x
Transfer	x	x	x
Transfer Return Interval	x	x	x
Type of Telephone	x [22]	x [22]	x
Voice Announcement Enable/Disable	x	x	x
Voice Announcement to Busy Telephone	x [23]	x [23]	x

---

20 The information for this feature is found in Section 2, "System Components," of the System Manual for Release 3.

21 The feature name is "Touch-Tone or Rotary Setting" for Feature Module 1.

22 The feature name is "Voice Terminal Type Setting" for Feature Module 1, and "Voice Terminal Type" for Feature Module 2.

23 The feature name is "Voice Announcement to Busy Voice Terminal" for feature Module 1 and Feature Module 2.

System Hardware

MERLIN II SYSTEM COMPONENTS

The MERLIN II system includes the following hardware:

- Control unit
- Voice terminals
  - > Analog
  - > Digital
- Basic Touch-Tone
- Digital data equipment
- Modems
- System accessories/auxiliary devices

CONTROL UNIT COMPONENTS

The assembly of modules containing a power source, a processor, and jack connections for outside lines, tie lines, MERLIN II system telephones, and other devices mounted on a carrier is called the control unit (Figure 1-4). The individual components are as follows:

- **Basic carrier.** The basic carrier is the main housing for the control unit. Every MERLIN II system must have at least one basic carrier, which houses the Power Supply Module, Processor Module, and up to five line and/or station modules.

- **Expansion carrier.** The expansion carrier provides slots for an additional Power Supply Module and six line and/or station modules. The expansion carrier does not require a Processor Module.
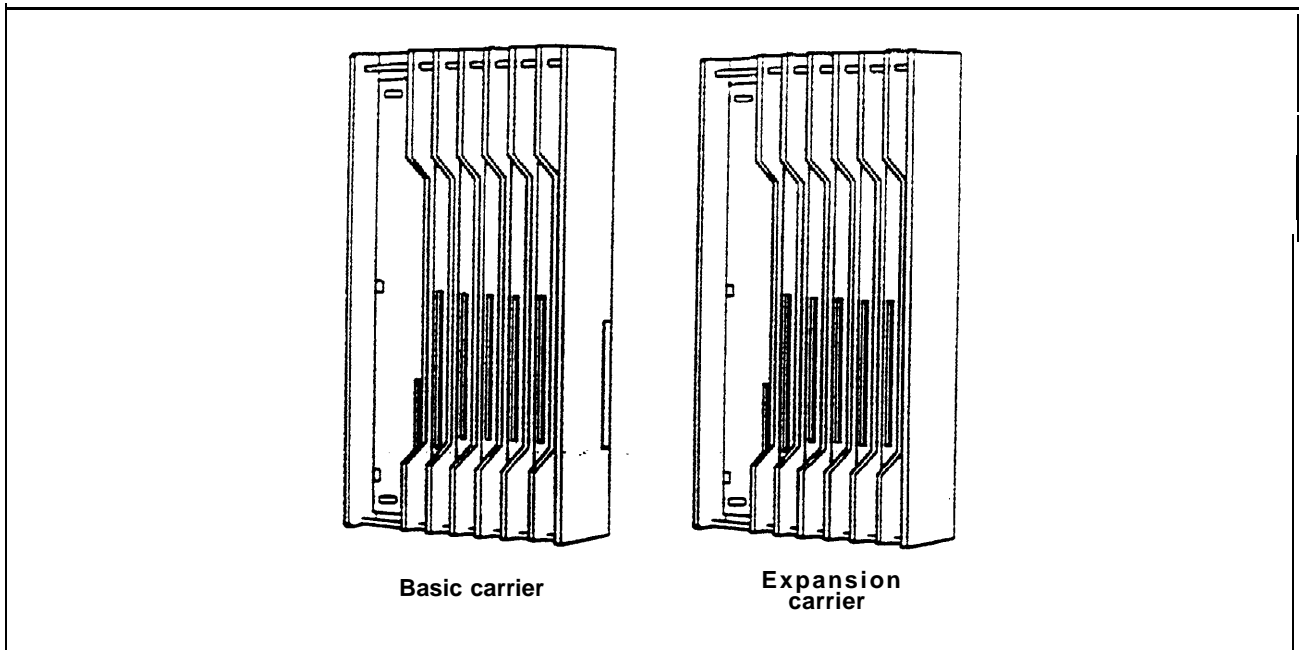
Basic carrier   Expansion
                                   carrier

FIGURE 1-4 Control unit components.

- Power Supply Module. The Power Supply Module
  receives an input of 117 VAC and supplies the system
  with the following dc voltages: +5, -5, and -48 VDC.
  The Power Supply Module can support up to 45 unit
  loads per carrier. (A unit load is a measure of power
  used to determine the electrical load of the MERLIN II
  system.) if the system's power requirements exceed 45
  unit loads, an Auxiliary Power Unit must be used. This
  device supplies an additional 20 unit loads to the
  system. For more information on unit loads and the
  Auxiliary Power Unit refer to "Determining Unit Load
  Requirements" on page 2-57.

  If the system uses Basic Telephone (012) Modules, a
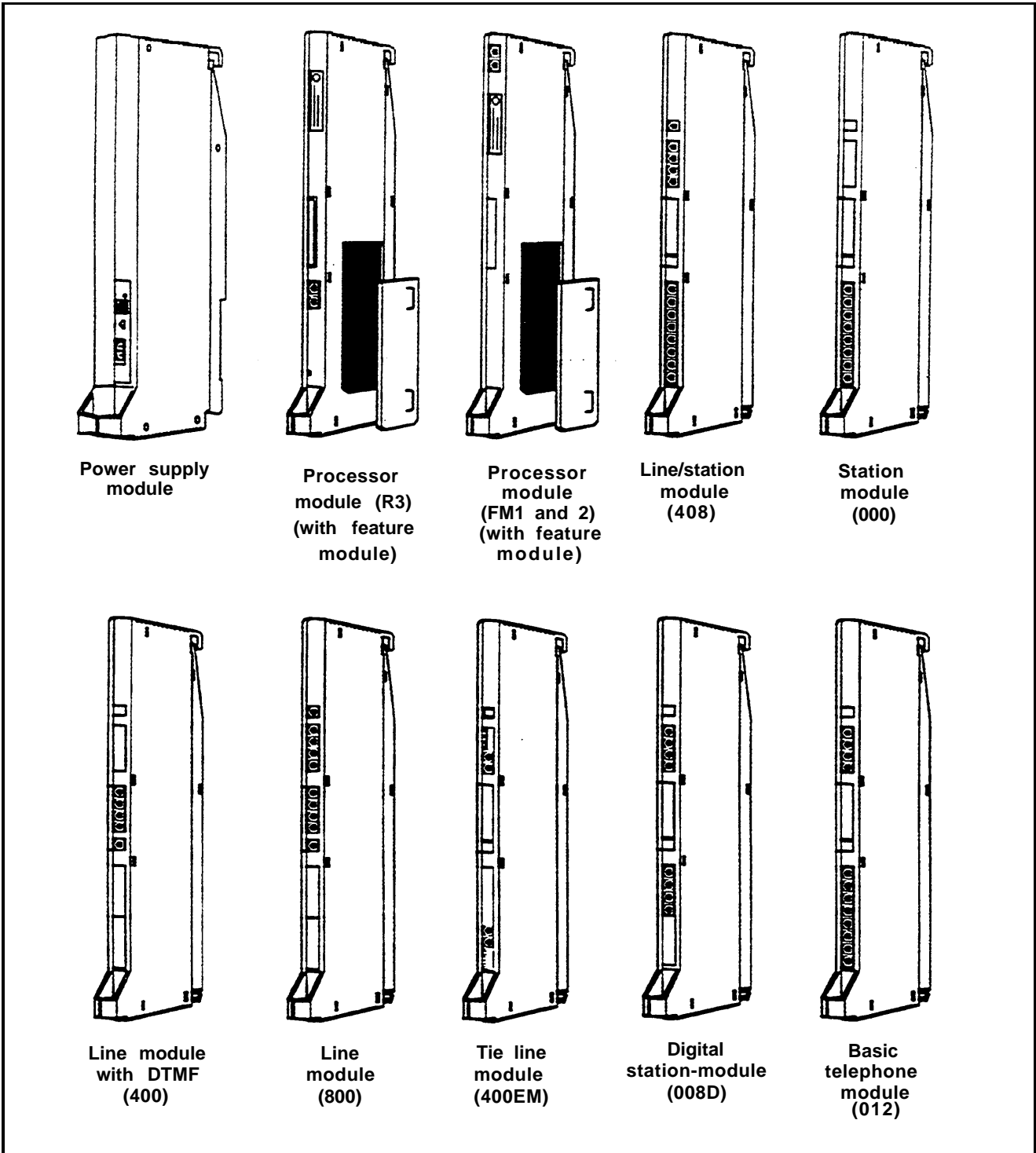 Frequency (Ring) Generator must be installed in the
  Power Supply Module.

Power supply module **Processor module (R3) (with feature module)** **Processor module (FM1 and 2) (with feature module)** **Line/station module (408)** **Station module (000)**

Line module with DTMF (400) **Line module (800)** **Tie line module (400EM)** **Digital station-module (008D)** **Basic telephone module (012)**

FIGURE 1-4 Control unit components (continued).

- **Processor Module.** The Processor Module contains the circuitry that controls the system's programs and features. It houses the Feature Module. Release 3 of the MERLIN II System must use Processor Module 517B7 with Feature Module 517F6.

- **Feature Module.** The Feature Module contains the Read Only Memory (ROM) and Random Access Memory (RAM) for the system features. It is housed inside the Processor Module. The MERLIN II Release 3 Feature Module(517F6) must be used only with the 517B7 Processor Module.

- **Line and station modules.** Line and station modules provide jacks for the system's tie lines, outside lines, and stations. Line and station modules can occupy slots 1 through 5 in the basic carrier and slots 6 through 11 in the expansion carrier. There is no required slot assignment for line and/or station modules except that the module in slot 1 of the basic carrier must be a 408 or 008 module. Either of these modules provides the user with an analog station port (port 01) to administer the system.

  > **Analog line and station modules:**

  - **4-Line/8-Analog (408) Module.** The 408 module is required for a MERLIN II system minimum configuration. It has four jacks for outside lines and eight jacks for analog stations. The 408 module has a Power Failure Telephone (PFT) jack for connecting a Basic Touch-Tone or rotary telephone for backup during power outages. The system automatically switches service to this jack in the event of a power failure.

    Simultaneous voice and data is available but requires you to connect both an odd and even numbered jack to the same voice terminal.

– 8-Analog (008) Module. The 008 module has jacks for eight analog stations. It has no jacks for outside lines. Simultaneous voice and data is available but requires you to connect both an odd and even numbered jack to the same voice terminal.

– 4-Line (400) with DTMF Module. The 400 module has jacks for four outside lines and one PFT jack. The board has four Touch-Tone receivers.

– 8-Line (800) Module. The 800 module has jacks for eight outside lines and two PFT jacks.

> E&M Tie Line (400 EM) Module. A tie line is a transmission facility dedicated to interconnect two private switching systems. The MERLIN II system Tie Line Module may be connected to another system locally or many miles away. Tie lines are provided by the telephone company.

> Digital (008D) Module. The 8-station digital module interfaces digital voice and data equipment to the system. Simultaneous Voice and Data is available on every port.

> Basic Telephone (012) Module. The Basic Telephone Module permits Touch-Tone or rotary telephones to be used with the MERLIN II system. This module provides 12 station jacks and supplies the tip/ring interface and Touch-Tone circuitry needed for basic telephones. This module requires the installation of the Frequency Generator in the Power Supply Module.

The 517CI 3 Basic Telephone Module must be installed in order to use the MERLIN II Attendant.
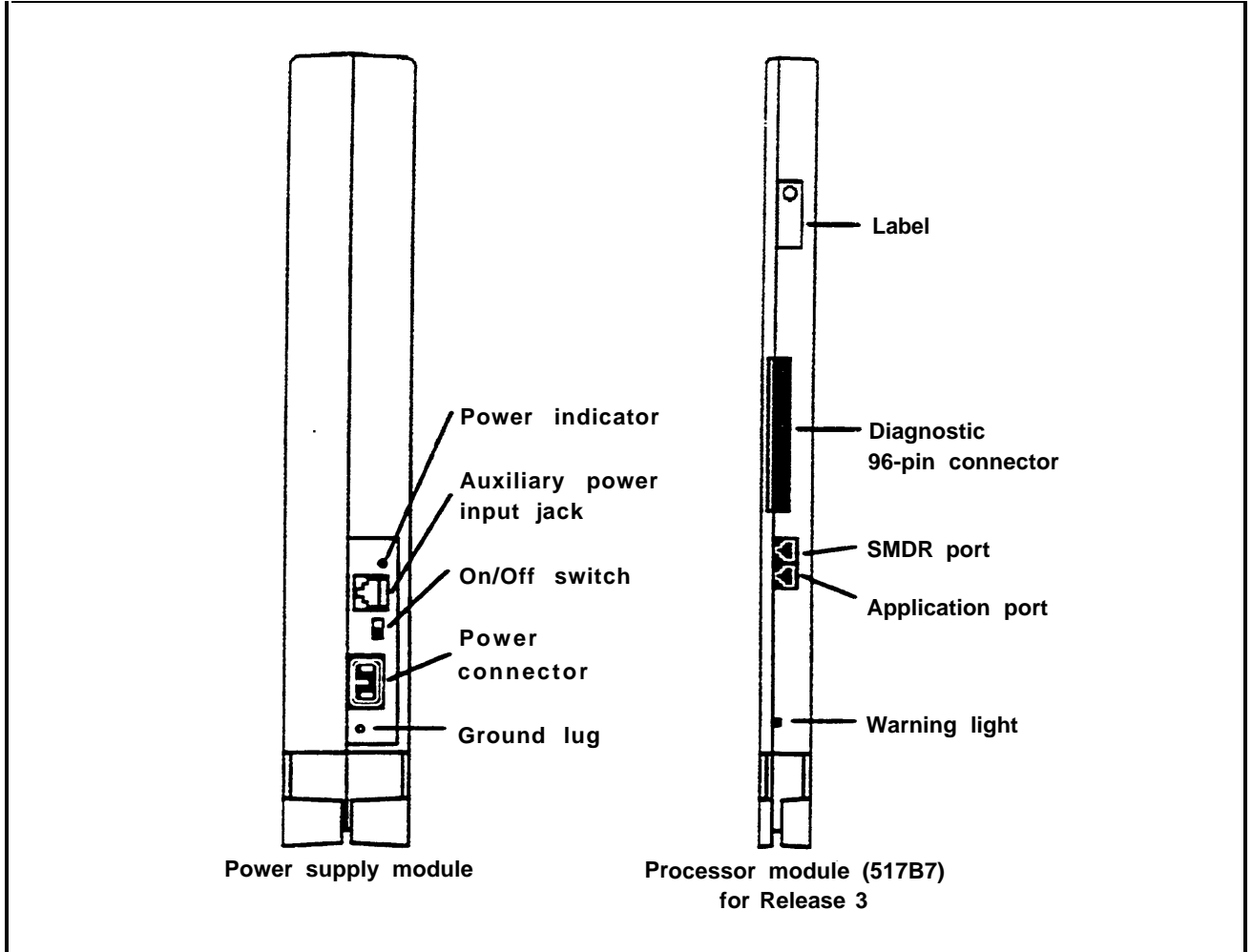
FIGURE 1-5 Module controls and indicators.

MODULE CONTROLS AND INDICATORS

The from panel controls, indicators, and special connectors (excluding line and station jacks) on control unit modules are described below. Refer to Figure 1-5 to locate these items.

Power Supply Module. The controls and indicators for this module are the following:

- Power indicator. Its light goes on when power is supplied to the module.

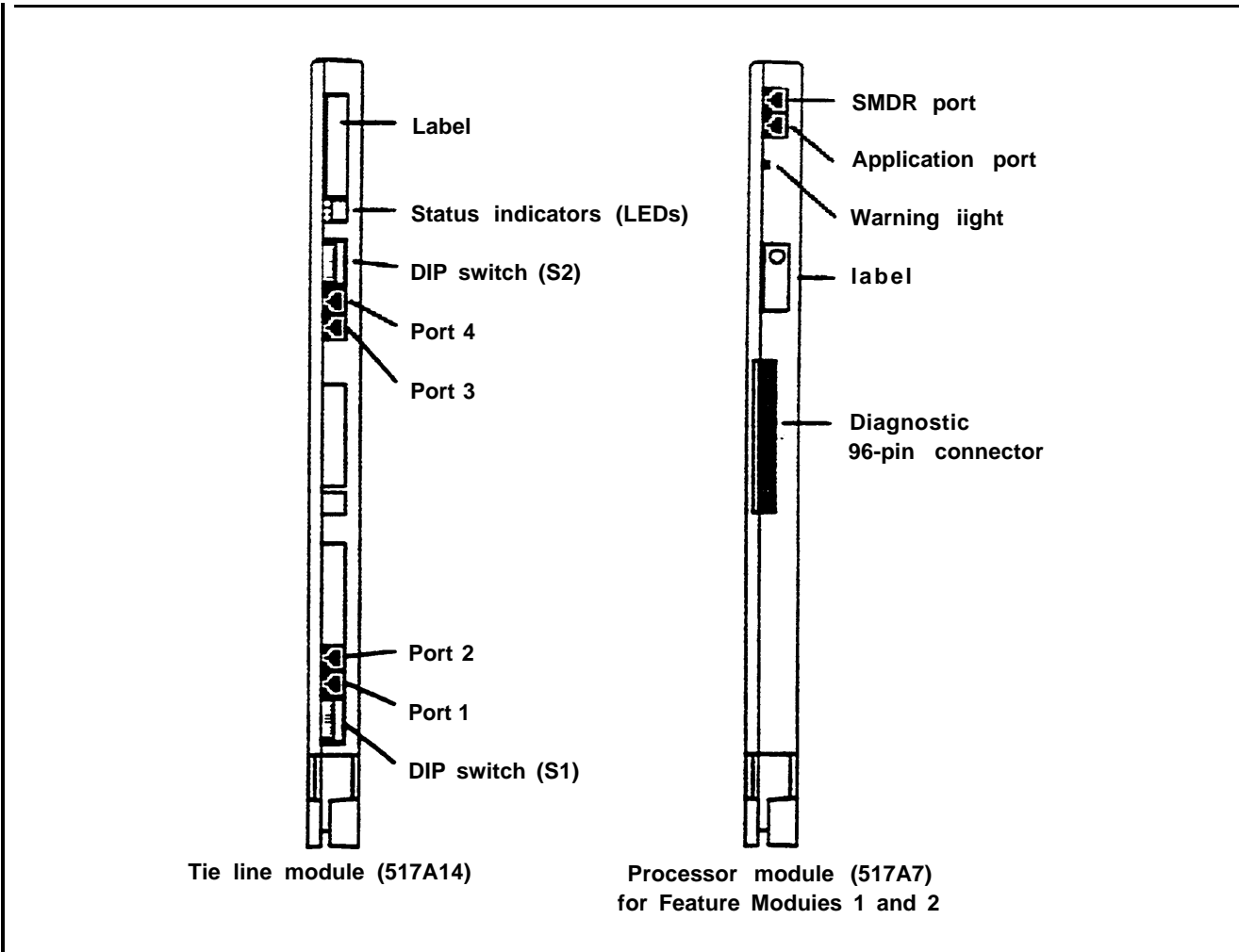- Auxiliary power input jack This jack provides the interface for the Auxiliary Power Unit.

FIGURE 1-5 Module controls and indicators (continued).

- On/off switch. This switch applies or removes power to the earner.

- Power connector. This is a male connector for the ac power cord.

- Ground lug. This connects the control unit chassis to an approved ground for the building.

Processor Module. This module has the following port and light:

- SMDR port. This port is an interface to Station Message Detail Recording (SMDR) for call reports on call activity or a printout of system administration.

- Warning light. When this red light is lit it indicates that there is a problem with either the Feature Module, line or station module, or the Processor Module.

Tie Line Module. The controls and indicators for this module are the following:

- Status indicators (LEDs). The three status indicators show the condition of the Tie Line Module.

  Green = test condition
  Amber = busy
  Red = standby mode

- Dual In-Line Package (DIP) switch (S2). This switch controls the signaling format for tie line ports 3 and 4.

- DIP switch (S1). This switch controls the signaling format for tie line ports 1 and 2.

- Ports 4 through 1. These ports are jacks for tie lines.

VOICE TERMINALS

Voice terminals are the user's link to the MERLIN II system. They are designed to allow easy access to system features, and have various buttons and indicators to facilitate operation The buttons on a voice terminal can function as line buttons or feature buttons. There are fixed feature buttons for the transfer, hold, recall, conference and drop features.

Each analog voice terminal has a Test/Program (T/P) switch that allows testing, programming, and normal operation. Digital voice terminals are programmed using a dial code. Other controls on a voice terminal include a message button, speaker volume control, speaker ON/OFF button, and red and green lights to indicate status of lines and features.

Voice terminals work like special input/output (I/O) devices. The control unit performs all the decision making for the system while voice terminals act as the system's sensors. Voice terminals inform the control unit of button depressions and feature status. They also inform the user of specific conditions by flashing lights or generating tones.

Voice terminals are connected to the control unit by a 4-pair wire. Each pair has a specific function:

- Voice 1 pair. The control unit uses this pair of wires for the primary audio path to and from the voice terminal. The control unit selects this pair to complete the path for outgoing, incoming, and intercom calls.

- Control pair. The control unit receives information on voice terminal status and user input on this pair of wires. It also uses this path to send ringing and lighting instructions to the voice terminal.

- Power pair. This pair provides power to the voice terminal.

- Voice 2 pair. The control unit uses this pair of wires for the secondary audio path to and from the voice terminals. This pair is used with the analog voice terminal to provide the Voice Announcement to Busy Voice Terminal and the Simultaneous Voice and Data features.

Voice terminals used with the MERLIN II system are listed here. Refer to Figure 1-6 for examples of analog voice terminals, including the MERLIN II Display Console. Figure 1-7 shows digital voice terminals.

- Analog voice terminals
    - > 7102A
    - > 5-Button
    - > 10-Button
    - > 10-Button HFAI
    - > 10-Button with Built-In Speakerphone (BIS-10)
    - .> BIS-22
    - > BIS-22 with Display
    - > 34-Button
    - > 34-Button Deluxe
    - > 34-Button (SP-34)
    - > 34-Button (SP-34D)
    - > BIS-34
    - > BIS-34 with Display
    - > Display Console (used to administer a system with Release 3)

    NOTE: The new 7102A single-line voice terminal (not illustrated) has been certified for the MERLIN II system. It is the same as a basic telephone and must be connected to a 012 module.

- Digital voice terminals
    - > 7406D
    - > 7406D with Display
    - > 7406D with Data Stand
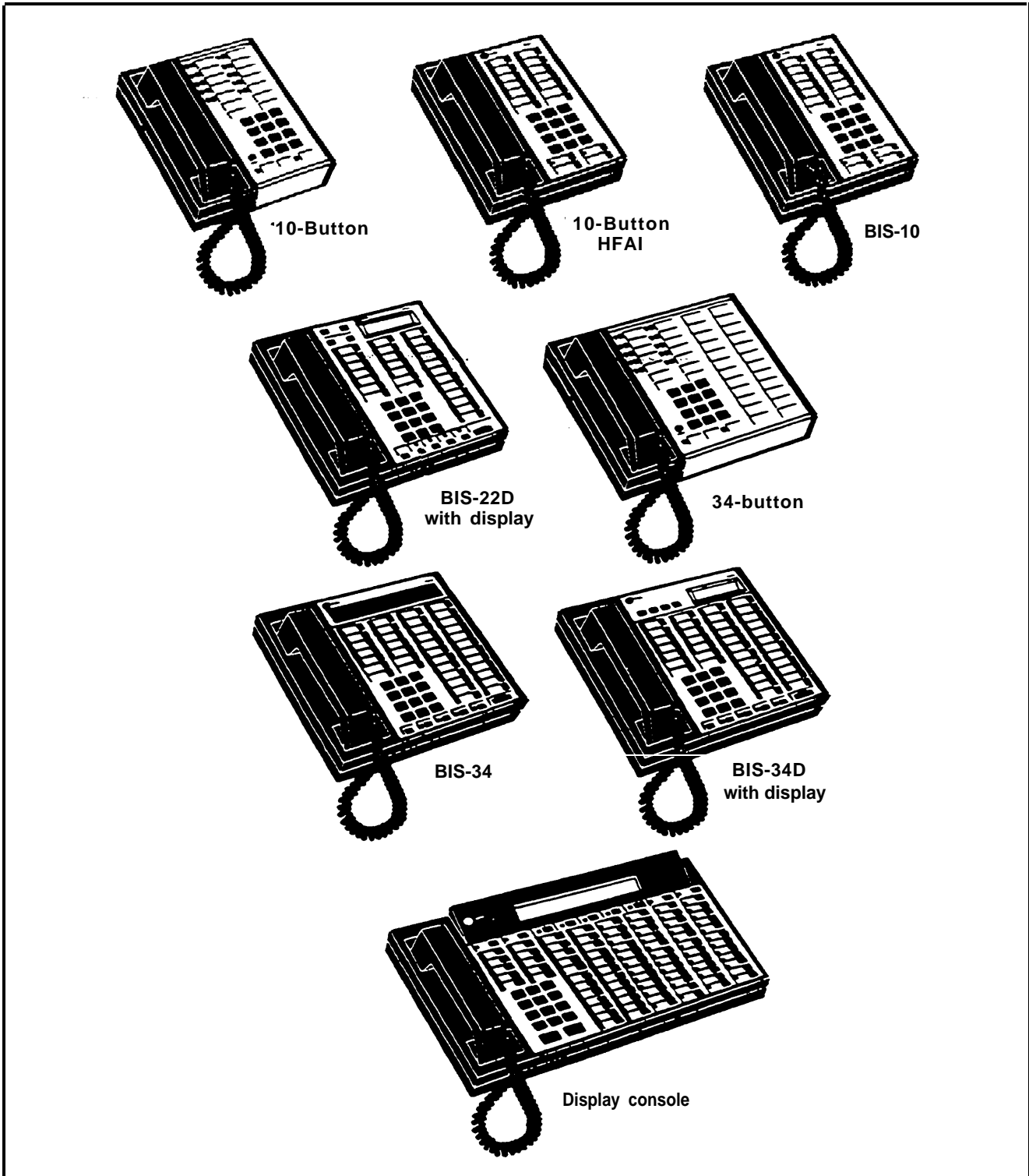   - > 7406D with Display and Data Stand

FIGURE 1-6 A selection of analog voice terminals.

7406D with display and Data Stand
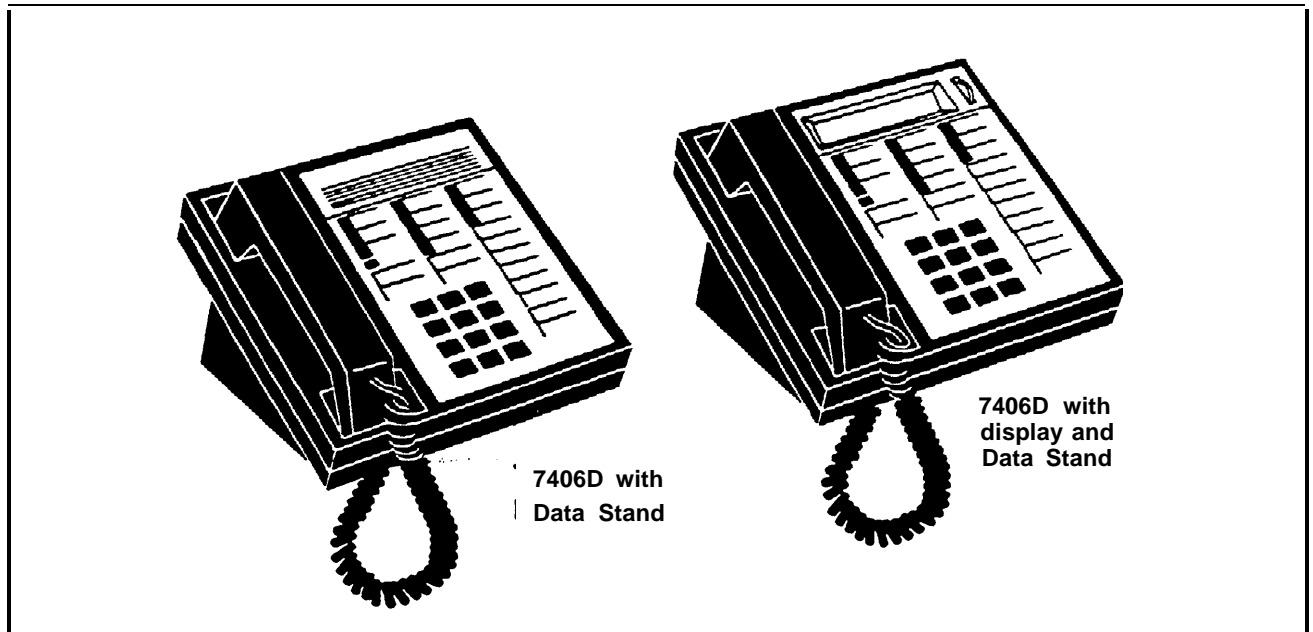
7406D with Data Stand

FIGURE 1-7 A selection of digital voice terminals.

BASIC OPERATION OF VOICE TERMINALS

Voice terminals perform a variety of functions. With a voice terminal, a user can make and receive intercom and outside calls, page someone, and, with the proper voice terminal (the attendant console), administer the MERLIN II system. Buttons on voice terminals maybe programmed for different functions. The following paragraph describe the basic operations of voice terminals.

- Administration. Two voice terminals, the Display Console and the BIS-34D, can be used to administer systems with Feature Module 1 and Feature Module 2. The Display Console, however, is the only voice terminal that can administer new MERLIN II Release 3 features. The voice terminal used for administration must be connected to station jack 01 on the control unit. During administration, the voice terminal Test/Program switch must be set to "Program". This switch is set to the center position during normal operation

- **Dialing out or in.** When a voice terminal goes off-hook, it signals the control unit to make a connection through a network switch to an available or requested outside line. When the path is established, the voice terminal receives a dial tone. The control unit will select a path in its multiplexing scheme to make the connection. A call coming into the will activate the ring indicator in the control unit and generate control signals to alert the voice terminal.

- **Intercom call.** Intercom calls can be made from one voice terminal to-any other voice terminal connected to the control unit. Dialing the intercom number of another voice terminal will cause the control unit to establish a voice path between both voice terminals.

- **Loudspeaker paging.** The system interfaces with auxiliary equipment such as a power amplifier and loudspeaker for single or multiple zone external paging.

- **Programming.** In programming mode, instructions keyed into a voice terminal are stored in the control unit's memory; the voice terminal itself has no memory. When a particular feature is requested by a voice terminal, the control unit examines its memory to determine the features for that station.

  For an analog voice terminal, you enter and exit programming mode by using the T/P switch. For a digital voice terminal, which doesn't have a T/P switch, you must use a dial code to enter and exit programming mode. For a basic voice terminal, the administrator must program any feature changes.

- **Telephone paging.** The MERLIN II system allows paging over voice terminal speakers. The Group Page feature allows paging to a maximum of 10 voice terminals. The Page All feature allows paging to all voice terminals in the system.

SYSTEM ACCESSORIES

Figure 1-8 shows several of the MERLIN II system accessories described here.

- **Alerter Accessories.** Devices such as a horn, bell, strobe, or chime can be connected to a Supplemental Alert Adapter so that people working in noisy or remote areas of a building can be alerted to incoming calls.

- **Attendant Intercom Selector.** Can be attached to a 34-Button Deluxe voice terminal when a MERLIN system has more than eight lines or more than 20 voice terminals. A system attendant can use the selector's 30 buttons to access up to 120 Auto Intercom numbers. The light beside each button indicates whether a voice terminal or basic telephone is busy and whether a voice terminal's message light is on.

- **Auxiliary** Power Unit. This unit must be added to the control unit if the total number of voice terminals and voice terminal accessories (including Hands-Free Units and Headset Adapters) is greater than the control unit's power capacity. The control unit supports up to 45 unit loads, and each Auxiliary Power Unit adds 20 unit loads to the system.

- **Basic Telephone and Modem Interface.** The BTMI connects telephones and data communications devices such as autodialers, answering machines, cordless telephones, facsimile machines, and modems to the MERLIN II system. A timer may be connected to a BTMI for automatic answering based on time of day.

    The BTMI is no longer available, having been replaced by the BTMI-2. The BTMI supports more features than the BTMI-2, however, including the Conference and Drop features, and line selection. For customers who already have the BTMI, it can be used with MERLIN II systems with Feature Module 1, Feature Module 2, and Release 3.
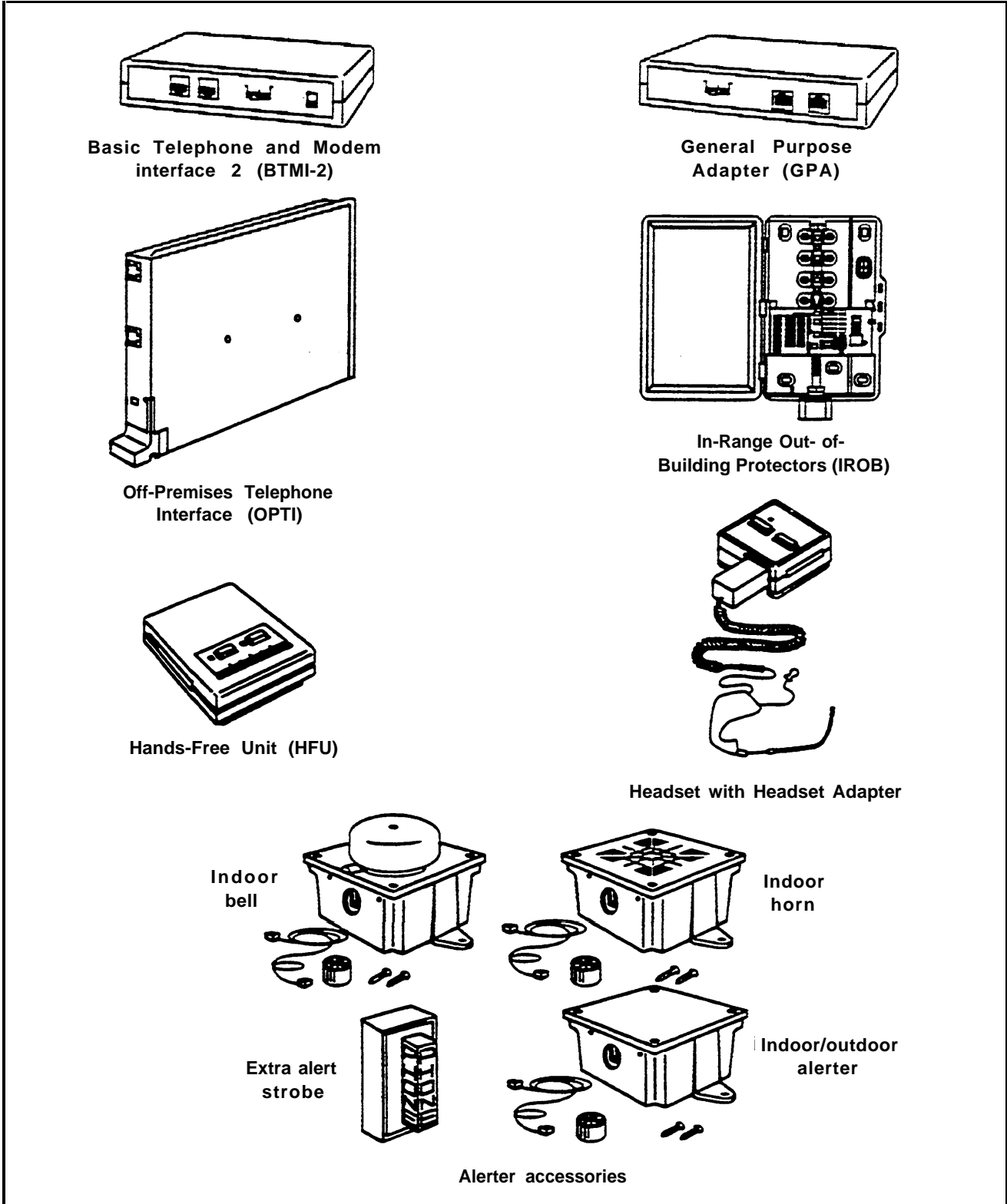
**Basic Telephone and Modem
interface 2 (BTMI-2)**

**General Purpose
Adapter (GPA)**

**Off-Premises Telephone
Interface (OPTI)**

**In-Range Out- of-
Building Protectors (IROB)**

Hands-Free Unit (HFU)

Headset with Headset Adapter

**Indoor
bell**

**Indoor
horn**

**Extra alert
strobe**

**Indoor/outdoor
alerter**

Alerter accessories

FIGURE 1-8 A selection of MERLIN II system accessories.

- **Basic Telephone and Modem Interface 2 (BTMI-2).**
  The BTMI-2 is a replacement for the BTMI. It
  connects telephones and data communications devices
  such as autodialers, answering machines, cordless
  telephones, facsimile machines, and modems to the
  MERLIN II system. A timer may be connected to a
  BTMI-2 for automatic answering based on time of day.

  Unlike the BTMI, the BTMI-2 does not support
  Conference, Drop, or line selection features. It can be
  used with MERLIN II systems with Feature Module 1,
  Feature Module 2, and Release 3.

- **Basic Telephones.** Basic Touch-Tone telephones,
  connected to the MERLIN system with the Off-
  Premises Telephone Interface (OPTI) and to outside
  telephone lines, provide service to people at a remote
  location. On-premises Basic Touch-Tone telephones
  can be connected to the system with a Basic Telephone
  and Modem Interface 2 or a Basic Telephone Module.

- **Frequency Generator.** If your basic carrier or
  expansion carrier has a Basic Telephone (012)
  Module, you must connect a Frequency Generator to
  the Power Supply Module, located in the first slot of
  each carrier containing Basic Telephone Modules.

  The Frequency Generator converts 117-volt, 60-Hz
  input power to 105-vol~ 30-Hz ringing voltage for
  basic telephones connected to the Basic Telephone
  Module.

- **General Purpose Adapter** (GPA). Permits
  connection of accessories such a modem with PCs or
  data terminals, cordless telephones, and autodialers to
  a MERLIN II system voice terminal. To use this
  accessory, you must program Auto Answer AU. The
  GPA is for use with all analog voice terminals except
  5-button and 10-button HFAI.

- **Hands-Free Unit (HFU).** Provides the voice terminal
  user with full speakerphone capability. This includes
  hands-free telephone conversation, on-hook dialing,
  monitor-on-hold, and teleconferencing at a short
  distance from the voice terminal. To use this
  accessory, you must program Auto Answer- Intercom.
  The HFU is for use with all analog voice terminals
  except 5-button and 10-button HFAI. An HFU used
  with a 7406D voice terminal requires a local power
  unit.

- **Headset-and-Headset- Adapter.** Enables a user **to**
  answer and listen to calls without lifting the handset.
  The headset and headset adapter is for use with all
  analog voice terminals except 5-button and 10-button
  HFAI.

- **In-Range, Out-of-Building (IROB) Analog Voice
  Terminal Protectors.** A voice terminal can be placed
  in another location outside of the main building but
  within 1000 feet of the MERLIN H system control
  unit. IROB protectors protect the control unit and
  voice terminal from exposure to lightning, contact with
  power lines, and power currents induced by nearby
  power lines.

- **Loudspeaker Paging System.** An optional
  loudspeaker paging system allows people with
  MERLIN II system voice terminals to page co-workers
  and/or make announcements through loudspeakers.

- **Music Coupler.** A music coupler connects a music
  source (such as a cassette player) to the MERLIN II
  system. It also provides a secondary bridged
  connection to provide Music-on-Hold. In addition, it
  allows the music source to be connected to a
  loudspeaker paging system to provide background
  music at the same time.

- **Off-Premises Range Extender (OPRE).** The OPRE
  will be available in place of the Off-Premises
  Telephone Interface (OPTI) for users of Feature
  Module 1, Feature Module 2, and Release 3. The
  OPRE will allow users to connect off-premises
  Touch-Tone Basic telephones to the MERLIN II
  system.

  NOTE: As of this printing the Off-Premises Range
  Extender is not available. Installation
  information will be supplied in a CIB with the
  product.

- **Off-Premises Telephone Interface (OPTI).**
  Connects off-premises Touch-Tone Basic telephones
  to the MERLIN II system. Allows you to use an off-
  premises telephone to access many of the features of
  the on-premises communication system. The OPTI is
  used with MERLIN II Feature Module 1. It can also
  be used with Feature Module 2 and Release 3, but only
  for two-digit intercom numbers.

- **Power Failure Telephone.** A power failure telephone
  allows calls to be made and received in case of a
  power failure. A Basic Touch-Tone or rotary
  telephone, when connected to a Power Failure
  Telephone jack on a module in the control unit, bridges
  onto the lowest line number in the block of jacks that it
  serves on the module when a power outage occurs.

- **Supplemental Alert Adapter.** Allows Extra Alert
  Devices, such as a horn, bell, strobe, or chime, to be
  connected to an analog voice terminal jack so that
  people working in noisy or remote areas of a building
  can be alerted to incoming calls.

Theory of Operation

**SYSTEM
ARCHITECTURE**

The MERLIN II system architecture provides a digital network that supports voice and data communications. The modular nature of the system makes the base configuration efficient and easy to expand. The control unit contains the memory for the system's features, Input/Output (I/O) functions, and interface requirements. The various modules are electrically connected to a backplane assembly that provides common circuitry for the I/O bus, Time Division Multiplex (TDM) bus, and power distribution. Refer to Figure 1-9 for a fictional block diagram of MERLIN II system architecture. System architecture is made up of the following items: a Processor Module interconnected to intelligent port modules by an I/O bus; a communications network made up of a TDM bus connected to the DigitaI Switch Element (DSE) of each module; and a Power Supply Module.
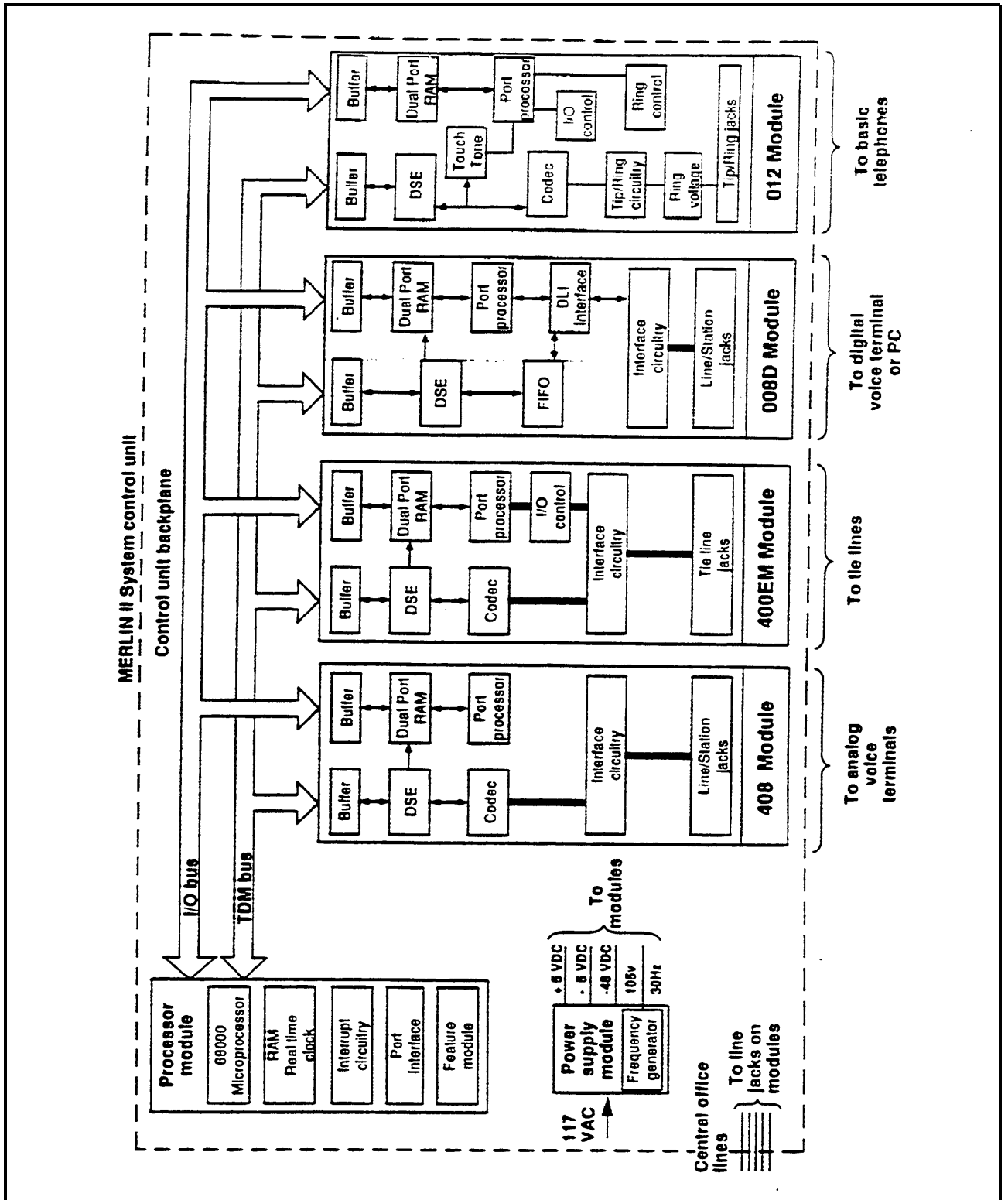
FIGURE 1-9 System architecture.

- **Power Supply Module.** The Power Supply Module converts 117 VAC line voltage to the following outputs: +5 VDC, -5 VDC, and -48 VDC (tip/ring).

- **Processor Module.** The central processor complex consists of a main board and the Feature Module. The main board contains the 68000 microprocessor, RAM, a real-time clock, interrupt circuitry, and port interface to the modules through the I/O bus.

  Communication between the Processor Module and the port processors on the various modules occurs over a parallel address/data bus. This structure allows memory-mapped I/O with up to 1 megabyte per second bandwidth.

- **Input/Output Bus.** Included in the I/O bus are a 16-bit address bus and an 8-bit data bus. The address bus selects the module that receives instructions from the 68000 microprocessor. The microprocessor provides instructions to the port processors and Digital Switch Elements (DSEs) through the 8-bit data bus.

- **Time Division Multiplex Bus.** The Time Division Multiplex bus (TDM) is a major part of the control unit. It connects the DSEs to allow voice and data to flow in and out of the MERLIN II system. The TDM bus is parallel, 8 bits wide, and runs at 2.048 MHz. Each TDM cycle has 256 time slots for voice, data, tones, and clocks.

  Voice signals on the TDM bus are encoded in "Mu-Law 255" Pulse Code Modulation (PCM) format for domestic use and "A-Law 100" for international applications. See "Analog to Digital Signal Processing" on page 1-40. Data signals are processed according to Digital Communications Protocol (DCP).

- **408 or 008 Module.** A 408 Loop Start Line/ATL Station Module or 008 module is required in slot 1 of the basic carrier of the control unit. Note, however, that the 008 module does not provide any outside lines

If you use a 008 module in this slot, you must provide for outside lines using another module.

The 408 module has a port processor to handle real-time intensive tasks such as ATL line protocol and central office rotary outpulsing. The port processor receives instructions from the main processor over the I/O bus. The instructions are stored in the dual port RAM. Buffer circuitry interfaces the I/O bus to the port processor.

The 408 module converts analog signals to digitaI for switching. Analog signals come into the 408 module through the outside lines and are converted to digital levels by coder-decodes (codecs). Voice and data signals going to the station jacks are converted to analog signals by codecs. Interface circuitry couples the analog output to the station jack. The DSE interfaces voice and data with the TDM bus. The main processor (through the 1/0 bus) directs the DSE to place or remove samples from the TDM bus in specific time slots.

- **008D Module.** The 008D Digital Module provides a digital interface to the system for PCs and other data devices. This module does not require codecs because no analog to digital conversion is required. Data flow through the module is controlled by the port processor, which receives its instructions from the I/O bus. Dual Line Interface (DLI) circuitry assures proper clocking and synchronization during all transfer cycles.

- **012 Module.** The 012 Module interfaces basic telephones to the MERLIN II system. It provides the -48 VDC tip/ring voltage and monitors the circuit for tip/ring conditions. The 012 module converts analog signals into digital levels for interface to the TDM bus and provides -24 VDC for the Ring relay. When a basic telephone goes off-hook and dials a number, ring control circuitry closes the ring voltage relay. At this point, ring control circuitry outputs signals to the port

processor. The port processor directs Touch-Tone circuitry to output tones. The tones are placed on the TDM bus by the DSE through buffer circuitry. After a tip condition occurs at the remote end, a conversation may occur.

ANALOG TO DIGITAL SIGNAL PROCESSING

The MERLIN II system receives analog signals from the central office lines and analog modules. In order to be switched, the analog signals must be converted to digital signals. Digital transmissions have several advantages over analog transmissions. They produce superior bit error rates and have lower noise/signal degradation, simpler circuitry in some cases, and greater flexibility. They also have various performance advantages, such as speed and a nonblocking architecture.

If an analog signal is sampled in increments equivalent to twice the frequency of that signal, then the sample can faithfully reproduce the signal at a digital level.

Analog to Digital Signal Conversion

The first step in analog to digital conversion is to sample the pulse amplitude of the analog signal. Then the sample is converted into a series of amplitude steps. This technique is referred to as Pulse Amplitude Modulation (PAM). Analog to digital converters (codecs) are an integral part of voice and data systems. Codecs use a variety of encoding techniques. The MERLIN II system uses Pulse Code Modulation (PCM).

The process of converting an analog signal to a digital level increases the capacity and efficiency of data transmissions. However, a digitized analog signal retains some of the problems of older transmission systems, such as having to be amplified.

PCM uses PAM as its starting point but goes further. PCM digitizes the information and sends the 8-bit code via PAM. PCM digitizes the PAM information by comparing each PAM sample to a point on a chart. Each point has a distinct 8-digit binary code. Therefore, it is the binary code, not the amplitude pulse, that is transmitted in PCM.

Quantizing

The process of converting PAM samples into discrete PCM values is known as "quantizing". In the case of voice grade signals eight bits are commonly used to encode one PAM sample. Quantizing with eight bits allows 256 unique values to represent the analog signal being sampled. With adequate sampling of an analog voice signal, the digital product can be toll quality.

The quantizing process creates errors due in part to the "rounding off" of PAM samples into discrete PCM values. This distortion can be minimized by increasing the number of bits used to sample the analog signal or to increase the sampling rate.

Commanding

Distortion also occurs in the quantizing process because equal consideration is given to all amplitude levels. Linear quantizing divides the amplitude range into equal segments which results in unnecessary quality at levels where voice signals are unlikely to occur. Commanding eliminates this distortion by using a nonlinear scale which has smaller divisions and more accuracy in areas of the scale where voice signals are most likely to occur.

Commanding is, in effect, a compression/expansion of the quantizing scale. This nonlinear scale is more accurate in areas where signal amplitudes occur most (thereby reducing quantizing distortion). The scale is less accurate in areas where signal amplitudes occur least (resulting in more quantizing distortion).

Mu-Law 255

Mu-Law 255 is a commanding scheme which uses a compression ratio that is compatible with modern channel bank equipment. The scale is divided into 16 intervals, with each interval having 16 levels. Therefore, it has 256 discrete values. Mu-Law 255 has a negative and positive zero; therefore, it really has 255 discrete values. This commanding scheme is used in the United States and Japan.

A-Law 100

The commanding scheme used in Europe is A-Law. It follows the same basic theory as Mu-Law 255 except that its scale is different. The scale tends to be more linear than Mu-Law 255. Because the intends tend to be equal, A-Law 100 does not concentrate its accuracy in areas of the scale where voice signals occur the most.

DIGITAL SWITCHING

The Time Division Multiplex (TDM) bus allows many users to communicate over a common electrical connection. The TDM bus is physically distributed across the backplane of the control unit and connects all line/station modules. It is 8 bits wide and has a frequency of 2.048 MHz. The frame repetition rate is 8 KHz providing a 64 Kbps channel on each of the 256 time slots. The TDM bus has specific time slots for various functions. During a conversation between station A and station B, a time slot is reserved for station A to transmit on and another for station B to receive on. Because the TDM bus cycles 8 thousand times per second, the conversation is continuous. The TDM bus carries tones and control signals to stations. Unlike other bus configurations, the stations on the TDM bus receive all transmissions. If a station is not assigned to any of the time slots, the TDM bus will ignore the data. Refer to Figure 1-10 for an example of the TDM bus.

The Digital Switch Element (DSE) functions as a digital switch for voice and data. It also performs the operations for commanding schemes such as A-Law and Mu-Law.

Each module has a DSE to interface codecs or digital transceivers to the TDM bus. The actual digital switching occurs when the DSE is programmed by the system I/O bus to place (transmit) data or retrieve (receive) data on the TDM bus in specific time slots. This process also involves time slot interchanging so that an available slot in the TDM cycle can be filled with a talk (transmit) or listen (receive) slot. The DSE provides dynamic conferencing ability by allowing up to 16 time slots to be conference together and sent out to a single port (station).
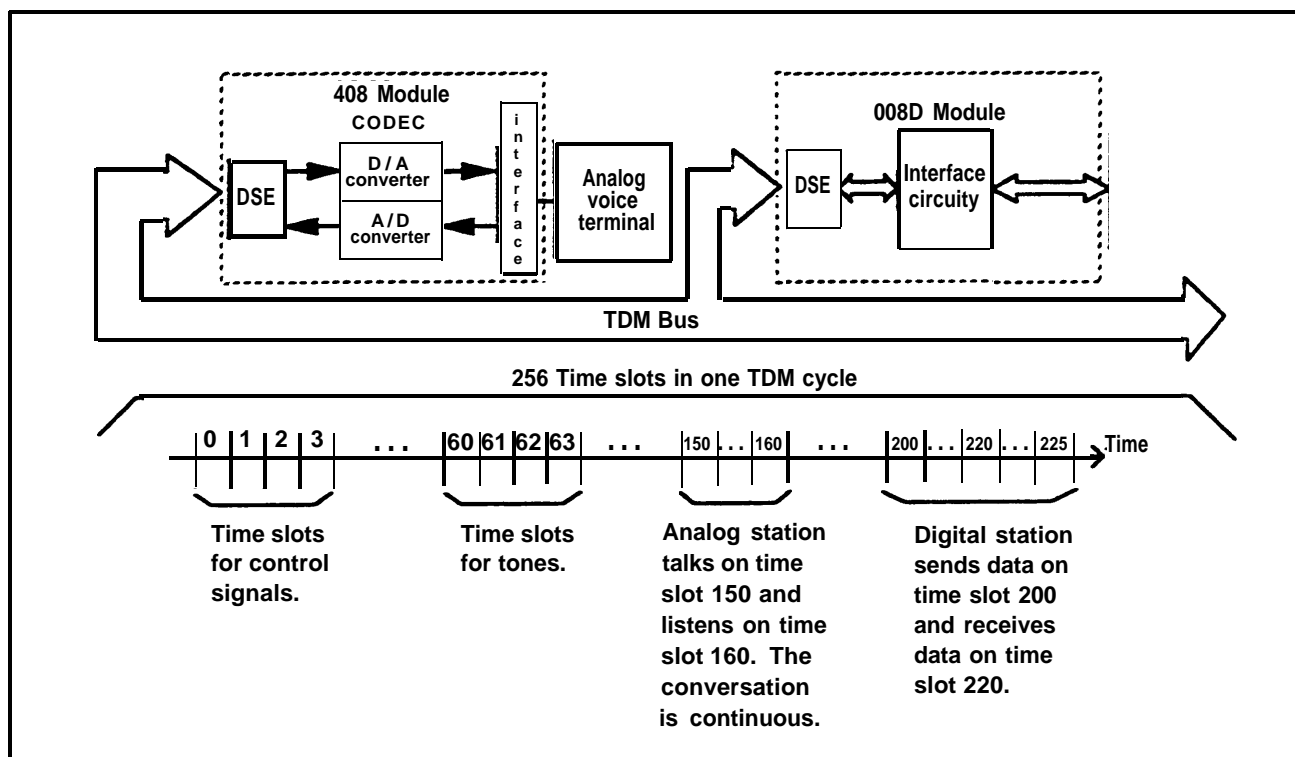
FIGURE 1-10 Time division multiplexing.

SYSTEM CAPACITY   The MERLIN II system hardware limits the system
capacity for the items found in Table 1-2.

TABLE 1-2 MERLIN II System Capacity

Item	Capacity
Module slots	17
Board signatures	16
Time slots	256
Simultaneous duplex connections	108
Tones	40

Table 1-3 lists items that the system architecture either
allows or requires.

**TABLE 1-3 Port Requirements for Features and System
Accessories**

Feature	Port Requirements
Music-on-Hold interface	1 CO line (administered)
External paging interface	1 CO line (administered)
Analog Simultaneous Voice/Data	2 ATL station ports
Analog Voice Announcement to Busy Voice Terminal	2 ATL station ports
Digital Simultaneous Voice/Data	1 DCP station port
Extra alert devices (with SAA)	1 ATL station port

E&M SIGNALING   Most signaling systems, other than loop signaling, are separate from the trunk equipment. They are normally located between the trunk equipment and the line facility. E&M signaling systems derive their name from the historical designations of the signaling leads on schematics covering these systems. By convention, the "E" stands for ear and the "M" stands for mouth (rEceive and transMit). The E&M lead signaling interface consists of two leads between the switching equipment (central office) and the signaling equipment (PBX). The "M lead carries signals from the switching equipment to the signaling equipment. The "E" lead carries return signals from the signaling equipment to the switching equipment. The E&M interface is designated as TL31M, and the 50-pin connector is designated as RJ2GX. At the RJ2GX interface, the PBX is the switching equipment side, and the network side (toward the central office) is the signaling equipment side. An example of E&M signaling is shown in Figure 1-11.
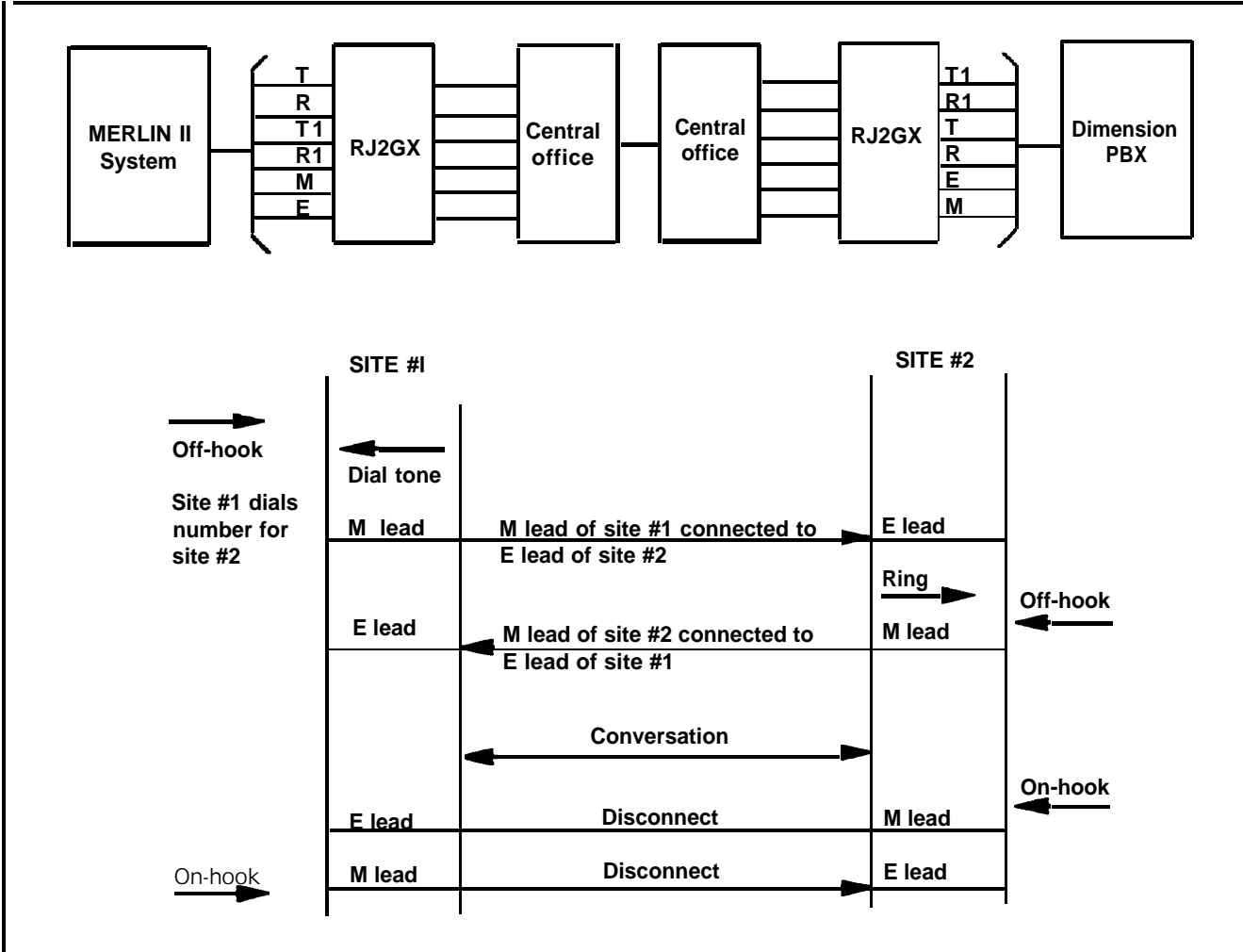
FIGURE 1-11 E&M signaling.

E&M Tie Line Parameters

The MERLIN II system 400EM Tie Line Module has four line ports. Each must be administered individually. All tie line options are software administered except for the signaling format parameters (signaling mode and signaling type). These are selected by DIP switches on the Tie Line Module. The following is an explanation of tie line options. For more information, see "Administering Tie Lines" on page 3-50 in Section 3, "Administration".

Direction A tie line may be administered in one of the three following ways:

- Two-way (default): Calls may be made in either direction.

- Outgoing only: Calls may be made but not received.

- Incoming only: Calls may be received but not made.

Type There are four types of tie line options.

- Wink start (default): The originating end of the tie line transmits an off-hook signal and waits for the remote end to send a signal indicating that it is ready (a wink). This is also know as a dial repeating tie line.

- Automatic start: Incoming calls are routed directly to an attendant station without a start signal. This is also known as an automatic ringdown tie line.

- Immediate start: No start dial signal is necessary. Dialing may begin immediately following seizure of a line. This is also known as a dial repeating tie line.

- Delay dial start: The originating end of the tie line transmits an off-hook signal and waits for the remote end to send a delay dial signal (an off- hook signal followed by an on-hook signal). This is also known as a dial repeating tie line.

Signaling Mode Signaling mode designates the electrical interface used.

- E&M mode: The signaling leads are isolated from the transmission leads. The E&M mode can be either protected or unprotected.

> **WARNING:** The protected mode must be used whenever the E&M leads extend out-of-building and are not connected to the network interface.

- Unprotected mode: Must be used for the E&M
  Type 1 Standard interface in order to meet voltage
  drop criteria for the interface. This mode is used
  when there is a network interface.

- Protected mode: Resistance is added in tie M lead
  to provide additional protection from foreign
  voltages and transients. This mode is used on local
  tie lines, such as between systems in different
  buildings.

- Simplex mode: The signaling leads are superimposed
  onto the analog transmission leads to provide a two-
  pair interface. Resistance is included in the signaling
  leads for protection from foreign voltages and
  transients. This mode is used primarily with E&M
  Type 5 signaling on local tie lines.

Signaling Type Signaling type designates the logical
signaling used. There are the following three options:

- Type 1 Standard (default): The M leads are used for
  signaling from PBX to line. Off-hook is -48 VDC and
  on-hook is local ground. Signaling in the other
  direction uses local ground for off-hook and open for
  on-hook.

- Type 1 Compatible: This interface is back-to-back
  compatible with Type 1 Standard. It allows direct
  connection between systems where no intermediate
  signaling equipment is used.

- Type 5: A symmetrical 2-wire arrangement that signals
  in both directions by means of open for on-hook and
  ground for off-hook. The primary application of Type-
  5 interface is local tie lincs.

Dialing Mode This option sets the dialing mode for the tie line.

- Touch-Tone
- Rotary (default)

Dial Tone This option determines whether the dial tone originates from the remote or local end of the tie line, or both (you receive a second dial tone).

- Remote (default)
- Local

Answer Supervision Time This option sets a time limit in milliseconds (ms) for the remote station to signal the calling station.

- 20 to 4800 ms (increments of 20 ms)
- 300 ms (default)

Tie Line Disconnect Time This option sets a time limit for the release of the E or M lead.

- 140 to 2400 ms (increments of 10 ms)
- 300 ms (default)

Your choice of signaling format (signaling mode and type) depends on the particular application. Using Table 1-4 "Tie Line Preferred Signaling Formats," you can determine tie line compatibility between the MERLIN II System and other systems.

TABLE 1-4 Tie Line Preferred Signaling Formats

Installation Situation		Preferred Signaling Format			
From MERLIN II System		MERLIN II System		Far End	
To	Location	Signaling Mode and Type	Protected or Unprotected	Signaling Mode and Type	Protected or Unprotected
MERLIN II System	Same Site or Inter-building	Simplex Type 5	N/A	Simplex Type 5	N/A
System 25 System 75	Same Site or Inter-building	Simplex Type 5	N/A	Simplex Type 5	N/A
System 85	Same Site or Inter-building	Simplex Type 5	N/A	Simplex Type 5	N/A
Dimension PBX	Same Site	E&M Type 1 Compatible	Unprotected	E&M Type 1 Standard	Unprotected
Dimension PBX	Inter-building	E&M Type 1 Compatible	Protected	E&M Type 1 standard	Protected
Other	Same Site	E&M Type 1 Compatible	Unprotected	E&M Type 1 Standard	Unprotected

TABLE 1-4 Tie Line Preferred Signaling Formats (continued)

Insulation Situation		Preferred Signaling Format			
From MERLIN II System		MERLIN II System		Far End	
To	Location	Signaling Mode and Type	Protected or Unprotected	Signaling Mode and Type	Protected or Unprotected
Other	Inter-building	E&M Type 1 Compatible	Protected	E&M Type 1 Standard	Requires a protection unit
Network interface	···	E&M Type 1 Standard	Unprotected	Either	Either

System Connectivity

This section describes typical hardware configurations for a MERLIN II system with accessories and auxiliary equipment Connectivity diagrams with descriptions are provided for the following:

- Simultaneous voice and data (analog station) using the analog station module (408) to gain access to a remote host computer.

- Simultaneous voice and data (digital station) and local host computer access using the digital station module (008D).

