MITEL

SX-200 | Integrated Communications Platform

MX Controller
TECHNICIAN'S HANDBOOK

Release 3.1

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SX-200 ICP MX Technician's Handbook
51009229, Revision B
Release 3.1
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Chapter 1 : Introduction

Chapter 2 : Basic Installation

Chapter 3 : Basic Programming

Chapter 4 : Advanced Installation and Programming

Chapter 5 : Routine Maintenance

Chapter 6 : Basic Troubleshooting and Repair

Chapter 1
Introduction

About this Handbook

Purpose of this handbook

This handbook provides

- an overview of the system capabilities
- installation steps
- programming procedures
- maintenance procedures
- troubleshooting information

Who this handbook is written for

This handbook is for a qualified technician who has successfully completed the SX-200® ICP Installation and Maintenance Course. The course has two parts: basic and advanced.

SX-200 ICP Basic Installation and Maintenance Course

You need to take the Basic I & M course if you are installing the SX-200 ICP as a voice system only.

This means that you are using the default settings for IP and you are not planning on implementing Virtual LANs (VLANs).

The basic course is available in self-study format and you must have completed your LIGHTWARE™ 19 RELEASE 3.2 certification.

SX-200 ICP Advanced Installation and Maintenance Course

You MUST complete the Advanced I & M course if you are planning to

- connect a PC to the PC port on the IP Phones (enable System Option 131)
- connect the SX-200 ICP in an existing LAN (Local Area Network)
- use an external DHCP (Dynamic Host Configuration Protocol) server
- implement VLANs (Virtual LANs)
- implement IP (Internet Protocol) Trunking
- network to a 3300 ICP via IP trunk or QSIG

The advanced course is available in a leader-led format. You must complete the Basic I & M course before attending the advanced course.

Where you can find more information

The SX-200 ICP documentation set includes the following components:

- Printed documents
  - Technician's Handbook
  - Safety Instructions
- Documents supplied on the SX-200 ICP software CD-ROM
  - SX-200 ICP Technical Documentation in Folio (NFO) format.
  - Technician's Handbook
  - Safety Instructions
  - IMAT Online Help (installs with IMAT application)
  - MyAdministrator Online Help (installs with MyAdministrator application)
  - Symbol® Netvision® MiNET Phone Installation Instructions (located in the Documentation folder on the SX-200 ICP software CD-ROM)
  - Telephone, Attendant, Subattendant, Voice Mail, Hotel/Motel Front Desk, and MyAdministrator User Guides
  - Technical Bulletins (TBs) and Release Notes (RNs).

Accessing Documentation on the software CD-ROM

1. Insert the CD in the CD-ROM drive.
2. Navigate to the Documentation folder.
3. Double-click Setup.exe to install the Technical Documentation and Folio Viewer, the application used to view the documentation.
4. To access user guides and other documentation, go to the appropriate Language subdirectory. Use the index.html file to locate the required guides.

Technical Training Materials

- SX-200 ICP Basic I & M Course Release 3.0
- SX-200 ICP Advanced I & M Course

Release Notes

Every software release is accompanied by Release Notes, which describe software changes, bug fixes, outstanding issues, and hardware compatibility considerations for the new software release. ***Read the Release Notes before you begin a software upgrade.***

Technical Bulletins

Technical Bulletins (TBs) are issued by Mitel® Technical Support to address frequently asked questions regarding software and hardware problems. Obtain the latest TBs from Mitel OnLine.

Mitel Knowledge Base

The Mitel Knowledge Base is a searchable database of problem-solving information on the SX-200 ICP and other Mitel products. The database is accessed through Mitel Online.

Accessing Mitel Online

You can access Mitel Online from the **www.mitel.com** Web site.

Tip: You must be a registered user to access Mitel Online.

Access Product and Technical Documentation

1. Login to Mitel OnLine.
2. Navigate to Product Documentation (Technical Documents, User Guides, and Installation Guides) OR Knowledge Base (Release Notes and Technical Bulletins).

View or Download a Document

To view a document:

- Click on the name of the document.

To download a document:

- Right-click on the name of the document and select Save Target As

  OR

- When viewing a PDF document, click the disk icon.

Create Telephone User Guides with Manual Maker

1. Login to Mitel OnLine.
2. Navigate to Product Documentation.
3. Click Manual Maker.
4. Follow the instructions on the screen to register and use Manual Maker.

Accessing Your Mitel Options Password

You must obtain your Mitel Options Password through Mitel Online (www.mitel.com). This password is required during the upgrade procedure, so you MUST keep a proper record of it. A new password is issued to you if you are purchasing new options. Before attempting the software upgrade, to confirm a current password or to purchase new options and receive a new password, call Mitel Customer Service during normal business hours.

Helpful websites

For definitions of technical terms

- http://www.techweb.com/encyclopedia
- http://www.whatis.com

For networking information

- http://www.practicallynetworked.com
- http://www.networktroubleshooting.com

Contacting Mitel

Sending Feedback

If you have suggestions on how to improve this documentation, please contact us at **techpubs@mitel.com**.

Order Desk

You can reach the Order Desk at 1-800-796-4835.

Repair Department

You must get a Return of Merchandise Authorization (RMA) form from the Repairs Department before sending equipment back to Mitel Network Corp.

You can reach the Repairs Department at 1-888-222-6483.

Technical Support - Mitel Dealers

Please contact Mitel Technical Support if you require technical assistance.

If you cannot resolve the problem by using the Troubleshooting chapter, please collect the required information listed in “Before You Contact Technical Support” on page 91 **before** calling Mitel Technical Support. You can reach Technical Support at 1-800-561-0860 or 1-613-592-2122.

Symbols used in this handbook

Indicates a hazardous situation which, if not avoided, could result in injury or death.

Indicates a situation which, if not avoided, could result in damage to the equipment.

Identifies an important note or a useful tip.

Important safety instructions

Failure to follow all instructions may result in improper equipment operation and/or risk of electrical shock.

See the system *Safety Instructions* that are shipped with the system for complete safety information.

About the SX-200 ICP MX

The Mitel SX-200 Integrated Communications Platform (ICP) provides the reliability and comprehensive features of a PBX, the ease of use and cost effectiveness of a key system, and the productivity-enhancing applications and networking efficiency of IP.

Tailored for small enterprises, the SX-200 ICP MX supports up to 248 IP phones, 12 LS/CLASS circuits, and 24 IP trunks for private networking.

SX-200 ICP System Packages

The SX-200 ICP MX controller is sold alone or as a package that includes the components shown in the table below. None of the packages include power supplies for the phones; they must be ordered separately. For part numbers, see Appendix B.

Table 1: SX-200 ICP MX System Packages

	Basic Business - Voice Only	Premier Business - Voice & Data	Basic Controller
LS/CLASS circuits	6		
ONS circuits	2		
DNIC circuits	2		
Voice mail ports	4		
DSPs	1 Dual DSP Module		
IP Phones	Seven 5207s One 5220	Four 5220s	None
PKMs	One 12-Button PKM		
Licenses IP Phone Voice Mailbox TDM ACD Agent IP Channel	 16 16 44 None None	 8 8 32 5 2	
Software Options	1 Digital Link Voice Mail Softkey	1 Digital Link Voice Mail Softkey 2nd Port on IP Phones Record a Call	

System configurations

The controller is configured at the factory as a square key telephone system (KTS). It can be reconfigured as a PBX or hybrid PBX/KTS by reprogramming the default database or by installing one of the alternate databases supplied on the software CD-ROM. For more information about alternate databases, see page 205. Both configurations are expandable through the purchase of additional components, including DSP resources (see “DSP Configuration Options” on page 12 for more information).

Table 2: SX-200 ICP System MX Configuration

Basic Configuration	Expanded Configuration	How Expanded
6 LS/CLASS circuits (Controller)	12 (Controller) More than 12	Add Analog Options Card Add Peripheral Bays (6 max)
2 ONS/CLASS circuits (Controller)	4 (Controller) More than 4	Add Analog Options Card Add ASU (2 max) Add Peripheral Bays (6 max)
2 DNIC circuits (Controller)	More than 2	Add Peripheral Bays (6 max)
0, 8, or 20 IP Phone licenses depending on system package	248 IP Phone licenses and 24 IP trunks	Purchase additional licenses Expand Ethernet Switch
0, 4, or 8 IP Phones depending on system package	Maximum 248 IP	Purchase additional licenses and phones
0, 4, or 20 ports of voice mail depending on system package	24 ports More than 24	Purchase Options and DSP resources (incremental) Add standalone voice mail system or Peripheral Bays with Mitel Express Messenger card(s)
0 or 4 voice mail user licenses depending on system package	748	Purchase additional licenses (incremental)

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Table 2: SX-200 ICP System MX Configuration (continued)

Basic Configuration	Expanded Configuration	How Expanded
Approximately 5 hours of voice mail message storage	Depends on capacity of upgraded media	Install hard drive
Three 3-party conferences	21 3-party Conferences (total 21 conferees – can have up to 5 parties per conference)	Purchase DSP resources.
256 MB of CompactFlash memory for database storage (inside controller)	Larger capacity media	Install hard drive
Dual DSP MMC	2 dual DSP MMC **or** 1 dual and 1 quad DSP MMC **or** 2 quad DSP MMC	Purchase modules
0 Links PRI-T1	4 Links PRI-T1	Purchase 2 NSUs or 2 Peripheral Bays with PRI cards

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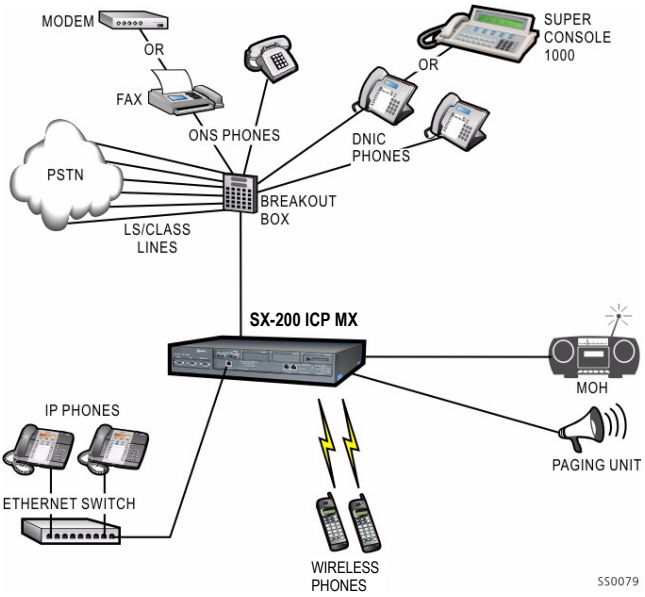

Figure 1: Basic System

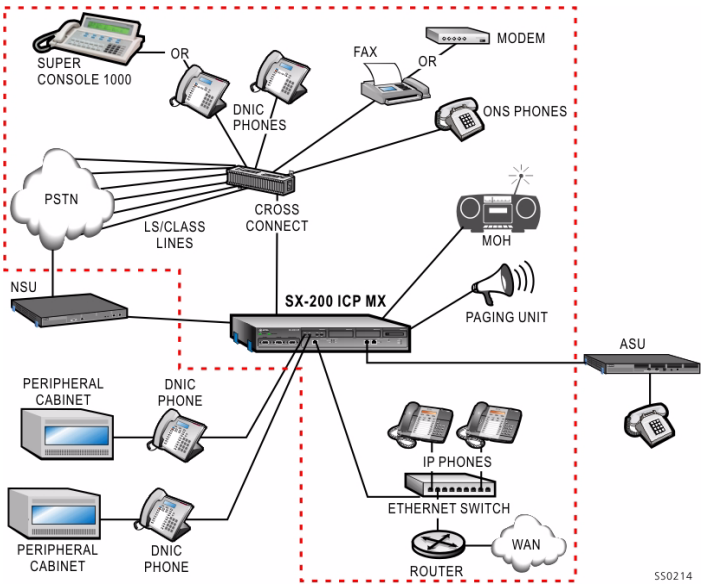

Figure 2: Expanded System

DSP Configuration Options

The SX-200 ICP MX has six DSP configurations selectable in CDE Form 04:

- Business Option 1
- Business Option 2
- Hospitality Option
- Analog Option 1, 2, and 3

The table below lists the DSP requirements for each of the DSP configuration options. The requirements are guidelines only; the actual number of DSPs required depends on the intended use of the system.

Table 3: DSP Configuration Options

Option Type	Base Dual DSP (2 total)	2 Dual DSP or 1 Quad DSP (4 total)	Add Quad DSP (6 total)	2 Quad DSP (8 total)
Business Option 1 IP (see Note)	3 conf x 3 parties 4 voice mail 8 G.729 48 IP 6 DNIC/ONS 12 LS/Class	8 conf x 3 parties 12 voice mail 8 G.729 96 IP 6 DNIC/ONS 12 LS/Class 24 T1 or 23 PRI	12 conf x 3 parties 18 voice mail 16 G.729 96 IP 96 DNIC/ONS 12 LS/Class 48 T1 or 46 PRI	12 conf x 3 parties 24 voice mail 24 G.729 192 IP 192 DNIC/ONS 12 LS/CLASS 96 T1 or 92 PRI
Business Option 2 IP	8 conf x 3 parties 8 voice mail 0 G.729 48 IP 6 DNIC/ONS 12 LS/CLASS	12 conf x 3 parties 18 voice mail 0 G.729 96 IP 6 DNIC/ONS 12 LS/CLASS 24 T1 or 23 PRI	18 conf x 3 parties 24 voice mail 8 G.729 96 IP 96 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	21 conf x 3 parties 24 voice mail 16 G.729 192 IP 288 DNIC/ONS 12 LS/CLASS 96 T1 or 92 PRI
Hospitality Option IP+TDM	8 conf x 3 parties 8 voice mail 0 G.729 96 DNIC/ONS 12 LS/CLASS	8 conf x 3 parties 12 voice mail 8 G.729 48 IP 96 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	12 conf x 3 parties 18 voice mail 16 G.729 96 IP 192 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	12 conf x 3 parties 24 voice mail 16 G.729 248 IP 384 DNIC/ONS 12 LS/CLASS 96 T1 or 92 PRI
Analog Option 1	2 conf x 3 parties 6 voice mail 0 G.729 24 IP 288 DNIC/ONS 12 LS/CLASS 48 T1 or 76 PRI	8 conf x 3 parties 18 voice mail 0 G.729 48 IP 288 DNIC/ONS 12 LS/CLASS 72 T1 or 69 PRI	12 conf x 3 parties 24 voice mail 0 G.729 96 IP 288 DNIC/ONS 12 LS/CLASS 72 T1 or 69 PRI	21 conf x 3 parties 24 voice mail 0 G.729 192 IP 384 DNIC/ONS 12 LS/CLASS 96 T1 or 92 PRI

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Table 3: DSP Configuration Options (continued)

Option Type	Base Dual DSP (2 total)	2 Dual DSP or 1 Quad DSP (4 total)	Add Quad DSP (6 total)	2 Quad DSP (8 total)
Analog Option 2	2 conf x 3 parties 4 voice mail 0 G.729 24 IP 384 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	10 conf x 3 parties 12 voice mail 0 G.729 48 IP 384 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	12 conf x 3 parties 16 voice mail 0 G.729 48 IP 480 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI	21 conf x 3 parties 24 voice mail 0 G.729 96 IP 480 DNIC/ONS 12 LS/CLASS 48 T1 or 46 PRI
Analog Option 3 (Requires Quad DSP)		8 conf x 3 parties 12 voice mail 0 G.729 96 IP 576 DNIC/ONS 12 LS/CLASS 96 T1 or 92 PRI		

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Notes:

1. The number of conference, voice mail, and compression resources is fixed by the purchased option and the number of DSP devices available; the other values are adjustable.
2. The SX-200 ICP supports the G.711 and G.729a codecs.
   - The G.711 PCM audio codec for 56/64 kbps generally provides the best voice quality and is comparable to TDM-type connections.
   - The G.729a audio codec for 8/13 kbps provides a good reduction in bandwidth with only minor loss in voice quality.
   - A purchasable MOSS option controls the number of G.729a codecs available to IP devices in the system. Compression enables more devices to share available bandwidth.
   - The option is purchasable in multiples of 8 to a maximum of 24. The default value is 0. The quantity entered must exactly match the quantity on the MOSS sheet.

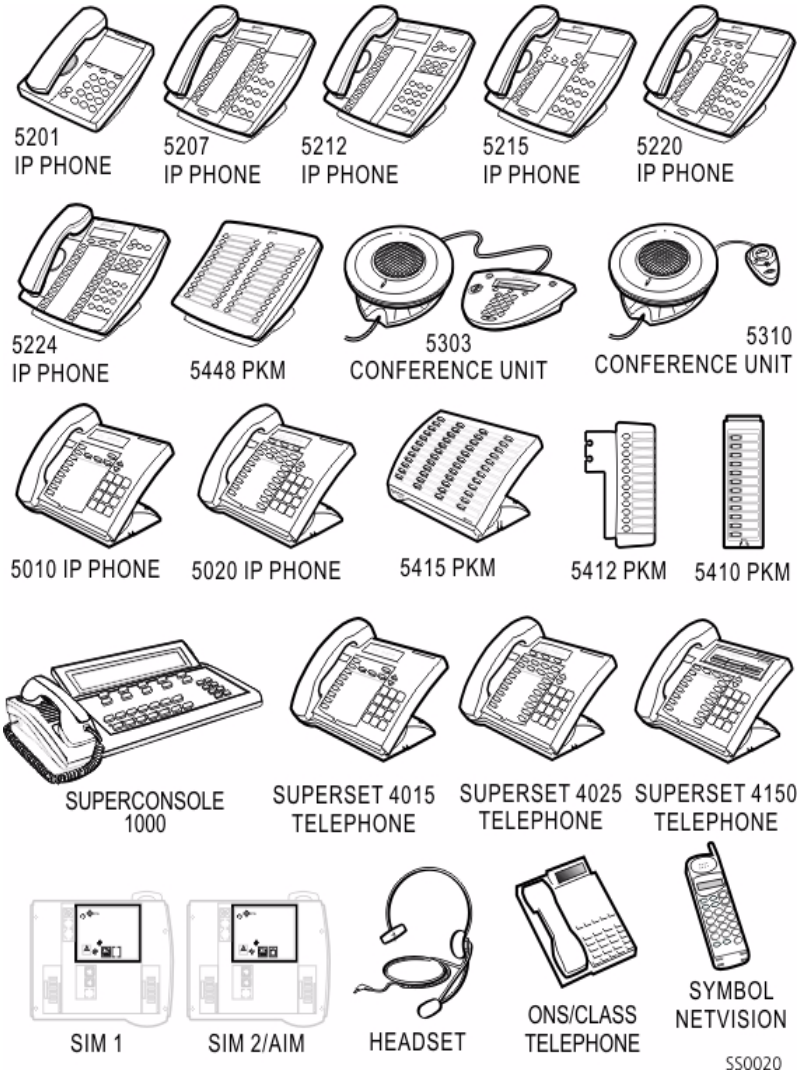
3. Installation of a hard drive is strongly advised for systems that have more than eight voice mail ports or when Record a Call is frequently used.
4. The MX controller can support 12 LS/CLASS, 2 DNIC, and 4 ONS on the internal analog boards in all option configurations.
5. All T1 trunk quantities include any combination of T1/D4 or T1/PRI.
6. The maximum system capacity is 672 TDM (ONS/DNIC) ports. In any option configuration, trunks may be added up to a maximum of 8 digital links (192 trunks) but only by reducing the number of digital bays (ONS and DNIC ports) connected, so that the total number of TDM ports does not exceed that shown in the table.
7. If System Option 82 is enabled (DSP Echo Cancellers), then one DSP device is removed from the available pool. The number of TDM resources (voice mail and conference) will be reduced. This option cannot be used in a base system with compression enabled (Business Option 1) or with a large number of TDM devices (Analog Options 1 and 2).

