

**Lucent Technologies**  
Bell Labs Innovations



Lucent Technologies 555-650-1116

**MERLIN LEGEND**  
Communications System  
Releases 5.0

**Pocket Reference**

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## Release 1.1 Enhancements

Refer to *Release 1.1 Notes* for detailed descriptions of Release 1.1 enhancements. Release 1.1 includes all Release 1.0 functionality plus the enhancements described in the following sections.

### Language Selection

This selection allows you to program the system for the display of prompts, menus, and messages on MLX display telephones in English, French, or Spanish. You can also program the following options in any of these languages, independently of the system language:

- Individual extensions with MLX telephones
- System Programming and Maintenance (SPM)
- System programming reports
- SMDR report headers

MLX-10D®, MLX-20L®, and MLX-28D® display telephones and MLX-10® nondisplay telephones are available in three separate versions, with factory-set buttons in English, Spanish, or French. (The MLX-10DP™ is available in the English version only.) In addition, user and operator guides and telephone tray cards are available in all three languages.

### Programming and Maintenance

Programming and maintenance enhancements include the following:

- Additional Inspect capability in system programming
- Editing capability (Backspace selection) in extension programming
- Improvements to system reports
- An access log that records the last 20 times maintenance or system programming has been accessed
- Longer (20-second) gap between ring cycles for programming mode and Forced Idle tone

### Operational

System operational enhancements include the following:

- Automatic selection of an **SA** button when Conference is invoked (Hybrid/PBX mode)
- Prompting through Conference feature on MLX display telephones
- Relocation of the More prompt on the MLX-20L display
- Display of the number saved on a programmed Last Number Dial or Saved Number Dial button when the button is inspected

### SPM

SPM enhancements include operation in English, French, or Spanish; faster backup and restore; and automatic on-screen display of reports as they are created, with a Browse capability for reading the reports.

### Equipment

Additional equipment includes the 8102 and 8110 analog telephones, four headsets, two headset amplifiers, and a transparent protective cover for the MLX-10 and MLX-10D telephones. The 8102 and 8110 telephones are also compatible with Release 1.0.

## PF Registration

PF registration number AS5USA-65646-PF-E is assigned by the FCC for operating the MERLIN LEGEND® Communications System in Hybrid/PBX mode in the United States. (The PF registration is also applicable to Release 1.0 systems.)

## Release 2.0 Enhancements

Refer to *Release 2.0 Notes* for detailed descriptions of Release 2.0 and later enhancements. Release 2.0 includes all Release 1.1 functionality plus the enhancements listed below.

### Programming

Programming enhancements include the following:

- Extension Copy is a feature that reduces programming time by allowing the use of any extension as a template for programming another extension or block of extensions through centralized telephone programming.
- Integrated Administration provides a single interface through Integrated Solution III (IS III) for programming entries common to the MERLIN LEGEND Communications System and AUDIX Voice Power™.
- Any SPM Version 2.xx (where xx is replaced by numbers) provides a Convert function for use in upgrading the system from Release 1.0 or 1.1. This function converts a backup file from a Release 1.0 or 1.1 system to Release 2.0 and later format, allowing reuse of existing system programming on the upgraded system.
- Forced idle reductions keep system interruptions at a minimum. In general, the smallest necessary component is forced idle during programming activities. For example, renumbering a single extension idles only one extension. Only a few system-wide programming activities, such as setting the system mode and system renumbering, idle the entire system.

### Operational

System operational enhancements include the following:

- Coverage VMS Off is a feature that prevents incoming outside calls from going to voice mail. (All other coverage remains active as programmed.) The feature is programmed extension by extension, either through extension programming or through centralized telephone programming.
- A Night Service group can be programmed to include either extensions or a calling group as members. However, you should not program both individual extensions and a calling group into the Night Service group because individuals will not have a chance to answer before calling group members do.
- When AUDIX Voice Power sends a Leave Message notification to an extension, the system identifies the voice mail system as the sender of the message. When the voice mail subscriber uses the Return Call feature, the call goes to any available voice mail port, not just to the specific port that generated the message. This reduces the chance of getting a busy port.

- Coverage receivers can call coverage senders and have the call receive coverage treatment. If a receiver calls a sender for whom he or she is covering, and the sender is busy or unavailable, the call proceeds to other points of coverage. It does not come back to the receiver who originated the call.
- Enhancements to display prompts include automatic posting of a Do Not Disturb message (for MLX display telephones or other multiline telephones, a Posted Message button must be programmed for the Do Not Disturb message to be posted automatically). When a user activates the Do Not Disturb feature, and confirmation messages when a user activates Hold, Privacy, Saved Number Dial, and Transfer.
- Direct Inward Dialing (DID) trunk emulation on a T1 facility provides up to 24 DID channels on a single DS1 interface, instead of requiring 24 separate physical trunks.
- A telephone user can send a timed flash (switchhook flash) on a loop-start trunk call on a System Access (**SA**) button.

### **Fax Attendant System™**

Fax Attendant is an application for sending and receiving fax messages; its interface is similar to the voice mail interface provided by AUDIX Voice Power. Fax Attendant System, which co-resides with AUDIX Voice Power on the IS III platform, provides the following services:

- **Fax Call Coverage.** Receives and holds messages for subscribers whose fax machines are busy or out of paper. This service also allows a subscriber to have a personal fax number without having a fax machine.
- **Fax Mail.** Allows subscribers to create and use fax distribution lists, send and receive fax messages, and record personal greetings for incoming fax calls.
- **Fax Response.** Prompts callers to select and receive faxes from a customer-created menu of choices, using touch-tone responses.

### **408 GS/LS-MLX Module**

The 408 GS/LS-MLX module (Releases 2.0 and higher only) combines four line/trunk jacks for ground-start or loop-start trunks and eight extension jacks for MLX telephones on a single module in the control unit.

### **Primary Rate Interface (PRI)**

Primary Rate Interface (PRI) enhancements include the following:

- Connectivity to the 5ESS® Generic 6
- Multiple incoming calls to directory number
- Call-by-Call Service Selection
- Password handling for FTS2000
- Extension ID as Calling Party Number for Automatic Number ID (ANI)

## Maintenance

Maintenance enhancements include the following:

- Clear descriptions of module test failures
- Optional printing of hard copy of error logs
- Display that correlates extension numbers to slot/port and logical ID
- Display of the slots, trunks, and extensions that are maintenance busy
- Internal digital switching element (DSE) loopback test for all modules
- B-channel loopback test for MLX modules
- B-channel line or call service states display
- Error log entries for dual-port RAM errors

## Release 2.1 Enhancements

Refer to *Release 2.1 Notes* for detailed descriptions of Release 2.1 enhancements. Release 2.1 includes all Release 2.0 functionality plus the enhancements listed below.

### Operational

System operational enhancements include the following:

- When a call is forwarded to a multiline telephone that has an Auto Dial or DSS button programmed for the forwarding telephone, the green light next to the Auto Dial or DSS button for the forwarding telephone does not flash.
- People answering calls received on **Cover** buttons are allowed to generate touch tones if their telephones are not outward- or toll-restricted.
- Calls received on personal lines with Do Not Disturb on go immediately to coverage instead of waiting for the coverage delay interval.
- A call put on hold at a **Cover** button can be added to a conference by someone who has a personal line for the call.
- A call put on hold at a **Cover** button can be picked up by any person who has a personal line for the call.
- Calls that have been put on hold at a **Cover**, **SA**, **Shared SA**, or **Pool** button can be picked up by a person who has a personal line button for the call.
- An inside call on hold at an **SA** button can be picked up and transferred by any person with a **Shared SA** button corresponding to the button with the held call.
- Calls that are on hold awaiting transfer can be picked up by any user who has a personal line for the call.
- Beginning with Integrated Solution III Version 1.2, the automatic reconciliation program that was run automatically at 3:00 a.m. has been disabled and can be invoked manually from the User Maintenance menu.
- When a telephone is programmed for Forced Account Code Entry, account codes do not have to be entered when using a programmed Loudspeaker Paging button. In addition, an SMDR record is not generated for calls made to paging ports.

- When an MLX telephone, other than an MLX-20L, is plugged into an MLX port and the Personal Directory does not contain any entries, the allocation of the Personal Directory resource is released. If there are any entries in the Personal Directory, the Personal Directory allocation and the entries in the Personal Directory are saved in the MLX port.
- SMDR call records for calls made on PRI facilities are more accurate than SMDR call records for calls made on non-PRI facilities. Outgoing calls made on PRI facilities receive "answer supervision." Consequently, SMDR timing for calls made on PRI facilities begins when the call is answered. Timing for calls made on non-PRI facilities begins when dialing is completed. Therefore, an SMDR call record is not generated when a call made on a PRI facility is not answered at the far end.
- The Call Type field and the Called Number field on the SMDR report have been changed for both the Basic and ISDN report formats.
- An 012 port that is programmed as a *generic* voice messaging interface (VMI) port can transfer an outside call to an outside number.
- In a system where the transfer audible option is programmed for Music On Hold and a music source is provided, outside callers who are transferred to a calling group and are waiting in the queue or who are parked or camped-on hear music while they are waiting. Internal callers never hear music on hold while waiting in the calling group queue or when they are parked, camped-on, or being transferred to another extension.

## Installation and Hardware

Installation and hardware enhancements include the following:

- The control unit covers for the MERLIN LEGEND Communications System are the same easy-to-use covers as those for the MERLIN® II Communications System.
- A new 012 (T/R) module [apparatus code 517G13 (28) or higher letter] contains a built-in ring generator. The maximum ring equivalency number (REN) supported is 2.2, and the module rings four ports at one time. Bridging of single-line telephones is not supported due to poor transmission quality.
- A new 008 OPT module (labeled "with RING GEN.") contains a built-in ring generator. It rings four ports at a time.
- Ferrite cores for the power supply modules are shipped from the factory to comply with FCC Part 15 requirements.
- 3129-WTWA (touch-tone outdoor telephone equipped with cast aluminum housing and armored handset cord with bell ringers)
- 3129-WRWA (rotary-dial outdoor telephone equipped with cast aluminum housing and armored handset cord with bell ringers)
- 3129-WAWA (auto dial outdoor telephone equipped with cast aluminum housing and armored handset cord with bell ringers)
- 3129-WNWA (nondial, automatic ringing on dedicated circuit outdoor telephone equipped with cast aluminum housing and armored handset cord with bell ringers)

## Equipment and Operations

Equipment and operations enhancements include the following:

- A new release (Version 2.16) of the System Programming and Maintenance (SPM) software to support international use.
- Support of PRI connection to DEFINITY® Communications Systems
- MLX-10DP telephone, identical to an MLX-10D, except that it provides a jack for access to the PassageWay™ Solution and PassageWay Direct Connection Solution application.

## Additional Application Packages, Telephones, Adjuncts, and Adapter

Additional application packages, adjuncts, and adapter enhancements include the following:

- A Lucent Technologies Digital Announcer Unit, compatible with all call management systems and tip/ring applications currently available for the MERLIN LEGEND Communications System.
- The HackerTracker™ system software enhancement to the Call Accounting System (CAS) detects abnormal calling activity by allowing monitoring of facilities or authorization code usage.
- A new digital Magic on Hold unit is available in three configurations:
  - Basic Prerecorded Package
  - Personalized Package
  - Custom Production Package
- The MERLIN® Identifier application enables people to receive, store, and use information provided by the local telephone company, specifically, the telephone number of a caller in an area where the service is also supported.
- An Off-Premises Range Extender (OPRE) supports off-premises operation with an off-premises extension capability and extended range operation for tip/ring devices as well as variable gain to improve voice transmission levels.
- PagePac® Plus Loudspeaker Paging Systems do not require system adapters. The controller provides 8 built-in zones (expandable to 56 zones by using up to 3 16-zone expansion units), group zones, talkback, night bell, operator override, tones, door supervision, microphone input, and system access security codes as standard features.
- PassageWay Solution (Release 1.0) software consisting of four applications that run with Microsoft® Windows™ 3.1 or later and provide an interface between an IBM®-compatible personal computer and the MERLIN LEGEND system.
- Four single-line telephones with memory buttons: 710, 715, 725, and 730.
- Four specialty handsets compatible with all MLX telephones and the 3101-series, 3178-NHL, 8102, and 8110 single-line telephones.

## Release 3.0 Enhancements

Release 3.0 includes all Release 2.1 functionality plus the enhancements listed below.

### Equipment

New hardware includes a variety of components. Additional details are included elsewhere in this book.

- CPU modifications include:
  - A processor running at 16 MHz with a 32-bit wide data bus
  - 1.5 Mbytes of non-volatile (battery-backed) RAM
  - 4.0 Mbytes of Flash ROM
  - PCMCIA memory card interface
  - A full-duplex 1200/2400 bps modem
  - Error/Status code display for maintenance support
- An 800 GS/LS-ID line/trunk module delivers the calling party's telephone number to the customer premises (MLX display telephones only) if the service is subscribed to by the customer and if it is supported by the caller's local telephone company.
- Support for:
  - MDC 9000 (6-line, cordless)
  - MDW 9000 (6-line, cordless, wireless)
  - 8101 (single-line telephone, desk or wall-mount, data/fax jack, selectable positive disconnect)
  - 2500YMGL and 2500 MMGL (single-line desk telephones, selectable positive disconnect)
  - Picasso™ Still-Image telephone (for interactive display of still images)
- Videophone 2500 single-line phone with interactive video display
- Pre-fabricated and pre-drilled backboard

### Installation, Upgrade Administration, and Maintenance

These are the new MERLIN LEGEND Communications System capabilities:

- SPM (Release 3.18) conversion of translations from Release 1.0, 1.1, 2.0, and 2.1 to 3.0
- Remote operation at 1200/2400bps
- Advice and feedback administration screens for new Release 3.0 functionality
- PCMCIA Memory Card Interface (a Release 3.0 processor board required) allowing:
  - System software installation
  - System software upgrade
  - 800 GS/LS-ID port module firmware upgrade
  - Integrated backup and restore of translations
    - Automatic and manual options for backup and restore are available on the system. Automatic backup can be scheduled weekly or daily to fit the customer's needs.
- Inter-digit dialing timer values are administratable
- Inspection of Lines/Trunks displays only those lines and trunks configured on system rather than all 80 facilities
- Stations and facilities in Maintenance Busy (both manual and automatic) can be identified by the maintenance monitor

### User Features

## ***Security***

The Remote Access feature allows people at remote locations to enter the system by dialing the number of a line or trunk designated for remote access. The system can be programmed to require the remote user to dial a barrier code (a type of password) after reaching the system. In earlier versions, the system-wide barrier code length is fixed at 4 digits. Release 3.0 allows a system-wide barrier code length ranging from a minimum of 4 digits to a maximum of 11 digits, with a default setting of 7 digits. SMDR records are enhanced to provide information for remote access calls. If the remote access call is received on a facility providing Caller ID information (see below), the SMDR report can help trace the call.

### ***Caller ID***

Caller information (telephone number) is furnished to MLX display telephones by an 800 GS/LS-ID module using the LS (loop-start) option. This allows customers to screen calls prior to answering the phone, as well as providing calling party information for use with various applications. This function is available only when the customer subscribes to caller identification service from the local telephone company, if the telephone company supports that service.

### ***Shared System Access (SSA)***

A telephone may have up to 27 **Shared SA** buttons to expand extension coverage.

### ***Authorization Codes***

The Authorization Code feature allows you to make calls using your calling privileges when you are dialing from an extension other than your own. When you enter your authorization code (ranging from 2 to 11 characters and unique across the system), the privileges and restrictions assigned to your home extension override the current restrictions at the host extension. This includes toll restriction, outward restriction, Facility Restriction Level (FRL), Allowed Lists, Disallowed Lists, Night Service Exclusion List, and Dial Access to Pools. All other functions on the telephone are those of the local telephone, not the home extension.

Authorization codes can also be used for the purposes of call accounting through the SMDR printout. The SMDR account code field can hold the authorization code extension number or the authorization code itself.

### ***Direct Voice Mail***

If your company has voice mail, this feature allows you to dial a co-worker's voice mailbox directly without ringing that person's extension. Direct Voice Mail is especially useful for transferring calls when a co-worker is not available.

## **Additional Features**

The status of Leave Word Calling (LWC) and Privacy are retained across cold starts.

Caller ID (CLASS<sup>SM</sup> ICLID and PRI) are available on primary coverage and return from transfer.

## **Additional Application Packages, Adjuncts, and Adapter Enhancements**

### ***PassageWay™ Direct Connection Solution***

PassageWay Direct Connection Solution (Release 2.0) is a Lucent Technologies computer telephone integrated product that links a desktop Windows PC to the MERLIN LEGEND's MLX-10DP, MLX-16DP, MLX-20L, or MLX-28D telephone. The Windows applications are: Lucent Technologies Call (autodial/contact manager), Lucent technologies Buzz (screen-pop applications), Lucent Technologies Set (station programming interface), and Log Viewer (call log application). PassageWay Direct Connection Solution (Release 2.0) is the version supported on MERLIN LEGEND 3.0.

### ***PagePal***

PagePal connects several Lucent Technologies and other paging systems to the MERLIN LEGEND Communications System. No other system adapter is necessary for loudspeaker paging.

### ***Fax Attendant 2.1.1***

Fax Attendant Release 2.1.1., which co-resides with AUDIX Voice Power on the IS III Release 1.2 platform, provides the same functionality as earlier versions, plus the following enhancements:

- **Personal Fax Messaging.** Inbound faxes can be stored until the subscriber asks that they be printed, at any fax machine he or she specifies, on company premises or off-site (when the subscriber retrieves fax messages remotely).
- **Fax Mail.** Allows subscribers to send fax messages, get fax messages, record personal greetings, and program outcalling.
- **Fax Broadcast.** Provides a simple way to send one fax to as many as 1000 fax numbers.

### ***Call Accounting System (CAS) for Windows***

This standalone version of CAS takes advantage of the easy-to-use graphical environment offered by Microsoft Windows. Through data communications, it also allows one CAS system to serve multiple business sites.

### ***Group Video Conferencing***

Group video conferencing is supported over DS1 (Digital Signal Level 1) facilities with PRI. (Video conferencing has been available since Release 2.0.)

## Release 3.1 Enhancements

Release 3.1 includes all Release 3.0 functionality plus the toll fraud and security enhancements listed below.

### Star Codes

Star codes are dialable codes for services provided by the CO. The user has to contract with the CO to get these codes activated.

With this release, users can now add a star (\*) code to Allowed and Disallowed Lists to help prevent toll fraud. The MERLIN LEGEND system checks if the star codes are allowed. If allowed, the system then checks the remaining dialed digits against the calling restrictions.

As a security enhancement, \*03 requires a technician to enter a maintenance password to access test procedures.

### Second Dial Tone Timer

Users can program a delay period (Second Dial Tone Timer) during which no dialing is allowed. This is useful in cases when the CO sends a second dial tone (such as after a star code); the user may start dialing before getting the second dial tone, creating a risk of toll fraud or misrouted calls. If the timer is programmed and dialing is attempted during the delay, the call is not completed.

### Trunk-to-Trunk Transfer

This feature allows or disallows trunk-to-trunk transfer on a per-station basis. The default setting for all stations is restricted (disallowed).

### Toll Fraud Defaults

This feature changes these default settings:

- No station or remote access user with a barrier code may dial access to any pool.
- Disallowed List 7 contains numbers most commonly abused for toll fraud: 0, 10, 11, 1809, 1700, 1900, 976, 1ppp976 (p=any number or character), \*. Assign this list to extensions as needed.
- VMI ports are maximally restricted. Outward restriction is on and they are assigned to Disallowed List 7.
- FRL settings for VMI ports is 0, for local calls is 2, and for toll calls is 3.

## Release 4.0 Enhancements

Release 4.0 includes all Release 3.1 functionality plus the enhancements listed below.

### System Functionality

The MERLIN LEGEND Communications System functionality is enhanced to include the following:

- An expanded dial plan supporting up to 200 tip/ring devices.
- National ISDN BRI service support for voice and data connectivity to the CO. Data speeds are 14.4 kbps for analog data and up to 64 kbps for digital data. Release 4.0 supports the IOC Package "S" and Multiline Hunt service configurations.

- Certified 2B-data video/data applications that connect to MLX ports and use NI-1 BRI, PRI, or T1 Switched 56 network interfaces to make outside connections.

**NOTE:**

The 008 MLX and 408 MLX modules must have firmware vintage other than 29. An earlier or later vintage firmware is supported.

- The use of T1 facilities for digital data transmission of up to 56 kbps per T1 channel.

## Equipment

New hardware includes two new modules. They are:

- An 016 module supporting 16 tip/ring devices and four TTR's. All 16 ports can ring simultaneously. The module's ringing frequency (default 20 Hz) can be changed through programming to 25 Hz for those locations that require it.
- An 800 NI-BRI module supporting high-speed data and video transmission.

## Maintenance Support

The R4.0 software includes a Provisioning Test tool that technicians can use to verify the operational status of installed NI-1 BRI lines.

## User Features

### *Product Enhancements*

The following enhancements are added:

- **Delay Call Forwarding.** Each user can program a Forwarding Delay setting for calls that are forwarded using Forward, Remote Call Forwarding, or Follow Me. The forwarding delay is the number of times a call rings at the forwarding extension before the call is sent to the receiver. During the delay, the user may screen calls by checking the displayed calling number (if it is available). The delay can be set at 0 to 9 rings. The factory setting for Forwarding Delay is 0 rings (no delay).
- **Voice Announce on the QCC.** The QCC operator can use the fifth **Call** Button to announce a call on another user's speakerphone if the destination telephone has a Voice Announce-capable **SA** button available. QCCs cannot receive Voice Announce calls; they are received as ringing calls. The factory setting for the fifth **Call** button is Voice Announce disabled.
- **Timebased option for overflow on Calling Group.** If the Overflow Threshold Time is set to a value between 1–900 seconds, calls that remain in the Calling Group Queue for the set time are sent to the Overflow Receiver. This is in addition to the *number* of calls that are in the Queue (previously, the only way to send calls to the Overflow Receiver). If the Overflow Threshold Time is set to 0, Overflow by time is off. The factory-set time limit is 0 (overflow by time is off).