- Modem pool using the digital station module (008D) and the basic telephone module (012).

- Modem pool using the digital station module (008D) and the analog station module (408).

- Modem pool on dedocated outside lines for data-

- Background music provided for callers through Music-on-Hold.

- External loudspeaker paging.

SIMULTANEOUS VOICE AND DATA

Simultaneous voice and data at an analog station allows the user to connect to the system an analog voice terminal and a data terminal or PC with data rates set by the modem. This feature requires both an odd and even jack to be connected to the voice terminal. Refer to the connectivity diagram in Figure 1-12.

Simultaneous voice and data at a digital station allows the user to have a digital voice terminal and a data terminal or PC with data rates up to 19,200 bps between digital endpoints. Note that between the Modular Trunk Data Module (MTDM) and the modem there can be a maximum of 17 feet. Refer to the connectivity diagram, especially Note 2, in Figure 1-13.
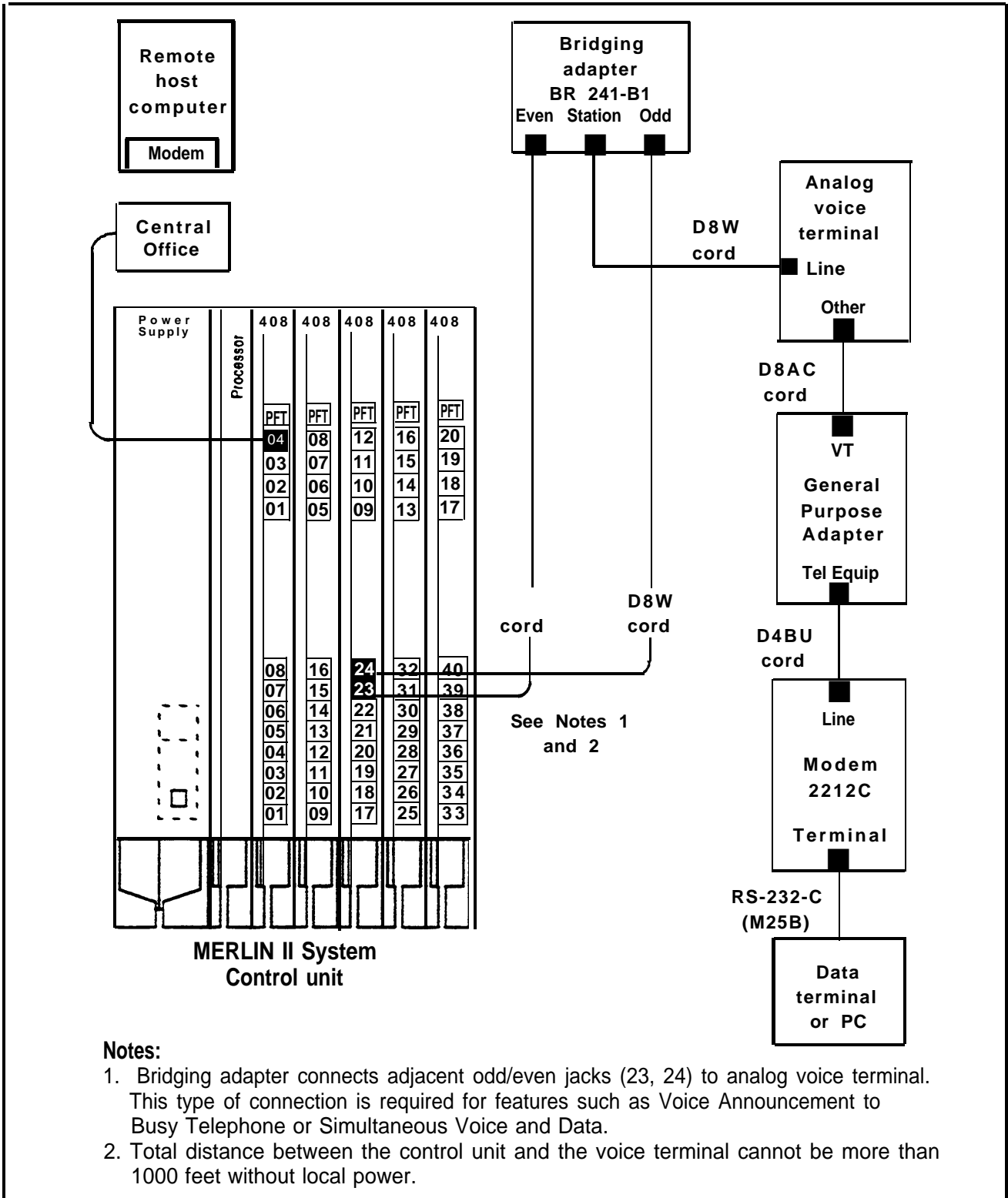
FIGURE 1-12 Simultaneous voice and data (analog station).

The diagram contains the following labeled elements:

- **Remote host computer** with **Modem**
- **Bridging adapter BR 241-B1** with **Even Station Odd**
- **Analog voice terminal** with **Line** and **Other**
- **Central Office**
- **Power Supply**, **Processor**, and five **408** cards
- PFT jacks numbered: 04, 03, 02, 01; 08, 07, 06, 05; 12, 11, 10, 09; 16, 15, 14, 13; 20, 19, 18, 17
- Lower jacks: 08, 07, 06, 05, 04, 03, 02, 01; 16, 15, 14, 13, 12, 11, 10, 09; 24, 23, 22, 21, 20, 19, 18, 17; 32, 31, 30, 29, 28, 27, 26, 25; 40, 39, 38, 37, 36, 35, 34, 33
- **MERLIN II System Control unit**
- **D8W cord**
- **D8AC cord**
- **VT General Purpose Adapter** with **Tel Equip**
- **D4BU cord**
- **Modem 2212C** with **Line** and **Terminal**
- **RS-232-C (M25B)**
- **Data terminal or PC**
- **D8W cord**, **cord**, **See Notes 1 and 2**

Notes:

1. Bridging adapter connects adjacent odd/even jacks (23, 24) to analog voice terminal. This type of connection is required for features such as Voice Announcement to Busy Telephone or Simultaneous Voice and Data.
2. Total distance between the control unit and the voice terminal cannot be more than 1000 feet without local power.

LOCAL HOST COMPUTER ACCESS

Local host computer access allows shared use of the host computer through Modular Processor Data Modules (MPDMs). The MPDMs may have different data rates or the same rate, each set to a data rate of 19,200 bps or less. Refer to the connectivity diagram in Figure 1-13.

MODEM POOLS

Modem pools are groups of modems and associated equipment used to convert digital data signals to analog data signals or vice versa. Putting modems in pools makes it easier for users to share a limited number of modems. Each modem pool is used exclusively for either incoming or outgoing calls.

Connected to Basic Telephone Jack

The modem pool members use available basic telephone jacks to send data between digital endpoints and remote computers over MERLIN II system lines. Refer to the connectivity diagram in Figure 1-14.

Connected to Analog Station Jacks

The modern pool members use available analog station jacks to send data between digital endpoints and remote computers over MERLIN II system lines. Refer to the connectivity diagram in Figure 1-15.

Connected to Dedicated Outside Lines

The modem pool members use dedicated outside lines to send data betwecn digital endpoints and remote computers. This type of modem pool would likely be used if thcrc were many data calls to remote computers in order to save the MERLIN II system lines for voice use. Refer to the connectivity diagram in Figure 1-16.
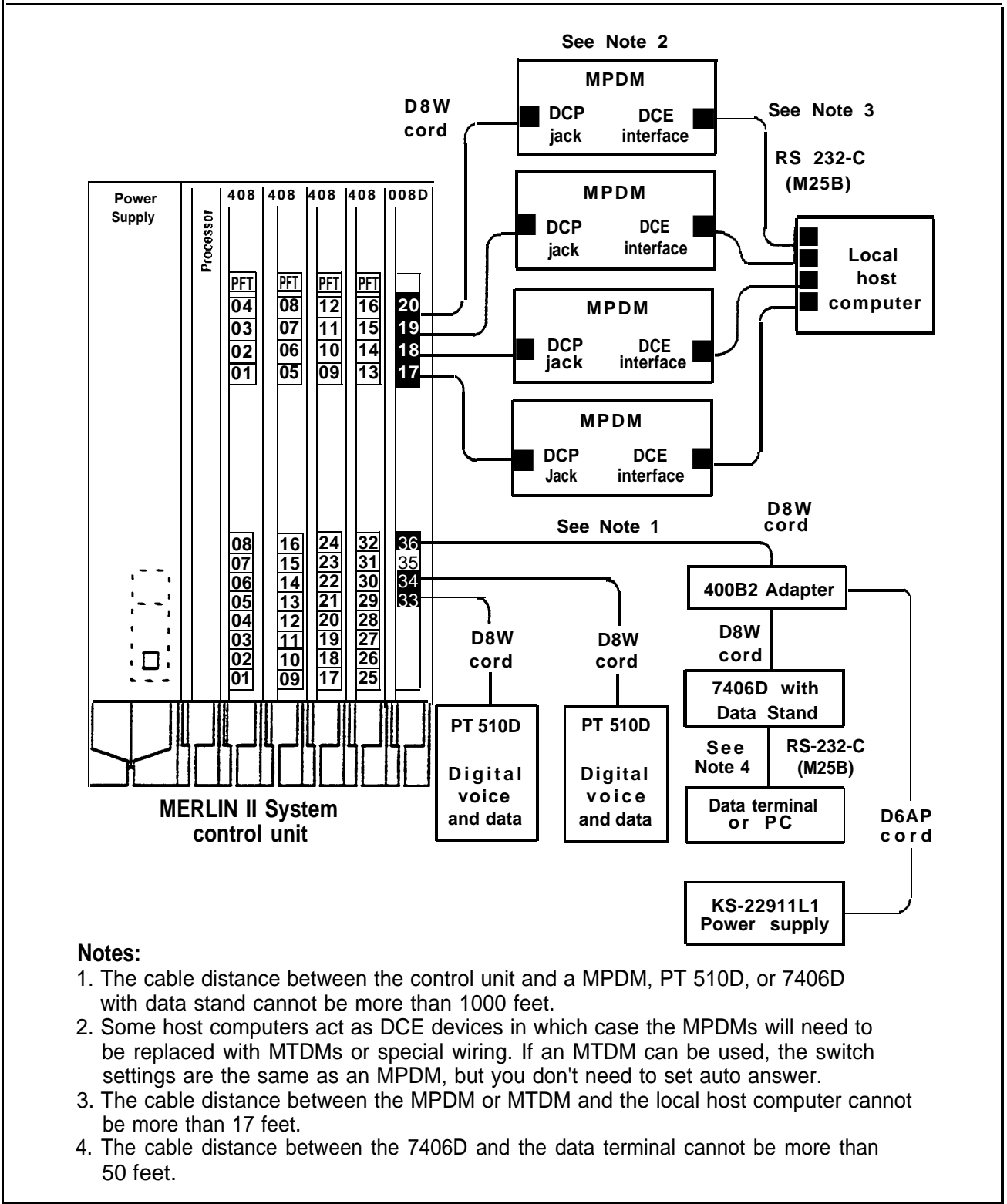
FIGURE 1-13 Simultaneous voice and data (digital station) and local host computer access.

Notes:

1. The cable distance between the control unit and a MPDM, PT 510D, or 7406D with data stand cannot be more than 1000 feet.
2. Some host computers act as DCE devices in which case the MPDMs will need to be replaced with MTDMs or special wiring. If an MTDM can be used, the switch settings are the same as an MPDM, but you don't need to set auto answer.
3. The cable distance between the MPDM or MTDM and the local host computer cannot be more than 17 feet.
4. The cable distance between the 7406D and the data terminal cannot be more than 50 feet.

FIGURE 1-14 Connectivity of a modem pool using a basic telephone module.
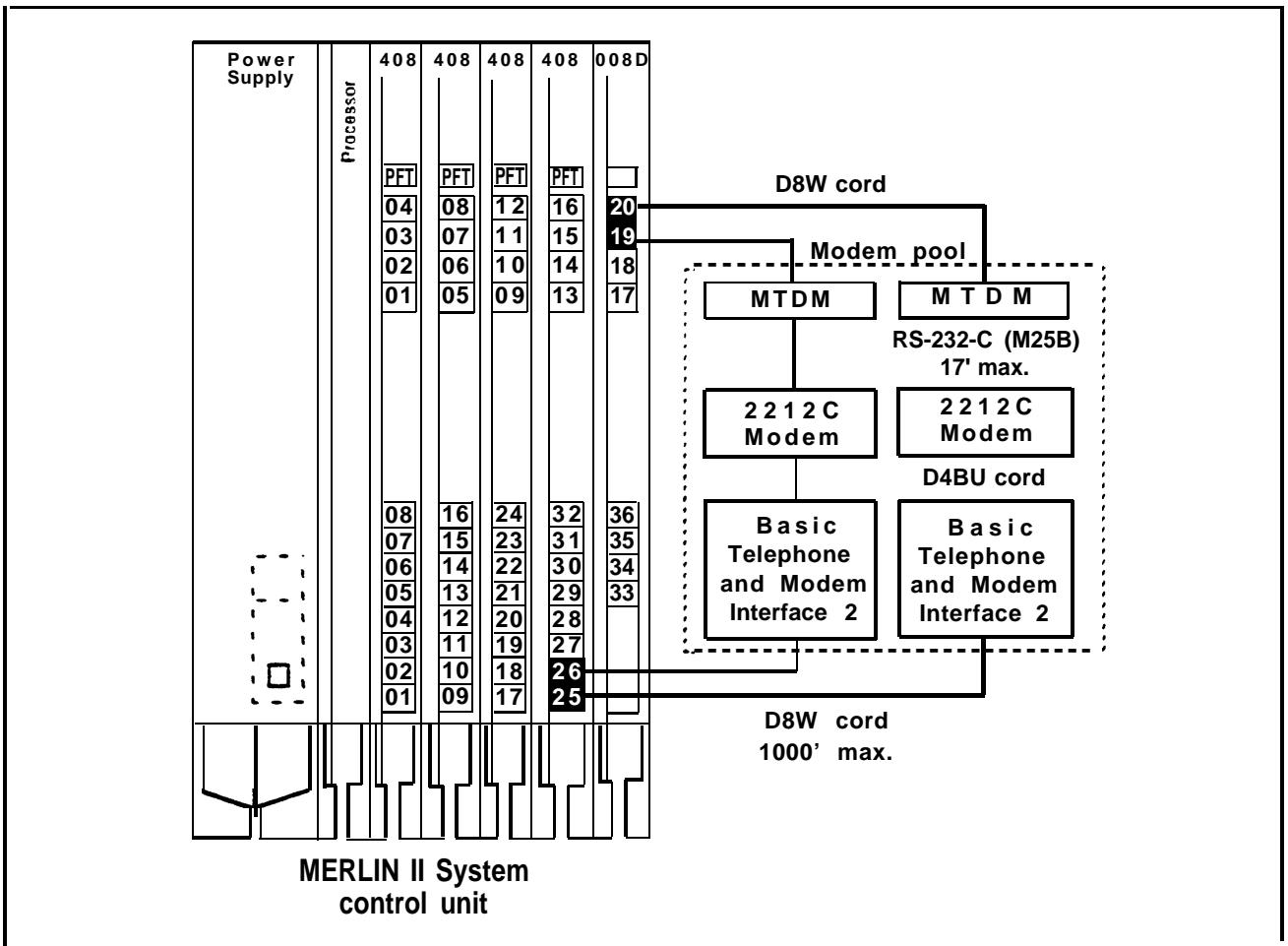
FIGURE 1-15 Connectivity of a modern pool using an analog station module.
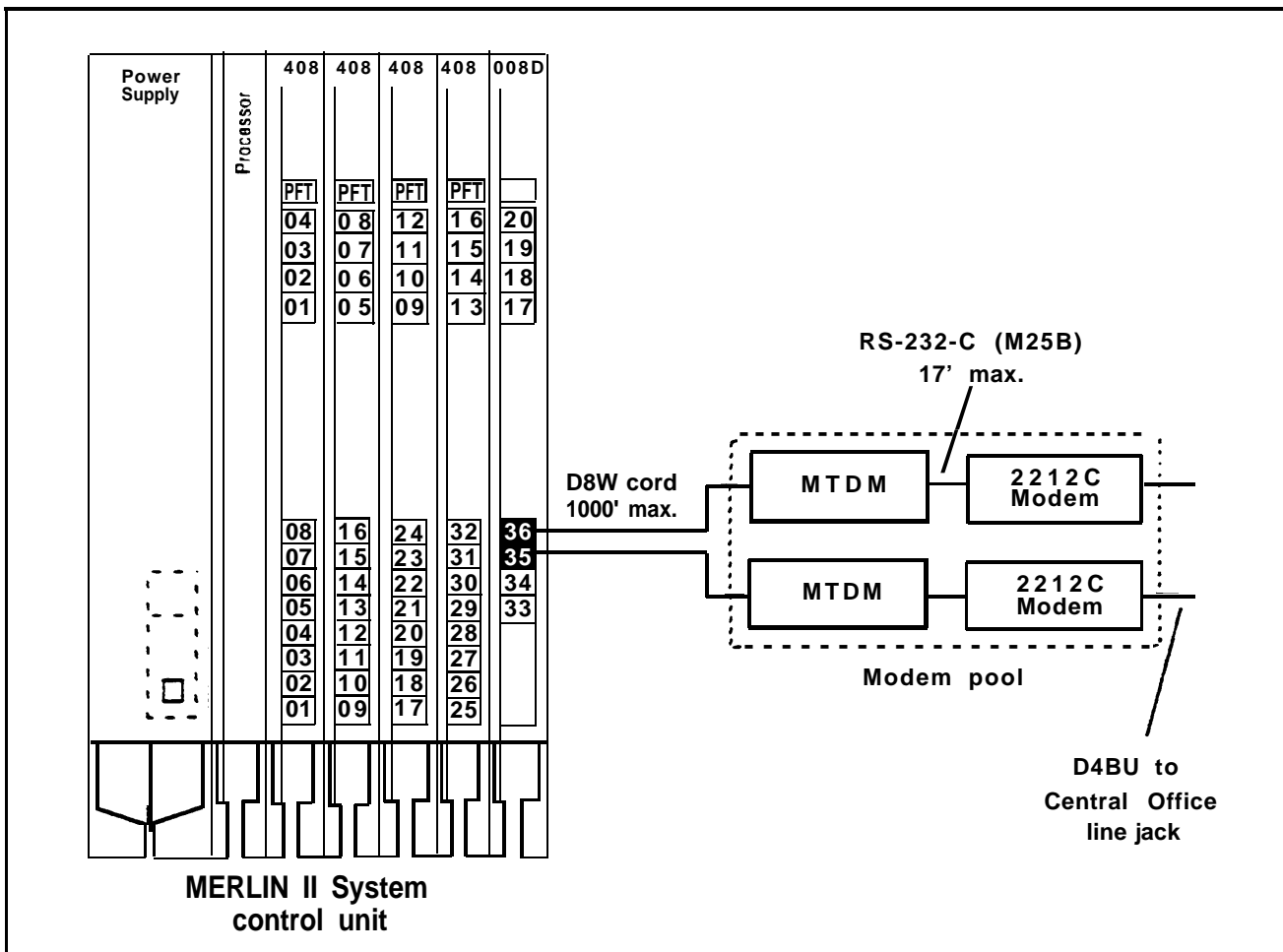
FIGURE 1-16 Connectivity of a modern pool on dedicated outside lines.

GENERAL REQUIREMENTS FOR MODEMS

Modems are an essential part of MERLIN II system features involving local and remote computer access. Any modem other than the 2212C used with system hardware should meet the following requirements to ensure proper operation under all conditions. Modem requirements differ according to applications. When planning the system, remember the various modem configurations such as a single modem for analog voice/data or modem pools. The planning information recorded on the individual Station Configuration forms should reflect the exact modem arrangement for each station.

The following paragraphs describe the basic requirements for any modem, and specific requirements when used in outgoing and incoming modem pools.

NOTE: Modems can meet these requirements through fixed features or through hardware and software options that can be set. An option setting may make a modem appropriate for one pool in the MERLIN II system but not another.

Basic Requirements for Modems

The basic-requirements for modems are the following:

- Full-duplex operation, for switched networks
- A single speed between 300 bps and 19,200 bps
- Serial transmission of characters in a binary asynchronous format
- EIA RS-232-C interface

  Peak signal level compatible with the MERLIN II system
- Modular jack connection for telephone network
- Loss of earner disconnect so that the modem goes on-hook and turns received line signal detector, EIA lead RLS (carrier on) off
- Disconnect if EIA lead DTR (data terminal ready) goes off
- Passing of break character and long space signal
- Saving of options during power outage

Requirements for Outgoing Modem Pools

In addition to meeting the basic requirements, a modem used for outgoing calls must have the following characteristics:

- Touch-Tone dialer that can pause and dial characters 0 through 9, #, and *

- Detection of dial tone

- Ability to take terminal dialing instructions (compatible parity and character length with the MTDM)

- EIA (RS 232-C) lead DSR and RLS on before a call is placed (follows DTR)

Requirements for Incoming Modem Pools

In addition to meeting the basic requirements, a modem used for incoming calls must have the following characteristics:

- Auto-answer feature

- Compatible parity and character length with MTDM

MUSIC-ON-HOLD

Music-on-Hold provides background music for callers who have been placed on hold. It requires the use of a music coupler. You must reserve a line jack for a music source such as a radio, tape player, or stereo system. To make it easier to add outside lines in the future, use the last line jack(s) on the rightmost line module for the Music-on-Hold connection. Refer to the connectivity diagram in Figure 1-17.

EXTERNAL LOUDSPEAKER PAGING

Refer to the connectivity diagram in Figure 1-18. External loudspeaker paging allows you to connect a single or multizone paging system through a line jack on the MERLIN II system. Background music can also be provided by connecting a music coupler and a music source.
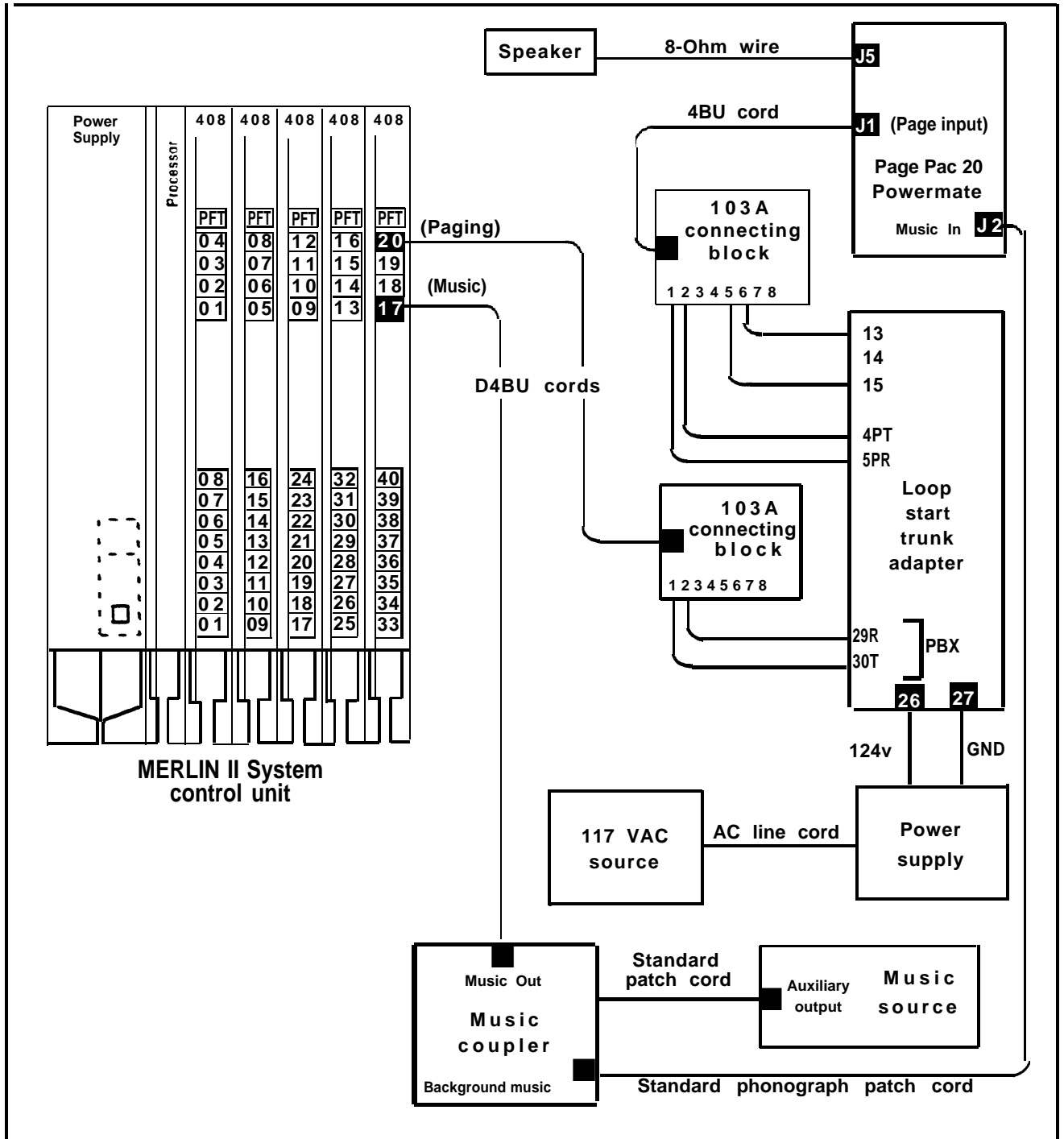
FIGURE1-17 Connectivity of single-zone paging with Music-on-Hold.
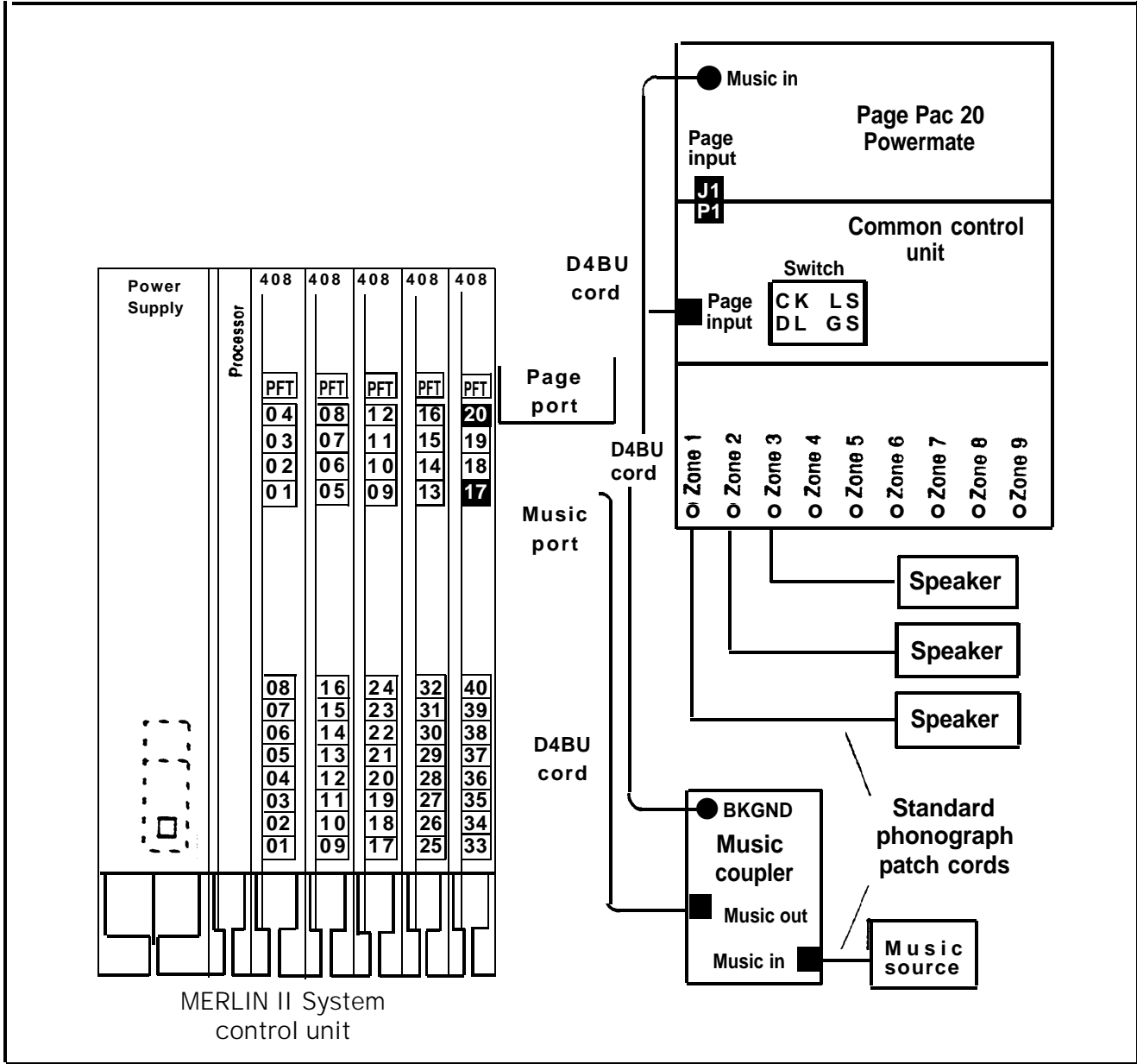
FIGURE 1-18 Connectivity of multizone paging with background music and Music-on-Hold.

Section 2: installation

Installing the Control Unit   2-50

Connecting the Voice Terminals   2-92

Preinstallation Requirements

REVIEWING THE PLANNING FORMS

Review the completed system planning forms, which should be on site, before starting installation. The forms for Release 3 are titled:

- Form la, System Form—Incoming Lines
- Form 1b, System Form—Tie Lines
- Form 1c, System Form—Module Identification Diagram
- Form 1d, System Form—Station Planning
- Form 1e, System Form—Requirements and Options

The forms for Feature Modules 1 and 2 are titled:

- Master Planning Form
- System Configuration Form

You should be familiar with the entire layout of the system including wiring, jack field, network interface, and accessory requirements. If the system has data hardware, see the separate manual, *MERLIN II Communications System Data Communications Guide,* for complete instructions for installing data equipment.

ENVIRONMENTAL REQUIREMENTS

The control unit should be operated in an environment that meets the following conditions.

- **Operating temperatures.** The operating temperature should be 40 to 104^{0}F (4 to 40^{0}C). Optimum operating temperature is 60^{0}F.
- **Humidity.** The humidity should be between 20 and 80 percent.
- **Airborne contamination.** Do not expose the control unit to moisture, corrosive gas, dust, chemicals, spray paint, or similar material.

> **WARNING:** The control unit cannot be installed outdoors. It must be installed in an environment suitable for electronic equipment. Do not expose the control unit to devices that generate electrical interference such as arc welders or motors.

SPACE AND LOCATION REQUIRIEMENTS

The control unit should be located with the following points in mind:

- **CO line protection.** The control unit should be installed near the Central Office line protectors provided by the local telephone company. Refer to "System Grounding Requirements" on page 2-5 for additional information about line protection.

- **Ventilation.** Allow at least 1 inch of space on the right and left sides of the control unit and 12 inches of space above and below the control unit to prevent overheating. Do not place the control unit near extreme heat or in direct sunlight.

- **Placement.** AIlow at least 1 foot of space to the right of the basic carrier for expansion and at least two feet of space to the left for a jack field. Refer to "Wiring the System" on page 2-12 and "Jack Field Wiring" on page 2-33 for additional information on space requirements.

POWER REQUIREMENTS SPECIFICATIONS

Listed below are the power requirements and specifications for the control unit:

- **Voltage range.** 99 to 129 VAC

  Voltages generated by the power supply remain within specification for an ac line voltage low of 99 VAC. The system will bridge a 40 millisecond supply outage without dc voltages being affected.

- **Frequency range.** 60 Hz +/- 1 percent
- **Max. current.** 3 amperes per power supply
- **Max. power use.** 225 watts per power supply

GROUNDING REQUIREMENTS

The system must be connected to a properly grounded ac outlet. See page 2-5, "System Grounding Requirements," for more information.

NOTE: If Modular Processor Data Modules, Modular Trunk Data Modules, or moderns are to be installed at the control unit location, additional grounded ac outlets will be needed.

WIRE LENGTH LIMITATIONS

Wires connected to the control unit should consist of a single continuous run, i.e., without extension cords or other splices, and should meet these specifications:

Power cord. The power cord must be less than 6 feet, and must be connected to a properly grounded ac outlet that is not switch-controlled.

Incoming lines. The distance from the network interface provided by the local telephone company for incoming lines must be spanned within one cord length (generally 25 feet or less).

Jack field. The distance to the jack field mounted to the left of the carrier must be within cord length.

Station. Each voice terminal must be within 1000 feet of the control unit.

> WARNING: If a voice terminal is used for In-Range, Out-of-Building (IROB) applications, IROB protectors are required. See "IROB Protectors" on page 2-126 for more information.

**WALL ATTACHMENT
REQUIREMENTS**

The customer should have a backboard mounted at the control unit site. If one is not in place, you may need to attach a backboard to the wall. The backboard should meet these specifications:

- It should be made of 3/4-inch thick plywood.

- It should be 4 feet wide by 2 feet high in order to accommodate a basic control unit with an expansion carrier and jack field. If ample wall space is available, use a backboard that is 4 feet by 4 feet, regardless of the system's size. This size provides enough space for future expansion.

- It should be attached to the wall with hardware that has a combined pull-out force of at least 500 pounds.

Determine the type of mounting surface on which the board is to be mounted, and refer to Table 2-1 for recommended hardware.

TABLE 2-1 Backboard Mounting Hardware

Mounting surface:	**Hardware required:**
Wood	Wood screws
Concrete Brick Cinder block	Masonry anchors
Plaster Plasterboard	Toggle bolts
Sheet metal	Sheet metal screws

System Grounding Requirements

Proper grounding of the installation site is fundamental to protect the MERLIN II communications system against these types of electrical discharges:

- Lightning strikes near the
- Power surges
- Power crosses on Central
- Static discharge

The following procedures serve as electrical safety requirements and guidelines in grounding. Apply them as you install the MERLIN II system.

> **WARNING:** Make sure these requirements are satisfied before applying power to the system.

SYSTEM GROUND CONNECTION

The control unit the CO line protector, and the ac power service panel should be as close to each other as possible. The adequacy of lightning protection is a direct function of the distance between these pieces of equipment.

Recognizing that equipment may be spread throughout a building, the National Electric Code (NEC) requires that the ground point for the CO line protector be bonded to the ac power ground. Proper grounding helps prevent equipment damage due to lightning energy and/or power transients conducted into the equipment via CO and ac power lines.

It is the responsibility of the local telephone company to provide protection of Central Office lines at the entrance to the site. The protection should consist of the following:

- Carbon blocks or gas discharge tubes connected to an approved ground

- Adequate bonding of the Central Office line protector ground and the power company ground

Refer to Figure 2-1 for an example of a typicaI MERLIN II system grounding plan.
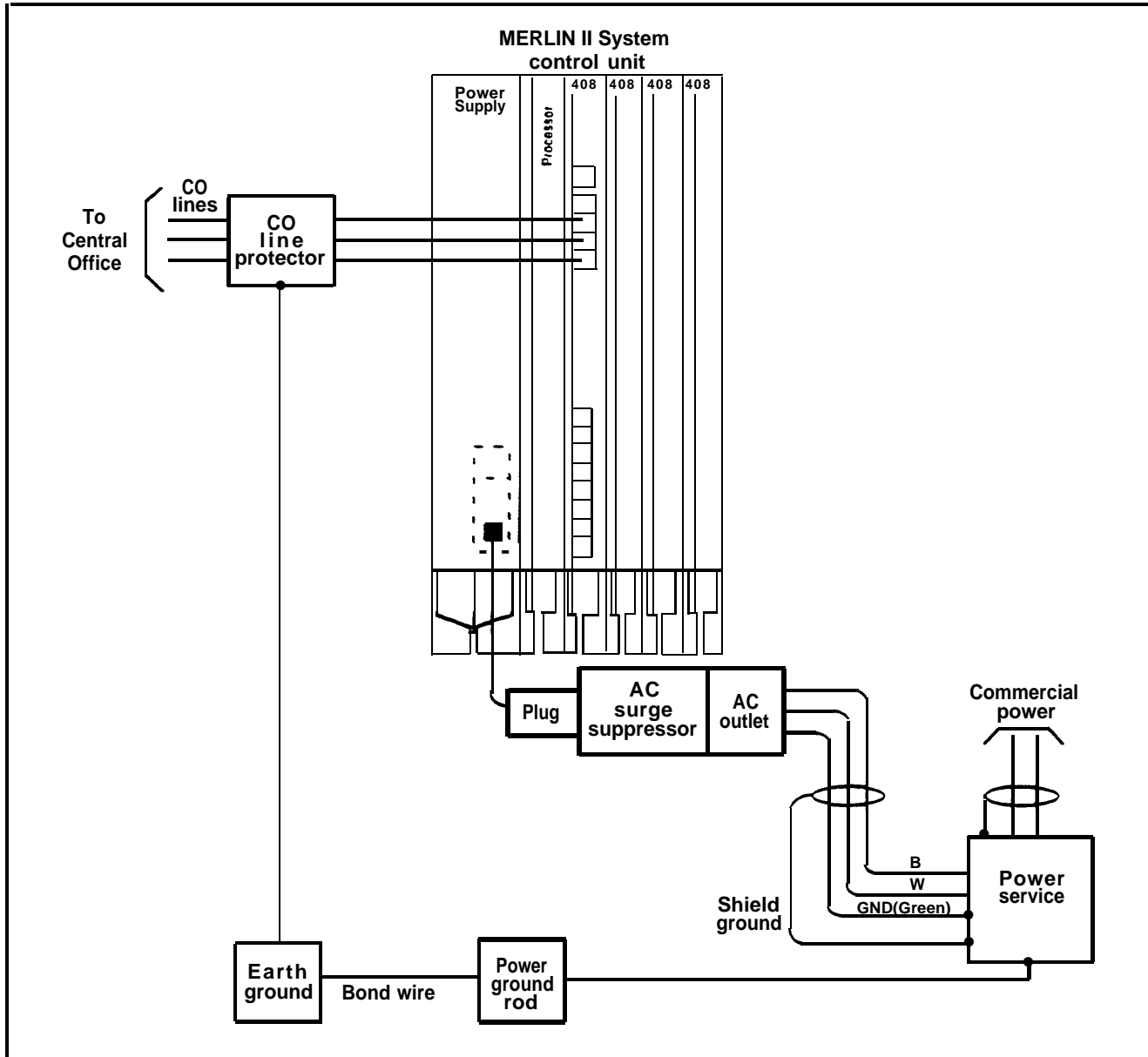

FIGURE 2-1 A typical MERLIN II system grounding plan.

AC OUTLET TESTS   The following tests verify proper grounding of the ac
                        outlet.

> **WARNING:** Hazardous voltages are present during the
> following tests. Use great care when working with ac
> power line voltages.

Check the ac outlet for proper ground with a circuit tester.

NOTE: You may use any generic unit (such as the Ideal
61-035 Circuit Tester) to verify that the outlet is
wired properly.

1 Plug an Ideal or equivalent circuit tester into the outlet
to be tested. If the circuit is properly grounded, the
yellow and white lights on the tester will light.

2 Remove the circuit tester and, if necessary, test another
outlet.

NOTE: If the ac outlet test shows an improper ground, do
not install the MERLIN II system. Tell the
customer to have an electrician correct the
problem.

Check the ac outlet for proper ground with a Volt-Ohm-
Milliammeter (VOM).

1 Set the VOM to the scale on which you can read 115
VAC.

2 Measure the ac outlet voltages:

> Hot to third-wire ground should be about 115
VAC.

> Neutral to third-wire ground should be less than
2.5 VAC.

3 If the voltage readings do not measure the values
suggested, the ac outlet is improperly wired. Notify
the customer that an electrician should repair the
outlet.

CO LINE PROTECTOR   The following test can be used to check CO line protector grounding. This test does *not* check the bond between the power company and telephone company protector grounds.

1 Connect a craft test set between the protector ground lug and the ring side of the CO line.

2 If a dial tone is present, the protector is grounded.

3 If a dial tone is not present, the protector is not grounded; call the local telephone company. Request that they properly-ground and bond the CO line protector to ac power ground.

SURGE PROTECTORS   If the CO line protector is properly grounded and bonded to the ac power ground, most lightning damage will be prevented.

Both the ac line and CO line parts of the 147A Protector are available as separate units. The ac line component is available as the 145A AC Surge Protector. For installation instructions, refer to CIB 3110, which is included with the component. The central office line component is available as the 146A CO Line Protector. Installation instructions for the 146A CO Line Protector are available in CIB 3111, which is included with the device.

A 147A Protector provides additional protection from ac and CO line power surges. If the line module's apparatus code contains the letter "A" (517A1, 517A2, or 517A4), use the 147A Protector for surge protection. If the line module's apparatus code contains the letter "B" (517B1, 517B2, or 51734), use a 145A Protector. Modules with the "B" designation have CO line protection built in, but not ac line protection.

For installation and user instructions, refer to Customer Instruction Booklet (CIB) 3109, which is included with the 147A Protector.

IROB PROTECTORS   Equipment that is connected to the analog station jacks (408/008) and is located in a building outside of the main (control unit location) building, but within 1000 feet of the control unit is called In-Range, Out-of-Building (IROB) equipment. To protect both the control unit and the IROB equipment from exposure to lightning, inadvertent contact with power lines, and power currents induced by nearby power lines, IROB Protectors are required. Two TII Model M343 IROB protectors are required for every analog station jack that is connected to IROB equipment. The IROB protectors must be located at the cable entrance/exit of both buildings. See "IROB Protectors" on page 2-126 for more information.

TIE LINE PROTECTION   Local tie lines that extend out-of-building must have primary protection in the form of voltage limiters (typically carbon blocks or gas tubes). A protector should be provided in each building where the wiring run leaves or enters.

STATIC DISCHARGE PROBLEMS   The MERLIN II system contains components that can be damaged by electrostatic discharge. To prevent static discharge, take these precautions:

1 Properly ground yourself when replacing modules or performing other tasks on the control unit.

2 Have the customer maintain relative humidity between 20 and 80 percent.

3 Have the customer install an antistatic mat at each voice terminal.

RADIO-FREQUENCY INTERFERENCE   In most cases, radio-frequency interference (RFI), or electrical noise, is introduced to the system through trunk or voice terminal cables. However, electromagnetic fields near the control unit may also cause RFI in the system. Therefore, the control unit and cable runs should not be

placed in areas where a high electromagnetic field strength exists. Leading causes of interference include AM and FM radio station transmitters, television station transmitters, induction heaters, and motors (with commutators) of 0.25 horsepower (200 watts) or greater. 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 2 volts per meter are unlikely to cause interference. Field strength can be measured by a tunable meter such as the Model R-70 meter manufactured by Electro-Metrics Division, or broadband meters such as the HOLADAY™ HI-3001 meter or Model EFS-1 meter manufactured by Instruments for Industry, Inc.

You can estimate the field strength produced by radio transmitters by dividing the square root of the emitted power in kilowatts by the distance from the atenna in kilometers. The result yields the approximate field strength in volts per meter and is relatively accurate for distances greater than about half a wavelength (150 meters for a frequency of 1000 KHz).

Solutions to Radio-Frequency Interference Problems

To reduce or eliminate radio-frequency interference problems from nearby induction heaters or 0.25 horsepower motors, either move the equipment causing the problem or move the MERLIN II system control unit to a different location.

To reduce or eliminate radio-frequency interference problems from nearby radio station antennas, choose from among the following solutions:

● Do not run MERLIN II system station wire in the same conduit as ac cable, or next to ac circuits if the station wire is exposed. If possible, do not cross station wire

over ac circuit wire. When crossing station wire over ac circuits is unavoidable, try to maintain a 3-foot clearance.

- Use conduit for wiring runs whenever possible. Be sure that the conduit is grounded. If the conduit is not grounded, run a No. 12 wire from the conduit and terminate it on the ac earth ground, or bond it to the earth ground.

- Run station wire on the baseboard or as close to the floor as possible.

- Run shielded wire for the stations that are having interference problems. Ground the shield of the wire and bond it to the ac ground.

- Visually verify that the ac power line is grounded and that it is bonded to the protector ground. Use an Ideal circuit tester (or equivalent) or a VOM to verify that the ac outlet is grounded. (See "AC Outlet Tests" on page 2-7.) If the outlet is not grounded, run a No. 12 wire from either the grounding terminal or the center screw of the ac outlet to the location where the ac power line is earth grounded, and terminate it.

    Install Built-in speakerphone stations (BIS-10, INS-22, BIS-34).

- Install a Z200A filter at the MERLIN II system station. If interference is still present, install another Z200A filter at the control unit.

- If there is radio interference on the CO lines, use a ZIOOA filter.

- Change the ac outlet to a different branch circuit.

- Move the control unit to a different location.

Wiring the System

Figure 2-2 illustrates typical MERLIN II system wiring. Central office lines enter the site through a 25-pair cable. The network interface in this example is a 66-type block configured as an RJ21-X-type connector. From the network interface, a DIW cable takes the 25 lines to a jack field for outside lines. The jack field interfaces the outside line wiring with D2R cords that plug into the line jacks on the control unit modules. At this point, outside lines are connected to the control unit.

The station side of the control unit goes to a jack field for voice terminals through D8W cords. The other side of the jack field goes to the 102A connecting blocks through 4-pair DIW cable. The voice terminals plug directly into the connecting blocks through four-pair modular cords.
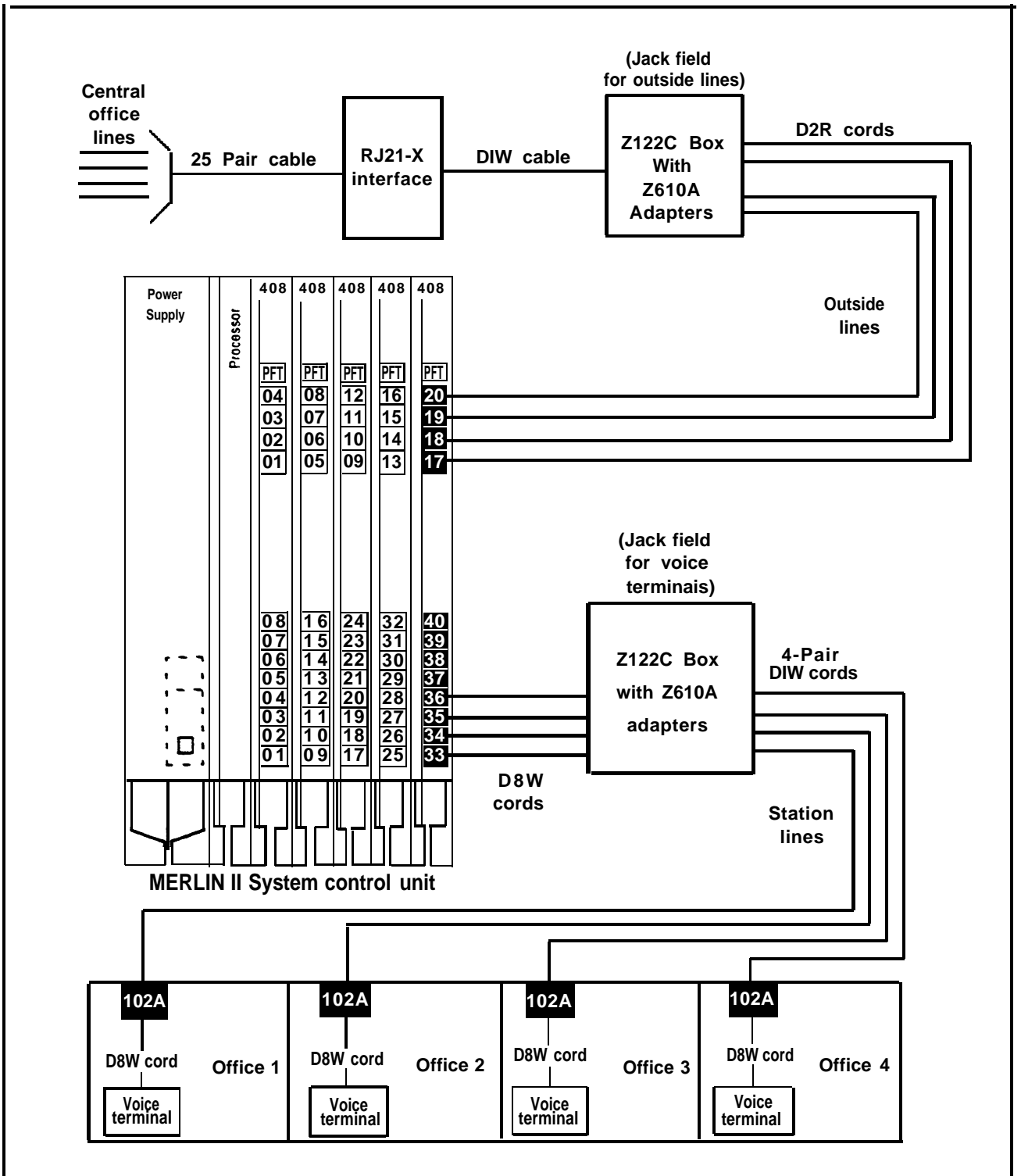
FIGURE 2-2 Typical MERLIN II system wiring installation.

MODULE JACKS

There are various types of jacks on the line and station modules (Figure 2-3). Each type of jack has a specific function as follows:

- **Analog station jacks.** These jacks are for analog voice terminals, analog data devices, and accessories.

- **Basic telephone jacks.** These jacks are for basic telephones with Touch-Tone or rotary dial capability. Do not connect MERLIN II system analog voice terminals to basic telephone jacks.

- **Digital station jacks.** These jacks are for digital voice terminals, digital voice/data sets, MPDMs, MTDMs, etc.

- **Outside line jacks.** These jacks are for outside lines provided by the local telephone company. You can also connect an optional loudspeaker paging device and/or music source to any of these jacks.

- **Power Failure Telephone (PFT) jacks.** These jacks are for basic telephones only. In case of a power outage, basic telephones plugged into these jacks become operational. They do so by bridging onto the lowest line of the group of four line jacks with which they are associated. Do *not* use MERLIN II system voice terminals as power failure telephones.

  Tie line jacks. These jacks are for a transmission facility dedicated to interconnect two private switching systems.
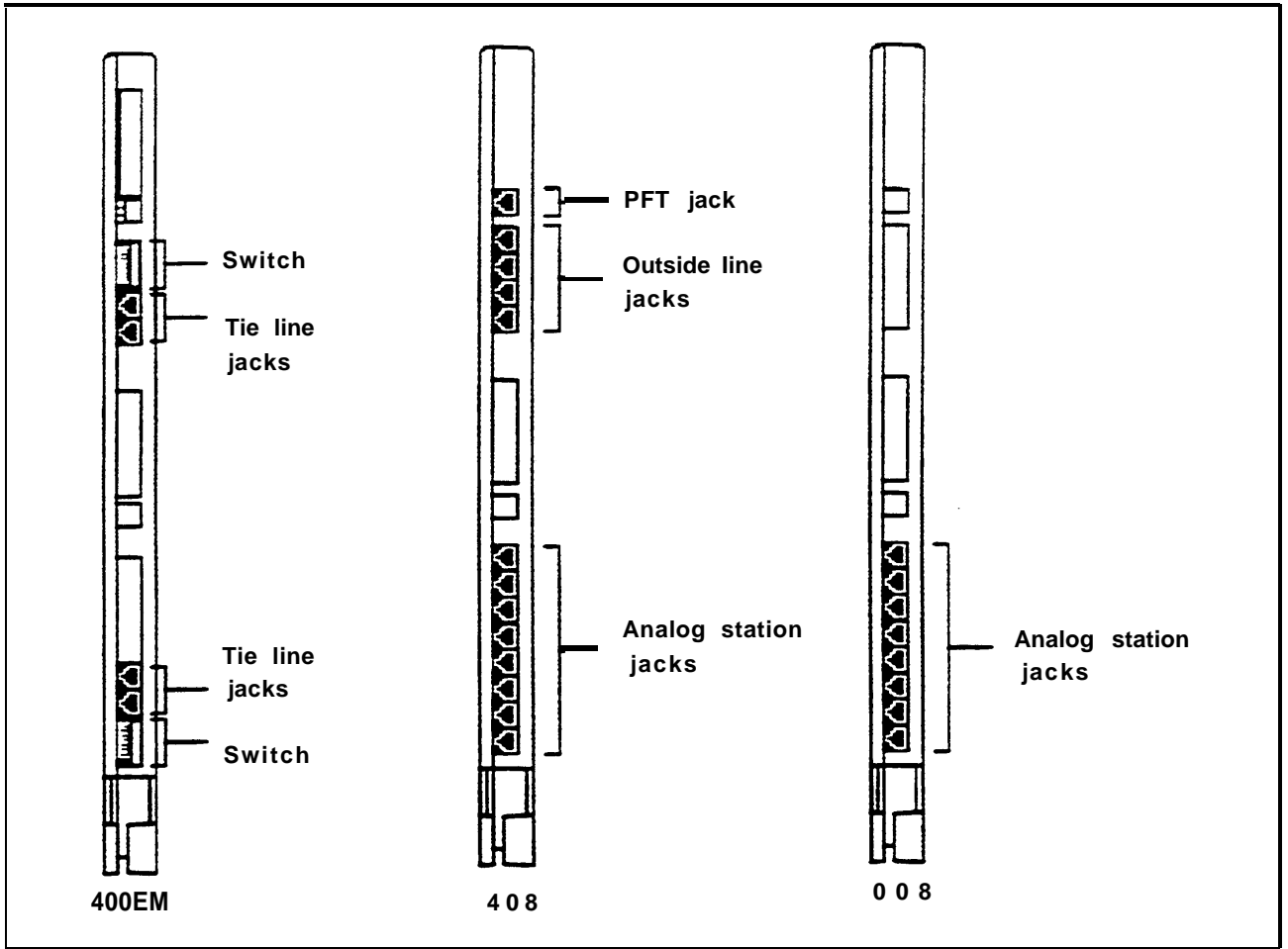
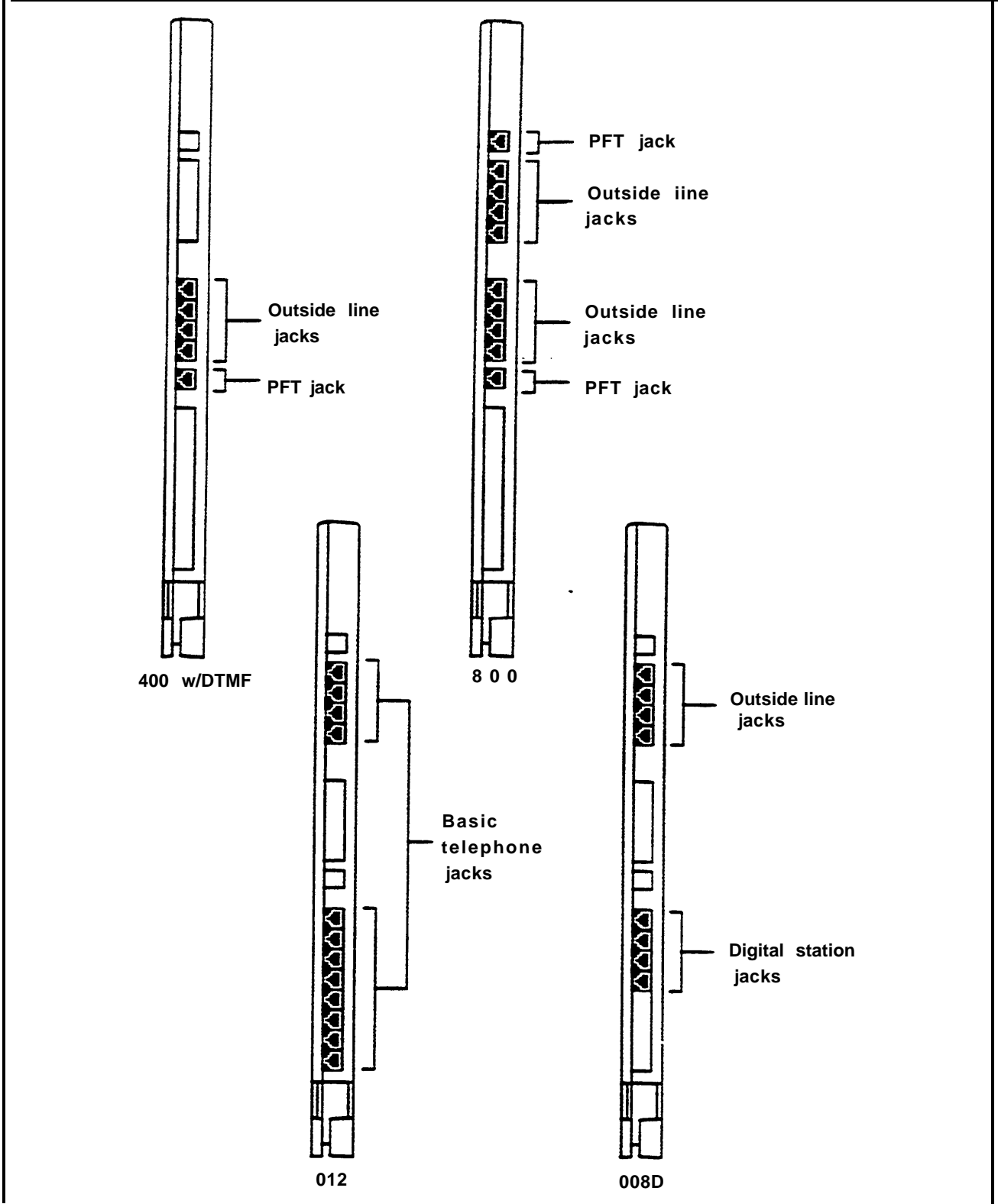**FIGURE 2-3 Line and station module jacks.**

FIGURE 2-3 line and station module jacks (continued).

Outside Line Wiring

The local telephone company provides the telephone numbers for outside lines, as well as an installed network interface that may consist of 1-Line adapters (RJ11-type), 2-line adapters (RJ14-type), or 25-line (50-pin, RJ21-type) connectors.

You can connect the outside lines from the network interface connector to the control unit using D2R cords. The method used to connect the outside lines to the control unit depends on the type of network interface as follows:

● 1-line adapter (RJ1l-type). This adapter allows one connector for each outside line.

> Label each jack with the telephone number.

● 2-line adapter (RJ14-type). This adapter connects two outside lines per jack.

> Label each jack with the telephone numbers of its two outside lines.

> Plug a 2-line adapter (267C-type) into each jack.

● 50-pin connector (RJ21-type). This connector carries up to 25 lines.

> Label the interface with the numbers for the outside lines.

> To extend the network interface to the jack field, refer to the instructions in "Jack Field Wiring" on page 2-33.

Refer to Figure 2-4 for examples of network interfaces and adapters.

Single-line adapter (RJ11)

2-Line adapter (RJ14)

(267C)

66-Type block (RJ21-type) 25 line interface

Line	Tip	Ring	Phone Number
1	1	2 6	555-3827
2	2	27	555-3828
3	3	28	555-3829
●	●	●	● ● ●
●	●	●	● ● ●
25	25	50	555-3851

Line 1
Line 2
Line 3
Line 4
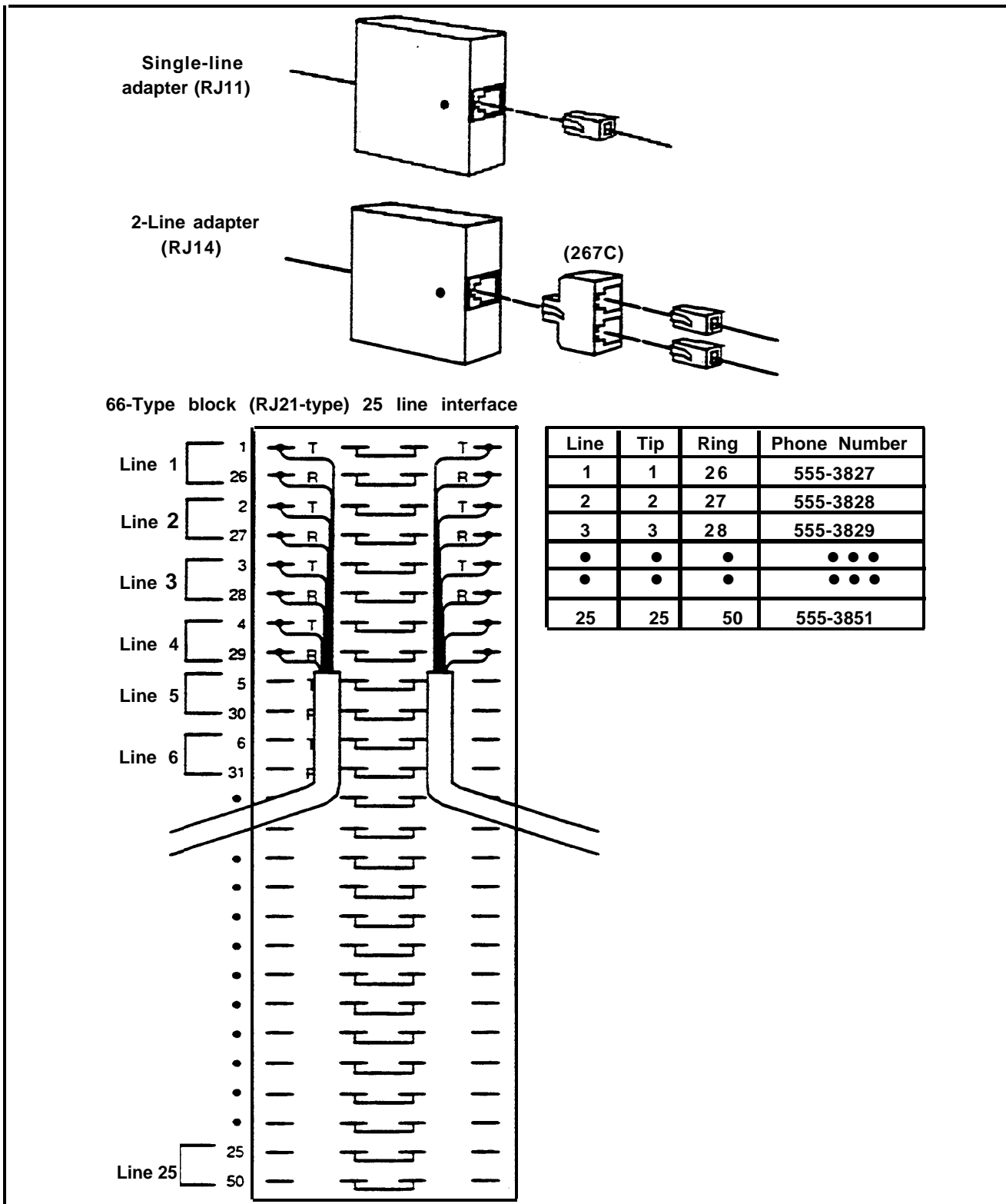Line 5
Line 6
Line 25

FIGURE 2-4 Network interface adapters.

TESTING THE OUTSIDE LINES

You often need to test an outside line at the network interface or jack field. This test will verify that the outside telephone lines are working properly. To perform this test, you-need a basic rotary dial telephone and a Touch-Tone telephone, each with a modular cord, or two craft sets.

CAUTION: Do not use a MERLIN II system voice terminal for testing. It does not work for this test, and it can be damaged if you use it for this purpose.

---

1 Bring the Basic telephones or craft set to the jacks for the outside lines (either at the network interface or at the jack field).

2 Plug the telephone's modular cord or the craft set's cord into an outside line jack and listen for a dial tone.

3 Dial a known telephone number with each basic telephone or the craft set to verify both rotary and Touch-Tone dialing.

4 Call each outside line jack with a basic telephone or craft set to verify ringing.

5 Repeat steps 2 through 4 for each outside line.

CONNECTING OUTSIDE LINES TO THE CONTROL UNIT

You need the following items to connect the control unit to the jacks for the outside lines, whether they appear at the jack field or at the network interface.

- Outside line numbers label. This label is for listing each outside line number connected to the system with its corresponding jack number. The label is packed with the installation kit and it should be pasted on the inside front cover of the control unit or the inside of the left door of the jack field box containing the outside lines.

- **Single-pair modular line cords.** You need one D2R cord for each outside line. The cord must be long enough to reach the network interface.

- **Green line-cord labels.** These labels are marked 01, 02, 03, etc. You need a matching pair for each line cord.

- **Outside line numbering strips.** These labels are used to number all the line jacks on the modules themselves.

You can have up to 56 outside line jacks with the MERLIN II system. The numbering sequence is 01 to 56. To connect the outside line wiring, follow these steps:

1 Review Form 1a, System Form-lncoming Lines for Release 3, or the Master Planning Form for Feature Modules 1 and 2, to determine each outside line assignment on the control unit.

   The outside line numbers are the telephone numbers listed at the network interface or inside the left door of the box in the jack field containing the jacks for your outside lines.

2 Number sequentially from 01 to 56 every outside line jack on the modules using the outside line numbering strips. Begin with the module in slot 1, numbering from bottom to top and working from left to right across the control unit (See Figure 2-2 on page 2-13 for the numbering sequence.)

   Refer to Figure 2-3 on pages 2-15 and 2-16 to identify those modules that have line jacks and locate the positions the line jacks occupy on those modules.

3 Connect the outside line jacks on the modules to the network interface using D2R cords. Thread the wires through the wire managers at the base of each module as you connect the wires to the jacks. Label each end of each cord with the outside line jack number to which each is connected.

4 Write the telephone number assigned to each of the
   line jacks next to the number for that line jack on the
   outside line numbers label found on the inside of the
   control unit's front cover or on the inside of the left
   door of the jack field box containing the outside lines.

WARNING: National and local building codes specify
the type of cable required for telecommunication
wiring. For example, indoor wiring (DIW) 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.

If staples are used to attach the cords to walls or
baseboards, check that the cords have not been pierced.
Also, do not run Central Office lines from the network
interface to the control unit if the distance if greater
than 25 feet.

TIE LINE MODULE WIRING

The interface from the Tie Line Module to the network
facility is provided through modular jacks. Each modular
jack provides an electrical interface to the network that
consists of six leads: T (pin 5) and R (pin 4) are for
outgoing analog transmission; T1 (pin 1) and R1 (pin 2)
are for incoming analog transmission; and E (pin 3) and M
(pin 6) are for signaling. Figure 2-5 shows how to connect
the Tie Line Module to the network interface.