Cabinet Configuration Rules

The MX controller can be expanded to include:

- up to seven SX-200 Peripheral cabinets which provide 672 TDM ports for ONS, OPS, DID, T1, PRI/T1
- up to four Universal NSUs which provide eight PRI Links (192 PRI/T1 trunks)
- up to two offboard ASUs which provide 48 ONS/CLASS circuits

Supported Peripherals



Note: The SX-200 ICP (R2.1 or later) also supports the Dual Mode (or DPLite) 5215 and 5220 IP phones. The Dual Mode phones look the same as the original 5215 and 5220 phones. Check the label on the underside of the phone to determine which type it is. The originals are identified as 5215 or 5220 “Dual Port.”

Default Database Configuration

The CDE Forms are factory-set with default values that make it easier and faster to program the system. The defaults allow you to install the SX-200 ICP in a square KTS (key telephone system) configuration with up to 20 IP phones and two analog terminals (phone, fax, or modem) and make extension-to-extension calls without doing any programming. You will also be able to receive fax and modem calls, but will have to program ARS to make external calls from ONS devices.

Two alternate databases are provided on the SX-200 ICP software CD: a blank database that has no programming and a Premier database for the SX-200 ICP Premier system. A database programmed with 4-digit extension numbers is also available on Mitel Online. See page 205 for more information about the alternate databases and how to install them.

The default database includes the following:

Telephone related

- 3 digit extension numbers that start at extension 100
- IP phone extensions that start at extension 102
- Ports on the Controller
  - 6 LS CLASS
  - 2 ONS (extensions 201 and 202)
  - 2 DNIC (extension 198 is the SUPERCONSOLE 1000® and 199 is the sub attendant.)
- 7 default classes of service (COS 1 – 7). They are for IP Phones, ONS, Subattendant, Attendant Console, LS/CLASS, Voice Mail, and IP trunks.
- default key programming on the sets for a 6-line square system
- default ring cadences
- all phones assigned to paging group 1
- the handsfree microphone is not automatically turned on when receiving a page (auto-latched).

Voice mail related

- 4 Voice mail ports (Business 1 Option with Dual DSP); 8 ports (Business 2 and Hospitality Options with Dual DSP)
- 20 Voice mail mailboxes are assigned with the same extension numbers as the
  - first 20 IP phones (extension 100 to 119)
  - Attendant Console (SUPERCONSOLE 1000; extension 198)
  - Subattendant (extension 199)
  - 2 ONS ports (extensions 200 and 201)
- Hunt Group for Voice mail ports with pilot number 300
  - COS 6 and
  - reserve extension 301 to 304 for voice mail port extensions
- system-wide Call Forward No Answer to voice mail for all calls.

Trunk related

- trunks in form 14 are non-dial-in to the CO line keys
- LS trunk circuit descriptor defaulted as CLASS
- one LS trunk programmed to Key 1 on IP Phones
- no ARS, no dial 9 for trunk access

System related

- default system options
- default feature access codes
- the default music port (located on the analog mainboard) is ON
- the default paging port (located on the analog mainboard) is ON
- the night bell extension is 340
- SMDR/CDE Print default to ON
- default DHCP settings and a SX-200 ICP Controller default IP address (192.168.1.2) to match (factory-set).

Note: See Appendix A for a list of default values in the programming forms.

Chapter 2
Basic Installation

Before you begin

A successful installation of the SX-200 ICP MX depends on careful planning, especially when integrating the system into an existing data network.For detailed planning information, see the Engineering Guidelines in the Documentation folder on the SX-200 ICP software CD-ROM. Appendix B of the Handbook provides a summary of the Guidelines.

CAUTION:Only experienced network administrators should integrate the SX-200 ICP MX into a customer's LAN.

Quick Installation

You can quickly install a system configured with Business Option 1 if your installation does not require any purchasable MOSS Options or optional controller hardware.

If you are adding MOSS Options, complete the installation by enabling the options in CDE Form 04, System Options/System Timers. For more information, see, "Enabling MOSS Options" on page 86.

If you have optional controller hardware to install, follow the procedure on page 31.

Note: Premier Business systems use the Premier database which must be installed before enabling the MOSS Options. For more information, see "Installing an Alternate Database" on page 205.

To install a basic system:

1. Mount the controller.
2. Connect the ground lug at the back of the controller to a ground connection.
3. Connect the hardware:
   - Connect an Ethernet Switch to the Controller's Ethernet port with a Cat 5 cable.

Note: The Ethernet port on the controller is auto-sensing, allowing you to use either a crossover or a straight-through cable.

   - Connect the IP phones to the Ethernet Switch ports using Cat 5 cable.
   - Connect a breakout box to the amphenol connector at the back of the controller. For amphenol connector Onboard Analog/DNIC Tip and Ring Assignments, see page *367.*
   - Connect the LS CLASS lines and any ONS and DNIC phones to the breakout box.
   - Connect a Music on Hold source, Pager, Night Bells, and any other optional devices to the back of the controller; see pages 72-74 for details.
4. Power up the controller.
   - The Alarms LEDs on the controller flash and the IP Phones display IP addresses.

5. Wait while the controller boots up.
   - The boot sequence is finished when the Major Alarm LED is the only flashing LED and the IP phones display “Use SuperKey to send PIN.”
   - All phones connected to the controller are now functional.
6. Enter the IP Set Registration PIN numbers on the IP phones (default *** + extension number).
7. Verify that the system is working; see “System Health Check” on page 77.

SX-200 ICP MX Hardware

Hardware ports and connectors

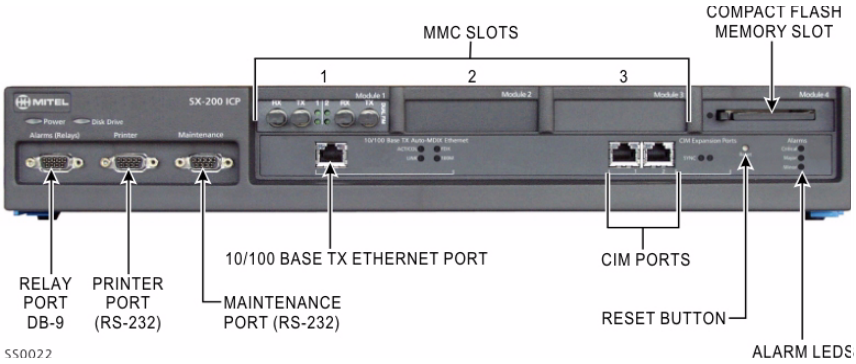


Figure 3: Controller front panel

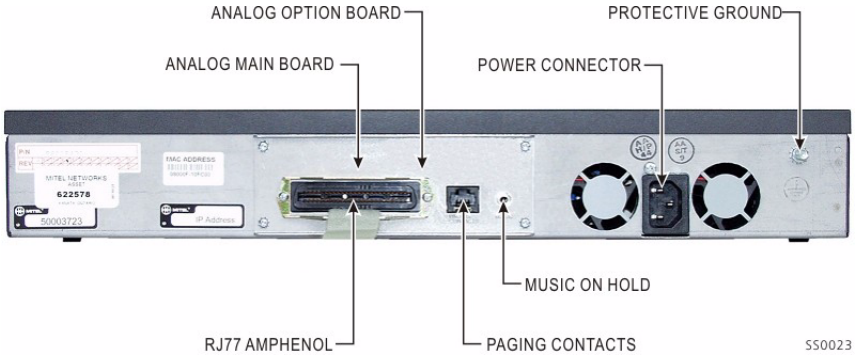


Figure 4: Controller rear panel

Controller components

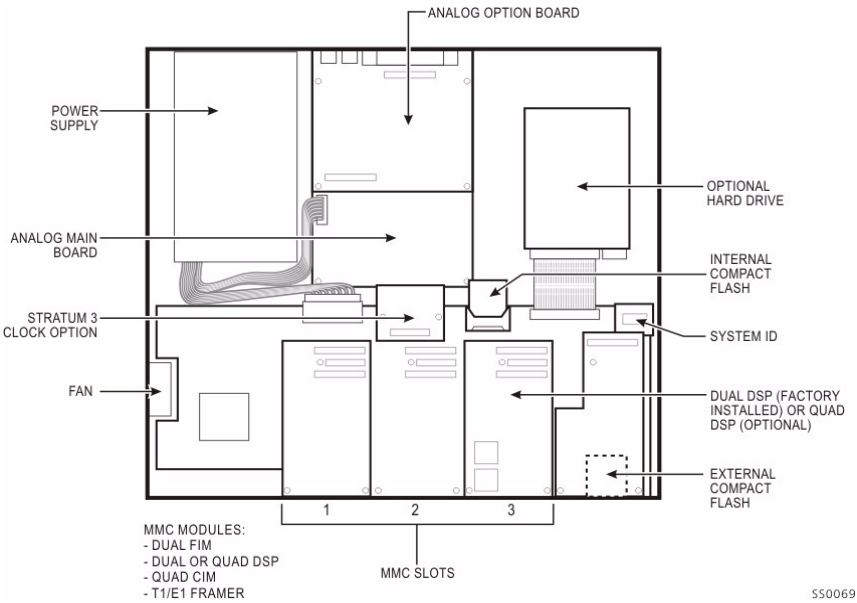


Figure 5: Controller Components

Identify the required components

The range of possible system configurations is determined by the type and number of controller components and external units (NSUs and Peripheral Cabinets) included.

Table 4: System Components

System components	Capabilities
Basic Controller	• 6 LS/CLASS, 2 ONS/CLASS and 2 DNIC circuits • 2 PFT (Power Fail Transfer) circuits • MOH (Music On Hold) port to connect an external audio source • Loudspeaker port to connect to an external paging system • Dry contacts for Alarm, Door Opener Relay and Auxiliary Ringer • RS232 ports for Printer and Maintenance • Onboard Real-Time Clock • 2 CIM ports to support up to 2 TDM/Digital Bays • Internal 256 MB CompactFlash card or hard drive for system software and database storage
Optional components:	
Analog Option Board	Provides 6 additional LS/CLASS and 2 ONS/CLASS circuits.
Dual or Quad DSP MMC	Provides more resources for conferencing, voice mail and other applications.
Stratum 3 clock module	For digital trunks.
Quad CIM Module	Four ports that provide connectivity to Peripheral Cabinets or NSUs.
Dual FIM Module	Two ports that provide connectivity to Peripheral Cabinets or NSUs.
Dual T1/E1 Framer Module (Rev. 3)	Two ports that provide connectivity to T1/D4 or PRI trunks.
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Table 4: System Components (continued)

System components	Capabilities
Hard Drive	Replaces the internal CompactFlash card to provide more database storage. (**Note:** System is available with factory-installed hard drive.)
Network Services Unit	Supports digital trunk protocols for ISDN PRI (NI2_STANDARD, NI2_5ESS, NI2_GTD5), and QSIG (QSIG_ISO), DMS 100/250, 4ESS
Analog Services Unit	Provides 24 ONS/CLASS circuits.
SX-200 EL Peripheral Cabinets	Up to seven Peripheral Cabinets can be connected to provide 672 TDM ports.
CompactFlash card	256 MB; for on-site software installation upgrades.
	(Page 2 of 2)

Installation checklist

Tools

- ❒ Static strap
- ❒ Phillips screwdriver (#1 and #2)

Use proper fitting screwdrivers to prevent damaging components and fasteners.

System Hardware and Software

- ❒ An SX-200 ICP MX Controller
- ❒ Optional hardware (see the previous table)
- ❒ Release 3.0 software
- ❒ A Layer 2 Ethernet switch
- ❒ IP phones
- ❒ CompactFlash memory card: 256M minimum (not required if using FTP to upgrade software on Release 1.0 systems.)

Cables and connectors

- ❒ Category 5 (CAT5) cable for all LAN devices (IP phones and computers)
- ❒ CAT3 cable for any analog phones connected to the system
- ❒ RJ45 cable and connectors
- ❒ RJ45 crossover cable
- ❒ Up to ten CIM cables to connect the SX-200 ICP Controller to Peripheral Cabinet(s), NSUs and ASUs.
- ❒ FIM or CIM cables if connecting Peripheral Cabinets or NSUs or ASUs
- ❒ A power cable for the SX-200 ICP Controller (supplied)

Cable plugs must meet FCC Rules part 68 subpart F for dimensions and registration. Use of non-conforming plugs can cause intermittent connections.

PC requirements

- ❒ Windows NT/98/2000/ME/XP PC or laptop
- ❒ Internet Explorer version 5.5 with service pack 2, or version 6 (recommended) for client-side rendering **and** 128 bit encryption (required for access to Mitel Online).
- ❒ Network Interface Card: Full Duplex 10/100M (100M recommended)
- ❒ a serial cable to connect a PC to the SX-200 ICP Controller
- ❒ FTP Server—used for software upgrades, database backups, and uploading maintenance logs
- ❒ CompactFlash Reader with Read/Write capability
- ❒ (Optional) secure Telnet client that supports SSL/TLS (Mitel Telnet client recommended)

Line requirements

- ❒ LS/CLASS lines
- ❒ ONS/CLASS lines
- ❒ PRI-T1 lines (requires a Dual T1/E1 Framer Module, a Dual FIM Module connected to a Network Services Unit, or a Dual FIM or Quad CIM Module connected to a Peripheral Cabinet and PRI card)

LAN requirements

- ❒ Pre-installation questionnaire complete
- ❒ A subnet
- ❒ (Advanced) SMTP server IP address for forwarding voice mail to e-mail and for e-mail notification of 911 calls and system alarms
- ❒ (Advanced) IMAP Server IP address for forwarding voice mail to e-mail
- ❒ (Advanced) Customer data network information (for example, DNS server information)
- ❒ (Advanced) Router if using IP trunking or connecting to the Internet or other network

IP Address Requirements

You need IP addresses for

- The SX-200 ICP Controller
- Each IP phone (a range of IP addresses assigned by the DHCP Server or statically assigned)
- A router or gateway (if using)

Important: The SX-200 ICP Controller uses the following reserved IP addresses:

192.168.10.1 - 192.168.10.255
192.168.11.1 - 192.168.11.255
192.168.12.1 - 192.168.12.255
192.168.13.1 - 192.168.13.255

Ensure no other devices on the network use IP addresses within these ranges.

Other

- ❒ Feature codes and extension number plans
- ❒ A list of customer-purchased options
- ❒ An uninterruptible power supply (recommended)
- ❒ Power source with surge protection for IP Phones; see page 32 for powering options.
- ❒ (Optional) Music on Hold source (radio, tape player etc.)

- ❒ (Optional) External paging amplifiers and speakers
- ❒ (Optional) Auxiliary ringer (Night Bells)
- ❒ (Optional) Door Phone/Opener
- ❒ (Optional) Alarm device to signal system alarms
- ❒ (Optional) SMDR printer

Installation overview

- ❒ Install SX-200 ICP Controller
- ❒ Install optional controller hardware
- ❒ Install an Ethernet switch
- ❒ Feed power to the IP Phones
- ❒ Initialize the System
- ❒ (Optional) Load software on an External CompactFlash Card
- ❒ (Optional) Install NSU
- ❒ (Optional) Install ASU
- ❒ (Optional) Install SX-200 Peripheral Cabinets
- ❒ (Optional) Install Music on Hold, Paging, Auxiliary Ringer, Door Phone/Opener, and Alarm Device
- ❒ Connect the Phones and Lines
- ❒ (Optional) Install Programmable Key Modules
- ❒ Install an FTP Server
- ❒ Verify the system

Installing the SX-200 ICP MX Controller

The SX-200 ICP system is shipped with the system software and a default database installed. The optional components (DSP modules, Analog Option Module, etc.) are field-installed.

Note: Premier Business systems use the Premier database which must be installed before enabling the MOSS Options. For more information, see “Installing an Alternate Database” on page 205.

1. Install optional controller hardware or peripheral units according to the instructions on the pages indicated.

   Analog Option Board: page 39
   DSP Modules: page 41
   Dual FIM Module: page 43
   Quad CIM Module: page 44
   Dual T1/E1 Framer Module: page 45
   Upgraded Internal CompactFlash or Hard Drive: page 46
   Stratum Clock Module: see page 48
   Network Services Unit, page 54
   SX-200 Peripheral Cabinets, age 57.

2. Wall mount the units, rack mount them, or place them on a desk or shelf; see page 32 for instructions.

Note: The NSU is NOT wall-mountable.

3. Connect the ground stud on the rear panel of the controller to a hard-wired ground using 18 AWG (0.75mm 2/) gauge wire. The wire must have green or yellow insulation. Crimp the wire to the ground source.
4. Connect a PC to the Maintenance port on the controller; see page 82.
5. Connect the trunks and phones. See “Connecting the Phones and Trunks” on page 66.
6. If you are NOT installing software or optional hardware in the controller, power up the system.