### ■ **Downloadable Firmware for 016 T/R board and the NI-BRI board.**

The PCMCIA technology introduced in Release 3.0 continues to support these two new boards in Release 4.0 for installation and upgrade. A Release 3.0 or later processor is required for PCMCIA technology.

### **Single-Line Telephone Enhancements**

The following enhancements are added to the single-line telephones:

- **Disable Transfer.** Through centralized programming, the system manager can disable the ability to transfer calls by removing all but one **SA** or **ICOM** button from the telephone.
- **No Transfer Return.** When a handset bounces in its cradle, the MERLIN LEGEND system interprets this as a switchhook flash and attempts to transfer a call. This causes unintended ringing at the user's phone. In Release 4.0, a flash followed by an on-hook state when a dial tone is present causes the call to be disconnected.
- **Forward Disconnect.** All ports on 012 and 016 modules now send forward disconnect to all devices connected to them when forward disconnect is received from the CO. This is a non-administrable operation.

### **System Security**

Greater system security is achieved by requiring a 7-digit maintenance password when using SPM to perform remote administration via the Remote Access Feature.

### **Release 4.1 Enhancements**

Release 4.1 includes all Release 4.0 functionality plus the enhancements listed below. There are no hardware changes in Release 4.1.

#### ■ **Coverage Timers Programmed for Individual Extensions**

Beginning with Release 4.1, coverage timers, which control the duration of the delay before calls are sent to each level of coverage, are changed as follows:

- The Group Coverage Ring Delay (1–9 rings) is programmed on individual extensions and replaces the Coverage Delay Interval programmed system-wide in previous releases.
- The Primary Cover Ring Delay (1–6 rings) and Secondary Cover Ring Delay (1–6 rings) programmed on individual extensions replace the Delay Ring Interval programmed system-wide in previous releases.

These enhancements allow the system manager to customize coverage call delivery to match individual extensions' call-handling requirements.

## ■ **Night Service Coverage Control**

Beginning with Release 4.1, a system manager can enable the Night Service Coverage Control option to automatically control the status of telephones programmed with Coverage VMS (Voice Mail System) Off buttons according to Night Service status.

When Coverage Control is enabled and the MERLIN LEGEND Communications System is put into Night Service, all programmed Coverage VMS Off buttons are automatically turned off (LED is unlit) and all eligible outside calls are sent to the assigned voice messaging system calling group with normal ringing delay. When Night Service is deactivated during the day, all programmed Coverage VMS Off buttons are automatically turned on (LED is lit) and voice mail coverage is disabled for outside calls.

Users can override the Coverage VMS Off button status at any time by pressing the programmed Coverage VMS Off button to turn the LED on or off.

## ■ **Night Service Group Line Assignment**

Beginning with Release 4.1, a system manager can assign lines to Night Service groups to control handling of after-hours calls received on individual lines. This capability replaces the automatic assignment to Night Service groups of only those lines that ring on the Night Service operator console. An outside line must be assigned to a Night Service group to receive Night Service treatment.

With this enhancement, Night Service can be activated and deactivated on lines that do not appear on operator consoles (for example, personal lines), and lines appearing at operator positions can be excluded from Night Service.

## ■ **Forward on Busy**

Beginning with Release 4.1, the Forward, Follow Me, and Remote Call Forward features are enhanced to remove the requirement that a call must be ringing at an extension before it can be forwarded. With the Forward on Busy enhancement, a call to an extension with no available **SA** (System Access) or **ICOM** (Intercom) buttons is forwarded immediately to the programmed destination, preventing the caller from hearing a busy signal from the intended call recipient's extension.

## ■ **Maintenance Testing for BRI Facilities That Are Part of Multiline Hunt Groups (MLHGs)**

Beginning with Release 4.1, the NI-1 BRI (National Integrated Services Digital Network-1 Basic Rate Interface) Provisioning Test Tool is enhanced to include testing for BRI facilities that are part of Multiline Hunt Groups (MLHGs).

The NI-1 BRI Provisioning Test Tool is used by Lucent Technologies maintenance personnel on MERLIN LEGEND Communications Systems that include a 800 NI-BRI module. Technicians use the tool during system installation and maintenance to test the functionality of the BRI lines and report analyzed results.

## Release 4.2 Enhancements

Release 4.2 includes all Release 4.1 functionality plus the enhancements listed below. There are no hardware changes or Release 4.2.

### ■ **Additional Network Switch interface and Services Options for ISDN Primary Rate Interface (PRI)**

Release 4.2 of the system supports connectivity to MCI® or local exchange carrier (LEC) PRI services and to the following central office switch types (in addition to the 4ESS and 5ESS switch types that are currently available for AT&T Switched Network Services):

- Nortel® DMS™-100 Generic BCS 36 for local exchange carrier services
- Nortel DMS-250 Generic MC107 serving the MCI network
- Digital Switch Corporation DEX600E Generic 500-39.30 serving the MCI network

Beginning with Release 4.2, the following MCI PRI and local exchange carrier (LEC) PRI services (along with the AT&T Switched Network Services) can be provided to users of the MERLIN LEGEND Communications System:

- MCI Toll Services for DMS-250 or DEX600E switch type:
  - MCI Prism® service for domestic outgoing long-distance and international voice calls; for domestic outgoing 56-kbps restricted, 64-kbps unrestricted, and 64-kbps restricted circuit-switched data calls
  - MCI VNet® service for incoming and outgoing domestic and voice calls; for 56-kbps restricted, 64-kbps restricted, and 64-kbps unrestricted circuit-switched data calls
  - MCI 800 for domestic, toll-free, incoming voice calls
  - MCI 900 service numbers
- LEC services for DMS-100 switch types:
  - DMS Virtual Private Network service for calls between the MERLIN LEGEND Communications System and another communications system (such as another MERLIN LEGEND Communications System)
  - DMS INWATS (Inward Wide Area Telephone Service) for domestic, toll-free, incoming voice calls
  - DMS OUTWATS (Outward Wide Area Telephone Service) for domestic, outgoing, long-distance voice calls
  - DMS FX (foreign exchange) to provide local call rating for calls from the local exchange to the area serviced by the foreign exchange.

- DMS Tie Trunk to provide private exchange call rating for calls placed on a dedicated central office facility between the MERLIN LEGEND Communications System and another communications system (such as another MERLIN LEGEND Communications System)

## ■ **Improvements to Station Message Detail Recording (SMDR) and Support for MERLIN LEGEND Reporter Application**

The SMDR feature is enhanced to provide more details about calling group agent activities and help system managers assess the effectiveness of call centers, in terms of both agent performance and the adequacy of facilities to handle inbound calls. These improvements apply to calling groups that are programmed as Auto Login or Auto Logout type. The SMDR and MERLIN LEGEND Reporter features listed are administrable:

- **TALK Field.** For Auto Login and Auto Logout calling groups, the TALK field records the amount of time a calling group agent spends on a call.
- **DUR. (DURATION) Field.** For Auto Login and Auto Logout calling groups, call timing begins when a call arrives at MERLIN LEGEND Communications System and not after a preset number of seconds. Call timing ends when the call is disconnected; either the caller or the agent hangs up. This allows the system manager to determine how long a caller waited for an agent's attention.
- **Coding of Calls on Reports.** An asterisk (\*) appears in the call record when:
  - a. A call is not answered by an Auto Login or Auto Logout calling group agent and is abandoned while waiting for an agent.
  - b. The call is answered by someone not a member of an Auto Login or Auto Logout calling group.

An exclamation point (!) signals that an Auto Login or Auto Logout agent handled a call that was answered by someone who was not a member of that Auto Login or Auto Logout with Overflow group. An ampersand (&) in the call record indicates that the group's overflow receiver answered the call.

- **MERLILN LEGEND Reporter.** MERLIN LEGEND Reporter provides basic call accounting system reports for all incoming calls to Auto Login or Auto Logout type calling groups. MERLIN LEGEND Reporter assists in determining the effectiveness of calling group agents, assessing the level of service provided to callers, and ascertaining whether adequate incoming phone lines and agents are available to handle peak call load. MERLIN LEGEND Reporter is an administrable option. The default is Off, in which case the Release 4.0 SMDR reports are available. If this option is set to On, the following reports are provided:

- Organization Detail Report
- Organization Summary and Trends Report
- Selection Detail Report
- Account Code Report
- Traffic Report
- Extension Summary Report
- Data Report
- Talk and Queue Time Distribution Report
- Time of Day Report
- ICLID Call Distribution Report
- Facility Grade of Service Report

## ■ Maintenance Enhancements

### — Change to Permanent Error Alarm

Beginning with Release 4.2, the most recent permanent error alarm is not shown on the System Error Log menu screen but is available as an option from that screen. For details, refer to the Maintenance section of the technician guide, *Installation, Programming and Maintenance*.

### — Enhanced Extension Information Report

Beginning with Release 4.2, the Extension Information Report includes the Extension Status (ESS) and supervisory mode for each extension.

## Release 5.0 Enhancements

Release 5.0 includes all Release 4.2 functionality plus the enhancements listed below.

### ■ Computer Telephony Integration (CTI)

Beginning with Release 5.0, a PassageWay<sup>®</sup> Telephony Services CTI link from the MERLIN LEGEND Communications System to a LAN server running Novell<sup>®</sup> NetWare<sup>®</sup> software allows Lucent Technologies-certified telephony applications to control MLX and analog multiline telephone (BIS only) operations that are *monitored* by the applications. The physical connection for the CTI link is an MLX port on a 008 MLX or 408 MLX module on the MERLIN LEGEND Communications System control unit and an ISDN link interface card plugged into the customer's server. The feature is available for Hybrid/PBX mode systems only.

### System Requirements for CTI link

Refer to Chapter 2 of the *Network Manager's Guide* for detailed installation instructions.

The following equipment and software are required:

- An Intel i386 , Intel i486, or Pentium class computer with at least 16 megabytes of RAM. Additional memory may be needed if additional applications will be running on the server machine.
- NetWare Version 4.10 or Version 3.12
- 5 megabytes of disk space available on the SYS (system) volume
- Telephony Services for NetWare software, Releases 2.21 or later, installed
- An Eicon/G. Diehl SCOM card for the CTI link
- A free 8- or 16- bit ISA slot for the Eicon/G. Diehl SCOM card
- System software Release 5.0 or later installed on the MERLIN LEGEND Communications system
- The MERLIN LEGEND configured in Hybrid/PBX mode
- An MLX port board (using firmware Version 28 or later, *except* Version 29) installed in the MERLIN LEGEND

**NOTE:**

The 008 MLX and 408 MLX modules must have firmware vintage other than 29. If the module has firmware 29, administering a CTI link on the module is prevented. An earlier or later vintage firmware is supported.

- If the MERLIN LEGEND switch has only one MLX port board, you also need System Programming and Maintenance (SPM) software, Version 5.01, to administer the CTI link
- One port on the MLX board is used for the CTI link. This port cannot be a potential operator port (2,3,4,6,7,and 8 must be available) or a console programming port
- For a NetWare 3.12 installation, ensure that either NWSNUT.NLM, Version 4.11 or later, and TUI.NLM, Version 1.04 or later, is obtained from Novell and installed in the SYS:\SYSTEM directory

**NOTE:**

To obtain these NLMs from Novell, access either the Novell web site (<http://www.novell.com>) or the Novell ftp site (<ftp.novell.com>). First, download IPXRT4.EXE and follow the directions in the associated readme file. Then, download NWSNUT.NLM and TUI.NLM.

- **Basic Call Control.** A CTI link application on a user's computer can assume basic call control of the user's analog multiline or MLX telephone's **SA** buttons. Basic call control includes:

- Answering calls arriving on an **SA** button
- Making calls from an **SA** button
- Hanging up calls
- Hold and retrieving a call on hold at the user's extension
- Conference calls from a DLC or QCC operator

**NOTE:**

Transfer and 3-way conference, when handled through a CTI link application, provide the original caller's calling number information or other information to the transfer receiver or new conference participant, if the user has screen-pop capability.

- **Screen Pop.** Screen pop occurs when the calling number, called number, or other user-defined identifier (such as an account code that a voice-response unit prompts the caller to dial) is used to display a screen associated with the calling party. For example, Caller ID services can be used to support screen pop on a system that includes a CTI link; using the calling party number as a database key code, information about a caller automatically appears on the user's computer screen when the call arrives at the extension. Depending on the application, screen pop may be available for calls that arrive on line buttons other than **SA** buttons and/or are answered manually at the telephone rather than by the application.

Screen pop can occur on incoming calls from the following sources:

- Calling group distribution
- ISDN PRI Routing by Dial Plan
- An extension on the MERLIN LEGEND Communications System
- Remote Access

**NOTE:**

In the case of remote access calls, the only information that the application can collect about the caller is the remote telephone number.

- A transfer of a call that was answered by a voice response unit
- A transfer, redirection, or conference of a call that was answered at a DLC or at a QCC

**NOTES:**

DLCs (Direct-Line Consoles) may use CTI applications. If they do, they perform the same way as other extensions. A DLC assigned to use a CTI link application is a *monitored* DLC. When a DLC is used as a regular operator console and not assigned as a CTI link extension, it is *non-monitored*.

Calls to a QCC non-monitored DLC do not initiate screen pop at the operator position., but when an operator directs a call to an

extension using a CTI application, caller information does initiate screen pop.

Calls transferred from Cover buttons on non-monitored DLCs do not initiate screen pop at the destination extension.

- **HotLine Feature.** The Release 5.0 HotLine feature is designed for retail sales, catalogue sales, and other types of businesses and organizations. It is available in all three modes of system operation. The feature allows a system manager to program a single-line telephone extension as a HotLine. When a user lifts the handset at the HotLine extension, the telephone automatically dials the inside extension or outside telephone number programmed as the first Personal Speed Dial number (code 01) for the extension. At HotLine extensions, calls cannot be transferred, put on hold, or conferenced.

Personal Speed Dial codes can be programmed at the extension prior to HotLine assignment (a system programming function). Alternatively, a Personal Speed Dial code can be programmed from the single-line telephone after HotLine operation is assigned. However, because of security considerations, this is a one-time opportunity. Once the Personal Speed Dial number is programmed, any changes to it or any other extension programming must be performed using centralized telephone programming.

Any type of inside or outside line that is normally available to a single-line telephone can be assigned to a HotLine extension. Generally, the HotLine telephone does not receive calls, and its line should be set to No Ring.

### **SECURITY ALERT:**

*A HotLine single-line telephone accesses a loop-start line, the line should provide and be programmed for Reliable Disconnect. If it is not, a caller may be able to stay on the line after the initial call and access an outside line.*

- **Call Center Enhancements.** Release 5.0 and later systems include Group Calling features that enhance call center operations.
  - **Most Idle Hunt Type.** In addition to the Circular (factory setting) and Linear hunt types supported in earlier releases, a third hunt type distributes calling group calls in an order based on which agent has waited the longest since transferring or hanging up on an incoming calling group call. For some applications, this hunt type is more efficient than the circular type because it takes into account the varying duration of calls. The system distributes calls based on when an agent last completed a call, not on when he or she last received one. This hunting method ignores non-calling group calls. For example, if an agent transfers a call that arrived on a line not assigned to the calling group, the calling group member's most-idle status is unaffected.

- **Delay Announcement Devices.** The system manager can designate as many as ten primary delay announcement devices per group rather than the single device for each group that is available in Release 4.2 and earlier systems. Furthermore, an additional secondary delay announcement device can be specified, for a total of ten primary device extensions and one secondary device extension per group.

A primary delay announcement device operates in the same fashion as a single delay announcement device, playing once, as soon as it is available, for the caller who has waited the longest for a calling group agent and has not heard a primary delay announcement. If a secondary announcement device is used, it can use the factory setting, which plays the announcement once, or it can be set to repeat the announcement after a certain amount of time. The system manager programs the time (0–900 seconds) between primary and secondary announcements. This setting controls both the interval between primary and secondary announcements and the interval between repetitions of the secondary announcement if it is set to repeat.

The primary and secondary announcement options, when used together, allow an initial message to play for callers, followed by a repeating announcement that, for example, urges callers to stay on the line and wait for a calling group member.

Two or more groups may share an announcement device.

- **Enhanced Calls-in-Queue Alarm Thresholds.** Three Calls-in-Queue Alarm thresholds can be set to more clearly indicate the real-time status of the queue according to the behavior of programmed Calls-in-Queue Alarm buttons. In earlier releases, only one Calls-in-Queue Alarm Threshold setting is available to activate the LEDs at programmed Calls-in-Queue Alarm buttons for a calling group.

Using all three levels, the system manager sets Threshold 1 to the lowest value, Threshold 2 to a middle value, and Threshold 3 to the highest value. A Calls-in-Queue Alarm button indicates the severity of the alarm conditions in the following ways:

- If the number of waiting calls is less than the value programmed for Threshold 1 or drops below that level, the LED is unlit.
- If the number of waiting calls is greater than or equal to the Threshold 1 value but less than the Threshold 2 value, the LED flashes.

- If the number of waiting calls is greater than or equal to the Threshold 2 value but less than the Threshold 3 value, the LED winks.
- If the number of waiting calls is greater than or equal to the highest value, Threshold 3, the LED lights steadily.

**NOTE:**

A DSS (Direction Station Selector) button that is used as a Calls-in-Queue Alarm button can only indicate two threshold levels, either by flashing or by lighting steadily. If a calling group must use this type of Calls-in-Queue Alarm button, only two threshold levels should be programmed.

If all three thresholds are set to the same value, the result is one threshold only. If two values are the same, then the result is two alarm levels. The factory setting is one call for all three thresholds.

An external alert only signals when the number of calls in the queue exceeds the programmed Threshold 3 value.

- **MLX-5 and MLX-5D Telephones.** The MLX-5 nondisplay and the MLX-5D display telephones are compatible with all system releases. The display telephone includes a 2-line by 24-character display, and both telephones come with 5 line buttons. In systems prior to Release 5.0, the MLX-5 and MLX-5D telephones are treated as MLX-10 and MLX-10D telephones respectively. As of Release 5.0, the system recognizes the MLX-5 and MLX-5D telephones as 5-button telephones.

## Design Benefits

**Modular components** allow easy, cost-effective growth in both size and function. For upgrades from the MERLIN LEGEND Communications System, all wiring and analog MERLIN system telephones can be reused. For upgrades from the MERLIN II Communications System, certain trunk and extension modules can also be reused. The modules are 800, 400, 400EM, 012, 008, and 408.

**Menu-driven system programming** maintains the customer's command of business operations.

**Built-in 1200/2400-bps modem** allows fast access to the system by customers, Lucent Technologies personnel, or authorized dealers from a remote location for system programming and maintenance.

**Flexible mode of operation** saves upgrade costs by allowing system configuration in one of three modes: Hybrid/PBX, Key, and Behind Switch. (The default setting on the 3.0 processor board is Hybrid/PBX.)

**Connectivity to other systems** in the Behind Switch mode optimizes existing resources by allowing the system to work as part of another MERLIN LEGEND Communications System, System 25, System 75, System 85, DEFINITY 75/85, or other communications system. The control

unit can connect to another system's control unit via either an off-premises telephone (OPT) line or an analog or digital tie trunk.

**Digital 2.048-MHz bus** supplies a 64-kbps channel on each of the 216 time slots.

**68EC020 Motorola CPU** running at 16 MHz with zero wait states provides fast system performance.

**Memory data retention** saves time by ensuring that system and extension programming information is retained for 5 days, depending on the system configuration, in case of power failure or system shutdown.

**Integrated voice and data capabilities** allow users to talk while transmitting data at speeds up to 64 kbps.

**DS1 interface** can be configured for connection of either T1 or PRI for basic call control with the 4ESS™ or 5ESS PRI service specifications.

**Basic Rate interface (BRI) S/T protocol** supports premier digital multiline (MLX) telephones with superior display capabilities and supports the ISDN terminal adapter Data Module for the connection of adjuncts.

## Environmental Specifications

The control unit requires a regulated environment and can be located in any room or closet that is temperature-controlled and clean. Do not mount the control unit where it will be exposed to direct sunlight.

In addition, the control unit should not be co-located with air conditioning or ventilation units, compressors, fans and blowers, heaters, arc welders, or other machinery that produces electrical interference.

The control unit is mounted on a Lucent Technologies pre-drilled backboard.

Once installed, it is important to keep the control unit site clear of hazards, such as stacked paper or boxes, that block ventilation. Installing any machinery in the vicinity of the control unit should be avoided. If any pollution-producing work (such as sanding or spray painting) is to be done in the area, care should be taken to protect the unit.

Table 1-4 gives the environmental specifications for the control unit.

### Control Unit

Fully loaded basic carrier

Weight: 45 lb. (20.4 kg)

Dimensions: 14 in. wide x 23 in. high x 12 in. deep  
(35.6 cm x 58.4 cm x 30.5 cm)

Fully loaded 2-carrier system (basic carrier plus 1 expansion carrier)

Weight: 90 lb. (40.8 kg)

Dimensions: 25 in. wide x 23 in. high x 12 in. deep  
(63.5 cm x 58.4 cm x 30.5 cm)

Fully loaded 3-carrier system (basic carrier plus 2 expansion carriers)

Weight: 135 lb. (61.2 kg)

Dimensions: 37 in. wide x 23 in. high x 12 in. deep  
(94 cm x 58.4 cm x 30.5 cm)

### Mean Time Between Failures

(mean/average time the system is expected to operate before any type of failure occurs)

2.4 years

For a system configured with 24 trunks and 50 stations (extensions)

## Backboard Mounting Hardware Requirements

This refers to the types of wall construction to which the backboard will be attached.

### Type of material

Wood surface

Concrete surface, brick, cinder block

Plaster, plasterboard

Sheet-metal surface

### Mounting Hardware

Wood screws

Masonry anchors

Toggle bolts

Sheet-metal screws

Hardware has a combined pullout force of 650 lb. (294.8 kg). When mounting to sheet-metal walls, attach to structural members.