WARNING: The protected mode must be used
whenever the E&M leads extend out-of-building and
are not connected to the network interface. See pages
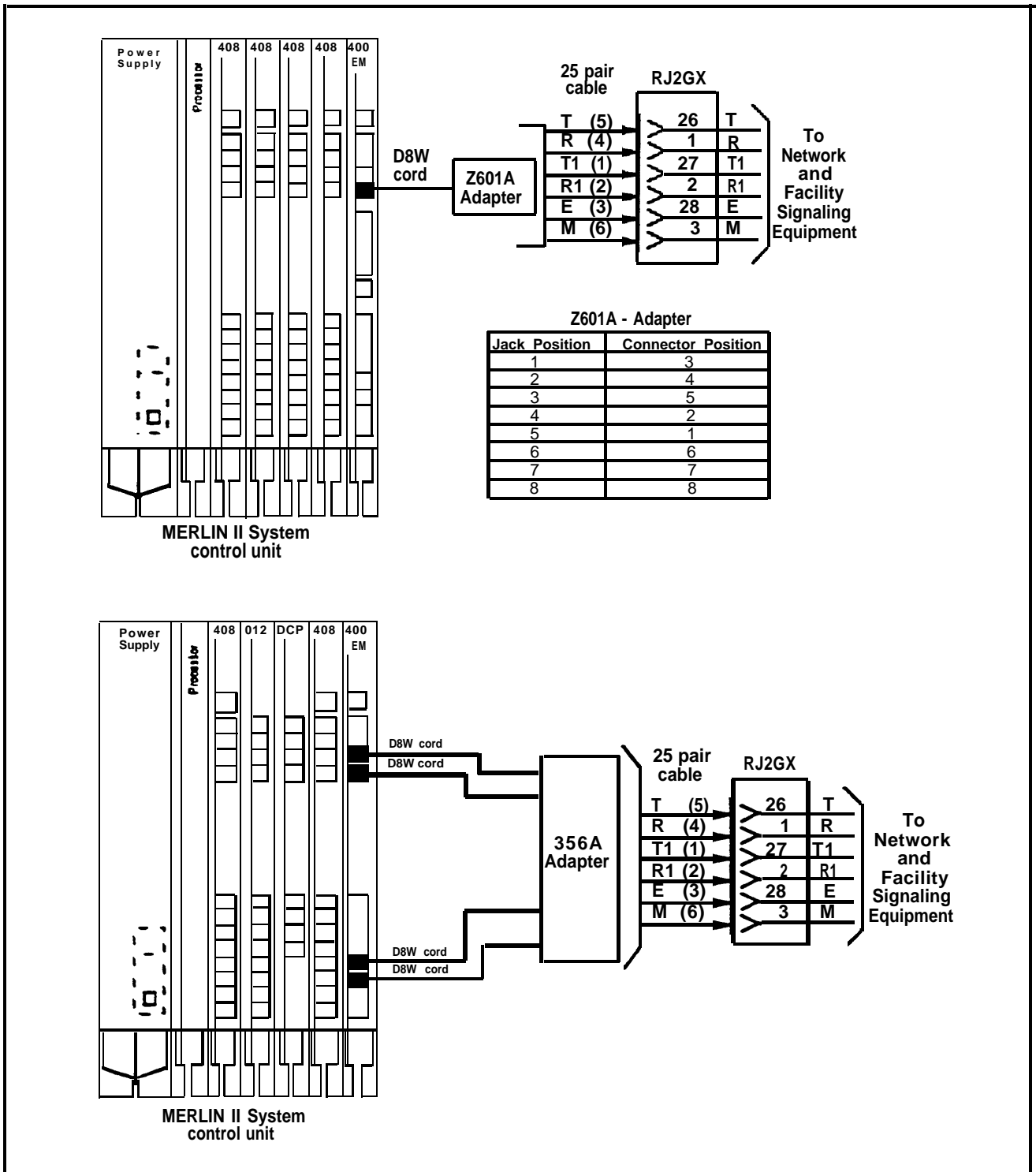1-47 and 1-48.

FIGURE 2-5 Tie Line Module wiring.

Within the figure (top diagram):

Power Supply · Processor · 408 · 408 · 408 · 408 · 400 EM

MERLIN II System control unit

D8W cord → Z601A Adapter → 25 pair cable → RJ2GX

T (5)	26	T
R (4)	1	R
T1 (1)	27	T1
R1 (2)	2	R1
E (3)	28	E
M (6)	3	M

To Network and Facility Signaling Equipment

Z601A - Adapter

Jack Position	Connector Position
1	3
2	4
3	5
4	2
5	1
6	6
7	7
8	8

(bottom diagram):

Power Supply · Processor · 408 · 012 · DCP · 408 · 400 EM

MERLIN II System control unit

D8W cord · D8W cord · D8W cord · D8W cord → 356A Adapter → 25 pair cable → RJ2GX

T (5)	26	T
R (4)	1	R
T1 (1)	27	T1
R1 (2)	2	R1
E (3)	28	E
M (6)	3	M

To Network and Facility Signaling Equipment

Voice Terminal Wiring

CONNECTING VOICE TERMINAL WIRING TO THE CONTROL UNIT

You can connect up to 120 station jacks, which support up to 120 voice terminals in the MERLIN II system.

NOTE: The terms "voice terminal" and "station" are synonymous when describing the wiring and labeling of the voice terminal side of the MERLIN II system.

Up to 60 stations can be connected with the Voice Announcement to Busy Voice Terminal or Simultaneous Voice and Data features. Both of these features require the use of two adjacent odd/even jacks on the control unit for each station that is connected with the feature. Because they require two voice-pair wiring, use of either of these features decreases the system's voice terminal capacity. See "Wiring a Voice Terminal for Two Voice-Pairs" on page 2-27.

NOTE: The default intercom numbers (10 through 69 and 700 through 759) should not be confused with the station jack numbers (01 through 120) that identify the sequential station jack locations on the modules. Intercom 10, for example, is located in the first station jack on the first station module of the control unit, labeled 01. The "odd/even" in this type of wiring refers to jack numbers, *not* intercom numbers.

You can connect the voice terminal locations either directly, with modular voice terminal cords, or through building wiring to a jack field at the control unit location.

Jack field wiring is the recommended method for installations with more than 30 stations. Direct connection is recommended for installations with fewer than 30 stations. Determine which method to use to connect the voice terminal wiring to the control unit and follow the appropriate instructions below under "Connecting Voice Terminal Wiring Through a Jack Field" or "Connecting Voice Terminal Wiring Directly."

Refer to "Jack Field Wiring" on page 2-33 for instructions on how to construct a jack field. You need the following items to complete the connections:

- **System directory label.** Use this label to record the end locations of each intercom number in the system.

- **Blue station-cord labels.** These labels come in pairs with the basic and expansion carrier and are used to identify cable runs. The first sheet of labels is numbered 01 through 69 and is shipped with the basic carrier. The second sheet is numbered 70 through 120 and 700-759. This sheet is packed with the expansion carrier. You should have a matched pair of labels for each line cord.

- **4-Pair modular jumper cords.** These cords are for jack field connections. You should have one cord for each voice terminal in your system.

- **System Labels.** These labels, used to number jacks, are shipped with the feature module. They are numbered 1 through 56 for lines and 01 through 120 for stations.

- **Line Cable Numbering Labels.** These green labels come in pairs and are numbered 01 through 56.

Connecting Voice Terminal Wiring Through a Jack Field

To connect the station wiring through a jack field, perform the following steps:

1 Number every station jack on the modules sequentially from 01 through 120, using the station numbering strips. Begin with the module in slot 1, and number from bottom to top, then continue from left to right across the control unit (See Figure 2-2 on page 2-13.)

You may want to review Figure 2-3 on pages 2-15 and 2-16 to identify which modules have station jacks and locate the positions of the station jacks on each module.

2 Wire the station jacks on the modules to the jack field using D8W cords. Thread the wires through the wire manager located at the base of each module as you connect them to the station jacks. Label each end of each wire with the intercom number to which it connects. Remember, the intercom numbers do not necessarily match the jack numbers. Intercom 10, for example, is connected to station jack 01 on the first station module of the control unit.

3 Record the end location of each intercom number on the system directory label and put this label on the inside of the front cover of the control unit.

Complete wiring instructions for data stations are found in the separate document, *MERLIN II Communications System Data Communications Guide*.

Connecting Voice Terminal Wiring Directly

To connect the voice terminal locations directly to the control unit, perform the following steps:

1 Number every station jack on the modules sequentially from 01 through 120, using the station numbering strips. Begin with the module in slot 1 and number from bottom to top; then go on to the next module with station jacks, working from left to right across the control unit modules.

You may want to review Figure 2-3 on pages 2-15 and 2-16 to identify which modules have station jacks and locate the positions of the station jacks on each module.

2 In the system directory, fill in the voice terminal location you have selected for each intercom number.

3 Beginning with a pair of labels marked 01, label each
   cord at both ends with matching labels.

   If the distance between a voice terminal location and
   the control unit requires the use of extension cords,
   label each end of the wiring run. Attach one label near
   the plug to the voice terminal and the matching label
   near the plug to the control unit.

4 Run cords from the voice terminal locations to the
   control unit.

> **CAUTION:** Do not run cords inside air plenums or
> ducts, along hot pipes, or across walkways. If you
> use staples to attach cords to walls or baseboards,
> be careful not to pierce the cords. If there are one
> or more In-Range Out-of-Building voice terminals
> to be installed, be sure to use two IROB protector
> for each lROB voice terminal.

5 Thread each cord through the wire manager of the
   control unit and up to the voice terminal jack with the
   same number as the cord label, and plug it in. For
   Release 3, refer to Form 1d System Form-Station
   Planning; for Feature Module 1 or 2, refer to the
   Master Planning Form to check the intercom number
   assignments against the voice terminal jack locations.
   Intercom 10, for example, is connected to the voice
   terminal jack labeled 01 at the first jack location of the
   first station module in the control unit.

WIRING A VOICE TERMINAL FOR TWO VOICE-PAIRS

If an analog voice terminal requires either the Voice Announcement to Busy Voice Terminal feature or the Simultaneous Voice and Data feature, you need to assign two adjacent odd/even station jacks (01 and 02, 13 and 14, etc.) on an analog station module to that voice terminal. For Release 3, Form 1d, System Form-Station Planning shows which stations receive either option. For Feature Modules 1 and 2, the Master Planning Form gives this information. The numbers of the station jacks to which each of these stations should be connected are boxed on the form.

The wiring requirement for either of these features is that two voice-pairs (one pair from each jack) must be connected from the control unit to the voice terminal. Refer to Figure 2-6 for an example of wiring a voice terminal for adjacent odd/even jacks. In this example, a bridging adapter (BR-241-B1) is used to connect both voice pairs to the voice terminal.

Note that in Figure 2-6, the wire from station jack 39 on the line module connects to the jack labeled "Even" on the bridging adapter. This is because the label on the bridging adapter refers to the default intercom number, which does not necessarily match the station jack number in terms of odd and even. Odd/even wiring refers to jack numbers, *not* intercom numbers.
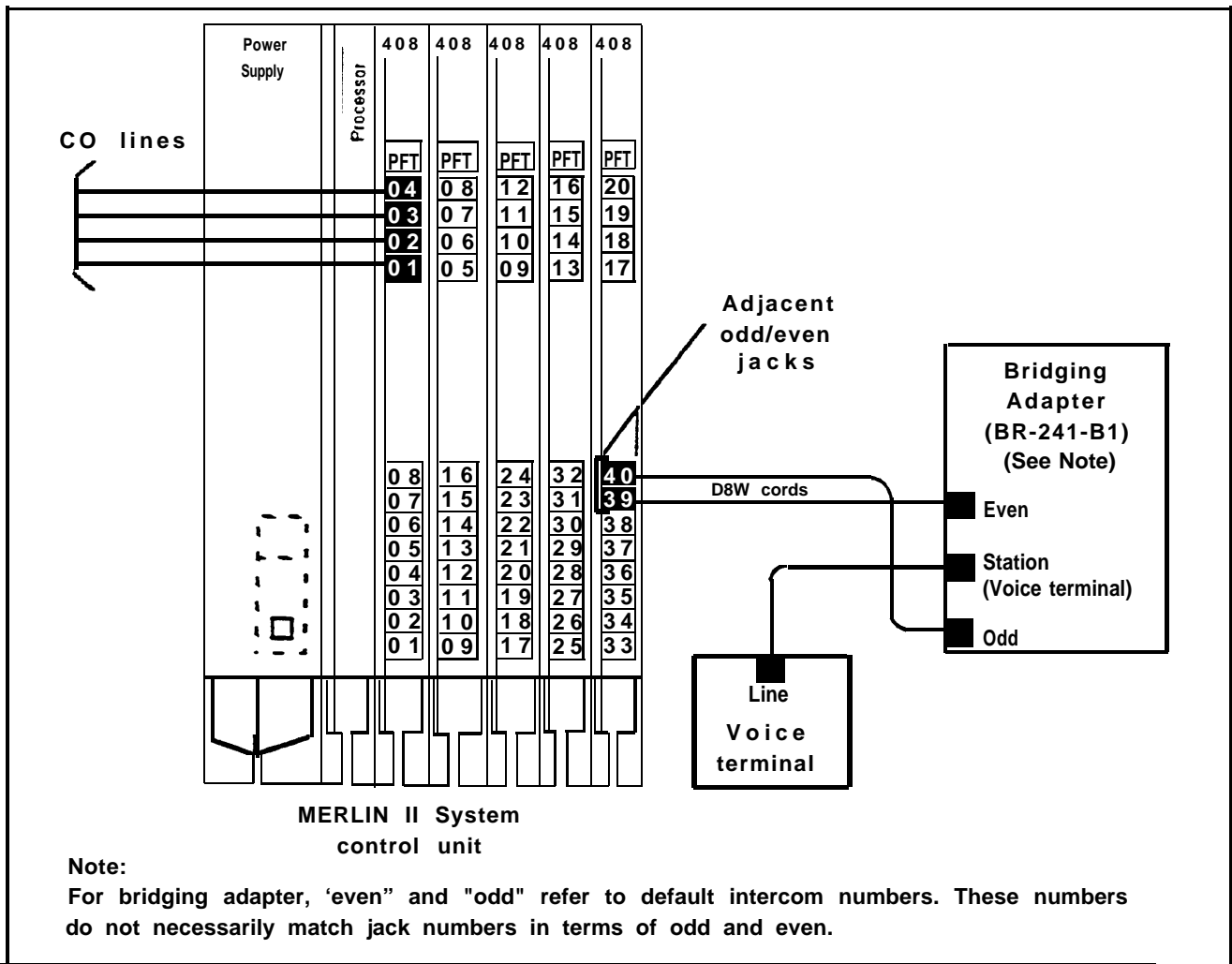
FIGURE 2-6 Wiring a voice terminal for adjacent odd/even jacks using a bridging adapter.

The bridging adapter is one method of wiring two voice pairs to a voice terminal (adjacent odd/even jacks). The electrical connections made by this adapter are shown in Figure 2-7.
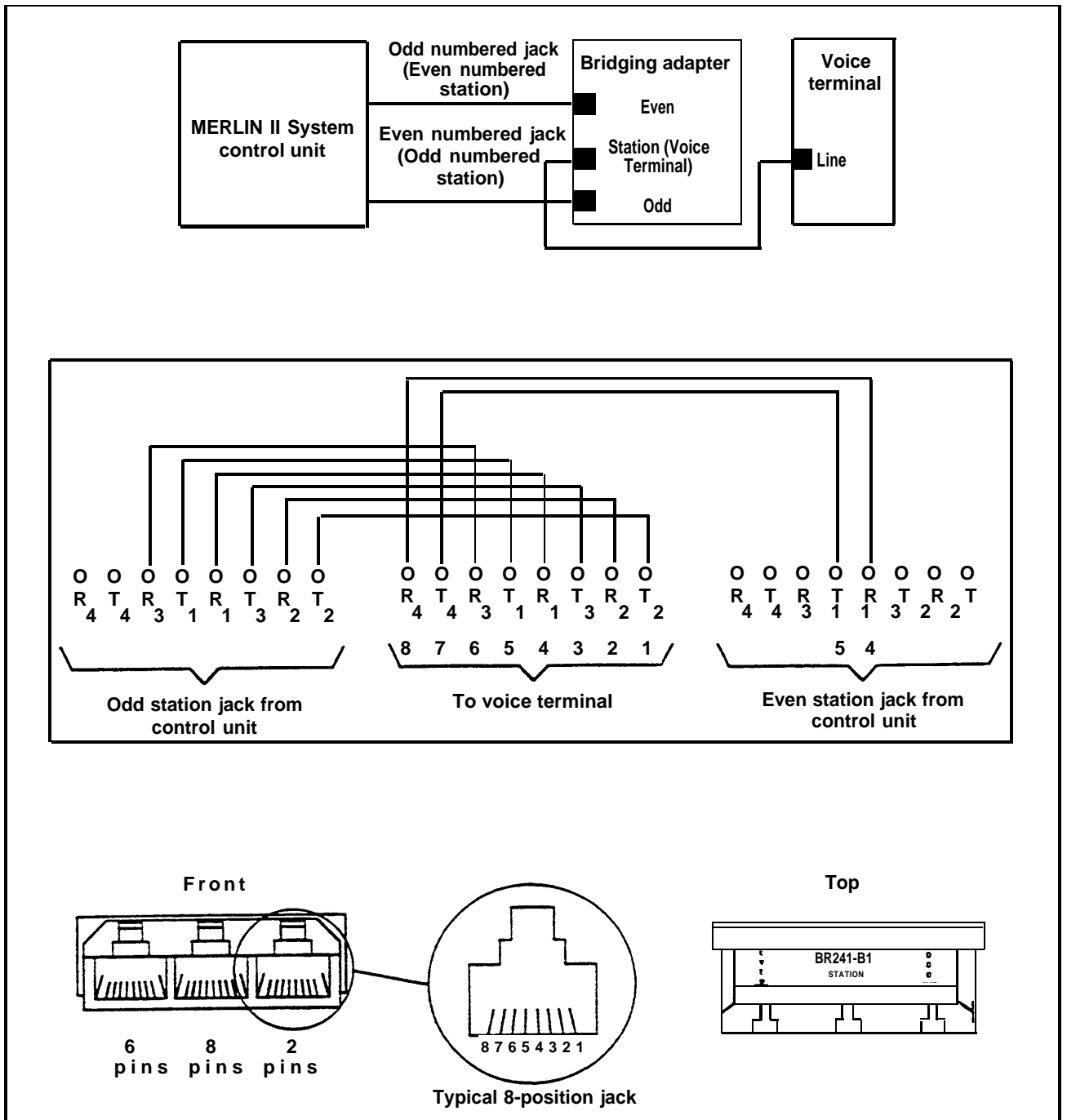
FIGURE 2-7 A wiring diagram of the bridging adapter for adjacent odd/even jacks.

STANDARD 4-PAIR WIRING

If you are wiring for 4-pair using a 66-type block, review the diagram in Figure 2-8. Notice that the wiring for the additional voice pair (the even-numbered jack) terminates in the same place on the building wiring block as the wiring for the odd-numbered jack. The brand Rex adapter (BR 866-JC) attaches to the block over all four pairs and provides a modular jack for a connection to the control unit.
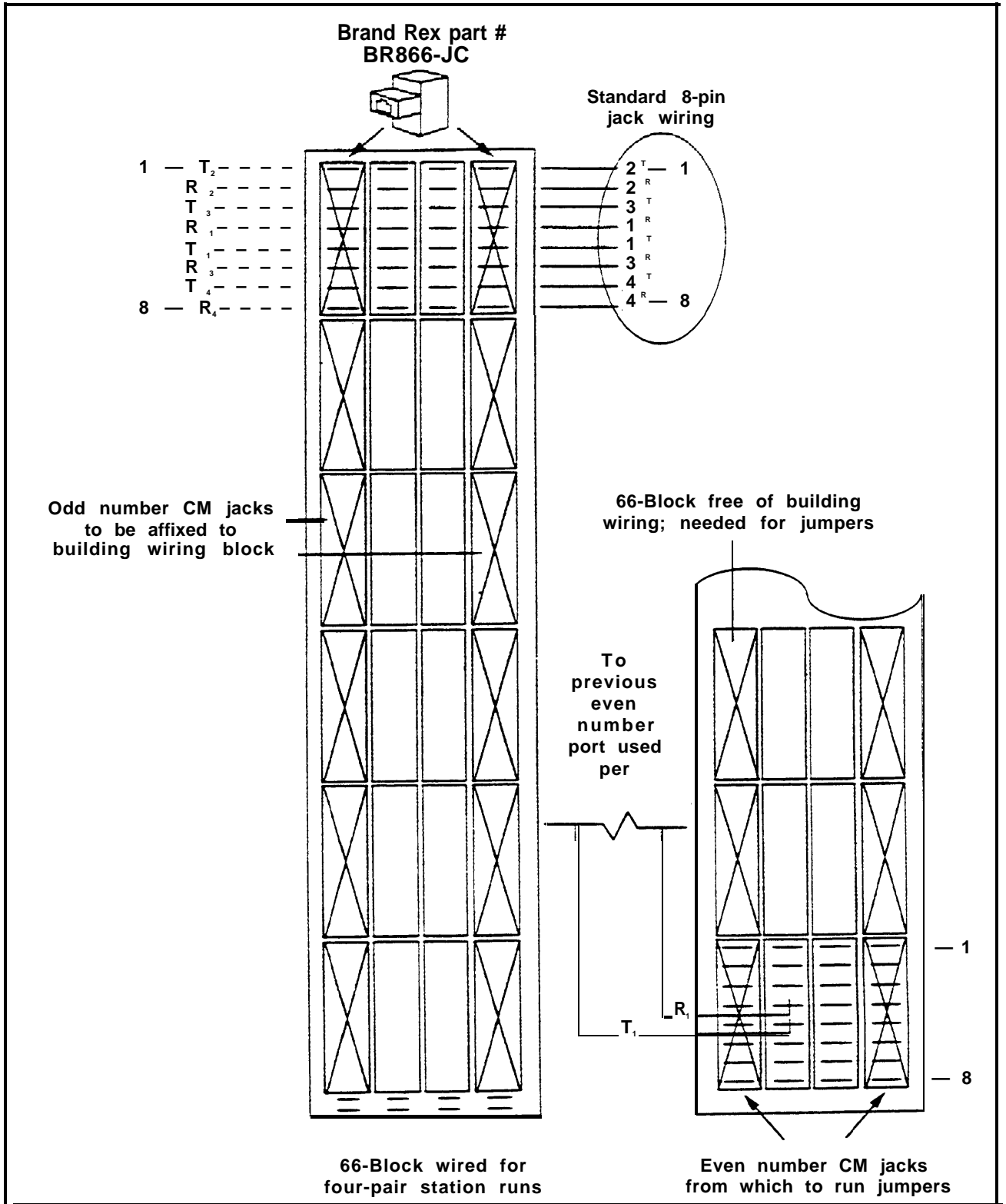
FIGURE 2-8 A 66-type block wired for 4-pair station runs.

The following labels appear in the figure:

Brand Rex part #
BR866-JC

Standard 8-pin
jack wiring

$1 - T_2$ - - - -
R_2 - - - -
T_3 - - - -
R_1 - - - -
T_1 - - - -
R_1 - - - -
T_3 - - - -
T_4 - - - -
$8 - R_4$ - - - -

$2^T - 1$
2^R
3^T
1^R
1^T
3^R
4^T
$4^R - 8$

Odd number CM jacks
to be affixed to
building wiring block

66-Block free of building
wiring; needed for jumpers

To
previous
even
number
port used
per

R_1
T_1

— 1

— 8

66-Block wired for
four-pair station runs

Even number CM jacks
from which to run jumpers

Follow the diagram in Figure 2-9 if you are performing a postwire surface-mounted application or if you are using apparatus boxes in a jack field.

The postwire surface-mounting requires a 104A connecting Block. Two 4-pair modular cords coming from the control unit (adjacent odd/even jacks) plug into it and the voice pairs from each connect to the wires of a single 4-pair modular cord. The voice terminal plugs directly into the modular cord and then has the use of the two voice pairs.

If you are using the Z122C apparatus boxes, you need to provide two Z601A adapters for each terminal that requires two voice-pairs. A single 4-pair cord can then be run from the jack field to the voice terminal that requires two voice-pairs.
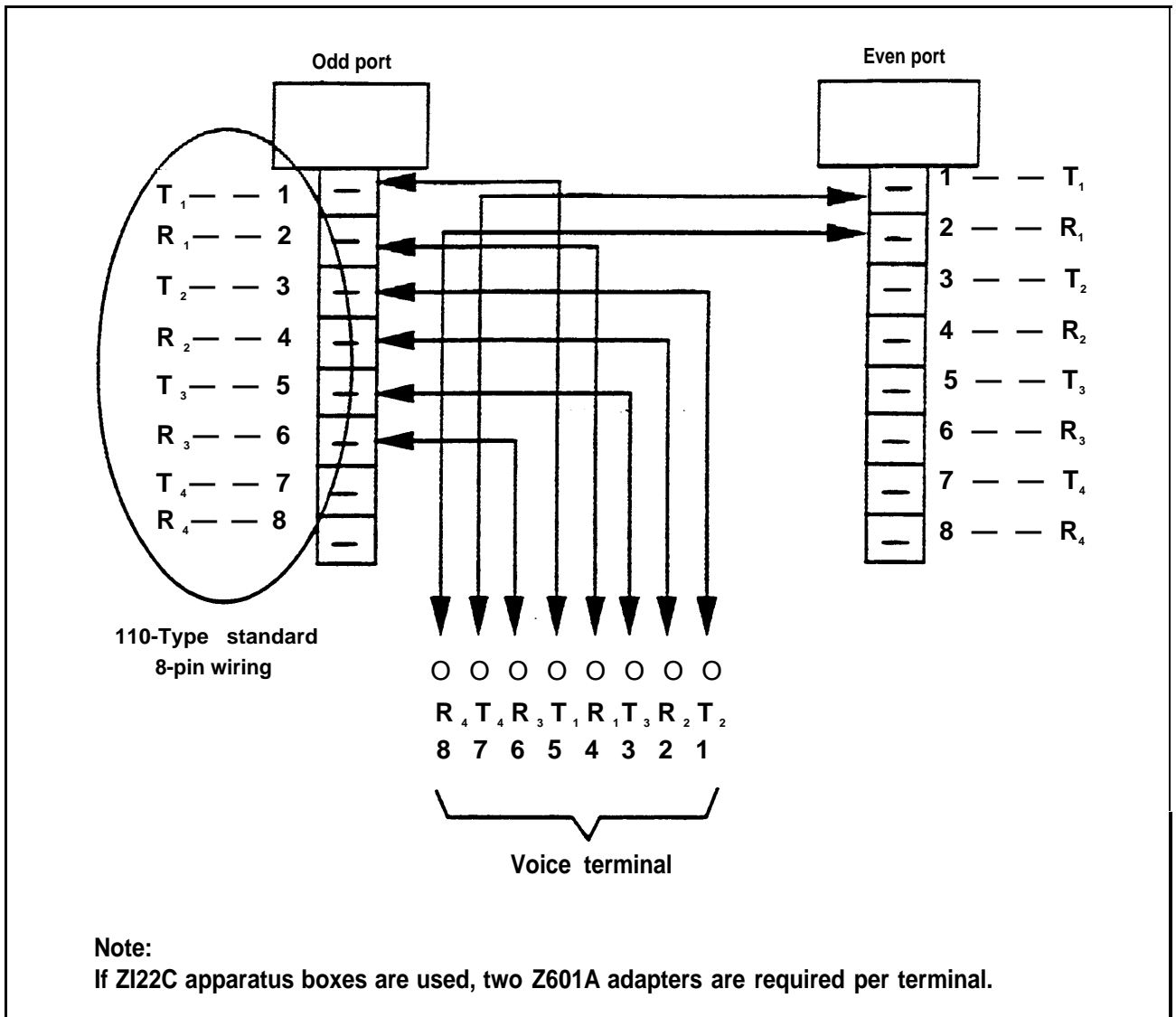
Odd port   Even port

T_1 — — 1   1 — — T_1

R_1 — — 2   2 — — R_1

T_2 — — 3   3 — — T_2

R_2 — — 4   4 — — R_2

T_3 — — 5   5 — — T_3

R_3 — — 6   6 — — R_3

T_4 — — 7   7 — — T_4

R_4 — — 8   8 — — R_4

110-Type standard
8-pin wiring

O O O O O O O O

R_4 T_4 R_3 T_1 R_1 T_3 R_2 T_2

8   7   6   5   4   3   2   1

Voice terminal

Note:
If ZI22C apparatus boxes are used, two Z601A adapters are required per terminal.

FIGURE 2-9 104A Connecting Block hardware wired for 4-pair station runs.

Jack Field Wiring

The following information describes how to construct a jack field for voice terminal wiring at the control unit and how to connect the jack field to the voice terminals through the building wiring. It also explains how to move

the point of connection to the outside lines from the network interface, which is provided by the local telephone company, to jacks in a jack field for the outside. lines.

Refer to the topics referenced below depending on your wiring needs.

● If you decide not to have direct connections from the voice terminals to the control unit and the building wiring and jack fields are not installed, you need to construct a jack field for the voice terminal wiring. Follow the instructions in "Constructing a Jack Field for Voice Terminal Wiring," found on page 2-35.

● If the local telephone company provided a 50-pin (RJ2 l-type) connector interface but the wiring from the network interface to a jack field for outside lines is not installed, you may want to construct a jack field for outside line wiring and extend the network interface to it. Follow the instructions in "Extending the Network Interface to the Jack Field for Outside Lines" on page 2-41.

● If all necessary wiring is in place, go on to "Installing the Control Unit" on page 2-50 and follow the instructions.

See Figure 2-2 on page 2-13 for an illustration of MERLIN II system wiring with jack fields.

NOTE: The jack fields for the system shown are constructed with Z122C apparatus boxes, which are attached to each other using a tongue-in-groove design and mounted to the left of or under the control unit. The Z122C boxes come with 2A retainers for holding wiring adapters, such as the cutdown-to-modjack 2601A adapter. If 2A retainers are not required, Z122B apparatus boxes can also be used. See the following heading, "Constructing a Jack Field for Voice Terminal Wiring."

You may also decide to connect the outside wiring directly from the network interface to the control unit and the voice terminal wires directly from the voice terminal locations to the control unit. If the installation is simple or other factors determine that direct wiring is best for all connections, you may skip these wiring instructions.

CONSTRUCTING A JACK FIELD FOR VOICE TERMINAL WIRING

Although you can connect the voice terminals to the control unit in any of several different ways, the method described here greatly simplifies certain aspects of system administration. This method calls for wiring runs that terminate in modular wall jacks at the voice terminal locations and in modular jacks in a jack field at the control unit location. Modular jumper cords then connect the jacks in the jack field to the appropriate jacks in the control unit.

Jack Field Construction Requirements

In order to construct a jack field and connect the voice terminals to it, you need the following:

- **Floor plan.** This plan should show the route of the wiring runs from the control unit location to the voice terminal locations. If you don't have one, draw one now.

- **4-Pair station adapters** You need as many 4-pair modular jack terminated adapters as you have voice terminals in the system. Some examples are the following:

  > The Z600A modjack-to-modjack adapter-an in-line connector for modular cords allowing for a jack-to-jack arrangement.

  > The Z601A cutdown-to-modjack adapter-for connecting cutdown cable to modular jacks.

  > The Z602A adapter—for connecting up to six modular cords to a connectorized 25-pair cable.

See the equipment supplier to obtain the correct adapters for the system.

- **Z122C apparatus boxes.** Each box holds six single-port voice terminaI connectors.

- **Modular wall jack adapters.** These adapters (or connecting blocks) terminate the wiring runs at the voice terminal locations. Various adapters (e.g., the 102A, 103A, 104A, 104B, 105AF, and 106AFD) are used to connect eight-conductor jacks to 110-type hardware. See the equipment supplier to obtain the correct adapters for the system.

- **Blue labels.** These labels come in perforated sheets with the installation kit for the apparatus boxes.

The recommended cable for the wiring runs is spooled DIW. If you choose to use spooled cable for the wiring runs, use cutdown-to-modjack adapters in place of modjack-to-modjack adapters in the apparatus boxes. The procedure "Terminating the Wiring Runs in Modular Wall Jacks" on page 2-39 shows how to connect wires to cutdown-to-modjack adapters.

The following tools and equipment may be needed to complete the wiring installation. What you need depends mostly on the layout, dimensions, and structural particular of the installation site.

- Cable termination tool

- Scissors

- Drill and bits

- Screwdriver

- Cable ties and clips

- Stapler and staples

A backboard should be in place at the location where you plan to install the control unit. If no board is ready, see "Wall Attachment Requirements" on page 2-4. If the backboard is in place, do the following:

1 Mark positions on the backboard mounting surface for the control unit and the jack field in relation to each other. Also note the locations of the ac outlet and the network interface (see "Installing the Control Unit" on page 2-50).

2 Attach a blue label (❏ 1-6, ❏ 7–12, ❏ 13-18, etc.) to the outside of the right door of each apparatus box. These labels identify the jacks in each box by *wiring run number.*

3 Attach the apparatus boxes to each other by meshing the tongues and grooves. Position the boxes so that the doors with the handles are on the right. Use only as many boxes as you need.

4 Fasten the apparatus boxes to the mounting surface with screws.

5 Snap into the boxes as many modular jack adapters as you need, filling the boxes from top to bottom.

- If one of the jacks on the adapter has a black dot on it, make sure that the jack with the black dot faces to the right.

- If you use cutdown-to-modjack adapters, make sure the jacks on the adapters face to the right.

CONNECTING VOICE TERMINAL WIRING TO A JACK FIELD

Once you have constructed a jack field, connect the voice terminal wiring to the field as described in the following topics:

Running the Cables

> **CAUTION:** Do not run cables inside or on top of air plenums or ducts, along hot pipes, or across walkways. If you use staples to attach cords to walls or baseboards, be careful not to pierce the cable. If there are one or more In-Range Out-of-Building voice terminals to be installed, be sure to use two IROB protectors for each IROB voice terminal.

1 On the floor plan, assign a wiring run number (1, 2, 3, etc.) to each voice terminal location.

2 Write the voice terminal location on each wiring run label (for example, ❑1 Reception, ❑2 Salesroom, ❑3 Shop).

3 Attach the labels for wiring runs 1 through 6 to the inside of the right door of the apparatus box labeled ❑1-6. The label for wiring run 1 goes at the top, and the rest follow in order down to the label for wiring run 6 at the bottom.

4 Label the remaining boxes in the same way until there is a label assigning a wiring run to each jack in the jack field.

5 Use spooled cable or select a length (usually 100 or 200 feet) of cable long enough for wiring run number 1 as shown on the floor plan.

> **NOTE:** The recommended method is to use spooled cable for the wiring runs and cutdown-to-modjack adapters in the jack field. An alternative is to use modular wall jacks to connect two or more cables if you have voice terminal locations beyond the reach of 200-foot cables. In any case, a voice terminal should not have a wiring run from the control unit that exceeds 1000 feet.

6   Insert and punch down (connect the wires of the spooled cable into the cutdown section of the adapter next to the label for wiring run 1 in the jack field (the top jack in the box labeled ❏ 1-6). If necessary, trim the ends of the wires with a pair of scissors or diagonal pliers.

7   Run the other end of the cable to the voice terminal location where wiring run number 1 ends. Use cable clips and/or staples to attach the cable along walls, baseboards, and moldings.

8   Run the rest of the cables consecutively from the connections in the jack field to the corresponding voice terminal locations.

Follow this procedure to terminate wiring runs in modular wall jacks.

1   At the voice terminal location for wiring run number 1, mark the place on the wall where you want to put the modular wal1 jack.

2   Trim the excess cable, leaving enough so that about 4 inches extend beyond the outline of the modular jack you drew on the wall.

3   Loosen the screw that holds the cover of the wall jack in place, remove the cover, and set the cover and screw aside.

4   Using the cable termination tool, remove about 2 inches of the cable's jacket. This exposes the color-coded twisted pairs of wires inside the jacket.

5   Thread the cable from the bottom of the jack up through the center until the exposed wires and 1/4 inch of the cable's jacket come through next to the center post on the jack.

6 Wrap the jacketed cable around the center post until the colored wires extend over the two plastic caps.

7 Align the cable in one of the notches on the jack, and attach the jack to the wall. One type of jack requires screws, while another uses adhesive backing.

8 Remove the two plastic caps on the adapter (this exposes the grooved connecting block), and set the caps aside. They are used instep 10.

9 Insert the colored wires into the grooves from left to right. See Table 2-3, "4-Pair Wiring" on page 2-46 for color/pin assignments.

10 Align the caps over the grooved block and press them down firmly until they snap into place.

11 Trim any colored wires protruding from the plastic caps. When you're finished, none of the wires should extend far enough beyond the plastic caps to touch each other.

12 Put the cover on the adapter and tighten the screw.

13 Attach the blue wiring run label for this voice terminal location (❑1) to the cover.

14 Connect the rest of the wiring runs from the jacks in the jack field to the voice terminal locations in the same way, making sure that both ends of each wiring run are labeled identically.

15 When you have completed the wiring runs, use cable ties and clips to bundle the cables at the jack field to reduce cord clutter, and then close the doors on the apparatus boxes.

You should now have a properly installed and labeled jack field with building wiring connecting the voice terminal locations to the control unit location.

EXTENDING THE NETWORK INTERFACE TO A JACK FIELD FOR OUTSIDE LINES

If the local telephone company has provided an RJ2l-type network interface, you can connect the control unit to the network interface using adapters that allow you to plug D2R cords directly into the interface. You can also extend the network interface to a group of single-pair modular jacks mounted in an apparatus box in a jack field. Then you can connect the control unit to the outside lines by plugging the modular line cords into these jacks. See Figure 2-2 on page 2-13.

You need the following items to extend the network interface to the jack field:

- **4-line adapters.** Some examples of 4-line adapters are the following:

  > The Z609A adapter splits four pairs from one 8-conductor modular jack to one pair in each of four 2-conductor modular jacks. All jacks are 8-position modular jacks.

  > The Z610A adapter provides up to four single-pair jacks for the MERLIN II system control unit. This adapter consists of a no-type insulation displacement connector wired to four 6-position 2-conductor modular jacks.

- **Z122C apparatus boxes.** Each box holds two 4-line adapters.

- **Single-ended 25-pair connectorized cable.** This cable must be long enough to reach from the network interface to the jack field with some slack. Before you order this cable, check to see whether the 50-pin connector at the network interface is male or female and order cable with a 50-pin connector of the opposite gender.

- **Cable termination tool.** You need this tool to strip some of the jacket from the raw end of the 25-pair cable. If the connecting block on the 4-line adapter does not have two caps that automatically punch down wires when the cap is snapped onto the block, you also need a tool for punching down the wires. Some cable termination tools can do both.
- **Green labels.** These labels come with the installation kit for the apparatus boxes.

Adding Jacks to the Jack Field

Follow these steps to acid jacks to the jack field:

1 Position the apparatus box so that the door with the handle is on the right and attach it to the top box in the rightmost column of boxes already in the jack field by meshing the tongues and grooves.

2 Use appropriate screws to attach the apparatus box to the mounting surface supporting the jack field.

3 Pull the two plastic caps off the connector on the adapter, and set the caps aside. You'll need the caps again in step 4 of the next procedure.

4 Snap the 4-line adapter into the apparatus box so that the jacks on the adapter face to the right. If you have more than four outside lines, remove the two plastic caps from the second adapter and snap it into the box in the same way.

Connecting the Outside Lines to the Jack Field

To connect outside lines to a jack field, follow these steps:

1 Attach the connector on the 25-pair cable to the 50-pin connector at the network interface.

2 Using the blade on the cable termination tool, slit the jacket at the free end of the 25-pair cable, and cut away as much of the jacket as necessary to allow the individual twisted pairs of colored wires to reach the adapter(s) in the jack field.

3   Depending on the kind of line wiring, follow the order and color codes listed in Table 2-4, "CO Line Wiring, 6-Position Jack, Single-Pair," Table 2-5, "CO Line Wiring, 6-Position Jack, Two-Pair," and Table 2-6, "CO Line Wiring, 6-Position Jack, Multipair" on pages 2-46 through 2-48. Place the colored wires in the grooves on the connector of the adapter. Continue placing wires in grooves on each adapter until you have attached a pair of wires for each outside line. If you have the maximum of 56 lines, for example, you'll need 14 adapters for each set of four outside lines.

4   Align the two plastic caps over the grooved connector now holding the colored wires, and push the caps down until they snap into place.

5   If the caps did not trim the wires when you snapped them down onto the block, trim the ends of the wire protruding from the grooves with a pair of scissors or diagonal pliers. When you're finished, none of the wires should extend far enough beyond the plastic caps to touch each other.

Labeling Jacks and Boxes

Follow these instructions to label jacks and boxes:

1   Locate the green label sheet that came with the apparatus box, the telephone number directory, jack-identifier label strips, and labels for the apparatus box and the line jacks.

2   On the telephone number directory, fill in the telephone numbers for the outside lines in the order in which they appear at the network interface or on the list provided by the local telephone company.

3   Using the telephone number directory as a guide, label the jacks in the apparatus box with the appropriate line jack labels.

4   Attach the label, ❑ 1-8, to the outside of the right door of the apparatus box.

5   Attach the long, narrow label showing jacks 1 through 8 to the inside of the right door of the apparatus box.

6   Attach the telephone number directory inside the left door of the apparatus box, and close the left door.

You should now have a single-pair modular jack in the jack field for each outside line.

Wiring Reference Tables

The following tables provide reference information on wiring equipment and wiring designations for the MERLIN II system and CO line wiring.

TABLE 2-2 Wiring Parts Cross Reference

PPEC	Description	Apparatus Code	COMCODE
		Z122B Apparatus Box	103962239
		Z122C Apparatus Box	103980843
		2A Adapter Mounting	103970562
		Z601A Adapter	103946653
		Z610A Adapter	103950556
62400	Net Intf Adptr	267C Adapter	103715652
2750-D14	Net Brdg Adptr	267A2 Adapter	103715082
2750-D08		103A Corm Block	103104220
2750-D07		102A Corm Block	103083200
		65B Faceplate	103658498
61407	NI/CU Mod Cord	D2R-29 Cord 7 ft	103732541
	VT Mod Cord	D4BU-29 Cord 7 ft	102479904
	VT Mod Cord	D8W-87 Cord 7 ft	103786786
	CU Jumper Cord	D8W-87 Cord 2.5 ft	104160148
61208	Cbl Strp Tool	953A Tool	103951588
32910	1000 ft 4-Pr Cable	(Spooled DIW Cable)	403101140

* For more information on additional wiring parts, *see the catalog Premises Distribution Products* (Catalog no. 775-076). Use the COMCODE number when ordering equipment from your equipment supplier.

TABLE 2-3 4-Pair Wiring

Signal	Pair	Modjk Pins	Modular Cord Wire Colors	102A 103A Z601A Term Stmp	DIW Cable Colors	25-Pair Cable Colors	25-Pair Corn. Pin No.
V1T		5	GREEN	1	W-B	W-B	1
V1R	1	4	RED	2	BLUE	B-W	26
CT		1	BLUE	3	W-O	W-O	2
CR	2	2	ORANGE	4	ORANGE	O-W	27
-48V		3	BLACK	5	W-G	W-G	3
GND	3	6	YELLOW	6		G-W	28
V2T		7	BROWN	7	W-BR	W-BR	4
V2R	4	8	SLATE	8	BROWN	BR-W	29

TABLE 2-4 CO Line Wiring, 6-Position Jack, Single-Pair

RJ11 NI Specification			D2R Cord		CU Line Jack	
Signal	Pin	Color	Plug	Plug	Pin	Signal
T	4	GREEN	4	3	3	T
R	3	RED	3	4	4	R

TABLE 2-5 CO line Wiring, 6-Position Jack, Two-Pair

RJ14 NI Specification			267A2 Adapter			267C Adapter		
Signal	Pin	Color	Plug	Jack 1	Jack 2	Plug	Jack	Pin
T1	4	GREEN	4	4	4	4		4
R1	3	RED	3	3	3	3	1	3
T2	2	BLACK	2	2	2	2		4
R2	5	YELLOW	5	5	5	5	2	3

TABLE 2-6 CO Line Wiring, 6-Position Jack, Multipair

RJ21 NI Specification				CO Line Wiring		Z610A Adapter		
Signal	Color	Terminal	25-Pair Conn Pin	Number	Jack No.	Terminal	Jack	Pin No.
T1	B-W	1	26		4	1		4
R1	W-B	2	1	1	3	2	1	3
T2	O-W	3	27		4	3		4
R2	W-O	4	2	2	3	4	2	3
T3	G-W	5	28		4	5		4
R3	W-G	6	3	3	3	6	3	3
T4	BR-W	7	29		4	7		4
R4	W-BR	8	4	4	3	8	4	3
T5	S-W	9	30		4	1		4
R5	W-S	10	5	5	3	2	1	3
T6	B-R	11	31		4	3		4
R6	R-B	12	6	6	3	4	2	3
T7	O-R	13	32		4	5		4
R7	R-O	14	7	7	3	6	3	3
T8	G-R	15	33		4	7		4
R8	R-G	16	8	8	3	8	4	3

TABLE 2-7 Wiring Tie Line Ports to Network interface

From MERLIN II		Network Interface RJ2GX, 25 pair connecting block							
		Tie Line Number							
Signal	Pin No.	1	2	3	4	5	6	7	8
T	5	26	29	32	35	38	41	44	47
R	4	1	4	7	10	13	16	19	22
T1	1	27	30	33	36	39	42	45	48
R1	2	2	5	8	11	14	17	20	23
E	3	28	31	34	37	40	43	46	49
M	6	3	6	9	12	15	18	21	24

Installing the Control Unit

CONTROL UNIT COMPONENTS

The required components of a MERLIN II Communications System control unit are shown in Figure 2-10 and are listed below:

- Basic Carrier Assembly

- Power Supply Module

- Processor Module

- Feature Module

- 4-Line/8-Analog. Voice TerminaI (408) Module

  or

  8-Analog (008) Module

NOTE: If an 8-Analog Module is used, a module containing line jacks will need to be added to provide for outside lines.
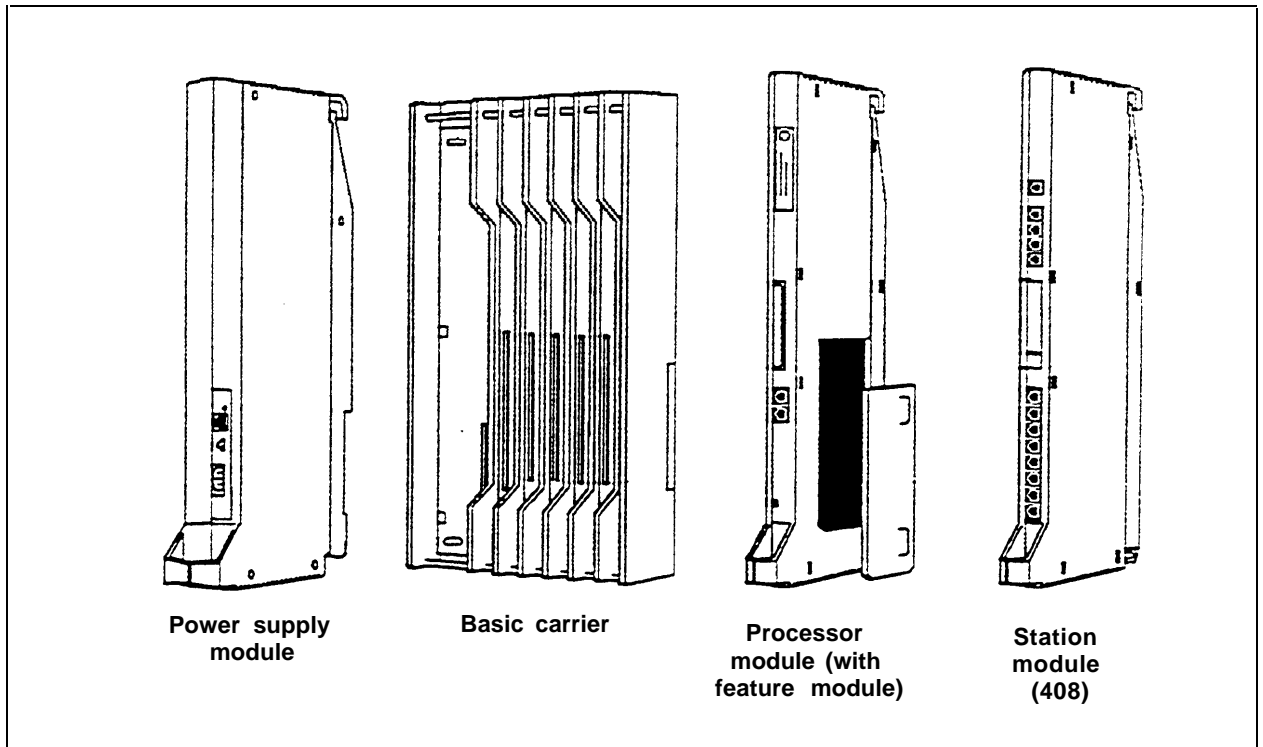
FIGURE 2-10 The required components of a MERLIN II system control unit.

The following modules maybe added to the system:

- 4-Line/8-Analog (408) Module

- 8-Analog (008) Module

- 4-Line (400 with DTMF) Module

- 8-Line (800) Module

- 12-Line Basic Telephone (012) Module

- 8-Digital Station (008D) Module

- Tie Line (400EM) Module

If the basic carrier is at its maximum capacity, expand the system with the following equipment:

- An Expansion Carrier Assembly

- A Power Supply Module for each Expansion Carrier Assembly

MOUNTING THE BASIC CARRIER

The basic earner is designed to be mounted on a plywood backboard that is attached to a wall. The four mounting bosses secure the basic carrier to the backboard (refer to Figure 2-1 1). A number 10 panhead screw fits into each mounting boss. Four screws are provided with the carrier.
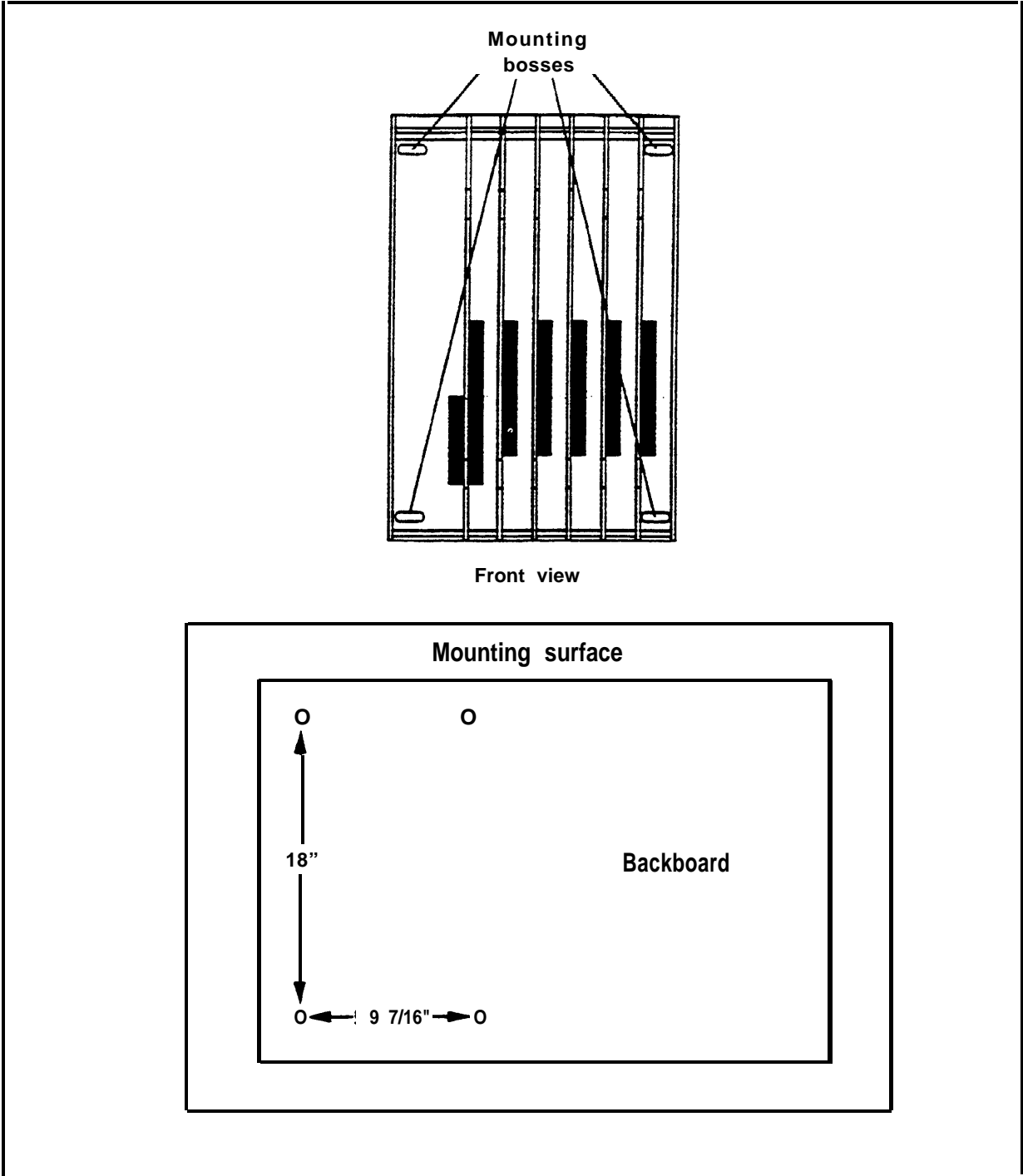
FIGURE 2-11 Preparing the backboard for the basic carrier.

To mount the basic carrier to the backboard, refer to Figure 2-12 and follow these steps:

1 Use the basic carrier as a template to mark the hole locations on the mounting surface.

2 Position the carrier on the backboard and check that all measurements are correct. The vertical distance between mounting holes should measure 18 inches. The horizontal distance should measure 9 7/26 inches.

3 Use a l/8-inch drill bit to drill a pilot hole in the center of each of the four marked mounting hole locations.

4 Insert the screws provided but leave enough room between the screw head and the backboard surface for the mounting bosses on the carrier.

5 Mount the carrier on the screws through the holes in the mounting bosses. Slide the carrier to the left along the boss slots and tighten the screws.

1. Use the basic carrier as a template to mark hole locations on the backboard.

Mounting surface

Backboard

Basic carrier

2. Drill pilot holes and mount the basic carrier on the backboard.

Basic carrier

3. Slide the earner into position.

Mounting Screws (4)

Mounting hole
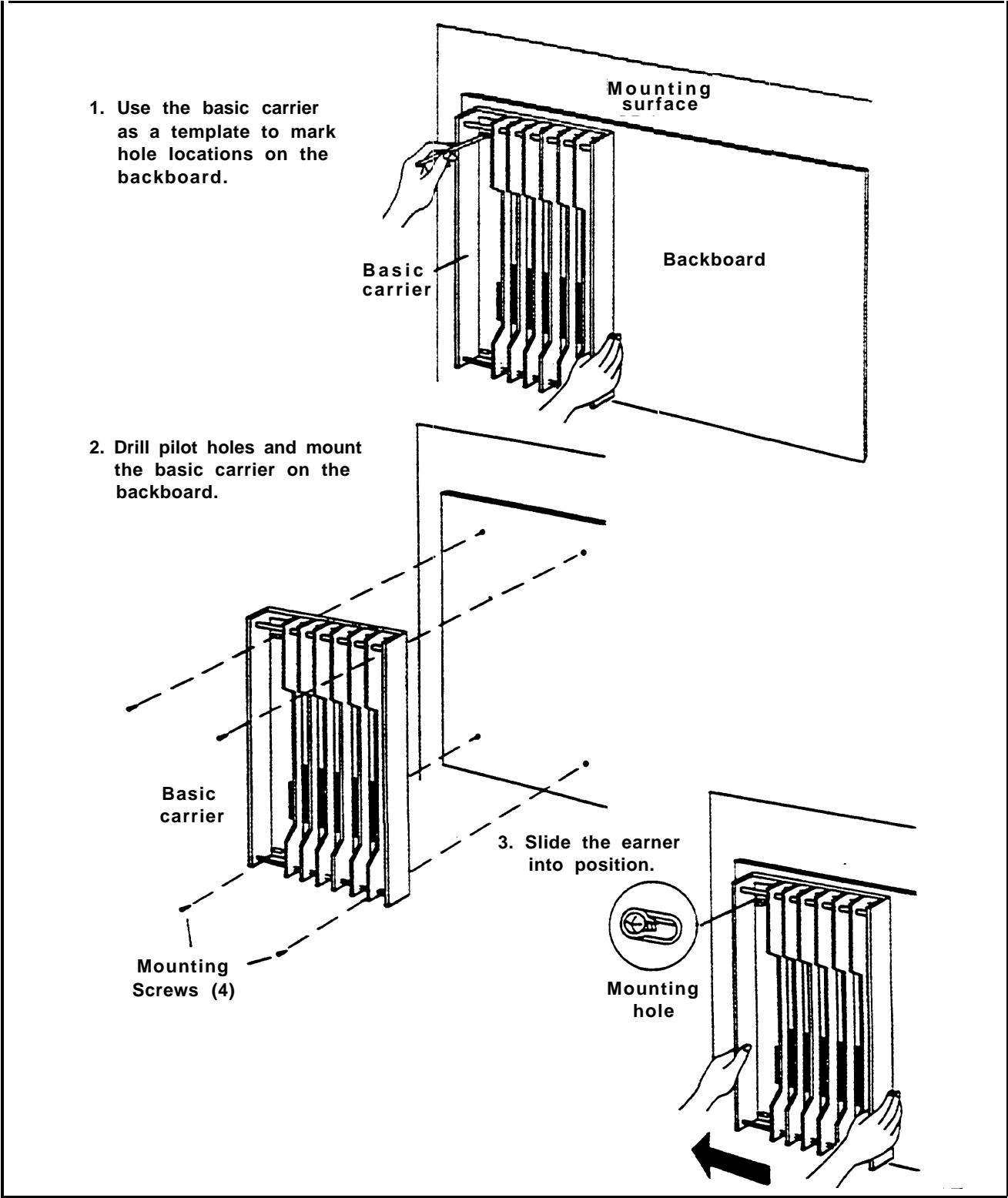
FIGURE 2-12 Mounting the basic carrier.

MOUNTING THE EXPANSION CARRIER

To attach the expansion carrier to the backboard and to the basic carrier, refer to Figure 2-13 and follow these steps:

1   Locate the breakaway plastic tab on the right side of the basic carrier. Use a flat-bladed screw driver to gently pry the tab open until it snaps free.

2   Engage the connector of the expansion carrier with the card extender on the basic carrier.

3   Make sure that the expansion carrier is properly aligned with the basic carrier.

4   Use the expansion carrier as a template and mark the screw hole locations on the backboard.

5   Remove the expansion carrier.

6   Drill holes and insert screws as you did for the basic carrier.

7   Mount the expansion carrier on the screws through the mounting bosses. Slide it to the left and reconnect the card extender of the expansion carrier to the connector on the basic carrier until it is completely engaged.

8   When the carriers are completely engaged, tighten the screws.

Mounting surface

Basic carrier

Expansion carrier

Connector

Card extender

Backboard
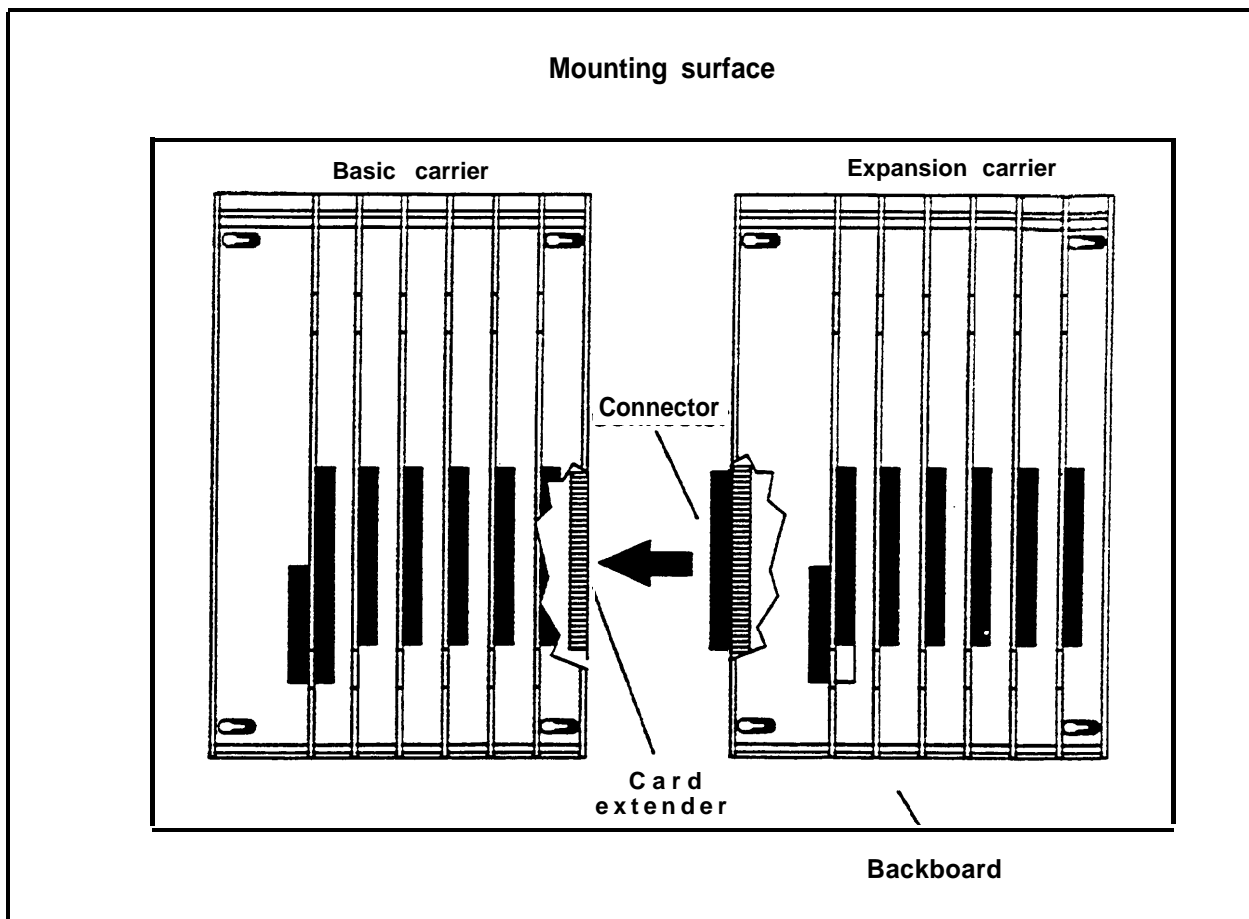
FIGURE 2-13 Mounting an expansion carrier.

DETERMINING UNIT LOAD REQUIREMENTS

Review the following paragraphs that discuss unit load requirements and module slot assignments before installing modules.

A unit load is a measure of power used to determine the eletrical load of the MERLIN II system. Due to variations in system size and complexity, unit load computations must be made to assure proper operation of the system under all conditions.

The Power Supply Module provides 45 unit loads to each carrier. A MERLIN II system with a basic and expansion carrier can support 90 unit loads. If the unit load requirement per carrier exceeds 45 unit loads, an Auxiliary Power Unit is needed. This device connects to the Power

Supply Module and allows the carrier to support an additional 20 unit loads. With an Auxiliary Power Unit, a single carrier MERLIN II system can add accessories without the expense of an expansion carrier. Refer to Table 2-8 for the approximate unit load requirements for the equipment listed.

NOTE: Only voice terminals and accessories that connect to an analog port have unit loads. Any equipment with its own power supply does not have to be included in the unit load calculation.

The unit load requirements in the table assume the following conditions:

- A "unit load" is defined as a measure of power equaling 44 milliamperes (mA) at 43 volts (under load).

- A maximum of 1000 feet of wire for each voice terminal.

- Above average use of voice terminals and accessories.

- Full volume on each voice terminal speaker.

To determine the total unit load, follow these steps:

1   Make a list of all voice terminals and accessories that are intended for use with the system.

2   Refer to Table 2-8 to find the unit load for each voice terminal and accessory you have listed. The equipment listed in Table 2-8 includes all the items that will affect a MERLIN II system unit load requirement. Do not include items such as the Display Console or modems because they have their own power supply and do not affect the system's power requirements.

TABLE 2-8 Unit Load Rating of MERLIN II System Voice Terminals and Accessories

Voice Terminals	Unit Load	Accessories	Unit Load
BIS-10 voice terminal	1	General Purpose Adapter	1
BIS-34 voice terminal	2	Hands Free Unit	1
BIS-34D voice terminal with display	2	Headset Adapter	1
BIS-22 voice terminal	1	Basic Telephone & Modem Interface	2
BIS-22D voice terminal with display	2	Basic Telephone & Modem Interface 2	2
5-Button voice terminal	1	Off-Premises Telephone Interface	2
7406D digital voice terminal	1		
7406D with display digital voice terminal	2		
10-Button voice terminal	1		
10-Button HFAI voice terminal	1		
34-Button (SP-34) voice terminal with speakerphone	2		
34-Button (SP-34D) voice terminal with speakerphone display	2		
34-Button Deluxe voice terminal	2		

TABLE 2-9 Unit Load Calculation Example

VOICE TERMINALS	Qty	Unit Load	Unit Load x Qty	Total
5-Button	8	1	1x8	8
10-Button HFAI	5	1	1X5	5
7406 Digital	4	1	1X4	4
BIS-34D	9	2	2x9	18
BIS-22D	5	1	1x5	5
			Voice terminal total	40

ACCESSORIES	Qty	Unit Load	Unit Load x Qty	Total
Basic Telephone & Modem Interface	5	2	2x5	10
General Purpose Adapter	2	1	1X2	2
Hands Free Unit	5	1	1X5	5
			Accessories total	17

3 Compute the unit load for all the voice terminals and accessories listed in step 1 by multiplying the quantity of each type by its unit load. See Table 2-9 for an example.

4 Add the total unit load computations for voice terminals and accessories.

Example:

Voice terminal unit load total   40
Accessory unit load total   17
Unit load grand total   57

5 Review the unit load grand total. Because the total number of unit loads in this sample configuration exceeds 45, this system requires an Auxiliary Power unit.

DETERMINING MODULE SLOT ASSIGNMENTS

The slot assignments for modules in the basic and expansion carriers are shown in Figure 2-14.

In order to function, a basic carrier must contain the following:

- A Power Supply Module in the leftmost slot

- A Processor Module (equipped with a Feature Module) in slot 0

> **CAUTION:** The Feature Module must be installed in the Processor Module before installing the Processor Module in the carrier.

- An Analog Voice Terminal Module, either the 4-line 8-Analog Voice Terminal (408) Module or the 8-Analog Voice Terminal (008) Module, in slot 1

- Line, tie line, or other modules can then be placed in slots 2 through 5

The only requirement for an expansion carrier is that the leftmost slot must contain the Power Supply Module. Slots 6 through 11 can be filled with additional modules.