Install an Ethernet Switch

You must connect all IP devices to a Layer 2 Ethernet Switch. Hubs should not be used. The type of Ethernet Switch required depends on the number of IP Phones you need to install.

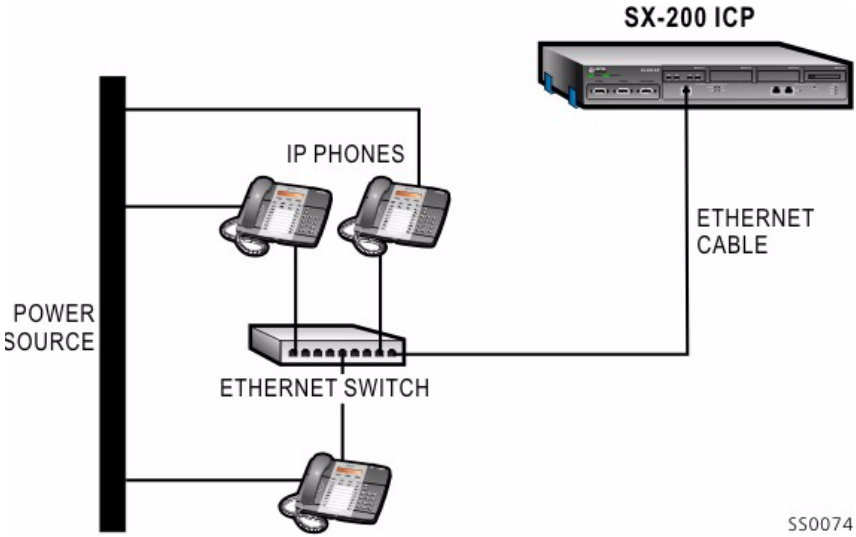
Important: Careful planning is essential when installing the SX-200 ICP for voice and data. For planning information, including a pre- installation questionnaire, see Chapter 4, Advanced Installation and Programming.

Small installations (under 20 phones)

- Connect the Ethernet Switch to the SX-200 ICP Controller Ethernet Port with an Ethernet cable.

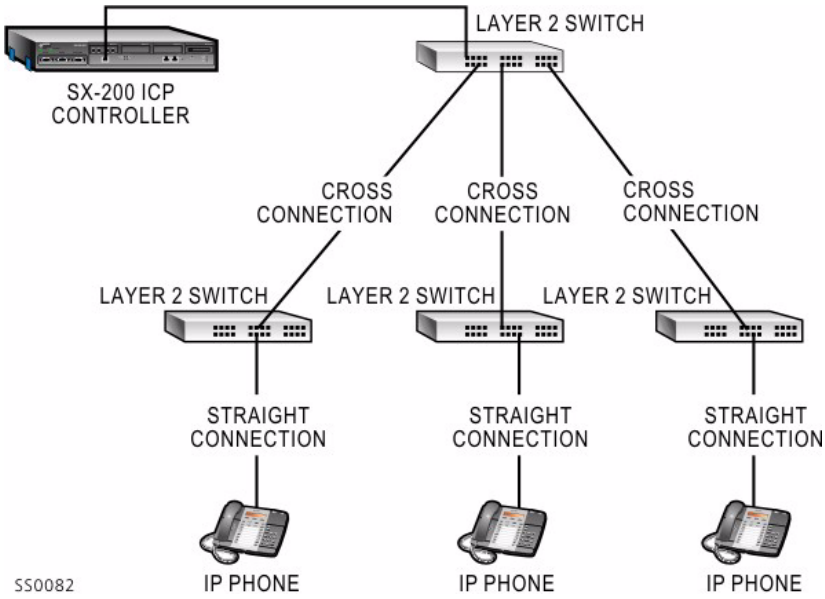
  The Ethernet port on the Controller is auto-sensing, allowing you to use a crossover or straight-through cable.

- Connect the Ethernet Switch power cord to a power source.



Larger installations (over 20 phones)

If you are connecting several switches together, connect them in a tree-type structure. Daisy-chaining switches is not recommended because all switches become involved in connections from one end of the chain to another. Layering reduces this unnecessary traffic.



Feeding Power to IP Phones

The IP Phones require power that can be provided by

- an external supply such as a 24-volt adapter (required by the 5010 and 5020 IP Phone; connects to back of phone) or 48-volt power brick (required by 5200 series IP Phones; see Figure 6 for connections).
- a multi-port Ethernet Inline Power Module (such as the PowerDsine 24PT Inline Power Unit)
- Layer 2 switches with integral power feed

None of the above are included with the system or phones. All except the powered Layer 2 switch can be ordered from Mitel. See Appendix B for part numbers.

Note: Power backup to the IP Phones, the SX-200 ICP, and the Ethernet switches is required to maintain service during a power failure.

CAUTION:Ensure that the powered cable from the inline power adapter is installed in the proper connector on the IP Phone. DO NOT plug it in to the connector (if available) designed for a PC or other Ethernet devices (Layer 2 port).

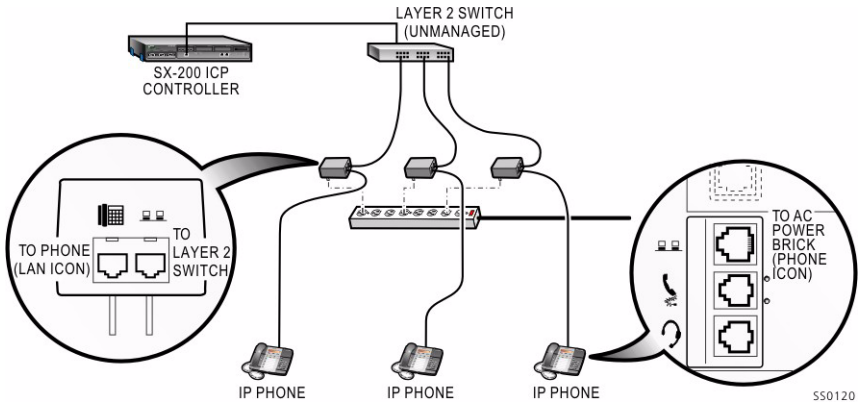


Figure 6: Power Brick Connections for 5200 Series IP Phones

Installing Software Using an External CompactFlash Card (Optional Initial Install)

The SX-200 ICP is shipped from the factory with the system software and a default database installed. Perform this procedure only if you,

- are upgrading the system software on site
- are upgrading Release 2.0 or later software

Note: Systems with Release 1.x software can only be upgraded on site using a CompactFlash card. For more information, see “Upgrading the System Software” on page 206.

- require a language other than the default English for voice mail prompts or a second language for bilingual voice mail operation
- are replacing the internal CompactFlash or installing a hard drive. For replacement instructions, see page 199
- are re-initializing the controller by re-installing the system software

Note: The “Initial” power-up and the reset in this procedure will each take 5 to 10 minutes.

To install software using an external CompactFlash card:

Important: Use only Mitel-supplied CompactFlash cards. DO NOT partition the card and DO NOT copy files to it before proceeding with the software installation.

1. Launch the SX-200 ICP Installation program on the supplied CD-ROM.
2. Select “Initial [CompactFlash Card] Installation”, and then click Next.
3. Select the voice mail language(s) that you want to install, and then click Next The default is English and is not selectable.

Note: The additional languages enable the embedded voice mail system to operate with bilingual prompts. Bilingual prompts is a purchasable MOSS option.

4. Specify the drive letter of the CompactFlash Writer/Reader.

5. Select Format to format the CompactFlash card.

Note: When formatting the CompactFlash card, specify FAT as the file system.

6. Select a database, then click Next.
7. Click Next to begin installing the software on the CompactFlash card.
8. Click Finish to complete the installation.

Note: Wait until the computer completes writing to the CompactFlash card before removing it. To ensure completion, DO NOT click STOP before EJECT.

Note: Certain PC CompactFlash readers have problems with cards larger than 128M. They report that copying is complete when in fact not all the files have been copied. If in doubt, eject the card, re-insert it, and then use Windows Explorer to confirm that all 37 files (64 if a second language for voice mail was installed) are present.

9. Insert the CompactFlash card into the controller.
10. Press the RESET button on the controller or power it down then back up.

    The system boots from the CompactFlash card, and then runs the install utility. When installation is complete, the system automatically reboots.

Do not remove the CompactFlash card while the system is rebooting as indicated by the LED adjacent to the card slot. Wait for the LED to turn green before removing the card.

IMPORTANT: Re-initializing a working system with a database that has different IP addressing information than the database it is replacing will force the IP Phones to reboot. The phones take 10 to 15 minutes to return to service once the system is re-initialized.

11. Remove the CompactFlash card from the controller when the LED adjacent to the card slot turns green.

IMPORTANT: If the card was removed and reinserted (or replaced by another card), the system will detect it and attempt an upgrade or installation when it reboots. Both processes take the system out of service. To prevent unnecessary loss of service, always remove the external card once the system is up and running.

12. Log in to CDE and enable MOSS sheet options (if any) in Form 04.

Installing Optional Controller Hardware

- Hard drive or larger internal CompactFlash
- Analog Option Board
- Dual FIM Option Module
- Quad CIM Module
- Dual T1/EI Frame Module
- Stratum Clock Module
- Dual or Quad DSP Option Modules

Precautions

WARNING: INSTRUCTIONS MUST BE FOLLOWED EXPLICITLY WHEN THEY INVOLVE WORK WITH AND CHANGES TO THE PRIMARY POWER SUPPLY OF THE UNIT.

Observe the following precautions when working on the system, particularly when handling PCB cards or using test equipment to measure voltages.

- When installing or replacing PCB cards turn power off, but maintain the ground connections to the equipment (see Note below). Power must be OFF when inserting or removing cards. These cards are identified with appropriate warnings on their faceplates.
- Always wear an antistatic wrist strap when handling printed circuit cards. Handle PCB cards only by the edges and avoid contact with any exposed electrical connections. When removing a new card from its package, touch the package to the cabinet frame first to release any static voltage buildup, prior to removing the card and inserting it into the equipment.
- Conductive packages (antistatic packaging) should be grounded prior to opening them to remove the contents, and similarly grounded prior to placing a card in the package. Place suspected faulty cards in conductive packages to prevent further possible damage to the cards. Cards that are not correctly packed in antistatic packaging when returned will not be covered by any warranty.

Use proper fitting Phillips screwdrivers (#1 or #2) to prevent damaging components and fasteners.

Removing the cover

To remove the SX-200 ICP Controller cover:

1. Unplug the power cord from the controller and disconnect all cables.
2. Remove the controller from the rack or wall and place it on a suitable work area (if applicable).
3. Remove the four screws from the top of the controller.

4. Slide the cover forward until it catches, then tilt the cover upward to remove it.
5. Remove the front faceplate by clipping it off from the bottom of the unit.

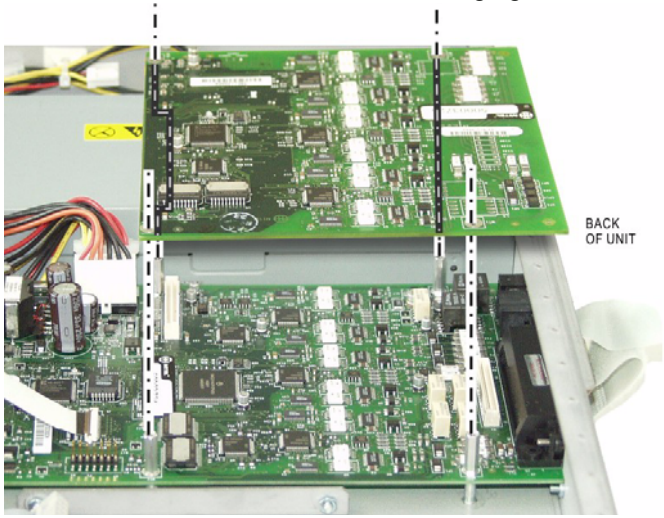
Note: It may be easier to pry the end off first, and then slide your fingers along the bottom edge of the faceplate to the other end.

To replace the cover:

1. Turn the controller until the back panel is facing forward.
2. Lift the lock for the AC power cord and place the cover at an angle to hook onto the back of the unit.
3. Straighten and slide the cover forward as far as it will go.
4. Secure the cover by inserting and snugly securing the two screws on the back panel.
5. Rotate the controller until the front panel is facing forward.
6. Secure the screws on the top of the unit.
7. Clip on the front face-plate taking care not to damage the protruding FIM connectors.
8. Reinstall the controller on the wall or in the rack (if applicable).
9. Reconnect all cables.

Install the Analog Option Board (AOB)

1. Unplug the power cord from the controller.
2. Remove the cover and the front panel.
3. Remove the Stratum Clock Module (if installed).
4. Attach the standoffs as shown in the following figure.



5. Lower the AOB onto the standoffs. Ensure it is well-seated.
6. Attach the screws.
7. Re-install the Stratum Clock Module (if it was removed).
8. Replace the cover and the front panel.
9. Connect lines or devices to the AOB ports and complete the required programming; see the following sections for more information:

   ONS telephones: "Connecting the Phones and Trunks" on page 66 and "Programming a Single Line Voice Station" on page 110

   LS trunks: "Connecting the Phones and Trunks" on page 66 and "Programming Analog Trunks" on page 131

   Relays: "Connecting Music on Hold, Paging and Door Phone/Door Opener" on page 72 and "Connecting a Night Bell and Alarm Device" on page 74

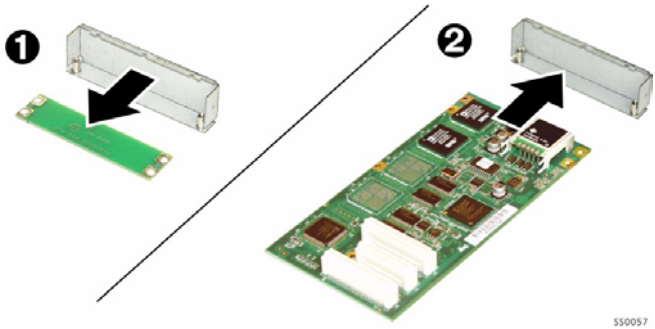
   Paging: "Connecting Music on Hold, Paging and Door Phone/Door Opener" on page 72.

Installing Optional DSP Module(s)

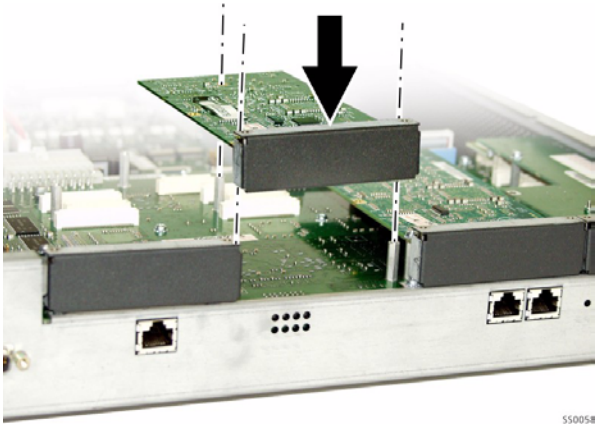
The basic SX-200 ICP MX has one Dual DSP module installed in Module Slot 3. Additional DSPs can be added by installing Dual or Quad DSPs modules in the Module Slots 2 and 3 as shown in the following figure. For information on determining DSP requirements, see “DSP Configuration Options” on page 12.

To install the optional DSP Modules:

1. Unplug the power cord from the controller.
2. Remove the top cover.
3. Repeat the steps below for each DSP module you install:
   - Remove the DSP module from its packaging.
   - Remove the blanking panel covering the Module Slot into which you are installing the DSP Module.
   - Remove the small PCB (❶).
   - Install the module cover on DSP module (❷).



   - Insert the DSP module in the appropriate slot.



   - Secure the DSP module to the controller using the screws provided.
4. Replace the cover.

Installing the Optional Dual FIM Module

The Dual FIM Module provides connectivity to a Peripheral Cabinet and/or to an NSU. The MX can support up to two Dual FIMs installed in MMC slots 1 and 2.

There are three fiber length variants of the FIM Module: 1, 5, or 14 km. Both ends must use the same variant.

Notes:

1. The NSU supports the 1 km variant only.
2. The SX-200 ICP does not support single FIM modules.

To install a Dual FIM Module:

1. Unplug the power cord from the controller.
2. Remove the top cover and the front panel.
3. Insert the new FIM II Module into Module slot 1 or 2 on the Main Board connector.

4. Attach the screws.
5. Replace the front panel and the top cover.

Installing the Optional Quad CIM Module(s)

The optional Quad CIM module has four ports that provide connectivity to Peripheral Cabinets, NSUs, and ASUs using Category 5 UTP copper cabling.

The system can support up to two Quad CIM Modules installed in Module slots 1 and 2.

To install a Quad CIM Module:

1. Unplug the power cord from the controller.
2. Remove the top cover and the front panel.
3. Insert the Quad CIM into Module slot 1 or 2 on the Main Board connector.

SS0223

4. Attach the screws.
5. Replace the front panel and the top cover.

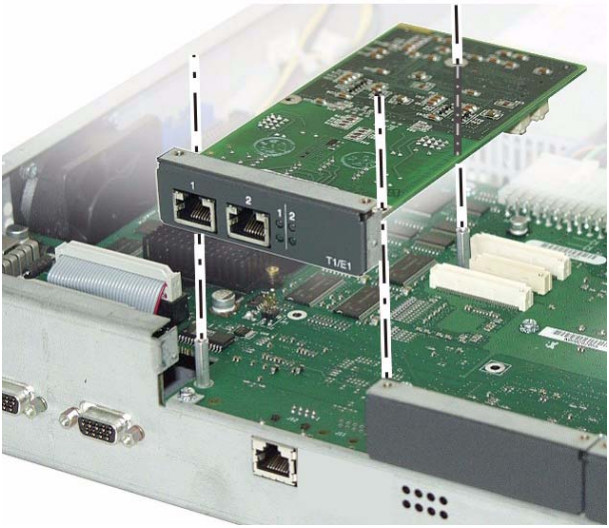
Installing the Optional Dual T1/E1 Framer Module(s)

The Dual T1/E1 Framer module has two digital trunk ports, each of which can be programmed to support either T1/D4 or PRI. Up to two modules can be installed in MMC slots 1 and 2 of the MX controller.

The system can support up to two Dual T1/E1 Framer Modules installed in Module slots 1 and 2.