### Location

Within 5 ft. (1.5 m) of dedicated AC power outlet (1 plug per carrier)

Within 1000 cable ft. (304.8 m) of telephones

### Heat Dissipation

Fully loaded basic carrier 500 Btu/hr (35 cal/sec)

Fully loaded 2-carrier system 1000 Btu/hr (70 cal/sec)

(basic carrier with one expansion carrier)

Fully loaded 3-carrier system 1500 Btu/hr (105 cal/sec)

(basic carrier plus two expansion carriers)

### Power Requirements

Basic carrier 117 VAC 60 Hz -15% to 10% 5.4A

2-carrier 117 VAC 60 Hz -15% to 10% 10.8A

3-carrier 117 VAC 60 Hz -15% to 10% 16.2A

### Temperature/Humidity Range

40°–104°F (4°–40°C)

20%–80% relative humidity

### Ventilation Clearances

1 in. (2.5 cm) on right and left sides

**Radio Frequency Interference, Tolerance** 1.0 V/m

### Electromagnetic Interference (EMI)

To reduce electromagnetic interference emissions (possible interference problems with handheld telephones), check the date of manufacture of the CPU (517A27) units. If they were manufactured before April 1993, replace them with a later version.

## CAUTION

- For the control unit, do not use an AC outlet that is controlled by a wall switch or some other switch.
- Use an approved ground (AC receptacle for 3-prong plug).
- Do not install the control unit outdoors.
- Do not place the control unit near extreme heat (furnaces, heaters, attics, or direct sunlight).
- Do not expose the control unit to devices that generate electrical interference (such as arc welders or motors).
- Do not place anything on top of carriers.
- Do not install the control unit under any device that may drip fluid, such as an air conditioner.
- Each auxiliary power unit requires one outlet.
- Do not expose the control unit to moisture, corrosive gases, dust, chemicals, spray paint, or similar materials.

## Power and Grounding

Proper power and grounding are essential for correct and safe functioning of the system.

### Power Specifications

The system control unit plugs into a 117-VAC outlet. To avoid accidental disconnection of the system, this outlet should not be controlled by a wall switch.

Each carrier unit requires its own power supply. Each power supply requires a maximum current of 5.4 amps. Therefore, if expansion carrier units are added to the system, extra AC outlets may be needed.

### Grounding Requirements

Proper grounding of the installation site protects the system against the following:

- Lightning
- Power surges
- Power crosses on outside lines/trunks
- Electrostatic discharge (ESD)

The local telephone company is responsible for providing protection of outside lines/trunks 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 outside line/trunk protector ground and the power company ground

## WARNING

*An improper ground can result in equipment failures and service outages. Verify that the AC power uses an approved ground for its primary ground, that all voltage-limiting devices are grounded to an approved ground, and that the ground is one of the approved grounds listed below.*

The following is a list of approved grounds, starting with the most preferred:

- Building steel
- Acceptable water pipe, must be a metal, underground water pipe at least ½-in. (30.4 cm) in diameter, and in direct contact with the earth for at least 10 ft. (3 m).
  - It must be electrically continuous so that the protector ground is connected. (Check for insulated joints, plastic pipe, and plastic water meters that might interrupt electrical continuity.)
  - A metallic underground water pipe must be supplemented by the metal frame of the building, a concrete-encased ground, or a ground ring.
  - Other local metal underground systems or local underground structures such as tanks and piping systems
  - Rod and pipe electrodes, a 5/8-in. (1.6-cm) solid rod or ¾-in. (1.9-cm) conduit or pipe electrode driven to a minimum depth of 8 ft. (244 cm)
  - Plate electrode, a minimum of 2 square ft. (61 square cm) of metallic surface exposed to the exterior soil
- Concrete-encased ground, which must be an electrode, consisting of one of the following:
  - At least 20 ft. (6.1 m) of one or more steel reinforcing rods, each being at least 0.5-in. (1.27 cm) in diameter
  - 20 ft. (6.1 m) of bare copper conductor not smaller than #4 AWG, encased in 2 in. (5 cm) of concrete. This electrode must be located within and near the bottom of a concrete foundation or roofing that is in direct contact with the earth.
  - Ground ring, consisting of at least 20 ft. (6.1 m) of bare copper conductor not smaller than #2 AWG, encircling the building. The ground ring must be in direct contact with the earth and buried at least 2.5 ft. (77 cm) below the earth's surface.

**⚠ WARNING:**

*Do not use a metal underground gas piping system. This is a safety risk.* For most power surges, the following standard grounding requirements provide adequate lightning and surge protection:

- Properly wired/grounded/bonded outside line protectors
- Properly wired/grounded AC outlet
- Properly grounded single-point ground bar
- Properly wired connection between single-point ground and power supplies

**Additional Power Surge Protection**

The 391A1 power supply has built-in AC line protection. This built-in protection handles almost all situations.

Occasionally, additional protection may be needed if the customer is located in a heavy lightning area. A 147A surge protector can be connected to the system to limit surges from the AC lines and outside lines. One 147A protector provides protection for four outside lines. Up to three 146A protectors can be added to the 147A to provide protection for a maximum of 16 outside lines. For more than 16 lines, additional 147A protectors are required.

**NOTE**

The 147A protector is usually not needed with the 391A1 power supply. It may be needed with the older 391A power supply module in heavy lightning areas.

Complete installation instructions are provided with the protectors.

## NOTES

## Control Unit Interfaces

Interface	Applications	Signaling Channel Rate	Audio/Data Rate
BRI S/T*	Control unit to MLX telephone  ISDN Terminal Adapter	16 kbps (D) 64 kbps (B) 64 kbps (B) and (D)	
DS1	Control unit to the following services: <ul style="list-style-type: none"> <li>■ <b>T1</b> <ul style="list-style-type: none"> <li>Emulated tie trunk</li> <li>Emulated DID</li> <li>Emulated loop-start</li> <li>Emulated ground-start</li> </ul> </li> <li>■ <b>PRI services</b> <ul style="list-style-type: none"> <li>ACCUNET® switched digital service</li> <li>MEGACOM® WATS</li> <li>MEGACOM 800</li> <li>Software Defined Network (SDN)</li> <li>MultiQuest® 900 number services</li> <li>Connectivity to 5ESS Generic 6/7/8/FTS 2000</li> <li>Multiple incoming calls to directory number</li> <li>Call-by-Call Service Selection</li> <li>Password handling for FTS2000</li> <li>SID-ANI as Calling Party Number</li> </ul> </li> </ul>	64 kbps	
RS-232-C	Control unit to PC connected to system programming port  Control unit to Lucent Technologies model 572 printer, PC with CAS, or CAT connected to RS-232-C port	2400 bps or 1200 bps  1200 bps	2400 bps or 1200 bps  1200 bps
ATL	Control unit to analog multiline telephone	40 kHz	300–3400 Hz
Tip/Ring	Control unit to single-line telephone, modem, fax, OPT, or voice mail system		

\* Call handling derived from CCITT recommendation Q.931.

## Network Interface Requirements

<b>Line/Trunk Type</b>	<b>Facility Interface Code</b>	<b>Network Interface</b>
Loop-start	02LS2	RJ11C, RJ14C, RJ21X
Ground-start	02G S2	RJ11C, RJ14C, RJ21X
DID	02RV2-T	RJ11C, RJ14C, RJ21X
OPT	0L13C	RJ11C, RJ14C
Tie	TL31M	RJ2GX
T1	04DU9-B 04DU9-C	RJ48C/X
PRI	04DU9-BN (D4 with AMI)  04DU9-DN (D4 with B8ZS)  04DU9-IKN (ESF with AMI)  04DU9-ISN (ESF and B8ZS)	RJ48C/X
BRI	02B1Q	RJ11C, RJ14C, RJ21

## FCC Registration

<b>Registration Number</b>	<b>REN</b>	<b>Type</b>
AS593M-72682-MF-E	1.5A	Multi-function
AS593M-72914-KF-E	1.5A	Key only
AS5USA-65646-PF-E	1.5A	Hybrid/PBX

## DOC Registration

<b>DOC Certification No.</b>	<b>CSA Certification No.</b>	<b>Load No.</b>
230-4095A	LR-56260	6

## Hardware and Software Capacities

You can configure the system as a stand-alone unit or as part of a private network. Maximum system capacities are as follows:

- Up to 108 simultaneous two-party conversations

### IMPORTANT:

If more than 108 conversations are in progress at the same time, blocking can occur.

- Up to 80 line/trunk jacks, including loop-start, ground-start, DID, and tie
- Up to 255 extension endpoints that support a combination of the following:
  - Up to 255 physical extension jacks for tip/ring telephones and adjuncts
  - Up to 127 logical digital data ports (through ISDN terminal adapters connected to jacks on the MLX module) providing RS-232 connections to data terminals and personal computers
- System call-handling capability of 3888 hundred call seconds per hour (ccs/hr)
- Up to three 100D DS1 modules, maximum two per carrier
- Up to five 800 NI-BRI modules, maximum three per carrier (Release 4.0 and later)
- One CTI link when operating in Hybrid/PBX mode

The system has a total capacity of 280 jacks (80 outside lines/trunks plus 200 extensions); however, each MLX module extension jack supports two logical endpoints (extension devices that can operate simultaneously and independently of each other). For example, an MLX telephone with a Multi-Function Module (MFM) plugs into one extension jack, but the jack supports both the telephone and the equipment (for example, a fax or an answering machine) connected to the MFM.

Similarly, although the 100D module has only one jack, it can serve up to 24 endpoints (emulated lines/trunks or PRI lines/trunks). Thus, you can configure the system to connect up to 80 lines/trunks and 255 extension endpoints—a total of 335 endpoints.

The following table, **Table of Hardware and Software Capacities**, lists the hardware and software capacities of the system. Constraining Factors appear with a checkmark (✓) and are explained at the end of the table.

## Table of Hardware and Software Capacities

	Limit	Constraining Factor
<b>Account Codes</b>	16	
Digits per code		
<b>Authorization Codes</b>	255	
Digits per code	11	
<b>Allowed/Disallowed Lists</b>		
Number of lists	8	
Entries per list	10	
Digits per entry	7	
<b>Automatic Route Selection (ARS)</b>		
Number of ARS tables	16	
Subpatterns per table	2	
Routes per subpattern	6	
Entries per table	100	
Entries across all tables	1600	
Default tables	4	
<b>Callback calls in queue</b>	64	
<b>Calling Groups</b>		
Number of groups	32	
Members per group	20	✓
Groups per member	1	
Delay announcements per system	32	
Delay announcements per group	1	
Groups per delay announcement	32	
External alerts per group	1	
Coverage groups per group	1	
<b>Carriers</b>	3	
Line/trunk and extension module slots per basic carrier	5	✓
Line/trunk and extension module slots per expansion carrier	6	
Maximum slots available for line/trunk and extension modules	17	
<b>Coverage Groups</b>		
Number of groups	30	
Senders per group	255	✓
Groups per sender	1	
Receiver buttons per group	8	
Groups per QCC receiver	30	
<b>CTI Link</b>	1	✓
<b>Direct Inward Dialing</b>		
Number of blocks	2	
Number of trunks	80	

**Table of Hardware and Software Capacities** (*continued*)

	Limit	Constraining Factor
<b>Data Hunt Groups</b>		
Number of groups	32	
Members per group	20	
Groups per member	1	
<b>Directories</b>		
System Directory	1	
Listings	130	
Extension Directory	1	
Listings	200	
Personal Directory (MLX-20L only)	48	
Listings	50	
<b>100D module (maximum 2 per carrier)</b>	3	
<b>800 NI-BRI Module (max 3 per carrier)</b>	5	
<b>Endpoints (devices)</b>	255	
<b>Extensions</b>		
Total physical jacks	200	
Total endpoints	255	
<b>Fax machines with Message Waiting</b>	16	✓
<b>Lines/Trunks</b>	80	
<b>Night Service</b>		
Groups	8	
Members per group	255	
Calling groups per group	1	
Groups per member	8	
Emergency Allowed List entries	10	
<b>System Operating Consoles</b>		
Direct-line consoles (DLCs)		
MLX-20L or MLX-28D	8	✓
BIS-22D, BIS-34D, or MERLIN II		
System Display Consoles	8	✓
QCCs	4	✓
DSSs	16	✓
Combination of DLCs plus QCCs	8	
Number of consoles per module	2	
<b>Park codes (number of codes)</b>	8	
<b>Personal lines</b>	64	

**Table of Hardware and Software Capabilities** (*continued*)

	<b>Limit</b>	<b>Constraining Factor</b>
<b>Pool Buttons</b>	64	
<b>Ports (not simultaneously)</b>		
Total extensions (dialable)	280	
Voice and data (physical pools)	200	
Voice Announce to Busy extensions	127	
Voice-Mail interface (VMI)	20	✓
ISDN Terminal Adapter	127	
Paging	3	
Delay announcements	32	
<b>Remote Access</b>		
Number of barrier codes	16	
Digits per code, systemwide	4–11	
<b>Shared System Access Buttons</b>		
Number of buttons per principal extension	27	
<b>Speed Dial</b>		
Personal Speed Dial		✓
Entries per telephone	24	
Entries per system	1200	
Digits per entry	28	
System Speed Dial		
Entries per system	130	
Digits per entry	40	
<b>System Programming Equipment</b>		✓
MLX-20L	1	
RS-232 jack for PC with SPM	1	
Modem (built in processor module)	1	
<b>Telephones (not simultaneously)</b>		
Analog multiline		
Without Voice Announce to Busy	136	✓
With Voice Announce to Busy	68	✓
MLX-20L	48	✓
All other MLX telephones (with/without ISDN terminal adapter /MFM)	127	✓
Single-line	200	✓
Power failure transfer	20	✓
<b>Traffic (100 call seconds/hr/system)</b>	3888	✓
<b>Two-party conversations</b>	108	✓
<b>Voice-messaging systems</b>	1	

## **Constraining Factors**

This section describes the constraining factors that limit the capabilities supplied in the table above.

### **Calling Groups**

*Members of groups.* QCCs cannot be members of calling groups because the QCC position is set up as a system operator and has its own queue that is different from the group's queue.

### **Carriers**

The first slot of the basic carrier is used for the processor module.

### **Coverage Groups**

*Senders per group.* QCCs cannot be senders because they do not have coverage available and use Position-Busy instead.

### **CTI Link**

One CTI link is supported in Hybrid/PBX mode only.

### **Fax machines with Message-Waiting**

The system can support more than 16 fax machines, but those in excess of 16 cannot use fax message-waiting indication.

### **System Operator Consoles**

*DLCs.* Two consoles are allowed for each MLX or analog module, with a maximum of eight per system. Up to two DSSs can be attached to an MLX operator console, and one is built into the MERLIN II System Display Console.

*QCCs.* Two consoles are allowed for each MLX module with a maximum of four per system.

### **Ports (not simultaneously)**

*Voice-Mail interface.* Although the system software supports up to 24 VMI ports, all the VMI ports must be in the same calling group, and the maximum number of extension in a calling group is 20.

### **Speed Dial**

*Personal Speed Dial.* Single-line and 5- or 10-button telephones only.

### **System Programming Equipment**

Remote access overrides on-site programming except during backup or restore.

### **Telephones (not simultaneously)**

*Analog multiline with/without Voice Announce to Busy.* 17 slots x 8 ports/board.

*MLX-20L.* RAM limit and the total includes the MLX-20L telephone used for system programming.

*All other MLX telephones.* RAM limit. An MFM and a ISDN terminal adapter cannot be connected to the same telephone (including the MLX-20L) at the same time.

*Single-line.* RAM limit

*Power failure transfer.* 1 for each 4 LS/GS line/trunk jacks.

### **Traffic (100 call seconds/hr/system)**

Assumes 20 percent internal traffic.

### **Two-party conversations**

216 time slots.

## Ordering Codes

Component	PEC	Comcode	App. Code
<b>Control Unit</b>			
<b>MERLIN LEGEND Control Unit</b>	6140-CU5		
Power Supply Module		107184848	391A3
R5.0 Processor		108004573	517J33
Backplane/Basic Housing and Carrier		107007114	403G
Blank Backup Card		107779878	10A1
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND Upgrade—</b>			
<b>R1/R2 to R5</b>	6141-109A		
R5.0 Processor		108004573	517J33
Blank Backup Card		107779878	
SPM-UNIX (Attribute: QTY 11)		108007782	
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		107713679	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND Upgrade—</b>			
<b>R3/R4 to R5</b>	6141-110A		
Force Installation Card		108004581	10F1
SPM-UNIX (Attribute: QTY 11)		108007782	
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		107713679	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND Upgrade—</b>			
<b>M II to R5</b>	6141-108A		
R5.0 Processor		108004573	517J33
Blank Backup Card		107779878	
SPM-UNIX (Attribute: QTY 11)		108007782	
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		107713679	555-650-100
End-User CD-ROM		108007972	555-650-800



\* The R5.0 Customer Reference Manuals package contains *Feature Reference*, *System Programming*, and *System Manager's Guide*.

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>MERLIN LEGEND MLX/012 T/R</b>			
<b>Bundle</b>	6140-P5C		
Power Supply		107184848	391A3
R5.0 Processor		108004573	517J33
Backplane		107007114	403G
Blank Backup Card		107779878	10A1
408 GS/LS-MLX Module		107044851	517B29
(QTY: 2)			
012 T/R Module w/Ring Gen.		107438939	517J13
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND ATL Bundle</b>			
<b>Bundle</b>	6140-P5D		
Power Supply		107184848	391A3
R5.0 Processor		108029471	517J33
Backplane		107007114	403G
Blank Backup Card		107779878	10A1
408 GS/LS-MLX Module		107044851	517B29
(QTY: 2)			
008 ATL Module		105351092	517B3
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND 016 T/R</b>			
<b>Bundle</b>	6140-P5F		
Power Supply		107184848	391A3
R5.0 Processor		108029471	517J33
Backplane		107007114	403G
Blank Backup Card		107779878	10A1
408 GS/LS-MLX Module		107044851	517B29
408 GS/LS-ATL Module		107091407	517D26
016 T/R Module		107856551	517C34
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800

\* The R5.0 Customer Reference Manuals package contains *Feature Reference*, *System Programming*, and *System Manager's Guide*.

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>MERLIN LEGEND 016 T/R</b>			
<b>Bundle</b>	6140-P5G		
Power Supply		107184848	391A3
R5.0 Processor		108029471	517J33
Backplane		107007114	403G
Blank Backup Card		107779878	10A1
408 GS/LS-MLX Module (QTY 2)		107044851	517B29
016 T/R Module (QTY 1)		107856551	517C34
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND DS1/CSU</b>			
	6140-P5I		
Power Supply		107184848	391A3
R5.0 Processor		108029471	517J33
Backplane		107007114	403G
Blank Backup Card		107779878	10A1
SPM-DOS (Attribute: QTY 11)		108007774	
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
CSU (QTY 1)		107564510	
DS1 Module (QTY 1)		105512438	
DB15-D515 Screw Slide Latch (QTY 1)		107369324	
CJ48M-RJ48M Twisted Pair Cable (QTY 1)		107369274	
<b>MERLIN LEGEND 012 to 016</b>			
<b>T/R Trade-in Package</b>	6141-T40A		
016 T/R Module		107533887	517A34
R5.0 Customer Ref. Manuals*		108008004	555-650-100
<b>MERLIN LEGEND R3 to R3.1</b>			
<b>Upgrade</b>	6141-131A		
Forced Installation Card		107752677	10B2
Doc Release Notes		107747479	

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>MERLIN LEGEND MLX/012</b>			
<b>Package</b>	6140-P5C		
Power Supply		107184848	391A3
R5.0 Processor		108004573	517J33
Backplane		107007114	403G
Blank Backup Card		107245243	10A1
408 GS/LS-MLX Module (QTY: 2)		107044851	517B29
012 T/R Module w/Ring Generator		107438939	517H13
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND MLX/ATL</b>			
<b>Package</b>	6140-P5D		
Power Supply		107184848	391A3
R5.0 Processor		108004573	517J33
Backplane		107007114	403G
Blank Backup Card		107245243	10A1
408 GS/LS-MLX Module (QTY: 2)		107044851	517B29
008 ATL Module		105351092	517B3
R5.0 Customer Ref. Manuals*		108008004	555-650-100
End-User CD-ROM		108007972	555-650-800
<b>MERLIN LEGEND MLX/ATL/012</b>			
<b>Package</b>	6140-P3E		
R3.1 Processor		107752693	517D33
Backplane		107007114	403G
Power Supply		107184848	391A3
Blank Backup (Translation) Card		107245243	10A1
408 GS/LS-MLX Module (QTY:1)		107044851	517B29
012 T/R Module w/Ring Gen.		107438939	517H13
408 GS/LS/ATL Module		107044877	517C26
R5.0 Customer Ref. Manuals*		108008004	555-650-100
<b>MERLIN LEGEND Control Unit</b>			
<b>Package</b>	6140-CU3		
Power Supply		107184848	391A3
R3.1 Processor		107752693	517D33
Blank Backup (Translation) Card		107245243	10A1
Backplane/Basic Housing and Carrier		107007114	403G
R3.0 Customer Ref. Manuals*		107713679	

\* The R5.0 Customer Reference Manuals packages contain *Feature Reference, System Programming, and System Manager's Guide.*

**Ordering Codes (continued)**

Component	PEC	Comcode	App. Code
<b>MERLIN LEGEND Upgrade—</b>			
<b>R1/R2 to R3</b>	6141-103A		
R3.1 Processor		107752693	517D33
Blank Backup (Translation) Card		107245243	10A1
SPM—UNIX (Attribute: QTY 11)		107741266	
SPM—DOS (Attribute: QTY 11)		107741258	
No Material (Attribute: QTY 99)		011111111	
R3.0 Customer Ref. Manuals*		107713679	
<b>MERLIN LEGEND Upgrade—</b>			
<b>M II to R3</b>	6141-U3LA		
R3.1 Processor		107752693	517D33
Blank Backup (Translation) Card		107245243	10A1
Kit of Parts (Cover Labels and Ferrite Cores)		107005027	D182764
R3.0 Customer Ref. Manuals*		107713679	
<b>MERLIN LEGEND</b>			
<b>Blank PCMCIA</b>			
<b>Backup/Restore Card</b>	61501	107245243	10A1
<b>Expansion Unit</b>			
	61490		
Expansion Wall Mount with Top/Front Cover		107007122	403H
Power Supply Module		107184848	391A3
Top \ Front Cover (Choose One)		106905953	18A
Cov99 (No Covers)			
Cov01† (One Top/One Front)			
Cov02 (Two Top/Two Front)			
Empty Module (Choose One)		107005720	19A
MOD90 (No Module)			
MOD01† (One Module)			
Kit of Parts (Cover Labels and Ferrite Cores. Not in PEC 61490)		107005027	D182764
<b>Plastic Backboard Hardware</b>			
Template		847009206	
Backboard (31.5" x 27")		847007523	
Shipping Container		847087376	
Shipping Tray		847087392	
Shipping Insert (pair)		847087384	
Network X-Conn: RJ-21X		403613003	
Station X-Conn: BR2580-66 Block		405464777	