Install modules on the carrier from left to right.

> **CAUTION:** Do not leave empty slots between modules in the carriers. The MERLIN II system will ignore modules installed beyond an empty slot.
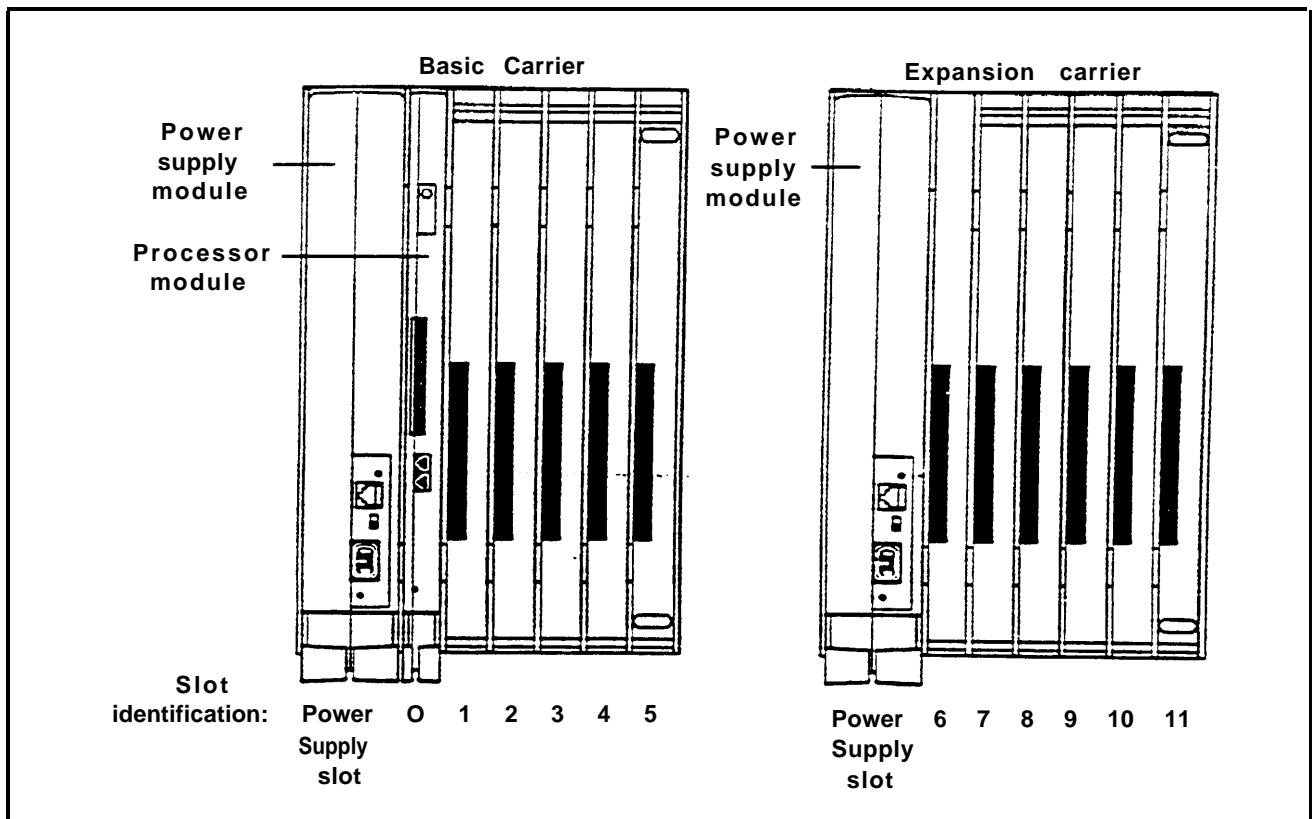
FIGURE 2-14 Module slot assignments on basic and expansion carriers.

Module Installation

All modules can be installed and removed as shown in Figures 2-15 and 2-16. Exercise caution when installing or removing modules. If you have difficulty installing or removing a module, check the module for alignment problems. Inspect the carrier channel for damage. If no damage is present, the modules should snap into place.

NOTE: Do not install or remove modules with the power on unless the system has the On-Line Module Swap feature, available only with Release 3. The Processor Module and Power Supply Module cannot be removed using this procedure. Refer to

"On-Line Module Swap" on page 4-7 and be sure to follow the procedures exactly.

In a system without the On-Line Module Swap feature, turn the power off in the following sequence before installing or removing a module:

1   Turn the power off at the Power Supply Module on the basic carrier.

2   If there is an Auxiliary Power Unit, turn it off.

3   If there is an expansion carrier, turn the power off at the Power Supply Module there.

4   If there is an Auxiliary Power Unit on this Power Supply Module, turn it off.

INSTALLING A MODULE

The following instructions apply when installing any module. Refer to Figure 2-15 and follow these steps:

1   Lower the module onto the rod on the carrier at the appropriate slot. Ensure that the connector on the module mates properly with the connector on the carrier.

2   Gently push the module into the carrier until it locks into place.

Ensure that the connector on the module mates properly with the connector on the carrier.

For instructions on installing specific modules, see the appropriate discussion as follows:

● "Installing the Power Supply Module" on page 2-66

● "Installing the Feature Module on the Processor Module" on page 2-73

● "Installing Line and Station Modules" on page 2-79

● "Installing a Tie Line Module" on page 2-80,

● "Installing a Basic Telephone Module" on page 2-81.
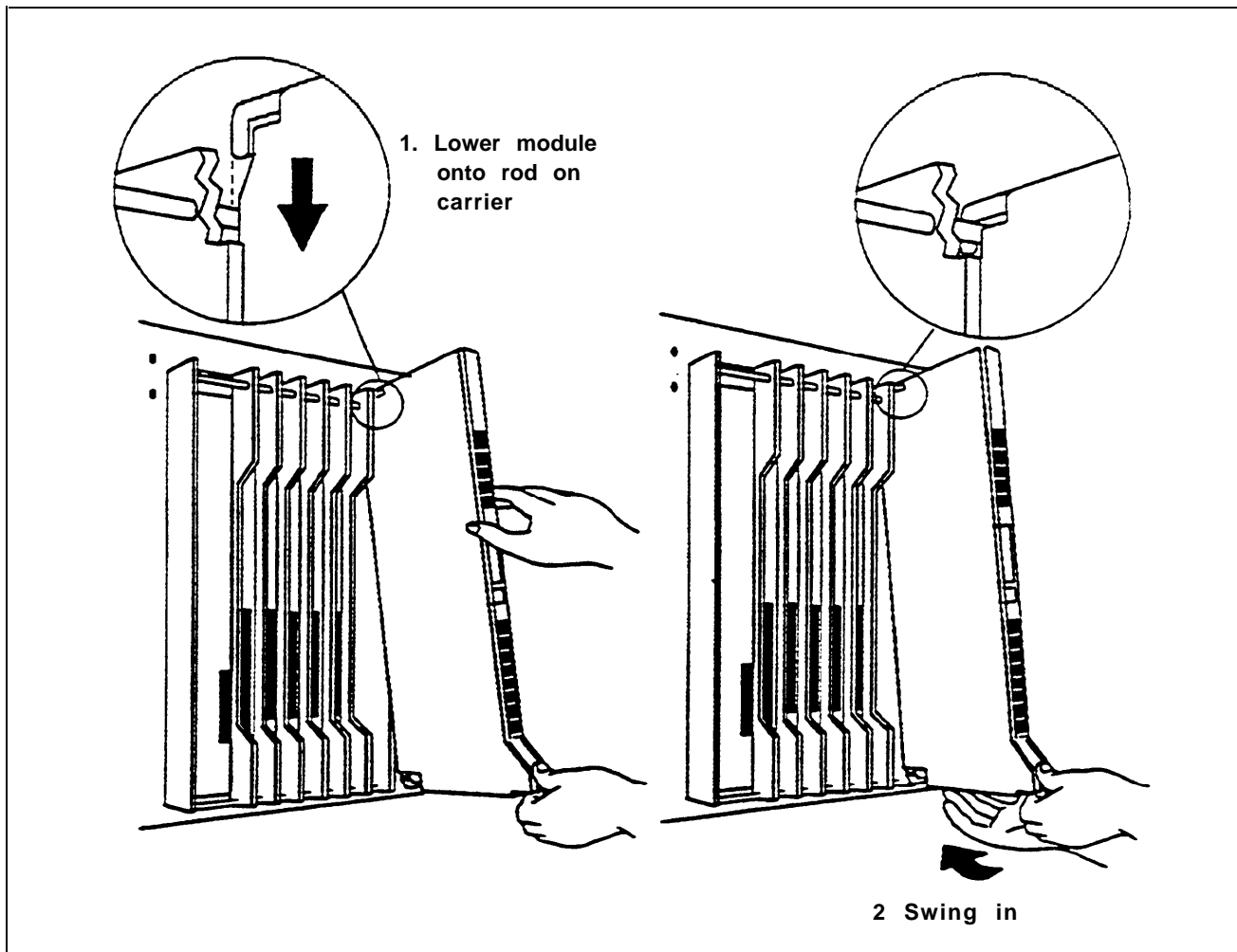
FIGURE 2-15 Installing a module on the carrier.

REMOVING A MODULE

To remove a module, refer to Figure 2-16 and follow these steps:

1 Press up on the release tab on the bottom of the module.

2 Pull the module away from the carrier.

3 Disengage the module from the rod on the carrier.
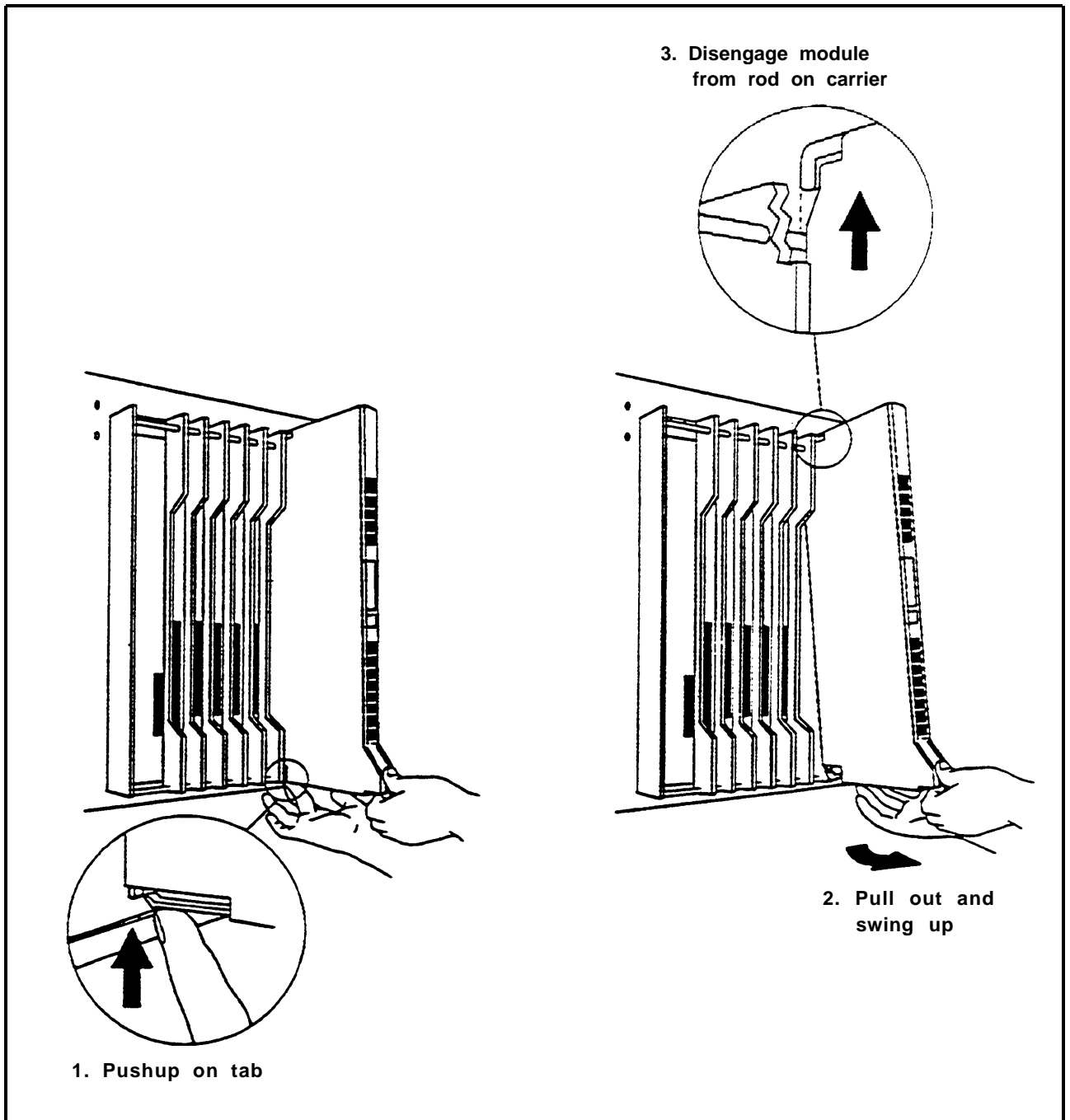
FIGURE 2-16 Removing a module from the carrier.

**INSTALLING THE
POWER SUPPLY
MODULE**

> **WARNING:** Do *not* attach any cables or power cords to the Power Supply Module until it is installed in the carrier. If a Power Supply Module requires a Frequency Generator, it must be installed before the Power Supply Module is installed in the carrier.

Install a Power Supply Module in the leftmost slot of the basic and expansion carriers.

If the carrier will have a Basic Telephone Module, a Frequency Generator must be installed on the Power Supply Module prior to installation. The Power Supply Module containing the Frequency Generator must be installed on the same carrier as any Basic Telephone Modules. Refer to the procedure, "Installing a Frequency Generator in the Power Supply Module" on page 2-67.

If you need to add an expansion carrier to the control unit, the power supply that you add to that carrier may cause excessive noise on certain line or station modules that you place next to it. In order to eliminate the noise, you need to apply a shield to the Power Supply Module. See "Adding a Shield to a Power Supply Module" on page 2-70.

> **WARNING:** Do not apply power to the control unit until. all the modules are installed and you have become familiar with the power up sequence. Failure to comply may result in shock hazard or damage to equipment.

Follow these steps to install the Power Supply Module.

1 Make sure aIl power is removed from the control unit.

2 Set the power switch on the Power Supply Module to *Off.*

3 Install the Power Supply Module in the leftmost slot of the carrier.

4 Connect one end of the ac power cord to the connector marked "AC INPUT" on the Power Supply Module.

5 Do not plug the power cord into the outlet at this time. Refer to "Connecting the Control Unit to an AC Outlet," on page 2-90.

Installing a Frequency Generator in the Power Supply Module

The Frequency Generator converts 117 VAC, 60 Hz to 105 VAC, 30 Hz ringing voltage for basic telephones. Each carrier that has a Basic Telephone Module must have a Frequency Generator installed in the carrier's Power Supply Module. Perform the following steps to install a Frequency Generator. Refer to Figure 2-17.

> **WARNING:** Hazardous electrical voltages may be present if the following steps are not performed correctly.

1 Before installing the Frequency Generator, make sure the power switch of the Power Supply Module is off.

2 If there is an Auxiliary Power Unit, unplug it from the ac outlet and then unplug it from the front of the Power Supply Module.

3 Unplug the Power Supply Module's power cord first from the ac outlet (or from the Auxiliary Power Unit, if used) and then from the front of the Power Supply Module itself.

4 Remove the Power Supply Module from the system.

At this point there should be no cords connected to the front of the Power Supp!y Module.

> **CAUTION:** Be sure to follow proper electrostatic discharge precautions. Refer to "Static Discharge Problems" on page 2-9.

5 With the Power Supply Module out of the carrier and on its left side, remove the five screws.

6 Carefully turn the module over on its right side and remove the left half of its housing.

7 Position the remaining half of the module so that the connector at the back of the module is facing you.

8 Position the Frequency Generator so that its screw holes are aligned with the screw posts on the Power Supply Module.

9 Attach the Frequency Generator to the Power Supply Module using four screws.

10 Locate the cable that has two 3-pin connectors. Connect one end of the cable to the header labeled P101 on the Power Supply Circuit Board. Connect the other end of this cable to the header labeled P1 on the Frequency Generator.

11 Locate the cable that has two 4-pin connectors. Connect one end of the cable to the header labeled P202 on the Power Supply Circuit Board. Connect the other end of the cable to the header labeled P2 on the Frequency Generator.

12 Replace the left half of the module housing. Make sure that the faceplate is positioned correctly.

13 Turn the module over and replace the five screws removed in step 5.

14 Affix the modification label to the wire manager on the front end of the Power Supply Module.

15 Install the Power Supply Module in the carrier.

1. Position the Power Supply Module so that the recessed holes ate facing up. Remove five screws.

2. Separate the module halves.

3. Locate the Frequency Generator and the two cables.

Transformer

Frequency Generator

Long cable (4-pin connectors)

Short cable (3-pin connectors)

Frequency Generate;

Transformer

Main board

Power Supply Module

Main circuit board

4-pin cable

3-pin cable

Frequency Generator

4. Using four screws, mount the Frequency Generator on the Power Supply Module. Install it so that the transformer on the Frequency Generator is close to the main board of the Power Supply Module.

5. Connect 3-pin cable between P101 on main circuit board and P1 on Frequency Generator.

6. Connect 4-pin cable between P202 on main circuit board and P2 on Frequency Generator.

FIGURE 2-17 installing a Frequency Generator in the Power Supply Module.

Adding a Shield to a Power Supply Module

When you add an expansion carrier, you must install a second Power Supply Module in it to power the additional line and/or station modules. The second Power Supply Module may induce excessive noise on the new line or station module immediately to its right. Copper foil shields can be installed to eliminate this noise. These shields are packaged in the 391A Power Unit Shielding Kit included with the expansion carrier.

Before installing the Power Supply Module on the expansion carrier, install a copper-foil shield as follows:

1　Lay the Power Supply Module on a flat surface with the right (as viewed from the front edge) side up.

2　Wipe the right side of the module free of any dust or dirt.

3　Peel the backing paper from the smaller copper foil shield to expose the adhesive.

4　Position the foil on the upper part of the module being sure to tuck the foil tightly into the comer as shown in Figure 2-18. Work out any air bubbles as you press the foil firmly in place.

> **CAUTION:** Make certain of the position of the foil before adhering it to the side of the module. Once in place, the foil is difficult to remove.

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

6　Position the foil on the lower part of the module as shown in Figure 2-18. Work out any air bubbles as you press the foil firmly in place.
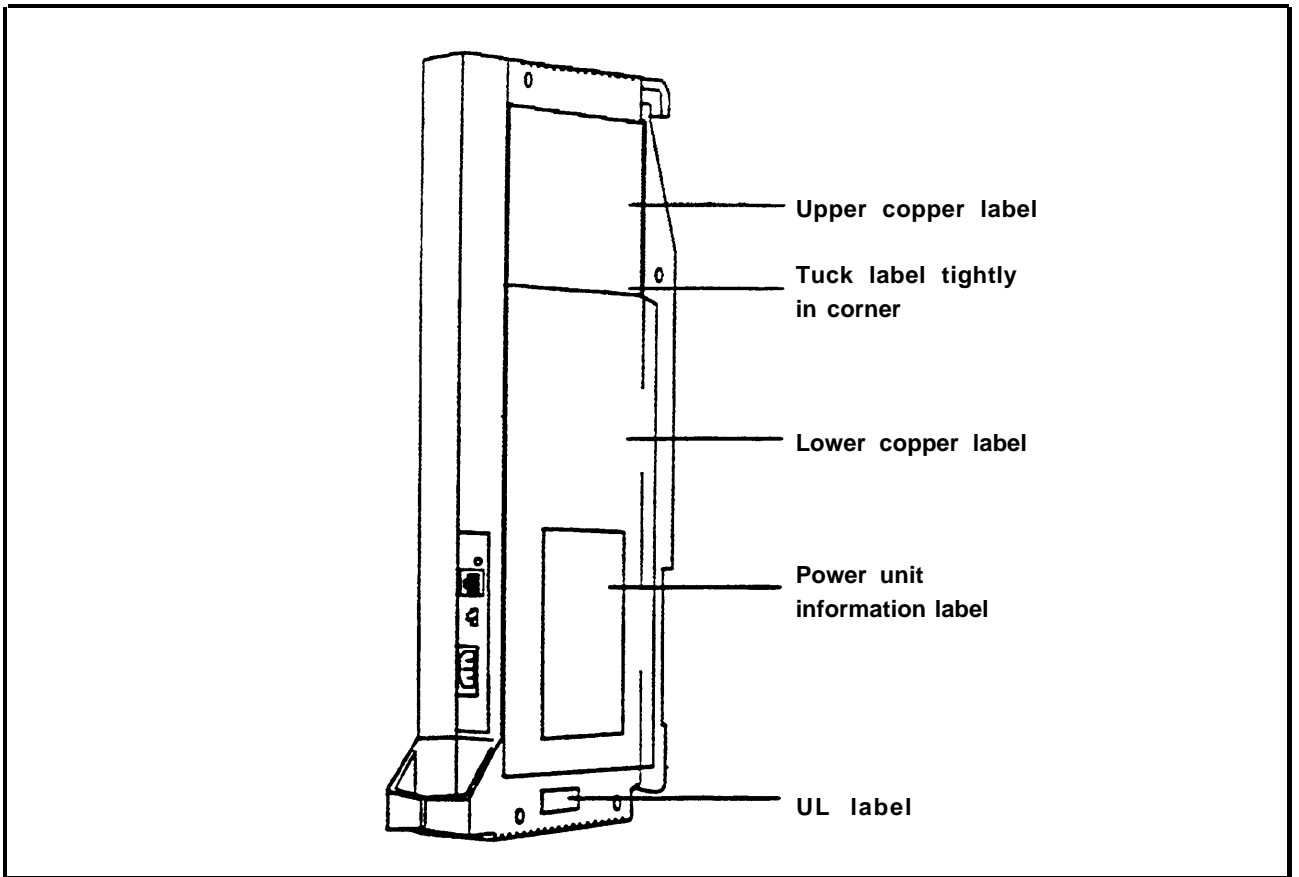
FIGURE 2-18 Proper placement of foil shields and labels on the Power Supply Module.

7 With the copper-foil shielding in place, place the power unit information label on the lower piece of foil as shown in Figure 2-18.

8 Attach the UL label (CSA label as appropriate) on the Power Supply Module below the copper foil in the position shown in Figure 2-18.

INSTALLING THE AUXILIARY POWER UNIT

Install an Auxiliary Power Unit if the system must support more than 45 unit loads.

1   Remove power from the system. Make sure that the 0N/OFF switch on the Power Supply Module is set to the OFF position. Unplug the power cord from the ac outlet.

2   Using appropriate hardware, mount the Auxiliary Power Unit on a surface within 2 feet of the control unit. For further information on mounting the Auxiliary Power Unit, refer to CIB 2866.

3   Plug one end of the control unit ac power cord into the connector labeled "AC INPUT" on the Power Supply Module.

4   Plug the other end of the control unit ac power cord into the outlet labeled "AC OUTPUT" on the Auxiliary Power Unit.

5   Insert one end of the modular line cord into the jack labeled "AUXILIARY POWER INPUT" on the Power Supply Module.

6   Insert the other end of the modular line cord into the jack labeled "AUX POWER" on the Auxiliary Power Unit.

7   Plug one end of the ac line cord into the connector labeled "AC INPUT" on the Auxiliary Power Unit.

8   Plug the other end of the ac line cord into the ac outlet. Do *not* perform this step until you are ready to apply power to the system.

> **CAUTION:** Do not attach the power cord(s) to the building surfaces.

Refer to Figure 2-19 when connecting the Auxiliary Power Unit to the control unit.
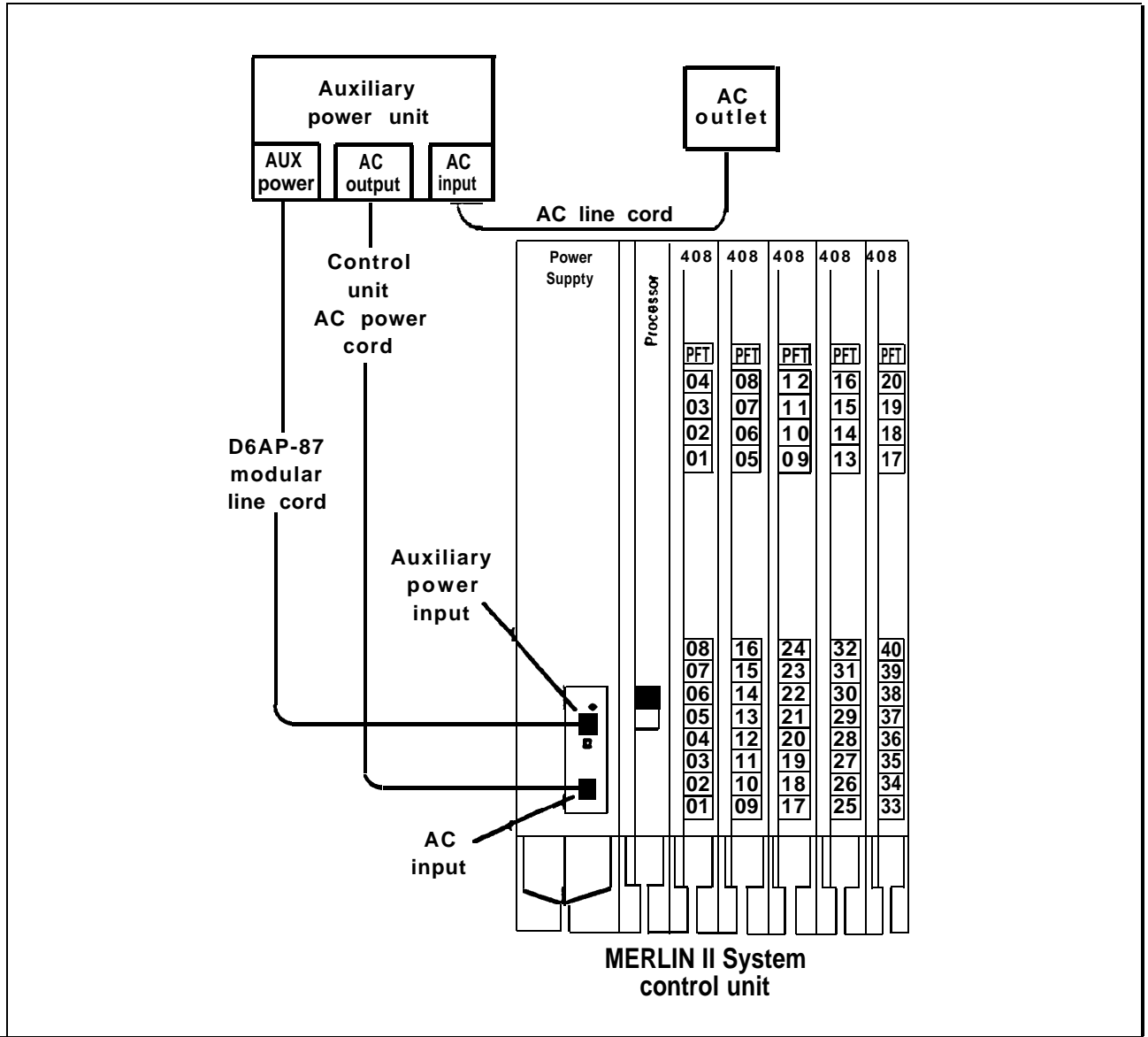
FIGURE 2-19 Connecting the Auxiliary Power Unit to the control unit

**INSTALLING THE
FEATURE MODULE
ON THE PROCESSOR
MODULE**

CAUTION: The Feature Module must be installed *before* installing the Processor Module into the carrier.

The Release 3 Feature Module can only be used with the Processor Modules (517B7 and 517C7) developed for Release 3.

> **CAUTION:** When replacing a Feature Module, make sure that you have all the necessary records to readminister the system. When the Feature Module is replaced, all system memory is lost, and the system will have to be readministered.

1   Affix the round (FMl, FM2, or FM3) label to the front of the Processor Module housing.

2   Remove power from the system. Make sure that the ON/OFF switch on the Power Supply Module is set to the *OFF* position.

3   Remove the Processor Module from the system and rest it on a flat surface with the right (as viewed from the front edge) side up.

> **CAUTION:** Be sure to follow proper electrostatic discharge precautions. Refer to "Static Discharge Problems" on page 2-9.

4   If you are upgrading, remove the previous Feature Module.

5   Align the connectors of the Feature Module with the connectors of the Processor Module.

6   Snap the Feature Module into the Processor Module.

7   Install the Processor Module in slot 0 of the carrier.
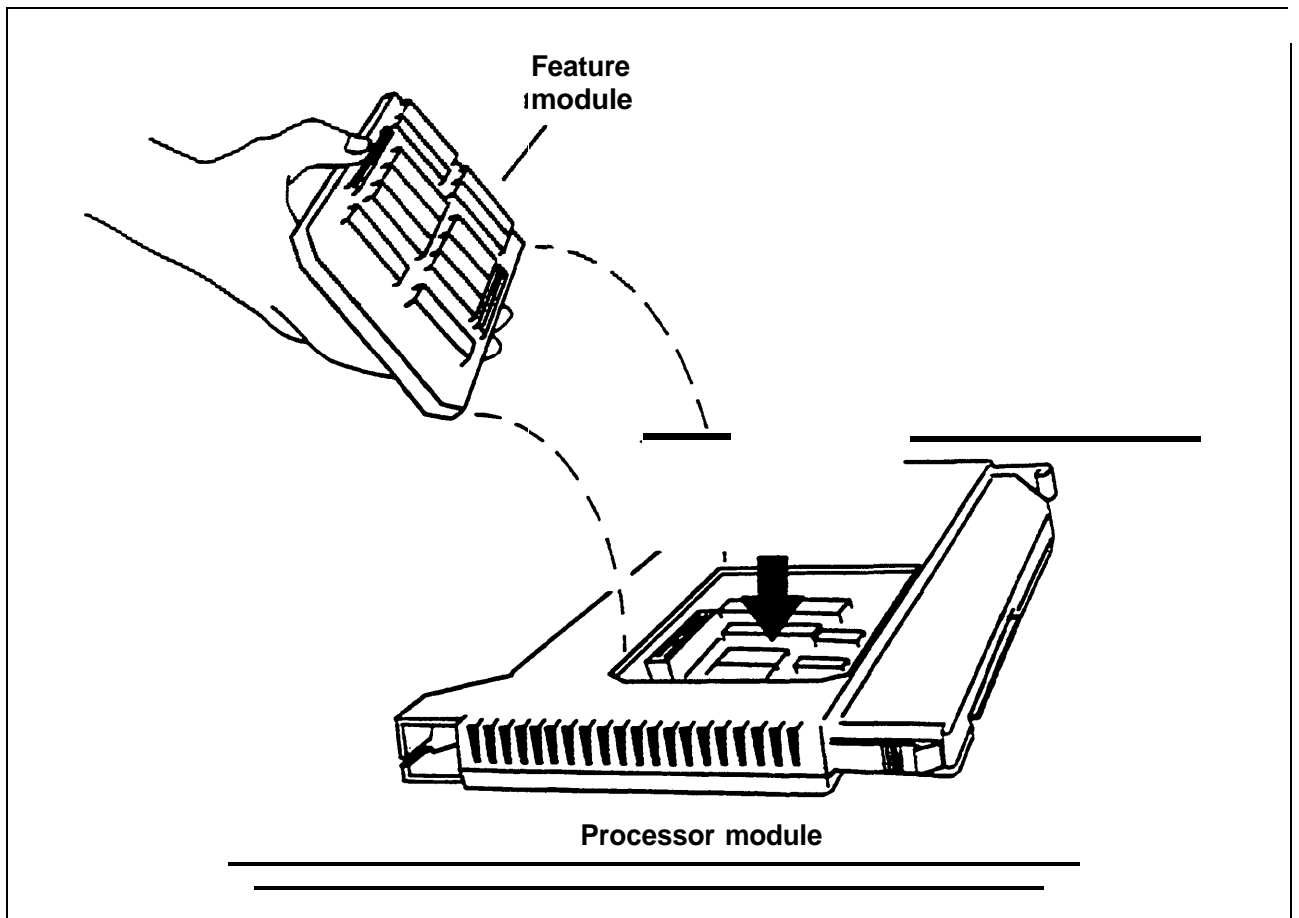
FIGURE 2-20 Installing the Feature Module.

Modifying the 517A7 Processor Module for Square (Key) Operation

The MERLIN II system can be configured to operate solely as a square (key) system. As such, every outside line appears on the same button at each voice terminal. If you have Processor Module 517A7, use the following steps to modify it for square (key) operation:

1 Open the Processor Module case by releasing the seven snaps located around the edges of its case (Figure 2-21).

2 Notice the two headers marked "AA" on the module's processor board. One header is located at the bottom right of the module; the other header is located at the center right. *Do not touch the header at the bottom.*

3 On the header at the center right of the module, locate the shunt (blue plug) attached to one of the pins.

4 Remove the shunt from the single header pin, then reinsert it so that it covers both pins on the header.

5 Snap the module halves back together.

6 Locate the *KF* (Key Function) label that came with the wall mount carrier label kit and affix it to the wire manager at the base of the module.

Snaps

1. Release 7 snaps

2. Open the processor case

Shunt

Pin

3. Locate top header (AA) on processor board

4. Adjust the shunt on top header (AA) to cover both pins

Processor board

Bottom header (AA) (Do not touch)
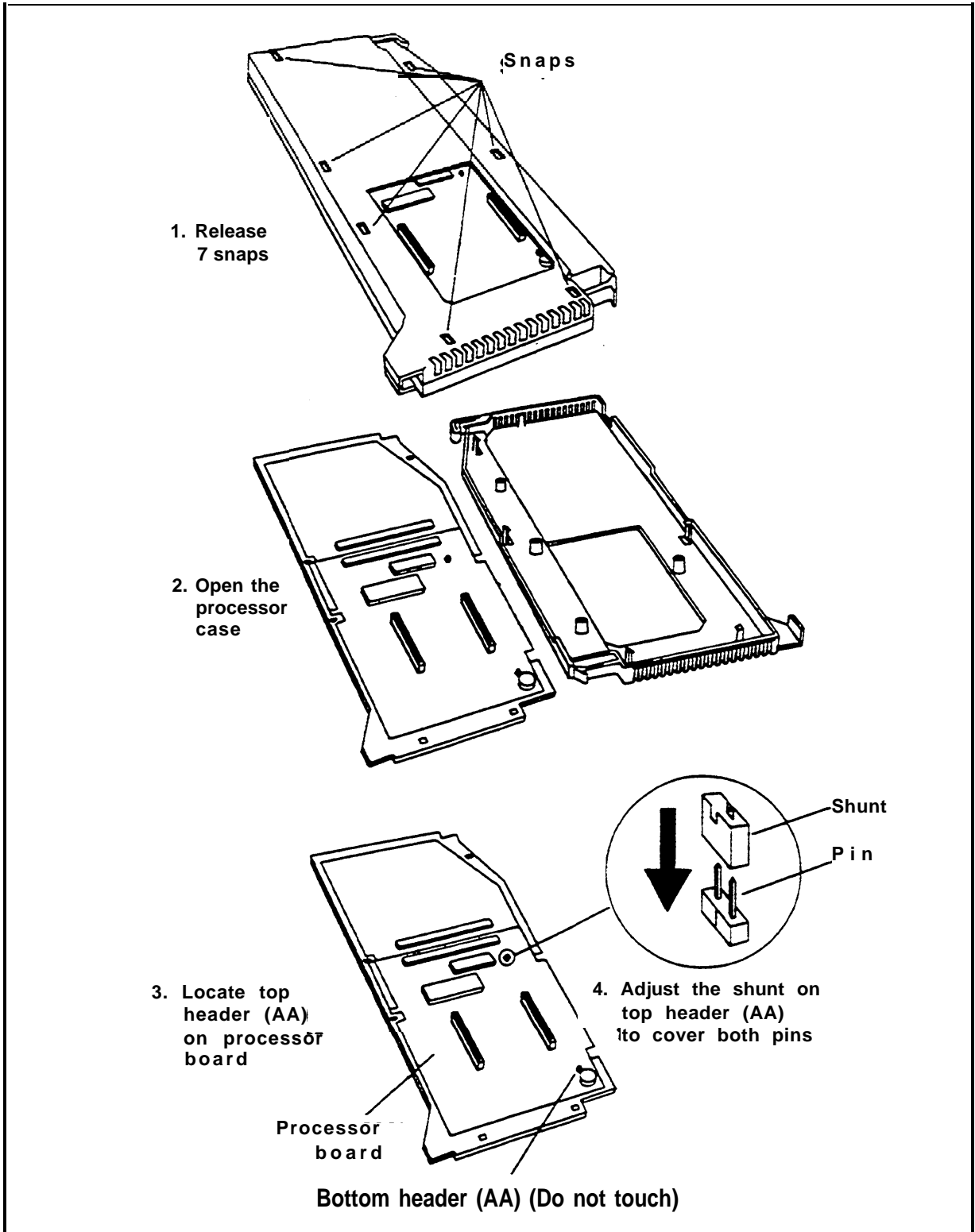
FIGURE 2-21 Modifying the 517A7 Processor Module for square (key) operation.

Modifying the 517B7 Processor Module for Square (Key) Operation

If you have Processor Module 517B7, use the following inductions to modify it for square (key) operation:

1 Before you insert the Feature Module, orient the Processor Module case as shown in Figure 2-22. Do *not* open the Processor Module case.

2 Notice the two headers marked "HD1" and "HD2" on the module's processor board. One header is located at the bottom of the opening (HD2); the other header is located at the top of the opening (HDl). *Do not touch the header at the bottom.*

3 On the header close to the top of the opening, locate the shunt (blue plug) attached to one of the pins.

4 Remove the shunt from the single header pin, then reinsert it so that it covers both pins on the header.

5 Locate the *KF* (Key Function) label that came with the wall mount carrier label kit and affix it to the wire manager at the base of the module.

Top header (HD1)

Shunt

Pin

**Bottom header (HD2)
(Do not touch)**

**Wire
manager**

Closed processor module
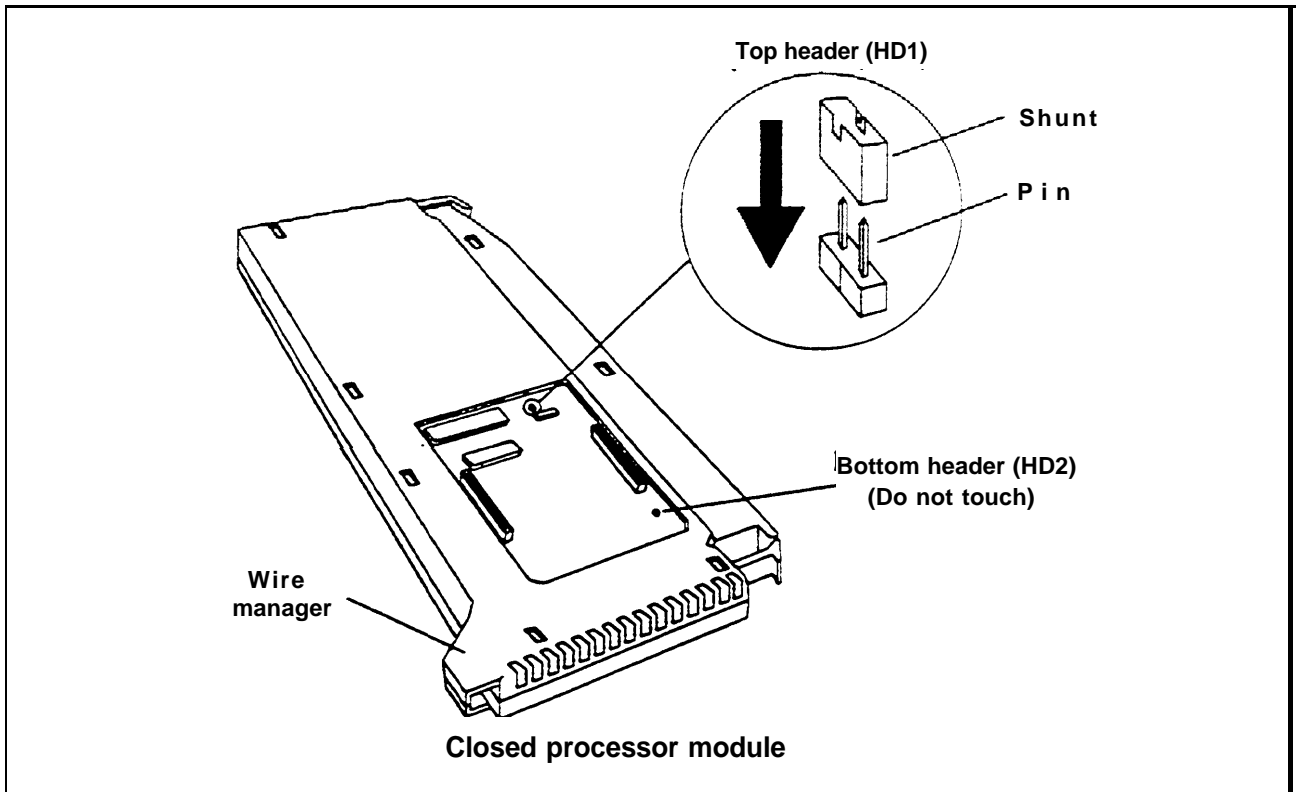
FIGURE 2-22 Modifying the 517B7 Processor Module for square (key) operation.

**INSTALLING LINE
AND STATION
MODULES**

The following installation procedure applies to these modules:

- 4-Line/8-Analog (408) Module

- 8-Analog *(008)* Module

- 4-Line (400 with DTMF) Module

- 8-Line (800) Module

- 8-Digital Station (008D) Module

Install line and station modules as follows:

1   Review the appropriate form to verify which modules
    will be installed on the carrier.

    • Form lc, Station Form—Module Identification
      Diagram (for Release 3)

    •   Master Planning Form, Module Location Diagram
        (for Feature Modules 1 and 2)

2   Install line and station modules in slots 1 through 5 on
    the basic carrier and slots 6 through 11 on the
    expansion carrier.

    NOTE: Do not leave empty slots between modules in
          the carrier. The system will ignore modules
          installed beyond an empty slot.

Installing a Tie Line
Module

Each Tie Line Module provides four tie line ports that may
be individually configured for trunk type and signaling
format.

1   Review forms Form 1a, System Form—Incoming
    Lines and Form lb, System Form—Tie Lines.

2   Install the Tie Line Module in slot 2 through 5 on the
    basic carrier or slot 6 through 11 on the expansion
    carrier.

3   Review "E&M Tie Line Parameters" on page 1-46.
    This material explains tie line parameters and lists
    preferred signaling formats.

Installing a Basic Telephone Module

If you are installing a Basic Telephone Module, you also need to install a Frequency Generator in the Power Supply Module. A Frequency Generator is required for each carrier that has one or more Basic Telephone Modules. If possible, place all Basic Telephone Modules on the same carrier. For additional information, refer to the procedure, "Installing a Frequency Generator in the Power Supply Module," on page 2-67.

NOTE: Basic Telephone Modules are not intended for use with an IROB.

Install the Basic Telephone Modules as follows:

1   Review Form lc, System Form—Module Identification Diagram for Release 3 or Master Planning Form, Module Location Diagram for Feature Modules 1 and 2 to determine which carriers have Basic Telephone Modules.

2   Install the Basic Telephone Modules on the carrier.

CONNECTING A PRINTER TO THE CONTROL UNIT

A printer (AT&T models 475/476, 572) can be connected to the control unit through the SMDR port on the Processor Module.

NOTE: The AT&T 570 printer is not compatible with the MERLIN II system because it is not a serial printer.

The following items are required for installation:

- EMI Filter (Z200A)

- Adapter (355AF) for male connector on interface cable

    or

- Adapter (355A) for female connector on interface cable

Before connecting a printer to the control unit, make sure that all modules are installed on the control unit Refer to Figure 2-23 and the following instructions to connect a printer to the control unit:

1 Locate the Z200A EMI filter. Notice that the filter is closer to one end of the cord than the other. Plug the end of the cord closest to the filter into the SMDR port of the Processor Module. The SMDR port is the top port on the Processor Module.

2 Plug the other end of the EMI filter into the module jack on the adapter (355AF or 355A). If the printer has a female connector on its interface cable, use a 355A adapter instead of a 355AF adapter.

3 Connect the female connector on the adapter to the 25-pin male connector on the printer's interface cable.

4 Set the printer options for use with the Call Report (SMDR) feature.

   > If you have an AT&T 572 printer, set the programming options on the printer according to Table 2-10. Refer to the user's guide supplied with the printer for further information.

   > If you have an AT&T 475/476 printer, set the DIP switches on the printer according to Table 2-11. Refer to the user's guide supplied with the printer for further information.
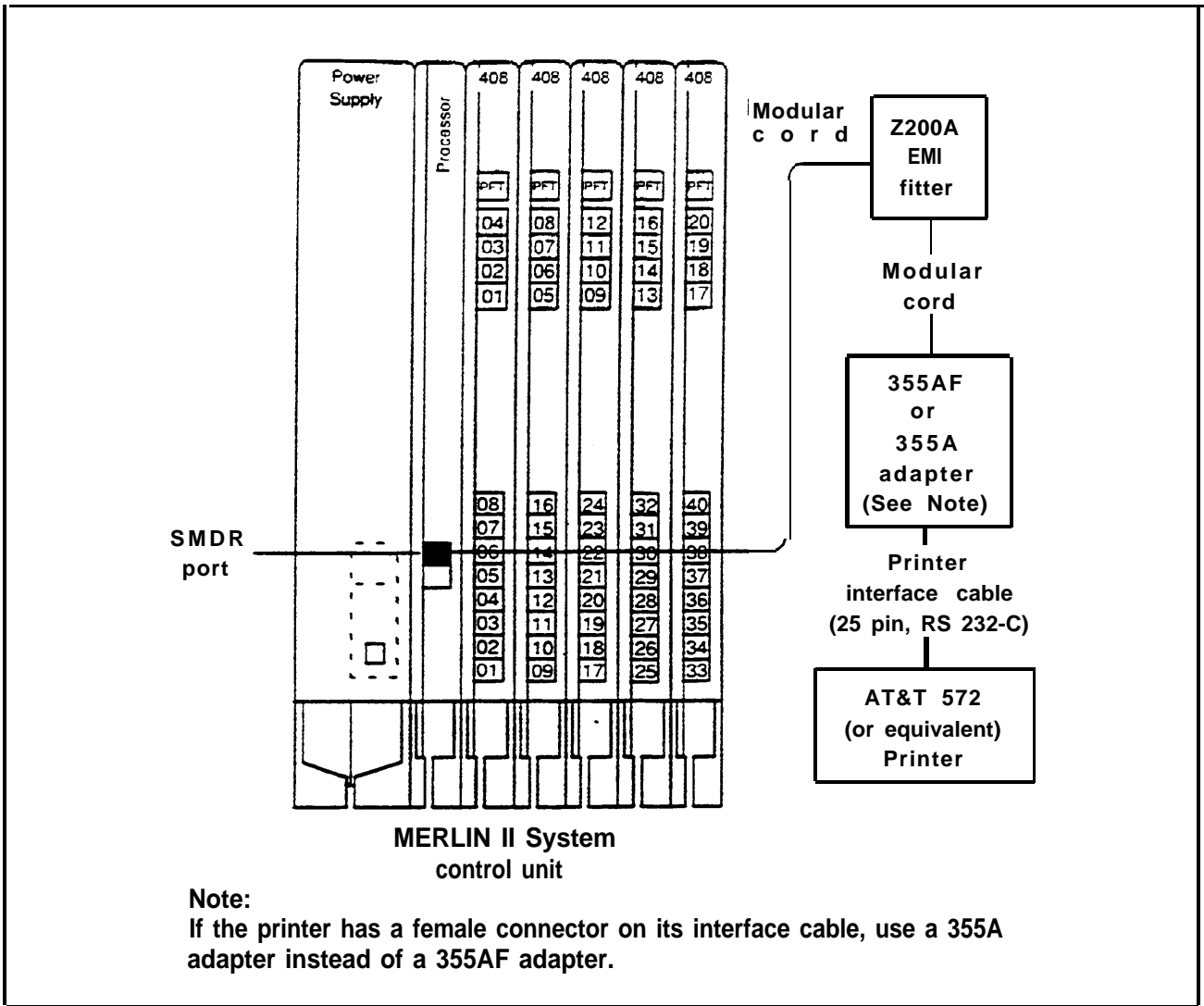
FIGURE 2-23 Connecting a printer to the control unit.

TABLE 2-10 AT&T 572 Printer Programming Options

No.	Function	Menu	Status
01	FORM LENGTH	09	11
02	LP1	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	N-LINE
13	PW ON MODE	01	ON-LINE
14	DIRECTION	01	B1-DIR.1
15	BUF. FULL	02	LF+CR
16	P.E.	01	ACTIVE
17	AUTO CR	01	CR+LF
18	ZERO	01	0
22	AUTO LF	01	CR ONLY
31	1" SKIP	01	OFF
32	CHAR. SET (GO, GL)	02	USA
33	CHAR. SET (G1, GR)	01	UK
34	CHAR. SET (G2)	03	GE
35	CHAR. SET (G3)	07	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	1
95	PARITY	01	NON
96	BPS	04	1200

TABLE 2-11 AT&T 475/476 Printer DIP Switch Settings

Switch 1	Switch 2	Switch 21
DIP1-Open DIP2-Closed DIP3-Open DIP4-Open DIP5-Closed DIP6-Closed DIP7-Closed DIP8-Open	DIP1-Open DIP2-Open DIP3-Open DIP4-Open DIP5-Open DIP6-Open DIP7-Closed DIP8-Open	DIP1-Open DIP2-Open DIP3-Open DIP4-Closed DIP5-Open DIP6-Open DIP7-Open DIP8-Closed
Switch 22	**Switch 23**	**Switch 24**
DIP1-Open DIP2-Closed DIP3-Closed DIP4-Open	DIP1-Closed DIP2-Open DIP3-Open DIP4-Open DIP5-Closed DIP6-Open	DIP1-Open DIP2-Closed DIP3-Closed DIP4-Open DIP5-Open DIP6-Closed DIP7-Open DIP8-Closed

NOTE: Open = off, Closed= on.

Connecting a Printer to the Control Unit 50 or More Feet Away

When the printer is located greater than 50 feet away from the control unit, or the printer and the MERLIN II system are not connected to the same ground, connect the printer according to these instructions. The following items are required for installation:

- EMI Filter (Z200A)

- Adapter (355AF) for male connector on interface cable

  or

- Adapter (355A) for female connector on interface cable

- Two 400B2 Power adapters (21691)

- Z3A1 ADU

- Z3A1 or Z3A4 ADU

- EIA crossover cable (M7U-87)

- ADU crossover cable (D8AM-87)

- AC transformer (2012D)

- Adapter (2488)

- Adapter (858A)

- Power cord (D6AP-87)

Before connecting a printer to the control unit, make sure that all modules are installed on the control unit. Refer to Figure 2-24 and the following instructions to connect a printer to the control unit:

1 Locate the Z200A EMI filter. Notice that the filter is closer to one end of the cord than the other. Plug the end of the cord closest to the filter into the SMDR port of the Processor Module. The SMDR port is the top port on the Processor Module.

2 Plug the other end of the EMI filter into the modular jack on the adapter (355AF or 355A).

3 Connect the female connector on the 355AF adapter to one end of the EIA crossover cable. Connect the other end of the cable to the 25-pin male connector of the Z3AI ADU.

4 Connect the modular jack marked "telephone" on the ADU to one of the input modular jacks on the 400B2 power adapter. The 2012D ac transformer is connected to the other input modular jack of the power adapter via a 248B adapter and a D6AP-87 power cord.

5 Plug the output modular jack from the 400B2 adapter into the ADU crossover cable (D8AM-87). Connect the output of the D8AM-87 to the building wiring.

> **WARNING:** If the printer is in a building outside of the main (control unit location) building, an ADU and an additional protector must be installed in each building. The ADUs and protectors provide both the control unit and the printer additional protection against exposure to lightning, inadvertent contact with power lines, and power currents induced by nearby power lines. See the ADU installation notes for more information.

6 At the remote printer location, connect another 400B2 power adapter, as described in step 4. the output from the 400B2 adapter is connected to the building wiring and the input modular jack should be connected to the ADU.

7 If the printer interface cable has a female connector, connect the output modular jack of the power adapter to a Z3A1 ADU. If the printer interface cable has a male connector, connect the output modular jack of the power adapter to a Z3A4 ADU.

8 Set the printer options for use with the Call Report (SMDR) feature.

> If you have an AT&T 572 printer, set the programming options on the printer according to Table 2-10. Refer to the user's guide supplied with the printer for further information.

> If you have an AT&T 475/476 printer, set the DIP switches on the printer according to Table 2-11. Refer to the user's guide supplied with the printer for further information.
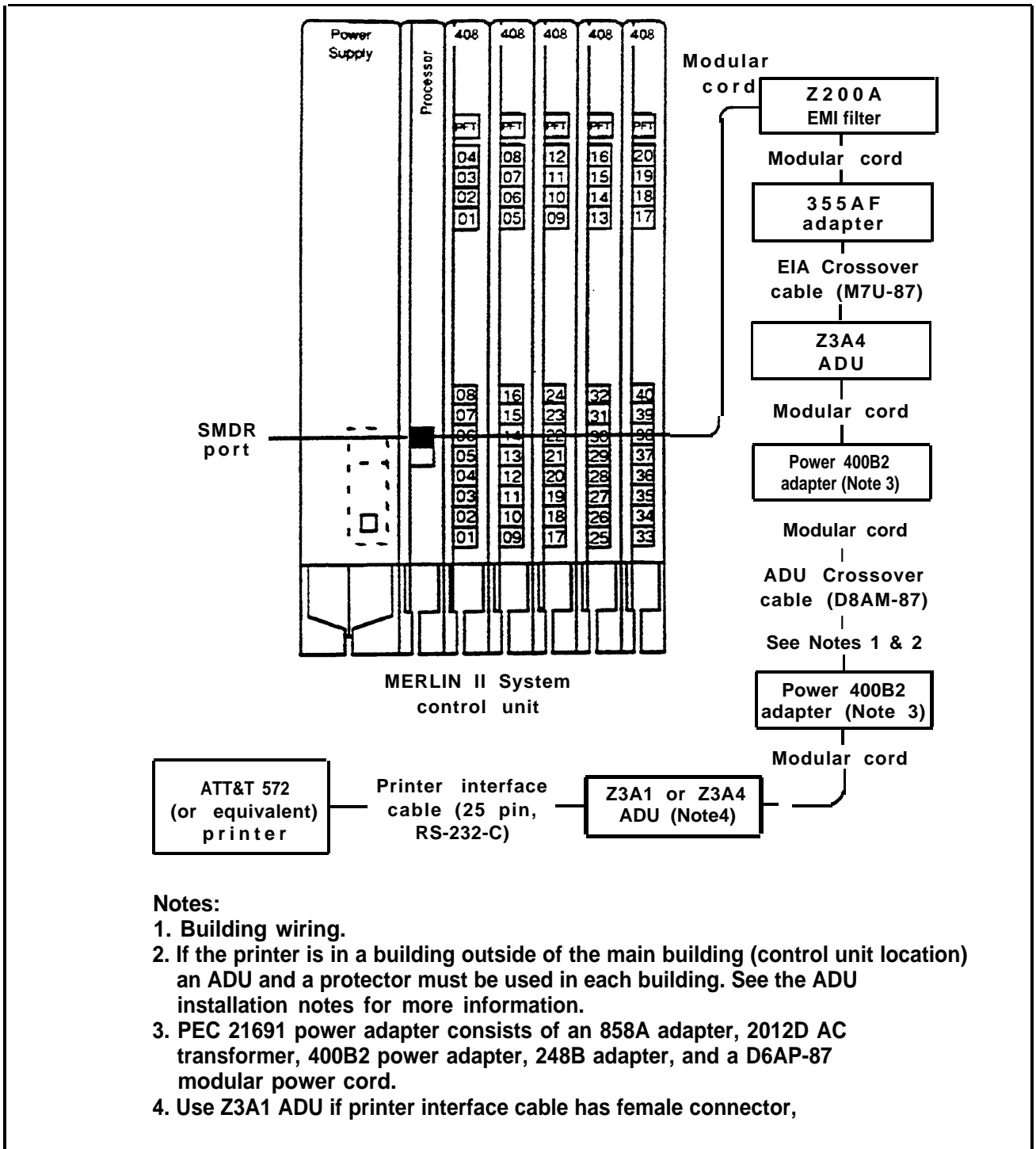
FIGURE 2-24 Connecting a printer to the control unit (when the distance is more than 50 feet or when they are not connected to the same ac outlet).

CONNECTING THE CONTROL UNIT TO AN AC OUTLET

A properly grounded outlet protects the system against damage from power surges and other disturbances. Refer to "System Grounding Requirements" on page 2-5. The outlet should be 117-volt, 60-Hz, third wire grounded. To ensure proper operation of the system, the ac outlet should be connected to earth ground.

NOTE: Do not connect the control unit to a switch controlled outlet. Accidental disconnection and loss of data may occur.

Perform the following steps to connect the control unit to an ac outlet:

1   Make sure the power switch on the Power Supply Module is in the *OFF* position. If there is an expansion power supply, turn it off also. If the system has any Auxiliary Power Supplies, make sure that they are unplugged from the ac outlet.

2   Plug one end of the power cord into the connector just below the power switch on the front of the Power Supply Module labeled "AC INPUT." Do this for each carrier.

3   If the system has one or more Auxiliary Power Units, see "Installing the Auxiliary Power Unit" on page 2-72.

4   Plug the other end of the power cord into the ac outlet, allowing for at least 1 foot of slack.

> **CAUTION:** Do not attach the power cord(s) to the building surfaces.

POWER TO THE SYSTEM

When the system is completely installed and ready to be powered-up, follow the sequences described below to apply or remove power.

To Turn the Power On
1 If there is an Auxiliary Power Unit(s), plug it (them) into the ac outlet.

2 If there is an expansion carrier(s), set that power supply switch to the *ON* position.
   The green power light on the Power Supply Module goes on.

3 Set the power switch on the basic carrier's Power Supply Module to *On.*
   The green power light on the Power Supply Module goes on.

   The red warning light on the Processor Module should go off in 30 to 45 seconds.

To Turn the Power Off
1 First turn off the power at the basic carrier.

2 Then turn the power off at the expansion carrier(s).

3 Finally, if there are Auxiliary Power Units, unplug them from the ac outlet. Because the MERLIN II Power Supply Modules are already OFF, the auxiliary power cord removal sequence is not important.

Normal Operation
If the system is operating properly, you will find these indicators:

• The green power light on the Power Supply Module remains on.

• The red light on the Processor Module goes on for 30 to 45 seconds during power-up and then goes off.

• All indicators on the Tie Line Module remain off when that module is idle. See "Tie Line Module, Status Indicators" on page 1-25.

If any of the conditions listed have not occurred, refer to Section 4, "Troubleshooting."

Connecting the Voice Terminals

You can connect any of the following analog voice terminal models to the MERLIN II system:

- 7102A
- 5-Button
- 10-Button
- 10-Button HFAI
- BIS-10
- BIS-22
- BIS-22D
- 34-Button
- 34-Button Deluxe
- 34-Button (SP-34)
- 34-Button (SP-34D)
- BIS-34
- BIS-34D with Display
- MERLIN II System Display Console

NOTE: The 7102A is the same as a basic telephone and must be connected to a 012 module.

In addition to the analog voice terminals, you can also use the following digital voice terminals:

- 7406D
- 7406D with Display
- 7406D with Data Stand
- 7406D with Display and Data Stand

The digital voice terminals connect to the jacks on the 8-Digital Station (008D) Module. See the *MERLIN II Communications System Data Communications Guide* for more information.

The following voice terminal items come boxed together:

Voice terminal body

- Handset
- Coiled handset cord
- Modular voice terminal cord
- Desk stand and/or wall mount
- Instructions for assembling the voice terminal

Refer to Figure 2-25 and follow the steps below to assemble each voice terminal:

1 Attach the desk stand or wall mount to the voice terminal.

2 Plug one end of the coiled handset cord into the handset.

3 Plug the other end of the coiled handset cord into the jack near the handset rest at the lower edge of the voice terminal body. The jack may also be located at the base of the voice terminal body next to the handset symbol.

4 Make sure that the Test/Program (T/P) switch, also On the left side of the voice terminal, is set to the center position. If the switch is set to *T* or *P,* the voice terminal will begin ringing as soon as you connect it to a system that is turned on.

5 Slide the volume control on the left side of the voice terminal to the center position to adjust the ringer volume.

6 Thread the modular voice terminal cord between the desk stand and back of the voice terminal, then plug the cord into the jack labeled "LINE" on the voice terminal.
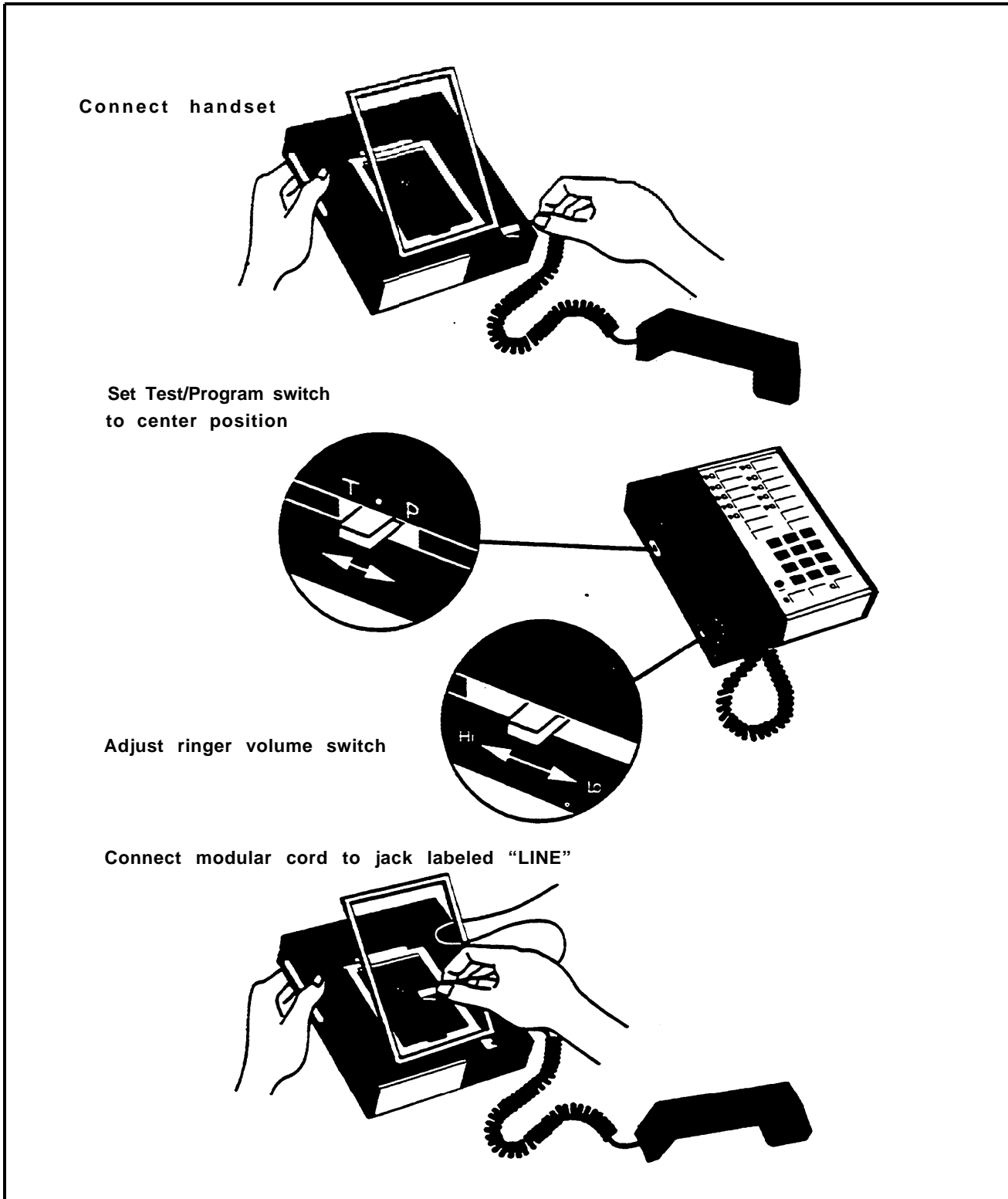
FIGURE 2-25 Assembling a voice terminal.

CONNECTING VOICE TERMINALS TO THE SYSTEM

To connect each voice terminal to the system, do the following:

1   Place the voice terminal in its designated location.

2   Plug the voice terminal into the system either by direct connection or through a jack field.

Connecting a voice terminal to the control unit directly requires one or more modular cords. Connect one end of the cord to the jack on the voice terminal. Connect the other end of the modular cord to a station port on a system module in the control unit. Refer to "Connecting Voice Terminal Wiring Directly" on page 2-25.

Connecting a voice terminal to the control unit through a jack field requires that cables from the voice terminals and control unit be connected to a jack field. Refer to "Jack Field Wiring" on page 2-33 for more information.

TESTING THE VOICE TERMINALS

Perform the following steps to verify that the voice terminals are connected properly.

1   Make sure that the Test/Program switch on the left side of each voice terminal is set to the center position. This step prevents the phones from ringing when the power at the control unit is turned on.

2   If the power to the control unit is not turned on, turn on the power at the control unit using the procedure described in "Applying Power to the System" on page 2-90.

3   Slide the T/P switch to *T*. On some voice terminals you will have to hold it there to keep it from springing back to the center position.
    All the red and green lights on the voice terminal begin flash, and a tone sound.

4   Slide the T/P switch to the center position.
    The lights stop flashing and the tone stops.

5   Lift the handset.
Red and green lights are on and a dial tone is present.

6   Touch one or more dial pad buttons.
The dial tone stops.

7   Hang up the handset.
The green light goes out.

If the voice terminal does not respond as described, make a note of the problem and refer to Section 4, "Troubleshooting."

Verify Intercom Number

Verify the voice terminal's intercom number as follows:

1   Using a working voice terminal, touch Intercom (fifth button down in the leftmost column).

2   Lift the handset or press Speakerphone

3   Dial the intercom number you want to verify.
If the voice terminal with the intercom number you dialed rings, you have verified the intercom number.

   NOTE: If you dial an intercom number that is not assigned or in use, you will hear a busy signal.

LABELING EACH VOICE TERMINAL

As you test the voice terminals, label each one with its intercom number as follows:

1   Find the intercom number labels that came with the voice terminal and fill in an intercom number label for each voice terminal.