To install a Dual T1/E1 Framer Module:

1. Unplug the power cord from the controller.
2. Remove the top cover and the front panel
3. Insert the Dual T1/E1 Framer into Module slot 1 or 2 on the Main Board connector.



4. Attach the screws.
5. Replace the front panel and the top cover.
6. Program the module in CDE:
   - Assign the module a bay number in Form 53, Bay Location.
   - Program the T1 link; see page 130.

Installing a hard drive

The SX-200 ICP is shipped with an internal CompactFlash card which provides 256 MB of memory for system software and database storage. If you need increased storage capacity for voice mail messages and recorded calls, you can replace the card with a MItel-supplied hard drive. (see Appendix C on page 351 for the part number).

Notes:

1. A hard drive is strongly recommended for systems that have more than eight voice mail ports or when Record a Call is frequently used.
2. Use Mitel-supplied hard drives only; those obtained elsewhere are not supported.

Use this procedure to upgrade systems only. To replace faulty cards or drives, use the media replacement procedure on page 199.

To install an optional hard drive:

1. Establish a serial connection to the Maintenance port on the controller. For instructions, see "Serial Connection to the Controller" on page 82.
2. As a precaution, perform a full database backup; for instructions, see page 203. Skip this step if the system is new and has no database changes to preserve.
3. If an external CompactFlash card is inserted in the controller, remove it.
4. Use the System > Restart > Shutdown command in Maintenance to stop the system.
5. When prompted on the PC, power down the controller.
6. Remove the cover.
7. Remove the internal CompactFlash card. Keep it on hand.
8. Install the hard drive as follows,
   a. Remove the drive from its packaging and set the jumpers on the drive to the Master setting.

b. Insert the hard drive as shown in the above figure.

c. Connect the power and IDE cables to the corresponding connectors on the hard drive and main board. The cables are keyed for proper connection.

d. Secure the hard drive to the controller using the screws provided.

9. Replace the cover.

10. Insert the internal CompactFlash card previously removed into the external card slot.

11. Restore power to the controller.

12. Re-establish a serial connection to the controller and wait while the new media is formatted and the contents of the CompactFlash card copied to it.

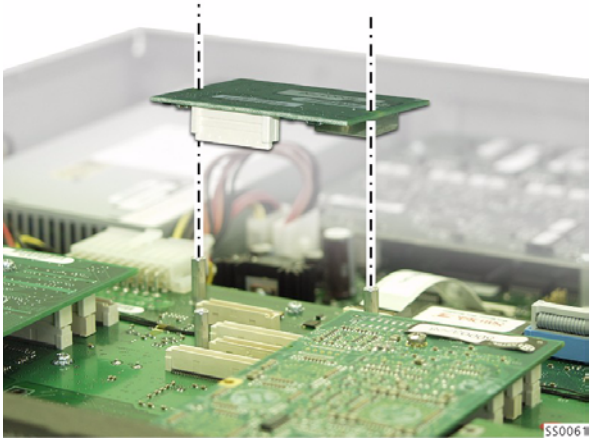
13. When prompted, press return four times to log in to CDE/Maintenance.

14. Verify that the phones are working and that calls can be made.

15. Remove the CompactFlash card from the external slot.

Installing the Stratum Clock

1. Unplug the power cord from the controller.
2. Remove the top cover and front panel.
3. Gently seat the Clock Module onto the Main Board.



4. Attach the screws.
5. Replace the top cover and front panel.
6. To check whether the system recognizes the Stratum clock card, log into Maintenance and use the System > Show > Identity command. It should show the clock as ST3.

Wall or Rack Mounting

The SX-200 ICP controller is wall and rack mountable. The NSU is rack-mountable only.

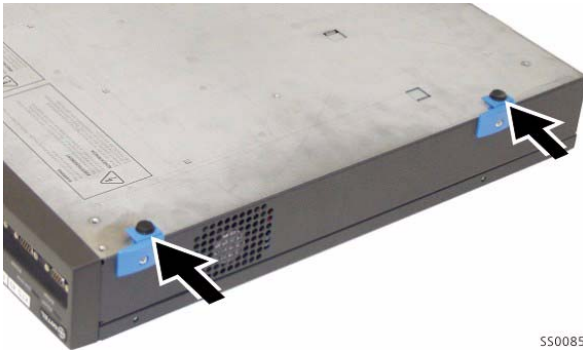
Wall mounting the controller

When mounting the controller on a wall, use the supplied long bracket and small bracket and the supplied screws (#10).

CAUTION:Make sure the wall material is capable of supporting the weight of the unit. Mitel is not responsible for units damaged as a result of improper wall mounting.

1. Turn the controller upside down.
2. Locate the two holes on the bottom of the Controller as shown in the following figure.

3. Remove the two feet as shown below.

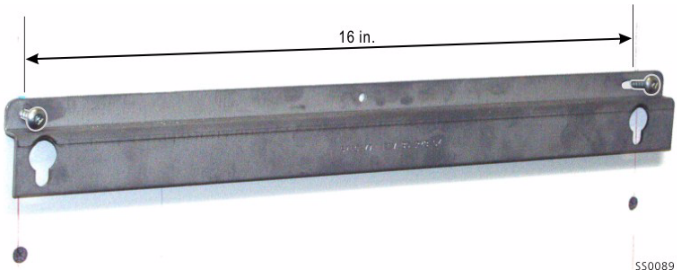


4. Assemble the two supplied screws and two nuts as shown below.

5. Screw the assembled nuts and screws into the holes as shown below.

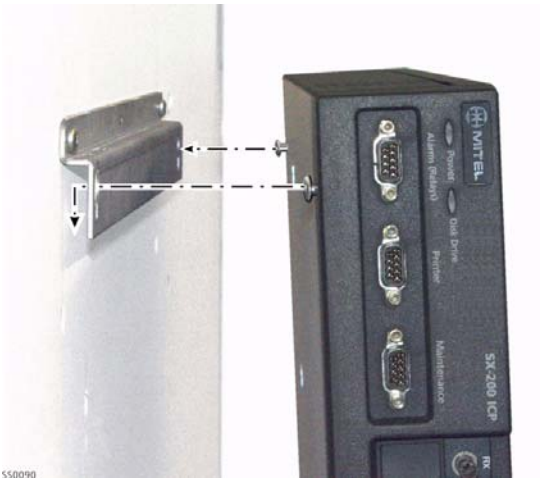
6. Screw the supplied small bracket onto the bottom of the controller as shown.

7. Mount the bracket onto the wall.
   a. Pre-drill two pilot holes into two wall studs with 16" centers.
   b. Orient the bracket over the two holes as shown below.

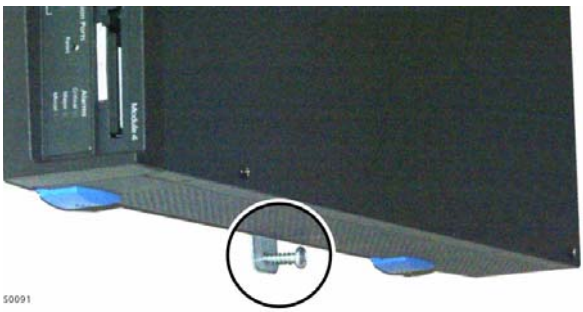


   c. Insert a screw into the hole on the left side of the bracket.
   d. Insert a screw into the hole on the slot on the right side of the bracket.

8. Hang the controller onto the mounted bracket as shown below. Position it with the front panel facing to one side so that the ports and connectors are accessible.



9. Insert a screw into the bottom bracket to stabilize the controller as shown below.



Rack mounting the controller or NSU

Use the Rack Mount Kit (Part Number: 50004150) to rack mount the Controller. The NSU requires a different kit that is supplied with the unit.

CAUTION:When installing the system in an enclosed rack, you MUST provide adequate ventilation to ensure that the maximum ambient temperature inside the rack does not exceed 40°C/104°F.

CAUTION:Ensure that a hazardous condition does not result from any uneven mechanical loading.

CAUTION:When using the system in a rack, you should consider the connection of the equipment to the power supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. When addressing this concern, refer to the system's ratings label.

1. Attach the brackets to the rack.
2. Slide the unit into the brackets.
3. Secure the unit to the brackets using the supplied thumbscrews. The screws fasten to the underside of the unit and fit into the notch on the bracket.

Installing an NSU

Figure 7: NSU Front View

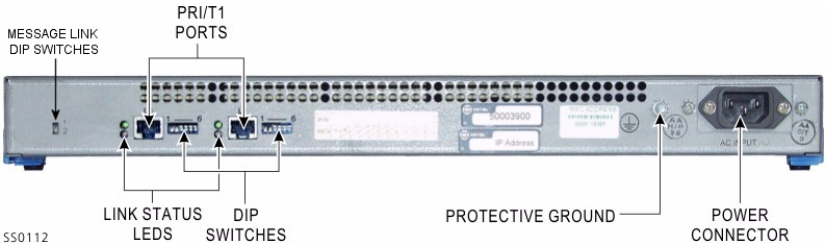


Figure 8: NSU Rear View

The NSU connects to the Controller via a CIM or FIM cable.

Note: The FIM Module in the controller must be the 1K variant, which is the only variant that the NSU supports.

1. Mount and secure the NSU in the desired location.
2. Set the L0/L1 port DIP switches to the appropriate termination mode and impedance; see Figure 9, "NSU DIP Switch Location," on page 55. The default is network termination mode (switch 6).
3. Set the two Message Link DIP switches to the down position. The left switch is partially hidden by the NSU rear panel.
4. Connect a fiber optic cable between the NSU FIM and the controller FIM. Or, connect a Cat 5 crossover cable between one of the CIM ports on the NSU and one of the CIM ports on the SX-200 ICP controller.
5. Connect the NSU L0 and/or L1 port to the remote system (the PSTN or another system). See the table below for the pinout.
6. Install IMAT from the SX-200 ICP software CD.
7. Connect power to the NSU.

8. Program the NSU using CDE and IMAT; see page 112 for programming instructions.
9. After programming the NSU, plug the T1 cable from the demarcation point for the T1 provided by the Carrier to either L0 or L1 on the back of the NSU. Each connector (L0 or L1) has LED indicators beside the connector to indicate sync or not. For example:
   - Red LED indicates no sync (check connection or switch 6 is in wrong position).
   - Flashing green LED indicates synch but D-channel is not synchronized (check programming (see table below) on IMATs to ensure correct protocol).
   - Solid green LED indicates that D-channels and B-channels are all in sync and PRI trunks on NSU are ready to process calls.

Table 5: Pinouts for T1 Line/Network Termination

Pin	Line Termination Mode	Network Termination Mode
1	Tx Ring	Rx Ring
2	Tx Tip	Rx Tip
3	Unused	Unused
4	Rx Ring	Tx Ring
5	Rx Tip	Tx Tip
6	Unused	Unused
7	Unused	Unused
8	Unused	Unused

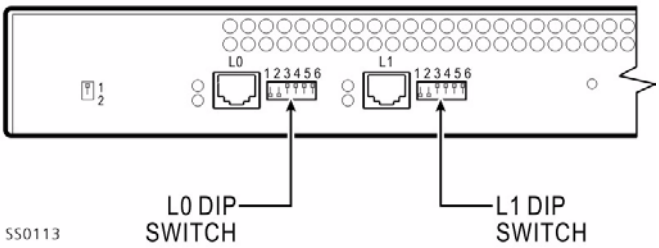


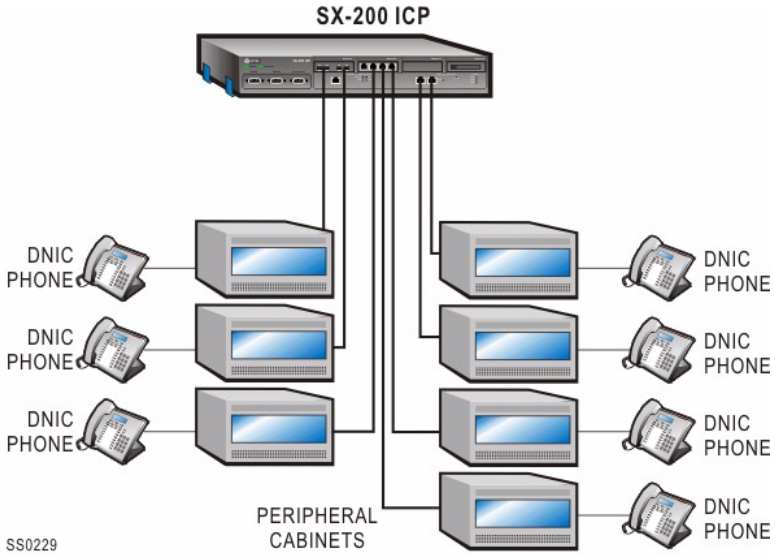
Figure 9: NSU DIP Switch Location

Table 6: NSU DIP Switch Setting

DIP Switch	Function	Settings	Notes
1	TX Ground	Down: Ground Up: Floating	Set to Up
2	RX Ground	Down: Ground Up: Floating	Set to Up
3	E1 Twisted Pair cable selector (RJ45, PRI)	Down: Enabled Up: Disabled	Set to Up 120 ohm impedance (Europe)
4	TI Cable Selector (T1/D4)	Down: Enabled Up: Disabled	100 ohm impedance Default - Down
5	EI, coaxial cable selector (R2)	Down: Enabled Up: Disabled	Set to Up 75 ohm impedance (Europe)
6	Line/Network Termination Selector	Down: Line Up: Network	If connecting to Telco, set switch to Up

Installing SX-200 Peripheral Cabinets

You can connect up to seven Peripheral Cabinets to the MX controller via CIM or FIM cables. The cabinets can be SX-200 ELx peripheral cabinets, SX-200 LIGHT peripheral cabinets, or a mix of both.



FIM Connectivity

There are three variants of the FIM II modules.The same variant of fiber interface module (1, 5, or 14 km) must be at both ends.

Note: The SX-200 ICP does not support single FIM modules.

CIM Connectivity

There is only one variant of the CIM. In the peripheral cabinets, a CIM sits on a Bay Control Card III (BCC III), on a Peripheral Interface Module Carrier card, or on a PRI card.

- The CIM (Copper Interface Module) supports a distance of up to 30 meters or 100 feet.
- The CIM requires Category 5 UTP crossover cable (TX and RX pairs reversed) with RJ45 connectors.

Cabinet installation and programming

The following procedure applies to the installation of new peripheral cabinets. Cabinets migrating from an existing SX-200 EL/ML installation install in a different manner; see "Migrating an SX-200 EL/ML to an SX-200 ICP" in the SX-200 ICP Technical Documentation for more information

1. Install the peripheral cabinet (including Bay Power Supply, Bay Control Card, interface cards and required Fiber or Copper Interface Module).
2. Complete the peripheral interface cabling.

   See Tip and Ring Assignment tables in Appendix C (page 365) for cabling and cross connecting the peripheral cabinets.
3. Connect one end of the fiber or copper cable to the interface module in the control cabinet and the other end to the CIM or FIM connector in the controller.
4. Power up the cabinet.
5. Enter CDE mode on the maintenance terminal.
6. In Form 04 (System Options/System Timers)
   - Enable the required number of TDM Bays (Option 133)
   - Make sure there are enough TDM devices available (Options 103).
7. In Form 53 (Bay Location Assignment)
   - Assign a bay number to the CIM or FIM ports used to connect the peripheral cabinets.
8. In Form 01 (System Configuration)
   - Configure the cards (select node type as required).
9. Complete the remaining CDE programming for the cards.

For detailed programming information, refer to the SX-200 ICP Technical Documentation.

Peripheral Cabinet Interface Cards and Modules

The following table lists the peripheral cabinet interface cards and modules supported by the SX-200 ICP.

Table 7: Peripheral Cabinet Interface Cards and Modules

Interface Card	Devices supported	Circuits	Maximum loop resistance /loop lengths
DID Trunk card (high power)	Direct Inward Dial (DID) trunks from CO	6	Loop resistance: 2450 W (includes set resistance) Loop length: 26 AWG - 7986 m (25955 ft.) 22 AWG - 19995 m (64984 ft.)
LS/GS Trunk card (low power)	Ground start and Loop start CO trunks	6	not applicable
LS/CLASS Trunk card (low power)	Loop Start CO trunks	8	not applicable
ONS/CLASS Line card (low power)	DTMF telephone sets Rotary telephone sets	12	External loop resistance: 600 W (includes set resistance) External wire resistance: 400 W External loop length: 22 AWG - 3560 m (11700 ft.) 24 AWG - 2250m (7400 ft.)
OPS Line card (low power)	DTMF telephone sets Rotary telephone sets	6	External loop resistance: 1800 W (includes set resistance) External wire resistance: 1600 W External loop length: 26 AWG - 7225 m (23700 ft.) 22 AWG - 18290 m (60000 ft.)

(Page 1 of 2)

Table 7: Peripheral Cabinet Interface Cards and Modules (continued)

Interface Card	Devices supported	Circuits	Maximum loop resistance /loop lengths
Digital Line card (DNIC) (low power; high power if a console is connected to a SX-200 LIGHT)	SUPERSET™ 4001 SUPERSET 4015 SUPERSET 4025 SUPERSET 4090 SUPERSET 4125 SUPERSET 4150 SUPERSET 401+ SUPERSET 410 SUPERSET 420 SUPERSET 430 SUPERSET 3DN SUPERSET 4DN DATASET 1100 DATASET 2100 SUPERCONSOLE 1000 SUPERSET 7000 DSS/BLF Interface Unit MOH/Pager Unit	12	24 AWG (25 IWG) - 1000 m (3300 ft.) including up to 50 m (162.5 ft.) 22 AWG (22 IWG) quad wire and up to 3 m modular line cord without bridge taps
Mitel Express Messenger Card (DNIC, low power)	2, 4, 6, and 8 voice mail ports	NA	NA
Universal card (high power)	Four modules: MOH/Paging DTMF Receiver, E&M Trunk, Console		Total power rating of modules on Universal card cannot exceed 10
Music-on Hold/Paging module		1 each	power rating = 1 loop length - not applicable
DTMF receiver module	DTMF telephone keypads and end-to-end signaling equipment.	4	power rating = 2 loop length - not applicable
E&M trunk module	E&M tie trunk	1	power rating = 3 26 AWG - 1068 m (3500 ft.) 24 AWG - 1708 m (5600 ft.) 22 AWG - 2715m (8900 ft.)
LS/CLASS Trunk module	4 LS/CLASS trunks plus SFT for circuit 1 (SPINE Bay only)	4	External loop resistance: 1600 W

(Page 2 of 2)

Peripheral Cabinet Control and Digital Services Cards and Modules

The following table lists the peripheral cabinet control and digital services cards and modules supported by the SX-200 ICP

Table 8: Digital Control and Digital Services Cards and Modules

Card or Module	Important Details
Bay Control Card II	One for each bay
Bay Control Card III	Requires the SX-200 ELx cabinet
T1 Trunk Card	A 24 circuit, high power card to CO or to another PBX, maximum distance is 655 feet of shielded cable to the Channel Service Unit
PRI Card	For the SX-200 ELx cabinet Rev 4.4 or greater (PN 9109-600-002-NA) Supports the T1/E1 module and the FIM II or CIM. The PRI card is not included in the high power card count. The PRI card is a separate bay.
T1/E1 module	Provides up to 2 T1 links of ISDN connectivity (24 or 48 channels) on the PRI card. Provides up to 2 T1 links of T1/D4 connectivity on the BCC III.
FIM II	Installs on the BCC III or the PRI card.
Copper Interface Module (CIM)	Installs on the BCC III or the PRI card.
DSP Module (Single)	Installs on the BCC III. Provides CLASS functionality for 8 ONS/CLASS Line cards, 16 DTMF receivers and 16 conference bridges for Record a Call.