† Default

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Line/Trunk and Extension Modules</b>			
008 (ATL)	61485	105351092	517B3
008 MLX	61486	105628010	517A21
008 OPT + Ring Generator	61489	107321192	517D28A
012(T/R)	61487	107438939	517H13
012 (T/R) + Ring Generator	61494	107989584	517J13
016(T/R) with 4 TTRs	61507	107824948	517B34
100D(DS1)	61491	105512438	517C15
800 NI-BRI	61510	107731127	517A35
400EM (tie trunk)	61492	105311401	517A14
400 GS/LS/TTR	61483	107044869	517C18
408 GS/LS	61481	107091407	517D26
408 GS/LS-MLX	61493	107044851	517B29
800 DID with 2 TTRs	61488	107731986	517E20
800 GS/LS	61484	107091381	517C19
800 GS/LS-ID ICL with 4 TTRs	61502	106975584	517A31
<b>Vintage Line/Trunk and Extension Modules</b>			
400 (with TTRs)	61379	105408892	517B12
408 LS/ATL	61482	105512495	517C1
800 LS	61384	105351100	517B4

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephones</b>			
<b>MLX Telephones</b>			
MLX-5™			
English (black)	3156-OB B	107894719	7712D05D-003
English (white)	3156-OB W	107894727	7712D05D-264
French (black)	3156-FB B	107926834	7712D05D(29)-003
French (white)	3156-FB W	107926842	7712D05D(29)-264
Spanish (black)	3156-SB B	107926859	7712D05D(22)-003
Spanish (white)	3156-SB W	107926867	7712D05D(22)-264
Hungarian (black)	3156-EB B	107926875	7712D05D(30)-003
Hungarian (white)	3156-EB W	107926883	7712D05D(30)-264
MLX-5D™			
English (black)	3156-OD B	107894735	7712D06D-003
English (white)	3156-OD W	107894743	7712D06D-264
French (black)	3156-FD B	107926891	7712D06D(29)-003
French (white)	3156-FD W	107926909	7712D06D(29)-264
Spanish (black)	3156-SD B	107926917	7712D06D(22)-003
Spanish (white)	3156-SD W	107926925	7712D06D(22)-264
Hungarian (black)	3156-ED B	107926933	7712D06D(30)-003
Hungarian (white)	3156-ED W	107926941	7712D06D(30)-264
MLX-10			
English (black)	3156-02B	107108722	7712D01D-003
English (white)	3156-02W	107108748	7712D01D-264
French (black)	3156-F2I	107108797	7712D01D(29)-003
French (white)	3156-F2I	107108789	7712D01D(29)-264
Spanish (black)	3156-S2I	107108755	7712D01D(22)-003
Spanish (white)	3156-S2I	107108771	7712D01D(22)-264
MLX-10D			
English (black)	3156-03B	107108870	7712D02D-003
English (white)	3156-03W	107108888	7712D02D-264
French (black)	3156-F3I	107108938	7712D02D(29)-003
French (white)	3156-F3I	107108920	7712D02D(29)-264
Spanish (black)	3156-S3I	107108904	7712D02D(22)-003
Spanish (white)	3156-S3I	107108912	7712D02D(22)-264
MLX-10DP			
English (black)	3156-06B	107108946	7712D04D-003
English (white)	3156-06W	107108953	7712D04D-264

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephones</b>			
<b>MLX Telephones</b>			
MLX-16DP™			
English (black)	3156-07B	106922271	7715D01D-003
English (white)	3156-07W	106922289	7715D01D-264
Spanish (black)	3156-S7I	106987423	7715D01D(22)-003
Spanish (white)	3156-S7I	106987456	7715D01D(22)-264
French (black)	3156-F7I	106987472	7715D01D(29)-003
French (white)	3156-F7I	106987498	7715D01D(29)-264
East. Europe (black)	3156-EE7	106987506	7715D01D(30)-003
East. Europe (white)	3156-EE7	106987514	7715D01D(30)-264
MLX-20L			
English (black)	3156-05B	107108979	7713D01D-003
English (white)	3156-05W	107108987	7713D01D-264
French (black)	3156-F5I	107109027	7713D01D(29)-003
French (white)	3156-F5I	107109019	7713D01D(29)-264
Spanish (black)	3156-S5I	107108995	7713D01D(22)-003
Spanish (white)	3156-S5I	107109001	7713D01D(22)-264
MLX-28D			
English (black)	3156-04B	107115800	713D02D-003
English (white)	3156-04W	107115818	713D02D-264
French (black)	3156-F4I	107115842	7713D02D(29)-003
French (white)	3156-F4I	107115859	7713D02D(29)-264
Spanish (black)	3156-S4I	106613599	7713D02D(22)-003
Spanish (white)	3156-S4I	106613607	7713D02D(22)-264

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephones (continued)</b>			
<b>MLX Secure Telephones</b>			
MLX-10DS			
English (black)	3156-03S	107185076	7712D02D1-003
MLX-28DS			
English (black)	3156-04S	107185050	7713D02D1-003
MLX-20LS			
English (black)	3156-05S	107185068	7713D01D1-003
800 LS/E&M Card	61395	406981209	93030.2 2/4 WIRE PRN
Fiber Interface Card			
with Ring Generator	61393	406981217	93030.2 FIB INT PRN
Chassis with Power			
Supply, Blank Cover	139-FS	406981225	93030.8C MINI
800 LS Card	61394	406981241	903030.3 2 WIRE PRN
<b>Analog Multiline Telephones (black)</b>			
BIS-10	3165-10B	107137671	7313HO1C-003
BIS-22	3166-22B	107137689	7314HO1C-003
BIS-22D	3166-DSB	107623449	7315HO1F-003
BIS-34D	3167-DSB	107635476	7317HO1F-003
<b>Inactive Analog Multiline Telephones (black)</b>			
MLC-5		105515332	7312HO1C-003
5-Button		105217426	Z7302H01D-003
10-Button		106641079	Z7303H01D-003
10-Button HFAI		106641053	Z7309H01C-003
34-Button Deluxe		106641046	Z7305H02D-003
34-Button BIS		106641087	Z7305H03D-003
34-Button		106641061	Z7305H01B-003
34-Button BIS/DIS		106641095	Z7305H04C-003
MERLIN PFC™ (ATL)		106681562	SET COMM 50A
PFC paper		406956367	
<b>Single-Line Telephones</b>			
8110M Analog Voice	3193-001		
Black		107535841	8110A01D-003 811
Kit (4 Black Sets)		107538399	8110A01D-003
White		107535858	8110A01D-264 811
Kit (4 White Sets)		107538401	8110A01D-264
8102M Analog Voice	3192-001		
Black		107538357	8102A01C-003 810
Kit (4 Black Sets)		107538373	8102A01C-003
White		107538365	8102A01C-264 810
Kit (4 White Sets)		107538381	8102A01C-264
8101 Analog Voice	3192-101		
Black		107730475	8101A01-B003
White		107730483	8101A01-B264

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephones</b> ( <i>continued</i> )			
<b>Single-Line Telephones</b> ( <i>continued</i> )			
2500 YMGL	3101-KFD		
Black		107005043	2500YMGL-003
Misty cream		107005050	2500YMGL-215
2500 YMGM			
Black		107732422	2500YMGM-003
Misty cream		107732430	2500YMGM-215
2500 MMGL	3101-KBD		
Black		107023236	2500MMGL-003
Misty cream		107023277	2500MMGL-215
<b>Inactive Single-Line Telephones</b>			
2500 YMGK			
(message waiting, recall, touch-tone, desk)			
Black		105480578	2500YMGK-003
Misty cream		105480560	2500YMGK-215
2500 MMGK			
(recall, touch-tone, desk)			
Black		105414130	2500MMGK-003
Misty cream		105414122	2500MMGK-215
2500 MMGJ			
(touch-tone, desk)			
Black		105414155	2500MMGJ-003
Misty cream		105414148	2500MMGJ-215
2554 MMGJ			
(touch-tone, wall)			
Black		105480081	2554MMGJ-003
Misty cream		105480032	2554MMGJ-215
500 MM			
(rotary, desk)			
Black		103870234	500MM-03
Ivory		103870226	500MM-50
Beige		103870267	500MM-60
554 BMPA			
(rotary, wall)			
Black		103823498	554BMPA-3
Ivory		103823506	554BMPA-50

**Ordering Codes (continued)**

Component	PEC	Comcode	App. Code
<b>Telephones (continued)</b>			
<b>Wireless Telephones</b>			
MDW 9000 TransTalk™			
Wireless Telephone			
Set (standalone product shipped w/power pack)			
White	3204-01W	107546368	7815H03A-264
Black	3204-01B	107017022	7815H01A-003
MDW 9000 TransTalk™			
Wireless Telephone			
Set (sets for use with wireless carrier assembly)			
White	3204-W1W	107546368	7815H03A-264
Black	3204-W1B	107077455	7815H02A-003
TransTalk Wireless			
Carrier Assembly			
Headset	3204-CR1	107073330	117A1
Battery Pack	3122-041	407560010	
White			
Black	32034	106760812	
Charging Cradle			
White	32040	107581506	CHRG CRADLE
(Attribute: COL10)		106760812	BAT PACK
Black*	32040	107581498	CHRG CRADLE
(Attribute: COL09)		106760804	BAT PACK
<b>Inactive Cordless/Wireless Telephones</b>			
Model 5405		106440472	CS6300U30A-2292
Model 5455		106440464	CS6300U29A-2292
MDC 9000 Business			
Cordless Telephone			
Set			
White		107304982	7311H11B-264
Black		107304974	7311H11B-003

\* Default

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephones</b> ( <i>continued</i> )			
<b>Special-Purpose Telephones</b>			
Explosive Atmosphere Telephones			
520B			
Rotary, Desk	3129-ERW	103873048	520B-3
2520B			
Touch-tone, Wall	3129-ETW	103873030	2520B-3
<b>Inactive Special Purpose</b>			
<b>Outdoor Telephones</b>			
Rotary Outdoor WL		105727444	526
Touch-tone Outdoor WL		105725386	2526
Non-Dial Outdoor WL		105725402	526
Auto-Dial Outdoor WL		105725394	526 AMACADL
<b>Consoles</b>			
MERLIN II	61392	105229744	7318H01A-003
System Display Console			
<b>DSS</b>			
English (black)	3156-DCB	106902463	604B1-003
English (white)	3156-DCW	106902489	604B1-264
Spanish (black)	3156-SDI	107013294	604B1(22)-003
Spanish (white)	3156-SDI	107013302	604B1(22)-264

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>Applications</b>			
SPM Version 2.16-DOS	61495	107259905	
SPM Version 2.16-UNIX	61496	107259913	
SPM Version 3.18-DOS	61495	107259905	
SPM Version 3.18-UNIX	61496	107259913	
SPM Version 4.15-DOS	61508	107886608	
SPM Version 4.15-UNIX	61509	107886624	
SPM Version 5.15-DOS	61515	108007774	
SPM Version 5.15-UNIX	61514	108007782	
<b>Call Accounting System (CAS)</b>			
CAS Plus V3.1.1			
Bundle, Model 300 (does not include a printer)	1202-015		
Custom Rate Table	12055		
CAS for Windows			
50-station	1202-400		
Custom Rate Table (mandatory)	12055		
Turnkey Installation Service	12052		
Printer (optional) dot matrix	69769		
Hacker/Tracker	12014	406806166	PCCB6201
Fax/Modem SW		407046317	92193WP
UNIX CAS (All Sets)	1201-U14	407243187	ISIII CAS 250
UNIX CAS Rate Tables	12003	406140764	3.5 SW ATT MTS
UNIX CAS Upgrade (250-500)	1201-U15	406898254	UN/CAS UPGR
UNIX HackerTracker	1201-U13	406898270	SFTW-ISIII
<b>Inactive CAS</b>			
CAS Plus V3 Bundle w/80-col. Parallel Printer			
CAS Plus V3 Bundle w/132-col. Parallel Printer			
CAS Plus V3 Software Rate Table*		406362244	
CAS Plus V3 Update (SW)		406158444	3300EA51
CAS Plus upgrade		406025916	3300KA2U
CAS V3 Hacker Tracker (MS-DOS)		406774513	3399EA

\* Consult Lucent Technologies for other area-specific information.

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Applications (continued)</b>			
<b>Call Accounting Terminal (CAT)</b>			
CAT BASIC/B (LEGEND) Printer	3600-010	406716464	PRNTR-ML182-R2
Processor		406669769	PROCR-36001-C1
CAT + LEGEND/H Printer	3600-024	406716464	PRNTR-ML182-R2
Processor		406478818	PROCR-37000-C6-HQU
CAT + LEGEND/B Printer	3600-023	406716464	PRNTR-ML182-R2
Processor		406478800	PROCR-37000-C6-BQU
CAT Basic Rate Table* (Update Chip)	36014A	406669739	
CAT/B Rate Table* (update)	36023A	406478792	
CAT/H Rate Table* (update)	36024A	406478784	
<b>Call Management System (CMS)</b>			
5¼" floppy disk	1207-100	107004988	
3½" floppy disk		107004970	
Board	8301-100	106198815	
MII/ML CMS Alerter	83010		
Block Connector		105164859	104A-246
Power Supply		405331711	KS22911L2 120VAC
<b>CONVERSANT INTRO</b>			
MAP5 Tower/AVP/ LEGEND Bundle (no Script Builder)	4201-410		
MAP5 500MB Hard Drive			
8 MB RAM			
(QTY: 1) IVP 4 Board (4 ports)			
Color Monitor			
Keyboard			
9-25 pin Adapter			
Applications Printer			
321P/Printer cable			

\* Consult Lucent Technologies for other area-specific information.

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Applications</b> ( <i>continued</i> )			
<b>CONVERSANT INTRO</b>			
<i>(continued)</i>			
9600 bps modem			
(Qty: 2) D8W cords			
(Qty: 2) 250 MB Cartridge tapes			
Surge protector			
CONVERSANT INTRO 3.1.1			
Basic speech (male/female)			
IVP Platform Software			
AVP 2.1.1 Software			
LEGEND/IVR Switch			
Integration Software			
<b>CONVERSANT INTRO</b>	4201-112		
MAP5 Tower/AVP/ LEGEND bundle (with Script Builder)			
(Qty:2) IVP 4 Boards (8 ports)			
The remaining components are the same as PEC 4201-410			
<b>Telephony Services Netware for</b>			
<b>MERLIN LEGEND</b>	8320-500		
PassageWay Telephony Services R2.21D for Netware (core/clients)		407556364	
PassageWay Telephony Services R2.21D for Netware (250+user license)		407465558	
PassageWay Telephony Services Netware Driver for MERLIN LEGEND		108027368	
EICON ISDN Board for MERLIN LEGEND PassageWay Telephony Services		407556364	
<b>PassageWay™ Direct Connect</b>			
<b>(R2)</b>	8302-500	407214782	
PassageWay upgrade R1 to R2	8302-520A	407189802	
PassageWay R2 and Commence 2.1	8302-522		
PassageWay Software		407214782	
Commence Software		407528512	

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Applications</b> ( <i>continued</i> )			
<b>PassageWay™ Direct Connect (R2)</b> ( <i>continued</i> )			
PassageWay R2 and Commence Startup	8302-523		
PassageWay Software		407214782	
Commence Startup Software		407160043	
PassageWay R2 and OnTime 1.54	8302-524		
PassageWay Software		407214782	
OnTime Software		407127349	
Fast Call Software	8330-191	407344928	
Fast Call and Passage Way Direct Connect	8302-521		
Commence 2.1	8330-201	407160027	
Commence Startup	8330-202	407160043	
OnTime 1.54	8330-301	407127349	
Lucent Technologies Attendant Hardware	6125-ATT	406899054	
Documentation		106431265	
<b>MERLIN MAIL Voice Messaging</b>			
System for the MERLIN LEGEND Communications System (Release 3)			
2-port	6107-400		
MERLIN MAIL unit modem		407241926	
		407002427	
4-port	6107-401		
MERLIN MAIL unit modem		407536739	
		407002427	
6-port	6107-402		
MERLIN MAIL unit modem		407241942	
		407002427	
Release 3 Upgrade			
2-port to 4-port modem	617-404A	407241934	
		407002427	
2-port to 6-port modem	617-405A	407241942	
		407002427	
4-port to 6-port modem	617-406A	407241942	
		407002427	

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Applications</b> ( <i>continued</i> )			
<b>MERLIN MAIL Voice Messaging</b>			
<i>(continued)</i>			
MERLIN MAIL Voice Messaging System for the MERLIN LEGEND Communications System (Release 2)			
2-port	6107-005		
MERLIN MAIL unit		407161355	
Remote maintenance device		407002427	
MERLIN MAIL Multi-Lingual Admin. Guide (585-320-742)		107074932	
User's Quick Reference (585-320-741)		107074924	
4-port	6107-006		
MERLIN MAIL unit		407161363	
Remote maintenance device		407002427	
MERLIN MAIL Multi-Lingual Admin. Guide (585-320-742)		107074932	
User's Quick Reference (585-320-741)		107074924	
2-port line card (R2) (upgrade from 2 to 4 for MERLIN MAIL releases prior to V7.4)	6107-007	407108521	
2-port line card (upgrade from 2 to 4 for MERLIN MAIL releases V7.4 or later)	6107-008	407072115	
MERLIN Identifier (for MERLIN LEGEND R2.x)			
<b>DISCONTINUED</b>			
Controller Assembly with Display Keyboard Administration	6128-KBD	406891556	
Controller Assembly with PC Administration	6128-PCA	406891564	
Display Assembly with Wall-Mounting	6128-DIS	406891572	
Call Alert Software		406891721	
Bracket Assembly, ATL Telephone Mounting		406891937	
Fixture, Display Wallmount		406891929	
PC Administration Adapter Kit		406960930	

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>Applications (continued)</b>			
<b>Discontinued (continued)</b>			
Printer Adapter Kit		406960948	
Printer Port to PC Adapter Kit		406960955	
Installation and System Administration Manual		406891713	
Quick Reference Card for MERLIN Identifier Users		406891705	
Display Unit		406891663	
Keyboard 101		406891655	
Controller with Mounting Panel		406891648	
Cable, Serial RS-232, Controller to PC		406891903	
<b>MERLIN LEGEND R5.0 TSAPI Offers</b>			
In all R5.0 PECs where paper and CD-ROM are options, add attributes:			
Paper (attribute: doc51)			
CD-ROM (attribute: doc52) default			
<b>MERLIN LEGEND R5.0</b>			
Documentation			
End-user CD-ROM	61513	108007972	
Internal CD-ROM (Lucent Technologies Associates only)		108007964	
<b>MERLIN LEGEND TSAPI Solution 8320-500</b>			
PassageWay Telephony Services			
R2.21D for NetWare (Core/Clients)		407556364	
PassageWay Telephony Services			
R2.21D for NetWare -250+User License		407465558	
Legend Driver Software		108027368	
EICON Card		407556364	
<b>CCOM Application (PhoneLine)</b>			
(does not include Professional Services)			
5 Users License			
10 Users License			
25 Users License			
50 Users License			

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>Applications (continued)</b>			
<b>MERLIN LEGEND R5.0 TSAPI</b>			
<b>Offers (continued)</b>			
Q.SYS Application (PhoneWare)			
(does not include Professional Services)			
5 Users License			
10 Users License			
25 Users License			
50 Users License			
CALLWARE Application			
(Phonetastic)			
(does not include Professional Services)			
5 Users License			
Phonetastic Admin Guide			
User Guide			
Application (core)			
10 Users License			
Phonetastic Admin Guide			
User Guide			
Application (core)			
25 Users License			
Phonetastic Admin Guide			
User Guide			
Application (core)			
50 Users License			
Phonetastic Admin Guide			
User Guide			
Application (core)			
100 Users License			
Phonetastic Admin Guide			
User Guide			
Application (core)			
Professional Services Offers			
1 Application			
2 Applications			
Custom Contract			

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>System Adjuncts and Adapters</b>			
Auxiliary Power Unit 9024	61416	406467142	9024
Channel service units (CSUs)			
T1 CSU (3150 CSU)	21581	107087546	
T1 ESF CSU Standalone		107063828	21581-00001
115VAC in line Transformer		406942284	
Converter Cable		107083711	3100-F1-560
RJ48M to RJ48M Unshielded			
Twisted Pair Cable (T1)		406941559	3110-F1-500
To order parts separately use:			
T1 ESF CSU Standalone		107063828	21581-00001
115VAC in line Transformer	21573	406942284	
Converter Cable	21583	107063711	3100-F1-560
RJ48M to RJ48M Unshielded			
Twisted Pair Cable (T1)	21587	406941559	3110-F1-500
3160-DSU	2156-SA2	107115784	3160-A1- DSU
3164-DSU	2156-SA4	107115792	3164-A1- DSU-CSU
Optional Equipment:			
Unshielded TW Pair Cable (T1)			
Canada	21582	107063703	3100-F1-510
Straight-Thru Cable PC Serial			
Port	21584	406941542	3100-F1-550
Straight-Thru Cable			
Terminal/Printer	21585	406941534	3100-F1-540
Modular DC Voltage Adapter	21586	406941492	3100-F1-250
Wall Mount Kit	21590	406941674	3100-F1-400
Cables for Mounting			
25' D4BU-29 Cord	31504	106472921	ASSY-4400- F1-533
<b>Limited Availability</b>			
15' M25M Cable	31500	106473317	ASSY-3230- 903F
25' M25M Cable	31501	106473325	ASSY-3230- 904F
50' M25M Cable	31502	106473333	ASSY-3230- 905F
2' D4BU-29 Cord	31503	106472905	ASSY-4400- F1-530
Dial Back Modem FLD (inactive)		106842271	ASSY-3400- F2-201
Dial Back Modem FAC (inactive)		106842289	ASSY-3400- G2-201
Dial Back Modem NFLD (limited availability)	31507	106842305	ASSY-4000- F2-201

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>System Adjuncts and Adapters (continued)</b>			
Dial Back Modem NFAC (limited availability)	31508	106842297	ASSY-4000- G2-201
Prism MUX Field	31509	106842313	ASSY-3400- F2-200
Optional Equipment:			
Peripheral Interface	62515	105179303	KIT PRTS- D181558
Async. Data Unit, Receptacle RS232 Connector/Cord	2169-004	103963971 105388474	Z3A2 CORD M8AJ-87
Async. Data Unit, Plug RS232 Connector/Cord	2169-001	103963971 105388466	Z3A2 CORD M8AK-87
Aux Power (2 required) Transformer (2012-D)	21691	102599354	TRNSF- 2012D-49
Adapter (248B)		102802113	ADPTR- 248B-50
Cord		102937620	CORD- D6AP-87
Adapter (400B)		104152558	ADPTR-400B2
Electrostatic discharge/ (ESD) suppression kits			
D-181574		105179329	D181574
D-181589		105201891	D181589
D-181590		105201909	D181590
D-181591		105201917	D181591
D-181593		105201933	D181593
EMI filter		103965208	Z200A
In-Range Out-of-Building -343B (IROB) unit			
Analog multiline*	32918	407568161	343B
IROB unit-MLX*	32919	407568161	505A ASSY 0A WD
Fuse block 505A for IROB (8 fuse blocks per box)		406610337	

\* Any multiline off-premises telephone must have an appropriate IROB protector both at the control unit location and at the off-premises location.