2   Pry the plastic number card retainer from its position below the handset rest.

3   Lay the intercom number label in the recess, and replace the plastic retainer.

CONNECTING THE POWER FAILURE TELEPHONE

A module that has outside line jacks also has at least one Power Failure Telephone (PFT) jack (Figure 2-26). If a power failure temporarily disables the MERLIN II system control unit and voice terminals, you can still gain access to an outside line through a basic Touch-Tone or rotary dial telephone that is plugged into the PFT jack on a module with outside line jacks.

When the power goes down, the basic telephone becomes active and uses the line number assigned to the *lowest* position line jack on the module. The top PFT jack on both the 408 and 800 modules uses the line number assigned to the fourth line jack from the top. The lower PFT jack on the 400 with DTMF module uses the line number assigned to the jack immediately above it.

To use any PFT jack properly, plug a basic telephone into it when the system is installed and be sure that the outside line jack to which the PFT jack bridges has an outside number assigned to it. If a line jack bridged by the PFT jack does not have a line number assigned to it, the PFT jack bridges to nothing in the event of a power failure, and you do not have access to an outside line.

NOTE: A MERLIN II system voice terminal will *not* work as a power failure telephone.
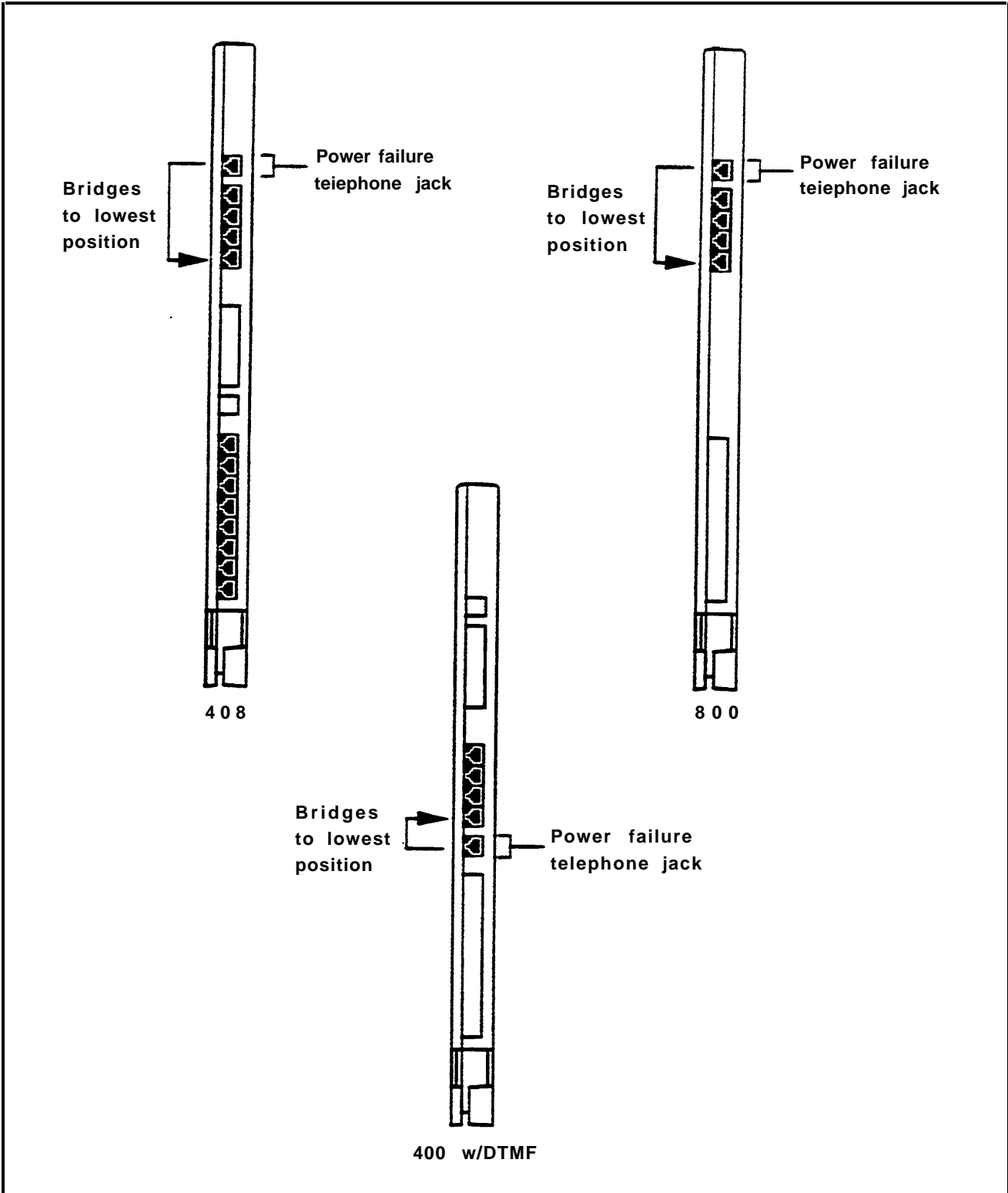
FIGURE 2-26 PFT jacks with bridging assignments.

TESTING THE PFT JACKS

To test a PFT jack for proper operation, the outside line numbers to the module's line jacks must be assigned and the lines must be operational, When you are certain of this, follow the procedure below to test the PFT jacks:

1   Plug a Touch-Tone or rotary dial telephone into a PFT jack.

2   Make note of the outside line number assigned to the lowest position line jack on the module and be sure that the outside line is connected to the system.

3   First turn off power to the control unit at the Power Supply Module on the basic carrier, then at the Power Supply Module on the expansion carrier.

4   Lift the handset on the Touch-Tone or rotary dial telephone.
    You should hear dial tone.

5   Dial an outside number where you know someone will answer the call.

6   After the call is answered and you have verified two-way communication, tell the person the telephone number assigned to the outside line jack bridged by the PFT jack to which you are connected.

7   Have that person call the number after you hang up.
    Your phone should ring after the other person completes dialing the number.

8   Answer the phone and verify two-way communication before disconnecting.

9   Turn the power back on, first at the expansion carrier, then at the basic carrier.

Testing the System

Perform the following tests to determine that the system is working properly. If these tests reveal any problems, refer to Section 4, 'Troubleshooting," and take corrective action

TESTING THE VOICE TERMINAL JACKS FOR A DIAL TONE

To test each voice terminal jack for intercom and outside line dial tones at the control unit location, follow the steps below. Refer to "Default Settings" on page 3-15 for an explanation of how default line and station identifying numbers are assigned.

Before you begin testing, follow these steps:

1 Make sure the outside lines are connected to the system.

2 Take your administrator/attendant console to the control unit.

3 Unplug the jumper cord from the jack on the control unit for Intercom 10 (jack location 01), and plug in the modular voice terminal cord for the console you are using for the test.

   The red light goes on next to the third button down in the leftmost column of buttons.

Testing for an Intercom Dial Tone

1 Touch the fifth button down in the leftmost column of buttons (intercom-Ring).

   The red light goes on next to this button.

2 Pick up the handset.

   The green light next to the red light goes on and you hear an intercom dial tone.

3 Replace the handset and touch the fourth button down in the leftmost column of buttons (Intercom-Voice).

   The red light goes on next to this button.

4 Pick Up the handset.

The green light next to the red light goes on and you hear another intercom dial tone.

5 Replace the handset.

Testing for an Outside Line Dial Tone

1 Without lifting the handset, touch a line button.

The red light goes on next to this button.

2 Pick up the handset.

The green light to the red light goes on and you hear a dial tone.

3 Replace the handset, and repeat Steps 1 and 2 for each line button on the voice terminal.

After you have performed the two tests, unplug the voice terminal cord from the jack at Intercom 10 (jack location 01) and plug it into the next voice terminal jack you are testing. Reconnect the jumper cord to Intercom 10. Repeat the two tests on every voice terminal jack on the control unit to verify both intercom and outside line dial tones.

When you are finished, make sure all the jumper cords are plugged in to the correct jacks on the control unit (match the number on the cord's label with the number next to the jack on the control unit), and return the administrator/attendant console to its original location.

TESTING INTERCOM CALLS

To make sure the system can be used to place intercom calls, perform this test from one voice terminal to another in the system. Make sure someone will answer the call.

Testing Intercom-Voice

1 At any voice terminal in the system, touch the fourth button down in the leftmost column of buttons (Intercom-Voice).

The red light next to the button goes on.

2 Lift the handset.

The green light next to the red light goes on and you hear an intercom dial tone.

3 Dial the intercom number of the voice terminal where someone is waiting for the call.

You hear a single tone. At the other voice terminal, on tone sounds, the red light glows steadily next to (Intercom-Voice), and the green light next to the red light flashes.

4 Speak into your handset or speakerphone.

5 The other person now picks up the handset, and tells you if the announcement was heard clearly.

At the other voice terminal the green light stops flashing and glows steadily when the handset is lifted.

6 After verifying two-way communication, hang up the handsets.

On each voice terminal, the lights go out, and the red light goes on next to the third button down in the leftmost column of buttons.

Testing Intercom-Ring

1 At any voice terminal in the system, touch the fifth button down in the leftmost column of buttons (Intercom-Ring).

The red light next to the button goes on.

2 Lift the handset.

The green light next to the red light goes on and you hear an intercom dial tone.

3 Dial the intercom number for the voice terminal where the other person is waiting for the call.

You hear ringing. At the other voice terminal, three short rings sound, the red light glows steadily next to the fifth button down in the left most column of buttons (Intercom-Ring), and the green light next to the red light flashes.

4 Wait until the other person answers and verify two-way communication.

At the other voice terminal, the green light stops flashing and glows steadily.

5 After verifying two-way communication, hang up at both voice terminals.

On both voice terminals, the lights go out, and the red light goes on next to the third button down in the left most column of buttons.

TESTING OUTSIDE LINES

Make sure the outside lines for the numbers assigned to the system are connected to the control unit modules.

Testing Each Outside Line Number for Incoming Calls

Perform this test from the administrator/attendant console at Intercom 10:

1 From any other voice terminal in your system, have someone dial the outside line numbers in the order in which they appear on Form 1a, System Form-Incoming Lines, for Release 3 or the Master Planning Form for Feature Modules 1 and 2.

As each call is completed, the console starts to ring, the green light flashes and the red light goes on next to the appropriate line button.

If the green light flashes next to the wrong line button, make sure the connections are correct between the jacks in the line module(s) in the control unit and the jacks at the network interface or in the jack field.

2 When you have verified two-way communication, hang up the handsets at both voice terminals.

The green light next to the button for the outside line should go off. When you're testing line 01, the red light stays on the third button. When you're testing subsequent lines, the red light jumps back from the line that was tested to the third button.

3 Repeat the procedure for each of the outside line telephone numbers.

Placing Outside Calls   Use any voice terminal in the system to test the ability to place outside calls on each outside line as follows:

1   Lift the handset.
    The green light goes on next to the red light.

2   Dial the outside number of someone you know will answer the call.

3   Verify two-way communication and then hang up.

4   Repeat the procedure for each of your outside line telephone numbers.

TESTING TIE LINES   Before making these tests, make sure that the tie lines for the system are connected and properly configured.

NOTE: Refer to "Tie Line Troubleshooting" on page 4-11 if you have any problems with tie line installation or testing.

Testing Outgoing and Two-way Automatic Ringdown Tie Lines   Before testing Outgoing or Two-way Automatic Ringdown tie lines, or automatic start tie lines, arrange to have someone waiting at the automatic ringdown console to receive your call. The automatic ringdown console is the voice terminal on which automatic ringdown tie line calls are received. Follow these steps:

1   At any voice terminal that has a tie line appearance, press the first tie line button.
    The red light jumps to the tie line button just pressed.

2   Lift the handset.
    The green light goes on next to the red light and you hear ringing.

3   Verify two-way communication and then hang up.

4   Repeat this procedure for each tie line administered.

Testing Outgoing and Two-way Dial Repeating Tie Lines

Test dial repeating he lines, wink start, immediate start, and delay start tie lines when you are sure that someone is available to receive your call at the far end. Follow these steps:

1   At any voice terminal that has a tie line appearance, press the first tie line button.
    The red light jumps to the tie line button just pressed.

2   Lift the handset.
    The green light goes on next to the red light.

3   Dial the tie line number of the station where someone is waiting for your call.
    You hear ringing.

4   Veify two-way communication and then hang up.

5   Repeat this procedure for each tie line administered.

Testing Incoming and Two-way Automatic Ringdown Tie Lines

Have someone at the far end system, where the tie lines are connected, place a call to you at the MERLIN II system automatic ringdown console. Follow these steps:

1   At a preset time, the person at the far end places a call to your system.
    You hear ringing at the console connected to the tie line and the green light flashes next to the button that has the tie line appearance.

2   Lift the handset,
    The red light goes on next to the tie line button and the green light becomes steady.

3   Verify two-way communication and then hang up.

4   Repeat this procedure for each tie line administered.

Testing Incoming and Two-way Dial Repeating Tie Lines

Test dial repeating tie lines when someone is available at the far end to place calls to your system. Follow these steps:

1   At a preset time, the person at the far end places a dial repeating call to your system by dialing the tie line number of the voice terminal at which you are waiting.
    You hear ringing at the designated voice terminal and the green light flashes next to the button that has the tie line appearance.

2   Lift the handset.
    The red light goes on next to the tie line button and the green light becomes steady.

3   Verify two-way communication and then hang up.

4   Repeat this procedure for each tie line administered.

Completing the Installation

ATTACHING THE CONTROL COVERS

After wiring and testing the system, install the front and top cover on the control unit. (Refer to Figure 2-27.) A set of covers should be installed on both the basic carrier and the expansion carrier. Make sure that there is a module in the rightmost slot of each carrier so that the covers are properly supported. If no functional module occupies the rightmost slot of a carrier, install the empty module that came with the system. Refer to Figures 2-28 and 2-29 as a guide when attching the covers to the control unit.

Top cover

AT&T MERLIN II

Front cover
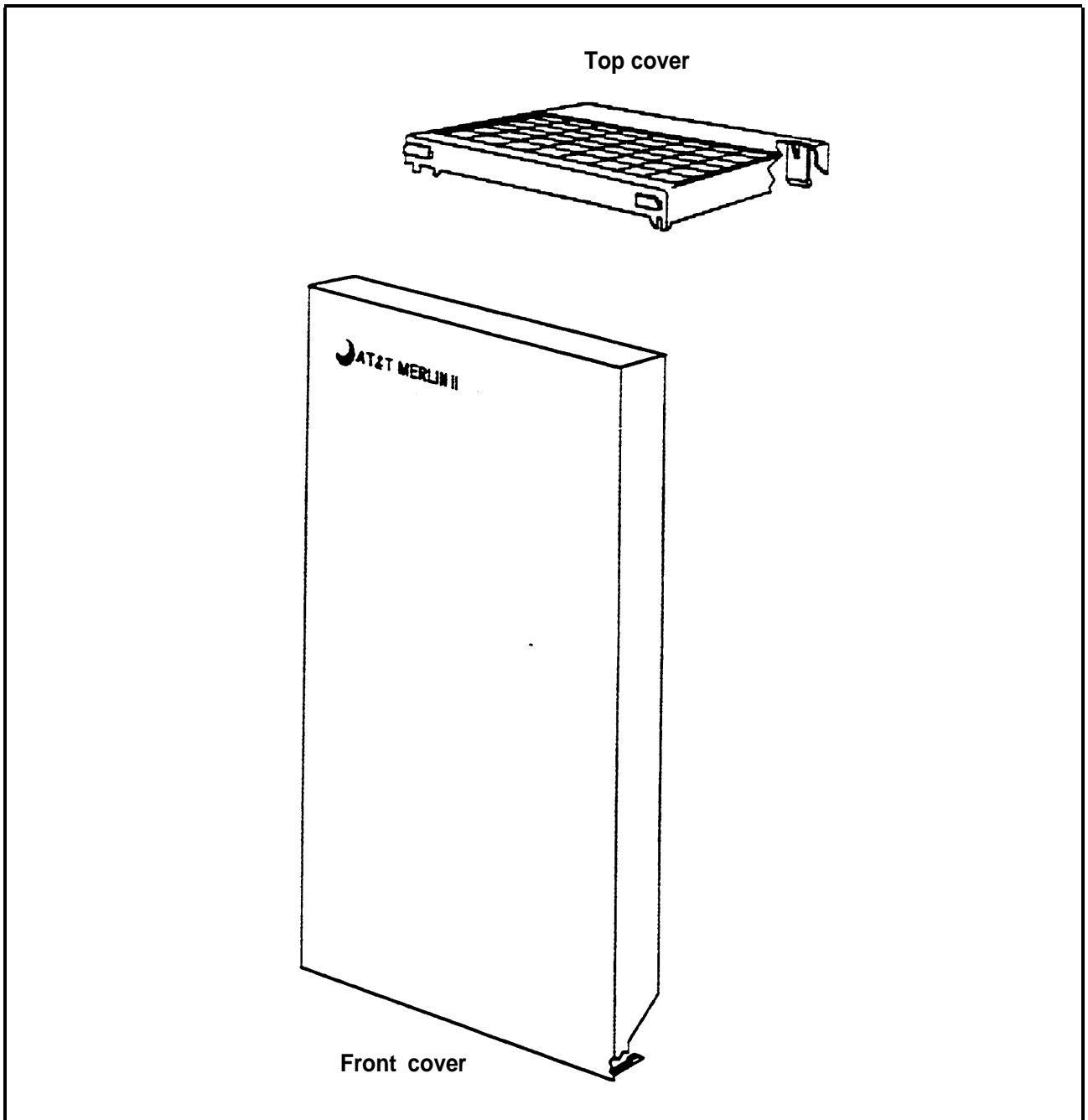
FIGURE 2-27 Control unit covers.

Installing the Top Cover

To install the top cover, see Figure 2-28 and follow these steps:

1 Be sure the cords have been pressed through the wire managers at the base of the modules.

2 Install the empty module that came with the system in the rightmost slot of the carrier if it is lacking a functional module in this slot. This empty module helps to support the top cover.

3 Hold the top cover so that the hooks are facing you.

4 Engage the tabs at the rear of the top cover with the carrier.

5 Lower the top cover so that the legs lock into the vents on the modules.
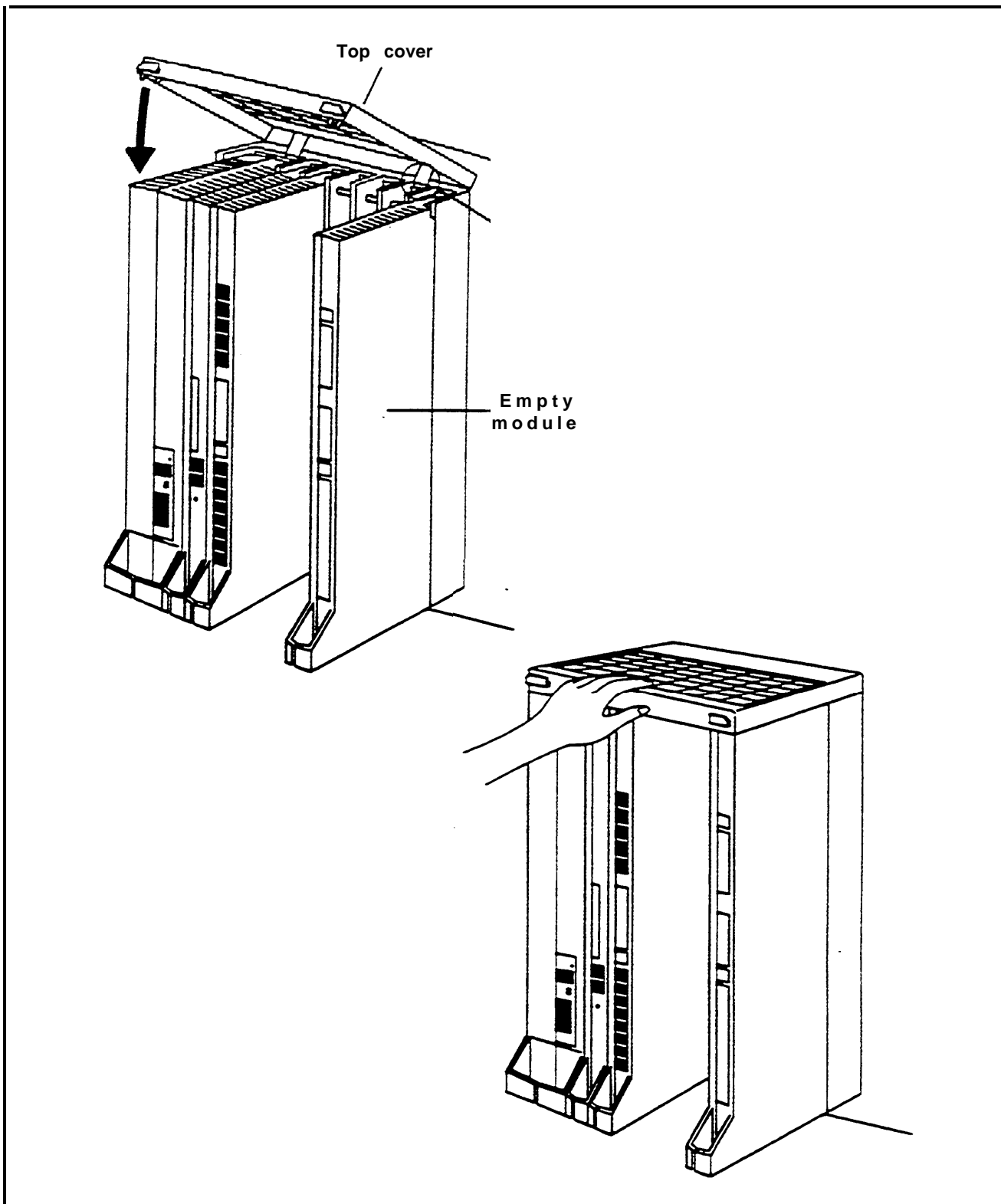
FIGURE 2-28 Installing the control unit top cover.

Installing the Front Cover

To install the front cover, see Figure 2-29 and follow these steps:

1 Hook the top of the front cover onto the top cover just installed.

2 Push down on the bottom of the front cover until it locks securely on the base of the wire managers on the modules.
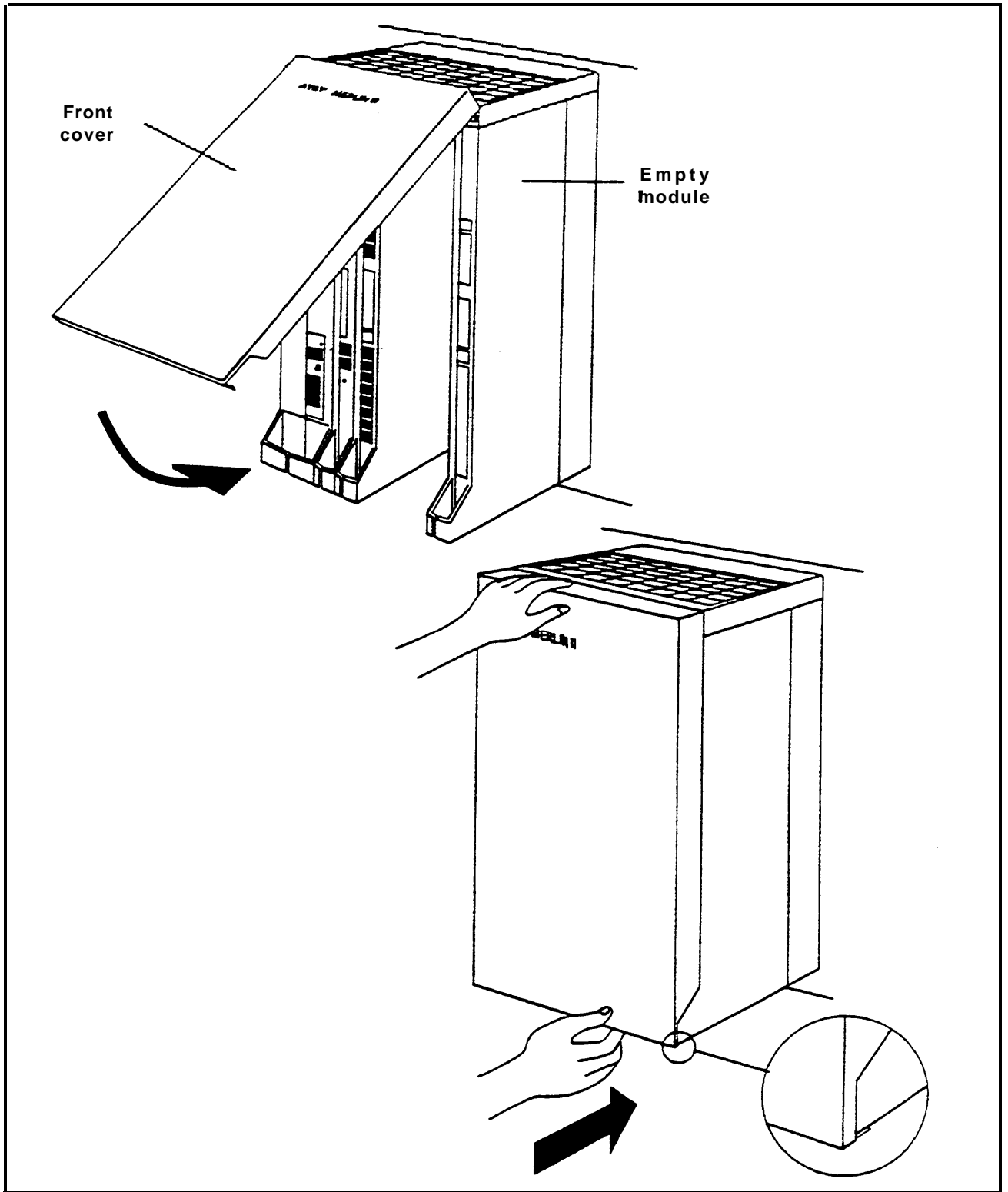
FIGURE 2-29 Installing the control unit front cover.

Modifying the System

The MERLIN II communications system is designed so that you can make changes quickly and easily. If the system is not at full capacity, you can add an expansion carrier, additional outside lines or voice terminals, or more data equipment. Modular plugs on much of the system wiring and modular components make it easy to reorganize the MERLIN II system as the customer's needs change.

With Feature Modules 1 and 2, you cannot switch module locations nor rearrange the modules on the carriers without having to readminister the system. Refer to "Module Installation" on page 2-62 for further information.

With Release 3, you can replace a module with one of the same type using On-Line Module Swap. Refer to the procedure "On-Line Module Swap" on page 4-7 for additional information.

The most common system changes are adding outside lines, adding voice terminals, and moving voice terminals. Contact an equipment supplier to order additional voice terminals and system modules.

NOTE: A Frequency Generator must be installed if basic sets are being used.

ADDING AN OUTSIDE LINE

The MERLIN II system can accommodate up to 56 outside lines. To add lines to the system, do the following:

1 Have the local telephone company add the outside line(s) and network interface.

2 Refer to "Connecting Outside Lines to the Control Unit" on page 2-19.

3 At the control unit, determine if an installed line module has unused line jacks. If so, simply connect new lines to the unused line jacks.

4 If all line jacks in the control unit are full, you can add any combination of line modules m the system so long as the sum total of outside lines does not exceed 56.

Contact an equipment supplier to order additional line modules.

Add each new line module, if necessary, according to the instructions in the procedure, "Module Installation" on page 2-62.

5 Readminister the system so that it recognizes the newly added lines. Refer the information under "Administering Lines" on page 3-32.

NOTE: Depending on the system configuration, you may want to assign the new line to an appropriate pool or assign the line to a new line button on one or more voice terminals. See the appropriate entry in Section 3, "Administration" for instructions on assigning lines to pools or voice terminals.

6 Record the new information on the outside-line numbers label and on Form 1A, System Form– Incoming Lines for Release 3 or on the Master Planning Form (Line Jack section) for Feature Modules 1 and 2.

ADDING A VOICE TERMINAL

The MERLIN II System can have up to 120 station jacks, which accommodate up to 120 voice terminals. Eight of these must be analog jacks; 112 can be a combination of analog, basic, or digital jacks. The Simultaneous Voice and Data feature and the Voice Announcement to Busy Voice Terminal feature reduce the total number of voice

terminals that a system can accommodate. For example, you can have up to 60 stations with either the Simultaneous Voice and Data feature or Voice Announcement to Busy Voice Terminal feature. These two features require an additional voice pair so that they can transmit either voice or data or indicate to a caller that a voice terminal is busy.

To add a voice terminal to the system, do the following:

Check the modules for unoccupied voice terminal jacks, and determine that all of the following conditions are met:

- There are fewer than 120 stations connected (R3 only). There are fewer than 72 responding stations connected (FM1 and FM2).

- There is an unoccupied jack.

- You have the correct type of voice terminals for the unoccupied jack.

If all three of the above conditions exist, you can add voice terminals to the system by connecting the voice terminals to the available voice terminal jacks.

NOTE: If all voice terminal jacks on all modules are occupied, you can add a combination of station modules to increase the system's capacity to 120 voice terminals. Contact the equipment supplier to order additional voice terminals and line modules.

To install the modules, see the instructions in the procedure, "Module Installation" on page 2-62.

2   If the voice terminal locations connect to the control unit through a jack field, install a wiring run for each new voice terminal location according to the instructions in "Jack Field Wiring," on page 2-33. If the voice terminals connect directly to the control unit, see "Connecting Voice Terminal Wiring Directly" on page 2-25.

3   To connect the new voice terminal to the system, see the instructions in "Connecting the Voice Terminals," on page 2-92.

4   Record the new information in the system directory and on the appropriate planning form. For Release 3, record this information on Form 1d, Systern Form–Station Planning and the appropriate Station Configuration form (Form 3b, Form 3c, Form 3f, or Form 3g). For Feature Modules 1 and 2, record this information on the Master Planning Foirm, Station Jack section and the appropriate Station Configuration Form.

MOVING A VOICE TERMINAL

You can easily move a voice terminal from one location to another within your system without having to reprogram the voice terminal.

To move a voice terminal, do the following:

1   Make sure the necessary wiring is in place at the new location (see "Voice Terminal Wiring" on page 2-23). Check Form 1d, System Form–Station Planning for Release 3 or the Master Planning Form for Feature Modules 1 and 2 for the number assignments.

2   Unplug the voice terminal at its old location, and plug it in at its new location.

3   Determine whether the new location has a jack field or a direct connection to the control unit.

If you have a jack field, follow these steps:

a Locate the jumper cord with the voice terminal's intercom number.

b Unplug it from the jack in the jack field for the voice terminal's old location.

c Plug it into the jack in the jack field for the voice terminal's new location.

Do not change any labels in the system. Simply record the change of location in the system directory. The voice terminal keeps its original intercom number and does not require reprogramming.

If you have a direct connection from the new location to the control unit, follow these steps:

a Find the modular cord that terminates the wiring run from the new location to the control unit.

b At the control unit locate the jack number that identifies the voice terminal's intercom number.

   NOTE: Jack numbering differs from intercom numbering. Jack locations run sequentially, beginning with 01, and intercom numbers run sequentially, beginning with 10.

c If another cord is in the jack, unplug it.

d Plug the cord for the new location and intercom number into the corresponding control unit jack assigned to the voice terminal's intercom number.

e Apply a new label to the cord at the new location and on the appropriate control unit module.

f Record the change in the system directory.

You do not have to reprogram the voice terminal.

Adding Accessories

There are many accessories that can be added to the system, some of which are shown in the following illustrations. There are two types of accessory equipment available, general accessories and power accessories. To add accessory equipment, follow the instructions that come with the components.

GENERAL ACCESSORIES

General accessories include alerting devices and other components that allow you to connect additional equipment to the system.

Alerter Accessories   Alerter accessories (Figure 2-30) such as horns and bells
provide audible alerts to make you aware of voice terminal
ringing in noisy or large working environment. The
strobe emits a high intensity flashing light to alert you of
voice terminal ringing in high ambient noise environment
(e.g., heavy machinery areas) and quiet zones (e.g.,
hospitals, libraries, and broadcast studios). It is also ideal
for alerting the hearing-impaired to voice terminal ringing.
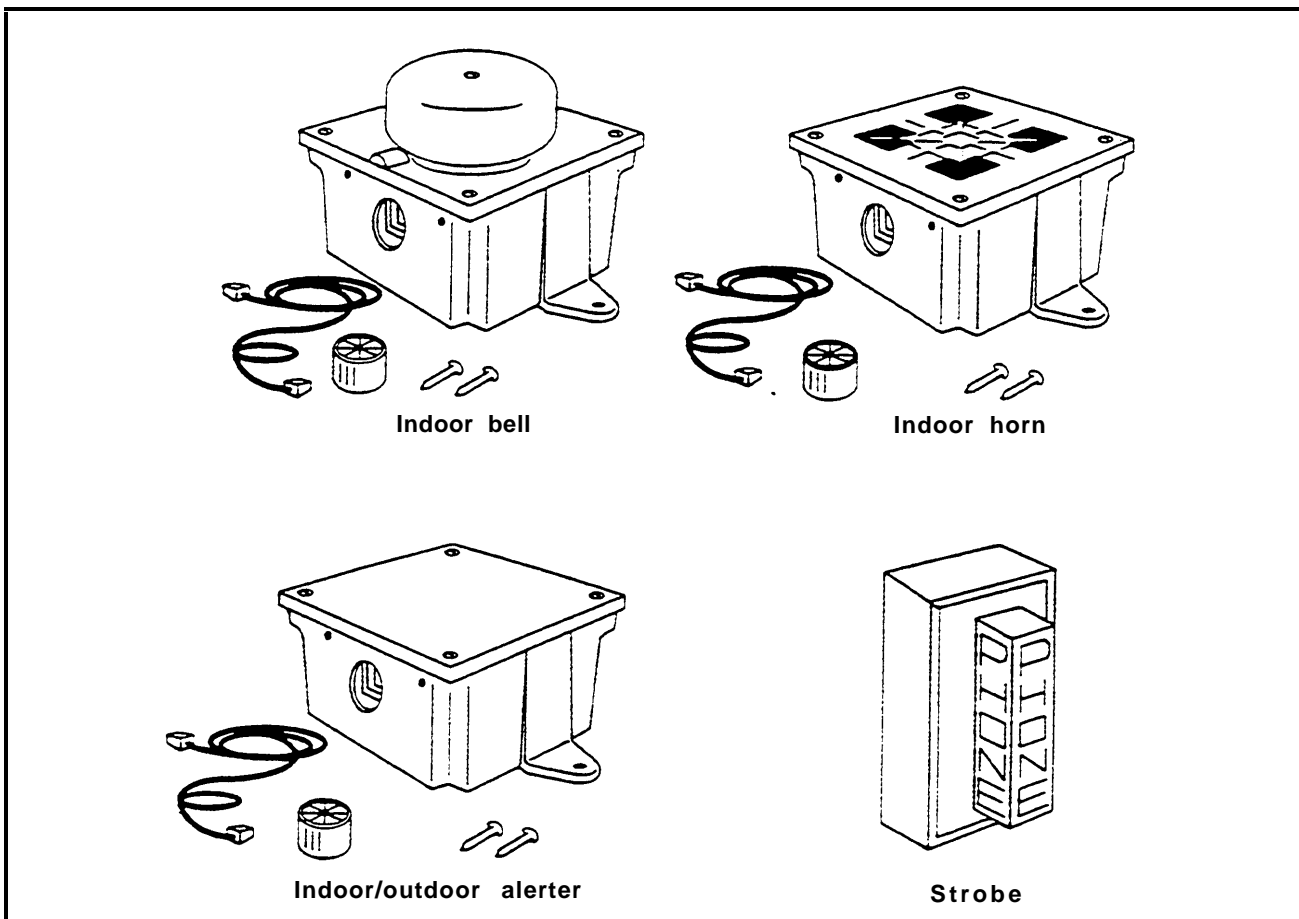
FIGURE 2-30 Alerter accessories.

Frequency Generator   A Frequency Generator is necessary in order to use basic telephones. A Frequency Generator must be connected to the Power Supply Module of each carrier that contains one or more Basic Telephone Modules. See page 2-67 for installation instructions.

General Purpose Adapter   A General Purpose Adapter (GPA) connects Touch-Tone *(not* rotary) equipment such as modems, autodialers, and telephone extensions (including cordless telephones) to voice terminals (Figure 2-31).
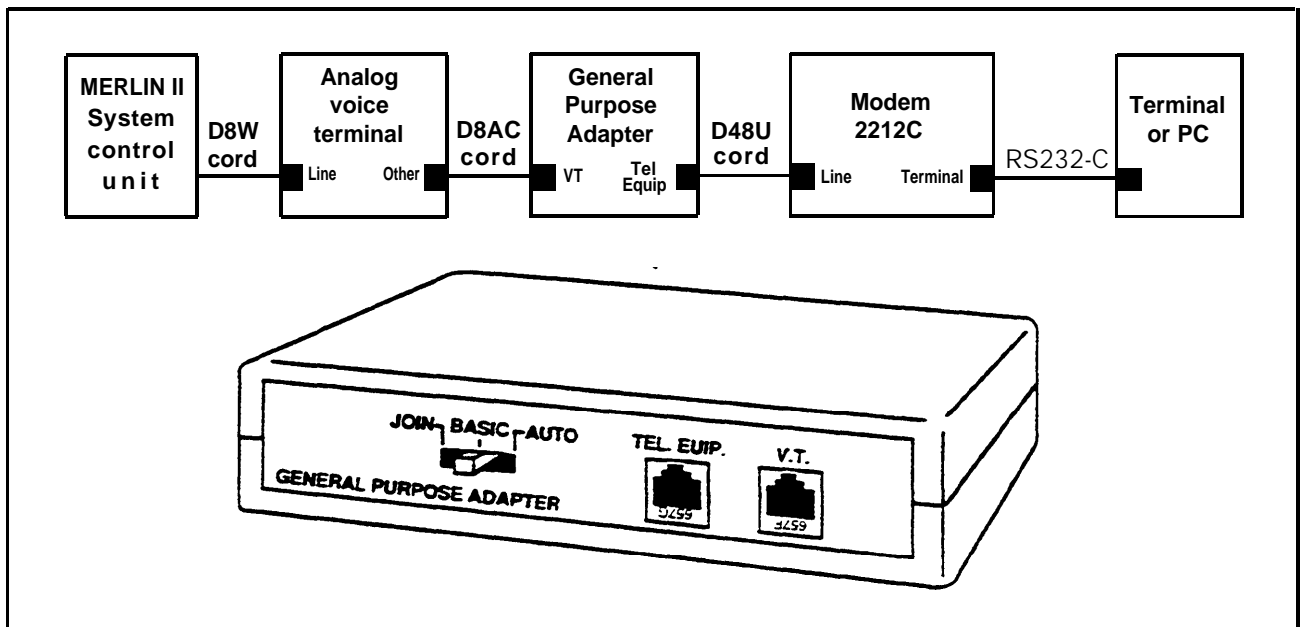
FIGURE 2-31 A General Purpose Adapter.

Hands-Free Unit   The Hands-Free Unit (HFU) is a speakerphone that allows
people to place and answer outside and intercom calls
without using the handset (Figure 2-32). Connect a HFU
to the "OTHER" jack on the voice terminal.
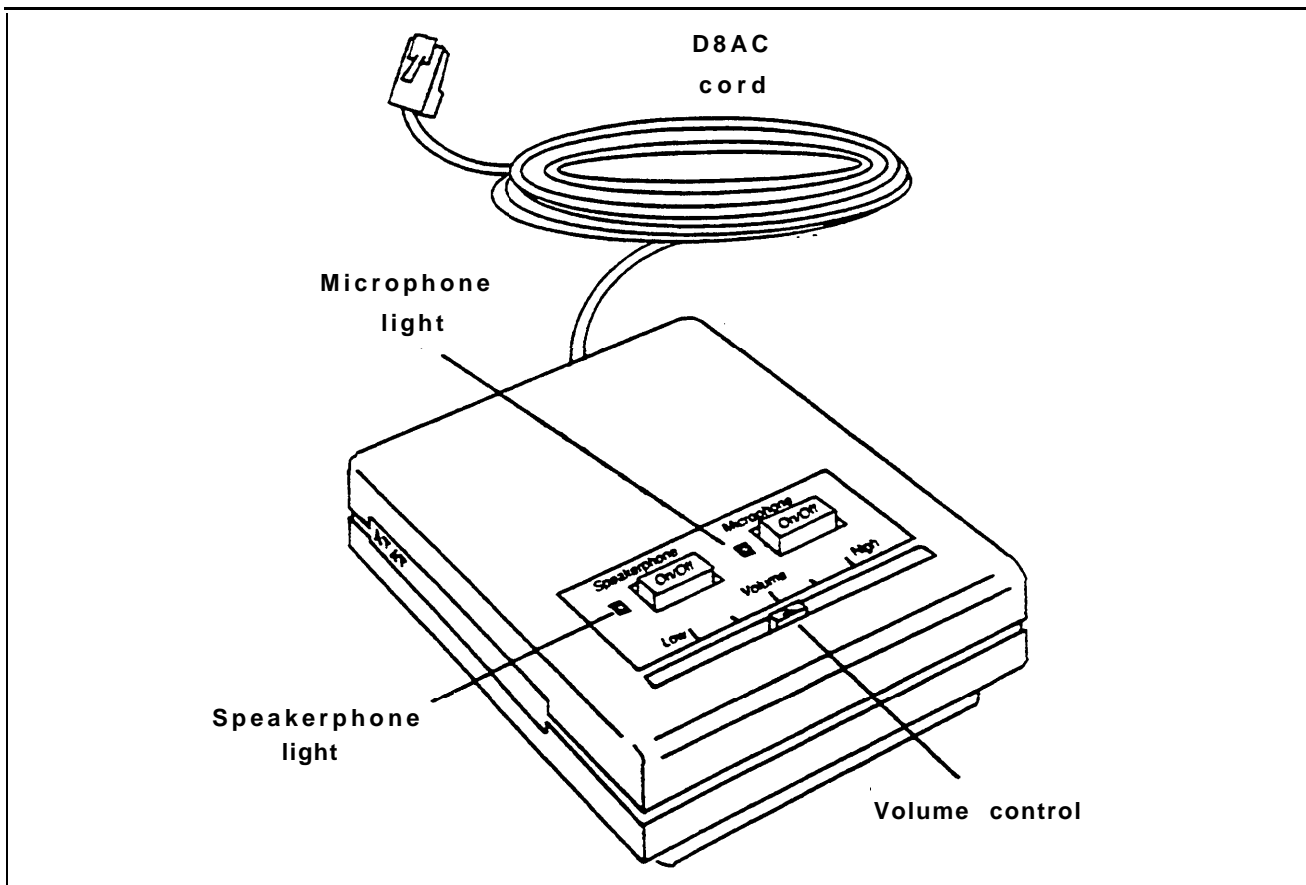
FIGURE 2-32 A Hands-Free Unit.

Headset Adapter   A headset connected to a voice terminal through the
Headset Adapter allows the user to handle calls more
easily (Figure 2-33).

10-Button voice
terminal
(bottom view)   **To station**
                                      jack

LINE
jack

                                      On/Quiet
                                      b u t t o n
                                                        off
                                                        button

OTHER
jack

                          Headset (with a
                          2-prong plug)
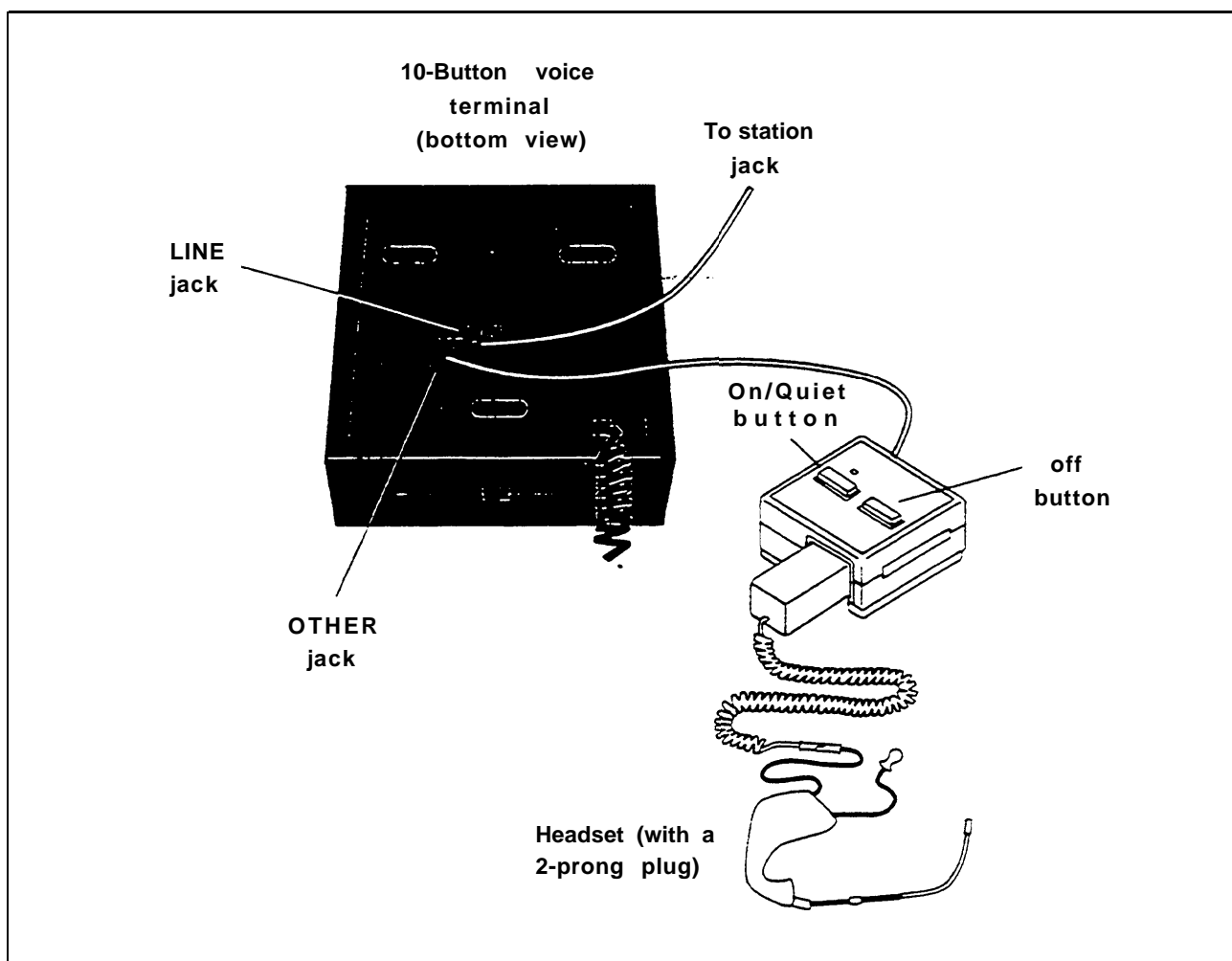
FIGURE 2-33 A headset with Headset Adapter.

Loudspeaker Paging System

An optional Loudspeaker Paging System allows people with MERLIN II system voice terminals to page co-workers and/or make announcements through loudspeakers.

Music Coupler

A Music Coupler connects a music source to the MERLIN II system. This enables you to have background music over the Loudspeaker Paging System, and Music-on-Hold.

Power Failure Telephone

A power failure telephone allows calls to be made and received in case of a power failure. See "Connecting the Power Failure Telephone" on page 2-97 for instructions on how to connect a power failure telephone.

Supplemental Alert Adapter

A Supplemental Alert Adapter allows Alerter Accessories to be connected to an analog voice terminal jack so that people working in noisy or remote areas of the building can be alerted to incoming calls.

POWER ACCESSORIES

Power accessories for the MERLIN II system extend the range of telephones, increase the power capacity of the system, and provide grounding for special telephone connections. To install power and power protection equipment for the system, follow the instructions that come with the components.

Auxiliary Power Units

Auxiliary Power Units increase the system's capacity to support voice terminals and accessories. The number of voice terminals and accessories attached to the system determines the amount of power required to operate it properly. If the power to one voice terminal is low, it is probably more cost effective to use a Voice Terminal Power Supply Unit than an Auxiliary Power Unit (see "Voice Terminal Power Supply Unit" on page 2- 130).

However, if there is a power demand of over 45 unit loads on one Power Supply Module, an Auxiliay Power Unit is generally required. This will support an additional 20 unit loads.

If one or more of the following conditions exist, the system may need an Auxiliary Power Unit:

- The maximum number of voice terminals are connected to the system.

- Several voice terminals have accessories and the voice terminals do not have Voice Terminal Power Supply Units.

- There are long wiring runs between the control unit and the voice terminals.

- The lights on some of the voice terminals become dim or go out altogether when many employees use their voice terminals simultaneously.

NOTE: Only one Auxiliary Power Unit can be connected to a carrier.

To determine the number of unit loads for each Power Supply Module on each carrier, determine the types of modules and types of voice terminals connected to them. Then see Table 2-8 on page 2-59 for the unit load requirements of each voice terminal and accessory. Add the number of unit loads together. If the total on any carrier exceeds 45, install an Auxiliary Power Unit.

See the equipment supplier for a complete list of power accessories.

Basic Telephone and Modem Interface 2

The Basic Telephone and Modem Interface 2 (BTMI-2) connects most types of telephones to analog module jacks on the control unit (Figure 2-34).

NOTE: The BTMI-2 replaces the BTMI, which is no longer available.
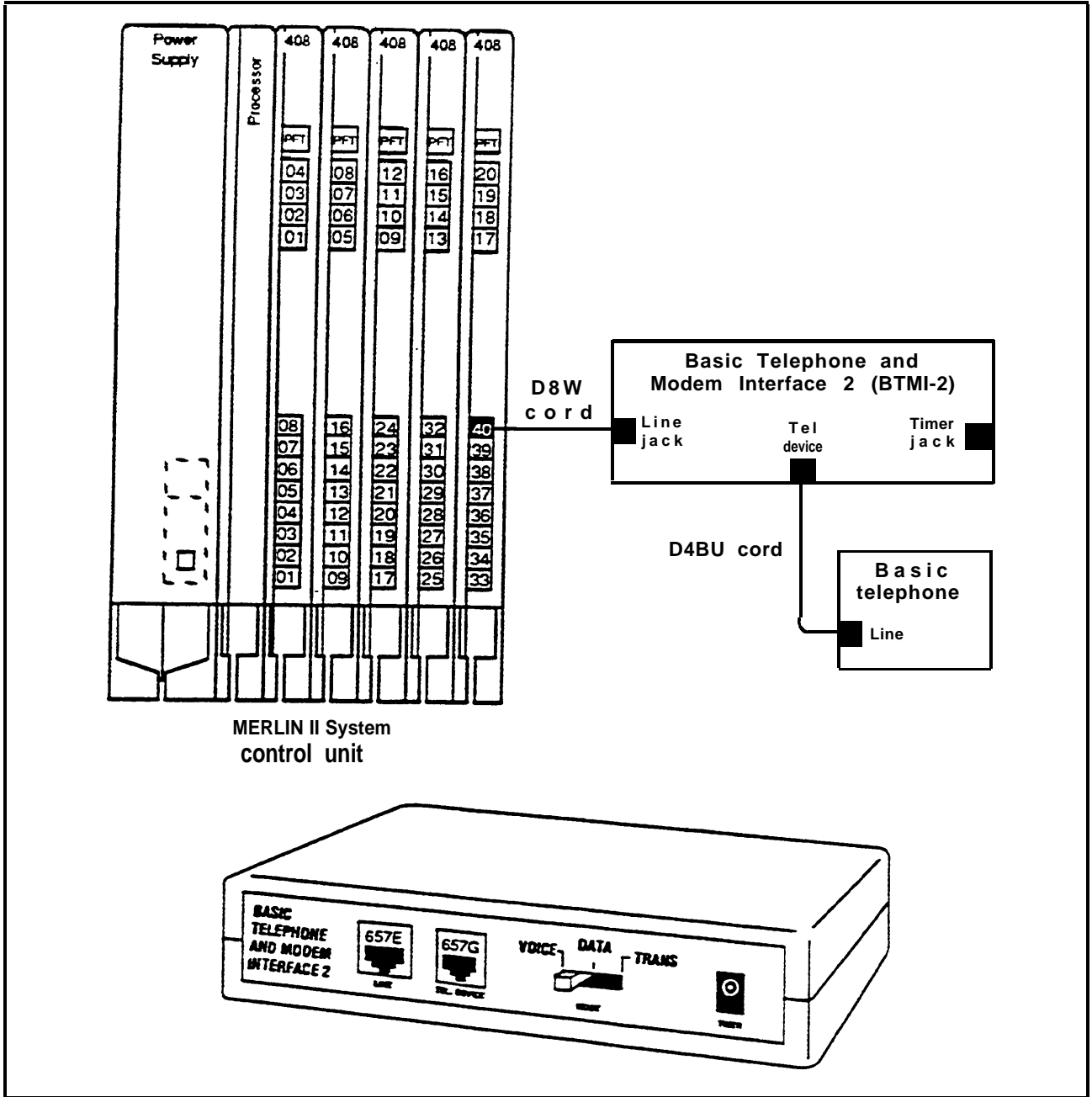
FIGURE 2-34 A Basic telephone and Modem Interface 2.

IROB Protectors   Equipment that is connected to the analog station jacks (408/008) and is located in a building outside of the main (control unit location) building, but within 1000 feet of the control unit, is called In-Range, Out-of-Building (IROB) equipment. To protect both the control unit and the IROB equipment from exposure to lightning, in advertent contact with power lines, and power currents induced by nearby power lines, IROB protectors are required. Two TII Model 343 IROB Protectors are required for every analog station jack that is connected to IROB equipment. Place one IROB protector where the cable from the control unit leaves the building, and place the other where the cable enters the building in which the IROB equipment is located (Figure 2-35). Refer to the installation notes that are packed with the IROB Protector for detailed instructions on proper installation. See "System Grounding Requirements" on page 2-5 for more information on grounding.

> **WARNING:** Only analog station-modules (408, 008) are to be used for In-Range, Out-of-Building (IROB) applications. The Digital Station Modules (008D) and the Basic Telephone Modules (012) cannot be used for IROB applications.

IROB protector
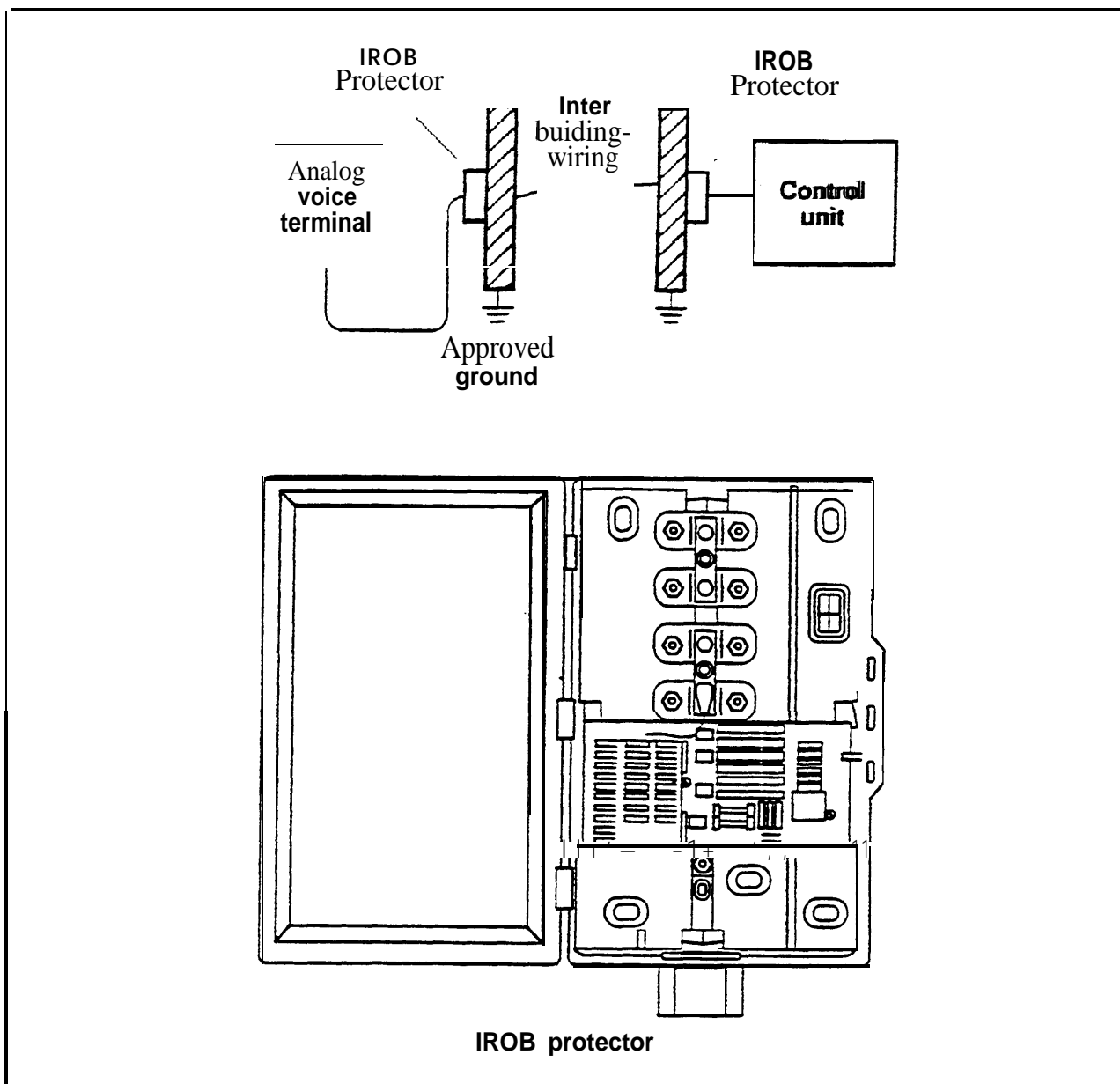
FIGURE 2-35 Grounding protection for IROB telephones.

Off-Premises Range
Extender

The Off-Premises Range Extender (OPRE) will be
available for Feature Module 1, Feature Module 2, and
Release 3 users to connect a basic Touch-Tone telephone
at a remote location to the system via an outside telephone
line.

NOTE: As of this printing the Off-Premises Range
Extender is not available. It is scheduled to be
certified in the last quarter of 1989. Installation
information will be supplied in a CIB with the
product.

Off-Premises
Telephone Interface

Service may be provided for Feature Module 1 users in a
remote location by using the Off-Premises Telephone
Interface (OPTI). The OPTI can connect a basic Touch-
Tone telephone at a remote location to the system via an
outside telephone line. See Figure 2-36.
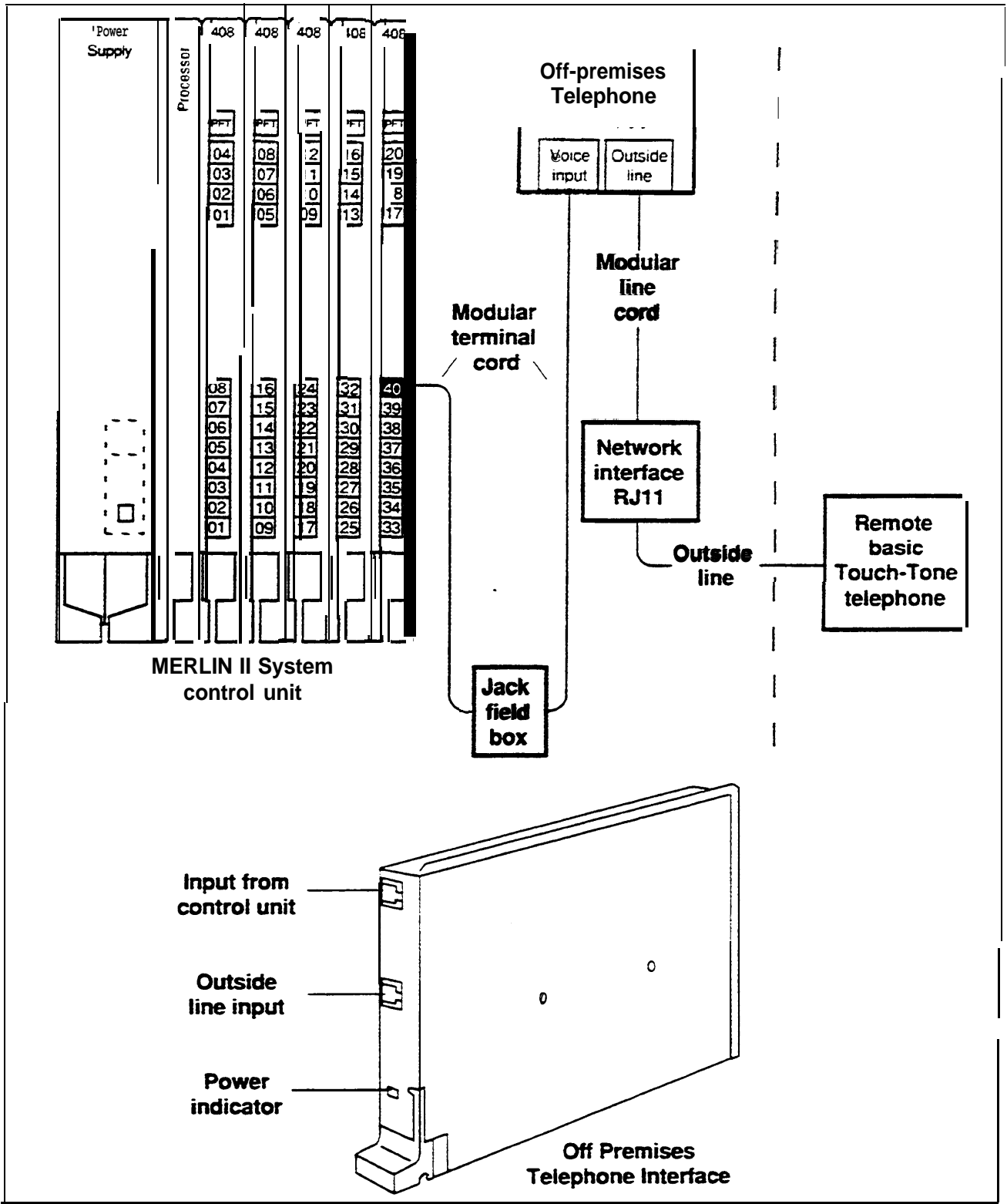
FIGURE 2-36 An Off-Premises Telephone Interface.

Voice Terminal Power Supply Unit

Voice terminal operation is guaranteed for a wiring run of up 1000 feet from the control unit. For a wiring run that is more than l000 feet from the control unit, you may have to supply extra power to the voice terminal.

If the power to one voice terminal is low, it is probably more cost effective to use a Voice Terminal Power Supply Unit than an Auxiliary Power Unit. However, if there is a power demand of over 45 unit loads on one Power Supply Module, an Auxiliary Power Unit is generally required. See "Auxiliary Power Units" on page 2-122.

Upgrading an Existing System

If you are upgrading a MERLIN 11 System with Feature Module 1 or 2 to a MERLIN II System with Release 3 or a MERLIN II System with Feature Module 1 m a MERLIN 11 System with Feature Module 2, you may need to do some site preparation work before installing the new modules that make up the upgraded control unit.

SITE PREPARATION

Although the customer should have the control unit site prepared, you may need to complete the job with the construction of one or more jack fields. Consider the following:

- Be sure that there is a complete set of planning forms for the system to which you will upgrade, that is, a complete set of Release 3 planning forms if upgrading from either Feature Module 1 or 2, or a complete set of Feature Module 2 planning forms if upgrading from Feature Module 1.

- If you are extending the capacity of the control unit be sure there is adequate backing to mount an Expansion Carrier onto the Basic Carrier. If necessary, mount a backboard on the wall next to the Basic Carrier to provide for the Expansion Carrier. See "Mounting the Expansion Carrier" on page 2-56 for instructions.

- If additional CO lines were installed, and if there is a jack field for those lines, you may need to enlarge that jack field. If no jack field exists, you may decide that one should be built. See "Jack Field Wiring" on page 2-33 for instructions that will enable you to enlarge or build the jack field. Recall that the maximum number of CO lines is the following for the different MERLIN 11 systems:

  > Feature Module 1 =32

  > Feature Module 2 = 56

  > Release 3 = 56

- If adding more stations, and if there is a jack field for them, you may need to enlarge that jack field. If no jack field exits, one may have to be built, especially if there are to be more than 30 stations, since a jack field would be the preferred method of connecting that many stations to the control unit. See "Jack Field Wiring" on page 2-33 for instructions that will enable you to enlarge or build the jack field.

  Recall that the maximum number of stations is the following for the different MERLIN II systems:

  > Feature Module 1 =72

  > Feature Module 2 = 88 (72 responding stations)

  > Release 3 = 120

GET A PRINTOUT OF THE EXISTING SYSTEM

Before you change the existing system to upgrade it, get a printout of the existing system settings so that you can later restore any voice terminal programming and system administration that will still apply to the new system. To get a printout from the administration menu, foIlow these steps:

With a Display Console

1 Enter administration mode by sliding the T/P switch to *P*.

2 Press Conference twice.
   The administration menu appears.

3 Press [More], [More], [Print], [All].

   Wait until printing is complete before leaving administration mode. Don't remove the printout until after you've left administration mode or printing page alignments will be affected.

3 Press [More], [More], [Print], [All]

Wait until printing is complete before leaving administration mode. Don't remove the printout until after you've left administration mode or printing page alignments will be affected.

4 Press Conference to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

Lights flash next to Adm Tel, *Adm* Pool, Message *and* Speaker.

3 Press Message.

4 Dial #999 and wait for the beep.

5 Press Message.

Wait until printing is complete before leaving administration mode. Don't remove the printout until after you've left administration mode or printing page alignments will be affected.

6 Leave administration mode by sliding the T/P switch to the center position.

UPGRADE INSTRUCTIONS FM1 OR FM2 TO R3

Follow these steps to upgrade the system from either Feature Module 1 or Feature Module 2 to Release 3.

1 Shutdown the system, Basic Carrier first, any Auxiliary Power Units next and the Expansion Carrier last if there is one.

2   Remove Processor Module 517A7 from s1ot of the
     Basic Carrier. See "Removing a Module" on page
     2-64 for instructions.

3   Insert Feature Module 3 in the Release 3 Processor
     Module (517B7). See "Installing the Feature Module
     on the Processor Module" on page 2-73 for
     instructions.

4   If needed, modify the Processor Module for square, or
     key, operation. See "Modifying the 51737 Processor
     Module for Square (Key) Operation" on page 2-78 for
     instructions.

5   Insert the Release 3 Processor Module in slot 0 of the
     Basic Carrier. See "Installing a Module" on page 2-63
     for instructions.

6   Add line or station modules as needed. See "Installing
     Line and Station Modules" on page 2-79 and/or see
     "lnstalling a Basic Telephone Module" on page 2-81
     for instructions.