Peripheral Cabinet Configuration Rules

FIM Carrier Assignments

- The SX-200 RM peripheral cabinet supports the Peripheral Interface Module Carrier (FIM II or CIM)
- The SX-200 RM peripheral cabinet supports the Peripheral FIM Carrier II
- The SX-200 LIGHT peripheral cabinet supports the Peripheral FIM Carrier

T1 Trunk Card Configuration Rules

- The system software supports up to two T1 links (includes T1 links from T1/E1 modules and T1 cards) in any bay with a maximum of eight T1 links in the system.
- The MOSS System Option 96, Number of Links (0-8) monitors how many T1 links (from T1/E1 modules) that the system will support. This count includes T1 links from the T1/E1 modules on the PRI cards and BCC III cards. The count does not include T1 links from the T1 cards.
- PIC slot 5 must be left vacant when a T1 card is installed in slot 10 or when Link 1 from a T1/E1 module on a BCC III is programmed.
- PIC slot 6 must be left vacant when a T1 card is installed in slot 11 or when Link 2 from a T1/E1 module on a BCC III is programmed.

Note: Do not insert T1 trunk cards into slots 5 or 6 of a peripheral cabinet.

Digital Line Card Configuration Rules for SX-200 RM Cabinets

Systems with BCC II cards have performance limits:

- In high traffic configurations, keep the Digital Line Card (DLC) count to a maximum of 7 per bay when using BCC II cards. If you have 8 DLCs per bay, keep the device count to 84 or less. This will avoid slow softkey response during peak traffic periods.
- With 2 T1 cards in a bay, do not add more than 5 DLCs or 60 devices. This avoids dial tone delays during peak traffic periods.
- With 1 T1 card in a bay, do not add more than 6 DLCs or 72 devices. This avoids dial tone delays during peak traffic periods.

Tip: A BCC III supports 8 DLCs per bay and is therefore ideal for high traffic conditions.

PRI Card Configuration Rules for SX-200 RM Cabinets

- The PRI card requires a Stratum 3 clock MMC installed in the SX-200 ICP controller.
- The peripheral cabinet supports one or two PRI cards in Slot 10 or 11.

Inserting the PRI card in any other slot besides 10 or 11 will cause the power supply to fail.

- The PRI card will appear as a peripheral bay on the SX-200 ICP controller, and the two links of the T1/E1 module installed on the PRI card will appear as slots 5 and 6 on that bay (not on the peripheral cabinet).
- The PRI card bay number is designated in Form 53.
- The PRI card requires a FIM II or CIM to connect to the SX-200 ICP controller.
- The S1 switch settings on the PRI Card inform the T1 module of the location of the clock source. Both switches must be set to closed as indicated in the following illustration (to designate the interface module as the clock source).

PRI CARD
WITH A FIM II
1 CLOSED
2 CLOSED

CC1124

Installing an ASU

Up to two ASUs can be connected to the controller via CIM ports. There is no need to power down the controller to make the connection.

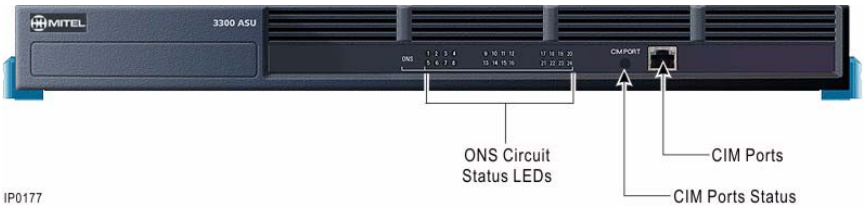


Figure 10: ASU Front View

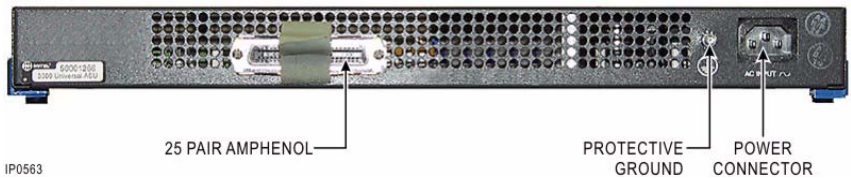


Figure 11: ASU Rear View

To install an ASU:

1. Mount the ASU.

Note: The ASU can be located up to 30 meters (100 feet) away from the SX-200 ICP.

2. Connect a cross-over Category 5 cable with RJ-45 connector to the CIM port on the ASU and a free CIM port on the controller.
3. Complete telephony cabling for the ASU. See Appendix C for Tip and Ring assignments.
4. Connect power to the ASU.
5. Wait for the CIM LEDs to turn on indicating that the CIM link is synchronized.
6. Program the ASU in CDE.

CDE Programming

1. In Form 53 (Bay Location Assignment)
   - Ensure that the CIM(s) are NOT assigned bay numbers.
2. In Form 01 (System Configuration)
   - Assign the ASU(s) to slots 14 and 15 of the IP bay.
   - Configure the card(s)
3. Complete the remaining CDE programming for the cards. See “Programming a Single Line Voice Station” on page 110.

Connecting the Phones and Trunks

ONS/CLASS, DNIC and LS/CLASS ports

Cross connect the ONS, DNIC and LS/CLASS ports to lines at the breakout box according to the Amphenol connector pin assignments in table below.

After connecting the LS trunks, use the Line Quality Test to program the audio configuration settings. For more information, see "Running the Line Quality Test for LS Trunks" on page 140.

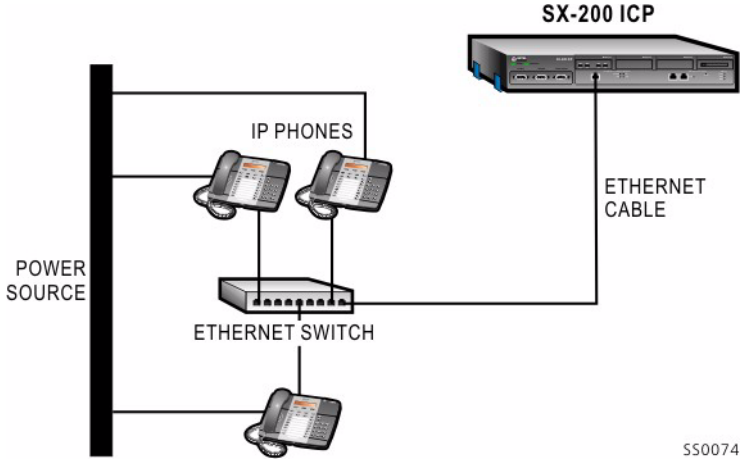
Table 9: Amphenol Connector Pin Assignments

Pair(s)	Circuit Type	Bay/Slot/Circuit	Default DN
1/26 and 2/27	ONS/CLASS	1/13/3, 1/13/4	200 and 201
3/28 and 4/29	ONS/CLASS	1/13/5, 1/13/6	Unassigned
5/30	Not Used		
6/31 and 7/32	DNIC	1/13/1, 1/13/2	198 - SC 1000 199 - Subattendant
8/33 to 10/35	Not Used		
11/36 to 16/41	LS/CLASS	1/13/7 - 1/13/12	
17/42 to 22/47	LS/CLASS	1/13/13 - 1/13/18	
23/48 to 25/50	Not Used		

Notes:

1. ONS/CLASS ports do not support high-voltage message-waiting lamps.
2. Circuits 1/13/5 and 1/13/6 are on the Analog Option Board.
3. Trunks circuits 1/13/7 and 1/13/8 are System Fail Transfer trunks. In the event of a system or power failure, the trunks connect to ONS circuits 1/13/3 and 1/13/3 respectively.
4. ONS ports are not designed with the necessary safety protection for off premise connections. ONS ports must not be used to connect to off premise phones.

IP Phones



1. Ensure that the controller is connected to the Layer 2 switch.
2. Plug the cables from the IP phones into the Layer 2 switch ports.
3. Connect the IP Phone to a power source; see page 34 for powering options.
4. Wait while the IP phone boots. After booting, the display on the phone shows “USE Superkey TO SEND PIN.” On 5201 IP phones, the MW lamp is lit.
5. Using the IP phone's dial pad, enter the IP Set Registration PIN access code (default, ***) followed by the IP Phone extension number.

Note: You MUST use a default IP Phone extension number (102 - 117) or a number previously programmed in CDE. You cannot use extension numbers 198 and 199; they are reserved for the Console and Subattendant station in the default database.

6. Press Superkey (or Hold for 5201 and 5207 IP phones).

   The phone is now ready for use. (The type of phone and its MAC address is automatically registered with the controller in Form 09).

Note: 5215 and 5010 IP phones will fail to register on a system that has a Default or Premier database because of the line appearances programmed on keys 8 and 10—keys that exist on the 5207 but not on the 5215 or the 5010. To register these phones, first delete the line appearances in Form 09, or follow the phone replacement procedure on the next page to delete all key programming.

Adding a PKM

A Mitel Programmable Key Module (PKM) provides the user with additional personal keys for their telephone set.

Table 10: PKM Models

Model	Number of Keys	Connects to	Number of PKMs that can be attached
PKM 48	48	SUPERSET 4025 SUPERSET 4125 SUPERSET 4150 SUPERCONSOLE 1000	2
PKM 12	12	SUPERSET 4025 SUPERSET 4125 SUPERSET 4150	1
5415 PKM	48	5020 IP	2
5410 PKM	12		1
5448 PKM	48	5220 IP 5224 IP	2
5412 PKM	12		1

Note: The 5448 PKM, and 5412 PKM are the only programmable key modules qualified by Mitel for connection to Mitel telephones.

Requirements

Interface Modules/Units

- The PKM 48 and PKM 12 require a SUPERSET Interface Module (SIM1 or SIM2) in the attached phone.
- A DSS/BLF Interface Unit is required to attach a PKM 48 to an older model SUPERCONSOLE 1000 (part numbers 9189-000-001 and 9189-000-003).
- THE PKM 5415 and 5410 require a Mitel 5421 Interface Module in the attached phone.
- The 5448 PKM and 5412 PKM require a Programmable Key Module Interface Module (5422 PKM IM) in the attached phone.

Power

All PKMs are powered by an AC adapter that attaches either to the Interface Module or to the host phone.

Host	Adapter Connects to...	Adapter Included?	Voltage	Part Number
SS 4025	SIM 1/SIM 2	No	12V	50000690 50002790*
SS 4125	Phone (see Warning)	Yes		
SS 4150				
5020 IP	Phone	No	24V	
5220 IP				
5224 IP				
Console	Console (Backlit version - PN 9189-000-300/1only) or DSS/BLF Interface Unit	No Yes	12V	700063021
* Universal model				

WARNING: Never plug a power supply into a SIM1or a SIM2 installed in a SUPERSET 4150 or SUPERSET 4125 telephone. If you do, you will lose the full duplex functionality of the speaker phone.

CDE programming

Associate the PKM with the attached phone in Form 09, Desktop Device Assignments.

Installation

Any connection of this set to an off-premise application, an out of plant application, or to any other exposed plant application may result in a safety hazard, and/or defective operation, and/or equipment damage.

Notes:

1. Ensure that the SUPERSET 4025, SUPERSET 4125, or 4150 telephone has the latest firmware upgrade available on the firmware status command in maintenance; see page 216.
2. The PKM 12, PKM 48, 5415 PKM, 5410 PKM, 5448 PKM, and 5412 PKM are the only programmable key modules qualified by Mitel for connection to Mitel telephones.

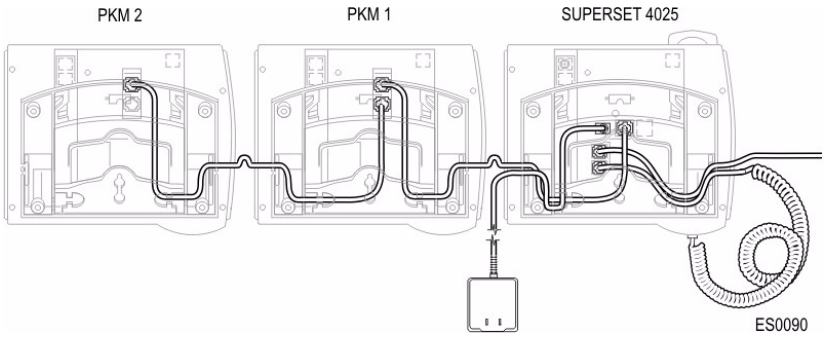


Figure 12: PKM Connections to a SUPERSET 4025

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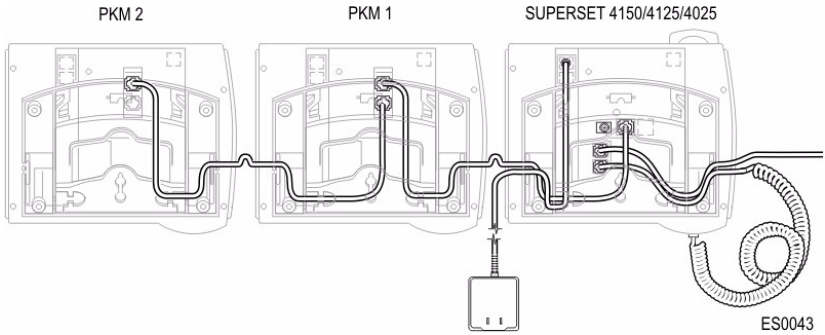

Figure 13: PKM Connections to a SUPERSET 4125/ 4150

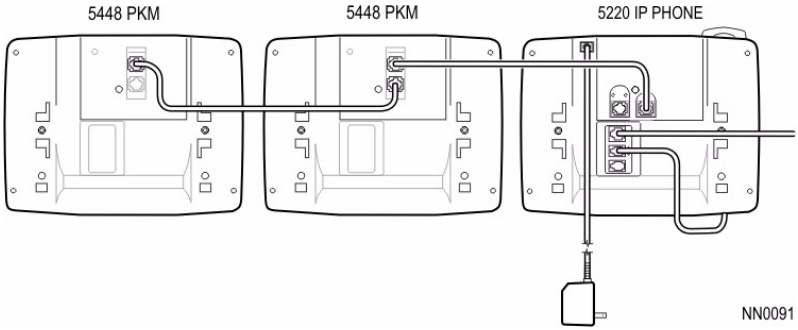

Figure 14: PKM Connections to a 5020 IP, 5220 IP & 5224 IP Phone

PKM to an Attendant Console

The PKM 48 provides an attendant console user with 48 DSS/BLF keys. Up to two PKM 48 devices can be attached.

SUPERCONSOLE 1000 part numbers 9189-000-300 and 9189-000-301 can directly connect up to two PKM 48 devices. Direct connection requires the purchasable MOSS System Option 102.

SUPERCONSOLE 1000 part numbers 9189-000-001 and 9189-000-003 require a DSS/BLF Interface unit to associate the PKM 48 devices. The DSS/BLF Interface unit requires a power adapter and needs to be programmed in Form 09 to associate with the PKM.

Note: The SUPERCONSOLE 1000 supports the connection of PKM 48 devices or a printer, both are not supported.

Connecting Music on Hold, Paging and Door Phone/Door Opener

Music-on-Hold (MOH) interface

The mini (1/8" - 3.5 mm) phono jack on the back panel of the SX-200 ICP controller provides an interface to an external music source (radio, CD player, etc.) for Music on Hold.

Input signals must be in the range of 10 to 100 mVrms. Any DC voltage applied to the input must be less than 50 VDC.

Note: Powering down the SX-200 ICP redirects the MOH source to the paging output. To stop the music from being heard over the pager, power down both the MOH source and paging amplifier before powering down the controller.

CDE Programming

MOH requires no CDE programming in the default database. If a different database is used, assign Music-on-Hold to PLID n/13/29/0 where "n" is the IP Bay number (default 1) in Form 18.

Paging

The controller provides a single dedicated paging circuits for the connection of customer-provided paging equipment. The equipment connects to the DB-9 on the front of the controller. See Appendix C for connector pinouts and relay states.

CDE Programming

The default database has programming for single zone paging to Zone 1, which any station can access by dialing *12. No additional programming is required.

If using a different database, complete the following programming:

1. In Form 18 (Miscellaneous System Ports), program a paging device.
2. Enable COS Option 303 (Paging Zone 1 Access) in the Class of Service of each extension that requires access to the paging equipment.

Door Phone/Door Opener

Customer-provided door phone units (up to four) can be connected to ONS circuits to provide two-way communication between an entryway and designated extensions. Door entry is controlled by the general-use relays in the controller—one at the front panel DB-9 connector and three at the rear panel RJ-45 connector. Each relay connects to an electric lock that is operated by key presses at the designated extension(s). See Appendix C for connector pinouts and relay states.

The relay contacts are rated at 90mA @60 Vac or Vdc peak and are normally open.

CDE Programming

1. In Form 18, assign an extension number to a Door Relay.
2. In Form 09, enter the Door Relay extension number from Form 18 into the ASSOC field of the ONS door phone. Assign the door phone a Name (e.g., Door Phone) to identify it on the door answerer's display.
3. In Form 19, assign the door phone to its own tenant group and program Station Dial 0 Routing to direct calls from the door phone to an answering position.
4. (Optional) Program an Open Door feature key to the door answering phones.
5. Set COS Option 115 in the door phone's COS to ring the door answerer the required length of time (default - 30 seconds).