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>System Adjuncts and Adapters (continued)</b>			
ExpressRoute 1000 Data Unit	2164-ER1	107651796	
V.35 Cable	2164-V35 (A)	107651275	
7500B data module	2164-BDM	105657639	7500B-L1
Stand-alone power supply	21625	405509852	WP90110L7
Multiple mounting	21626	105441166	Z77A
7500A upgrade kit	21627	105688501	D182208
Off-Premises Range Unit	2302-OPT	107531337	122A-215
Digital Magic on Hold <sup>®</sup>			
Basic Prerecorded Package	3128-020		
Digital Deck		407464684	DMOH1DIGITAL
Cassette		407166941	DMOH-02 GENERIC
Personalized Recording Package	3128-030		
Digital Deck		407464684	DMOH1 DIGITAL
Cassette		406876664	DMOH-01 PERSONALIZE
Custom Production Package (Std. Tape program)	3128-040		
Digital Deck		407464684	DMOH1 DIGITAL
Cassette		406876680	DMOH-05 SIN F/CUST
Standalone Single Custom Production Package	31284	405135344	INDIV
Standalone Package of 3 Custom Productions	31283	406876649	DMOH-03
Standalone Package of 4 Custom Productions	31280	405126632	M4 FOUR
Duplicate of a Custom Production (for Second Location)	31289	405127945	D-IP/EM DUB IND MSTR
Re-License of Music	31288	405127879	D24 24 DUB
Digital Announcer Unit (one minute)	3119-001		
Announcer		407344365	
Recorder		406659342	RCDR-DMOH2
Cassette		406769455	CSTT-DMOH5

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>System Adjuncts and Adapters</b> ( <i>continued</i> )			
Digital Announcer Unit (three minute) Announcer	3119-003	407344357	
Recorder		406659342	
Cassette		406659359	
Four Channel System (1-minute recording per channel)	3119-141	407716638	
Four Channel System (1-minute recording per channel, remote recording capability)	3271-141	407038512	ADP02/A
Eight Channel System (1-minute recording per channel, remote recording capability)	3271-241	407079003	
Eight Channel System (2-minutes recording per channel, remote recording capability)	3271-142	407556232	
Package of 12 Headset Prong Adapters	3122-012		
Package of 12 Headset Modular Adapters (for MLX sets)	3122-024		
Package of 12 Supra Noise Canceling Headpieces	3122-155		
Modem 2224G (limited availability)	2224-CEO	105659965	2224C-L1 D/2
Music Coupler	61398	406143925	ASSY-K23395 L3
PagePac Plus PagePac Plus Controller	5323-100	406914598	UNIT-22051-000
PagePac Plus Controller with Power	5325-105		
PagePac Plus 16 Zone D20 PagePac Plus	5335-100	406914614	UNIT-22051-016
Amplicenter	5328-020	406915280	UNIT-22051-020
D100 PagePac Plus			

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>System Adjuncts and Adapters (continued)</b>			
Amplicenter D300 PagePac Plus	5328-100	406915264	UNIT-22051-100
Amplicenter Universal 70V Door Spkr.	5328-300 5330-230	406915330 406914630	UNIT-22051-300 UNIT-22050-070
Ring generator unit	61388	105213201	129B RING GEN
<b>SMDR Printers</b>			
AP Printer (80-column)	4200-570	406637314	ML182
Lucent Technologies 571 Parallel Printer (132-column)	4200-571	406712067	ML321P
AP CAT Printer (serial)	4200-572	406716464	571-MCII 6FT
<b>Uninterruptible Power Supply</b>			
500 VA (15 min) (inactive)		406716464 105610141	ML182-R2 515005C111
Reserve (1 hr) (inactive)		105610174	0053150
PagePal Interface	5335-700	407120716	
<b>Universal Paging</b>			
Access Module (UPAM)	58500	405891698	KIT-UPAM
TAM-B		405899972	D181900
PRS-48		405742735	D181900
WMT-1A		405891680	D181900
<b>Zonemate™ 9</b>			
Dialer unit	53505	404057911	DIAL UNIT-9ZONE
Control unit		405024134	CNTL 22050-020
<b>Zonemate 39 (inactive)</b>			
Dialer unit		404057929	39 ZONE SELECT
Control unit		405024134	CNTL-22050-020C
<b>Audio Visual Paging</b>			
215C Message Center	5332-100		
4120C Message Center	5332-150		
Connector Kit	5332-900		
Wireless Keyboard	5332-905		
Alpha Net Plus Software	5332-910		
R2485 Repeater	5332-915		
<b>Lucent Technologies</b>			
People Finder			
2-Watt	5337-002		
4-Watt	5337-004		
Power Amplifier Kit	5337-035		
<b>Pagers (Numeric)</b>			
Renegade	5338-100		
Ultra Express	5338-210		

**Ordering Codes (continued)**

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>System Adjuncts and Adapters (continued)</b>			
Pagers (Alphanumeric)			
Memo Express	5338-200		
Advisor Alphanumeric	5338-500		
AlphaMate 250 Message Entry Unit	5338-900		
Pagers (Voice)			
PF300 Voice Pager	5338-300		
PF500 Voice Memory Pager	5338-310		
Director II Voice Pager	5338-320		
Director II Stored Voice Pager	5338-330		
Pagers (Hybrid)			
KeyNote Voice and Numeric Pager	5338-400		
<b>External Alerts</b>			
Loud external ringer	31016A	407105691	RINGER-L1AMP-49
E1CM-type	31019A		
Gray		102872934	RINGER-E1CM-49
Ivory		102917952	RINGER-E1CM-50
E1CM ringer and parts	61211		D-181233
290A adapter		102992252	290A ADPTR
Ringer		407105683	E1CM-49
Mounting plate		102988466	1049A
Cord		103938494	CORD-D4CH-87-25
<b>Supplemental Alerts</b>			
Alert Bell	5580-002	406293720	TB591-1
Network Interface Alert Bell	61211	407105683	RINGER-E1CM-49
Alert Horn	5580-021	406207217	THET4-1
Alert Strobe	5580-041	403319197	AT-WHL LK
Alert Chime	5580-030	405136060	CHBT2-1
<b>Telephone Adjuncts and Adapters</b>			
General Purpose Adapter			
(GPA) (analog)	2301-GPA	103977997	Z1C
Multi-Function Module (digital)	3156-MFM	105746474	540A1
Supplemental Alert Adapter (SAA)	2301-SSA	105031199	ADPTR-856A
MLX-10/ MLX-10D cover		406648469	
MLX Telephone Power Supply	2404-010		
MSP1 Power Supply		406743419	WP92464L1
7' Cord		103786778	

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Telephone Adjuncts and Adapters</b> ( <i>continued</i> )			
Analog Multiline Phone	62510	105105514	D181522
Power			
48V Power Supply		405331711	KS22911L2
Modular Power Cord		102937620	D6AP-87
Z400F Adapter		103942850	Z400F
<b>Single-line telephones</b>			
Program, Pause, and Auto Dial button conceal kit for 8100-series telephones (limited availability)	31931	106248370	Kit-D 182363 Analog
4A Speakerphone (limited availability)	3120-02W		4A
Power unit		102139938	PWR UNIT-85B1
Block connector		102434925	BLK CON-82B-49
Adapter for single-line telephone		102813888	ADPTR-223C
Adapter for multiline telephone		102949013	ADPTR-223D IP
Transmitter (black)		103971891	TRMR-680AF-03
Transmitter (ivory)		103971909	TRMR-680AF-50
Loudspeakers			
Black		103873873	LSPK-108AA-03
Ivory		103873881	LSPK-108AA-50
Green		103873899	LSPK-108AA-51
Beige		103873907	LSPK-108AA-60
White		103873964	LSPK-108AA-58
S201 Speakerphone	3152-007A	103786786	D8W-87 7FT
Black		106192651	MOD-S201AP-003
Misty cream		106192693	MOD-S201AP-215
CS201 Conference Speakerphone	3131-004A	103786786	D8W-87 7FT
Black		106270325	MOD-CS201A-003
Misty cream		106270333	MOD-CS201A-215
S202A Speakerphone	3152-008		
Black		105721088	TEL-S202A-003
Misty cream		105721096	TEL-S202A-215
S203A Speakerphone	3131-008		
Black		106058340	MOD-S203A-003
Misty cream		106508365	MOD-S203A-215
Message-Waiting Indicator	3152-004	103966396	Z34A
Hands-Free Unit (HFU) (inactive)		103814356	MOD-S102A

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>Telephone Adjuncts and Adapters (continued)</b>			
<b>Headsets and Adapters</b>			
StarSet® Headset	3122-030	406445627	KS23822L3
Mirage® Headset	3122-050	406445783	KS23822L4
Supra® Monaural Headset	3122-040	406445791	
Supra NC® Monaural Headset w/Noise Canceling	3122-055	406445809	
Supra Binaural Headset	3122-045	406976076	
Supra NC Binaural Headset w/Noise Canceling	3122-060	406445817	
Headset Adapter	3164-HFA	105752042	ADPTR-502C-003
500A Headset Adapter (inactive)		106690043	Adapter EL-500A-265
		405331711	Pwr Sup-KS2291 1L2
		102479904	Cord-D4BU-29 Std 7FT
		104152558	Adapter-40082
Modular Amplifier	3122-020	406741900	KS23822L2
Plug Prong Amplifier	3122-010	406445601	KS23822L1
<b>MLX Telephones—Miscellaneous Add-Ons/Replacement Parts</b>			
<b>Handsets and Cords</b>			
Handset Hook (black)		845544998	
Handset Hook (white)		845545003	
Handset (black)		106050065	K2S1-003
Handset (white)		106053408	K2S1-264
Handset, amplified hearing	31052		
Black		105581896	K6S2-003
White		106248248	K6S2-264
Misty cream*		105581904	K6S2-215
Noise Canceling Handset	31056		
Black		406712463	KS23843L7
White		406712471	KS23843L8
Misty cream*		406712489	KS23843L9
High-Noise Canceling Handset	31057		
Black		406712497	KS23843L10
White		406712505	KS23843L11
Misty cream*		406712513	KS23843L12
Amplified Speech Handset	31054		
Black		406712406	KS23843L1
White		406712414	KS23843L2
Misty cream*		406712422	KS23843L3

\* Default

## Ordering Codes (continued)

Component	PEC	Comcode	App. Code
<b>MLX Telephones—Miscellaneous Add-Ons/ Replacement Parts (continued)</b>			
<b>Handsets and Cords (continued)</b>			
Push-to-Talk Handset	31055		
Black		406712430	KS23843L4
White		406712448	KS23843L5
Misty cream*		406712455	KS23843L6
Push-to-Listen Handset	31053		
Black		406382344	K8S2-003
White		406382369	K8S2-264
Misty cream*		406382351	K8S2-215
Handset cord, 9' (2.74 m), black		105635429	H4DU-003 9 FT
Handset cord, 9' (2.74 m), white		105701809	H4DU-264 9'BULK
Handset cord, 12' (3.66 m), black		102401445	H4DU-3 12FT IP
Handset cord, 12' (3.66 m), white		102402609	H4DU-26412'IP
Handset cord, 25' (7.62 m), black		105523866	H4DU-3 25'
DSS line cord, 2' (61 cm)		106187545	CORD D8AC-87
<b>Desk Stands and User Trays</b>			
Stand (large, black)		846320851	STAND-LARGE BL
Stand (large, white)		846320844	STAND-LARGE WH
Stand (small, black)		846320810	STAND-SMALL BL
Stand (small, white)		846320802	STAND-SMALL WH
User tray (black)		846320240	USER TRAY DWR B
User tray (white)		846320232	USER TRAY DWR W
<b>Designation (Button Assignment) Cards and Covers</b>			
Card —MLX-10, MLX-10D, MLX-10DP, MLX-16DP, MLX-20L, MLX-28D		847355559	
Card set-DSS†		106448756	KIT-D182464
Card covers-DSS (black)†		106448731	KIT-D182462 PRT
Card covers-DSS (white)†		106448749	KIT-D182463 PRT
Card set-QCC‡		106561673	KIT-D182562 PRT
Card covers§—MLX-10, MLX-10D, MLX-20L		106448681	KIT-D182457 PRT
Card covers§—MLX-16DP		107499162	KIT-D182846 PRT
Card covers§—MLX-28D		106448699	KIT-D182458 PRT

\* 10 sheets per package

† Includes both top and bottom cards or covers

‡ 8 cards per kit (four sets)

§ 4 per package

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Analog Multiline Telephones—Miscellaneous Add-Ons/ Replacement Parts</b>			
<b>Desk Stands and Wall Mounts</b>			
Adjustable desk stand, 10-button (inactive)		103746855	11A
Adjustable desk stand, 34-button	32003	103746863	11C
Fixed desk stand, 5- & 10-button	32004	103746848	10A
Desk stand/wall mount 14A, BIS-10		103804290	14A-003
Desk stand/wall mount 14B, BIS-22		103964458	Z14B-003
Desk stand/wall mount 14C, BIS-34		103979837	14C-003
Fixed desk stand and wall mount, 5-button	32000	103804290	14A
Kit of parts		103995882	D-181230
Wall mount, 10-button	32001	103747846	201A
Kit of parts		103995882	D-181230
Wall mount, 34-button	32006	103747853	203A
Kit of parts		103995882	D-181230
<b>Faceplates</b>			
BIS-10		105203186	KIT PRTS-D-181582
BIS-22		105336986	KIT PRTS-D-181786
BIS-22D		105690762	KIT PRTS-D-182210
BIS-34 and BIS-34D		105203194	KIT PRTS-D-181583
<b>Button Label Sheets</b>			
BIS-10		105336978	KIT PRTS-D- 181785
BIS-22		105336960	KIT PRTS-D- 181784
BIS-22D		105690770	KIT PRTS-D- 182211
BIS-34 and BIS-34D		105336956	KIT PRTS-D- 181783

**Ordering Codes** (*continued*)

<b>Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>App. Code</b>
<b>Analog Multiline Telephones—Miscellaneous Add-Ons/ Replacement Parts</b> ( <i>continued</i> )			
<b>Button Label Sheets</b> ( <i>continued</i> )			
Display console (FM1) (includes one faceplate)		105299754	KIT PRTS-D-181727
Display console (FM2 & R3) (includes one faceplate)		105486252	KIT PRTS-D-182041

**Single-Line Telephones—Miscellaneous Add-Ons**

Ground-Start Button	31021	405792839	Key-KS23566L1
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**Wiring Kits**

## Interconnect Wiring Kit

110AB1-100JP12		104409396	
110A1 trough		104407960	
D-Rings		842139248	
D8W cords		103786802	
Parts list			

SYSTIMAX<sup>®</sup>

MERLIN Wiring Kit	3103-MER	106393671	
110A1 trough (5)		104407960	
110AB1-100JP12 modular block (2)		104409960	
110AB1-100 FT punch down block (1)		103823845	
D-Rings (6)		842139248	
Patch cords 12 cords, 4-pair, 5' (1.5 m)		846619989	
D8W cords 24 cords, 14' (4.3 m)		103786802	
Template		846613933	
Instruction sheet		846613941	
Parts List		846623924	

## Control Unit Modules

<b>Module</b>	<b>Trunk Type</b>	<b>Extension Type</b>
Processor	N/A	N/A
Power supply	N/A	N/A
008	N/A	Analog multiline telephone; Call Management System; analog data via a modem
008 MLX	N/A	MLX telephone; digital data device (such as the ISDN terminal adapter)  CTI link connected to Passageway Telephony services for NetWare
008 OPT	N/A	On-premises or off-premises single-line telephone

## Specifications

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**Highlights:** 68EC020 processor at 16 MHz, built-in 1200/2400-bps modem; built-in diagnostics; Hybrid/PBX, Key, or Behind Switch mode option; 1.5 MB RAM backup for 4 days; PCMCIA interface

**Ports:** Three RS-232-C ports. One for debugging (plugged to prevent access), one for SMDR, and one for system administration

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**Power input:** 117 VAC

**Power output:** +5 VDC (10 A), -5 VDC (2.50 A), -48 VDC (2.05 A)

**Capacity:** 54 unit loads

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**Capacity:** 8 analog extensions

**Signaling:** Analog multiline telephone protocol (40 kbps)

**Loop range:** 1000 feet (305 m), in-building or in-range out-of-building (with analog IROB protectors) only

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**Capacity:** 8 digital extensions, each with 1 or 2 endpoints (each endpoint assigned a separate extension number), including these extension types:

- CTI link (only one per system)
- digital voice only
- digital voice with Voice Announce to Busy
- digital voice and digital data (via ISDN terminal adapter)
- digital voice and analog data
- digital data only (ISDN Terminal Adapter)

**Signaling:** BRI S/T protocol (two 64-kbps B channels, one 16-kbps D channel) on a passive bus

**Power:** 48 VDC phantom power to telephone, 48 VDC over a separate pair (7–8) to an operator console with a DSS

**Loop range:** 1000 feet (305 m), in-building or in-range out-of-building (with MLX IROB protectors) service only

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**Capacity:** 8 T/R extensions\* on 2-way voice transmission path with support for telephones with message-waiting LEDs; built-in ring generator; 2 TTRs

**Notice to Telephone Company:** Meets FCC Class C

**Ring current:** 75-Vrms, 20-Hz trapezoidal ringing superimposed on -48 VDC.

**REN:** ≤ 1.0 per port

**Disconnect signal:** 900 ms (T/R short for answering machines, G3 fax, etc.)

**Switchhook flash detection:** 300–1200 ms

**Loop resistance:** Serves 2-wire loops to 1300 ohms, including extensions

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\* The system recognizes the OPT module as an 012 module having 12 ports. However, the OPT module has only 8 jacks. Therefore, each installed OPT module decreases the system's capacity by 4 ports.

**Control Unit Modules** *(continued)*

<b>Module</b>	<b>Trunk Type</b>	<b>Extension Type</b>
012 (T/R) + Ring Generator	N/A	Single-line telephone; AT&T Attendant; MERLIN MAIL Voice Messaging System; T/R adjunct (such as an answering or fax machine); analog data device (such as a modem)
016 (T/R)	N/A	Single-line telephone; AT&T Attendant, MERLIN MAIL Voice Messaging System; T/R adjunct (such as an answering or fax machine); analog data device (such as a modem)
100D	T1 or PRI	N/A
800 NI-BRI	T1 NI-BRI interface	Certified video applications
400*	Loop-start and TTR	Power failure transfer (PFT) telephone
400EM	Tie trunk	N/A
400 GS/LS/TTR	Loop-start or ground-start and TTR	PFT telephone (button needed for ground-start PFT telephone)

\* Although these MERLIN II modules are supported, the 400 GS/LS, the 408 GS/LS, and the 408 GS/LS-MLX are the recommended modules.

## Specifications

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**Capacity:** 12 T/R extensions on 2-way voice transmission path with support for telephones with message-waiting LEDs; 2 TTRs

**Power:** 21-VDC, 600-ohm battery source

**Ringing current:** 105-Vrms, 30-Hz sinusoidal ringing superimposed on -48 VDC; a ring generator must be installed in the power supply module of each carrier that has an 012 module.

**REN:**  $\leq 4.0$  per port

**Disconnect signal:** 900 ms (T/R short for answering machines, G3 fax, etc.)

**Switchhook flash detection:** 300–1200 ms

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**Capacity:** 16 T/R extensions on 2-way voice transmission path with support for telephones with message-waiting LEDs; 4 TTRs

**Power:** 40-VDC, 600-ohm battery source

**Ringing current:** 105-Vrms, 30-Hz sinusoidal ringing superimposed on -48 VDC; a ring generator must be installed in the power supply module of each carrier that has an 016 module.