7   If an Expansion Carrier has been added, insert the
     Power Supply Module on that carrier in its slot. *See*
     "Installing the Power Supply Module" on page 2-66 for
     instructions.

8   Consider unit load requirements to determine if any
     Auxiliary Power Units are needed. See "Determining
     Unit Load Requirements" on page 2-57 for information
     about unit loads and their calculation.

9   Add Tie Line Modules as needed. See "Installing a
     Tie Line Module" on page 2-81 for instructions.

10   Connect any new CO lines as follows as appropriate:

     > Connect new CO lines from the network interface
        to the jack field if one has been used. Connect the
        CO lines from the jack field to the proper jacks on
        the line modules.

> If no jack field is used to connect the CO lines to the network interface, connect new *CO lines* directly to the appropriate jacks on the line modules.

See "Testing Outside Lines" on page 2-103 and/or "Testing Tie Lines" on page 2-104 for instructions on testing the line jacks for dial tone.

11 Connect any new station wiring as follows as appropriate:

> Connect new station wiring runs to their appropriate jacks in the jack field if one has been used. Connect the jacks in the jack field to the proper station ports on the station modules.

> If no jack field is used, connect the station wiring runs to their appropriate station pens on the station modules..

See "Testing the System" on page 2-100 for instructions on testing the voice terminal jacks for dial tone.

12 Connect any new stations to their wiring runs. See "Connecting the Voice Terminals" on page *2-92* for instructions.

13 Add a printer to the control unit if needed. See "Connecting a Printer to the Control Unit" on page 2-81 or "Connecting a Printer to the Control Unit 50 or More Feet Away" on page 2-86 for instructions.

14 Add new adjunct equipment as needed. See "Adding Accessories" on page 2-117 for instructions.

15 Power up the system turning on the Expansion Carrier first, any Auxiliary Power Units next and the Basic Carrier last.

Turn to "Administering an Upgraded System" on page 3-62 to complete the installation

UPGRADE INSTRUCTIONS FMI TO FM2

Follow these steps to upgrade the system from Feature Module 1 to Feature Module 2.

1 Shut down the system, Basic Carrier first, any Auxiliary Power Units next, and the Expansion Carrier last if there is one.

2 Remove the Processor Module. See "Removing a Module" on page 2-64 for instructions.

3 Exchange Feature Module 2 for Feature Module 1. See "Installing the Feature Module on the Processor Module" on page 2-73 for instructions.

4 Replace the Processor Module on the Basic Carrier. See "Installing a Module" on page 2-63 for instructions.

5 Add line or station modules as needed. See "Installing Line and Station Modules" on page 2-79 and/or see "Installing a Basic Telephone Module" on page 2-81 for instructions.

6 If an Expansion Carrier has been added, insert the Power Supply Module on that carrier in its slot. See "Installing the Power Supply Module" on page 2-66 for instructions.

7 Consider unit load requirements to determine if any Auxiliary Power Units are needed. See "Determining Unit Load Requirements" on page 2-57 for information about unit loads and their calculation.

8 Connect any new CO lines as follows as appropriate:

   > Connect new CO lines from the network interface to the jack field if one has been used. Connect the CO lines from the jack field to the proper jacks on the line modules.

> If no jack field is used to connect the CO lines to the network interface, connect new CO lines directly to the appropriate jacks on the line modules.

See "Testing Outside Lines" on page 2-103 for instructions on testing the line jacks for dial tone.

9 Connect any new station wiring as follows as appropriate:

> Connect new station wiring runs to their appropriate jacks in the jack field if one has been used. Connect the jacks in the jack field to the proper station ports on the station modules.

> If no jack field is used, connect the station wiring runs to their appropriate station ports on the station modules.

See "Testing the System" on page 2-100 for instructions on testing the voice terminal jacks for dial tone.

10 Connect any new stations to their wiring runs. See "Connecting the Voice Terminals" on page 2-92 for instructions.

11 Add a printer to the control unit if needed. See "Connecting a Printer to the Control Unit" on page 2-81 or "Connecting a Printer to the Control Unit 50 or More Feet Away" on page 2-86 for instruction.

12 Add new adjunct equipment as needed. See "Adding Accessories" on page 2-117 for instructions.

13 Power up the system turning on the Expansion Carrier first, any Auxiliary Power Units next and the Basic Carrier last.

Turn to 'Administering an Upgraded System" on page 3-62 to complete the installation

Section 3: Administration

The Administrator/Attendant Console

After the MERLIN II system hardware has been installed. you set its operating conditions and features through a series of administration procedures, which are described in this section.

You use similar procedures, also described in this section, to change an existing MERLIN II system's operating conditions and features to adapt it to new communication requirements.

In either case, the administration procedures are performed at the administrator/attendant console. The administrator/attendant console has two functions:

❶ It serves as the *administrator console* when put into administration mode. In this mode, you use the console to establish the operating conditions for the MERLIN II system and to set up optional features and call restrictions. You can also assign features to individual voice terminals from the console.

It serves as the *primary attendant* console for day-to-day call handling.

TYPES OF ADMINISTRATOR ATTENDANT CONSOLES

There are two types of administrator/attendant consoles used with MERLIN II systems:

- The MERLIN II System Display Console is intended for use with a Release 3 system or Feature Module 1 or 2 configured as a large system. *It is the **only console** that can be used to administer Release 3 features.*

- The BIS-34D is intended for use with Feature Modules 1 and 2 configured as a small system

Display Console

The Display Console shown in Figure 3-1 is used to administer Feature Module 1 or 2 configured as a large system, that is, one configured for more than 8 lines or more than 20 stations. Using this console, you follow *menu-driven* administration procedures in which

which administration information and system promps appear on the console's display screen.

An overlay is provided with the Displav Console to show the functions of each button when the console is in administration mode. When administration is completed, remove the overlay and place it in the tabbed pocket folder of the MERLIN II Communications System Release 3 (or Feature Module 2) System Manual.
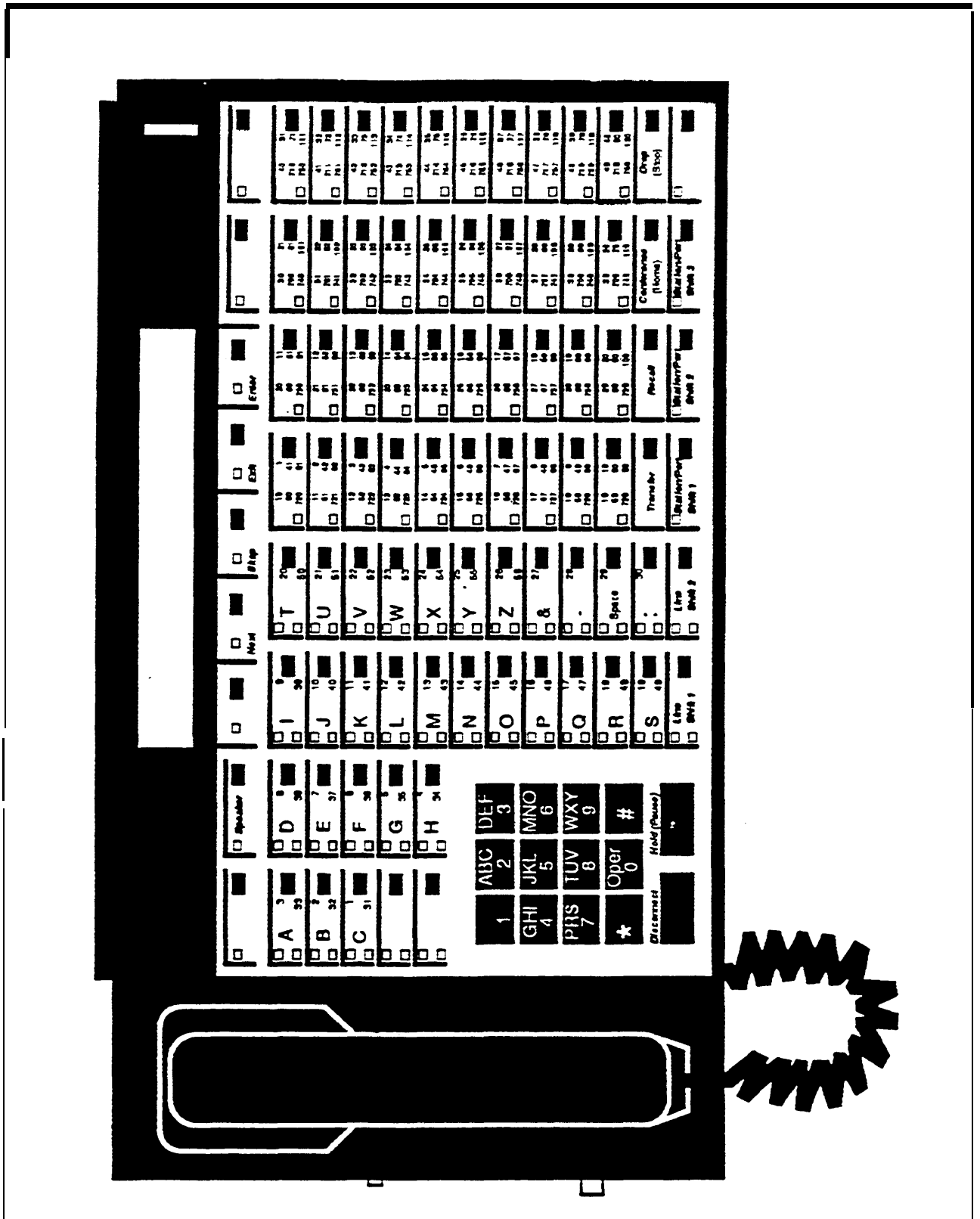
FIGURE 3-I A MERLIN II System Display Console.

BIS-34D Console   The BIS-34D Console is suitable for administering a small system, that is, a system configured for 8 or fewer lines and 20 or fewer stations. This console, shown in Figure 3-2, *cannot be* used to administer the MERLIN II System Release 3.

With the BIS-34D Console, you use the button code administration method provided in this section under "Administering Features a BIS-34 Console" beginning on page 3-93. This method involves dialing administration codes on the dial pad, then pressing line and station buttons to administer system features and to assign lines and features to individual voice terminals.
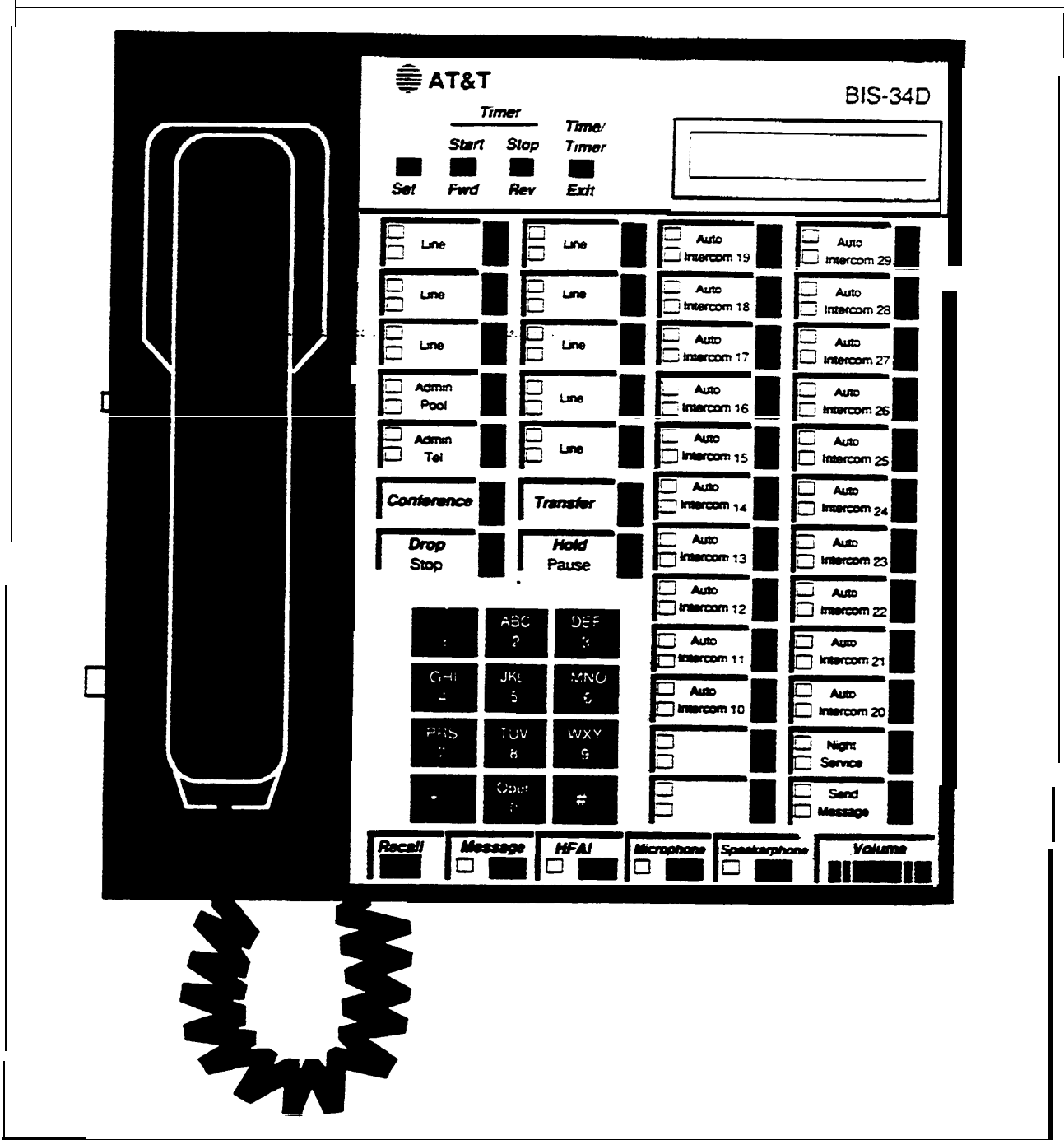
FIGURE 3-2 A BIS-34D Console.

**ASSIGNING
INTERCOM
NUMBERS**

Each voice terminal in the system has a unique intercom number. These intercom numbers are automatically assigned to Auto Intercom buttons on the Display Console and on a BIS-34 Console used with a system configured as a small system. When a B1S-34 Console is used on a system configured as a large system, lines are automatically assigned to buttons above and to the right of the dial pad. If there are fewer lines than there are buttons, the remaining buttons can be programmed with features or as Auto Intercom, The lights next to each Auto Intercom button indicate the status of the voice terminal.

Auto Intercom buttons correspond to station jack connections on modules in the control unit. Usually, one station jack is used for each voice terminal, and the Auto Intercom button represents the voice terminal connected to that station jack. In some cases, however, two station jacks may be used for-a single voice terminal. The second jack is used to give the voice terminal access to the Voice Announcement to Busy Voice Terminal feature or the Simultaneous Voice and Data feature. The lower numbered jack provides the intercom number.

**DISPLAY CONSOLE
SHIFT BUTTONS**

On the Display Console there are two types of shift buttons (station shift and line shift) used during administration.

Station Shift Buttons

The three station shift buttons allow you to administer up to 120 stations using just the 40 Auto Intercom buttons provided. When you press one of the station shift buttons, you change the intercom numbers assigned to the Auto Intercom buttons, as shown in Table 3-1:

TABLE 3-1 Display Console Station Shift Buttons

Label	Selects Intercom Numbers
Shift 1	10 through 49 (or the equivalent Flexible Numbering codes)
Shift 2	50 through 69,700 through 719 (or the equivalent Flexible Numbering codes)
Shift 3	720 through 759 (or the equivalent Flexible Numbering codes)

If you want to select a particular voice terminal, the light must be on next to the shift button for the group that contains that voice terminal's intercom number. If the light isn't on, press the appropriate shift button before pressing the Auto Intercom button. For example, if you want to assign lines to the voice terminal represented by intercom nurnbe~61, press Station Shift 2. The light next to Station Shift 2 comes on, and the Auto Intercom buttons now represent intercom numbers 50 through 69 and 700 through 719.

Line Shift Buttons   There are two line shift buttons on the Display Console for use during administration of systems with more than 30 lines. If you press Line Shift 1, the line buttons represent the first 30 lines (the lines connected to line jacks 01 through 30). If you press Line Shift 2, the line buttons represent the remaining lines (those connected to line jacks 31 through 56).
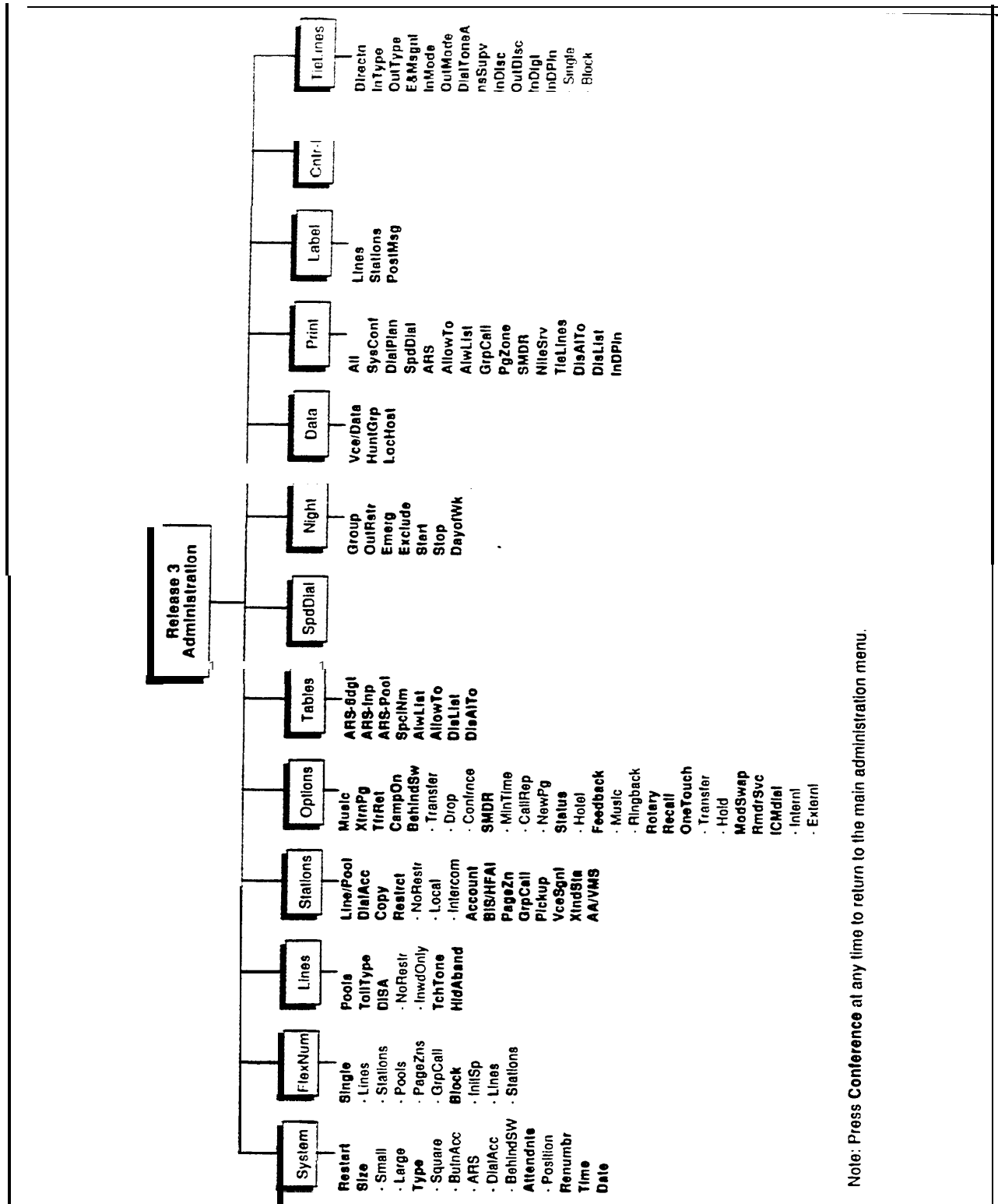
USING THE DISPLAY DURING ADMINISTRATION   Both administrator/attendant consoles have display screens; however, they are used differently during administration.

The Display on the Display Console

With the Display Console, the entire administration process is menu-driven. You use the buttons beneath the display to select the action you want to perform. The buttons beneath the display change their functions to match the labels on the display as the display changes during administration. You follow the display prompts, pressing the buttons beneath the display, line buttons, and Auto Intercom buttons to set basic operating conditions, assign lines, and administer optional features.

For a detailed description of this display, refer to the *MERLIN II System Manual.* Figure 3-3 shows the administration menu for the MERLIN II System, Release 3, for use with the Display Console. Figure 3-4 shows the administration menu for the MERLIN II System with Feature Module 2 for use with the Display Console.

Release 3
Administration

System | FlexNum | Lines | Stations | Options | Tables | SpdDial | Night | Data | Print | Label | Cntrl | TieLines

System
Restart
Size
· Small
· Large
Type
· Square
· BulnAcc
· ARS
· DialAcc
· BehindSW
Attendnte
· Position
Renumbr
Time
Date

FlexNum
Single
· Lines
· Stations
· Pools
· PageZns
· GrpCall
Block
· IntlSp
· Lines
· Stations

Lines
Pools
TollType
DISA
· NoRestr
· InwdOnly
TchTone
HldAband

Stations
Line/Pool
DialAcc
Copy
Restrct
· NoRestr
· Local
· Intercom
Account
BIS/HFAI
PageZn
GrpCall
Pickup
VceSgnl
XtndSta
AA/VMS

Options
Music
XtrnPg
TfrRet
CampOn
BehindSw
· Transfer
· Drop
· Confrnce
SMDR
· MinTime
· CallRep
· NewPg
Status
· Hold
Feedback
· Music
· Ringback
Rotary
Recall
OneTouch
· Transfer
· Hold
ModSwap
RmdrSvc
ICMdial
· Internl
· Externl

Tables
ARS-8dgt
ARS-Inp
ARS-Pool
SpclNm
AlwList
AllowTo
DisList
DisAlTo

Night
Group
OutRstr
Emerg
Exclude
Start
Stop
DayofWk

Data
Vce/Data
HuntGrp
LocHost

Print
All
SysConf
DialPlan
SpdDial
ARS
AllowTo
AlwList
GrpCall
PgZone
SMDR
NiteSrv
TieLines
DisAlTo
DisList
InDPln

Label
Lines
Stations
PostMsg

Cntrl

TieLines
Directn
InType
OutType
E&Msgnl
InMode
OutMode
DialToneA
nsSupv
InDisc
OutDisc
InDigt
InDPln
· Single
· Block

Note: Press Conference at any time to return to the main administration menu.

FIGURE 3-3 Administration Menu for MERLIN II System, Release 3.

Feature Module 2 Administration

- **System**
  - Restart
  - Size
    - · Small
    - · Large
  - Type
    - · Square
    - · BtnAcc
    - · ARS
    - · DialAcc
    - · BehIndSw
  - Attendnte
    - · Positions
    - · Hybrid
  - Renumbr
  - Time
  - Date

- **FlexNum**
  - Single
    - · Lines
    - · Stations
    - · Pools
    - · PageZns
    - · GrpCall
    - · CMSsplit
  - Block
    - · InitSp
    - · Lines
    - · Stations

- **Lines**
  - Pools
  - TollType
  - DISA
    - · NoRestr
    - · InwdOnly
  - CMS
  - TchTone
  - HldAband
  - HybPool

- **Stations**
  - Line/Pool
  - DialAcc
  - Copy
  - Restrct
    - · NoRestrct
    - · Local
    - · Intercom
  - Account
  - BIS/HFAI
  - PageZn
  - GrpCall
  - Pickup
  - VceSgnl
  - XtndSta
  - CMS

- **Options**
  - Music
  - XtrnPg
  - TfrRet
  - CampOn
  - BehIndSw
    - · Transfer
    - · Drop
    - · Confrnce
  - SMDR
    - · CallLen
    - · CallRep
    - · NewPg
  - Status
    - · Hotel
    - · CMS
  - Feedback
    - · Music
    - · Ringback
  - Rotary
  - Recall
  - OneTouch
    - · Transfer
    - · Hold
  - RmdrSvc
  - ICMdial
    - · Internl
    - · Externl

- **Tables**
  - ARS-6dgt
  - ARS-Inp
  - ARS-Pool
  - SpclNm
  - AlwList
  - AllowTo

- **SpdDial**

- **Night**
  - Group
  - OutRstr
  - Emerg
  - Exclude
  - Start
  - Stop
  - DayofWk

- **Data**
  - Vce/Data
  - HuntGrp
  - LocHost

- **Print**
  - All
  - SysConf
  - DialPlan
  - SpdDial
  - ARS
  - AllowTo
  - AlwList
  - GrpCall
  - PgZone
  - SMDR
  - NiteSrv

- **Label**
  - Lines
  - Stations
  - CMSspll

- **Cntr-Prg**

FIGURE 3-4 Administration Menu for MERIJN II System with Feature Module 2.

**The Display on the
BIS-34D Console**

The BIS-34D display provides the following kinds of
information:

- The current administration mode

- A "wait" message if the entire system or an individual
  voice terminal can't be administered

- The current feature being administered

- An echo of your input

- System prompts for additional input information

NOTE: For Feature Module 2, proceed with
administration after the "wait" message changes.

Before Administering a System

Once a system has been installed, it can be administered. How you do this depends on whether you are administering a new system, upgrading from an older to a newer system or making changes to an existing system.

Read the remaining paragraphs under this heading and then go to the appropriate topic that suits your situation:

Ž   If you are performing initial administration for a system that has just been installed, follow the procedures in this Section under the heading, "Administering a New System," on page 3-21.

Ž   If you are upgrading from a MERLIN II System with Feature Module 1 to a MERLIN II System with Feature Module 2 or with Release 3, or from a MERLIN II System with Feature Module 2 to a MERLIN II System with Release 3, see the information in this 'section under the heading, "Administering an Upgraded System," found on page 3-62.

Ž   If you are making changes to a system already in use, foIlow the procedures in this section under the heading, "Administering a Changed System," found on page 3-63.

NOTE: It is best to administer the system before or after working hours when it is not in use or when traffic is lowest. You cannot administer voice terminals that are in use and users cannot place or receive calls on lines that are being administered.

REVIEW PLANNING FORMS

Before you begin administration, you should collect the completed system planning forms. Planning forms for Release 3 can be kept in numerical order (la through 8c). Planning forms for Feature Modules 1 and 2 should be arranged as foIlows:

- Master Planning Form
- Flexible Numbering Form
- System Configuration Form
- Station Configuration Forms
- Enhanced Night Service Forms
- Call Restrictions and Allowed Lists Forms
- Group Page Form
- Group Call Distribution Forms
- Call Pickup Group Forms
- System Speed Dial Form
- Forms for Automatic Route Selection Tables

You should also label buttons on the administrator/ attendant console, other attendant consoles, and the voice terminals.

LABELS FOR THE ADMINISTRATOR/ ATTENDANT CONSOLE

Labels, as described below, are provided with the MERLIN II System Display Console and the BIS-34D Console for use in normal call handling mode and for administration mode.

Call-Handling Mode Buttons

Both the MERLIN II System Display Console and the BIS-34D Console are shipped with labels on which should be recorded CO line numbers, Auto Intercom numbers and/or names or locations, and feature names for use when the console is in call-handling mode. Verify that the type of console you are using is correctly recorded on the Attendant Console Station Configuration Form that is used with the installed system, then copy the information form the form onto the button labels.

If you have a MERLIN II System Display Console with more than 40 stations in the system, some labels will have two entries. Write the lower intercom number on the top half of the button label and the higher intercom number on the bottom half. Likewise, on a BIS-34D console, leave room below "Intercom-Voice" and "Intercom-Ring" since these buttons have another function for administration as described below.

Administration Mode Overlay

The MERLIN II System Display Console has an overlay that is placed on the console during system administration.

lf you have a BIS-34D Console, a separate overlay is not used during administration. However, because the bottom two buttons in the leftmost column take on special functions in administration mode, you should place a second entry on the labels for those buttons. Under "Intercom-Ring," write or type, "Adm Tel." Under "Intercom-Voice," write or type, "Adm Pool." You may want to record the administration function labels in a different color than the call-handling function labels.

NOTE: Although the Message and Conference buttons take on different functions during administration, those functions are not labeled on the buttons.

LABELS FOR ATTENDANT CONSOLES AND VOICE TERMINALS

For attendant consoles other than at Station 10 and for all the voice terminals and basic telephones in the system refer to the completed Station Configuration Forms. Copy the information from the forms onto the appropriate labels.

NOTE: If you label buttons with the names of programmable features, be sure to assign the features from the attendant console using Centralized Programming, or notify the users that they should program those features themselves.

DEFAULT SETTINGS   The default operating conditions for a MERLIN II system are the following:

- **Administration port.** Station port 01 (intercom number 10) is the only port for system administration and initially the only attendant port.

- **CalI Report (SMDR).** Both incoming and outgoing calls are recorded; outgoing calls are recorded if they have a duration of 1 minute for Feature Modules 1 and 2, or 40 seconds for Release 3.

- **Call Restrictions.** None assigned.

- **Camp On Return Interval.** Camped calls return after 1 minute.

- **Data Hunt Group.** Data Hunt Groups are assigned 4-digit codes *870 through *875.

- **Dialing Timeout Interval.** The dialing timeout interval for rotary lines is 12 seconds.

- **Direct Inward System Access.** DISA has no password assigned.

- **Group CaI1 Distribution Groups.** Group Call Distribution groups are assigned 3-digit codes 870 through 875.

- **Group Page Groups.** Group Page groups are assigned 3-digit codes 881 through 887.

- **Hold Disconnect Interval.** The Hold Disconnect Interval is set at 450 milliseconds (ms).

- **Line Pools.** Line pools are assigned numbers 9, and 890 through 899.

- **Lines.** Lines are assigned identifying numbers 01 through 32 for Feature Module 1 and assigned identifying numbers 801 through 856 for Feature Module 2 and Release 3.

- On-Line Module Swap Port. Station port 19 is designated as having the capability to reset modules for on-line module swap (for Release 3 only).

- Posted Message. Users can choose from among 20 messages and leave one posted for information to callers with display sets (for Release 3 only). There are 10 default messages and 10 blanks to be administered. The default messages are the fallowing:
    01 DO NOT DISTURB
    02 OUT TO LUNCH
    03 AT HOME
    04 OUT SICK
    05 IN A MEETING
    06 IN CONFERENCE
    07 WITH A CLIENT
    08 WITH A CUSTOMER
    09 AWAY FROM DESK
    10 OUT ALL DAY

- **Recall Timer.** The recall timer interval is 450 milliseconds.

- **Ringing-on-Transfer.** Music-on-Hold is the default but callers do not hear anything if a music source is not connected.

- **Stations.** Voice terminals and data equipment are assigned intercom numbers 10 through 79, and 800 and 801 for Feature Module 1; intercom numbers 10 through 69 and 700 through 727 for Feature Module 2 and intercom numbers 10 through 69, and 700 through 759 for Release 3.

- **System size.** Large (more than 8 lines).

- **System type.** Pooled with Button Access to Line Pools.

- **Tie Lines.** See also "Administering Tie Lines" on page 3-50. Tie lines (for Release 3 only) require several settings and the defaults for those settings are as follows:

> **Answer Supervision Time.** 300 ms

> **Dial Tone.** Remote

> **Incoming Disconect Time.** 300 ms

> **Incoming Line Dial Mode.** Rotary

> **Incoming Line Type.** Wink start

>. **Inward Dial Plan Numbers.** Four digits. 4010 through 4097

> **Line Direction.** Two way

> **Outgoing Disconect Time.** 300 ms

> **Outgoing Line Dial Mode.** Rotary

> **Outgoing Line Type.** Wink start

> **Signaling Type.** Type 1 Standard

•**Touch-Tone signaling.** Touch-Tone signals are the default.

• **Transfer Return Interval.** The Transfer Return interval is set at four rings.

•**Voice Terminal type.** BIS/HFAI (raised plastic button) sets are the default.

Compare these default settings with the entries on the System Configuration Form for Feature Modules 1 and 2 or Form le, System Form-Requirements and Options to determine whether any setting must be changed.

ADMINISTERING IN SEVERAL SESSIONS

You can leave administration mode before you've finished setting all the operating conditions and optional features for the system. Just complete the procedure you are performing, then slide the T/P switch to the center position. When you're ready to continue, follow the steps under "Enter Administration Mode" below, and resume administration at the point where you stopped.

**TO ENTER
ADMINISTRATION
MODE**

Follow these steps to enter the administration mode:

1   Slide the T/P switch on the left side of the console to
    P.

2   Press **Conference** twice.

   *On the DisplayConsole, the administration menu appears. On the
   BIS-34D Console, lights start flashing next to* Adm Pool, Adm
   Tel, Message, *and* Speaker.

**TO LEAVE
ADMINISTRATION
MODE**

To leave administration mode, slide the T/P switch to the
center position.

**SUMMARY OF
ADMINISTRATION
PROCESS**

Following is a Iist of the procedures that make up the
administration process. The procedures are listed in the
order in which they are performed.

● **Set system operating conditions**

  > Set system size

  > Set system type

  > Designate attendant positions

● **Perform flexible numbering (FM2 and R3 only)**

● **Administer lines**

  > Assign lines to pools

  > Specify toll type

  > Specify Touch-Tone or rotary signaling on lines

● **Administer stations**

  > Assign lines and line pools to stations

  > ldentify analog voice terminal type

  > Identify jacks for voice announcement to busy
    voice terminal feature

- **Set options**

    > Identify music-on-hold line jack

    >Identify loudspeaker page line jack

ı ı**Administer data**

    > Identify analog jacks needing simultaneous voice
      and data feature

- **Administer tie lines (R3 only)**

- **Administer optional features**

    The administration procedures for optional features are
    provided in quick reference tables at the end of this
    section. Table 3-5, "Display Console Administration,"
    contains menu driven administration information for
    use with the Display Console. Table 3-6, "BIS-34D
    Console Admimistration," contains button method
    administration information for use with the BIS-34D
    Console.

SYSTEM BUSY
MESSAGES

If you see the message "System Busy-Please Wait" while
performing an administration procedure, the system must
be idle to perform the procedure. Do one of the following:
wait for the system to become idle, move onto another
procedure, or leave administration mode and try the
procedure later, preferably before or after business hours.

The following features require the system to be idle when
they are being administered:

- System restart

- System size

- System type

- Assigning attendant positions

- Flexible numbering

- Module renumbering
- Flexible numbering
- Line pool administration
- Tie line direction assignment
- Tie line incoming type
- Tie line outgoing type
- Tie line signaling
- Tie line inward dial plan administration
- Voice announcement to busy voice terminal
- Music-on-Hold port assignment
- Page port assignment
- Simultaneous Voice and Data port assignment

The following features require that the station be idle during administration:

- Centralized Programming
- Copy
- Dial Access to Line Pools
- Button Access 10 Line Pools
- Allowed Lists
- Disallowed Lists
- Call Restriction Assignments

Administering a New System

SETTING SYSTEM SIZE

A MERLIN II system can be set for two different sizes: small and large. The small setting is for systems administered for eight or fewer lines. The large setting is for systems administered for more than eight lines. This large size setting allows the system to accommodate Up to 56 lines. Refer to the System Configuration Form for Feature Module 2 or Form 1e, System Form-Requirements and Options to determine the system size.

With a Display Console

1   Enter administration mode by sliding the T/P switch to **P.**

2   Press **Conference** twice.
   The administration menu apperas

3   Press [System], [Size]
   The size screen appears.

4   Press [Small] for a small system or [Large] for a large System.
   You see the message "System is Re-starting..." The system renumbers itself, then the administrationmenu appears on the display

5   Continue administration or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.
   Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3   Press **Message.**
   Light goes on steady next to Message. Flashing lights go off.

4   Dial #201
   Two beeps Sound.

5 Dial number to designate system size:

>   0 = small
>   1 = large

The message "System is Re-starting... " appears. When renumbering is complete, after a short delay, the lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

6 Continue administration or leave administration mode by sliding the T/P switch to the center position.

SETTING SYSTEM TYPE

Refer to the System Configuration Form for Feature Module 2 or Form 1e, System Form- Requirements and Options to determine the system type: square, behind-switch, or pooled. If the system is to be pooled, determine the method to be used to access line pools: Button Access, Dial Access, or Automatic Route Selection (ARS).

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
The administration menu appears.

3 Press [System], [Type].
The type screen appears.

4 Press the appropriate button:

>For a square system, press: [Square].

>For a pooled system, press one of the following:

[ButnAcc], [ARS], [DialAcc].

>For a behind switch system, press [More],

[BehindSw].

The message "System is Re-starting..." appears, followed by the administration menu after a short delay.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.

    Lights flash nexto to Adm Tel, Adm Pool, Message, *and* Speaker.

3   Press **Message.**

    The green light goes on steady next to Message. *All flashing lights go off.*

4   Dial #202.

    Two beeps sound.

5   Dial the appropriate number:

        0 = Square
         1 = Pooled with Button Access to line pools
         2 = Pooled with Dial Access to line pools
         3 = Pooled with Automatic Route Selection
         4 = Behind switch

    The message "System is Re-starting..." appears. When renumbering is complete, afier a short delay, the Lights jlash next to Adm Tel, Adm Pool, Message, *and* Speaker.

6   Continue administration or leave administration mode by sliding the T/P switch to the center position.

DESIGNATING ATTENDANT POSITIONS

Refer to the Master Planning Form for Feature Module 2 or Form 3a, System Form-Station Planning to determine which voice terminals should be attendant positions.

NOTE: The system is factory set with the station connected to jack 01 (default intercom number 10) as an attendant position, and this *cannot* be changed.

Keep in mind that there cannot be more than eight attendant positions; therefore, you can designate up to seven additional attendant positions. There can be only two attendant ports on each analog station module. Every fourth analog station port after port 01 (default intercom number 10) can be designated an attendant position. If

you want to designate a new attendant position and the
system already has the maximum number, you must
change an existing attendant position to a nonattendant
voice terminal *before* you designate the new attendant
position.

With a Display Console

1   Enter administration mode by sliding the T/P switch to
    P.

2   Press Conference twice.

    The administration menu appears.

3   Press [System], [Attendnts].

4   Press [Position].

5   Press the Auto Intercom buttons of the stations you
    want to designate as attendant positions until their
    green lights show the appropriate code:

    Slteady green light = attendant position
    Flashing green iight = potential attendant position used
    *   as nonattendant voice terminal*
    Green light off = cannot be assigned as attendant position

6   Press [Store].

    *The message "System is Re-staring..." appears. When the process
    is complete, after a short delay, the administration menu appears.*

7   Continue administration or leave administration mode
    by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to
   P.

2 Press **Conference** twice.

   Lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

3 Press Message.

   Light goes on steady next to Message. Flashing lights go off.

5 Press the Auto Intercom button until the green light
next to the button shows the setting you want:

Studygreen light = attendant position
Flashing green light = potential attendant position
Green light off cannot be assigned as an attendant position

6 Press #.

The message "System is Re-starting..." appears. When the process is complete, after a short delay, the lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

7 Continue administration or leave administration mode
by sliding the T/P switch to the center position.

Performing Flexible Numbering

C0NSIDERATIONS

- This feature can be administered only from a MERLIN II System Display Console. It is available with Feature Module 2 and Release 3, not with Feature Module L

- Flexible Numbers, except for tie lines, can be one to four digits but the first digit *cannot* be 0.

- If you combine short flexible numbers with long ones, the longer numbers cannot begin with the same digit as the shorter ones. For example, a hotel couldn't assign the number 2 to the bellhop and the number 201 to room 201 because when callers begin to dial mom 201, they would be connected to the bellhop as soon as they dialed 2.

- For Release 3, the following numbers *cannot* be used for flexible numbering: 7,76,77,78,760 through 783, and 7600 through 7839. These numbers were reserved for CMS split codes used only with FM2.

- If your system is using basic telephones, you should not use 9 or 88 as flexible numbers. If the basic telephones are connected through a BTMI, BTMI-2, or

OPTI, you cannot dial flexible numbers longer than two digits.

- If a flexible number is invalid or conflicts with a number already assigned, the console beeps.

- There are some unused numbers already available that you can assign to stations without initializing. The number are 784 through 799, 857 through 869, 876 through 880, and 888 through 889. If you can use discrete numbers or random sets of numbers, you can use these numbers.

- When renumbering with block renumbering, the numbers must be consecutive. For example, when renumbering all stations using intercom numbers with block renumbering the first block is intercom numbers 10 through 69 and the second block is intercom numbers 700 through 759.

- Tie line inward dial plan numbers can be flexibly renumbered to either three or four digits. See "Administering Tie Lines" on page *3-50* for the administration procedure to renumber the inward dial plan.

If the system is to be renumbered using Flexible Numbering, refer to completed Form 2a, Flexible Numbering Form-Station Numbers and Form 2b, Flexible Numbering Form-Lines, Pools, and Groups for Release 3, or the two Flexible Numbering Forms for Feature Module 2. Follow the procedure below *before* you go on to other administration procedures. Flexible Numbering must be assigned before you perform any other administration to avoid possible loss of other features. There are two types of administration for Flexible Numbering:

- In single renumbering, a specific dial code is assigned to a station line, line pool, Call Distribution group, or Group Page group.

first station or line and instruct the system to renumber the other stations or lines in the group sequentially.

DIAL PLAN PRINTOUT

You can get a printout of the numbers currently assigned to stations, lines, line pools, Call Distribution and Group Page groups. Having these numbers on hand is useful as you administer flexible numbering to be sure that the numbers you're assigning do not conflict with numbers already assigned, To get a printout from the administration menu, follow these steps:

With a Display Console

1 Enter administration mode by sliding the T/P switch to *P*.

2 Press **Conference** twice.

The administration menu appears.

Press [More], [More], [Print], [DialPlan]

Wait until printing is complete before leaving administration mode. Don't remove the printout until after you've left administration mode or printing page alignments will be affected.

4 Press Conference to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1　Enter administration on mode by sliding the T/P switch to P.

2　Press **Conference** twice.

*Lights flash next to **Adm** Tel, Adm Pool, Message, and Speaker.*

3　Press **Message.**

4　Dial #999 and wait for the beep.

3   Press **Message.**

4   Dial #999 and wait for the beep.

5   Press **Message.**

Wait until printing is complete before leaving administration mode. Don't remove the printout until after you've Ieft administration mode or printing page alignments will be affected.

6   Leave administration mode by sliding the T/P switch to the center position.

INITIALIZING STATION POSITIONS (CHANGING INTERCOM NUMBERS TO MAKE SPACE IN THE DIAL PLAN)

When the MERLIN II system is first setup, it assigns default dialing codes to stations, lines, line pools, and Call Distribution and Group Page Groups. See "Default Settings" on page 3-15.

NOTE   It also assigns codes to agent splits for the Call Management System (CMS) that is available with Feature Module 2 only. For additional information, see the *MERUN II Communications System System Manual for the Call Management System.*

Because dialing plan numbers must be unique, the default dialing plan leaves few numbers available for use as Flexible Numbering codes. To make space available in the dial plan you need to perform the Initialize Station Position procedure.

This procedure renumbers the stations in the system so that they are all in the 7000 range by placing 70 or 7 before their default intercom numbers, i.e., 7010 through 7069 and 7700 through 7759. This saves you time and makes Flexible Numbering codes 1000 through 6999 available for use. To assign intercom numbers in the 7000 range to all stations and change default codes to lines, line pools, tie lines, Call Distribution Groups, and Group Page Groups:

1   Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

The administration menu appears.

3 Press [FlexNum], [Block], [InitSp].

All the intercom numbers are assigned numbers in the 7000 range. (Add 7000 to the default intercom number. Intercom 10 becomes 7010, intercom 11 becomes 7011, etc.)

4 To assign Flexible Numbering codes, press [Exit] and go to step 4 of Block Renumbering or Single Renumbering, whichever is the appropriate procedure, below.

BLOCK RENUMBERING

To assign sequential Flexible Number codes to a group of stations or lines:

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.

The administration menu appears.

3   Press [FlexNum].

4   Press [Block].

5   Press [Lines], or [Sations] to select the screen for the numbers you want to change.

6   Press the line button or the Auto Intercom button for the *first* line or station on the console to be changed, i.e., the one with the lowest-numbered line or station jack. This is the first line or station to be renumbered in the string of lines or stations.

7   Press [Enter].

The system displays the line or station number and prompts you to enter the number of the last line or station in the block to be changed, i.e., the one with the higest numbered jack.

8   Press the line button or Auto Intercom button of the last (highest-numbered) line or station in the string of lines or stations to be changed.

9   Press [Enter].

The system prompts you to enter the first new Fiexible number dial code.

10   Dial the first (lowest-numbered) new Flexible Number dial code.

11   Press [Enter]

The system renumbers the entire string of lines or stations sequentially, then returns you to the Block Renumber screen.

> **NOTE:**   If you get an error tone, one or more of the stations in the string of stations is being prevented from duplicating a number that is currently used. If you do not know the number in use, you will need to determine it. Using a process of elimination, substitute a different first or last new dial code in order to renumber smaller blocks until you determine the number already in use. Consider also single renumbering.

12   Press Conference to return to the administration menu or leave administration sliding the T/P switch to the center position.

SINGLE RENUMBERING

To assign a Flexible Number code to a particular station, line, line pool, Call Distribution Group, or Group Page Group:

1 Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

The administration menu appears.

3 Press [FlexNum]

4   Press [Single] .

5   Press the appropriate button for the type of dial code
     you want to change. The choices are the following:
     [Station] [Pools] [Page Zns] [GrpCall]

6   Take *one* of the actions below to indicate the "old" dial
     code.

     NOTE: The third action can only be used for lines or
                  stations.

     > Dial the current number of the line, station, line
        pool, or group.

     > Dial the logical ID number. Be sure to enter the
       pound sign (#) before the number.

         NOTE: Logical ID numbers run from lowest to
                   -highest, with the lowest number being #1.
                   For example, to specify line pool 9, you
                   would enter "#l ." Pool 890 is #2, Pool
                   891 is #3, etc. Note that logical ID
                   numbers for lines and stations are
                   preprinted on the administration overlay.

     > If you're identifying a line or station, press its line
       button or Auto Intercom button.
       The light next to the button goes on.

7   Press [Enter]. .
     *The display shows the old number and prompts you to enter the
     new number-*

8   Dial the new Flexible Number code.

9   Press [Enter]. .
     The system reiurns you to the Single Renumber screen.

10   Press Conference to return to the administration menu
     or leave administration mode by sliding the T/P switch
     to the center position.

Administering Lines

ASSIGNING LINES TO LINE POOLS {POOLED SYSTEMS ONLY)

If your system is pooled, follow this procedure. If your system is square or behind-switch, follow the "Assigning Lines to Stations" procedure in this Section under "Administering Stations" on page 3-36.

DESCRIPTION

To administer lines in pooled systems, you group interchangeable outside lines into pools that people can access with a single button or a dial code on their phones. People within the system can-place a call through a line pool in one of three ways:

- **Button Access.** People access the main pooI (default pool 9, which usually contains locaI lines) by pressing one of the two buttons to which the system assigns that pool. You can assign phones access to other line pools as well, such as pools of WATS lines or FX lines. You can also assign individual lines to buttons on phones.

- **Dial Access.** People use a dial code to access any line pool that you assign to their phones. The user presses one of the two Pool Access buttons that the system assigns to each phone. Then he or she dials the access code for any of the pools that you've assigned to the phone. You can also assign individual lines and line pools to buttons on these phones.

- **Automatic Route Selection.** People press the Pool Access button and dial the telephone numbers they want to reach and the system selects the line pool that you have designated as the best one for the type of call being made. If the most appropriate line for a call is busy, the system routes the call to the second-choice line and so on.

CONSIDERATIONS

The number of lines available for pooling is affected by the number of lines that must be reserved for personal or special-purpose use. For example, if there are ten outside lines and two people need personal lines, there are eight lines left for pooling. If a line is

assigned to a pool, it cannot be assigned to a second pool nor to an individual as a personal line.

- The system can have as many as 11 different line pools. If the business has special-purpose lines, such as WATS or FX lines, they should be assigned to separate pools. Do not mix types of lines in a pool, because people in the system cannot control which line they get when they access the pool.

- You can assign all, some, or none of the system's lines to a single pool, but you cannot assign any line to more than one pool.

- If the system has Loudspeaker Page and the Music-on-Hold features, the loudspeaker paging system and the music source are connected to line jacks. A Loudspeaker Page line *cannot* be assigned to line pools, but you can assign the individual line to appropriate stations, such as attendant consoles.

- On analog phones, the system automatically assigns the main pool or Pool Access to the two buttons above the Intercom buttons, and you cannot change this assignment. On the 7406D phone, the main pool or Pool Access is automatically assigned to buttons in the leftmost and middle column.

- If a line appears as an individual line at a phone in the system, it wilI disappear from that phone if you add it to a line pool. Before adding lines to pools, make sure they aren't needed as individual lines.

Initially, all lines are assigned to the main pool (default pool 9). You must remove lines from the main pool in order to do the following:

- Assign them to other line pools

- Use them as personal lines

- Use the line jacks for Music-on-Hold or Loudspeaker Page

Refer to Form 1a, System Form- Incoming Lines and/or Form 1b, System Form-Tie Lines for Release 3, and the Master Planning Form, Line Jacks for Feature Module 2 which shows how each line jack should be administered. Follow the steps below to add or remove lines from the main pool. If a line should be assigned to a different line pool, perform that step as well.

With a Display Console

1   Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

The administration menu appears.

5 Press [Lines], [pools].

4 Dial the pool code (the default codes are 9 for the main pool and 890 through 899 for the other pools).

5 Press [Enter]

6 Press the line buttons until the appropriate code shows for each line:

Red light on = the line is assignd to the pool
Red light off = the line is not assigned to the pool

7 Press[Exit], and repeat steps 4 through 6 to administer any other line pools.

8 Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

Lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

3 Press Adm Pool.

Green light comes on steady and two beeps sound.

4 Dial the pool code.

5 Press line buttons until your selection is shown:

Red light on = line in pool
Red light off = line not in pool

6 Press Adm Pool.

7 Press Conference to continue administration or leave administration mode by sliding the T/P switch to the center position.

SPECIFYING TOUCH-TONE OR ROTARY SIGNALING

Refer to Form la, System Form-Incoming Lines for Release 3, or the System Configuration Form for Feature Module 2 to determine if the system contains any rotary lines. If it does, follow the appropriate procedure below:

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

The administration menu appears.

3 Press [Lines], [More], [TchTone].

4 Press the line buttons until your selection is shown:

Green light on = Touch-Tone signaling
Green light off = rotary signaling

NOTE: Lights next to tie line buttons do *not* light when you perform this procedure.

5 Press Conference to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.

    Lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

3   Press **Message.**

    Green light goes on steady and two beeps sound.

4   Dial #302

5   Press line buttons for the selection you want:

    Green light on = Touch Tone selected
    Green light off = rotary seiected

6   Press **Message.**

7   Continue administration or leave administration mode by sliding the T/P switch to the center position.

Administering Stations

ASSIGNING LINES TO STATIONS

After you have administered lines or line pools, you must assign them to stations. If you are assigning dial access to line pools, see "Assigning Lines to Stations for Dial Access to Pools" below. Refer to Form la, System Form-Incoming Lines for Release 3, or the System Configuration Form for Feature Module 2 for proper assignments.

Assigning Lines/Line Pools to Stations for Square, Button-Access, and Behind Switch Systems

The following procedure can be used for assigning lines or line pools for a square, button access, or behind-switch system.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [Stations], [Line/Pool].

4 Press the Auto Intercom button or dial the code for the station

5 Press [Enter] .

6 Press the the buttons until your selection is shown. For behind-switch systems, lines are assigned in the order in which you press the line buttons.
   Green light on = line is assigned to the station
   Green light off= line is not assigned to the station
   Red light on = line is assigned to a pool

   If you want to give another station the same line assignments as one you have already set up, use the following shortcut:

   > **CAUTION:** Be aware that when you copy line assignments, you also copy call restrictions, allowed list, and disallowed list permissions. Be sure you want the two stations to be identical in these respects before using this copy procedure.

   a Press [Copy] .

   b In response to the prompt, press the Auto Intercom button or dial the code of the station you are copying *from.*

   c Press [Enter] .

   d In response to the prompt, press the Auto Intercom button or dial the code of the station you are copying to.

e Press [Enter]

You hear a 2-beep signal to let you know that a copy procedure is complete.

f Repeat steps b through e for each station for which you want to copy line assignments.

g Press [Exit] to return to the Stations screen.

7 To assignlines to another station, press [Line/Pool] and repeat steps 4 through 6.

8 Label the stations with the telephone numbers you've assigned.

9 Press **Conference to** return to the administration menu, or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3 Press **Adm Tel.**

4 Press the Auto Intercom button or dial the code for the station.

Green light goes on steady netx to Adm Tel and two beeps sound.

5 Press the line buttons until your selection is shown:

Green light on = line assigned to station
Green light off = line is not assigned to station

6 Press Adm Tel.

7 Continue administration or leave administration mode by sliding the T/P switch to the center position.

Assigning Stations Dial Access to line Pools

Use this procedure to assign stations dial access to line pools. Refer to Form 1a, System Incoming Lines for Release 3, or the System Configuration Form for Feature Module 2 for proper assignments.

With a Display Console

1 Enter administration mode by sliding the T/P switch to **P.**

2 Press **Conference** twice.
   The administration menu appears.

3 Press [Station], [DialAcc] .

4 Press the Auto Intercom button or dial the intercom number for the station you want to assign dial access.

5 Press [Enter] .

6 Press the button of a line in each pool you want to assign until your selection is shown.
   Green light on = station has Dial Access to the pool containing the line
   Green light off= station does not have Dial Access to the pool containing the line

If you want to give another station the same line assignments as one you have already set up, use the following shortcut:

> **CAUTION:** Be aware that when you copy line assignments, you also copy call restrictions, allowed list and disallowed list permissions. Be sure you want the two stations to be identical in these respects before using this copy procedure.

a Press [Copy] .

b Press the Auto Intercom button or dial the intercom number of the station you are copying from.

c Press [Enter].

d Press the Auto Intercom button or dial the intercom number of the station you are copying *to*.

e Press [Enter].

You hear a 2-beep signal to let you know that the copy procedure is complete.

f Repeat steps a through e for each station for which you want to copy line assignments.

g Press [Exit] to return to the Stations screen.

7 Press [DialAcc] and repeat steps 4 through 6 for each station to which you want to copy line assignments.

8 Press Conference to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

Lights flash next to Adm Tel, Adm Pool, Message and Speaker.

3 Press Adm Tel.

4 Press the Auto Intercom button or dial the intercom number for the station you want to assign dial access.

Steady green light goes on next to Adm Tel and two beeps sound.

5 Press the same Auto Intercom button or dial the same intercom number from step 4.

6 Press the button of a line in each pool you want to assign until your selection is shown.

Green light on = station has dial access containing line
Green light off = station does not have dial access to pool
containing line

7 Press Adm Tel

8 Press Conference to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

IDENTIFYING ANALOG VOICE TERMINAL TYPE

Initially, the system recognizes all analog voice terminals as BIS or HFAI models, the kind that have raised plastic buttons.

- Analog voice terminals that have flat membrane buttons are the 5-button, 10-button, 34-button, and 34-button deluxe models.

- Analog voice terminals that have raised plastic buttons are the 10-button HFAI voice terminal, the 34-button (SP-34) voice terminaI with speakerphone, the 34-button (SP-34D) voice terminal with speakerphone and display, and the BIS-10 BIS-22, BIS-34 voice terminals, and BIS-22D and BIS-34D voice terminals with display.

If the system you're administering has any voice terminals with flat membrane buttons, you must identify them by intercom number. Refer to the following Station Configuration Forms to determine which voice terminals in the system have flat membrane buttons.

For Release 3:

- Form 3b, Station Configuration Form, Analog Stations and Basic Telephones (Square Systems)

- Form 3f, Station Configuration Form, Analog Stations and Basic Telephones (Pooled Systems)

For Feature Module 2:

- Station Configuration Form, Analog Stations and Basic Telephones (Square Systems)

- Station Configuration Form, Analog Stations and Basic Telephones (Pooled Systems)

Follow the appropriate procedure below to identify any voice terminals in the system that are membrane-button rather than BIS/HFAI (raised button) models.

With a Display Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press Conference twice.

The administration menu appears.

3   Press [Stations], [More], [BIS/HFAI]

4   Press the Auto intercom button until your selection is shown:

Green light on = BIS/HFAI voice terminal (raised buttons)
Green light off= flat membrane-button voice terminal

5   Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference twice.**

Lights flash next to Adm Tel, Adm Pool, Message and Speaker.

3   Press **Message.**

Light goes steady next to Message. All flashing lights go off.

4   Dial #320.

Two beeps sound.

5   Press Auto Intercom button until your selection is shown:

Green light on = BIS/HFAI voice terminal (raised buttons)
Green light off= flat membrane button voice terminal

6 Press **Message.**

7 Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

IDENTIFYING JACKS FOR THE VOICE ANNOUNCEMENT TO BUSY VOICE TERMINAL FEATURE

Refer to Form 1d, System Form-Station Planning for Release 3, or the Station Jacks section of the Master Planning.Form for Feature Module 2. The form shows which analog voice terminals, if any, have been assigned two station jacks so that the Voice Announcement to Busy Voice Terminal feature can be used.

Considerations

- You must assign two consecutive analog telephone jacks on the control unit to the voice terminal. The first jack must have an odd jack number (even intercom number) and the second jack the next higher even jack number (odd intercom number). The intercom number for the phone is the even intercom number.

- You can assign a phone either the Voice Announcement To Busy Telephone feature or the Simultaneous Voice and Data feature but not both.

- This feature is not available with basic telephones.

Follow the appropriate procedure below to identify any station jacks in voice/voice pairs.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
The administration menu appears.

3 Press [Stations], [More], [More], [VceSgnl].

4 The system prompts you to assign voice/voice pairs of jacks by pressing the appropriate Auto Intercom buttons. Each successive press of a button gives you one of the following codes:

Green light on = station jack is in a voice/voice pair
Green light off = station jack is not paired

5 Press **Conference** to return to the administration menu or leave administmtion mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference twice.**

Lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

3 Press **Message.**

4 Dial #210.

Green light goes on steady next to Message *and two beeps sound.*

5 Press either one of two adjacent Auto Intercom buttons until your selection is shown:

Green light on = station jack is in voice/voice pair
Green light of = station jack is not paired

6 Press **Message.**

7 Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

Setting Options

**IDENTIFYING MUSIC-
ON-HOLD LINE JACK**

If the MERLIN II system has Music-on-Hold, you need to identify the control unit line jack to which the music source is connected. Remember that the Music-on-Hold line can't be placed in a line pool, assigned to a voice terminal, used for Loudspeaker Page, or used as a Direct Inward System Access (DISA) line.

NOTE: If you have a pooled system, you must remove the line designated for Music-on-Hold from the main pool, where it is assigned by default before you can identify it as the Music-on-Hold line. If you haven't already done so, follow the instructions under "Assigning Lines to Line Pools" on page 3-32, then continue with this procedure.

Follow the appropriate procedure below to identify the Music-on-Hold line jack.

With a Display Console

1 Enter administration mode by sliding the TIP switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [More], [Options], [Music].

4 The system prompts you to indicate the Music-on-Hold line jack by pressing the appropriate line button. Each successive press of a button gives you one of the following codes:
   Green light on = jack is assigned for Music-on-Hold
   Green light off = jack is for a standard line or loudspeaker page

5 Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   Lights flash next to Adm Tel, Adm Pool, Message, *and* Speaker.

3 Press Message.

4 Dial #204.
   Green light nex t o Message goes on steady and two beeps sound.

   Press the line button until your selection is shown:
   Green light on = jack is assigned for Music-on-Hold
   Green light off = jack is for a standard line or loudspeaker page

5 Press **Message.**

6 Continue administration or leave administration mode by sliding the T/P switch to the center position.

IDENTIFING LOUDSPEAKER PAGE LINE JACK

Check Form 1e, System Form-Requirements and Options for Release 3, or the Line Jack section of the Master Planning Form for Feature Module 2 to see if the system includes the Loudspeaker Page feature. If so, you need to identify the control until line jack to which the paging equipment will be connected. Keep in mind that the Loudspeaker Page line can't be placed in a line pool, used for Music-on-Hold, or used as a DISA line.

Perform the appropriate procedure below to identify the Loudspeaker Page line jack.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [More], [Options], [XtrnPg].

4 The system prompts you to press the appropriate line button to identify the line jack used for Loudspeaker Page. Each successive press of a button gives you one of the following codes:

   Green light on = Loudspeaker Page line
   Green light off = standard line or Music-on-Hoid line

5 Press Conference to return m the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

   Lights flash next to Adm TeI, Adm Pool, Message, *and* Speaker.

3 Press **Message.**

4 Dial #205.

   The green light goes on steady next to Message and two beeps sound.

5 Press the appropriate line button. Each successive press gives you one of the following:

   Green light on = jack is assigned for Loudspeaker Page
   Green light off = standard line jack or Music-on-Hoid jack

6 Press **Message.**

7 Continue administration or leave administration mode by sliding the T/P switch to the center position.

Administering Data

IDENTIFYING ANALOG JACKS NEEDING SIMULTANEOUS VOICE AND DATA FEATURE

Refer to Form 1d, System Form-Station Planning for Release *3,* or the Station Jacks section of the Master planning Form for Feature Module 2. The form shows whether a second station jack has been assigned to any analog voice terminal to allow simultaneous voice and data calling.

Considerations

- To use this feature, you must have a General Purpose Adapter and a modem connected to your analog voice terminal, not a basic telephone.

- You can assign either the Voice Announcement To Busy Telephone feature or the Simultaneous Voice and Data feature to a voice terminal. Since both features require two consecutive analog jacks, a voice terminal *cannot* have both features.

- You should assign the voice/data station pair to an analog station jack with an odd jack number (even intercom number) and the next higher analog phone jack that has an even jack number (odd intercom number). The intercom number of the voice terminal connected to these jacks is the even intercom number.

- You cannot use a Hands-Free Unit when the Simultaneous Voice and Data feature has been administered.

- The Voice Announcement to Busy Telephone feature decreases the total number of telephones a system can have.

Follow the appropriate procedure below to identify any station jacks invoice/data pairs.

With a Display Console

1 Enter administration mode by sliding the T/P switch to
  P.

2 Press **Conference** twice.
  The administration menu appears.

3 Press [More], [More], [Data], [Voe/Data]

4 Assign voice/data pairs by pressing the appropriate
  Auto Intercom-buttons. Each successive press of a
  button gives you one of the following codes:
  Green light on= voice terminal is in a voice/data pair
  Green light off = voice terminal is not paired

5 Press **Conference** to return to the administration menu
  or leave administration mode by sliding the T/P switch
  to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to
  P.

2 Press **Conference** twice.
  Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3 Press **Message.**

4 Dial #211
  Green light next to Message comes on steady and two beeps sound.

5 Press either one of two adjacent Auto Intercom
  buttons:
  Green light on = station jack part of voice/data pair
  Green light off = station jack is not paired

6 Press **Message.**

7 Continue administration or leave administration mode
  by sliding the T/P switch to the center position.

Administering Tie Lines

Available only with MERLIN II System Release 3, a tie line module provides up to four tie line ports. For many installations, placing tie lines in one or more pools will be most convenient for their use. By default, lines in pools are set to not ring at stations. No ring is the recommended setting at an attendant station for dial repeating tie lines. However, if the lines are administered as automatic ringdown, they should be set for immediate ring at the attendant station.

Each tie line port must be administered individually. In addition, each port has associated with a set of five DIP switches that must be set to choose the signaling mode. The tie line module has two blocks of DIP switches (S1 and S2). The bottom DIP switch block (S1) contains two sets of five switches, one set each for port 1 and port 2. Like the bottom block, the top DIP switch block (S2) contains two sets of five switches, one set each for port 3 and port 4. See Figure 3-5.
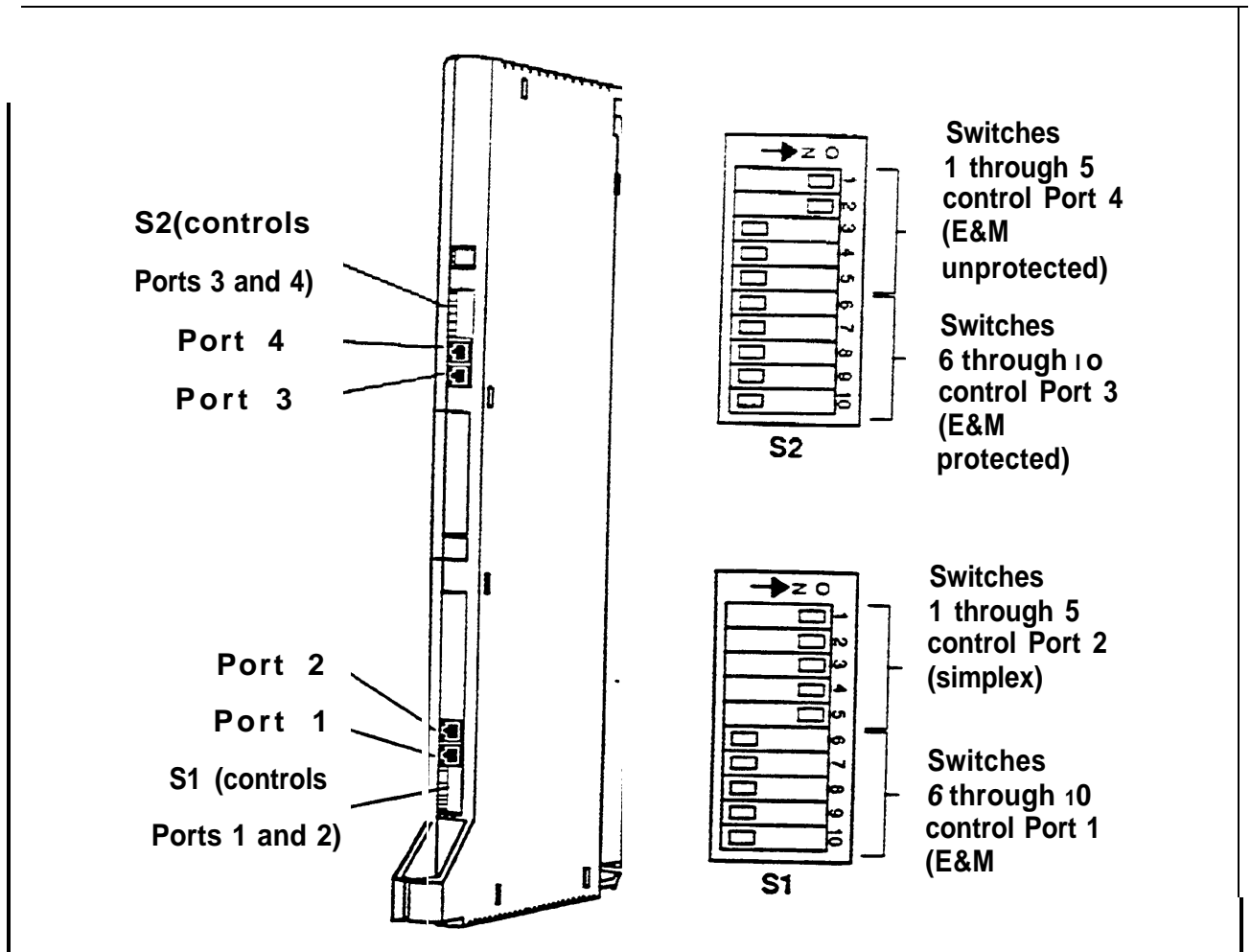
FIGURE 3-5 Setting tie line module DIP switches.