Note: If you have a Subattendant phone or a console, you can set call forwarding on the Door Phone to ring a destination instead of programming it as described above.

Connecting a Night Bell and Alarm Device

Night bells and devices such a lamps used to signal Critical alarms connect to the general-use relays via the DB-9 and RJ-45 connectors. See Appendix C for connector pinouts and relay states.

The night bell and alarm device each require an independent power supply.

The contacts are rated at 90mA @60 Vac or Vdc peak. Connection of the bell or alarm device must be through an auxiliary relay if the total current requirement exceeds the relay contact ratings.

All equipment (bell, power supply, etc.) are customer-supplied.

CDE programming for a Night Bell

The default database contains the required CDE programming for Night Bell operation If using a different database, complete the following programming:

1. In Form 18 (Miscellaneous System Ports), assign an extension number to the night bell extension (default 340) at bay/slot/circuit/subcircuit n/13/29/01, where "n" is the IP bay number (default 1).
2. In Form 14 (Non-Dial in Trunks), assign the night bell extension as night answer point.

CDE programming for an Alarm Device

- In Form 18 (Miscellaneous System Ports), assign Major Alarm to bay/slot/circuit/subcircuit n/13/29/2, where "n" is the IP bay number (default 1).

Setting up an FTP Server on a Maintenance PC

An FTP server is required to back up all configuration data and voice mail messages in the controller. The server is also used to download new software to the controller through its built-in FTP client and to upload Maintenance logs.

Any FTP server application designed for the Windows environment will work. Windows 2000 and XP have one built into them. Others can be downloaded for free from the Internet.

Server setup varies by vendor; the basic steps are provided below. For specific instructions, see the vendor's documentation.

The PC hosting the FTP server must connect to the controller through a TCP/IP (LAN) connection. Connecting through the serial Maintenance port on the controller will not work.

CDE Programming

- In Form 04, System Options/System Timers
  - Enable Option 109, Remote Software Download.
- In Form 47, System IP, Subform 01
  - Enter the IP address of the FTP server and the user name and password from Step 2 of the FTP server setup procedure.

For information on upgrading the controller software via FTP, see page 206.

For information on backing up and restoring the controller database via FTP, see page 203.

Note: If future attempts to connect to the FTP server fail, check the IP address of the PC to see if it has changed. Follow the steps above to reprogram the system with the new address.

FTP Server Setup

1. Create a directory (or directories) on the PC to hold the files you will transfer to and from the controller—example,

   C:\FTPdir\backups
   C:\FTPdir\software
   C:\FTPdir\logs

Note: Ensure that the folders are writable.

2. In the server application,

- Create a User for password-protected logins or allow Anonymous (no password required) logins.

  The default database is programmed to allow Anonymous logins. The default user name is FTP.

- Set up the paths to the directories you created in step 1.
- Enable read/write access to directories.

3. Restart the server.

Note: To verify that the FTP Server works, log into it from the PC. Go to the CMD prompt (DOS) and enter ftp < IP Address of the FTP Server >. Look for the message "Anonymous user logged in" or a prompt to enter a user name.

System Health Check

Complete the following procedure to verify that the system is working properly.

1. Press Superkey followed by the prime line/intercom key (bottom key, or bottom-right key when the phone has two rows of personal keys). The extension number appears in the phone display. Record the extension numbers.
2. Verify that you can make calls between the IP phones.
3. If an analog phone is connected to an ONS port (extensions 201 to 203) on the controller, verify that you can call it from an IP phone.
4. Place a call into the system and verify that the call rings all IP and DNIC phones as they should with the default key system configuration.
5. Verify that you can place an external call from the IP phones.

Note: If you are not using the default database, you must program ARS to access an outside line.

6. If you cannot perform all of the above tasks, check your cable connections. If the problem persists, see *Basic Troubleshooting and Repair* (p. 235).
7. Proceed to Chapter 3, Basic Programming.

Chapter 3
Basic Programming

Programming Overview

This chapter provides the key procedures to follow when programming the system. Refer to the SX-200 ICP Technical Documentation for comprehensive and detailed programming information.

The key steps to programming the system are

- ❒ Prepare to enter customer data
- ❒ Enable your purchased MOSS options
- ❒ Program the features for each phone
- ❒ Program Embedded Voice Mail
- ❒ Program Phonebook
- ❒ Program Analog Trunks
- ❒ Run the Line Quality test

Optional programming:

- ❒ Program the Attendant Console
- ❒ Program a Subattendant Set
- ❒ Program a Printer Port
- ❒ Program Single Line / Multi-Line Sets
- ❒ Program an Analog Device to a SIM2
- ❒ Program Symbol MiNET Wireless Phones
- ❒ Programming an NSU or a PRI Card in a Peripheral Cabinet
- ❒ Programming a T1 Trunk
- ❒ Program Datasets for Hotel/Motel or ACD
- ❒ Program the PMS Interface
- ❒ Program Call Forwarding - External
- ❒ Program 6010 Teleworker Phones

Preparing to Enter Customer Data

You can use a desktop or laptop computer to program the controller on-site or from a remote location.

PC requirements

- Windows 98, NT, 2000 Professional, ME or XP
  (Windows 98 does not support secure Telnet)
- for serial connections, a VT100™ emulator such as HyperTerminal
- for remote or LAN-based connections, a secure Telnet client that supports SSL/TLS (Mitel Telnet client version 1.0.0.1 or later recommended), or a web browser (Internet Explorer 6 or Mozilla Firefox) to access the SX-200 ICP Web Interface
- a Network Interface Card (NIC)

The PC can connect to the controller via a serial connection to the Maintenance port or via a secure Telnet connection to port 2000.

Serial Connection to the Controller

1. Connect an RS-232 straight DTE serial cable between the controller's Maintenance port and the PC's serial port.
2. Program the PC's serial port (from the communication program) with the following settings:

   Baud Rate: 9600 or 19200
   Stop Bits: 1
   Data Bits: 8
   Flow Control: None
   Parity: None
3. Verify the connection as follows:

   - In the VT100 emulator or other communications program, press **RETURN** several times.

While the maintenance session is active, do not disconnect the serial cable or attempt to open another maintenance session with a Telnet connection. Doing so will cause an error message stating that CDE is currently in use.

Secure Telnet Connection to the controller

Telnet is a terminal emulation program for TCP/IP networks such as the Internet. To enable a Telnet connection between a PC and the controller, the PC must be equipped with a secure Telnet client that supports SSL/TLS. The Mitel Telnet client is recommended.

With the controller connected to the LAN and the PC connected to the LAN or Internet:

1. Install and then launch the secure Telnet client.
2. Enter the hostname or IP address of the controller, and port 2000.

   For example, to open a connection with the Mitel Telnet client, enter: open 192.168.1.2 2000

   The IP address in the example is the default; use Form 47 to check or change it
3. Log in to SSL/TLS with login name ‘installer’ and default password ‘1000.’
4. Select a Terminal Type.
5. Select an Application.
6. Log in to the application with username ‘installer; maint1; maint2; supervisor; or attendant’ and default password ‘1000.’

While the maintenance session is active, do not disconnect the Ethernet cable or attempt to open another maintenance session with a serial connection. Doing so will cause an error message stating that CDE is currently in use.

Web Interface Connection to the Controller

A web browser can be used to connect to the SX-200 ICP from the LAN and manage the system using the embedded SX-200 ICP Web Interface.

Before using the SX-200 ICP Web Interface, configure the management PC as follows:

- disable your web browser's pop-up blocker software
- install Sun Java plugin version 1.5 or later

With the controller connected to the LAN and the PC connected to the LAN or Internet:

1. Launch the web browser (IE 6.x or Mozilla Firefox).
2. Enter http://<controller IP or hostname>

   For example, http://192.168.1.2

   The IP address in the example is the default; use Form 47 to check or change it.
3. Log in to the SX-200 ICP Web Interface with login name 'installer' and default password '1000.'

   A CDE session will open.

While the maintenance session is active, do not disconnect the Ethernet cable or attempt to open another maintenance session with a serial connection. Doing so will cause an error message stating that CDE is currently in use.

Port Usage

If the SX-200 ICP is operating behind a firewall, you may need to open the following ports.

Table 11: Port Usage for IP Trunks

Function	Transport	Port
AMC Communications	TCP	22
DNS	UDP	53
DHCP Server	UDP	67
DHCP Client	UDP	68
TFTP	UDP	69
HTTP	TCP	80
HTTPS	TCP	443
IP trunk signalling	TCP	1066
Secure IP trunk signalling	TCP	1067
Telnet to CDE/MTCE	TCP	2000
Telnet to 6000 MAS	TCP	2005
IMAT	TCP	6543
MiNet Server	TCP	6800
VM CMPS Server	TCP	6830
MiNet Client	TCP	6900
MyAdmin GUI	TCP	7012
MiTAI™	TCP	8000
MiTAI (SSL)	TCP	8001
Phone Rx B1	UDP	9000
Phone Rx B2	UDP	9002
E2T IP	UDP	50000 to 50127
User Defined (Hotel PMS/Call Log)	TCP	61320 to 61328

Enabling MOSS Options

MOSS options provide additional functionality or capacity to the system. If this is a new system and you have purchased options, such as additional voice mailboxes or additional IP set licenses, you must enable them.

Note: Before enabling MOSS Options in a Premier Business system, replace the factory-installed default database with the Premier database provided on the software CD-ROM. Replacing the database prevents conflicts with Option 114 (Maximum IP Sets). The conflict is caused by the different number of IP phones programmed in the two databases. For information on replacing databases, see "Installing an Alternate Database" on page 205.

To enable MOSS options:

1. Select CDE Form 04.
2. Press ENTER MOC and enter the Mitel Options Code printed on the MOSS Sheet that is included with the system software package.
3. Enter the Mitel Options password to activate the purchased options. The password must be the password that is printed on the MOSS sheet.
4. Program any other required options.
5. Select Confirm if prompted to reset the controller.
6. After the system resets, go into Maintenance and revise Alarm Thresholds to prevent unnecessary alarms.

Notes:

1. Attempts to enable unpurchased options causes the system to respond with PASSWORD/OPTIONS CONFLICT -- "QUIT" TO EXIT -- "ENTER" TO RE-EDIT. Conflicts are resolved by entering the correct password; a system reset is not required.
2. The system warns if changing an option requires a reset. The reset is automatic and occurs when the change is confirmed.
3. If a database from another system is installed in the controller, the System ID and Password will no longer match. Phone service will be lost (some phones may appear to be in service, but will display SYSTEM BUSY when they go offhook) and a MOSS alarm message will display in the CDE forms header. Enabling the options using the above procedure clears the alarm and restores phone service.

System Options to Avoid

Certain options in Form 04 could cause unexpected behaviors in system operation if changed from their factory-set (default) values.

Table 12: System Options to Avoid

Option #	Option Name	Default
60	Tone Plan	NA
68	SX-200 ICP DSP DTMF Receiver Channels (0...7)	7
69	DTMF ON Timer (5-15 in 10 ms increments);	9 (90 ms)
70	DTMF OFF Timer (5-15 in 10 ms increments);	9 (90 ms)
71	Slot 10 FIM Capacity (2 or 3 Bays)	2
72	Slot 11 FIM Capacity (2 or 3 Bays)	2

Programming the Customer Data Entry (CDE) Forms

The CDE Forms are factory-set with default values that make programming the system faster and easier. The defaults allow you to install the system and connect up to 20 IP phones plus two analog terminals (phone, fax, or modem) and place extension-to-extension calls without doing any programming. You will also be able to receive fax and modem calls, but will have to program ARS to make external calls from ONS devices.

The default database configures the system to operate as a square key system with six trunk appearances per phone.

Note: The default numbering plan uses three-digit extension numbers. If you require a four-digit plan, either reprogram Forms 9, 17, and 50 or install the four-digit database available on Mitel Online. For more information, see “Installing an Alternate Database” on page 205.

Programming Features for each Phone

Before you begin

- Ensure that the phone-related MOSS options are specified in CDE Form 04, System Options.
- Enable COS options for features that are COS dependent.

To program features for IP phones:

- Program the appropriate features for each phone either from the phones (using Superkey) or in the Expand Set Subform for Form 09.

  The table below shows the codes to enter when programming features that are not selectable via SUPERKEY.

  The figures on page 90 show the key numbers required for programming features via CDE.

  A list of the features and the phones that support them is in Appendix D.

Table 13: Feature Codes

Code	Feature Key	Code	Feature
00	Speedcall (See Note)	14	Night Answer
01	Forward All	15	Forward Call
02	Account Code	18	Release
03	Do Not Disturb	19	Single Flash
04	Auto Answer	20	Double Flash
05	Music	21	Headset Mode
06	Direct Page	22	Handset Mute
07	PA Paging	23	Call Park
08	Pickup	24	System Park
09	Campon (I Will Wait)	25	Forward Always
10	Callback	26	Forward Busy
11	Swap (Trade Calls)	27	Forward No Answer
12	Privacy Release	28	Forward Busy/No Answer

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Table 13: Feature Codes (continued)

Code	Feature Key	Code	Feature
13	Override (Intrude)		

To program features using Feature codes:

- Using the phone dialpad, enter the Program Feature Key access code.
- Press a programmable key.
- Enter the feature code listed above.
- Press SPEAKER or CANCEL.

Note: After dialing 00, dial the number to be stored.

(Page 2 of 2)

The programmable keys on 5010 and 5215 IP Phones are numbered as follows:

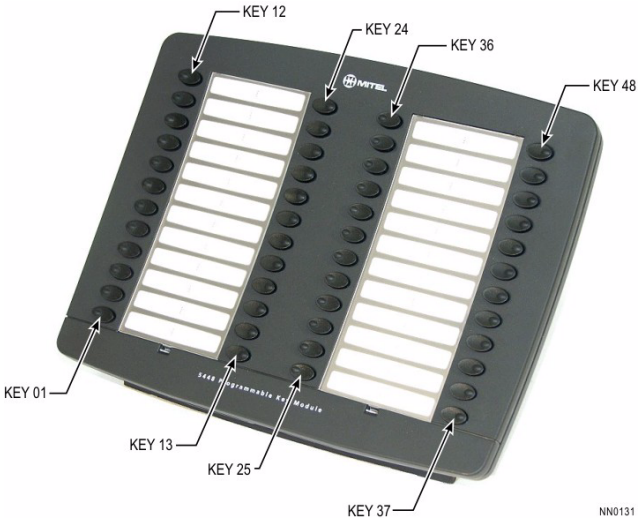
Note: Key 1 is reserved for the phone's prime directory number.

The programmable keys on 5207 (not shown), 5020 and 5220 IP Phones are numbered as follows

The programmable keys on 5212 IP Phones are numbered as follows

The programmable keys on 5224 IP Phones are numbered as follows

The keys on the 5448 PKM are numbered as follows:



The keys on the 5412 PKM are numbered as follows:

Programming Embedded Voice Mail

Note: Embedded voice mail Release 6.22 (included in SX-200 ICP Releases 2.0 and 2.1) now supports notification on every new message regardless of whether or not notification for previous messages has already been answered. This feature is normally deactivated by default and may only be enabled or disabled by accessing the Administrator's mailbox.

CDE Programming for Embedded Voice Mail

The default database includes most of the programming required for a fully operational voice mail system. The defaults are as follows:

- 16 Voice Mail mailboxes are assigned with the same extension numbers as the first 16 IP phones (extension 102 to 117)
  - Attendant Console (SUPERCONSOLE 1000; extension 198)
  - Subattendant (extension 199)
  - Two ONS ports (extensions 201 and 202)
- Hunt Group for Voice Mail ports with pilot number 300
  - COS 6 and
  - extension 301 to 324 for voice mail ports (default is from 301 to 304)
- System-wide Call Forward No Answer to voice mail, for internal and external calls
- Maximum number of saved messages per mailbox is 10, which the system deletes after 15 days.

Voice mail programming that is NOT provided in the default database includes:

- Auto Attendant Setup
- Bilingual Prompting
- Mailbox Greetings and Names
- Distribution Lists
- RAD Setup
- Record a Call
- PMS Integration

- Open and closed greetings

Note: The default password for mailboxes is 1111.

See "CDE Programming for Embedded Voice Mail" in the Technical Reference for programming requirements when not using the default database.

Voice mail forms

Use the following CDE forms to complete the voice mail programming:

Table 14: Voice Mail Options

Form	Options
49	Used to set the following system-wide parameters: • Default Prompt Language • Alternate Prompt Language and Language Change Number (for bilingual operation) • Fax Destination Number • Message Notification • Digital Pager Callback Number • Auto Attendant Transfer to Any Extension • Auto Attendant Transfer Restrictions • Directory Voice Prompt for First/Last Name • Generate Account Codes in SMDR (for Message Notification Calls • Personal Contact Numbers • Synchronize Business Open/Closed Greetings with System Day/Night mode • Business Hours • Length of Mailbox numbers • Length of passcodes • PMS Protocol (for PMS integration) • RAD Greeting Setup • SMTP/IMAP Server Addresses (required for Unified Messaging)
	(Page 1 of 2)

Table 14: Voice Mail Options (continued)

Form	Options
50	Used to add and delete mailboxes and to customize the following mailbox settings: • Mailbox type (extension, guest, information-only, transfer-only, etc.) • Message Notification • Forward of Voice Mail to E-mail using SMTP or IMAP (Unified Messaging - standard) • Routing for Multi-Level Auto Attendant and Personal Contacts • Operation Extension • Language • Play Message Envelope? (priority, date, time, and caller ID) • Maximum Message Storage • Delete Saved Messages • Set Password • Personal Contacts and Menus (for Multi-Level Auto Attendant) **Note:** Mailbox creation and setup can be done automatically for each new extension added in Form 09 by enabling Option 277 in the extension's Class of Service (Form 03). If System Options 107 (Lodging), 108 (Property Management System) or 124 (Voice Mail Property Management System) are enabled, the mailboxes created will be GUEST instead of EXTENSION type mailboxes. Form 50 is used to customize mailbox following initial setup.
51	Used to set up distribution lists of system-wide use. **Note:** For each list created, record a name for identification purposes.
	(Page 2 of 2)

Setting up RADs

Before you begin,

- determine how the customer intends to use the RADs.
- map the expected call flow to determine how many messages are required and the order of play.
- script the messages and say them several times to ascertain how much time they take.
- verify that sufficient voice mail ports and DSP resources are available; see DSP Configuration Options, page 12.