**REN:**  $\geq 4.0$  per port

**Disconnect signal:** 900 ms (T/R short for answering machines, G3 fax, etc.)

**Switchhook flash detection:** 300–1200 ms

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**Capacity:** 24 trunks for voice and analog data or 23 trunks for voice and data with 1 channel used for signaling

**Mode:** Multiplexes 24 or 23 trunks into 1 facility and demultiplexes 1 facility into 23 or 24 trunks

**Speed:** Up to 64 kbps

**Signaling:** DS1 over 4-wire; T1 uses robbed-bit or common-channel, PRI uses 23 B + D

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**Capacity:** Eight modular jacks each supporting one Digital Subscriber Line

**Mode:** National ISDN 1

**Speed:** Up to 64 kbps

**Signaling:** ISDN Basic Rate 2B+D

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**Capacity:** 4 trunks, 4 TTRS, 1 PFT telephone

**Signaling:** Loop-start

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**Capacity:** 4 tie lines

**Method of completion:** Automatic start, immediate-start, wink-start, or delay-dial-start

**Signaling:** E&M type 1S, type 1C, type 5

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**Capacity:** 4 trunks, 4 TTRs, 1 PFT telephone

**Signaling:** Loop-start or ground-start, optioned per port

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## Control Unit Modules *(continued)*

Module	Trunk Type	Extension Type
408 <sup>*</sup>	Loop-start	Analog multiline telephone; Call Management System; PFT telephone
408 GS/LS	Loop-start or ground-start	Analog multiline telephone; Call Management System; PFT telephone
408 GS/LS-MLX	Loop-start or ground-start	MLX telephone; digital data device (such as ISDN Terminal Adapter)  CTI link connected to Passageway Telephony services for NetWare
800 <sup>†</sup>	Loop-start	PFT telephone
800 DID	Direct Inward Dialing	N/A
800 GS/LS	Loop-start or ground-start	PFT telephone; button needed for ground-start PFT
800 GS/LS-ID	Loop-start or ground-start	Calling number identification on MLX display telephones. Calling number identification is not available on ground-start trunks

<sup>\*</sup> Although these MERLIN II modules are supported, the 400 GS/LS, the 408 GS/LS, and the 408 GS/LS-MLX are the recommended modules.

<sup>†</sup> Although this MERLIN II module is supported, the 800 GS/LS is the recommended module.

## Specifications

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**Capacity:** 4 trunks, 8 extensions, 1 PFT telephone

**Extension signaling:** Analog multiline telephone (40 kbps)

**Trunk signaling:** Loop-start trunk, analog voice

**Loop range:** 1000 feet (305 m), in-building or in-range out-of-building (with analog IROB protectors) only

**Capacity:** 4 trunks, 8 extensions, 1 PFT telephone

**Extension signaling:** Analog multiline telephone (40 kbps)

**Trunk signaling:** Loop-start or ground-start trunk (optional per port); voice

**Loop range:** 1000 feet (305 m), in-building or in-range out-of-building (with analog IROB protectors) only

---

**Capacity:** 4 trunks, 8 digital extensions, 1 PFT telephone, 1 CTI link

**Extension signaling:** BRI S/T protocol (two 64-kbps B channels, one 16-kbps D channel) on a passive bus

**Trunk signaling:** Loop-start or ground-start trunk (optional per port), analog voice

**Loop range:** 1000 feet (305 m), in-building or in-range out-of-building (with MLX IROB protectors) only

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**Capacity:** 8 trunks, 2 PFT telephones

**Signaling:** Loop-start

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**Capacity:** 8 trunks, 2 TTRs

**Transmission:** Incoming calls only; 2-way (1-pair) fixed impedance to DID trunks; no outgoing calls

**Signaling:** Loop-reverse battery; wink-start or immediate-start; accepts touch-tone dialing

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**Capacity:** 8 trunks, 2 PFT telephones

**Signaling:** Loop-start or ground-start

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**Capacity:** 8 lines/trunks, 2 PFT telephones, 2 TTRs

**Signaling:** Loop-start or ground-start

**Protocol:** Requires calling number identification service from central office

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## Adjunct Summary

Equipment Type	Specifications	Lucent Technologies Products
Alerts (AC)*	<ul style="list-style-type: none"> <li>■ Any audible or visual alert that operates on 20–30 Hz ringing signals</li> <li>■ Associated with a specific extension (supplemental alert) or works on a programmed trunk port (external alert)</li> </ul>	External Ringer—Loud External Ringer
Alerts (DC)	<ul style="list-style-type: none"> <li>■ Any audible or visual alert that operates on 48-VDC ringing signals</li> <li>■ Associated with a specific extension (supplemental alert) or works on a programmed trunk port (external alert)</li> </ul>	Alert bell Alert horn Alert strobe Alert chime Alert deluxe horn Alert switch
Answer/record machine*	<ul style="list-style-type: none"> <li>■ Industry-standard machine</li> <li>■ Low ringer equivalence (less than 0.15 or <math>\leq 4.0^{\dagger}</math> total REN for T/R port)</li> <li>■ Ability to recognize 600-ms disconnect signal or other means of automatic disconnect (such as voice reset disconnect timer, fixed recording time)</li> </ul>	Model 1300 answering machine Model 1531 Remote Answering System telephone

\* Cannot be connected to a QCC.

† latest 012 T/R Module (517H13)

**Interface**

<b>LS or GS/LS</b>	<b>T/R</b>	<b>MFM</b>	<b>GPA</b>	<b>SAA</b>
<b>Line/Trunk Jack</b>	<b>012/016 Extension Jack</b>	<b>MLX Extension Jack</b>	<b>Analog Extension Jack</b>	<b>Analog Extension Jack</b>
	✓	✓	✓	
✓†		✓		✓
	✓	✓	✓	

† Requires Universal Paging Access Module (UPAM) to provide 48 VDC.

## Adjunct Summary (continued)

<b>Equipment Type</b>	<b>Specifications</b>	<b>Lucent Technologies Products</b>
Cordless Telephone *	<ul style="list-style-type: none"><li>■ Must have touch-tone dialing capability when connected via MFM; rotary or touch-tone dialing can be used on T/R port.</li><li>■ Single line</li></ul>	5650 Cordless Telephone 5481 Cordless Telephone 5552 Cordless Telephone
Credit Card Verification Terminal*	<ul style="list-style-type: none"><li>■ Must have touch-tone dialing capability when connected via MFM; rotary or touch-tone dialing can be used on T/R port</li></ul>	N/A
Dial Dictation*	<ul style="list-style-type: none"><li>■ A device that requires contact closure can be used on LS/GS line jack only with UPAM</li></ul>	N/A
Direct Station Selector	<ul style="list-style-type: none"><li>■ A maximum of 2 DSSs can be connected to an operator console.</li><li>■ A 329A power unit must be added to an operator console having 2 DSSs.</li><li>■ Connects to DSS jack on operator console</li></ul>	Direct Station Selector (DSS)

\* Cannot be connected to a QCC.

**Interface**

<b>LS or GS/LS</b>	<b>T/R</b>	<b>MFM</b>	<b>GPA</b>	<b>SAA</b>
<b>Line/Trunk Jack</b>	<b>012/016 Extension Jack</b>	<b>MLX Extension Jack</b>	<b>Analog Extension Jack</b>	<b>Analog Extension Jack</b>
	✓	✓	✓	
	✓	✓		
✓	✓	✓	✓	

## Adjunct Summary *(continued)*

Equipment Type	Specifications	Lucent Technologies Products
Fax*	<ul style="list-style-type: none"> <li>■ Must have touch-tone dialing capability when connected via MFM; rotary or touch tone dialing can be used on T/R port.</li> <li>■ Industry-standard analog interface.</li> </ul>	
Group Calling Delay Announcement*	<ul style="list-style-type: none"> <li>■ Industry-standard announcement device</li> <li>■ Must provide automatic disconnect</li> <li>■ Each calling group can have its own announcement (maximum 32).</li> <li>■ A device can provide delay announcement for more than one group.</li> </ul>	<p>Model 1330 Answering Machine</p> <p>Digital Announcement Unit</p>
Hands-Free Unit	<ul style="list-style-type: none"> <li>■ For use with analog multiline telephones</li> <li>■ Connects directly to telephone</li> </ul>	5202A
Headset for analog multiline telephone	N/A	<p>Starset</p> <p>Mirage</p> <p>Supra</p> <p>Supra NC</p>

\* Cannot be connected to a QCC.

**Interface**

<b>LS or GS/LS</b>	<b>T/R</b>	<b>MFM</b>	<b>GPA</b>	<b>SAA</b>
<b>Line/Trunk Jack</b>	<b>012/016 Extension Jack</b>	<b>MLX Extension Jack</b>	<b>Analog Extension Jack</b>	<b>Analog Extension Jack</b>
	✓ can also use 008 OPT Extension Jack	✓		
	✓	✓	✓	

## Adjunct Summary *(continued)*

Equipment Type	Specification	Lucent Technologies Products
Headset for MLX telephone	N/A	Starset Mirage Supra Supra NC
Headset Adapter	<ul style="list-style-type: none"> <li>■ Connects directly to telephone OTHER jack.</li> </ul>	
Loudspeaker Paging	<ul style="list-style-type: none"> <li>■ External paging system using DTMF signaling connected to LS or GS line jack</li> <li>■ CPE paging systems require an interface unit; if CPE has 2-wire input, the PagePal interface (5335-700) can be used.</li> </ul>	PagePac Plus Amplicenters D20, D100, D300 PagePac Plus Controller PagePac 6 PagePac 6 Plus
Message Waiting Indicator	<ul style="list-style-type: none"> <li>■ For single-line telephones</li> <li>■ Connects directly to telephone</li> </ul>	Z34A (PEC 3 1032)
Modem	<ul style="list-style-type: none"> <li>■ If the modem supports touch-tone dialing via the associated data terminal, the keyboard can be used for dialing.</li> <li>■ If the modem does not support touch-tone dialing, an associated basic (single-line) telephone can be used for dialing.</li> </ul>	

**Interface**

<b>LS or GS/LS</b>	<b>T/R</b>	<b>MFM</b>	<b>GPA</b>	<b>SAA</b>
<b>Line/Trunk Jack</b>	<b>012/016 Extension Jack</b>	<b>MLX Extension Jack</b>	<b>Analog Extension Jack</b>	<b>Analog Extension Jack</b>
✓				
✓*	✓	✓	✓	

\* For 2224G Modem only.

## Adjunct Summary *(continued)*

Equipment Type	Specifications	Lucent Technologies Products
Music-on-Hold <sup>*</sup>	<ul style="list-style-type: none"> <li>■ Any FCC-registered 8-ohm music source or recorded announcement device</li> </ul>	Magic on Hold
Speakerphone	<ul style="list-style-type: none"> <li>■ Connect directly to telephone</li> <li>■ For single-line telephones only</li> </ul>	4A <sup>†</sup> (PEC 3120-02W) 203A (PEC 3131-008)
SMDR Printer	<ul style="list-style-type: none"> <li>■ Connects to upper RS-232-C jack on processor module</li> <li>■ Must be located within 50 feet (15 m) of control unit or use ADU to extend distance</li> </ul>	475 Printer 476 Printer 572 Printer

\* If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI). Or you can purchase a Magic on Hold system, which does not require you to obtain such a license, from Lucent Technologies or an authorized dealer.

† Requires 2500SM telephone.

**Interface**

<b>LS or GS/LS</b>	<b>T/R</b>	<b>MFM</b>	<b>GPA</b>	<b>SAA</b>
<b>Line/Trunk Jack</b>	<b>012/016 Extension Jack</b>	<b>MLX Extension Jack</b>	<b>Analog Extension Jack</b>	<b>Analog Extension Jack</b>
✓*				
	✓†			

\* Music Coupler required (PEC 61398).

† As of Release 4.0

## Power Supply Unit Load Requirements

### Unit Load Calculation Rules

Mode	Installed Modules	Calculation
Hybrid/PBX, Modified Key, or Behind Switch	6*	Not required
Square Key or Behind Switch	4 or fewer†	Not required

\* The 391A1 and 391A2 power supply units generally support 6 modules of any type in Hybrid/PBX mode. However, if all 6 carrier slots meet the following conditions, the unit load total may exceed 54 and auxiliary power may be required:

- Only MLX or analog multiline station modules are installed.
- More than 45 MLX-20L or 34-button analog multiline telephones are installed.

The 391A3 power supply has a maximum rating of 75 unit loads. Use this power supply in place of a 391A1 or 391A2 on systems where unit loads will exceed 54.

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

† The 391A1 power supply unit generally supports 4 modules of any type in Square Key mode.

## Power Supply Unit Load Requirements

(continued)

### Unit Load Calculation Rules (continued)

<b>Mode</b>	<b>Installed Modules</b>	<b>Calculation</b>
Square Key or Behind Switch	5 or more	<ul style="list-style-type: none"><li>■ Use the “Unit Load Rating of System Modules” table and instructions below to determine the estimated unit loads (ULs):<ul style="list-style-type: none"><li>—If the ULs &lt; 75 and the 391A3 power supply is used, then no calculation is required. If a 391A1 or 391A2 power supply is used and the ULs &gt; 54, then an auxiliary power supply is needed <u>or</u> replace the power supply with a 391A3.</li><li>—If ULs &gt; 75, reconfigure the system so that the total ULs do not exceed 75 per carrier.</li></ul></li></ul>

## Power Supply Unit Load Requirements

(continued)

### Unit Load Rating of System Modules

Module	Unit Load	Module	Unit Load
008	12.0	408 GS/LS	12.0
008 MLX	13.5	408 GS/LS-MLX	12.0
008 OPT	8.0	408 (LS)	12.0
012 T/R	7.2 <sup>†</sup>	800 GS/LS	0.0
016 T/R	12.8	800 GS/LS-ID	0.0
100D (DS1)	0.0	800 (LS) <sup>*</sup>	0.0
400 GS/LS/TTR	0.0	800 DID	8.0
400 (LS) <sup>*</sup>	0.0	800 NI-BRI	0.0
400EM	8.0	Processor	0.0

<sup>†</sup> 012 modules older than 517H13 may have a unit load up to 8.4.

<sup>\*</sup> This is a MERLIN II loop-start-only module that can be used in the MERLIN LEGEND Communications System.

## Power Supply Unit Load Requirements (continued)

### Unit Load Rating of System Trunks, Telephones, and Adjuncts

<b>Network Access Trunks*</b>	<b>Unit Load</b>
DID	1.0
DS1	0.0
GS/LS	0.0
Tie	1.4
<hr/>	
<b>Telephones</b>	
MLX-5, MLX-5D	.9
MLX-10, MLX-10D, and MLX-10DP	1.2
MLX-16DP	1.5
MLX-28D	1.7
MLX-20L	1.6
BIS-10	1.1
BIS-22 and BIS-22D	1.3
BIS-34 and BIS-34D	1.5
MLC-5	0.0
MDC 9000	0.0
MDW 9000	0.0
5-Button	0.8
10-Button Basic	1.1
10-Button HFAI	1.2
34-Button Basic	1.1
34-Button DLX	1.7
34-Button BIS	1.4
34-Button BIS/DIS	1.4
Single-line telephone	0.7
<hr/>	
<b>Optional Equipment</b>	
EICON board (CTI link interface in NetWare server)	0.0
DSS console <sup>†</sup>	0.9
MFM <sup>‡</sup>	1.3
General Purpose Adapter	1.0
Hands Free Unit	1.0
Headset adapter	1.0

\* Unit loads are computed per trunk.

† Up to two DSS consoles (one DSS per MLX-28D or MLX-20L) can be powered from each control unit carrier. For example, a 3-carrier system can have 6 system operator positions, each with one DSS powered from the control unit.

‡ The MFM is powered by an individual wall power unit located at the station.

## System Feature Availability by Operating Mode

Feature	Mode		
	PBX	Key	Behind Switch
Account Code Entry	✓	✓	✓
Authorization Codes	✓	✓	✓
Automatic Maintenance Busy	✓	✓	✓
Automatic Route Selection	✓		
Callback	✓	✓	✓
Calling Restrictions	✓	✓	✓
Coverage	✓	✓	✓
Coverage VMS Off	✓	✓	✓
CTI Link	✓		
Delayed Ring interval	✓	✓	✓
Direct Inward Dialing	✓		
Direct-Line Console options	✓	✓	✓
Direct Voice Mail	✓	✓	
Directory	✓	✓	✓
Extension Status	✓	✓	✓
Forced Account Code Entry	✓	✓	✓
Group Calling	✓	✓	✓
Headset Status	✓	✓	✓
Hold disconnect	✓	✓	✓
Inside dial tone	✓	✓	✓
Labeling	✓	✓	✓
Language selection	✓	✓	✓
Loudspeaker Paging	✓	✓	✓
Microphone Disable	✓	✓	✓
Night Service	✓	✓	✓

**System Feature Availability  
by Operating Mode** (*continued*)

<b>Feature</b>	<b>Mode</b>		
	<b>PBX</b>	<b>Key</b>	<b>Behind Switch</b>
Paging groups	✓	✓	✓
Park	✓	✓	✓
Pickup groups	✓	✓	✓
Pools (trunk groups)	✓		
Queued Call Console options	✓		
Recall interval	✓	✓	✓
Reminder Cancel	✓	✓	✓
Remote Access	✓	✓	✓
Remote Call Forward	✓	✓	✓
Station Message Detail Recording	✓	✓	✓
System Numbering	✓	✓	✓
System Restart	✓	✓	✓
System Speed Dial	✓	✓	✓
Toll Type	✓	✓	✓
Touch-tone or rotary signaling	✓	✓	✓
Transfer options	✓	✓	✓
Voice Announce to Busy	✓	✓	✓

K Key mode
P Hybrid/PBX mode
B Behind Switch mode

## Telephone and Operator Console Features

Feature	Program Code	Feature Code
Account Code Entry	*82	82 + code
Alarm§	*759	
Authorization Code	*80	80+ code
Auto Answer All	*754	
Auto Answer Intercom	*753	
Auto Dial		
Inside (ext., group, zone)	*22 + ext. no.	
Outside	*21 + tel. no.	
Automatic Line Selection		
Enter	*14	
Exit	**14	
Barge-In * §	*58	
Callback		
Automatic		
On	*12	
Off	**12	
Selective	*55	55
Cancel selective		*55 (single-line sets only)

\* Centralized telephone programming only.

§ System operator-only feature.

<b>MLX-5D, 10D</b>	<b>MLX-16DP,28D</b>	<b>MLX-20L</b>	<b>Single-Line</b>	<b>MLX-5, -10</b>	<b>Analog Multiline<sup>†</sup></b>
KPB	KPB	KPB	KP	KPB	KPB
	KPB	KPB			KPB
KPB	KPB	KPB	KP	KPB	KPB
					KPB
					KPB
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB	KP	KPB	KPB

<sup>†</sup> Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Call Waiting		
On	*11	
Off	**11	
Call Waiting Pickup		87
Camp-On	*57	57
Conference	*772	772
Coverage		
Receiver buttons		
Group	*42 + ext. no.	
Primary	*40 + ext. no.	
Secondary	*41 + ext. no.	
Sender buttons		
Cover inside & outside calls	*48	
Cover outside calls only	**48	
Coverage Off	*49	
Coverage VMS Off	*46	
Data Status	*83 + ext. no.	
Direct Voice Mail	*56	56+ext. no.
Directory		
System Directory	(system programming)	
Extension Directory	(display only)	
Personal Directory	(display only)	
Do Not Disturb	*47	
Drop	*773	773

MLX-5D, 10D	MLX-16DP,28D	MLX-20L	Single-Line	MLX-5, -10	Analog Multiline <sup>†</sup>
KPB	KPB	KPB	KPB	KPB	KPB
KPB	KPB	KPB		KPB	KPB
B	B	B		B	B
KPB	KPB	KPB		KPB	KPB
			KPB KPB KPB KPB		
KPB	KPB	KPB		KPB	KPB
KP	KP	KP	KP	KP	KP
KPB	KPB	KPB			
KPB	KPB	KPB KPB KPB			
KPB	KPB	KPB		KPB	KPB
B	B	B		B	B

<sup>†</sup> Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Extension Status		
Direct-Line Console <sup>§</sup>		
Status Off	*760	760 + DSS button
Status 1	*761	761 + DSS button
Status 2	*762	762 + DSS button
Telephones (rooms or agents)		
Status Off		*44
Status 1	*45	45
Status 2	*44	44
Feature button	*20	
Forward and Follow Me		
Activate		
Forward (inside)	*33	33 + ext. no.
Remote Call Forward	*33	33 + tot. no. + #
Follow Me		34 + ext. no.
Cancel		
At originating extension		33 + own ext. no.
At destination extension		
Cancel one		*34 + ext no.
Cancel all		*34*
Group Calling		
In-Queue Alarm button	*22 + calling group ext. no.	
Calling group supervisor		
Enter supervisor mode <sup>§</sup>		32 + Hold
Exit supervisor mode <sup>§</sup>		32 + Drop
Available (ES Status 2)	*762	762 + DSS button
Unavailable (ES Status Off)	*760	760 + DSS button
Calling group members		
Sign in (Available)	*44	44
Sign out (Unavailable)		*44
After-call work state (CMS only)	*45	45

<sup>§</sup> System operator-only feature.

MLX-5D, 10D	MLX-16DP,28D	MLX-20L	Single-Line	MLX-5, -10	Analog Multiline†
	KPB	KPB			KPB
KPB	KPB	KPB	KPB	KPB	KPB
					KPB
KPB	KPB	KPB	KPB	KPB	KPB
KPB	KPB	KPB		KPB	KPB
	KPB	KPB			KPB
KPB	KPB	KPB	KPB	KPB	KPB

† Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Group Page Auto Dial button	*22 + <i>group ext. no.</i>	
Headset		
Auto Answer	*780	
Hang Up*	*781	
Mute (Headset/Handset)	*783	
Status	*782	
Hold		771
Hold Release		**
Intercom buttons		
Assign buttons*		
ICOM (Default Ring)	*16	
ICOM Originate Only	*18	
Change type		
Ring	**19	
Voice	*19	
Language		
English		790
French		791
Spanish		792
Last Number Dial	*84	84
Messaging		
Leave Message		
After calling	*25	25
Without calling		53 + <i>ext. no.</i>
Cancel message left		*53 + <i>ext. no.</i>
Message LED off	*54	54
Posted Message	*751	
Send/Remove Message§	*38	38 + <i>ext. no.</i>

\* Centralized telephone programming only.

§ System operator-only feature.