Table 3-2 shows the switch settings you should use to set the signaling mode of each port to E&M protected, E&M unprotected, or Simplex.

> **WARNING:** The protected mode must be used whenever the E&M leads extend out-of-building and are not connected to the network interface. See pages 1-47 and 1-48

NOTES: The unprotected mode *must* be used for the E&M Type 1 Standard interface in order to meet the voltage drop criteria for that interface.

Switch positions designated n/a can be either on or off.

Refer to Form lb, System Form-Tie Lines and set the options for each tie line port as described here.

TABLE 3-2 Tie Line DIP Switch Settings

Port	Options		Switch Position	Switch Setting
4 or 2	E&M	Unprotected	1 2 3 4 5	
		protected	1 2 3 4 5	o f f o f f o f f o f f o f f
	Simplex		1 2 3 4 5	n/a n / a O n On On
3 or 1	E&M	Unprotected	6 7 8 9 10	On On off off off
		Protected	6 7 8 9 10	off off o f f o f f o f f
	Simplex		6 7 8 9 10	n/a n/a O n O n O n

DEFAULT TIE LINE SETTINGS

The default settings for tie line options are summarized below in Table 3-3.

TABLE 3-3 Default Tie Line Settings

Tie Line Option	Default Setting
Answer supervision time	300 ms
Dial mode (incoming line)	Rotary
Dial mode (outgoing line)	Rotary
Dial Tone	Remote
Direction	Two way
Disconect Time (incoming)	300 ms
Disconect Time (outgoing)	300 ms
Inward Dial Plan	Four digits, 4010 through 4097
Line type (incoming)	Wink start
Line type (outgoing)	Wink start
Signal type	Type 1 Standard

SELECTING THE DIRECTION

To select the direction on which tie line calls can be initiated, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

The administration menu appears.

3 Press [More], [More], [More], [TieLines], [Dirctn].

   The direction screen appears.

4 Dial the line number or press the line button of a tie line, then press [Enter].

5 Press the button beneath the display to select the direction of the tie line:

> Two way (default)

> Outgoing

> Incoming

The direction screen appears.

6 Repeat step 4 for each line port.

7 Press Conference to return to the main administration menu or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE LINE TYPE

To select the tie line type, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
The administration menu appears.

3 Press [More], [More], [More], [TieLines], [InType].
The in type screen appears.

4 Dial the line number or press the line button of a tie line, then press [Enter].

5 Press the button beneath the display to select the type of tie line wanted:

> Wink= wink start (default for outgoing)

> Delay= delay dial

> Imm = immediate start

> Auto= automatic ringdown (default for incoming)

The in type screen appears.

NOTE: If the tie line is Touch-Torte signaling, the immediate start (Imm) option is disallowed.

6 Repeat steps 4 and 5 for each incoming tie line port.

7 Press [Exit] and select [OutType] of [InType] to select the outgoing line type repeat steps 4 and 5 for each outgoing tie line port.
The out type screen appears.

8 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE SIGNAL TYPE

To select the signal type for tie lines, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
The administration menu appears.

3 Press [More], [More], [More], [TieLines], [E&Msgni].
The E&M signal screen appears.

4 Dial the line number or press the line button of a tie line, then press [Enter] .

5 Press the button beneath the display to select the type of signal wanted:

>Type1S =Type 1 Standard (default)

>Type1C=Type 1 Compatible

>Type5=Type5 Simplex

The E&M signal screen appears.

6 Repeat steps 4 and 5 for each tie line port.

7 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE DIALING MODE

To select the dialing mode for tie lines, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

   The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [InMode].

   The in mode screen appears.

4 Press the tie line button to select the dialing mode. wanted.

   Green light on = Touch-Tone selected the dialing mode.

   Green light off = Rotary selected.

5 Press [OutMode]

   The out mode screen appears.

6 Perform steps 2 through 4 again, except select the dialing mode for outgoing lines.

7 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE DIAL TONE

To select the dial tone for tie lines follow these steps:

1 Enter administration mode by sliding the T/P switch to P .

2 Press **Conference** twice.

The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [DialTone].

The dial tone screen appears.

4 Touch the tie line button to select the dial tone:

Green light on = (remote default)

Green light off = Local

5 Press **Conference** to return to main administration menu or leave the administration mode by sliding the T/P switch to the center position.

SELECTING THE ANSWER SUPERVISION TIME

To select the answer supervision time for tie lines, follow these steps:

1 Enter administration mode by sliding the T/P switch to *P*.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [More], [AnsSupv]
   The answer supervision screen appears.

4 Dial the line number or press the line button of a tie line, then press [Enter] .
   The current setting is displayed.

5 Press [Drop] remove the old setting.

   NOTE: Press **[Exit]** if you do not want to change the setting.
   The answer supervison screen appears.

6 Dial the new setting.

   > time= 20 to 4800 ms (increments of 20)

   > time= 300 ms (default)

   NOTE: Use the backspace button to erase numbers incorrectly dialed.

7 Press [Enter] .The system will round down to the nearest increment.
   The answer supervion screen appears.

8 Repeat steps 4 through 7 for each tie line port.

9 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE DISCONNECT TIME

To select the disconnect time for tie lines, follow these steps:

1 Enter administration mode by slding the T/P switich to *P*.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [More]. [InDisc] .
   The in disconnect screen appears.

4 Dial the line number or press the line button of a tie line, then press [Enter].
   The current setting is displayed.

5   Press [Drop] to remove the old setting.
   NOTE: Press [Exit] if you do not want to change the setting.
   The in disconect screen appears.

6 Dial the new setting.
   > time = 140 to 2400 ms (increments of 10)
   > time = 300 (default)
   NOTE: Use the backspace button to erase numbers incorrectly dialed.

7 Press [Enter]. The system will round down to the nearest increment.

   The in disconnect screen appears.

8 Repeat steps 4 and 7 for each line port.

9 Press [Exit] and repeat steps 3 through 8 again, except select [OutDisc] instead of [InDisc] to select the outgoing disconnect time.

10 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

SELECTING THE INWARD DIAL PLAN

The Inward Dial Plan, that is, the numbers that other people use to call in to the business on tie lines, can have either three or four digits. This option is set for all the tie lines installed and does not need to be administered to individual lines. To change the number of digits people use to dial into the MERLIN II system on tie lines, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

   The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [More]. [More], [InDigt] .

   The inward digit screen appears showing current setting.

4 Press [Exit] if you do not want to change the setting.

   o r

   Press [Drop] or [Bksp] to remove the old setting.

5 Use the dial pad to dial the number of digits, either 3 or 4 (default is 4), for the inward dial plan.

6 Press [Enter] .

7 Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

FLEXIBLE RENUMBERING OF THE DIAL PLAN

The default tie line inward dial plan provides 4-digit numbers, 4010 through 4097. These numbers parallel the default intercom numbers between intercom numbers 10 and 69. The tie line dial plan number continue consecutively while the intercom numbers leap from 69 to 700 before continuing consecutively. Form 2c, Flexible Numbering Form-Tie Line Inward Dial Plan shows the relationship between the default dial plan numbers and default intercom numbers and station jack numbers.

These default dial plan numbers can be changed to a 3-digit number or some other 4-digit number. However, 3-digit and 4-digit numbers cannot be mixed.

Flexible numbering for the tie lines is not related to the flexible numbering of stations, lines, line pools, and groups. Therefore, any 1-or 2-digil numbers that you have assigned to stations, lines, line pools, or groups through flexible numbering can also be the beginning digits of a renumbered tie line dial plan. When people dial the longer tie line number, they will not be connected to the shorter renumbered station, line, line pool, or group.

Use completed Form 2C and the following procedures to renumber the inward dial plan.

To change the tie line dial plan number of one station, follow these steps.

1   Enter administration mode by sliding the T/P switch to *P*.

2   Press **Conference** twice.

    The administration menu appears.

3   Press [More], [More], [More], [TieLines], [More], [More], [More], [InDPin] .

    The inward dial plan screen appears.

4   Press [Single] .

5   Press [Stations] .

6   Dial the old station number or press the Auto Intercom. button, them press [Enter] .

7   Dial the new station number, then press [Enter] or press [Next] to change the next sequential station.

8   Press **Conference** to return to the main administration menu, or leave administration mode by sliding the T/P switch to the center position.

1 Enter Administration mode by sliding the T/P switch to
   P .

2 Press **Conference** twice.

   The administration menu appears.

3 Press [More], [More], [More], [TieLines], [More], [More],
   [More], [InDPin] .

   The inward dial plan screen appears.

4 Press [Block] .

5 Press [Stations] .

6 Dial the first (lowest numbered) new dial code.

7 Press [Enter] .

   The system renumbers all the stations sequentially, then returns
   you to the block renumber screen.

8 Press **Conference** to return to the main administration
   menu, or leave administration mode by sliding the T/P
   switch to the center.

**PRINTING THE
INWARD DIAL PLAN**

To get a printout of the inward dial plan, follow these
steps:

1 Enter administration mode by sliding the T/P switch to
   P.

2 Press **Conference** twice.

   The administration menu appears.

3 Press [More], [More], [Print], [More], [More], [More],
   [More], [InDPin] .

   Wait until printing is complete before leaving
   administration mode. Don't remove the printout until
   after you've left administration mode or printing page
   alignments will be affected.

4 Press Conference to return to the main administration
   menu, or leave administration mode by sliding the T/P
   switch to the center position.

Administering an Upgraded System

Use the printout of the prior system obtained at the beginning of the procedure for upgrading an existing system plus the new FM2 planning forms or the new R3 planning forms to readminister the system. See "Get a Printout of the Existing System" on page 2- 132 if the printout is not available.

Since the upgraded system has 1ost all previous memory, you will need to administer the system as though it were a new system. See, "Administering a New System" on page 3-21 for complete instructions.

REPROGRAM VOICE TERMINALS

Because the printout of the prior system obtained at the beginning of the procedure for upgrading an existing system does not include information on individual stations, you should use the new FM2 planning forms or the new R3 planning forms to reprogram the voice terminals in the system. In providing the new (upgraded) system planning forms, the system administrator should specifically provide the following information for voice terminals.

- Lines and line pools appearing on buttons
- Dial access to line pools, if that is the access method wanted
- Features to be programmed on buttons
- BIS/HFAI settings
- Ringing Options and Personalized Ringing
- Idle Line Preference
- Voice Announcement Enable/Disable
- Call Restrictions

Administering a Changed System

Performing system administration on an existing system that has been changed involves some special considerations. Read the following information carefully before you install or remove modules or change the basic settings for a MERLIN II system that is already in use. You may delete important system administration settings if you:

• Install or remove modules in the control unit

• Change the system size (small or large) or type (square, pooled, or behind-switch)

• Change a standard voice terminal setting to an attendant position setting or vice versa

RENUMBERING AFTER REPLACING OR ADDING MODULES

If you replace a module with one of a different type, you must readminister the system to reassign numbers to lines and stations. The procedure for renumbering the system appears below.

NOTE: Replacing station modules may require readministration of features that are related to particular types of stations. For example, you might replace an analog station module that contained jacks used for attendant positions with a digital station module. Since digital voice terminals can't be attendant positions, you would need to reassign those attendant positions to analog station jacks on a different module.

If you add modules without changing the modules that are already in place, the system assigns numbers to the additional lines and/or stations automatically. In that case, the numbers for the lines and stations that you've already administered don't change, so you don't need to perform the renumbering procedure. (If you expand the system, be sure not to leave any empty slots between modules.)

Follow the appropriate procedure below to renumber the system. Be sure to update all of the planning forms that are affected by the replacement or addition of a module.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press Conference twice.

The administration menu appears.

3 From the administration menu, press [System], [More], [Renumber] .

You see the message, "System is restarting. .." When the renumbering is complete, the administration menu appears on the display.

4 Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.

Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3 Press **Message.**

4 Dial #299.

Lights next to Adm Tel, Adm Pool Message, and Speaker begin to flash. You hear two beeps and then see the message, 'System is Re-starting..." If only the light next to Message flashes, one or more calls are in progress and the procedure is not executed until the light becomes steady.

5 Continue administration or leave administration mode by sliding the T/P switch to the center position.

CHANGING SYSTEM SIZE

If you change the system size designation from small to large, or vice versa, the system reverts to the default setting. See "Default Setings" on pg 3-15. In addition, the line assignments will change on all attendant consoles.

NOTE: Be sure to record the changes on the appropriate planning forms.

With a Display Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.
    The administration menu appears.

3   Press [System], [Size] .

4   Press [Small] or [Large] for the system size wanted.
    You see the message, "System is Re-starting..." The system renumbers, then the administration menu appears on the display.

5   Continue administration or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.
    Lights flash next to Adm Tel, Adm Pool Message and Speaker.

3   Press **Message.**
    Light goes on steady next to Message. Flashing lights go off.

4   Dial #201.
    Two beeps sound.

5   Dial number to designate system size:
    0 = small
    1 = large

    Lights flash next to Adm Tel, Adm Pool, Message and Speaker.

6 Continue administration or leave administration mode by sliding the T/P switch to the center position.

CHANGING SYSTEM TYPE

If you change the system type (square, pooled, or behind-switch), you *delete all system line administration and voice terminal programming formerly in place.* You'll have to reassign the lines and reprogram all the voice terminals, since this change resets them to the default configuration. Check Form 1e, System Form-Requirements and Options for Release 3 or the System Configuration Form for Feature Module 2 to determine the system type: square, behind-switch, or pooled. (The default setting is pooled with Button Access to Line Pools.)

If the system is to be pooled, determine the method to be used to access line pools: Button Access, Dial Access, or Automatic Route Selection (ARS). If you change it from Button Access to either Dial Access or Automatic Route Selection (ARS), the system automatically assigns a different function to the two buttons above **Intercom-Voice** on voice terminals. If the system is administered for Dial Access or ARS and you change it to Button Access, the system assigns the main pool to the two buttons above **Intercom-Voice** on voice terminals. The system automatically removes the main pool from any other buttons to which it was assigned at voice terminals throughout the system.

NOTE: Be sure to record the changes on the appropriate planning forms.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3   Press [System], [Type] .

4   Press the appropriate button:

> For a square system, press [Square] .
> For a pooled system, press one of the following:
[ButnAcc], [ARS], [DialAcc] .
> For a behind switch system, press [More],
[BehindSw] .

The message "System is Re-starting..." appears, followed by the administration menu.

5   Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a BIS-34D Console

1   Enter administration mode by sliding the T/P switch to P .

2   Press Conference twice.

Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3   Press **Message.**

The green light goes on steady next to Message. All flashing lights go off.

4   Dial #202.

Two beeps Sound.

5   Dial the appropriate number

        0 = square
        1 = pooled with Button Access to line pools
        2 = pooled with Dial Acess to line pools.
        3 = pooled with Automatic Route Selection
        4 = behind switch

Lights flash next to Adm Tel, Adm Pool, Message and Speaker.

6   Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

CHANGING ATTENDANT POSITIONS

If you change a standard voice terminal station port to an attendant position or vice versa, you have reassign lines and features to it, since all settings return to the default condition. Depending upon the equipment plugged into the port and the port's new use, you may have to change the voice terminal or console and any attached accessory equipment.

NOTE: Be sure to record the change on the appropriate planning forms.

The station connected to jack 01 (default intercom number 10) is an attendant position, and this cannot be changed. You can designate up to seven other analog attendant positions, two per analog station module.

Keep in mind that there cannot be more than eight attendant positions. If you want to designate a new attendant position and the system ahead y has the maximum number, you must change an existing attendant position to a nonattendant voice terminal *before* you designate a new attendant position.

With a Display Console

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [System], [Attendants] .

4 Press [Position]   .
   A steady flashing green light appears next to each button for each station that either is or can be an attendant position. No light means the station cannot be an attendant position.

5   Press the appropriate Auto Intercom buttons until the green lights show the code you wan

Steady green light = attendant position
Flashing green light = potential attendant position used as
nonattendant voice terminal
Green light off = cannot be assigned as attendant position

6   Press [Store] .

The message "System is Re-starting..." appears. When the process is complete after a short delay, the administration menu appears.

7   Press **Conference** to return to the administration menu or leave administration mode by sliding the T/P switch to the center position.

With a B1S-34D Console

1   Enter administration mode by sliding the T/P switch to P.

2   Press **Conference** twice.

Lights flash next to Adm Tel, Adm Pool, Message, and Speaker.

3   Press **Message.**

Light goes on steady next to Message. Flashing lights go off.

4   Dial *#203.*

Two beeps sound.

5   Press the Auto Intercom button for the appropriate selection:

Steady green light = attendant position
Flashing green light = potential attendant position
Green light off = cannot be assigned as an attendant position

6   Press #.

After a short delay, lights flash to Adm Tel, Adm Pool, Message, and Speaker.

7   Continue administration or leave administration mode by sliding the T/P switch to the center position.

REPLACING MODULES WHILE ON-LINE (RELEASE 3 ONLY)

A module that needs to be replaced can be exchanged with another module of the same type while the system is in operation. This procedure requires the designation of a station port to place modules in reset. The default port is station 19, the first port on the second module.

> **CAUTION:** The processor module and power supply module cannot be removed or exchanged with On-Line Module Swap.

ADMINISTERING THE ON-LINE MODULE SWAP CONTROLLER STATION PORT

To designate the On-Line Module Swap controller station, follow these steps:

1 Enter administration mode by sliding the T/P switch to P.

2 Press **Conference** twice.
   The administration menu appears.

3 Press [More], [Options], [More], [More], [ModSwap] .

4 Press the Auto Intercom button to select a controller that has the capability to reset modules (only one station can be designated).
   Green light on = station is designated
   Green light off = station is not designated

   > **NOTE:** If the station light does not come on when pressed and you hear a beep, another station is currently selected. Press the Auto Intercom button for that station to deselect it before selecting the new station.

See "On-Line Module Swap" on page 4-7 for instructions on replacing a module.

Optional Features

After you have completed system administration, you can assign the optimal features listed on the following table to the system. If the system has a printer, you can get a printout showing the current status of these features. See "Printouts" in Table 3-5 on page 3-89.

FEATURES COMPATIBILITY TABLE

Table 3-4 identifies all the optional features available for each MERLIN II system. A check mark in the FM 1 column indicates the feature is available with Feature Module 1. A check mark in the FM2 column indicates the feature is available with Feature Module 2. A check mark in the R3 column indicates the feature is available with Release 3.

TABLE 3-4 Features Compatibility Table

F e a t u r e	FM1	FM2	R3
Allowed Lists	√	√	√
Attendant (MERLIN II)			√
Automatic Route Selection	√	√	√
Behind Switch Operation		√	√
Call Pickup Groups		√	√
Call Report	√	√	√
Call Restriction	√	√	√
Camp On		√	√
Centralized Programming	√	√	√
Dialing Timeout Interval	√	√	√
Direct Inward System Access		√	√
Disallowed Lists			√
Extended Station Status		√	√
Forced Account Code Entry		√	√
Group Call Distribution -	√	√	√
Group Paging	√	√	√
Hold Disconnect Interval	√	√	√
Intercom Dial Tone		√	√
Labels for Lines			√
Labels for Stations		√	√
Night Service	√	√	√
One-Touch Call Handling	√	√	√
Posted Message			√
Pintouts	√	√	√
Recall Timer lnterval	√	√	√
Reminder Service		√	√
Ringing-on-Transfer	√	√	√
System Date	√	√	√
System Information Report	√	√	√
System Speed Dial	√	√	√
System Time	√	√	√
Touch-Tone/Rotary Signaling	√	√	√
Transfer Return Interval	√	√	√

QUICK REFERENCE TO ADMINISTRATION FEATURES

Table 3-5, "Display Console Administration," provides an alphabetized list of features that can be administered from a Display Console for MERLIN II System Release 3 and Feature Module 2. Consult Table 3-4, "Features Compatibility Table," to see which features are available for Feature Module 2.

Table 3-6, BIS-34D Administration, provides an alphabetized list of features that can be administered from a BIS-34D console. Consult Table 3-4, "Features Compatibility Table," to see which features are unique to Feature Modules 1 and 2.

Not all features have a procedure forgetting a printout; however, if you want to verify your administration for those features that do offer a printout, keep the following points in mind:

• Wait until printing is complete before leaving administration mode.

• Don't remove the printout until after you've left administration mode or printing page alignments be affected.

Administering Features from a Display Console

Table 3-5 Display Console Administration

F e a t u r e	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Allowed Lists
  To set up
  allowed lists
	1 Press [More], [Tables], [More], [AlwList]
	2 Dial list number (0 through 7).
	3 Dial entry number (0 through 9).
	4 Press [Enter] .
	5 Use Backspace or Drop to remove the current entry.
	6 Dial the new entry up to 6 digits (area code and/or exchange) plus leading 1 if required, or emergency number (e.g. 911).
	7 For each additional entry, press [Next] and dial the entry for this list.
	or.
	Press [Enter], [AlwList] and follow steps 2 through 6 to create a new list.
	8 Press **Conference** to return to the administration menu.

To assign access to allowed lists to station	1 Press [More], [Table], [More], [AllowTo] . 2 Dial list number (0 through 7) 3 Press [Enter] . 4 Press Auto Intercom button for station. *Steady green on = phone has access to renumbers on list* *Green off = phone doesn't have access to numbers on list* 5 Press and repeat steps 2 through 4 for additional lists. 6 Press **Conference** to return to the administration menu.
To get a printout of an allowed list	1 Press [More], [More], [Print], [More], [AlwList] . 2 Dial list number (0 through 7) 3 Press [Enter] . 4 Press Conference to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice then follow steps for feature
Allowed Lists (continued) To get a printout of station access to alllowd lists	1 Press [More], [More], [Print], [More], [AllowTo] . 2 Press **Conference** to return to the adminisnation menu.
Attendant (MERLIN II) To assign a port for Attendant (Automatic)	1 Press [Stations], [More], [More], [More], [AA/VMS] . 2 Press the Auto intercom button for the port you want to assign to the MERLIN II Attendant. *Green light on = station is assigned as a Merlin II Attendant* *port* *Green light off= station is not assigned as a Merlin II* *Attendant port*
Automatic Route Selection (ARS) To specify how many tables are 6-digit tables	1 Press [More], [Tables], [ARS-6dgt] . 2 Dial number of 6-digit tables (0 through 8). 3 Press [Enter] . 4 Press **Conference** to return to the administration menu.
To add an area code or exchange	1 Press [More], [Tables], [ARS-Inp] . 2 Dial table number (0 through *7).* 3 Press [Enter] . 4 Dial entry number (00 through 99). 5 Press [Enter] . 6 Dial entry (an area code or exchange). 7 Press [Next] to add more entries in the table or press [Enter] . 8 Press **Conference** to return the administration on menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to **P**, press Conference button twice, then follow steps for feature
Automatic Route Selection (continued)	
To delete an area code or exchange	1 Press [More], [Tables], [ARS-Inp] . 2 Dial table number (0 through 7). 3 Press [Enter] . 4 Dial entry number (00 through 99). 5 Press [Enter] . 6 Press **Drop.** 7 Press [Enter] . 8 Press **Conference** to return to the administration menu
To add a pool number, other" digits. and an absorption code, if required	1 Press [More], [Tables], [ARS-Pool] . 2 Dial table number (O through 9). 3 Dial entry number (O through 5). 4 Press [Enter] . 5 Dial enter (pool number) 6 Press [Enter] . 7 Dial other digits (access and/or account code, if required). 8 Press [Enter] . 9 Dial absorption code (0 through 5). 0= none 1= leading 1 2= area code 3 = 1+ area code 4 = 1 + exchange 5 = 1 + area code and exchange 10 Press [Next] to add more entries, other digits, and absorption codes in the table or press [Enter] to finish. 11 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Automatic Route Selection (continued) **To delete a pool number (action also deletes any other digits and absorption type)**	1 Press [More], [Tables] [ARS-Pool] .
	 2 Dial table number (0 through 9).
	 3 Dial entry number (0 through 5).
	 4 Press [Enter] .
	 5 Press **Drop.**
	 6 Press [Enter] .
	 7 Dial other digits (access and/or account code, if required).
	 8 Press **[Enter]** .
	 9 Dial Absorption code (0 through 5)
	     0 = none
	     1 = leading 1
	     2 = areacode
	     3 = 1 + area code
	     4 = 1 + exchange
	     5 = 1 + area code + exchange
	 10 Press [Next] to delete more entries or press [Enter] to finish.
	 11 Press **Conference** to return to the administration menu.

To add other digits in the Special Number Table	1 Press [More], [Tables], [SpclNm] . 2 Dial other digits entry (access and/or account code). 3 Press **[Enter]** . 4 Press Conference to return to the administration menu.
To delete other digits in the special Number Table	1 Press [More], [Tables], [SpclNm] . 2 Press **Drop.** 3 Press [Enter] . 4 Press Conference to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Autormatic Route selection (continued) To get a printout of ARS tables	1 Press [More], [More], [Print], [More]. 2 Press [ARS] to begin printing. 3 Press **Conference** to return to administration menu.
Behind-Switch Operation To specify system type To administer fixed features to work with the host system	1 Press [System], [Type], [More] . 2 Press [BehindSw] **.** 1 Press [More], [Options], [More], [BehindSw] . 2 Press the appropriate button, [Transfer], [Drop], or [Conference] . 3 Dial host system code or press button again for Recall. 4 Press [Enter] . 5 Press **Conference** to return to the Administration menu.
Call Pickup Groups	1 Press [Stations], [More], [More], [Pickup] **.** 2 Dial a group number (01 through 30). 3 Press [Enter] . 4 Press Auto Intercom buttons of voice terminals to be included or removed from group. *Green on= station inciuded in Call Pickup group* *Green off = station not included in Call Pickup group* 5 Press [Pickup] and replace steps 2 through 4 to create other groups. 6 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Call Report
 	
To administer Call Report options
	1 Press [More], [Options], [More], [SMDR] .
	2 Press [MinTime] .
	3 Use **Backspace** or **Drop** to remove the current value.
	4 Dial the minimum call duration in seconds (0 through 255).
	5 Press [Enter] .
	6 Press [CallRep] **.**
	7 Press the appropriate button for the calls you want recorded:
	    [In/Out] = record incoming and outgoing calls
	    [OutOnly] = record outgoing calls only
	8 Press **Conference** to return to the administration menu.

To get a printout of Call Report options	1 Press [More], [More], [Print], [More], [More] . 2 Press [SMDR] to begin printing. 3 Press **Conference** to return to the administration menu.

Call Restrictions
 	
To assign outward and toll call restrictions to stations
 	
1 To set lines to identify long distance calls by area code only
	1 Press [Lines], [TollType] .
	2 Press line buttons:
	    Steady green on = toll calls detected by toll prefix only
	    Green off = toll calls defected by area code or toll prefix
	3 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

F e a t u r e	Procedure: Slide T/P switch P, press Conference button twice, then follow steps for feature

Call Restrictions (continued)
 	
  2 To assign
     call
     restrictions
     to stations
	1 Press [Stations], [Restrct] .
	
	2 Press Auto Intercom button for station.
	
	3 Press [Enter] . The Speaker button lights as follows:
	Steady green on = all calls permitted (unrestricted)
	*Flashing green = local and intercom calls and calls to numbers on
	                assigned lists permitted (toll call restriction)*
	*Green off = intercom calls and calls to numbers on assigned lists
	            permitted (outward call restriction)*
	
	4 Press the appropriate button for the restriction you want at this station
	
	    [NoRestr] = unrestricted
	    [Local] = toll call restriction
	
	    [Intercm] = outward call restriction
	
	5 Repeat steps 2 through 4 for as many stations you want
	    to restrict.
	
	6 Press **Conference** to return to the administration menu.

To Copy line assignments and call restriction assignments from one station to another	1 Press [Stations], [Copy] .
	
	2 Press Auto **intercom button for station you want to**
	    copy *from*.
	
	3 Press [Enter] .
	
	4 Press Auto Intercom button for station that you want to copy *to*.
	
	5 Press [Next] to select another station to copy to.
	    o r
	    Press [Enter] to choose a new station to copy from
	
	6 Press **Conference** to return to the administration menu

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Camp On To set the Camp On return interval	1 Press [More], [Opitions], [CampOn] . 2 Use **Backspace** or **Drop** to remove the current entry. 3 Enter the number of minutes (1 through 5) that calls should remain camped. 4 Press [Enter] . 5 Press **Conference** to return to the administration on menu.
Centralized Programming	1 Press [More], [More], [Cnrt-Prg] . 2 Press Auto Intercom button or dial the code for the station to be programmed. 3 Press [Enter] . 4 Program the voice terminal as appropriate. 5 Press **Conference** to return to the administration menu.

Dialing Timeout Interval for Rotary Lines	1 Press [More], [Opitions], [More], [More], [Rotary] .
	
	2 Use **Backspace** or **Drop** to remove the current entry.
	
	3 Dial number to specify timeout interval:
	
	    0 = 0 seconds
	    1 = 4 seconds
	    2 = 8 seconds
	    3 = 12 seconds
	
	4 Press **Conference** to return to the administration menu.

Direct Inward System Access	1 Press [Lines], [DISA] . 2 If desired, dial a four digit password or press Drop to remove entry. 3 Press [Enter] . 4 Press [NoRestr] for no restriction or press [InwdOnly] for inward only. (continued)

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Direct Inward system Access (continued)	5 Press line button:
	   Green light on = line or the pool can be used for DISA
	   Green light off = be or line pooi cannot be used for DISA
	6 Press **Conference** to return to the administration menu.

Disallowed Lists
 	
  To create
  disallowed list
	1 Press [More], [Tables], [More], [More], [DisList] **.**
	
	2 Dial the number of the list (0 through 7).
	
	3 Dial the entry number for the list (0 through 9).
	
	4 Press [Enter] .
	
	5 Use **Backspace** or **Drop** to remove the current entry.
	
	6 Dial the disallowed number. Press **Hold** when you want to indicate a wildcard charatcter (appears as "p" on the display).
	
	7 Press [Enter] .
	
	8 For an additional entry, press [Next] and dial the entry for this list.
	
	9 Press [Enter], [DisList] and follow steps 2 through 7 to create anew list
	
	10 Press **Conference** to return to the administration menu.

To assign lists
  to phones
	1 Press [More], [Tables], [More], [More], [DisAITO]
	
	2 Dial the disallowed list number (O through 7).
	
	3 Press [Enter] **.**
	
	4 Press the Auto Intercom button for the phone you are assigning to the disallowed list.
	   Green light on = phone is restricted from calling numbers on
	                 the list
	   Green light off = phone may call the numbers on the list

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
To print the disallowed lists	1 Press [More], [More], [Print], [More], [More], [More], [More], [D i s L i s t] 2 Dial the list number (0 through 7). 3 Press [Enter] . 4 Press [DisList] and repeat steps 2 through 4 for additional lists. 5 **Press Conference** to return to the administration menu.
To print the disallowed list phone assignments	1 Press [More], [More], [Print], [More], [More], [More], [More] [DisAlTo] . 2 Press Conference to return to the administration menu.

Extended Station Status
   To change the mode of ES Status operation
	1 Press [More], [Options], [More], [Status] .
	
	2 Select [Hotel] for Release 3.
	   o r
	   Select [Hotel] or [CMS] as appropriate for Feature Module 2.
	
	3 Press **Conference** to return to the administration menu.

To put consoles into ES Status Display Mode	1 Press [Stations], [More], [More], [XtndSta.]
	
	2 Press the Auto Intercom button for attendant console until the light next to the button shows the appropriate code.
	   Green light flashing = console is a candidate for ES Status display
	
	   Green light steady = console is in ES Status display mode
	   Green light off= console is not in ES Status display mode
	
	3 Press **Conference** to return to the administration menu.

Forced Account Code Entry	1 Press [Stations], [More], [Account] .
	
	2 Press Auto Intercom button(s):
	   Steady green on = phone has Forced Account Code Entry
	   Green off = phone doesn't have Forced Account Code Entry
	
	3 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (conntinued)

Feature	Procedure: Slide T/P switch to P', press Conference button twice, then follow steps for feature
Group Call Distribution	
To assign lines and stations to groups for Group Call Distribution	1 Press [Stations], [More], [GrpCall] . 2 Dial code (870 through 875), or logical ID number of Call Distirbution Group. **3 Press** [Enter] . 4 To assign lines, press line button(s): *Steady green on = line assigned to group* *Green off = line not assigned to group* 5 To assign stations, press Auto Intercom button(s): *Steady green on= phone in group* *Green off = phone not in group* 6 Press Conference to **return to the administration** menu.
To get a printout of call Distribution groups	1 Press [More], [More], [Print], [More], [More] **.** 2 Press [GrpCall] to begin printing. 3 Press **Conference** to return to the administration menu.
Group Paging	
To assign stations to groups for Group Page	1 Press [Stations], [More], [PageZn] . 2 Dial code (881 through 886) or logical ID number of Group Page group. 3 Press [Enter] . 4 Press Auto Intercom button(s): *Steady green on= phone in paging group* *Green off= phone not paging grow* 5 Press **Conference** to return to the administration menu.
To get a printout of paging groups	1 Press **[More], [More], [Print], [More], [More]** . 2 Press [PgZone] to begin printing. 3 Press Conference to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to *P,* press Conference button twice, then follow steps for feature
Hold Disconnect lnterval	1 Press [Lines], [More], [HidAband] . 2 Press line buttons: *Steady green on = line drops held call on long (450 millisecond)* *signal (default)* *Green off = line drops held call on short (50 millisecond) signal* 3 Press **Conference** to return to the administration menu.
Intercom Dial Tone	1 Press [More], [Opitions], [More], [More], [More], [ICMdial] . 2 Press either [Internl] to provide the MERLIN II system intercom dial tone, or [Externl] to provide CO line dial tone. 3 Press **Conference** to return to the administration menu.
Labels for Lines	1 Press [More], [More], [Label], [Lines] **.** 2 Enter the line number or press the line button. 3 Press [Enter] **.** 4 Use **Backspace** or **Drop** to remove the current entry. 5 Enter the label (up to 7 characters). 6 Press [Next] to enter a label for the next line in sequence or press [Enter] . 7 Press **Conference** to return to administration menu.
Labels for Stations	1 Press [More], [More], [Label] . 2 Press [Stations] . 3 Enter the station number or the Auto Intercom button. 4 Press [Enter] . 5 Use **Backspace** or **Drop** to remove the current entry. 6 Enter the label for the station (up to seven characters). 7 Press [Next] to enter a label for the next station in sequence or press [Enter] . 8 Press **Conference** to return to the administration menu

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to *P,* press Conference button twice, then follow steps for feature
Night Service. Enhanced	
To assign stations to attendant's Night Service group	1 Press [More], [Night], [Group] . 2 Dial attendant's station number or depress the Auto Intercom button. 3 Press [Enter] . 4 Press Auto Intercom button(s): *Steady green light on = phone in group* *Green light off = phone not in group* *Green light flashing = attendant position* 5 Press [Group] and repeat steps 2 through 4 to set up more groups. 6 Press **Conference** to return to the administration menu.
To set up Outward Restriction by creating a password	1 Press [More], [Night], [OutRstr] **.** 2 Use **Backspace** or **Drop** to remove the current entry. 3 Dial a 4-digit password. 4 Press [Enter]. 5 Press **Conference** to return to the administration menu.
To remove Outward Restriction	1 Press [More], [Night], [OutRstr] . 2 Press [Drop] . 3 Press [Enter] . 4 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to *P,* press Conference button twice, then follow steps for feature
Night Service, Enhanced (continued)	
To set up an allowed list of emergency numbers	1 Press [More], [Night], [Emerg]. 2 Dial entry number (0 through 9). 3 Press [Enter]. 4 Use **Backspace** or **Drop** to remove the current entry. 5 Dial telephone number (12 digit maximum). 6 Press [Next] and repeat steps 4 and 5 for up to 10 numbers. 7 Press [Enter] . 8 Press **Conference** to return to the administration menu.
To set up a Night Service Exclusion list	1 Press [More], [Night], [Exclude]. 2 Press Auto Intercom button for stations: *Steady green on = phone in list* *Green off = phone not in list* 3 Press **Conference** to return to the administration menu.
To set times for Night Service to go on and off automatically	1 Press [More], [Night], [More]. 2 Press [Start]. 3 Dial number of day of week: 0 = Sunday 4 = Thursday 1 = Monday 5 = Friday 2 = Tuesday 6 = Saturday 3 = Wednesday 4 Dial "on" time using 24-hour format (0000 through 2359). 5 Press [Enter]. 6 Press [Stop].

(continued)

TABLE 3-5 Display Console Administration (continued)

F e a t u r e	**Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature**	
Night Service, Enhanceed (continued)		
To set times for Night Service to go on and off automatically (continued)	**7**	Dial number of day of week: 0 = Sunday 4 = Thursday 1 = Monday 5 = Friday 2 = Tuesday 6 = Saturday 3 = Wednesday
	8	Dial "off" time using 24-hour format (0000 through 2359).
	9	Press [Enter] and Repeat steps 2 through 9 for each day of week. (Don 't set on or off time if Night Service should stay on for entire 24 hours.)
	10	Press **Conference** to return to the administration menu.
To record current day for Night Service with Time Set	**1**	Press [More], [Night], [More], [DayofWk] .
	2	Use **Backspace** or **Drop** to remove the current entry.
	3	Dial number of current day of week: 0 = Sunday 4 = Thursday 1 = Monday 5 = Friday 2 = Tuesday 6 = Saturday 3 = Wednesday
	4	Press [Enter] .
	5	Press **Conference** to return to the administration menu.
To suspend Night Service with Time Set	**1**	Press [More], [Night], [More], [DayofWk] .
	2	Use **Backspace** or **Drop** to remove the current entry.
	3	Dial 9.
	4	Press [Enter] .
	5	Press **Conference** to return to the administration menu.
To get a printout of Enhanced Night Service Information	**1**	Press [More], [More], [Print], [More], [More], [More] .
	2	Press [NiteSrv] to begin printing.
	3	Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
One-Touch Call Handling	
To set system for One-Touch Transfer	1 Press [More], [Options], [More], [More], [OneTouch] . 2 Press [Transfer] . 3 Press **Conference** to return to the administration menu.
or	
To set system for One-Touch Hold with Call Announcement	1 Press [More], [Options], [More], [More] [OneTouch] . 2 Press [Hold] . 3 Press **Conference** to return to the administration menu.
Posted Message	The 10 default message (each may be changed) are 01 DO NOT DISTURB 06 IN CONFERENCE 02 OUT TO LUNCH 07 WITH A CLIENT 03 AT HOME 08 WITH A CUSTOMER 04 OUT SICK 09 AWAY FROM DESK 05 IN A MEETING 10 OUT ALL DAY
To create a new message or change an existing message	1 Press [More], [More], [Label] . 2 Press [PostMsg]. 3 Dial the message number (01 through 20). 4 Press [Enter] . 5 Use **Backspace** or **Drop** to remove the current entry. 6 Enter your new message. 7 Press [Enter] or [Next] to advance to the next entry. 8 Press Conference to return to the administration menu.
Printouts, All	1 Press [More], [More], [Print] . 2 Press [All] to begin printing. 3 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued) ,

F e a t u r e	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Recall Timer Interval	**1** Press [More], [Options], [More], [More], [Recall] . **2** Use **Backspace** or **Drop** to remove the current entry. **3** Dial number to specify timer interval: **0** = 350 milliseconds **1** = 450 milliseconds **2** = 650 milliseconds **3** = 1 second **4** Press [Enter] . **5** Press Conference to return to the administration menu.
Reminder Service To administer a Cancel All reminder time	**1** Press [More], [Options], [More], [More], [More], [RmdrSvc] . **2** Use **Backspace** or **Drop** to remove the current entry. **3** Dial 4-digit Cancel All reminder time using 24-hour format (0000 through 2359). **4** Press [Enter] . **5** Press **Conference** to return to the administration mew.
To cancel the Cancel All feature	**1** Press [More], [Options], [More], [More], [More], [RmdrSvc] . **2** Press **Drop.** **3** Press [Enter] . **4** Press **Conference** to return to the administration menu.

Ringing-on-Transfer	**1** Press [More], [Options] [More], [Feedback] .
	
	 2 Press:
	
	    [Music] for music (if available, or else silence)
	
	    [Ringback] for ringing
	 3 Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

F e a t u r e	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
System Information Report Printout	**1** Press [More], [More], [Print] . **2** Press [SysConf] to begin printing. **3** Press **Conference** to return to the administration menu.
System Date	**1** Press [System], [More], [Date] . **2** Press **Backspace** or **Drop** to remove current entry. **3** Dial the month, day and year (Month 01 to 12, Day: 1 to31, Year: 00) to 99). **4** Press [Enter] . **5** Press **Conference** to return to the administration menu.
System Speed Dial To assign System Speed Dial codes	**1** Press [More], [SpdDial] . **2** Dial System Speed Dial number (#60 through #99 for FMl and FM2 or #600 through #729 for R3). **3** Press [Enter] . **4** Use **Backspace** or **Drop** to remove the current entry. **5** Dial * if it is a marked code. **6** Dial number. **7** Press [Next] for next highest code or press [Enter] and follow steps 2 through 7 to assign nonconsequential System Speed Dial codes. **8** Press **Conference** to return to the administration menu.
To get a printout of System Speed Dial codes	**1** Press [More], [More], [Print] . **2** Press [SpdDial] to begin printing. **3** Press **Conference** to return to the administration menu.

TABLE 3-5 Display Console Administration (continued)

Feature	Procedure: Slide T/P switch to *P,* press Conference button twice, then follow steps for feature
System Time	**1** Press [System], [More], [Time] . **2** Press **Backspace** or **Drop** to remove current entry. **3** Dial the new Line using 24-hour format (0000 through 2359). **4** Press [Enter] . **5** Press **Conference** to return to the administration menu.

Touch-Tone or Rotary Signaling	**1** Press [Lines], [More], [TchTone] .
	
	2 Press each each button until the light shows the appropiate code:
	    Green light on = Touch-Tone
	    Green light off = Rotary
	
	3 Press **Conference** to return to the administration menu.

Transfer Return Interval	**1** Press [More], [Options], [TfrRet].
	
	2 Press **Backspace** or **Drop** to remove current setting.
	
	3 Dial number of rings (1 through 9) before tranferred calls return to original phone.
	    or
	   Dial 0 if transferred calls should not return.
	
	4 Press [Enter] .
	
	5 Press **Conference** to return to the administration menu.

Administering Features from a BIS-34D Console

Table 3-6, BIS-34D Administration, below describes the administration procedures for optional features using the BIS-34D Console.

NOTE: You *cannot* administer Release 3 features using the BIS-34D console.

Not all features have a procedure for getting a printout; however, if you want to verify your administration for those features that do offer a printout, keep the following points in mind:

• Wait until printing is complete before leaving administration mode.

• Don't remove the printout until tier you've left administration mode or printing page alignments will be affected.

TABLE 3-6 BIS-34D Console Administration

F e a t u r e	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps far feature
Allowed Lists To set up allowed lists	**1** Press **Message.** **2** Dial #5. **3** Dial list number (0 through 7). **4** Dial entry number (0 through 9). **5** Dial entry (area code and/or exchange or emergency number), or touch **Drop.** **6** Press **Message.**

To assign access to allowed lists to phone	**7** Press **Message.**
	2 Dial #4.
	3 Dial list number (0 through 7).
	4 Press Auto Intercom button for phone:
	Steady green light on = phone has access to numbers on
	                              list
	Green light off = phone doesn't have access to numbers on
	                                 list
	5 Press **Message.**

To get a printout of an allowed list	**1** Press **Message.** **2** Dial #5. **3** Dial list number (0 through 7). **4** Dial 0#900 and wait for beep. **5** Press **Message.**
To get a printout of phone access to allowed lists	**1** Press **Message.** **2** Dial #904 and wait for beep. **3** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Automatic Route Selection (ARS)	
To specify how many tables are 6-digit tables	**1** Press **Message.** **2** Dial #305. **3** Dial number of 6-digit tables (0 through 8). **4** Press **Message.**
To add an area code or exchange	**1** Press **Message.** **2** Dial #6. **3** Dial table number (O through 7). **4** Dial entry number (00 through 99). **5** Dial entry (area code or exchange). **6** Press **Message.**
To delete an area code or exchange	**1** Press **Message.** **2** Dial #6. **3** Dial table number (O through 7). **4** Dial entry number (00 through 99). **5** Press **Drop.** **6** Press **Message.**
To add a pool number plus other digits, if required	**1** Press **Message.** **2** Dial #7. **3** Dial table number (0 through 9). **4** Dial entry number (0 through 5). **5** Dial entry (pool number plus acess and/or account code, if required). **6** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Automatic Route Selection (ARS) (Continued)	
To associate an absorption type with a pool number *after* adding the pool number	**1** Press **Message.** **2** Dial #7. **3** Dial table number (0 through 9) **4** Dial entry number (0 through *5).* **5** Dial absorption type: 0 = none 1 = leading l 2 = area code 3 = 1 + area code 4 = 1 + exchange 5 = 1 + area code+ exchange **6** Press **Message.**
To delete a pool number (action also deletes any other digits and absorption type)	**1** Press **Message.** **2** Dial #7. **3** Dial table number (0 through 9). **4** Dial entry number (0 through 5). **5** Press **Drop.** **6** Press **Message.**
To add other digits in the Special Number Table	**1** Press **Message.** **2** Dial #800. **3** Dial enter (access and/or acoount code) **4** Press **Message.**
To delete other digits in the Special Number Table	**1** Press **Message.** **2** Dial #800. **3** Press **Drop.** **4** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Automatic Route Selection (ARS) (continued) 　　To get a printout of ARS 　　tables	**1** Press **Message.** **2** Dial #902 and wait for beep. **3** Press **Message.**
Behind-Switch Operation 　　To assign a code or Recall 　　to a fixed button	**1** Press **Message.** **2** Dial #328. **3** Press the fixed button **(Conference, Transfer,** or **Drop).** **4** Dial a 6-character code or touch the fixed button again to assign Recall to it. **5** Press **Message.**
Call Pickup Groups 　　To assign phone to groups.	**1** Press **Message.** **2** Dial #327. **3** Dial number of Call Pickup group (01 through 30). **4** Press Auto Intercom button(s) 　　*Steady green light on = phone in group* 　　*Green light of = phone not in group* **5** Press **Message.**
Call Report 　　To set minimum all 　　duration time	**1** Dial #390 **2** Dial minimum call duration (00 through 99) in minutes **3** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Call Report (continued)
 	
To record outgoing and incoming calls
	1 Dial #3910 to record outgoing calls only
	     or
	     Dial #3911 to record outgoing and incoming calls.
	
	2 Press **Message.**

To get a printout of Call Report options	**1** Press **Message.** **2** Dial #390#900 and wait for beep. **3** Press **Message.**
To set printer to scroll to top of page automatically. printer must be off and scrolled to top of next page	**1** Press **Message.** **2** Dial #399. **3** Press **Message.**
Call Restrictions To assign outward and toll call restrictions to phones:	**NOTE:** If you do not need to dial a toll prefix (0 or 1) to place a long distance call, perform steps 1 and 2 below. If you use a toll preform, just perform step 2 below.

1 To set lines to identify long distance calls by area code only	**1** Press **Speaker.**
	2 Press line buttons:
	   Steady green light on = toll calls detected by toll prefix only
	   Green light off = toll calls detected by area code or toll prefix
	3 Press **Speaker.**

2 To assign call restrictions to phones	**1** Press **Adm Tel.** **2** Press Auto Intercom button for phone. **3** If steady green light shows next to **Adm Tel** and you hear two beeps, go on to step 4. If not, wait for 2-beep signal or try again later.

TABLE 3-6 BIS-34D Console Administration (continued)

F e a t u r e	**Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature**
Call Restrictions (continued) 2 To assign call restrictions to phones (continued)	**4** Press **Speaker** until the green light shows the restrictions wanted: *Steady green light on = all calls permitted (unrestricted)* *Flashing green light = local and intercom calls and calls to numbers on assigned lists permitted toll call restriction* *Green light off = intercom calls and calls to numbers on assigned lists permitted (outward call restriction)* **5** Press **Speaker.** **6** Press **Adm Tel**
To copy line assignments and call restriction assignments from one phone to another	**1** Press **Adm Tel.** **2** Press Auto Intercom button for new phone. **3** If a steady green light goes on next to the Auto Intercom button and you hear two beeps, go on to step 4. If not, wait for 2-beep signal or try again later. **4** Press **Recall.** **5** Press Auto intercom button for phone whose assignments you want to copy. **6** When red light next to **Adm Tel** stops flashing, touch **Adm Tel**
Camp On Return Interval	**1** Press **Message.** **2** Dial #326. **3** Dial number of minutes (1 through 5) before transferred calls return to originator. **4** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Centralized Programming	**1** Press **Conference.** **2** Press Auto Intercom button for phone to be programmed. **3** If red light next to **Adm Tel** goes off and console rings way 5 seconds, go on to step 4. If not, wait for light to go off or try again later. **4** Program the voice terminal. **5** Press Conference twice.

Dialing Timeout Interval for Rotary Lines	**1** Press **Message.**
	
	2 Dial #317.
	
	3 Dial number to specify timeout interval
	
	    0 = 0 seconds
	    1 = 4 seconds
	    2 = 8 seconds
	    3 = 12 seconds
	
	4 Press **Message.**

Direct Inward System Access
  To assign lines for DISA
	1 Press **Message.**
	
	2 Dial #323.
	
	3 Press line button:
	    Steady green light on = line used for DISA
	    Green light off = line not used for DISA
	
	4 Press **Message.**

To specify a password for DISA users	**1** Press **Message.** **2** Dial #324. **3** Dial a 4-digit password or touch **Drop** to remove entry. **4** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Direct Inward System Access To set up DISA outward restriction	**1** Press **Message.** **2** Dial #325. **3** Dial 0 for outward restriction or 1 for no restriction **4** Press **Message.**
To get a printout of DISA options	**1** Press **Message.** **2** Dial #905 and wait for beep. **3** Press **Message.**

Disconnect lnterval for Held Calls	**1** Press **Message.**
	2 Dial #303.
	3 Press line buttons:
	    Steady green light on= line drops held call on long (450 milliseond) signal (default)
	    Green light off = line drops held call on short (50 millisecond) signal
	4 Press **Message.**

Extended Station Status To specify the ES status mode	**1** Press **Message.** **2** Dial #329. **3** Dial 0 for Hotel/Motel or 1 for CMS mode. **4** Press **Message.**

To put consoles in and out of ES Status Display mode	**1** Press **Message.**
	2 Dial #330.
	3 Press Auto Intercom button(s):
	    Steady green light on = console in display mode
	    Green light flashing = console not in display mode
	4 Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature

Forced Account Code Entry	**1** Press **Message.**
	
	2 Dial #319.
	
	3 Press Auto Intercom button(s):
	 Steady green light on = phone has Forced Account Code
	     E n t r y
	 Green light off = phone doesn't have Forced Account Code
	     Entry
	
	4 Press **Message.**

Group Call Distribution To assign phones to groups for Group Call Distribution	**1** Press **Message.** **2** Dial #. **3** Dial default number of Call Distribution group (870 through 875). **4** Press Auto intercom button(s) *Steady green light on = phone in group* *Green light off= phone not in group* **5** Press **Message.**
To associate lines with groups for Group Call Distribution	**1** Press **Message.** **2** Dial #. **3** Dial default number of Call Distribution group (870 through 875). **4** Press line button *Steady green light on = line assigned 20 group* *Green light off = line not assigned to group* **5** Press **Message.**
To get a printout of Call Distribution groups	**1** Press **Message.** **2** Dial #906 and wait for beep. **3** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Group Paging To assign phones to groups for Group Page	**1** Press **Message.** **2** Dial #. **3** Dial default Group page group number (881 through 886). **4** Press Auto lntercom buttom(s): *Steady green light on = phone in paging group* *Green light off = phone not in paging group* **5** Press **Message.**
To get a printout of paging groups	**1** Press **Message.** **2** Dial #903 and wait for beep. **3** Press **Message.**
Hold Disconnect Interval	**1** Press **Message.** **2** Dial #303. **3** Touch each line button to change its disconnect interval. *Steady green on = line drops held call on long (450 millisecond) signal (default)* *Green off = line drops held call on short (50 millisecond) signal* **4** Press **Message.**
Intercom Dial Tone	**1** Press **Message.** **2** Dial #335. **3** Press 0 to provide MERLIN II system intercom dial tone. or Press 1 to provide CO line dial tone. **4** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Night Service, Enhanced To assign phones to attendant's Night Service group	**1** Press **Message.** **2** Dial #307. **3** Dial attendants intercom number. **4** Press Auto Intercom button(s): *Steady green light on = phone in group* *Green light off = phone not in group* **5** Press **Message.**
To set up Outward Restriction by creating a password	**1** Press **Message.** **2** Dial #309. **3** Dial a 4-digit password. **4** Press **Message.**
To remove Outward Restriction	**1** Press **Message.** **2** Dial #309. **3** Press **Drop.** **4** Press **Message.**
To setup an allowed list of emergency numbers	**1** Press **Message.** **2** Dial #310. **3** Dial entry number (0 through 9). **4** Dial telephone number (12 digit maximum), or touch **Drop** to remove entry. **5** Press **Message.**
To set up a Night Service Exclusion list	**1** Press **Message.** **2** Dial #308. **3** Press Auto Intercom button for phone: *Steady green light on = phone on list* *Green light off = phone not on list* **4** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Night Service, Enhanced (continued)	
To set times for Night Service to go on and off automatically	**1** Press **Message.**
	2 Dial #311.
	3 Dial the number of the day of the week 0= Sunday 4 = Thursday 1 = Monday 5 = Friday 2 = Tuesday 6 = Saturday 3 = Wednesday
	4 Dial "on" time using 24-hour format (0000 through 2359), or **touch Drop to remove entry.**
	5 Dial #312.
	6 Dial the number of the day of the week 0 = Sunday 4 = Thursday 1 = Monday 5 = Friday 2 = Tuesday 6 = Saturday 3 = Wednesday
	7 Dial "off time using 24-hour format (0000 through 2359), or touch Drop to remove entry.
	8 Repeat steps 2 through 7 for each day of week (Don't set on or off time if Night Service should stay on for entire 24 hours.)
	9 Press **Message.**
To record current day for Night Service with Time Set	**1** Press **Message.**
	2 Dial #313.
	3 Dial number of **current day of week** 0 = Sunday 4 = Thursday 1 = Monday 5 = Friday 2= Tuesday 6 = Saturday 3 = Wednesday
	4 Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Night Service, Enhanced (continued) To suspend Night Service with Time Set	**1** Press **Message.** **2** Dial #313. **3** Dial 9. **4** Press **Message.**
To get a printout of Enhanced Night Service lnformation	**1** Press **Message.** **2** Dial #907 and wait for beep. **3** Press **Message.**
One-Touch Call Handling To set system for One-Touch Transfer (default)	**1** Press **Message.** **2** Dial #3150. **3** Press **Message.**
To set system for One-Touch Hold with call Announcememt	**1** Press **Message.** **2** Dial #3151. **3** Press **Message.**
Printouts, All	**1** Press **Message.** **2** Dial #999 and wait for beep. **3** Press **Message.**

Recall Timer interval	**1** Press **Message.**
	2 Dial #318.
	3 Dial number to specify timer interval:
	    0 = 350 milliseconds
	    1 = 450 milliseconds
	    2 = 650 milliseconds
	    3 = 1 second
	4 Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Reminder Service Cancel	**1** Press **Message.** **2** Dial #333. **3** Dial a time using 24-hour format (0000 through 2359) or touch **Drop** to remove entry. **4** Press **Message.**
To get a printout of Reminder Service Cancel	**1** Press **Message** **2** Dial #905 and wait for beep. **3** Press **Message**

Ringing-on-Transfer	**1** Press **Message.**
	2 Dial #314.
	
	3 Dial number to specify what callers hear:
	
	   0 = music, if available or silence
	   1 = ringing
	
	4 Press **Message.**

System Date
  (Required for Call
   Report Night Service,
   and Reminder Service)
	1 Press **Message.**
	
	2 Dial #301
	
	3 Dial current date (Month:0l to 12, Day:0l to 31. year 00 to 99).
	
	4 Press **Message.**

System Information Report Printout	**1** Press **Message.** **2** Dial #905 and Wait for beep. **3** Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to *P,* press Conference button twice, then follow steps for feature
System Speed Dial To assign System Speed Dial codes	**1** Press **Conference.** **2** Dial 0. **3** Dial System Speed Dial Code (#60 through #99 for FMl and FM2 or #600 through #729 for R3), then dial* if it is a marked code. **4** Dial Telephone number. **5** Press **Conference** twice.
To get a printout of System Speed Dial codes	**1** Press **Message.** **2** Dial #901 and wait for beep. **3** Press **Message.**
System Time (Required for Call Report Night Service, and Reminder Service)	**1** Press **Message.** **2** Dial #300. **3** Dial current time using 24-hour format (0000 through 2359). **4** Press Message.

Touch-Tone or Rotary Signaling	**1** Press **Message.**
	
	2 Dial #302
	
	3 Touch each line button until the light next to it shows the appropriate code:
	    Green light on = Touch-Tone
	    Green light off= Rotary
	
	4 Press **Message.**

TABLE 3-6 BIS-34D Console Administration (continued)

Feature	Procedure: Slide T/P switch to P, press Conference button twice, then follow steps for feature
Transfer Return Interval	**1** Press **Message.** **2** Dial #306. **3** Dial number of rings (1 through 9) before call return to original phone. o r Dial 0 if transferred calls should not return. **4** Press **Message**

Administering Basic Telephones

The MERLIN II system may include basic telephones installed in the office or at remote locations. A basic telephone is any single line telephone set (a zero button set such as the 7102A), any rotary telephone (a 500 set), or any Touch-Tone telephone (a 2500 set). A basic telephone can be connected to the system through one of these devices:

- A Basic Telephone Module in the control unit

- An Off-Premises Telephone Interface (OPTI)

  NOTE: The OPTI is limited in use to stations with 2-digit intercom numbers.

- An Off-Premises Range Extender (OPRE)

  NOTE: As this document went to press, the OPRE was not yet available.

- A Basic Telephone and Modem Interface (BTMI)

- A Basic Telephone and Modem Interface 2 (BTMI-2)

These devices are described in Section 1, "System Description."

NOTE: Basic telephones at remote locations must be connected through an OPTI. An OPTI is compatible with Touch-Tone basic telephones only.

BASIC TELEPHONES CONNECTED TO BASIC TELEPHONE MODULES

Users with basic telephones connected to Basic Telephone Modules use dialing codes and switchhook signals to access most system features. A few operations, such as using a Night Service password, aren't available to them.

To administer a basic telephone connected to a Basic Telephone Module, you perform the same general procedures that you use to administer the MERLIN II system voice terminals. However, because basic telephones are used somewhat differently than voice terminals, keep these points in mind:

- lf the system is square, users with basic telephones can get an outside line by dialing 88. If the telephone has more than one line assigned to it, the system automatically searches through the lines in the order assigned, and provides the first idle line it finds. Assign identical types of lines, such as all local lines, to basic telephones in square systems, or give the user a list of the diaI codes shown on the Station Configuration Form, Basic Telephones (Square Systems) for Feature Module 2 or Form 3d, Station Configuration Form, Basic Telephones (Square Systems) for Release 3.

- If the system is pooled, users with basic telephones access outside lines based on the type of access provided for the system as a whole. It also depends on what additional lines or line pools you assign to basic Telephones.

  > In a system with Button Access, the user can place calls using default pool 9 (dial code 9) or one of the other lines or line pools assigned to the telephone (dial code 88).

  > In a system with Dial Access, the user dials 9 to get Dial Access and then can access all the line pools that have been administered using standard dial codes. For example the user dials 9-9,9-890, etc. The user can use dial code 88 to access an additional line or line pool, if you assign one.

  > In a system with Automatic Route Selection, the user just disk 9 and then the outside number. The user can use dial code 88 to access one of the additional lines or line pools assigned m the telephone.

If a user needs to access specific lines or line pools, refer to the list of dial codes on the Station Configuration Form, Basic Telephones (Pooled Systems) for Feature Module 2 or Form 3e, Station Configuration Form, Basic Telephones (Pooled Systems) for Release 3.

- In a behind-switch system, users are connected to their prime lines automatically when they lift the handset. The prime line is the user's line in the host system.

- Users with basic telephones cannot enter a password to make calls while Night Service with Outward Restriction is in effect unless they are assigned to the Night Service Exclusion list.

BASIC TELEPHONES CONNECTED TO TELEPHONE INTERFACE DEVICES

The procedure for administering basic telephones connected to interface devices is slightly different from the procedure for administering voice terminals. Follow the steps below to administer a basic telephone connected to an Off-Premises Telephone Interface (OPTI), a Basic Telephone and Modem Interface (BTMI), or a Basic Telephone and Modem Interface 2 (BTMI-2).

1 At the administrator/attendant console, enter administration mode by sliding the T/P switch to *P*.

2 Press **Conference** twice.

3 Assign lines and line pools to the intercom number assigned to the OPTI, BTMI, or BTMI-2. Do this by following the "Assigning Lines/Line Pools to Stations for Square, Button Access, and Behind-Switch Systems" procedure on page 3-36.

4 To assign call restrictions to an OPTI, BTMI, or BTMI-2, follow the "Call Restrictions" procedure on page 3-79 for a Display Console or page 3-98 for a BIS-34D Console.

5 Use either Centralized Programming to program the basic telephone or connect a voice terminal directly to the control unit station jack where you plan to connect the OPTI, BTMI, or BTMI-2. To use centralized Programming, follow the procedures on page 3-81 for a Display Console or page 3-100 for a BIS-34D Console.

6 To change the order in which the system searches for an available line, follow the "Automatic Line Selection" procedure on page 3-117. Do *not* include intercom lines in the sequence.

7 Set Ringing Options on lines and line pools. To do this, follow the "Ringing Options" procedure on page 3-114.

8 Remove any custom features assigned to buttons above the dial pad.

9 Disconnect the voice terminal or leave Centralized Programming.

10 Leave administration mode by sliding the T/P switch to the center position.

11 Connect the basic telephone to the OPTI, BTMI, or to the BTMI-2.

12 Connect the OPTI, BTMI, to the BTMI-2 or the basic telephone port selected and connect the BTMI or BTMI-2 to the analog port selected.

Programming Voice Terminals

CENTRALIZED PROGRAMMING

When you performed system administration, you assigned lines and line pools to the individual voice terminals in the system. In administering optional features, you may also have assigned Call Restriction or Forced Account Code Entry to voice terminals and assigned them to groups for Group Page, Group Call Distribution, Call Pickup, and Night Service.

The final step in preparing voice terminals for use involves assigning programmable features to meet individual needs. These features may be programmed from individual voice terminals or from the administration/attendant console (centralized programming). To program voice terminals from the administrator/attendant console, follow the "Centralized Programming" procedure on page 3-81 for a Display Console or 3-100 for a BIS-34D console.

FEATURES THAT CAN AFFECT CALLING PATTERNS

Most programmable features are designed solely for the user's convenience. There are four features, however, that are of particular importance because they can affect other voice terminals in the system. These are Ringing Options, Call Coverage, Call Pickup, and Automatic Line Selection.

NOTE: Before you add or change any features on voice terminals, be sure to record the changes on the appropriate Station Configuration Forms for Feature Module 2 or Forms 3a through 3g, Station Configuration Forms for Release 3. Also be sure that the feature buttons on the voice terminals are labeled correctly.

Ringing Options

You can assign immediate, delayed, or no ring to individual lines or line pools on your phone or you can program the same option for all your lines and line pools. You assign Abbreviated or Repeated Ringing to all your lines or line pools.

1 Enter programming mode by sliding the T/P switch to P.

   NOTE: Digital phones: Dial #33.

2 Take the appropriate action:

> To assign immediate, delayed, or no ringing to an individual line or line pool button, press the button and dial the appropriate code:

   - Dial *35 for No Ring.
     The red light next to the line button goes off.

   - Dial *36 for Delayed Ring.
     The red light next to the line button flashes.

   - Dial *37 for Immediate Ring.
     The red light next to the line button goes on steady.

> To assign immediate, delayed, or no ring to all the lines and line pools at your phone, press any line button and dial the code for the type of ringing you prefer:

   - Dial *345 for No Ring.
     The red lights next to all the line buttons go off.

   - Dial *346 for Delayed Ring.
     The red lights next to all the buttons flash.

   - Dial *347 for Immediate Ring.
     The red lights next to all the line buttons go on steady.

3 To select Abbreviated or Repeated Ringing for incoming calls to a busy phone, press one of your line or line pool buttons and dial the appropriate code:

> Dial *341 for Abbreviated Ringing.

> Dial *342 for Repeated Ringing.

4 Leave programming mode by sliding the T/P switch to the center position.

> **NOTE:** Digital phones: Dial #00.

Call Coverage

The Call Coverage feature allows you to cover calls, including intercom calls, for other voice terminals in your system. To program this feature, follow these steps:

1 Label a button with lights.

2 Enter programming mode by sliding the T/P switch to P.

> **NOTE:** Digital phones: Dial #33.

Press the button just labeled that you want to program.

3 Dial ✶ 40 to assign primary coverage or ✶ 50 to assign a secondary coverage;

4 Dial the intercom number of the person you are covering.

5 To assign a Ringing Option, press the Cover button, then dial the appropriate code for the type of ringing you prefer:

> Dial ✶ 35 for no ring.
> *The red light next to the button goes off.*

> Dial ✶ 36 for delayed ring.
> *The red light next to the line button flashes.*

> Dial ✶ 37 for immediate ring.
> *The red light next to the line button goes on steady.*

6 Program another feature or leave programming mode by sliding the T/P switch to the center position.

NOTE: Digital phones: Dial #00.

Call Pickup

You can use the Call Pickup feature to answer a call that is ringing, parked, or on hold anywhere in the system. To program this feature, follow these steps:

1 Label a button.

2 Enter programming mode by sliding the T/P switch to **P**.

  NOTE: Digital phones: Dial #33.

3 Press the button just labeled that you want to program.

4 Dial ⋆ 84.

5 If you want to make this an individual Call Pickup button, dial the intercom number or line number.

6 Program another feature or leave programming mode by sliding the T/P switch to the center position.

  NOTE: Digital phones: Dial #00.

Automatic Line Selection

You can use the Automatic Line Selection feature to specify the order in which the system makes outside lines available to you. To program this feature, follow these steps:

1 Enter programming mode by sliding the T/P switch to **P**.

  NOTE: Digital phones: Dial #33.