Note: All embedded voice mail ports can operate as dedicated RAD ports. However, a least one non-RAD port is required to record RAD greetings; to administer the voice mail system by telephone; and for message notification by pager.

When configuring voice mail ports, ensure that some of the last ports are not configured as RAD ports to avoid any potential conflicts with message notification. It is recommended that at least two or three ports be left free for message notification dependant upon system usage. Embedded voice mail will attempt to use the last programmed voice mail port that is available for message notification. If the last port is not available, the second last port will be attempted and if that port is busy, the third last port and so on. Embedded voice mail will continue in this fashion until it finds a free port but message notification will not function properly on a port assigned to RAD.

To program RADs:

1. Form 04, System Options/System Timers
   - Enable System Option 134, Recorded Announcement Devices.
2. Record RAD greetings
   - Access the System Administrator's mailbox (see Using the Administrator's Mailbox, page 99.)
   - Press 8 to select the RAD Greetings menu.
   - Press 1 to record a greeting.
   - Select RAD greeting number to record (1- 200).

If the selected RAD greeting already exists, you will hear it along with prompts to accept, review or re-record it.

- Record the greeting, speaking clearly into a handset (do not use a handsfree or speaker phone).
- Follow the voice prompts to record each additional greeting set.

3. Form 49 (Voice Mail Options), RAD Setup subform
   - Assign greeting sets to the RAD ports and specify how often the sets play.

Note: Leave fields for unneeded greetings blank.

Note: Verify that disconnect supervision is provided by the CO.

4. Form 17, Hunt Groups
   - Select unused voice mail ports and assign them to their own hunt group. Leave the hunting method set to CIRCULAR.
   - Set each RAD hunt group type to RECORDING.
5. Recording Hunt Group Options subform of Form 17
   - Give the RAD hunt group a name — for example, Greeting 1.
   - Set the Message Length timer to the duration of the RAD greeting set (Greeting 1 + Greeting 2 + Greeting 3...) multiplied by the amount of times the set repeats plus three seconds.

Note: When the Message Length timer expires, the Recording Failure to Hangup Timer starts. If the RAD port is still off-hook when this timer expires, the port is placed into DND state making it unavailable to answer calls. The port remains unavailable until DND is disabled. The Recording Failure to Hangup Timer is Option 404 in Form 03, COS Define.

   - Set the RAD Greeting set (number 10-39) as programmed in Form 49.
6. Form 03, COS Define
   - Put RAD ports in a COS of their own, with only COS option 223 (Flash Disable) enabled.

Setting up Record a Call

1. Form 04, System Options
   - Enable Record a Call, Option 87.

2. Form 02, Feature Access Codes:
   - Choose an access code for Send Message (feature number 41; default code *41) if sharing Record a Call ports with voice mail messages.
3. Form 03, COS Options
   - Set the following COS options

COS Option	COS of Voice Mail Ports used for RAC	COS of Phones using RAC	COS of Attendants using RAC
Option 119, Attendant Tone Signalling	Not required	Not required	Enable
Option 229, Voice Mail Port	Enable	Not required	Not required
Option 268, Record a Call in Voice mail	Enable	Enable	Enable
Option 269, Record a Call: Start Recording Automatically	Not required	Optional	Optional
Option 270. Record a Call: Save Recording on Hang up	Not required	Optional	Optional

4. Form 17, Hunt Groups
   - (Optional) Assign voice mail ports for exclusive use by Record a Call to their own hunt group. Set the group type to STN/SET.

Note: Dedicating voice mail ports to Record a Call is NOT advisable for basic systems that have only four such ports.

   - In the Recording Hunt Group Options subform, enter the maximum number of ports allowed for Record a Call use.

Note: The number entered must be less than the number of available voice mail ports; otherwise, none would be available for voice mail.

5. Form 19, Call Rerouting Table
   - Enter the voice mail hunt group as the Record a Call Voice mail Destination For This Tenant.
6. Program a feature key for Record a Call on phones that require it.
7. Form 50, Mailboxes
   - Program a mailbox for each extension that requires use of Record a Call.
8. (Optional) To forward Record a Call messages to e-mail, see "Programming SMTP" on page 185.

Using the Administrator's Mailbox

The Administrator's Mailbox allows you to do some voice mail programming using a telephone. Programming by phone cannot completely replace CDE programming; however, it is convenient for certain functions such as adding mailboxes and editing mailbox settings.

The passcode used to log into the Administrator's Mailbox determines which functions can be accessed:

- **Manager Passcode:** Allows the user to perform all the system administration, mailbox management, and maintenance functions except changing the Administrator passcode or passcode length.
- **Administrator Passcode:** Allows the user to perform all the manager functions plus changing the Administrator passcode and passcode length; and defaulting the voice mail database.

Default passcodes are as follows:

Passcode Type	Passcode Length			
	3	4	5	6
Administrator	864	8642	86420	864200
Manager	648	6483	64830	648300

Important: The Manager passcode should be given to the person who performs the day-to-day task, such as adding mailboxes and changing greetings. The Manager passcode provides limited access to the database, thereby reducing the likelihood of novice users causing serious disruptions to the system. (Note that users are still prompted to begin a new installation when they enter the Manager Passcode, but get the response "Invalid Selection" when they attempt to do so.) To protect system security, change the passcodes at first login and keep them confidential.

Accessing the Administrator's Mailbox

Follow these steps to log in to the administrator's mailbox.

1. From any internal DTMF telephone, lift the handset and obtain dial tone.
2. Dial the voice mail hunt group number (default is 300). The system answers and plays the usual greeting.
3. Press * when you hear the greeting.

4. When prompted for a mailbox number, enter the system administrator mailbox number: default 999.
5. When prompted for a passcode enter the Administrator's passcode or the Manager's passcode. (See above for defaults.)
6. You are now logged in to the system administrator's mailbox. Follow the voice prompts for instructions; use the menu map on the following page for reference.

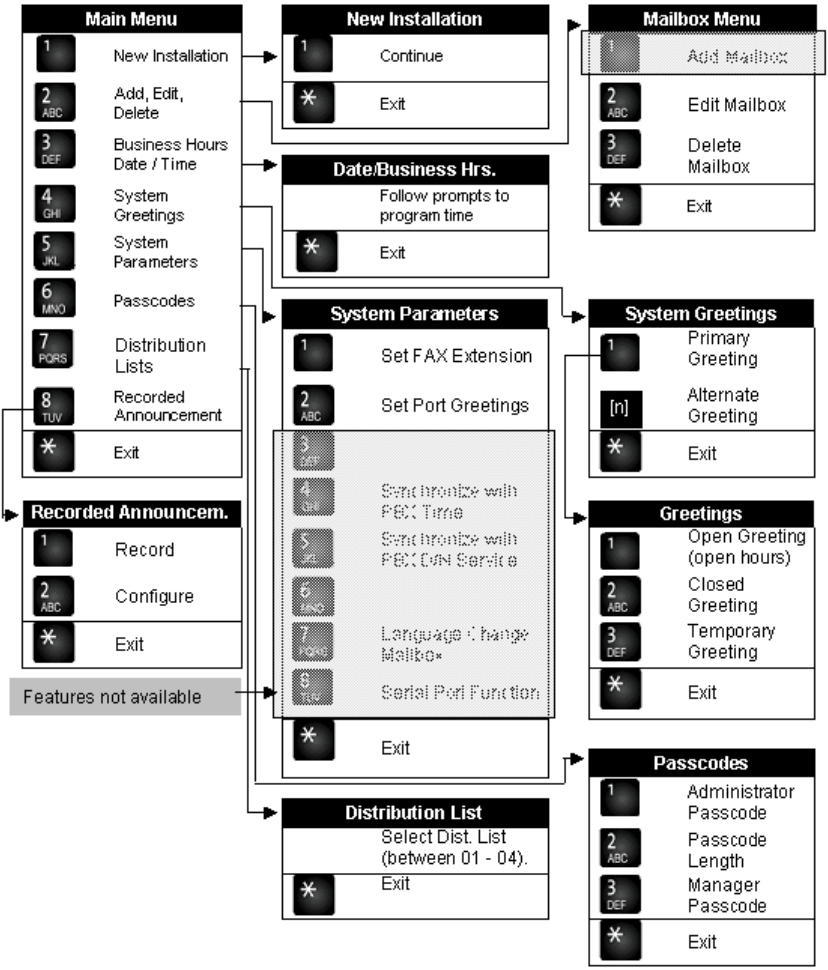


Figure 15: Administrator Mailbox Menu

Voice Mail Notification On Every New Message

To activate voice mail notification on every new message (which can only be performed using the telephone user interface):

1. Access the System Administrator's mailbox.
2. When prompted for a passcode, enter the Technician's passcode (default is 9731) instead of using either the Administrator’s passcode or the Manager's passcode.
3. Press 9.
4. Enter 20301 to enable notification on every new message.

To deactivate voice mail notification on every new message (the default setting):

1. Access the System Administrator's mailbox.
2. When prompted for a passcode, enter the Technician's passcode (default is 9731).
3. Press 9.
4. Enter 20302 to disable notification on every new message.

Testing voice mail operation

Perform the following tests to verify that voice mail is working properly.

1. Call the business using an outside line or cell phone. Verify that you hear the company open or closed greeting (as appropriate) and that the message is clear and understandable.
2. Call the business using several outside lines. Verify the number of rings allowed before the system answers.
3. Call the business using an outside line. When the auto attendant answers, press 0 and verify that the system transfers the call to the attendant.
4. Call the voice mail hunt group using an internal line. Verify that you do not hear the company greeting. Verify the number of rings allowed before answer.
5. Call the voice mail hunt group using an internal line. Verify that you do not hear the company greeting. When the system answers, press ***0** and verify that the system transfers the call to the attendant.
6. Call to several extensions directly (not through auto attendant) to verify that the calls are forwarded to the correct mailbox.
7. Leave a message at an extension to verify that the messaging waiting indicator (light) comes on.

Note: ONS/CLASS lines do not support high-voltage message-waiting lamps.

8. (Optional) Call the voice mail hunt group from a fax terminal and verify that the Auto Attendant answers and transfers the call to the fax extension.
9. (Optional) Call an extension that has message notification enabled and verify that it is working correctly.
10. (Optional) Leave a message at an extension and verify that the message is forwarded to the user's e-mail account.

Note: Once a message has been deleted, it cannot be recovered.

Programming Phonebook

1. Form 04, System Options/System Timers
   - Enable System Option 128, Phonebook.

Note: The option must be purchased (listed on MOSS sheet).

Note: Phonebook and Speak@Ease (Option 85) cannot both be enabled.

2. Form 19, Call Rerouting Table
   - Program the voice mail hunt group number to the “Phonebook Number For This Tenant” field.
3. Form 09, Desktop Device Assignments
   - Program a Phonebook feature key on phones that do not have softkeys.
4. (Optional) Form 02, Feature Access Codes
   - Enter the access code for Feature 65 to allow DNIC-based single line phones to access the Phonebook. All types of phones can also use the access code. (Default, *65)
5. Form 50, Mailboxes
   - Enter a NAME for each mailbox owner. Only mailboxes with names are listed in the Phonebook.

Note: Phonebook searches will only work if the first and last name entered in Form 50 are in the order specified by the Directory Voice Prompt option in Form 49. For example, if the option is set to LAST NAME, then the name “Tom Jones” should be entered as Jones Tom in Form 50. However, you may want to enter the name in Form 9 as first name, last name (Tom Jones) because it looks better on the called party's display. And at the same time, you may want Phonebook searching by last name. In this case, set “Directory Voice Prompt” in Form 49 to LAST NAME, enter “Tom Jones” as the device name in Form 9 Tom Jones, and then name the mailbox in Form 50 “Jones Tom.” Only one space is permitted between the first and last name.

6. Form 49, Voice mail Options
   - Set the Directory Voice Prompt option to search the Phonebook by first or last name.

Programming an Attendant Console

Except for LDN assignments, the programming for a SUPERCONSOLE 1000 is provided already completed in the default database (see page 316 for the defaults). If you are starting with a blank database default, follow the steps below to program the console:

1. Form 01, System Configuration
   - Program one of the two DNIC circuits.
2. Form 07, Console Assignment
   - Assign an extension number, COS, COR, and Tenant for each console bay/slot/circuit entry.
3. Form 08, Console LDN Assignment
   - Assign a directory number and label to each required console LDN key.

Programming a Subattendant Set

The programming for a subattendant set is provided already completed in the default database (see page 316 for the defaults). If you are starting with a blank database default, follow the steps below to program the console:

1. Form 01, System Configuration
   - Program a Digital Line Card or DNIC module.
2. Form 09, Desktop Device Assignments
   - Assign set type to SUB, extension number, COS, COR, and name (optional) for each bay/slot/circuit.
   - Assign a separate COS with subattendant options.
   - Set type SUB can only be SUPERSET 4150, SUPERSET 430, or SUPERSET 4DN.
   - Complete the sub-form for assigned keys, types, and options.

Programming a Printer Port

System Printer Port

- Form 34, Directed I/O
  - Program the printer port in Form 34.
  - Define Printout Types that are to be delivered to the system printer port.
  - Remove printer port for print types not used.
  - Speed of printer port is programmed in Maintenance. Defaults:

    Baud Rate: 300
    Stop Bits: 1
    Data Bits: 8
    Flow Control: None
    Parity: None

Note: Printer ports only work on the SX-200 ICP controller, not on Peripheral cabinets.

Dataset Printer Port

1. Form 11, Data Circuit Descriptor
   - Define a circuit descriptor to match characteristics of device type. Refer to Form 04, System Options and Timers on page 133 for typical circuit descriptor.
2. Form 12, Dataset Assignment
   - Assign the type of data device for the dataset PLID. Available types are DSCONS Console (output only, maximum 2400 baud) and 1103/2103 Standalone dataset.
   - Assign a Tenant, Extension number, COS, COR, and circuit descriptor number.
3. Form 34, Directed I/O
   - Define printout type to be delivered to the dataset.

IP Printer Port

Data for the functions listed below can be output through an IP socket in the controller to a telnet-enabled application for printing.

- SMDR
- CDE Data Print
- Maintenance Logs
- Traffic Measurement
- IP Traffic Measurement
- ACD Real Time Events
- ACD Agent Summary
- ACD Group Summary
- Hotel/Motel Audit
- Hotel/Motel Wakeup

The default database sends SMDR and CDE Data Print output to IP socket 61328. If you are using a different database, follow the procedure below to program a printer port.

1. Form 11, Data Descriptor
   - Define a circuit descriptor to match the characteristics of the device type. The default circuit descriptor number 1 works for most applications.
2. Form 12, Data Assignment
   - Program a SOCKET type data device to an available PLID in the following range:

PLID	Port	PLID	Port
1/13/20	61320	1/13/25	61325
1/13/21	61321	1/13/26	61326
1/13/22	61322	1/13/27	61327
1/13/23	61323	1/13/28	61328
1/13/24	61324		

   - Assign a Tenant, Extension number, COS, COR, and circuit descriptor number.
3. Form 34, Directed I/O
   - Define the printout type to output.

Programming Stations/Sets Automatically

The AUTO PROGRAM function in Form 09, Desktop Device Assignments, checks for unprogrammed circuits in the system and programs them as follows:

- Extension numbers are automatically assigned according to a Bay, Slot, Circuit address format “BSCC”, where
  - B is the Bay number (1-8)
  - S is the slot number (1-8)
  - CC is the cct number (01-12).

  The system prompts for a starting extension number.
- Other parameters assigned to ONS and OPS devices:
  - COS = 2
  - COR = 1
  - Tenant = 1
- Other parameters assigned to DNIC and IP sets:
  - COS = 1
  - COR = 4 for all set types except SUPERSET 430 and SUPERSET 4150
  - COR = 5 for the SUPERSET 430 and SUPERSET 4150
  - Tenant = 1

Note: Before an extension number can be automatically assigned, a DNIC set or DMP must be physically connected to the circuit. If no set or console is detected on a circuit, that circuit is skipped and no extension number is assigned.

To automatically program all connected sets, DNIC sets and DMPs:

1. Install all ONS cards, OPS cards, DNIC cards. Do not program stations, DNIC, sets or DMPs.
2. Connect the DNIC sets or DMPs to the circuits.
3. Access Form 09, Desktop Device Assignments.
4. Press Auto Program.

   The system prompts for an extension number to assign to the first auto-programmed extension. The number is incremented by one for each subsequent extension—for example, 100, 101, 102.
5. Enter a starting extension number.

   Conflicts with existing extension numbers result in an error message and a prompt to press the CONTINUE or ABORT softkey. Auto-programming will not proceed to the next BAY/SLT/CCT until a valid extension number has been found for the current position.

Note: The maximum length of extension numbers is five. It is recommended that the length be equal to the "Length of Mailbox Numbers" in Form 49, to take advantage of automatic mailbox creation.

After verifying that the unprogrammed sets are physically connected, the system automatically programs all unprogrammed circuits. The system displays all of the devices that have been programmed.

If a circuit cannot be programmed because an extension number has already been assigned to that circuit, a warning is displayed. Press ABORT to cancel the procedure or press CONTINUE to skip the device and resume programming the other devices in the range.

Deleting a Device and All Dependent Resources

The DELETE softkey in Form 09, Desktop Device Assignments, deletes a device and all of its dependent resources including

- All line keys (including LDN) that are programmed on a deleted set, standalone BLF, or PKM module
- All line and feature keys that are programmed on associated BLF or PKM modules
- The associated BLF and PKM modules
- Any other line appearances and BLFs of the deleted station or set.

A warning message appears if any of the above exists. To continue, press CONFRIM. To abort, press CANCEL.

Deleting a range of devices and dependent resources

The RANGE DELETE softkey in CDE Form 09, Desktop Device Assignments, allows block deletion of devices and all dependent resources.

To delete a range of devices and all dependent resources:

1. Press RANGE DELETE.

   The system displays: FROM BAY: SLOT: CIRCUIT:.

2. Enter valid Bay, Slot and Circuit numbers for the first device and press the ENTER softkey.

   The system displays: TO BAY: SLOT: CIRCUIT:.

3. Enter valid Bay, Slot and Circuit numbers for the last device and press the ENTER softkey.

   The system prompts you to choose whether or not you want to receive warnings as devices are deleted.