MLX-5D, 10D	MLX-16DP,28D	MLX-20L	Single-Line	MLX-5, -10	Analog Multiline†
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB		KPB	
B	B	B		B	B
B	B	B	B	B	B
K B	K B	K B		K B	K B
			K B		
			K B		
KPB	KPB	KPB		KPB	
KPB	KPB	KPB	K P	KPB	KPB
KPB	KPB	KPB	KPB	KPB	KPB
KPB	KPB	KPB	KPB	KPB	KPB
KPB	KPB	KPB		KPB	KPB
	KPB	KPB			KPB

† Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Messaging (continued)		
Receiving messages	*26	26
Delete Message†	*28	28
Next Message†	*27	27
Return Call†	*29	29
Scroll†		
Night Service§	*39	39
Notify		
Send	*757 + ext. no.	
Receive	*758 + ext. no.	
Park	*86	
Park Zone Auto Dial§	*22 + Park Zone	
Personal Speed Dial	# + (01-24) + *21 + tel no. + #	01-24
Personalized Ringing	*32 + ring (1-8)	
Pickup		
General use	*9	
Specific line or ext.	*9 + line no./ext.	9 + line no./ext.
Group	*88	88
Position Busy§	*750	
Privacy		
On	*31	31
Off		*31
Recall	*775	775

† Display telephones only. Programming and feature codes are used with analog multiline telephones only; MLX telephones use display.

§ System operator-only feature.

MLX-5D, 10D	MLX-16DP,28D	MLX-20L	Single-Line	MLX-5, -10	Analog Multiline†
KPB	KPB	KPB			KPB
KPB	KPB	KPB			KPB
KPB	KPB	KPB			KPB
	KPB	KPB			KPB
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB	K P	KPB	KPB
	KPB	KPB			KPB
KPB			K P	KPB	KPB
KPB	KPB	KPB		KPB	KPB
KPB	KPB	KPB	K P	KPB	KPB
		P			
KPB	KPB	KPB	K P	KPB	KPB
KPB	KPB	KPB		KPB	KPB

† Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Reminder Service		
Set	*81	81 + time †
Operator Set §		81 + ext. no. + time †
Cancel	**81	*81
Operator Cancel §		*81 + ext. no. §
Missed §	*752	
Ringing/Idle Line Preference		
On	*343	
Off	*344	
Ringing Options		
Individual lines		
Immediate ring	*37	
Delay ring	*36	
No ring	*35	
All lines		
Immediate Ring	*347	
Delay Ring	*346	
No Ring	*345	
Abbreviated Ring		
On	*341	
Off	*342	
Send Ring (Shared SA)		
On	*15	
Off	**15	

† English only: time is 12-hour (0100-1259) + 2(A) or 7(P). French and Spanish: time is 24-hour (0000-2359).

§ System operator-only feature.

<b>MLX-5D, 10D</b>	<b>MLX-16DP,28D</b>	<b>MLX-20L</b>	<b>Single-Line</b>	<b>MLX-5, -10</b>	<b>Analog Multiline†</b>
KPB	KPB	KPB	KPB	KPB	KPB

---

KPB	KPB	KPB		KPB	KPB
-----	-----	-----	--	-----	-----

---

KPB	KPB	KPB		KPB	KPB
-----	-----	-----	--	-----	-----

P                  P                  P                  P                  P                  P

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† Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Telephone and Operator Console Features, (continued)

Feature	Program Code	Feature Code
Saved Number Dial*	*85	
Send/Remove Message§	*38	38 + ext. no.
Signaling	*23 + ext. no.	
System Access buttons		
Assign buttons*		
SA (default Ring)	*16	
SA Originate Only	*18	
Shared SA	*17 + primary ext. no.	
Change type (SA or Shared SA)		
Ring	**19	
Voice	*19	
System Speed Dial	*24 + code (600-729)	600-729
Transfer	*774	774
Voice Announce		
On	*10	
Off	**10	

\* Centralized telephone programming only.

§ System operator-only feature.

MLX-5D, 10D	MLX-16DP,28D	MLX-20L	Single-Line	MLX-5, -10	Analog Multiline†
KPB	KPB	KPB		KPB	KPB
	KPB	KPB			KPB
KPB	KPB	KPB		KPB	KPB
P	P	P		P	P
			P		
			P		
			P		

KPB	KPB	KPB	K P	KPB	KPB
B	B	B		B	B
KPB	KPB	KPB		KPB	KPB

† Includes the MDW 9000, MDC 9000, and MLC-5 telephones.

## Reference Documents

<b>Document Number</b>	<b>Title</b>
<b>System Documents</b>	
555-650-110	<i>Feature Reference*</i>
555-650-111	<i>System Programming*</i>
555-650-112	<i>System Planning</i>
555-650-113	<i>System Planning Forms</i>
555-650-116	<i>Pocket Reference</i>
555-650-118	<i>System Manager's Guide*</i>
555-650-800	<i>End-User CD-ROM</i>
<b>Telephone User Support</b>	
555-650-122	<i>MLX-10D, MLX-10DP, MLX-16DP, MLX-28D, and MLX-20L Display Telephones User's Guide, comcode: 108005851</i>
555-630-150	<i>MLX-5D, MLX-10D and MLX-10DP Telephone Tray Cards (6 cards), comcode: 107883589</i>
555-630-155	<i>MLX-16DP Telephone Tray Cards (5 cards), comcode: 107883597</i>
555-630-152	<i>MLX-28D and MLX-20L Telephone Tray Cards (5 cards), comcode: 107883571</i>
555-640-124	<i>MLX-10 Nondisplay Telephone User's Guide, comcode: 107286999</i>
555-630-151	<i>MLX-5 and MLX-10 (non-display) Telephone Tray Cards (6 cards) comcode: 107886657</i>
555-650-120	<i>Analog Multiline Telephones User's Guide</i>
555-650-126	<i>Single-Line Telephones User's Guide</i>
555-650-138	<i>MDC 9000 and MDW 9000 Telephones User's Guide</i>
<b>System Operator Support</b>	
555-650-134	<i>MLX Direct-Line Consoles Operator's Guide</i>
555-650-132	<i>Analog Direct-Line Consoles Operator's Guide</i>
555-650-136	<i>MLX Queued Call Console Operator's Guide</i>

\* This book is part of the *R5 Customer Reference Manuals* package, comcode: 108008004. This package is sold as part of PEC numbers 6140-CU5 and 6141-109A.

## Reference Documents, (continued)

<b>Document Number</b>	<b>Title</b>
	<b>Miscellaneous User Support</b>
555-650-130	<i>Calling Group Supervisor's Guide</i>
555-640-105	<i>Data and Video Reference</i>
	<b>Documentation for Qualified Technicians</b>
555-650-140	<i>Installation, Programming, &amp; Maintenance (IP&amp;M) Binder [consists of Installation, System Programming &amp; Maintenance (SPM), Maintenance and Troubleshooting Programming Summary]</i>
555-650-801	<i>Internal User CD-ROM</i>
	<b>Toll Fraud Security</b>
555-025-600	BCS Products Security Handbook

Within the continental United States, these documents can be ordered from the Lucent Technologies GBCS Publications Fulfillment Center by calling 1 800 457-1235.

## NOTES

**Maintenance Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
0001	TIMEOUT COLD START: System programming OK.	No action required; however, if problem persists, troubleshoot the processor.
0002	POWER UP WARM START: System programming OK.	No action required; however, if problem persists, troubleshoot the processor.
0003	SOFTWARE COLD START: System programming OK.	If problem persists, troubleshoot the processor.
0004	SOFTWARE WARM START: System programming OK.	If problem persists, troubleshoot the processor.
0005	Reset - DIAGNOSTIC SWITCH:	
0006	INCOMPLETE COLD START: System cold-started while restart in progress.	If problem persists, troubleshoot the processor.
0007	SANITY TIMEOUT RESET: Faulty software, module, carrier, or processor sanity timer.	Check module and/or processor.
0008	MAX RESET COUNT EXCEEDED: System cold-started because of too many warm starts.	If problem persists, troubleshoot the processor.
0009	FRIGID START: System restarted and initialized to defaults; also logged after System Erase.	If processor was removed while in use, system may perform frigid start because of loss of system programming. Restore system as described in <i>System Programming and Maintenance (SPM)</i> .

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
000A	POWER UP COLD START: RAM failure in processor; system programming OK.	If problem persists, check processor.
000B	CARD INSERTED/REMOVED:	None.
000C	SLOT STREAM CNT EXCEEDED: Slot generated excessive interrupts.	If problem persists, check module.
000D	FMWR NOT IN STANDBY MODE: Module firmware not in standby mode.	If problem persists, check module.
000E	COMMAND BUFFER FULL:	If problem persists, check processor and module.
000F	TASK RUNNING TOO LONG	None; if problem persists, check processor.
0010	INVALID SLOT INTERRUPT: Cannot determine module responsible for interrupt.	Check modules and replace if necessary; if problem persists, check processor.
0011	STACK OVERFLOW: Processor problem.	Check processor.
0012	INVALID RESET FLAG: Processor problem.	Check processor.
0013	DUART STREAMING INT: Processor problem.	Check processor.
0014	PROCESSOR ERR INTERRUPT: Processor problem.	Check processor.
0015	MODULE MISMATCH: Module inserted into wrong slot.	Change system programming for proper module or install proper module.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
0016	POWER UP COLD START: Module dual port RAM failure; system programming OK.	If problem persists, check module for slot indicated.
0017	REAL TIME CLOCK FAULT: Date and/or time incorrect or unreadable.	If problem persists, replace processor module.
0018	RTC COLD START: This error is not displayed.	
0019	RESET TIME & DATE: System cold-starts because real-time clock chip is not working correctly.	If problem persists, replace processor module.
0401	ABK CARD NOT INSERTED: PCMCIA memory card for translation is not inserted.	Insert a translation card or an unformatted card.
0402	ABK INCORRECT CARD TYPE: PCMCIA memory card for non-translation is inserted.	Remove current card and insert a translation card or an unformatted card.
0403	ABK CARD WRITE- PROTECTED: Translation card has write- protected switch on.	Turn write-protection switch to off. If problem persists, try another card. If still not working, replace processor module.
0404	ABK EXTENSION BUSY: A station is in program, administration, or maintenance mode.	Wait until station changes mode.

## Technician's Addendum

### Maintenance Error Codes (continued)

Error Code	Description	Action
0405	ABK FAULTY CARD: Unknown cause of a bad card.	Reset card and retry. If problem persists, try another card. If still not working, replace processor module.
0801 and 1C07 and 5801	CTI LINK DELETED: A board renumber or slot restore moved the CTI link to an unacceptable port and the system has removed the link.	Check that the following are true:  1. The system is in Hybrid/PBX mode.  2. The link is on an 008 MLX or 408 MLX board.  3. The MLX board firmware vintage is not 29.  4. The extension is not an operator position.  5. An MLX telephone is not connected to that port.  6. Board renumber has not moved the MLX extension to the system programming port.
0C01	NO I-VMS PORT IN SERV: VMS machine may be down.	None
0C02	DID INTERDIGIT TIMEOUT: Noisy line or CO problem.	None; if problem persists, check DID line and inform CO if necessary.
1C01	POOL M-BUSY EXCEEDS 50%: More than half the trunks in pool are busy.	Check trunk.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
1C02	DPR TEST NOT COMPLETED:	Slot did not complete initializing.
1C03	FW UPGRADE ATTEMPT:	No action required.
1C04	FW UPGRADE COMPLETE	No action required.
1C05	INVALID FMW 29 DETECTED: Incompatibility problem; specified video endpoint or UDM is connected to an 008 or 408 MLX module with firmware of vintage 0x29.	Replace 008 or 408 MLX module with one of another firmware vintage. Retire permanent alarm manually.
1C06	BAD BOARDS IN SYSTEM: At least one incompatibility problem of type HER 0x1C05 detected. Turns on red LED on processor.	Replace 008 or 408 MLX module with one of another firmware vintage. Retire permanent alarm manually.
1C07	See error code 0801	
2C01	T1 ACCESS VIOLATION: T1 services (channels-voice/data) administered incorrectly.	Check facility provisioning and readminister channels for voice or data. Ensure that T1 data facilities are accessed from data terminals only (such as UDMs or desktop video systems) and that T1 voice facilities are accessed from telephones only (such as MLX telephones).

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
3001	ALARM TABLE FULL: Error logs are full; turns on processor LED.	Correct indicated errors, and then remove entries from the transient system error log. If problem persists, cold-start the system. SysProgram→System→Restart
4401	USER REQUESTED SYS ERASE: Logged after System Erase. If System Erase is successful, this error is removed immediately.	If error remains in transient log, repeat System Erase. If problem persists, check processor.
4402	USER REQST UPGRD/INSTALL:	None.
5801	See error code 0801	
6C01	DS1 LOSS OF SIGNAL ALARM: Service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.
6C02	DS1 BLUE ALARM: All 1s being received; service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.
6C03	DS1 RED ALARM: Invalid framing information on incoming signal; service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.
6C04	DS1 YELLOW ALARM: Far end of network interface has lost frame synchronization; service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
6C05	DS1 LOSS OF MULTIFRAME: Service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.
6C06	DS1 REMOTE MULTIFRAME: Far end of network interface is experiencing loss of multiframe; service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III.
6C07	DS1 MAJOR ALARM: Average bit error rate exceeds 10E-3; service on link has been lost.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III. Maintenance → Slot → Error Events → Current hr
6C08	DS1 MINOR ALARM: Average bit error rate exceeds 10E-6.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III. Maintenance → Slot → Error Events → Current hr
6C09	DS1 MISFRAME ALARM: Misframe count reached 18.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III. Maintenance → Slot → Error Events → Current hr
6C0A	DS1 SLIP ALARM: Slip count reached 88.	Usually no action. Check T1 facility. If problem persists, contact NSAC Tier III. Maintenance → Slot → Error Events → Current hr

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
6C0B	HARDWARE INOPERATIVE: Hardware not operating properly. If this is the only 100D module or 800 NI-BRI module, or if this is the designated clock module, its TDM bus clock generator was not activated.	A Busy-Out/Restore or Reset/Restore may clear problem. If problem persists, contact NSAC Tier III.
6C0C	BRI LOSS OF SYNC: Service on link has been lost.	Usually none; check BRI facility. If problem persists, contact NSAC Tier III.
6C0D	BRI NET DEACTIVATED:	Usually none; check BRI facility. If problem persists, contact NSAC Tier III.
6C0E	BRI NET INV 2B+D LB ACT:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
6C0F	BRI NET INV B1 LB ACT:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
6C10	BRI NET INV B2 LB ACT:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
6C11	BRI NET INV IL LB ACT:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
6C12	BRI NET INV QM LB ACT:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
6C13	BRI SLIPS > 88:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
6C14	BRI NET REQUESTED CCRCs:	Usually none; link should return to normal once test is completed. If problem persists, contact NSAC Tier III.
7001	PRI SVC AUDIT TIMEOUT:	Check PRI facility and report to service provider; otherwise, no action is needed. If problem persists, contact NSAC Tier III.
7002	PRI SVC STATE INCONSIST:	Check PRI facility and report to service provider; otherwise, no action is needed. If problem persists, contact NSAC Tier III.
7003	PRI D-CHNL INOPERATIVE:	Check PRI facility and report to service provider; otherwise, no action is needed. If problem persists, contact NSAC Tier III.

## Technician's Addendum

### Maintenance Error Codes (*continued*)

Error Code	Description	Action
7004	PRI B-CHNL NOT RELEASED:	Check PRI facility and report to service provider; otherwise, no action is needed. If problem persists, contact NSAC Tier III.
7005	PRI B-CH GROUP INCONSIST:	Check PRI facility and report to service provider; otherwise, no action is needed. If problem persists, contact NSAC Tier III.
7006	PRI PROTOCOL MISMATCH:  A mismatch in the protocol being supplied versus the protocol expected by MERLIN LEGEND.	<ol style="list-style-type: none"><li>1. Inform the service provider to change the administration for this circuit.</li><li>2. After the service provider restarts the circuit, verify that all alarms for this slot are cleared.</li></ol>
7401	TRK UPLINK MESSAGE ERROR: Communication problems between processor and modules; unrecognized message from module to processor.	Test trunk with single-line telephone. If problem is not in trunk, replace module with one known to work. If problem is not seen with known working module, replace the module and restart.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
7402	LOOP CONTROL BIT NOT SET: No loop current on outgoing call. If error occurs four times consecutively, and if automatic maintenance-busy is enabled with less than 50% maintenance busy, trunk is busied-out automatically.	Test trunk with single-line telephone. If problem is not in trunk, replace module with one known to work. If problem is not seen with known working module, replace the module and restart.
7403	NO LOOP CURRENT: Communication problems between module and CO. No loop current. If error occurs four times consecutively, and if automatic maintenance-busy is enabled with less than 50% maintenance busy, trunk is busied-out automatically.	Test trunk with single-line telephone. If problem is not in trunk, replace module with one known to work. If problem is not seen with known working module, replace the module and restart.
7404	STUCK RINGING: Communication problems between module and CO. If error occurs two times consecutively, trunk is busied-out automatically whether or not automatic maintenance-busy is enabled.	Test trunk with single-line telephone. If problem is not in trunk, replace module with one known to work. If problem is not seen with known working module, replace the module and restart.
7801	NOT IN NORMAL OP MODE: Module not in normal operation mode; reported in background module check.	Reset board. If problem persists, check module. Maintenance → Slot → Slot Number → Reset
7802	SANITY INT NOT GENERATED: Applies only to modules with extension jacks.	Reset board. If problem persists, check module.

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
7803	NO PORT BOARDS AVAILABLE: Modules not present.	None; delete entry from transient log.
7804	INVALID SANITY RESPONSE: Sanity test received invalid responses; applies only to modules with extension jacks.	Reset board. If problem persists, check module.
7805	INVALID SLOT NUMBER: Rare; software could not process an event detection because slot number was invalid.	None; if problem persists, restart system.
7806	NOT IN STANDBY MODE: Reported during cold start or background check.	Reset board. If problem persists, check module.
7807	SELF TEST NOT COMPLETED: Reported during cold start.	Reset board. If problem persists, check module.
7808	TEST RESULT REGISTER BAD: A module or processor error during test run.	Reset board. If problem persists, check module.
7809	TEST STATUS REGISTER BAD: A module or processor error during test run.	Reset board. If problem persists, check module.
780A	DPR TEST NOT COMPLETED: Reported during cold start.	If problem persists, check module.
780C	RAM TEST FAILURE: Memory failed RAM test; turns on processor LED.	If problem persists, replace processor.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
780D	UPPER ROM FAILURE: Memory failed ROM test; turns on processor LED.	If problem persists, replace processor.
780E	LOWER ROM FAILURE: Memory failed ROM test; turns on processor LED.	If problem persists, replace processor.
8401	MISCELLANEOUS ERROR: Not reported.	None.
8402	WINK TOO SHORT: Outbound dialing problems on tie trunks. Wink from the far end of network interface is less than 100 ms, the minimum for delay-dial or wink-start tie trunks. Tie trunk waits for valid signal.	Check far end of network. Check for faulty cable. Replace module.
8403	NO EXTERNAL RELEASE: Communication problems between module and CO. Far end has not disconnected within 4 minutes. If error occurs twice consecutively, trunk is busied-out automatically whether or not automatic maintenance-busy is enabled.	Check far end of network interface. Check for faulty cable.
8404	ON HOOK BEFORE WINK: Outbound dialing problems on tie trunks. Far end of network interface went on- hook before handshake was completed (for delay-dial or wink-start tie trunk).	If problem persists, check tie trunk configuration. Check far end. Check for faulty cable. Replace module.

## Technician's Addendum

### Maintenance Error Codes (continued)

Error Code	Description	Action
8405	ON HOOK BEFORE READY: Outbound dialing problems on tie trunks. Far end of network interface went on-hook before guard time elapsed (for delay-dial or wink-start tie trunk).	Check far end of network interface. Check wink start and for faulty cable. Check far end of network. Replace module.
8406	INTERDIGIT TOO SHORT: Inbound dialing problems on tie and DID trunks.	Check far end of network interface. Check for faulty cable. Replace module.
8407	BAD UPDATE: Communication problems between processor and modules; module may need to be replaced.	Turn processor off and then on. Repeat system programming procedure. If problem persists, contact NSAC Tier III.
8408	ROTARY RATE > 12PPS: Inbound dialing problems on tie and DID trunks.	Check far end of network interface. Check for faulty cable. Replace module.
8409	ROTARY RATE < 8PPS: Inbound dialing problems on tie and DID trunks.	Check far end of network interface. Check for faulty cable. Replace module.
840A	BAD DOWNLINK MESSAGE: Communication problems between processor and modules; module received an unrecognized message from processor.	Turn processor off and then on. Repeat system programming procedure. If problem persists, replace module.
840B	NO LOOP CURRENT: Communication problems between module and CO; no loop current. If error occurs four times consecutively and if automatic maintenance-busy is enabled and maintenance-busy limit is less than 50%, trunk is busied-out automatically.	Replace module with similar module and test. If problem is resolved, replace bad module. If problem persists, reinstall old module and test trunk.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
840C	STUCK RINGING: Communication problems between module and CO; no loop current. If error occurs four times consecutively and if automatic maintenance-busy is enabled and maintenance-busy limit is less than 50%, trunk is busied-out automatically.	Replace module with similar module and test. If problem is resolved, replace bad module. If problem persists, reinstall old module and test trunk.
840D	INCORRECT FIRMWARE STATE: If error occurs four times consecutively and if automatic maintenance-busy is enabled and maintenance-busy limit is less than 50%, trunk is busied-out automatically.	Turn power off for at least one second, and then turn it on. Repeat system programming procedure. If problem persists, replace module.
840E	UPLINK MESSAGE ERROR: Communication problems between processor and modules. Module received unrecognized message from processor.	Turn processor off and then on. Repeat system programming procedure. If problem persists, replace module.
840F	LOST IDLE MESSAGE ERROR:	
8C01	SLOTS NOT EQUAL: Module that occupies indicated slot does not match slot information contained in PC or PCMCIA card backup file.	Check slot descriptions in backup file against actual system modules that occupy slots. After mismatch is corrected, restore.
9801	MCARD WRITE ERROR: Write to memory card is unsuccessful or too slow.	Reset card and try again. If problem persists, replace card and try again. If problem continues, replace processor module.