2 Dial ⋆⋆

3 Press the line buttons in the order you prefer.

4   To program other features, you must dial ✷✷ to exit
Automatic Line Selection. Dialing ✷✷ applies *only* to
exiting the Automatic Line Selection programming
routine. Otherwise, leave programming mode by
sliding the T/P switch to the center position.

NOTE: Digital phones: Dial #00.

There are three features that can be programed onto voice
terminals to allow the user to rapidly dial calls; Outside
Auto Dial, Last Number Redial, and Saved Number
Redial.

Outside Auto Dial An Outside Auto Dial button can be
used to dial telephone numbers, account numbers, and
PBX, Centrex, or Custom Calling feature codes, with one
touch. To program an Outside Auto Dial
these steps:

1   Label a button.

2   Enter programming mode by sliding the T/P switch to
P.

NOTE: Digital phones: Dial *#33.*

3   Press the button you want to program.

4   Dial ✷ 90 and, if required, a Pool Access number and
two pauses (press Hold twice) plus a telephone
number or a PBX or Centrex code.

5   You may need to program a pause, stop, or switchhook
flash into an Outside Auto Dial sequence, or you may
need to switch from rotary to Touch-Tone signals in
the middle of a programmed dialing sequence. To do
so, you must enter the following special character
when you program the sequence.

> To program a pause, press **Hold.**

> To program a stop, press **Drop.**

> To program a switchhook flash at the beginning of a programmed dialing sequence, press Recall and then press Hold.

> To program Touch-Tone Enable, press Transfer.

6 Leave programming mode by sliding the T/P switch to the center position.

> **NOTE:** Digital phones: Dial #00.

Last Number Redial A Last Number Redial button allows the user to redial with one much the number dialed last. The user does not need to do anything to save the number. To program a Last Number Redial button, follow these steps:

1 Label a button.

2 Enter programming mode by sliding the T/P switch to *P*.

> **NOTE:** Digital phones: Dial #33.

3 Press the button you want to program.

4 Dial ⋆ 73 (you do not need to dial an Outside number).

5 Leave programming mode by sliding the T/P switch to the center position.

> **NOTE:**   Digital phones: Dial #00.

Saved Number Redial   With a Saved Number Redial button, a user can save the number just dialed to be dialed later with one touch. The user saves the number by pressing a button before he or she hangs up. Later, they press the Saved Number button again, and the phone automatically redials the last number saved. To program a Saved Number Redial button, follow these steps:

1 Label a button.

2 Enter programming mode by sliding the T/P switch to
   P.

   NOTE: Digital phones: Dial #33.

3 Press the button you want to program.

4 Dial ⋆ 74 (you do not need to dial an outside number).

5 Leave programming mode by sliding the T/P switch to
   the center position.

   NOTE: Digital phones: Dial #00.

Section 4: Troubleshooting

General Tests

Basic Troubleshooting Procedures

This section shows you how to diagnose and solve basic problems in the MERLIN II system. It also provides you with the procedures for making an on-line module swap in a Release 3 system.

Most of the troubleshooting procedures are based on identifying the symptom, determining whether it is hardware or software related, isolating the problem to one of the areas indicated in Figure 4-1, and replacing individual components in that area with components that are known to be working until the cause of the problem is identified and solved. If the problem lies with administration or programming, determine the correct procedure, then administer the system or program the voice terminals accordingly. Tie line troubleshooting is presented separately and is based on your being able to test individual ports to determine if they are functioning properly.

Problems that go beyond those caused by faulty but easily replaced components should be referred to the equipment supplier. Refer any problems involving the outside lines to the serving telephone company.

The following troubleshooting checklist is provided to guide you through the necessary steps to troubleshoot a system. When a problem arises with the MERLIN II system, be sure to check first the items listed under "General Operating Condition' in this section. If none of those items are the source of the trouble, go on to "Procedures for Specific Symptoms." If the problem is not described under that heading, or if none of the tests reveal a specific problem, proceed to "General Tests" before calling the equipment supplier.
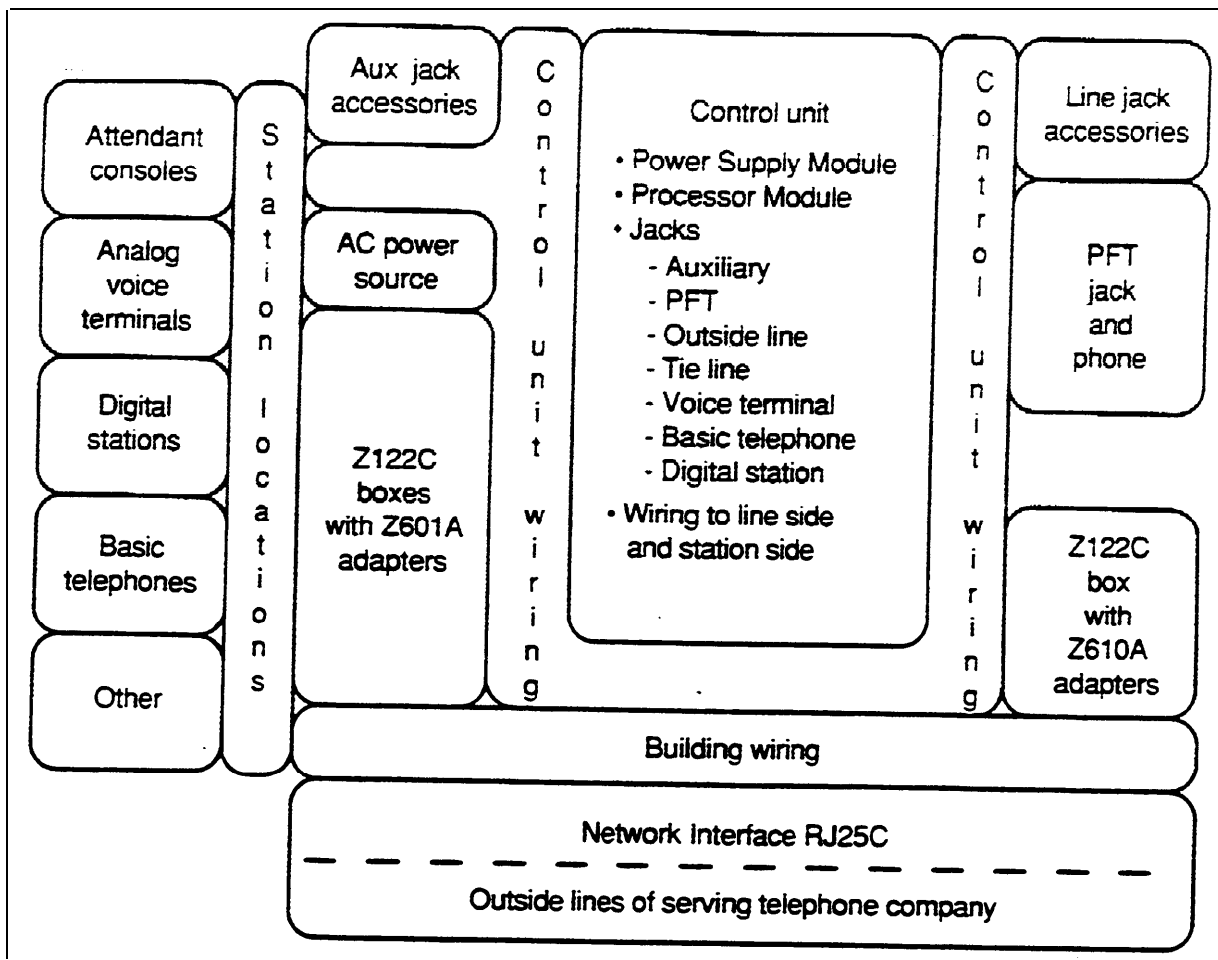
FIGURE 4-1 Specific areas of the MERLIN II system for troubleshooting reference.

TROUBLESHOOTNG CHECKLIST

When a problem occurs with the MERLIN II system, follow this general procedure:

1 Identify the symptom.

2 Isolate the problem area and/or the faulty component(s).

3 If the symptom is hardware related:

  a   Check the connections.

  b   Replace individual components in the area of tie problem with components known to be working until the malfunction is connected.

  c   Test the system.

  d   Notify the local telephone company if the problem is on the outside Iines.

4 If the symptom is related to administration or programming:

  a   Refer to all the MERLIN II system planning forms for the site. These show the intended system administration and voice terminal programming, and should reflect any changes made since the system was first installed.

  b   If possible, make a printout of all the system administration and check it against the planning forms. Refer to page 3-89 for the Display Console or page 3-106 for the BIS-34D console instructions to print all. Make sure the forms are up to date and reflect the customer's current requirements for system features.

  c   Readminister the system and/or reprogram components as necessary.

  d   Test the system.

6   Check the control unit site by following the steps under "General Operating Conditions" on page 4-5.

MERLIN II SYSTEM PLANNING FORMS

Each MERLIN II system site should have the following planning forms completed and available for reference during service and maintenance.

For Release 3:

- Form la, System Form-Incoming Lines
- Form 1b, System Form-Tie Lines
- Form 1c, System Form-Module Identification Diagram.
- Form ld, System Form-Station Planning
- Form le, System Form-Requirements and Options

For Feature Module 1 and Feature Module 2:

- Master Planning Form
- System Configuration Form
- Voice Terminal Configuration Forms

The forms for MERLIN II system, should also be completed and available for reference. The option form titles are as follows:

For Release 3:

- Form 4a, Call Restriction Assignments
- Form 4b, Group Page Assignments
- Form 4c, Group Call Distribution Form-Call Distribution Groups
- Form 4d, Group Call Distribution Form-CaIl Distribution Groups Line/Line Pool Assignments
- Form 4e, Call Pickup Group Assignments
- Forms 5a through 5j, Automatic Route Selection Forms

- Form 5k, Allowed Lists
- Form 5l, Disallowed Lists
- Form 6, System Speed Dial Assignments
- Forms 7a through 7c, Enhanced Night Service
- Forms 8a through 8c, Label Forms

For Feature Module 1 and Feature Module 2:

- Enhanced Night Service Forms
- Call Restrictions and Allowed Lists Forms
- Group Page Form
- Group Call Distribution Forms
- System Speed Dial Forms
- Automatic Route Selection Forms

GENERAL OPERATING CONDITIONS

If people are having trouble with the MERLIN II system, first check the following items to determine if the system is operating according to prescribed conditions. This list is especially useful if a problem is not easily isolated to a specific area or component.

- **Modules installed securely in carrier.** Check to see that each module is properly installed in the basic and/or expansion carrier. (Refer to "Module Installation" on page 2-62.)

- **Module indicators.** Verify that all power, warning, and other lights are indicating normal operating conditions. Under normal conditions:

  > The green power light on all Power Supply Modules is on

> The red warning light on the Processor Module is
o f f

> All lights on the Tie Line Module are off

● **Module jacks.** Check that all module connection are
securely seated in the line and station jacks.

● **AC power.** Check the ac power outlet and make sure
that it is working properly and that it is not switch
controlled. The outlet should be grounded properly.
(Refer to "AC Outlet Tests" on page *2-7* to verify
proper grounding.) Be sure that the control unit is not
on the same electrical circuit with motors or other
devices that generate electrical interference.

● **Auxiliary power unit.** If the system requires this
device, make sure that it is installed and working
properly. (Refer to "Installing the Auxiliary Power
Unit" on page 2-72 for instructions.)

● **System grounding.** Verify that the control unit is
connected to a proper ground. (Refer to "System
Grounding Requirements" on page 2-5.)

● **Power outage.** If a temporary loss of power has
occurred, system administration could have been
disrupted. Use a printer to verify that all
administration is intact by using the printing all
procedure. See page 3-89 for Display Console
administration or page 3-106 for BIS-34D Console
administration.

● **Accessory and auxiliary equipment.** Disconnect all
accessories and auxiliary devices from the system to
see if the problem exists there.

● **Features.** Using the planning forms, verify that each
feature has been administered or programmed properly
and that the right equipment has been installed to
support it. Certain features, such as Simultaneous
Voice and Data Calls, require special wiring and
programming.

On-Line Module Swap

Troubleshooting the MERLIN II system somtimes involves replacing control unit modules. It is possible with Release 3 of the MERLIN II system, to remove and insert modules while the system is in operation.

NOTE: The Processor Module and Power Supply Modules cannot be removed using On-Line Module Swap. They require that the power be turned off to the control unit. The replacement module must be the same as the one removed (e.g., a 408 module must be replaced with a 408 module). If the replacement module is not the same, the MERLIN II system will restart when you exit the procedure.

Follow the procedures outlined below to replace a module or modules while the system is powered and in use. Any deviation from these procedures may cause the system to restart, with the loss of all active calls as a result.

Designate a Controller Station Port

To designate a station port from which to reset modules (called the "controller" station port), follow these steps:

1 At the MERLIN II System Display Console, enter administration mode by sliding the T/P switch to P.

2 Touch **Conference** twice.
The administration menu appears.

3 Touch [More], [Options], [More], [More], [ModSwap] . designate a controller station port. The default station port is station 19.

NOTE: Do not select a basic telephone port.

4 There can be only one controller station port at any given time. If the Auto Intercom button you select does not light and you hear a beep when you touch the button, another station port is currently designated. Find the Auto Intercom button of the station showing a steady green light. Touch the Auto Intercom button to

remove the controller station port designation.

The green light goes out..

5 Now select the station port you want to designate as the controller station port by touching its Auto Intercom button.

The green light goes on.

To Replace a Module

When replacing a module, you need a MERLIN system voice terminal then follow these steps:

1 Plug a voice terminal into the controller station port.

> Use an analog voice terminal if the controller station port is located on an analog module.

> Use a digital voice terminal if the controller station port is located on a digitd module.

2 Enter programming mode:

> On an analog voice terminal, slide the T/P switch to *P.*

> On a digital voice terminal, dial #33.

3 To exit the On-Line Module Swap procedure at anv time *before* you have removed a module, perform one of the foIlowing actions:

> Touch **Intercom Ring**

or

> On an analog voice terminal, slide the T/P switch to the center position.

> On a digital voice terminal, dial #00.

If you touch any button besides **Intercom Ring,** the red light next to **Intercom Voice** will go out and the green light next to the **Intercom Ring** will flash fast to indicate an error. To continue after an error, dial ✶ 09 plus the slot number of the module to be removed.

4 Touch a programmable button.

5 Dial ✷ 09 plus the slot number of the module to be removed (01 through 11) to select that slot

The green light next to Intercom Ring *will flash. The red light next to Intercom Voice indicates activity on the module.*

Flashing red light =activity
Steady red light =no activity

> **NOTE:** Digital station modules with only data calls active do not show the flashing red light for activity. Extra care is needed to avoid dropping active data calls.
>
> If the red light is flashing, or if the module has MPDMs or MTDMs connected to it that have the "Call In Progress" light on, skip this module by dialing ✷ 09 plus a new slot number. If you reset the module when it is active, any active voice or data calls will be dropped.
>
> If you decide to change a digital module despite the presence of active calls, remove the station cords before resetting the module.

6 To idle a module, touch Intercom Voice. The appropriate module will be idled.

*The red light will be on steady next to **Intercom Voice**.*
*The green light next to **Intercom Ring** will go on steady.*

7 Remove all line and/or station cords connected to the module that is to be removed.

8 Replace the designated module with a module of the same type.

9 Reconnect all line and/or station cords that were connected to the module.

10 Touch Intercom Ring to restore the module.

The red light on the Processor Module will go on for a short time.

11 Repeat steps 4 through 10 for any other module to be replaced.

12 Exit the procedure by:

> Touching **Intercom Ring.**

or

> On an analog voice terminal, sliding the T/P switch to the center position.

> On a digital voice terminal, dialing #00.

Tie Line Troubleshooting

TESTING TIE LINES

Before performing the following tests, make sure that the tie lines for the system are connected and properly configured. These tests procedures verify proper installation for Type 1 Standard, Type 1 Compatible, and Type 5 Simplex, or E&M signaling types. Refer to page 1-48 for a description of these signaling types. The verification process can seine as a means to troubleshoot problems with tie lines.

> **WARNING:** The protected mode must be used whenever the E&M leads extend out-of-building and are not connected to the network interface. See pages 1-47 and 1-48.

Testing Type 1 Standard Tie Lines

To test tie lines configured for Type 1 Standard, follow these steps:

1 Connect an attendant console to station port 10.

2 Connect a printer to the SMDR port on the Processor Module. Set the printer port to 1200 baud.

3 Set the Tie Line Module switches to E&M signaling/unprotected mode. Refer to "Administering Tie Lines" on page 3-50 for instructions.

4 Administer tie line port 1 to Type 1 Compatible. Administer the port(s) being tested (ports 2,3, or 4) to Type 1 Standard. Refer to "Selecting the Signal Type" on page 3-55 for instructions. Administer all signaling parameters as specified by Form lb, System Form— Tie Lines.

5 Assign the tie lines to two stations, called station A and station B in this procedure, in order to conduct the tests. Assign the tie lines to a line pool (890 through 899).

6 Print out the tie line translation and make sure that the ports are configured as described in step 4.

> If the tie lines are translated correctly, go on to step 7.

   If the tie lines are not translated correctly according to Form 1b, repeat steps 4 through 6. If the tie lines still aren't translated correctly, call the National Service Assistance Center (NSAC) at 1-800-628-2888 for help.

7 Remove the bridging clips and connect the tie line ports to the network interface (a 66-type connecting block).

8 From the 66-type block, cross-connect tie line port 1 to one of the ports you want to test (ports 2, 3, or 4). See Figure 4-2.

**NOTE:** Test only one port at a time.

FIGURE 4-2 Cross-connect field for Type 1 Standard and Type 1 Compatible.

9 Go off-hook on station A.

> If you hear dial tone, go on to step 10.

> If you do not hear dial tone, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go on to step 17.

10 Dial station B.

> If the tie line does not drop (within five seconds), go on to step 11.

> If the tie line drops within five seconds, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go onto step 17.

11 Listen for ringback tone.

> If there is ringback tone, go on to step 12.

> If there is no ringback tone, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go on to step 17.

12 Pickup the handset at station B.

> If you are connected to station B, hang up and go onto step-13.

> If you are not connected to station B, hang up and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go onto step 17.

13 Go off-hook on station B.

> If you hear dial tone, go on to step 14.

> If you do not hear dial tone, go on to step 17.

14 Dial station A.

> If the tie line does not drop (within five seconds), go on to step 15.

> If the tie line drops within five step 17.

15 Listen for ringback tone.

> If you hear ringback tone, goon to step 16.

> If you do not hear ringback tone, go to step 17.

16 Pickup the handset at station A.

> If you are connected to station A, the tie line is good. Go on to step 17.

> If you are not connected to station A, go on to step 17.

17. Hang up. Repeat steps 8 and 9 for any other ports

> If all the line are good, go on to step 25.

> If one or more of the tie lines are not good, go to step 18.

NOTE: For the following steps, refer to Table 4-1 to identify the pin numbers of the tie line jack associated with the leads identified in the steps. Use the green ground wire on the power supply or a pipe ground.

TABLE 4-1 Tie Line Jack Pin Identification

Signal	Pin No.
T	5
R	4
T 1	1
R 1	2
E	3
M	6

18 Ensure that all phones are on-hook. Connect a volt meter between the M lead and ground at the 66-type connecting block for one of the bad tie lines.

> If the voltage is 0 volts, go to step 20.

> If the voltage is not 0 volts, go on to step 19

19 Try the following steps one at a time:

a   Reverse the E and M leads, then retest the condition.

> If the condition has been corrected, go back to step 8.

> If the condition has not been corrected, go on to step 19b.

b Try another tie line port, then retest the condition.

> If the condition has been corrected, the original tie line port is faulty. Go back to step 8.

> If the condition has not been connected, go on to step 19c.

c Replace the Tie Line Module, then retest the condition.

> If the condition has been corrected, the original Tie Line Module is faulty. Go back to step 8.

> If the condition has not been connected, stop testing and call the equipment supplier.

If the problem was either the tie line port or the Tie Line Module, call the equipment supplier when you have finished testing.

20 Connect the volt meter between the E lead and ground at the 66-type block for the tie line being tested.

> if the voltage is -48 volts, go on to step 21.

> If the voltage is not -48 volts, go to step 19.

21 Select the tie line being tested and go off hook at station A.

22 Reconnect the volt meter between the M lead and ground at the 66-type block.

NOTE: This measurement must be made within 5 seconds after going off-hook

> If the voltage is -48 volts, go on to step 23.

> If the voltage is not -48 volts, go to step 19.

23 Connect a craft set between leads T1 and RI. Select the tie line being tested using station A. The receiving end should provide dial tone.

> **NOTE:** The tie line dial tone option should be administered for remote in order to send dial tone out to the port being tested.

> \> If you hear dial tone and can break it, return to step 8 and select the next tie line for testing.

> \> If you hear dial tone and cannoit break it, go to step 24.

> \> If you do not hear dial tone, go to step 19

24 Connect a craft set between leads T and R. Select the tie line being tested using station B. The transmitting end should provide dial tone.

> \> If you hear dial tone and can break it, return to step 8 and select the next tie line for testing.

> \> If you do not hear dial tone, or you hear dial tone and cannot break it go to step 19.

25 Readminister port 1 for Type 1 Standard.

26 Print out the tie line translation and make sure that all the ports are configured for Type 1 Standard.

> \> If the tie lines are translated correctly according to Form lb, testing is complete.

> \> If the tie lines are not translated correctly, repeat steps 4 through 6.

Testing Type 1
Compatible Tie Lines

To test tie lines configured for Type 1 Compatible, follow these steps:

1 Connect an attendant console to station port 10.

2 Connect a printer to the SMDR port on the Processor Module. Set the printer port to 1200 baud.

3 Set the Tie Line Module switches to E&M signaling/protected mode. Refer to "Administering Tie Lines" on page 3-50 for instructions.

4 Administer tie line port 1 to Type 1 Standard. Administer the port(s) being tested (ports 2, 3, or 4) to Type 1 Compatible. Refer to "Selecting the Signal Type" on page 3-55 for instructions. Administer all signaling parameters as specified by Form lb, System Form-Tie Lines.

5 Assign the tie lines to two stations, called station A and station B in this procedure, in order to conduct the tests. Assign the tie lines to a line pool (890 through 899).

6 Print out the tie line translation and make sure that the ports are configured as described in step 4.

> If the tie lines are translated correctly, go on to step 7.

> If the tie lines are not translated correctly according to Form 1b, repeat steps 4 through 6. If the tie lines still aren't translated correctly, call the National Service Assistance Center (NSAC) at 1-800-628-2888 for help.

7 Remove the bridging clips and connect the tie line ports to the network interface (a 66-type connecting block).

8 From the 66-type block, cross-connect tie line port 1 to one of the ports you want to test (ports 2, 3, or 4). See Figure 4-2.

NOTE: Test only one port at a time.

9 Go off-hook on station A.

> If you hear dial tone, go on to step 10.

> If you do not hear dial tone, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go onto step 17.

10 Dial station B.

> If the tie line does not drop (within five seconds), go on to step 11.

> If the tie line drops within five seconds, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go onto step 17.

11 Listen for ringback tone.

> If there is ringback tone, go on to step 12.

> If there is no ringback tone, hang up and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, goon to step 17.

12 Pick up the handset at station B.

> If you are connected to station B; hangup and go on to step 13.

> If you are not connected to station B, hang up and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go onto step 17.

13 Go off-hook on station B.

> If you hear dial tone, go on to step 14.

> If you do not hear dial tone, go on to step 14

14 Dial station A.

> If the tie line does not drop (within five seconds) go on to step 15.

> If the tie line drops within five step 17.

15 Listen for ringback tone.

> If you hear ringback tone, go on to step 16.

> If you do not hear ringback tone, go to step 17.

16 Pickup the handset at station A.

> If you are connected to station A, the tie line is good. Goon to step 17.

> If you are not connected to station A, go 17.

17 Hang up. Repeat steps 8 and 9 for any other being tested.

> If all tie lines are good, go on to step 25.

> If one or more of the tie lines are not good, go to step 18.

NOTE: For the following steps, refer to Table 4-1 on page 4-15 to identify the pin numbers of the tie line jack associated with the leads identified in the steps. Use the green ground wire on the power supply or a pipe ground.

18 Ensure that all phones are on-hook. Connect a volt meter between the M lead and ground at the 66-type connecting block for one of the bad tie lines.

> If the voltage is 48 volts, go to step 20.

> If the voltage is not 48 volts, go on to step 19.

19 Try the following steps one at a time:

a   Reverse the E and M leads, then retest the condition.

> If the condition has been corrected, go back to step 8.

> If the condition has to step 19b.

b   Try another tie line port then retest the condition.

> If the condition has been corrected, the original tie line port is faulty. Go back to step 8.

> If the condition has not been corrected, go on to step 19c.

c   Replace the Tie Line Module, then retest the condition.

> If the condition has been corrected, the original Tie Line Module is faulty. Go back to step 8.

> If the condition has not been corrected, stop testing and call the equipment supplier.

If the problem was either the tie line port or the Tie Line Module, call the equipment supplier when you have finished testing.

20 Connect the volt meter between the E lead and ground at the 66-type block for the tie line being tested.

> If the voltage is 0 volts, go to step 21.

> If the voltage is not 0 volts, go to step 19.

21 Select the tie line being tested and go off-hook station A.

22 Reconnect the volt meter between the M lead and ground at the 66 type block

NOTE: This measurement must be made within 5 seconds after going off-hook.

> If the voltage is 0 volts, go on to step 23.

> If the voltage is not 0 volts, go to step 19.

23 Connect a craft set between leads T1 and R1. Select the tie line being tested using station A. The receiving end should provide dial tone.

NOTE: The tie line dial tone option should be administered for remote in order to send dial tone out to the port being tested.

> If you hear dial tone and can break it, go to step 8 and select the next tie line for testing.

> If you hear dial tone and cannot break it go to step 24.

> If you do not hear dial tone, go to step 19.

24 Connect a craft set between leads T and R. Select the tie line being tested using station B. The transmitting end should provide dial tone.

> If you hear dial tone and can break it, go to step 8 and select the next tie line for testing.

> If you do not hear dial tone, or you hear dial tone and cannot break it go to step 19.

25 Readminister port 1 for Type 1 Compatible.

26 Print out the tie line translation and make sure that all the ports are configured for Type 1 Compatible.

> If the tie lines are translated correctly according to Form 1b, testing is complete.

> If the tie lines are not translated correctly, repeat steps 4 through 6.

Testing Type 5 Simplex Tie lines

To test tie lines configured for Type 5 Simplex, follow these steps:

1 Connect an attendant console to station port 10.

2 Connect a printer to the SMDR port on the Processor Module. Set the printer port to 1200 baud.

3 Set the Tie Line Module switches to E&M signaling/protected or unprotected mode. Refer to "Administering Tie Lines" on page 3-50 for instructions.

4 Administer tie line port 1, and any ports being tested (ports 2,3, or 4), to Type 5 Simplex. Refer to "Selecting the Signal Type" on page 3-56 for instructions. Administer all signaling parameters as specified by Form 1b, System Form- Tie Lines.

5 Assign the tie lines to two stations, called station A and station B in this procedure, in order to conduct the tests. Assign the tie lines to a line pool (890 through 899).

6 Print out the tie line translation and make sure that the ports are configured as described in step 4.

> If the tie lines are translated correctly, go on to step 7.

> If the tie lines are not translated correctly according to Form lb, repeat steps 4 through 6. If the tie lines still aren'translated correctly, call the National Service Assistance Center (NSAC) at l-800-628-2888 for help.

7 Remove the bridging clips and connect the tie line ports to the network interface (a 66-type connecting block).

8 From the 66-type block, cross-connect he line port 1 to one of the ports you want to test (ports 2,3, or 4). See Figure 4-3.

NOTE: Test only one port at a time.
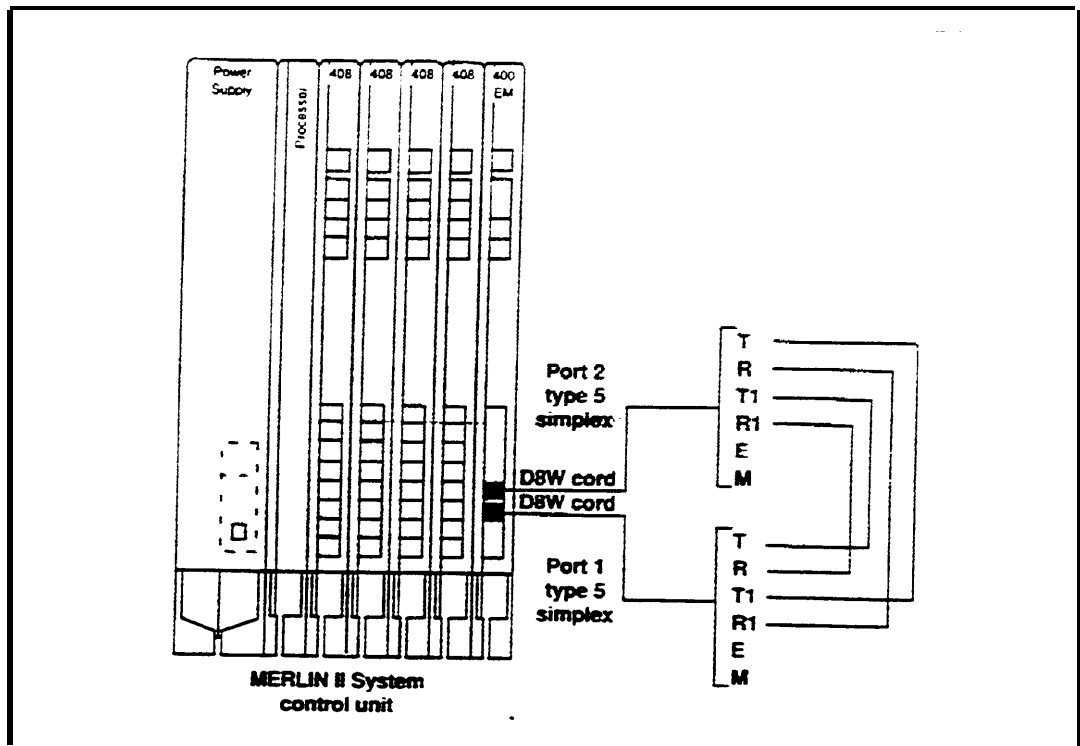
FIGURE 4-3 Cross-connect field for Type 5 Simplex

9 Go off-hook on station A.

> If you hear dial tone, go on to step 10.

> If you do not hear dial tone, hangup and repeat
steps 8 and 9 for any other ports being tested.
When all ports have been tested, goon to step 17.

10 Dial station B.

> If the he line does not drop (within five seconds),
goon to step 11.

> If the he line drops within five seconds, hang up
and repeat steps 8 and 9 for any other ports being
tested. When all ports have been tested, go onto
step 17.

11 Listen for ringback tone.

> If there is ringback tone, go on to step 12.

> If there is no ringback tone, hang up and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go on to step 17.

12 Pick up the handset at station B.

> If you are connected to station B, hang up and go on to step 13.

> If you are not connected to station B, hangup and repeat steps 8 and 9 for any other ports being tested. When all ports have been tested, go on to step 17.

13 off-hook on station B.

> If you hear dial-tone, go on to step 14.

> If you do not hear dial tone, go on to step 17.

14 Dial station A.

> If the tie line does not drop (within five seconds) go on to step 15.

> If the tie line drops within five seconds go on to step 17.

15 Listen for ringback tone.

> If you hear ringback tone, goon to step 16.

> If you do not hear ringback tone, go to step 17.

16 Pick up the handset at station A.

> If you are connected to station A, the tie line is good. Go on to step 17.

> If you are not connected to station A, go on to step 17.

17 Hang up. Repeat steps 8 and 9 for any other ports being tested.

> If all tie lines are good, go on to step 25.

> If one or more of the tie lines are not good, go m step 18.

NOTE: For the following steps, refer to Table 4-1 on page 4-15 to identify the pin numbers of the tie line jack associated with the leads identified in the steps. Use the green ground wire on the power supply or a pipe ground.

18 Ensure that all phones are on-hook. Connect a volt meter between the T lead, pin number 5 on the tie line jack, and ground at the 66-type connecting block for one of the bad tie lines.

> If the voltage is 48 volts, go to step 20.

> If the voltage is not 48 volts, go on to step 19.

19 Try the following steps one at a time:

a Reverse the T,R pair and the T1 ,Rl pair, then retest the condition.

> If the condition has been corrected, go back to step 8.

> If the condition has not been connected, go on to step 19b.

b Try another tie line port, then retest the condition.

> If the condition has been connected, the original tie line port is faulty. Go back to step 8.

> If the condition has not been corrected, go on to step 19c.

c Replace the Tie Line Module, then retest the condition.

> If the condition has been corrected, the original Tie Line Module is faulty. Go back to step 8.

> If the condition has not been corrected, stop testing and call the equipment supplier.

If the problem was either the tie line port or the Tie Line Module, call the equipment supplier when you have finished testing.

20 Connect the volt meter between the T1 lead and ground at the 66-type block for the tie line being tested.

> If the voltage is 48 volts, go on to step 21.

> If the voltage is not 48 volts, go to step 19.

21 Select the tie line being tested and go off-hook at station A.

22 Reconnect the volt meter between the T lead and ground at the 66-type block.

NOTE: This measurement must be made within 5 seconds after going off-hook.

> If the voltage is 0 volts, go on to step 23.

> If the voltage is not 0 volts, go to step 19.

23 Connect a croft set between leads T1 and Rl. Select the tie line being tested using station A. The receiving end should provide dial tone.

NOTE: The tie line dial tone option should be administered for remote to send dial tone out to the port king tested.

> If you hear dial tone and can break it, go to step 8 and select the next tie line for testing.

> If you hear a dial tone and connot break it, go to step 24.

> If you do not hear dial tone, go to step 19.

24 Connect a craft set between leads T and R. Select the tie line being tested using station B. The transmitting end should provide dial tone.

> If you hear dial tone and can break it, go to step 8 and select the next tie line for testing.

> If you do not hear dial tone, or you hear dial tone and cannot break it, go to step 19.

25 Readminister port 1 for Type 5 Simplex.

26 Print out the tie line translation and make sure that all the ports are configured for Type 5 Simplex.

> If the tie lines are translated correctly according to Form 1b, testing is complete.

> If the tie lines are not translated correctly, repeat step 4 through 6.

Procedures for Specific Symptoms

**LOCATING THE
SYMPTOM**

Use the contents page of this Section to locate a specific symptom and the page number on which its troubleshooting procedure can be found. Then perform the recommended action to isolate and correct the problem.

If you encounter a symptom that is not in this section or if you are not able to identify a specific problem, perform the procedures explained in "General Tests" at the end of this section before calling the equipment supplier for assistance.

DIFFICULT TO PLACE CALLS   *Symptom: People have difficulty placing outside talk and/or intercom calls from one or more voice terminals.*

Possible Cause	Possible Solution	To Investigate Further
1. A faulty accessory is connected terminal.	Disconnect the accessory from the malfunctioning voice terminal. If the trouble no longer occurs do not reconnect the faulty accessory. Contact the equipment supplier to replace it.	If the trouble still occurs. reconnect the accessory and go to possible Cause 2.
2. The Call Restriction feature is activated on the malfunctioning voice terminal.	Refer to "Call Restictions" on page 3-79 for Display Console administration or page 3-98 for BIS-34D Console administration to learn how to determine if the Call Restriction feature is activated on a voice termimal. If the feature is activated on the malfunctioning voice terminal, deactivate it following the appropriate administration instructions.	If the feature is not activated go to Possible Cause 3.
3. The Outside Auto Dial, Saved Number Redial, or Last Number Redial feature is programmed or used incorrectly.	Program each feature correctly and try to place an outside call and an intercom call. See "Rapid Dialing" on page 3-118 for programming instructions for the Outside Auto Dail Saved Number Redial, or Last Number Redial feature.	If each feature is programmed correctly and the trouble still occurs, go to Possible Cause 4.

Possible Cause	Possible Solution	To Investigate Further
4. Faulty **MERLIN II** system components.	Try to place an outside call and an intercom call from several voice terminals.	If the trouble appears only on intercom calls or the trouble appears only on one voice terminal, the trouble is caused by a component in your system. Go to the symptom "Lights, Speaker, Ringing Problems." If the trouble appears only on outside calls from some or all voice terminals, go to Possible Cause 5.
5. Faulty telephone company wiring.	**Step 1.** Go to the control unit and find the network interface associated with the outside line from which you cannot make a call. Unplug the line cord from the network interface and, in its place plug in a basic Touch-Tone or rotary telephone. (Do *not* use a **MERLIN II** system voice terminal.) Try to place an outside call from the telephone. If the trouble appears on the basic telephone and the network interface does *not* have a line adapter, the outside line is faulty. Report the trouble to the local telephone company representative. *(continued)*	If the trouble appears on the basic telephone and the network interface uses a line adapter, go to Possible Cause 6. If the trouble doesn't appear, the problem is in the control unit or the wiring. Go to Step 2.

Possible Cause	Possible Solution	To Investigate Further
5. Faulty telephone company wiring (Continued).	**Step 2.** Replace the wiring with a cord this is known to work and try to place calls. If the calls go through. the wire you replaced is faulty. (You may want to plug the faulty wire into a different jack and attempt to make calls to verify that the wire is indeed faulty.)	If the calls still do not go through, contact the equipment supplier.
6. Faulty network interface line adapter.	Replace the network interface's line adapter with another one. Plug the basic telephone into each of the jacks, and try to place an outside call If the trouble does not appear on the basic telephone, the old line adapter is faulty. Replace it with a new line adapter.	If the trouble still appears on the basic telephone, the outside lines are faulty. Report the trouble to the local telephone company representative.

**CALLER CAN'T HEAR
PERSON
ANSWERING**

*Symptom: The person placing a call from the MERLIN
II system, doesn't hear the person answering.*

Possible Cause	Possible Solution	To Investigate Further
The Dialing Timeout interval is too long.	**Step 1.** Check Form 1a System Form-Incoming Lines or the System Confuration Form to determine if the outside lines are configured for rotary operation.	If the lines are rotary, the Dialing Timeout interval is too long. (Go to Step 2. If the lines are not rotary, the voice terminal is faulty. Contact the equipment supplier.
	Step 2. Follow the instructions for "Dialing Timeout Interval for Rotary Lines" on page 3-81 for a Display Console or page 3-100 for a BIS-34D Console. Reset the interval to the next shorter time.	If the trouble persists after you have reset the interval, set the delay interval to 12 seconds, and contact the equipment supplier for assistance.

PERSON CALLED *Symptom: A person called with the voice*
CAN'T HEAR CALLER *announcement to idle voice terminal procedure cannot*
hear the caller.

Possible Cause	Possible Solution	To Investigate Further
Misadministration of the membrane button set.	Check to see if the membrane button set is administered as a BIS/HFAI voice terminal. If the set is administered as a BIS/HFAI set, the call is coming in on voice 1 path while the speaker is on voice 2 path. That means the person called hears a tone, but does not hear the caller after lifting the handset. Because the set can handle only one feature decide whether the set should be replaced by a BIS/HFAI set or whether it should be readministered to handle the voice announcement to idle voice terminal feature, and administer accordingly. Refer to "'Identifying Analog Voice Terminal Type'" on page 3-41 for instructions.	

**CALLS ON HOLD
DISCONNECTED**

Symptom: Calls waiting on hold are frequently disconnected.

Possible Cause	Possible Solution	To Investigate Further
The hold disconnect interval for the MERLIN II system is shorter than the interval at the local telephone company's central office.	Follow the instructions for the "Hold Disconnect Interval" feature on page 3-85 for Display Console administration or page 3-103 for BIS-34D Console administration to set the hold disconnect interval to "long" (450 milliseconds). If calls on hold are no longer disconnected you have corrected the problem.	If calls on hold are still disconnects, contact the equipment supplier for assistance.

**CALLS ARE CUT OFF
OR DROPPED**   *Symptom: Calls to voice terminals connected to 408
or 008 modules are cutoff or dropped.*

Possible Cause	Possible Solution	To Investigate Further
Too many Off-Premises Telephone Interfaces (OPTIs), Basic Telephone and Modem Intererfaces (BTMIs), or Basic Telephone and Modern Interface 2s (BTMI-2s) are connected to the module.	**Step 1** Check the number of voice terminal connections to the module. Make sure that no more than four OPTIs, BTMIs, or BTMI-2s are connected to the module. No more than two should be connected to the upper set of four jacks, and no more than two should be connected to the lower set of four jacks. If the trouble no longer occurs you have corrected the trouble.	If the trouble still occurs. the module is still overloaded. Go to Step 2.
	Step 2 Check the type of voice terminals connected to the module. If the remaining ports are assigned to voice terminals that use two unit loads each, overloads may still occur. Switch some of the voice terminals to other modules or power each accessory externally with an auxiliary 48-volt dc power supply. If the trouble no longer occurs, you have corrected the trouble.	If the trouble still occurs, go to "General Tests" at the end of this section before calling the equipment supplier.

PHONE DOESN'T RING

Symptom: A voice terminal doesn't ring.

Possible Cause	Possible Solution	To Investigate Further
1. The volume control switch setting is too low.	Check the volume control setting on the voice terminal. Slide the switch to a higher" setting.	If the trouble persists, go to Possible Cause 2.
2. The voice terminal is programmed not to ring.	Refer to "Ringing Options" on page 3-114 to learn how to determine if the voice terminal is programmed not to ring. If the voice terminal is programmed not to ring. change the ringing option by following the "Ringing options" procedure.	If the voice terminal is programmed to ring, go to Possible Cause 3.

Possible Cause	Possible Solution	To Investigate Further
3. The Do Not Disturb feature is activated.	**Step 1.** Look at the light next to a Do Not Disturb button. If the green light is on, touch the button to deactivate the feature.	If the green light is off, or there is no button labeled Do Not Disturb, or the Do Not Disturb button has no light Go to Step 2.
	Step 2 Do Not Disturb may be programmed on a mislabeled or unlabeled button, or on a button without lights. To see if the feature is programmed, follow these steps: **1** Enter program mode by sliding the T/P switch to **P** **2** Touch Intercom Ring **3** Dial ✶ 71 from the dial p a d **4** Look at the lights beside **Intercom Ring** If the red and green lights next to **Intercom Ring** are on, or just the red light is on, the feature is programmed. Program Do Not Disturb on a button with lights. This will remove the feature from its present position. Touch the button to deactivate the feature m its new position. Relabel buttons accordingly. Then slide the T/P switch to the center position	If the red and green lights next to **Intercom Ring** are both off, refer to the symptom, "Lights. Speaker, Ringing Problems"

PHONE CONSTANTLY RINGS

Symptom: There is trouble with voice terminal lights, speaker, and/or ringing.

Possible Cause	Possible Solution	To Investigate Further
1. The T/P switch on an analog voice terminal is not set in the center position.	Check the position of the T/P switch. If it is set to either *T* or *P,* slide it to the center position. (the ringing should stop).	If the T/P switch is in the center position and the ringing continues, either the system administrtior has placed the voice terminal in programming mode, or the voice terminal is faulty. See Possible Cause 3.
2. A digital voice terminal is in programming mode.	Dial #00, the code to remove a digital voice terminal from programming mode. If the voice terminal is silent, you have corrected the problem.	If the voice terminal continues to ring, either the system administrator has placed the voice terminal in programming mode or the voice terminal is faulty. Go to Possible Cause 3.
3. The system is in administration mode and the voice terminal is placed in programming mode.	Check whether the system administrator has put the voice terminal into Programming mode. If the system is in administration mode and the voice terminal is in programming mode wait until programming is finished to see if the ringing continues. If the ringing stops when the voice terminal is not being programmed by the attendant and the T/P switch is in center position, the voice terminal is working properly.	If the ringing continues when the voice terminal is not being programmed and the T/P switch is in center position go to "General Tests" at the end of this section before calling the equipment supplier.

LIGHTS, SPEAKER, RINGING PROBLEMS

Symptom: There is trouble with voice terminal lights, speaker, and/or ringing.

Possible Cause	Possible Solution	To Investigate Further
1. A faulty control unit or Power Supply Module.	**Analog set:** Slide the T/P switch on the left side of the voice terminal to the *T* position and hold it there if necessary. If all the red and green lights flash alternately and a tone sounds continually, the analog set is working properly.	Go to Possible Cause 3.
	Digital set with data stand: Turn the voice terminal over and press the recessed Self-Test button on the data stand with a pointed object such as a straightened paper clip. If the lights come on but do not flash. The digital set is working properly.	Go to Possible Cause 3.
	If some (but not all) of the lights flash continually and/or a tone sounds at irregular intervals, the trouble is caused by the voice terminal or the cable connection.	Go to Possible Cause 2.
	If all lights are off and a tone sounds continually or irregularly the trouble is caused by the control unit, the voice terminal, or the cable connection.	Go to Possible Case 2.
	(continued)	

Possible Cause	Possible Solution	To Investigate Further
1. A faulty control unit or Power Supply Module *(Continued).*	If the lights are dim when testing an analog set look for a faulty control unit or Power Supply Module. You may need an auxiliary power supply. If the lights are dim when testing a digital set with a data stand, the trouble is its power supply.	Contact the equipment supplier for assistance.
2. A faulty voice terminal.	Use these steps to try to correct the problem: **1** Unplug the modular voice terminal cord from the malfunctioning voice terminal. **2** Plug the cord into a working voice terminal of the same type (either analog or digital). **3** On an analog set slide its T/P switch to the *T* position and hold it there if necessary. or On a digital set with a data stand, turn the unit over and press the recessed Self-Test button with a pointed object such as a straightened paper clip. *(Continued)*	

Possible Cause	Possible Solution	To Investigate Further
2. A faulty voice terminal *(Continued).*	If some (but not all) of the lights flash Continually and/or a tone sounds at irregular intervals *or* If all lights are off and a tone sounds continually or irregularly, the original malfunctioning voice terminal probably is not faulty. The trouble is either in the control unit or the cables.	Plug the original malfunctioning voice terminal into its original jack and go to Possible Cause 3.
	If on the analog set, all the red and green lights flash alternately and a tone sounds continually, or If on the digital set, the lights come on but do not flash, the original malfunctioning voice terminal is faulty.	Contact the equipment supplier for assistance.

Possible Cause	Possible Solution	To Investigate Further
3. Faulty cable connection.	**Step 1.** Go to the control unit and locate the intercom jacks for the malfunctioning voice terminal and for a working voice terminal of the same type (analog or digital). Unplug both from the control unit and replug the working voice terminal into the malfunctioning voice terminal jack. See if the trouble occurs on the working voice terminal.	If the trouble still occurs, the trouble is in the control unit. Call the equipment supplier for assistance.
	If the trouble no longer occurs, the trouble is caused by one of the cables running to the malfunctioning voice terminal.	Go to Step 2.
	Step 2. Replace each cable of the wiring run to the malfunctioning voice terminal one at a time, and test the malfunctioninig voice terminal after each cable is replaced. If the trouble still occurs the replaced cable is not the faulty one. Replace the next cable.	
	If the trouble no longer occurs, you've found the faulty cable and corrected the problem.	

NO LIGHTS OR DIAL TONE

Symptom: All voice terminals are without lights or dial tone.

Possible Cause	Possible Solution	To Investigate Further
1. The control unit is not receiving power.	Follow the instructions under "Restarting the Control Unit" on page 4-55. If the green *power light is on* and the trouble is gone, the problem was corrected when you reset the control unit.	If the green power light on the control unit is on and the trouble remains, call the equipment supplier for assistance. If the green power light is off, go to Possible Cause 2.
2. The power outlet is controlled by a wall switch.	Make sure the control unit is not plugged into an outlet controlled by a wall switch. If the control unit is plugged into a switch-controlled outlet and the switch is turned off, power off the MERLIN II system and move the plug to another outlet See "Power to the System'" on page 2-90 to turn the power off.	If the control unit is not plugged into a switch-controlled outlet go to Possible Cause 3.
3. Faulty power outlet.	Test the outlet by plugging in an appliance such as a lamp or a calculator. If the appliance doesn't work the outlet is faulty. Have it repaired by an electrician.	If the appliance works, the problem is caused by the control unit Call the equipment supplier.

LINE BUTTON LIGHT SHOWS FALSE STATUS

Symptom: A caller waiting on hold hangs up, but the light next to that line button on voice terminals in the system continues to flash as if the call were still on hold.

Possible Cause	Possible Solution	To Investigate Further
The hold disconnect internaI for the MERLIN II system is longer than the interval at the local telephone company's central office.	Follow the instructions for the "Hold Disconnect Interval" feature on page 3-85 for Display Console administration or page 3-103 for BIS-34D console administration. Set the hold disconnect interval to "'short" (50 milliseconds). If the light next to the line button no longer flashes after a caller has hung up, you have corrected the problem.	If the light continues to flash after a Caller has hung Up, contact the equipment supplier for assistance.

**BIS-34 LIGHTS DON'T
GO OFF**

Symptom: When a call is terminated at a BIS-34 Voice terminal, the line button lights do not go off.

Possible Cause	Possible Solution	To Investigate Further
Misadministration of the BIS/HFAI voice terminal.	Check to see if the BIS-34 voice terminal has been administered as a membrane button set. If it has, readminister the set to remove the membrane button administration (Refer to "Identifying Analog Voice Terminal Type" on page 3-41 for instructions.)	

**HFAI-10 LIGHTS
DON'T TURN ON**

Symptom: When a call is answered at a HFAI-10 voice terminal, the lights do not turn on.

Possible Cause	Possible Solution	To Investigate Further
Misadministration of the BIS/HFAI voice terminal.	Check to see if the HFAI-10 voice terminal has been administered as a membrane button set. If it has, readminister the set to remove the membrane button administration. (Refer to "'Identifying Analog Voice Terminal Type"' on page 3-41 for instructions.)	

PROGRAMMED FEATURE DOESN'T WORK

Symptom: A feature programmed on a voice terminal doesn't work.

Possible Cause	Possible Solution	To Investigate Further
1. The feature was programmed incorrectly or changed.	Turn to the programming instructions for the feature in the "Reference" section of the *MERLIN II. System Manual* Reprogram the feature on the voice terminal. If the feature works, you have corrected the problem.	If the feature is programmed correctly and it still doesn't work, go to Possible Cause 2.
2. A faulty control unit or voice terminal.	**Step 1.** program the feature on another voice terminal of the same type (either analog or digital) connected to the system at another station jack and try to use the feature.	If the feature works correctly, the problem is either the voice terminal on which the feature did not work or the control unit. Go to step 2. If the feature still doesn't work the problem is in the control unit Contact your equipment supplier for assistance.
	Step 2. Replace the first voice terminal at its station jack with a voice terminal of the same type (either analog or digital) known to be working correctly. If the feature works correctly, the first voice terminal is defective. Replace it.	If the feature still doesn't work the problem is in the control unit Contact the equipment supplier for assistance.

MODULE DOESN'T WORK

Symptom: A module doesn't work properly in a slot.

Possible Cause	Possible Solution	To Investigate Further
1. The module needs to be cleared of previous administration.	To correct this problem, it is preferable LO have a printer to check previous administration. **If you have a printer:** Enter administration mode and dial #905. The printout shows what type of module the operating system is expecting. If the module is not administered correctly for the system, follow instructions under "Renumbering After Replacing or Adding Modules" on page 3-63 to renumber the system.	If the module is correctly administered for the system and it still doesn't work go to Possible Cause 2.
	If you don't have a printer to check previous administration: Follow instructions under "Renumbering After Replacing or Adding Modules'" on page 3-63 to renumber the system. Note that by doing so you will lose all previous administration. If the module works, you have corrected the problem. Check your administration forms and readminister the system.	If the module is correctly administered for the system and it still doesn't work go to Possible Cause 2

Possible Cause	Possible Solution	To Investigate Further
2. The module contacts are dirty.	**If a Release 3 system:** Refer to the instructions under "On-Line Module Swap" on page 4-7 to remove and reinsert the module without powering down the system. This action automatically cleans the contacts. If the module works, you have corrected the problem.	If the module doesn't work. go to "General Tests" on page 4-55 before calling the equipment supplier.
	If an FM1 or FM2 system: Refer to the instructions under "Module Installation" on page 2-62 to power down the system and remove and reinsert the module. This action automatically cleans the contacts. Then power up the system. NOTE: Do not power up the system before the module is in place; this will cause changes in system administration. If the module works, you have corrected the problem.	If the module doesn't work, go to "General Tests" on page 4-55 before calling the equipment supplier.

**CHANGED
INTERCOM
NUMBERS OR
FEATURES**

*Symptom: Intercom numbers have changed or
features assigned to a person's station have changed.*

Either of these conditions can occur when a system has
been readministered and the wires to the stations affected
have not been connected to the jacks that reflect the latest
administration.

Possible Cause	Possible Solution	To Investigate Further
1 The station is not connected to the correct jack.	Check that station wiring is connected to the correct jack.	
	If the connections are incorrect plug the wires into the jacks as intended by the current administration.	
	If the connections are correct, check the positions and numbering of the modules on the carrier. If the modules are not placed in the correct order or the intercom numbers do not reflect current administration, turn the power off, place the modules in their correct order, and renumber the intercom numbers to reflect current administration. Check your administration forms and readminister the affected stations.	
	If modules are in their correct positions, numbered appropriately, and connected to the correct stations, verify your planning forms.	If the planning forms are correct go to "General Tests" on page 4-55 before calling the equipment supplier.

**RECALL BUTTON
DOESN'T WORK**

*Symptom: When you touch the Recall button or
access the Recall feature, nothing happens.*

Possible Cause	Possible Solution	To Investigate Further
1. Your system has Automatic Route Selection (ARS).	Ask the system administrator if the system has ARS. If the system has ARS, the Recall button or feature can't be used.	If the system does not have ARS, go to Possible Cause 2.
2. The Recall Timer Interval is too short.	Follow the instructions for "Recall Timer Interval" on page 3-90 for Display Console administration or 3-106 for BIS-34D Console administration. Increase the Recall Timer Interval to 650 milliseconds or one second If the Recall feature works, you have corrected the problem.	If the Recall feature still does not work, set the system back to the default setting of 450 milliseconds and contact the equipment Supplier for assistance.

RECALL
DISCONNECTS
LINE WHEN
BEHIND SWITCH

Symptom: When using a MERLIN II system behind another switching system, such as a PBX, the outside line disconnects when you touch Recall or access the Recall feature (in place of a switchhook flash)

Possible Cause	Possible Solution	To Investigate Further
The Recall Timer Interval is too long.	Follow the instructions for "Recall Timer lnterval" on page 3-90 for Display Console administration or 3-106 for BIS-34D Console administration. Shorten the Recall Timer Interval to 350 or 450 milliseconds. If accessing Recall no longer causes the outside line to disconnet you have corrected the problem.	If accessing Recall still causes the outside line to disconnect set the interval to the default setting of 450 milliseconds and contact the equipment supplier for assistance.

SYSTEM LOOSES ITS MEMORY DUE TO A POWER FAILURE

Symptom: All programmed features don't work after a power failure.

Possible Cause	Possible Solution	To Investigate Further
1. The blue shorting plug in the Processor Module that is used in dumping the memory has been placed incorrectly over the pins.	Use these steps to try and correct the problem: 1 Follow the instructions under "Module Installation" on page 2-62 to power down the system. 2 Remove the Processor Module from the basic carrier, then remove the Feature Module from the Processor Module 3 Lay the Processor Module on a flat surface with the front facing you and the side with the Feature Module cavity up. 4 Look under the cover in the back right-hand corner of the Feature Module cavity. Make sure the blue shorting plug is over both pins. 5 Reinstall the Feature and Processor modules. 6 Power up the system If system features work you have corrected the problem.	If system features do not work go to "General Tests" on page 4-55.

General Tests

If you are experiencing a problem not described in the previous tests, or if none of the tests reveaI a specific problem, try the following procedures before calling the equipment supplier.

RESTARTING THE CONTROL UNIT

If the portion of the memory that maintains administration and station programming has been corrupted, the system may act abnormally. Restarting the control unit restores this part of the memory, which may solve the problem. (Restating the control unit does *not* erase administration or programmmg.)

There are two ways to restart the control unit. One is through an administration procedure, the other is through the control unit hardware.

Administrative Restart

To restart the system using an administrative procedure, dial a restart code by following these steps:

1 Slide the T/P switch on the administrator/attendant console to *P.*

2 Touch Conference twice.

3 Choose the appropriate step for your console:

> On a MERLIN II System Display Console, touch [System] , [Restart] .

> On a BIS-34D Display Console, touch Message and dial #200.

NOTE: When you restart the control unit by dialing a restart code, the Auto Answer-Intercom, Coverage Inhibit, Do Not Disturb, and Privacy features may get turned off, even though they are still programmed. To turn them back on, touch the button associated with the feature.

Hardware Restart

To restart the control unit, remove and restore its power by following these steps:

1 Turn the power off at the Power Supply Module on the basic carrier.

2 If there is an Auxiliary Power Unit, turn the power off.

3 If there is an expansion carrier, turn the power off.

4 Turn the power on at the expansion carrier.

5 Turn the power on at the Auxiliary Power Unit.

6 Turn the power on at the Power Supply Module on the basic carrier.

The green power light on the Power Supply Module(s) should turn on. If the trouble remains after you have recycled the power, contact the equipment supplier for assistance.

TESTING OUTSIDE LINES

In order to operate properly, the system must receive toll-quality dial tones at the network interface. To perform this test use a basic rotary telephone, a Touch-Tone telephone with a modular cord, or a telephone with clip-on leads.

> **CAUTION:** Do not use a MERLIN II system voice terminal for this test. It will not test for dial tones and may be damaged.

At the network interface associated with the outside line from which you cannot make a call, choose the appropriate procedure from among those that follow.

Testing a Single-Line Network Interface

Plug the telephone's modular cord into the network interface and listen for a dial tone.

- If a dial tone is present, the trouble is in the control unit or the wiring.

- If no dial tone is present, have the local telephone company check the line and the network interface.

Testing a Two-Line Network Interface with an Adapter

Plug the telephone's modular cord into the network interface and listen for a dial tone.

- If a dial tone is present the trouble is in the control unit or the wiring.

- If no dial tone is present, replace the adapter. If there is still no dial tone, have the local telephone company check the line and the network interface.

Testing a 66-Type Block

Use a telephone that has clip leads and test each outside line for a dial tone. Make sure to remove the bridging clip from the block to isolate the outside line from the MERLIN II system.

- If a dial tone is present on some lines and not on others, check the wiring for damage or broken connections.

- If a dial tone is present on all lines, check the wiring to the control unit.

- If no dial tones are present, have the local telephone company check the lines and the network interface.

Section 5: Ordering Information

Ordering Information

PRODUCT LISTING

This section contains a comprehensive listing of all MERLIN II system components and accessories. All products listed are compatible with all releases of the MERLIN II system unless otherwise noted.

ORDERING INFORMATION

AT&T Service technicians can order most products as price element items through DOSS. However, some products (e.g., 5-button voice terminals) are *only* available as maintenance items. These items are not ordered through DOSS, but through the Material Stocking Locations (MSL) using their apparatus code rather than the Price Element Code (PEC). Detailed descriptions of most MERLIN II system components are found in Section 2, "Installation."

MERLIIN II system customers can order components through the *AT&T Source Book.* If the products are not available through the Source Book, customers can order them through the National Parts Sales Center (NPSC) by calling 1 -800-222-PART.

TABLE 5-1 Products: Control Unit

Description	Comcode	Apparatus Code	PEC Code
Attendant MERLIN II	405-992-538	ATTENDANT	61375
Basic Carrier	103-983-664	403A	613-CU1
Circuit Pack Module 8-Digital Station (008D)	103-983-557	517A8	61386
Circuit Pack Module 8-Line (800)	105-351-100	517B4	61384
Circuit Pack Module 8-Voice Terminal (008)	103-983-508	517A3	61385

TABLE 5-I Products: Control Unit *(continued)*

Description	Comcode	Apparatus Code	PEC Code
Circuit Pack Module 4-Line, 8-Voice Terminal (408)	105-351-076	517B1	61382
Circuit Pack Module, 4-Line with Touch-Tone Receivers (400 w/TTR)	105-408-892	517B12	61383
Circuit Pack Module 12-Basic Telephone (012)	105-512-412	517C13	61387
Feature Module 1 (FM1)	103-983-532	517A6	61380
Feature Module 1 w/CMS (FM1)	105-396-279	517B6	61380
Feature Module 2 w/CMS (FM2)	105-442-586	517D6	61381
Feature Module 3 (R3)	105-442-651	517F6	61378
Expansion Carrier (403B)	103-985-222	403B	61390
Kit of Parts (Release 1)	105-299-747	D-181726	N/A
Kit of Parts (Release 2)	105-486-252	D-182041	N/A
Music Coupler	405-476452	KS23395-L2	61398
Power Supply	104-380-365	391A	None
Processor Module (A7)	103-983-540	517A7	None
Processor Module (B7)	105-408-843	51737	None
Ring Generator Unit	105-213-201	129B	61388
Tie Line Module (400EM) (R3	105-311-401	517A14	8303-200

TABLE 5-2 Products: Voice Terminals and Accessories

Description	Comcode	Apparatus code	PEC Code
Voice Terminals			
5-Button	105-217-426	Z7302H01C-003	3160-111
10-Button	105-217-509	Z303H01D003	3161-172
10-Button HFAI	105-371-942	Z7309H01C-003	3161-161
BIS-10	105-161-061	7313H01A-003	3165-10B
BIS-22	105-188-809	7314H01A-003	3166-228
BIS-22D (with Display)	105-630-420	7315H01B-003	3166-DSB
BIS-34	105-309-074	7317H01A-003	3167-MB
BIS-34D (with Display)	105-167-027	7317HOlA-003	3167-DSB
34-Button Deluxe	105-217-715	Z7305H02D-003	3162-417
34-Button Speakerphone with Display unit	103-981-981	Z7305H04C	3162-DIS
34-Button Speakerphone	103-981-965	Z7305H03C-003	3162-BIS
Display Console	105-229-744	7318H01A	61392
Multiline 5-Button Cordless	105-515-332	7312H0lA	3168-MLC

TABLE 5-2 Products: Voice Terminals and Accessories *(continued)*

Description	Comcode	Apparatus Code	PEC Code
Desk Stands and Wall Mounts			
Adjustable Desk Stand, 10-Button VT	103-746-855	11A	32002
Adjustable Desk Stand, 34-Button VT	103-746-863	11C	32003
Fixed Desk Stand, 5-& 10-Button VT	103-746-848	10A	32004
Desk Stand/Wall Mount 14A, BIS-10	103-804-290	14A-003	N/A
Desk Stand/Wall Mount 14B, BIS-22	845-455-328	14B-003	N/A
Desk Stand/Wall Mount 14C, BIS-34	103-979-837	14C-003	N/A

Fixed Desk Stand and Wall Mount
    5-Button VT
    Kit of Parts
	103-804-290
	103-995-882
		14A
		D-181230
			32000
			32000

Wall Mount 10-Button VT Kit of Parts	103-747-846 103-995-882	201A D-181230	32001
Wall Mount 34-Button VT Kit of Parts	103-747-853 103-995-882	203A D-181230	32006
Faceplates			
BIS-10	105-203-186	D-18152	N/A
BIS-22	105-336-960	D-181786	N/A
BIS-22D	105-690-762	D-082210	N/A
BIS-34	105-203-194	D-181583	N/A
BIS-34D	105-336-956	D-181583	N/A

TABLE 5-2 Products: Voice Terminals and Accessories (continued)

Description	Comcode	Apparatus Code	PEC Code
Button Label Sheets			
10-Button BIS VT	105-336-978	D-181785	N/A
22-Button BIS VT	105-336-960	D-181784	N/A
22-Button BIS VT with Display	105-690-770	D-182211	N/A
34-Button BIS VT	105-336-956	D-181783	N/A
Display Console (**FM1**) (includes one Faceplate)	105-299-754	D-181727	N/A
Display Console (**FM2 & R3**) (includes one Faceplate)	105-486252	D-182041	N/A

TABLE 5-3 Products: System Accessories

Description	Comcode	Apparatus Code	PEC Code
2-Line Adapter	103-715-652	267C	61400
AC Surge Protector	105-327-647	145A	None
Acoustic Coupler Adapter	104-010-061	349A	31710
Auxiliary Power Unit	103-806-998	335A	61216
Basic Telephone Modem Interface 2 **(FM2 & R3 only)**	105470-355	113A	2301-BTIA
Basic Telephone Modem Interface **(FM 1)**	103-971479	102A	2301-BTI
CO Line Protector		46A	None
Call Accounting Terminal, Business			
Call Accounting Terminal, Hospitality			
Display Unit, 34-Button Speakerphone VT	105-400-030	D-181782	N/A
ESD Suppression Kit, D-181574	105-179-329	D-181574	Craft
ESD Suppression Kit, D-181589	105-201-891	D-181589	Craft
ESD Suppression Kit, D-181590	105-201-909	D-181590	Craft
ESD Suppression Kit, D-181591	105-201-917	D-181591	Craft
ESD Suppression Kit, D-181593	105-201-933	D-181593	Craft
EMI Filter		Z200A	None
Extra Alert Bell	403-349-962	KS23053L1	61212

Table 5-3 Products: System Accessories *(continued)*

Description	Comcode	Apparatus Code	PEC Code
Extra Alert Deluxe Chime	403-762-826	CHM-CH-BT2-B-1	6 1 2 2 2
Extra Alert Deluxe Horn	403-764-053	HORN E SET 4S	6 1 2 2 3
Extra Alert Horn	403-349-970	KS23053L2	6 1 2 1 3
Extra Alert Strobe	403-319-197	STROB SCOD	6 1 2 2 1
General Purpose Adapter (GPA)	103-977-997	ZlC	2301-GPA
Hands-Free Unit (HFU)	103-953-790	S102A-185	31730
Headset Adapter	103-943-213	502A	3164-HFA
Headset Adapter	105-471-304	502B	62524
* In-Range, Out-of-Budding VT and Protectors	403-865-785	PROT MDL 341	32918
* In-Range, Out-of-Building VT Protector	406-106-583	TII MDL 343	32918
Jack, Customer Installable	103-104-22O	103A	3 2 6 0 1

Line-Powered Ex.-Alert
  E1CM Ringer and Parts
  290A Adapter
  Rings
  Mounting Plate
	
	102-992-252
	102-872-934
	102-988-466
		
		D181233
		290A
		RINGER E1CM-49
		 1049A
			
			6 1 2 1 1
			6 1 2 1 1
			6 1 2 1 1
			6 1 2 1 1

Off Premises Telephone Interface (OPTI)	103-965-653	Z187A1	2302-OPU
Supplemental Alert Adapter	105531-199	856A	2301-SSA
VT Power Supply, 34-Button Deluxe VT	104-214-192	D181282	31641

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* The TII Model 341 IROB has been replaced by the TII Model 343 IROB. The TII Model 343 IROB should be used.

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