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
9802	MCARD ERASE ERROR: Erasure of memory card is unsuccessful or too slow.	Reset card and try again. If problem persists, replace card and try again. If problem continues, replace processor module.
9803	MCARD 12-VOLT ERROR: The memory card voltage is incorrect.	Reset card and try again. If problem persists, replace card and try again. If problem continues, replace processor module.
9C01	NW REJECTS SPID: Service on link has been lost.	Check administered line. Modify if required, or call CO to correct.
9C03	LINK ESTABLISHMENT FAIL: Service on link has been lost.	Check that line is securely connected to port and that LEDs on module show proper operation. If card appears to work properly, line may not have been activated by CO.
9C04	NW NOT RESPOND TO SETUP: Service on link has been lost.	Network not responding to LEGEND messages. Contact CO.
9C05	NW NOT RESPOND TO RELEASE: Service on link has been lost.	Network not responding to LEGEND messages. Contact CO.
9C07	ENDPOINT UNINIT (L2/L3): Service on link is uninitialized.	If this lasts more than three minutes, replug the DSL. If the error remains, contact CO.

**Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
9C08	PROTOCOL ERROR: Service on link may be affected.	Verify line provisioning. If correct, contact NSAC Tier III.
A401	CTI LINK BROADCAST RESET: Occurs during a broadcast reset.	If several of these occur:  1. Check that the system is in Hybrid/PBX mode.  2. Validate the wiring and the connections.  3. Press the Restart Button (see the procedure "Restart" in Chapter 4 of <i>Maintenance and Troubleshooting</i> ).  4. Call the TSO's Telephony Services Maintenance Group (800 242-2121) for the procedures to unload and reload the PBX driver.

## **Technician's Addendum**

### **Maintenance Error Codes** (*continued*)

<b>Error Code</b>	<b>Description</b>	<b>Action</b>
A801	CTI LINK HIDDEN RESET: Occurs during a hidden reset.	<p>If several of these occur, and the client application has "slow" response time:</p> <ol style="list-style-type: none"><li>1. Validate the wiring and the connections.</li><li>2. Press the Restart Button (see the procedure "Restart" in Chapter 4 of <i>Maintenance and Troubleshooting</i>).</li><li>3. Call the TSO's Telephony Services Maintenance Group (800 242-2121) for the procedures to unload and reload the PBX driver.</li></ol>

## NOTES

## Technician's Addendum

### Module/Component History

Module/ Component	PEC	Comcode	Apparatus Code
<b>Backplane</b> Basic		106388614 107007114	403E 403G
Expansion	61490 61450	106388630 107007122	403F 403H
<b>Power Supply</b> 120 V		105743801 106257199 107184848	391A1 391A2 391A3
220 V		106678931 107184855	391B1 391B2
Auxiliary	61416	406467142	90240-3
<b>Processor</b> R1.0/2.0		106215155	517A27
Secure		107096869	517A27-F
Hong Kong		107221434	517A27(16)
Czech		107628133	517A27(34)

<b>Release Used In</b>	<b>HW Vint</b>	<b>FW Vint</b>	<b>Notes</b>
All			Used in control units 6140-CU1, 6140-CU2, 6140-CU3, 6140-INT, 6140-220, 6140-CUL, 6140-P3C, 6140-P3D, 6140-P3E, 6140-P4D, 6140-P4F and 6140-SEC
All			Used in control units 6140-CU1, 6140-CU2, 6140-CU3, 6140-INT, 6140-220, 6140-CUL, 6140-P3C, 6140-P3D, 6140-P3E, 6140-P4D, 6140-P4F and 6140-SEC
All non-US			Used in control unit 6140-220 and in expansion units 61450 and 61497
All US			No longer available
1.0, 2.0 1.1, 2.1 1.2i, 1.3i, 1.4i	00		Used in control units 6140-CU2, 6140-INT, 6140-INT, and 6140-220
2.0, 2.1	05		For Federal Systems; used in control unit 6140-SEC
1.2i, 1.3i, 1.4i	01		For Hong Kong
1.2i, 1.3i, 1.4i			For Czech Republic

**Technician's Addendum****Module/Component History** (*continued*)

<b>Module/ Component</b>	<b>PEC</b>	<b>Comcode</b>	<b>Apparatus Code</b>
<b>Processor (cont'd)</b> R3.0		107040438	517A33
		107438921	517B33
R3.1		107752693	517D33
R4.0		107743403	517C33
<b>Feature Module</b> R1.0		106064660 106656739  106729031  106767767  106743008 106743016	517A25 517B25  517C25  517C25B  517D25 517E25

<b>Release Used In</b>	<b>HW Vint</b>	<b>FW Vint</b>	<b>Notes</b>
3.0	01		ML R3.0 or later; no FM used; used in control units 6140-CU3, 6140-P3C, 6140-P3D, 6140-P3E, 6141-U3LA, 6141-103A
	02		ML R3.0 or later; no FM used; higher temperature reliability; no watch point registers; used in control units 6140-CU3, 6140-P3C, 6140-P3D, 6140-P3E, 6141-U3LA, 6141-103A
3.1	02		Used in control units 6140-CU3, 6140-P3C, 6140-P3D, 6140-P3E, 6141-U3LA, 6141-103A
4.0	02		Used in control units 6140-CU3, 6140-P3C, 6140-P3D, 6140-P3E, 6141-U3LA, 6141-103A
1.0			GA version
1.0		SW* = 1.0 V14.7	See QPPCN 244 MT.
1.0		SW = 1.0 V14.9	See QPPCNs 244MTS1 and 251MT.
1.0		SW = 1.0 VEAL (14.10)	See QPPCN 254MT.
1.1			GA version
1.1		SW = 1.1 V5.2	See QPPCN 260MT.

\* SW = software

## Technician's Addendum

### Module/Component History (continued)

Module/ Component	PEC	Comcode	Apparatus Code
<b>Feature Module (cont'd)</b>			
R1.1		106825888	517F25
		106999873	517F25B
		106999899	517F25C
R2.0		106874738	517G25
		106874746	517H25
R2.1		106874753	517J25
		107526352	517J25B
NI-BRI (R2.B)		106999824	517K25
		107499170	517K25B
R1.2i		106796949	517A30
R1.3i		106875750	517B30(28)
		106875768	517C30
R1.4i		107252728	517D30
<b>PCMCIA Card</b>			
Backup/Restore	61501	107245243	10A1
R3.0 SW Upgrade		107245250	10B1
R3.0 Forced Install		107245268	10C1
		107655201	10C2
R3.1 SW Upgrade		107752743	10B2
R3.1 Forced Install		107752677	10C3
R4.0 SW Upgrade	61506	107741274	10D1

Release Used In	HW Vint	FW Vint	Notes
1.1		SW = 1.1 V5.3	See QPPCN 266MT.
1.1		SW = 1.1 V7.3	See QPPCN 292MT.
1.1		SW = 1.1 V7.7	See QPPCN 308MT.
2.0		SW = 2.0 V8.2	See QPPCN 279MT.
2.0		SW = 2.0 V8.3	See QPPCN 290MT.
2.1		SW = 4.0	See QPPCN 307MT.
2.1		SW = 4.9	See QPPCN 406MT
NI-BRI (2.B)		SW = 9.2	Pre-GA
NI-BRI (2.B)		SW = 9.6	GA version
1.2i			
1.3i			
1.3i		SW = 8.0	GA version
1.4i			Included in 6141-INT and 6141-220
3.0 and higher			Translation card for R3; also included as part of processor PEC
3.0			Contains R3V10.3
3.0			R3V10.0 R3V10.3
3.1			Contains R3.1V2.0
3.1			Contains R3.1V2.0
4.0			Contains R4.0V9.0

## Technician's Addendum

### Module/Component History (continued)

Module/ Component	PEC	Comcode	Apparatus Code
<b>PCMCIA Card (cont'd)</b> R4.0 Forced Install		107741241	10E1
008 ATL	61385 61485	103983508 105351092	517A3 517B3
008 MLX	61486	105628010	517A21
<b>008 OPT</b> Without Ring Generator	61489	106387525 106933187 106980162 107009821	517A28 517B28 517C28 517C28B
With Ring Generator	61479	106995269 107321192	517D28 517D28A
<b>012 TR</b> Without Ring Generator	61387 or 61487	105249023 105461545 105512412 106397631 106553779 106767379	517A13 517B13 517C13 517D13 517E13 517F13
With Ring Generator	61494 or 61459	106933773 107108698 107438939	517G13 517G13(28) 517H13
Ring Generator	61388 61498	105213201 106741788	129B 129C

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Release Used In	HW Vint	FW Vint	Notes
4.0			Contains R4.0V9.0
All	0.1 0.1 0.4 0.4	0.B 0.B 1.1 1.3	Reduced package; no telephone user's guide
	05		
All	02 03 03 03	11 12 14 15	Fixes ring patterns and ring trip Eliminates flash during hang-up Eliminates flash during answer
All	04 05 05 05	16 16 17 18	Built-in ring generator Enhances ringing on long loops
All	01 01 01 01 01	08 08 08	REN >5 Enhanced battery feed protection Forward disconnect added; need for Voice Mail Improve performance of inductive ringers Meets EIA transmission standards for use with MEGACOM® services
All	01 02 03 04	70 32 33 34	Built-in ring generator; REN <+1 REN increased to 2.4 REN increased to = 4.0
All			Required for 517A13—517F13

## Technician's Addendum

### Module/Component History (continued)

Module/ Component	PEC	Comcode	Apparatus Code
016 TR	61507	107824948	517B34
100D (DS1)/T-1	61491	107538887 105461560  105512438	517A15 517B15  517C15  517E15
400 EM TIE	61492 8303-200	105311401	517A14
400 (w/TTRs)	61379	105408892	517B12
400 GS/LS/TTR	61483	105627988 105628044 107044869	517A18 517B18 517C18
400 LS	61384	103983490  105351084	517A2  517B2
400 LS/TTR Int'l (DTD)	61452	106819238 107732018	517B12(28) 517C12(28)
408 GS/LS/ATL	61481	106064678 106939366  107044877	517A26 517B26  517C26
408 GS/LS MLX	61493	106698590 107044851	517A29 517B29
408 LS/ATL	61482	103983482  105351076 105512495	517A1  517B1 517C1
800 NI-BRI	61503	107025793	517A32
800 NI-BRI	61510	107731127	517A35

## Technician's Addendum

Release Used In	HW Vint	FW Vint	Notes
4.0, 1.4i			
All			Tie trunk only LS, GS, DID, and PRI emulation added Meets BC interoperability specs Improved EMI performance
All			
All	01	0.B	Lightning protection added; starting in 1996, replaced by 517C12(28)
All U.S.	03 03 03	1.1 1.2 1.3	Sleeping TTR fix Phantom ringback fix
			No lightning protection; 146 protector required Lightning protection added
1.2i, 1.3i, 1.4i			Includes LG80 crosstalk fix
All U.S.	04 04 04	11 12 13	Reduces clicking on third carrier Phantom ringback fix
All US 2.0 or later		28 29	Cost-reduced version; current production Withdrawn from production
All	01 01 01	0.B 0.B 0.B	No lightning protection; 146A protector required Protection added Reduced packing; no telephone user's guide
NI-BRI (2.B)	00	70	Supports 5ESS® Custom
4.0			Supports ISDN 1 standard

## Technician's Addendum

### Module/Component History (continued)

Module/ Component	PEC	Comcode	Apparatus Code
800 DID	61488	105628002	517A20
		105628077	517B20
		106936644	517C20
		106995251	517D20
800 GS/LS	61484	105627996	517A19
		105628069	517B19
800 GS/LS ICLID	61502	106975584	517A31
800 LS	61384	103983516	517A4
		105351100	517B4
800 LS Int'l	61451	106819220	517B4(28)
800 LS Int'l (DTD/PPM)	61458	107074726	517C4(28)
		107252736	517D4(28)
E1 75 Ohm	61454	106825896	517C15(28)
			517E15(28)
120 Ohm	61457	107100133	517D15(28)
		107533861	517F15(28)
MFC 6-Channel	61456	106825904	517C16(28)

<b>Release Used In</b>	<b>HW Vint</b>	<b>FW Vint</b>	<b>Notes</b>
All	01 02 03 04	11 01 12 17	Fixes DID call misrouting Eliminates false error messages Cost-reduced version
All US	03 03	1.1 1.2	Phantom ringback fix
3.0 or later			
All	0.1 0.1	0.B 0.B	No lightning protection; 146A protection required Introduces dual solid-state relays on lower board
1.2i, 1.3i	0.2	0.CD	
1.3i, 1.4i	02	E4	PFT polarity fix
1.3i, 1.4i			EMI improvement
1.3i, 1.4i			EMI improvement
1.3i, 1.4i			

## Technician's Addendum

### Telephone LEDs

#### MLX-20L Console

System Programming Menu Option	Option	LED Status			
		Green LED		Red LED	
		ON	OFF	ON	OFF
Lines Trunks	Tie Lines				
	Inmode	Incoming tie line is touch-tone	Incoming tie line is rotary dial*		
	Outmode	Outgoing tie line is touch-tone	Outgoing tie line is rotary dial*		
	Dialtone	Remote dial tone*	Local dial tone		
Lines Trunks	TT/LS Disc				
	Outmode	Line/trunk is touch-tone*	Line/trunk is rotary dial		
Lines Trunks	Pools			Trunk is in pool	Trunk is not in pool
Lines Trunks	Toll Type	Must dial 1 + area code*	1 + dialing is not needed		
Lines Trunks	Hold Disconc	Long—450 ms*	Short—50 ms		
Lines Trunks	LS-ID Delay	LS-ID Delay is on	LS-ID Delay is off*		
Extensions	Lines Trunks	Line/trunk or pool is assigned to button	Line/trunk or pool is not assigned to button	Trunk is assigned to a pool	

\* Factory setting

**Telephone LEDs (continued)**
**DSS Console**

System Programming Menu Option	Option	Red LED Status		
		ON	OFF	FLASHING
Extensions	Account (FACE)	Forced Account Code Entry assigned	Forced Account Code Entry not assigned*	
Extensions	BIS/HFAI	Telephone has BIS/HFAI capability (factory setting for analog multiline telephone)		
Extensions	Call Pickup	Telephone is assigned to Call Pickup Group	Telephone is not assigned to Call Pickup Group*	
Extensions	VoiceSignl	Voice Announce to busy assigned	Voice Announce to Busy not assigned*	
Extensions	Ext status	Extension Status assigned	Extension Status not assigned	Extension Status can be assigned
Extensions	Group Page	Telephone is in group	Telephone is not in group*	
Extensions	Group Cover	Telephone is in coverage group	Telephone is not in coverage group*	

\* Factory setting

## Technician's Addendum

### Telephone LEDs (continued)

### DSS Console (continued)

System Programming Menu Option	Option	Red LED Status		
		ON	OFF	FLASHING
Extensions	Group Calling Members	Telephone is assigned to group	Telephone is not assigned to group*	
Extensions	Mic Disable	Telephone microphone is disabled	Telephone microphone is enabled	
Extensions	Remote Frwd	Telephone can transfer calls to a remote telephone number	Telephone cannot transfer calls to a remote telephone number*	
Night Service	Group Assign	Telephone is in group	Telephone is not in group*	
Night Service	Exclude List	Telephone is excluded	Telephone is not excluded*	
Aux Equip	Msg Waiting	Station is a fax message-waiting station	Station is not a fax message-waiting station	
Aux Equip	Fax Extension	Extension is a fax machine	Extension is not a fax machine	
Tables	AllowTo	Allowed List assigned to telephone	Allowed List is not assigned to telephone*	

\* Factory setting

**Telephone LEDs (continued)**
**DSS Console (continued)**

System Programming Menu Option	Option	Red LED Status		
		ON	OFF	FLASHING
Tables	DisallowTo	Disallowed list assigned to telephone	Disallowed list is not assigned to telephone*	
Data	Voice/Data	Voice/data pair	Not voice/data pair*	
Operator	Direct Trunk Queued Call	Operator position	Other	Can be assigned as operator position
Operator	Queued Call Message Center	Message Center position	Other	Can be assigned as Message Center
Operator	In Queue Alert	Position receives In-Queue alert	Other	Position can receive In-Queue alert
	Call Types—Dial 0, LDN Unassigned, DID, Grp Coverage	Position receives call type	Other	Position can receive call type

\* Factory setting

### **Wiring Constraints**

#### **System Wiring**

- System within 5 ft. of dedicated AC power outlet.
- System within 25 ft. of the network interface. Otherwise, use an Off-Premises Range Extender (OPRE).
- System within 1000 cable ft. (304.8 m) of telephones.
- Ground wire for the power supply cannot be over 10 ft.
- If the SMDR printer is over 50 ft. from the control unit, use an Asynchronous Data unit (ADU).
- Back-to-back connection of the DS1 facility with another system's facility is possible when the cable distance is less than 1300 ft.

#### **Telephone Wiring**

- Maximum cord length from an MLX telephone to a 7500B data module is 80 ft. (24 m).
- The total length of cords between the KS22911-L2 or 406743419 power supply and the MLX telephone cannot be more than 50 ft.
- Do not replace the 2-ft. D8AC cord (packaged with the DSS) with a longer cord.
- The radio base of the MDW 9000 cordless telephone must be at least 3 ft. from the control unit.

## Installing SPM

Follow these steps to install System Programming and Maintenance (SPM) onto the hard drive of a computer:

1. Insert the SPM diskette into the computer.
2. At the C: prompt, type **MKDIR SPM** and press **ENTER**.
3. Type **cd\spm** and press **ENTER**.
4. Type **a:install** and press **ENTER** to install the program from the diskette.
5. After the installation is complete, type **spm** and press **ENTER** to display the SPM Welcome screen.

## Accessing SPM

### **Direct Local Connection**

Follow these steps to access SPM when you are directly connected to the system via the administration jack on the processor module:

1. Set up the physical connection between your laptop or PC and the control unit.
2. Type **spm** and press **ENTER** to display the SPM Welcome screen.
3. Press any key to display the SPM Main Menu.

### **Local Modem Connection**

Follow these steps to access SPM when you are connected on-site via a modem:

1. Set up the physical connections between the PC and a 012 module on the control unit.
2. Type **spm** and press **ENTER** to display the SPM Welcome screen.
3. Press **ENTER** to display a blank screen on which you can enter modem commands. (You may have to press **ENTER** several times.)
4. Dial **ATDT \*10**.
5. Type the SPM password to display the SPM Main Menu.

### **Remote Modem Connection**

Follow these steps to access SPM when you connected off-site via a modem:

1. Type **spm** and press **ENTER** to display the SPM Welcome screen.
2. Press **ENTER** to display a blank screen on which you can enter modem commands. (You may have to press **ENTER** several times.)
3. If your system has activated the Remote Access feature, type the following:
  - a. **ATDT**
  - b. Remote access telephone number
  - c. Barrier code (if existing) preceded by a "W."
  - d. **W\*10**

### **Remote Modem Connection(continued)**

4. If your system does not have the Remote Access feature activated, do the following:
  - a. Place a voice call to the system on the line to which the modem is connected by using the main telephone number.
  - b. Have the operator transfer you to the modem (by pressing Transfer, dialing **\*10**, and hanging up the telephone).
  - c. To put the modem on line, type **ATH1** or **ATH1O**, depending on the type of modem. (In ATH1O, the last "digit" is the alphabet letter "O," not zero.)
  - d. Press **ENTER**, and hang up the telephone.
5. Type the SPM password to display the SPM Main Menu.

### When Calling NSAC

Do the following before you call Tier III for troubleshooting:

- Check and recreate the problem.
- Connect your laptop or PC so you are ready.
- Know the software version of your system (Dial \*05 on an Intercom button).
- Write down the errors in the Error Logs.
- Know the configuration of the system operator console (DLC or QCC).
- Know the type of tie lines (emulated or not, wink-start, etc.).

### QPPCNs on the NSAC Bulletin Board

Follow these steps to review QPPCNs on the NSAC bulletin board:

1. Dial **800-241-3375**.
2. At the first screen, select "**F**" for File Section.
3. At the next screen, select "**N**" for Non-Tier III Tips.
4. At the next screen, select "**8**" for QPPCNs.

### Available Publications

*Tier III Tips*

*SCAN\** (Sales Competitive Analysis Newsletter)

*Hotwire\**

*Hotsheet\**

*Hot News and Views\**

\* Published by National Technical Marketing (NTM)

## **Technician's Addendum**

### **Technical Support Telephone Numbers**

<b>Product or Service</b>	<b>Comments</b>	<b>Telephone Number</b>
<b>Lucent Technologies Equipment</b>		
NSAC Tech Support	PARTNER, MERLIN, VINTAGE, CLASSIC	800-552-3293
TSC Tech Support	DEFINITY	800-248-1234
Network Systems (RTAC)	DACS, SLC, ESS, DDM	800-225-7822
Network Systems	ISDN Sets (6500/7500)	800-225-4672
AT&T Paradyne	CSU, DSU, MUX, Hubs, Routers	800-237-0016
<b>Long Distance</b>		
<i>Over Local Lines/Trunks</i>		
AT&T		800-222-3000
MCI		800-444-2222
SPRINT		800-877-4646
<i>T1 Service</i>		
AT&T	800/MEGACOM/ISDN	800-222-1000
AT&T	Data	800-325-1230
MCI		800-444-8722
SPRINT		800-877-5045 or 6277
To identify your long distance carrier		700-555-4141
To identify the telephone # you are calling from		10732-1-404-988-9664

## **Technician's Addendum**

### **Technical Support Telephone Numbers** (*continued*)

<b>Product or Service</b>	<b>Comments</b>	<b>Telephone Number</b>
<b>Other GBCS Support</b>		
NSAC QPPCN Coordinator	Small Business Products	303-843-5204
TSC QPPCN Coordinator	Large Business Products	800-248-1234
GBCS Publications Fulfillment Center	Documentation on all GBCS products	800-457-1235
NSAC Bulletin Board	On-line technical/product information	800-241-3375
TIER III TIPS publication	Sue Williams—Publication Manager	303-843-5921
Tech Quarterly publication	Production Editor	303-850-8898
Comcode Hotline	PEC/Comcode/Part Cross-Reference	800-654-5832

## NOTES

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