4. To receive a warning prior to deleting each device and its dependent resources, press YES. To delete all devices and dependent resources without warning, press NO.

   The system prompts you once again to confirm the deletion of the range.

5. To proceed with the deletion of the range of devices and all dependent resources, press CONFIRM. Press CANCEL to abort.

If you chose to receive warnings each time a device is deleted, the system displays "deleting all keys, ..." for each device in the range.

6. To proceed, press CONFIRM. Press CANCEL to abort the deletion of the specific device and continue with the next device.

   To abort the deletion of a range of devices, press ABORT. Any devices that were deleted prior to pressing the ABORT key will remain deleted.

Programming a Single Line Voice Station

The default database for a basic system has programming for two ONS/CLASS circuits. The Analog Option Board adds two more. If you are starting with a blank database, follow the steps below to program a single line voice station:

1. Form 01, System Configuration
   - Program an ONS or OPS line card.
   - Program a Digital Line card or DNIC module for SUPERSET 401+, and SUPERSET 4001 sets.
2. Form 09, Desktop Device Assignments
   - Assign an extension number, COS, COR, and name (optional) for each bay/slot/circuit (set type remains STATION).
3. Form 30, Device Interconnection Table (optional)
   - Set the required interconnect restrictions (for example, to restrict connections between specific device types).
4. Form 05, Tenant Interconnection Table (optional)
   - Set the required interconnect restrictions (for example, to restrict connections between specific tenants).
5. Form 19, Call Rerouting Table (optional)
   - Program how to handle the caller's call violations.
   - Each tenant requires its own Call Rerouting Table.
6. Form 03, COS Define (optional)
   - Create a unique class of service (COS) if required.
7. Form 20, ARS: COR Group Definition
   - Create a COR group that includes the COR number which you will assign to the station.

- This COR group restricts the external calls that the user can dial.

Ensure that the system is provisioned with a sufficient number of DSP.

Programming a Multi-Line Set

The default database for a basic SX-200 ICP has programming for sixteen multi-line IP phones and two multi-line DNIC sets. See page 317 for circuits locations, extension numbers and other defaults. If you are starting with a blank database default, follow the steps below to program a multi-line set:

1. Form 01, System Configuration
   - Program a line if not already programmed.
2. Form 09, Desktop Device Assignments
   - Assign set type, extension number, COS, COR, and name (optional) for each bay/slot/circuit.
   - Complete the Expand Set subform for key types and options.
3. Form 30, Device Interconnection Table (optional)
   - Set the required interconnect restrictions (for example, to restrict connections between specific device types).
4. Form 05, Tenant Interconnection Table (optional)
   - Set the required interconnect restrictions (for example, to restrict connections between specific tenants).
5. Form 19, Call Rerouting Table (optional)
   - Program the action that the system will take to handle the caller's call violations.
   - Each tenant requires its own Call Rerouting Table.
6. Form 03, COS Define (optional)
   - Create a unique class of service (COS) if required, or use an existing COS.
7. Form 20, ARS: COR Group Definition
   - Create a COR group that includes the COR number which you will assign to the station, or use an existing COR.
   - This COR group restricts the external calls that the station user can dial.

Programming an Analog Device to a SIM2 (DNIC Phones Only)

The analog interface in the SIM2 supports devices such as analog telephones, fax machines, or modems. The SUPERSET provides the power to the analog interface.

Ensure that the set firmware revision level matches the system firmware revision level. If the revision level on the system is higher than the set revision level, upgrade the set firmware.

Refer to Upgrading Set Firmware (page 216).

When adding an analog set to a SIM2, use Form 12 to program the port. The port type is AIM.

Programming an NSU or a PRI Card in a Peripheral Cabinet

The NSU and PRI card support the following purchasable MOSS options: QSIG (option 86), NFAS (option 91), D-Channel Backup (option 92), Remote LAN Access (option 93), Min/Max (option 94), Auto Min/Max (option 95), Number of Links 0-8 (option 96).

Option 91 to 95 are downloaded to each NSU and PRI card installed. Option 96 enables the number of ISDN T1 links purchased. These MOSS options serve all the NSUs and PRI cards in the system. If you change any of these options, you must reset the NSU and PRI card to enable them, and you may need to download a new IMAT database into each NSU and PRI card.

Note: If you purchase a number of T1 links less than the number of T1 links you install and program, Mitel cannot reliably predict which T1 links the system will use after a reset. If you purchase a number of T1 links (System Option 96) greater than the number of T1 links you install and program, the T1 links programmed will remain consistent.

CDE programming

1. Form 53, Bay Location Assignment
   - Assign a bay number to the CIM or FIM ports used to connect each NSU or PRI card to the controller.
2. Form 01, System Configuration

- Program the bay(s) assigned in Form 53 as ISDN nodes.
- Program a T1 Trunk Card in Slot 6 and 8 (assuming both spans will be programmed)

3. Form 03, Class of Service (COS)

- Create a separate COS for ISDN trunks.

Note: COS Level 7 in the default database has all COS options required by ISDN trunks enabled except for Option 246 (SMDR - Extended Record).

- Enable the following COS options for the ISDN Trunks:

  246 – SMDR- Extended Record
  701 – No Dial Tone
  702 – SMDR - Overwrite Buffer. (Required if option 806 SMDR-Record Incoming Calls enabled)
  801 – Incoming Trunk Call Rotary
  802 – Limited Wait for Dial Tone
  811 – ANI/DNIS Trunk
  814 – SMDR - Record ANI/DNIS

Tip: Ensure that COS Option 800 (ANI Applies) is NOT enabled in the class of service of the ISDN trunks.

- For extensions (sets and stations), the following COS options must be set:

Table 15: Extension COS Options for Systems with an NSU or PRI Card

COS Option	Setting	Notes
236 – Outgoing Trunk Callback	Disable	
237 – Outgoing Trunk Campon	Disable	
502 – Display ANI/DNIS Information **and possibly** 613 – Display ANI information only	Enable	Must have 502 enabled for 613 to function.
503 – Enable Calling Name Display	Enable	
702 – SMDR Overwrite Buffer	Enable	Required if option 806 SMDR – Record Incoming Calls enabled

4. Form 04, System Options/System Timers

   - Assign values to the first two options in table below and enable the others as required:

Table 16: NSU MOSS Options

System Options	Setting	Notes
Option 48 – Limited Wait for Dial Tone	1-15 secs	Set to 1 sec. Default = 5 sec.
Option 96 – Number of Links	2	Purchase 1 for each link used. Default = 0
Option 86 - QSIG	Optional	Enabling Option 86 allows the called party to see the name of the caller on their telephone display. The option is not required if connected to a DMS100 Central Office.
Option 91 – NFAS	Optional	If Option 91 is to be disabled, Option 92 must be disabled first. Not required if using a single link PRI.
Option 92 – D-Channel Backup	Optional	If Option 92 is to be enabled, Option 91 must already be enabled. Not required if using a single link PRI
Option 94 – Min/Max	Optional	If Option 94 is to be disabled, Option 95 must be disabled first.
Option 95 – Auto Min/Max	Optional	If Option 95 is to be enabled, Option 94 must already be enabled.

5. Form 13, Trunk Circuit Descriptor

   - Assign a T1 trunk circuit descriptor. To receive CLID or DDI digits, the PRI trunk must be a non-DISA trunk that is programmed with a T1 E&M trunk circuit descriptor. The Debounce timer must be set to 100 milliseconds and the Incoming Start type and Outgoing Start type must be set to WINK.

6. Form 13, Options Subform

   - Set the DTMF option to NO.
   - Set the QSIG Supplementary Services to "Yes" if you want to insert the calling name ID when the trunks are programmed for QSIG or connected to a DMS100.

7. Form 15, Dial-In Trunks

   - PRI trunks are Dial-In Trunks and are not normally used in a Non-Dial-in configuration.

     Search for the correct Bay/Slot/Circuit and enter the following for each trunk:

     - COS number – see previous requirements
     - COR number
     - Tenant number – unless site has tenanting set to 1
     - N – number of incoming DID digits – usually 4
     - M – number of digits to absorb – usually 0
     - X – digits to be inserted (up to 2 digits)
     - CDN – Circuit Descriptor Number
     - Trunk Number – Enter a trunk number (1-200)

8. Form 16, Trunk Groups

   - Locate an empty Trunk Group and add the PRI trunks (trunk numbers programmed in Form 15) to the Trunk Group. (Program them in reverse order to prevent contention with incoming calls from the CO.)
   - Add a name to the Trunk Group for future reference.
   - Set Group Type to Terminal (recommended) or Cyclic.
   - Enable SMDR (outgoing only) if required.

9. Form 42, T1 Link Descriptor

   - Create a Link Descriptor for the PRI trunks using the recommended settings in the following table:

Table 17: T1 Link Descriptor Values for PRI trunks

Descriptor		Value
Alarm debounce timer	(300 –3200 ms)	2500
Line Coding	(AMI, AMI&ZCS, B8ZS)	B8ZS
Line Build Out	(0, -7.5, -15. –22.5 dB)	0 dB
Line Length	(max 132, 265,398,533 or 655)	266-398
Framing	(D4 or ESF)	D4

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Table 17: T1 Link Descriptor Values for PRI trunks (continued)

Descriptor	Value
Slip rate – maintenance limit (0 – 9000) /24 hrs	255
Slip rate – service limit (0 – 9000) /24 hrs	7000
Slip rate – network sync limit (0 – 9000) /24 hrs	7
BER – maintenance limit (10**-n , n = (3,4,5,6)) / hour	4
BER – service limit (10**-n , n = (3,4,5,6)) / hour	3
Framing losses – maintenance limit (0 – 9000) /24 hrs	255
Framing losses – service limit (0 – 9000) /24 hrs	9000
RTS timer – service limit exceeded (1- 255 min)	30
RTS timer – net slip limit exceeded (1- 255 min)	30
RTS timer – after alarm (0 – 300 sec)	10
(Page 2 of 2)	

10. Form 43, T1 Link Assignment

- Assign the Link Descriptor to the PRI trunks (referencing the Bay and Slot location).

11. Form 44, Network Sync

- Enter the links according to their Bay/Slot/Circuit in the order that you want them to be used as the network sync source. Typically, CO's are the first choice for a sync source. When using both PRI and TI trunks, make the PRI trunk the clock source.

12. Form 22, Modified Digit Table

- DID Calling Party Number to the network interacts with the current SX-200 ICP system networking functionality and ignores programmed node-IDs in the NSU or PRI card. The Node ID Information Element ("*8") for Analog Networking, if programmed in the Modified Digit Table, will be ignored by the NSU or PRI card. If *6 is programmed in the digit modification table the DID calling extension number is sent to the NSU or PRI card and can be sent to the network as the calling party. The extension must belong to a block of DID numbers purchased from the Network provider.

The following table shows how Analog Networking and Call-by-Call information co-exist in the Modified Digit Table.

Entry	Quantity to Delete	Digits to be Inserted	Comments
01	1	*4000*6*4*04	ISDN CxC and DID

In the “Digits to be Inserted” field, the definition of characters are:

*4	No SMDR for further modified digits
000	Call-by-Call digits, (speech, default O/G, clid)
*6	Send caller ID (DID to network)
*4	Start SMDR again for further modified digits
*04	Inserts Caller's Name (for calls over ISDN Trunks)

13. Complete ARS programming

- ARS programming must match with the service selection programming that is entered through the ISDN Maintenance Administration Tool (IMAT) computer.

14. Program the IMAT database according to the instructions in the next section.

IMAT Programming

The IMAT software is used to program hardware and call characteristics for the NSU and PRI card. IMAT is also used to install software upgrades and backup the NSU database.

Note: You must have IMAT software version 7.3 or greater. Maintenance activities include access to the following maintenance information:

- a list of all software files and versions on the NSU
- log messages that contain a history of activities and the status of faults
- a database

Installing IMAT Software

You can install IMAT on the Maintenance PC or on its own PC (IMAT PC).

Note: If using a dial-up connection to the NSU, we strongly suggest that you use a non-networked computer (a Windows 95/98 networked computer may have difficulties communicating with Dial-up Networking).

To install IMAT on the PC:

1. Close all the applications running on the PC.
2. Insert the SX-200 ICP software CD-ROM in the CD drive.
3. Open the Tools folder, then the Disk 1 folder.
4. Double-click the Setup.exe file. The installation program starts. Follow the prompts to install IMAT.

Programming IP Settings

Collect the following information:

- The Static IP Address that will be programmed on the NSU. Choose an IP Address that will not conflict with the IP Phone range, which starts at the default 192.168.1.20 and continues to 192.168.1.250. For example, you might choose 192.168.1.15 as the static IP address.
- The gateway address (if there is a gateway on your network)
- The subnet mask (the default setting is 255.255.255.0 which is represented in hexadecimal as ffffff00)

To program a static IP address on the NSU:

1. Ensure the NSU is disconnected from the SX-200 ICP Controller and that no power is applied to the NSU. Re-apply power only after completing CDE and IMAT programming.
2. If you have not already done so, connect a serial cable from a com port on your PC to the Maintenance port on the NSU.
3. Launch a Hyperterminal session on the PC (38400, 8, N, 1, no flow control).
4. Apply power to the NSU by connecting the power cord.

   Messages are displayed on the PC while the NSU is booting up.
5. When the PC displays "Press any key to stop this autoboot", press any key on the PC keyboard. If you do not stop the autoboot on time, remove the power cord from the NSU and repeat this step

   The PC displays "[MC269AA Boot]"
6. Type 'c' on the PC keyboard.

   The PC displays "boot device".
7. Press the Enter key until "net on ethernet" is displayed.

8. Enter the IP Address of the NSU and Subnet mask as shown in the following example:

   192.168.1.2:ffffff00 (where ffffff00 is the subnet mask 255.255.255.0)

Note: There are 6 x f's and 2 x 0's,

9. Press the Enter key until the PC displays “gateway inet (g):”
10. Enter the IP Address of the Gateway as shown in the following example:

    192.168.1.1

11. Press the Enter key until the PC displays “[MC269AA Boot]”
12. Enter “@” to continue the bootup or power down the NSU.

Connecting a Windows PC to the NSU

Only the direct cable connection is described here. For information on connecting to the NSU via modem and or LAN, see the IMAT Online Help.

By default, Windows does not support a direct cable connection. You must add a device driver. Windows takes the information from a Mitel file and creates the driver called NT Direct Connection.

To install a direct connection device driver in Windows:

1. Use the instructions for your Windows operating system to install a new modem.
2. Browse to find the install file located at: c:\Program Files\Mitel\Imat.
3. Select a COM port.
   - Windows creates a driver called NT Direct Connection.
4. Set the following parameters:

   Maximum speed: 38400
   Only connect at this speed enabled
   Data bits: 8
   Parity: None
   Stop bits: 1
   Mode: Auto Answer (in Advanced Settings).
   Error control: Clear if you have a direct connect cable.
   Flow Control: Clear if you have a direct connect cable.

5. To connect the PC to the NSU, connect an RS-232 straight DTE serial cable between the NSU's serial port and the PC's serial port.

Note: If you are connecting through a modem, use a null modem adapter on the NSU side.

To create a Dial-Up Network connection on Windows 95/98:

Note: You might need to do this procedure twice to create two Dial-up Networking connections: one for on-site direct access, and one for remote modem access.

1. Click the Start button, select Programs, Accessories, then Dial-Up Connections.
2. Double-click Make New Connection.
3. Enter an appropriate name for the connection (for example, Direct for direct connections, Remote or a customer's name for remote connections) and click Next.
4. Enter an Area Code and Telephone Number and select a Country Code from the drop-down list. Click Next.

Note: Even though it is not needed for a direct connection, Windows requires that you enter this information.

5. Click Finish.
6. Right-click your new connection icon and click Properties.
7. Click Configure. Ensure the fields are set as follows:

   Data bits: 8
   Parity: none

Note: If you are creating a direct connection, make sure NT Direct Connection is listed in the drop-down list in the Make a New Connection window.

For a direct connection:

Maximum speed: 38400
Check: only connect at this speed.
Select wait for dial tone before dialing.
Select cancel the call time at 60 seconds.
Click Advanced and turn off error control and flow control.

For a remote connection:

- Stop bits: 1

- Click Advanced and turn on error control and select Compress data.
- Turn on flow control and select Hardware.

8. Click OK.
9. Select Server Types tab and make sure that PPP: Windows, Windows NT3.5, Internet or PPP:Internet appears in the Type of Dial-Up Server field.
10. In the Advanced Options field, select Log onto Network and Enable software compression.
11. Make sure that only TCP/IP is selected in the Allowed network protocols field.
12. Select the Scripting tab and enter:

    c:\program files\mitel\Imat\pridun.scp.

13. Click OK.

To create a Dial-Up Network connection on Windows 2000:

Note: You may need to follow this procedure twice to create two Dial-up Networking connections: one for on-site direct access, and one for remote modem access.

1. Click the Start button, select Programs, Accessories, Communications, then Dial-Up Connections.
2. Double click Make New Connection, and then click Next.
3. Select Dial-up to the Internet, and then click Next.
4. Select I want to set up my Internet connection manually, or I want to connect through a local area network (LAN). Click Next.
5. Select I want to connect through a phone line and a modem, and then click Next.
6. Use the COM Port that has been configured as a null Modem connection: 38400, 8, none, 1.
7. In the Choose Modem box, from the drop-down list select Communications cable between 2 computers. Click Next.
8. Clear the box Use area code and dialing rules, and then click Advanced.
9. For the Connection type, select PPP (Point to Point Protocol).
10. For the Logon procedure, select Use logon script, and then click Browse. Select the appropriate script c:\program files\mitel\Imat\ pridun.scp, click OK, then Next.

11. In the Internet account logon information box, leave the username and password fields blank and then click Next.
12. Dialog boxes appear that warn you that you will not be able to connect to your Internet service provider without your user name and your password. Disregard these warnings and click Yes on these boxes to continue.
13. Enter the Connection name, and then click Next.
14. In the box to set up an Internet mail account, select No, then click Next.
15. De-select the option to connect to the Internet immediately, then click Finish.
16. In the Network and Dial-up Connections window, right-click on the new DUN connection, point to Properties, then click Configure.
17. From the Maximum speed (bps) list, select 38400 for the baud rate.
18. Click OK until you exit the windows.

Using IMAT

To start IMAT:

1. Launch IMAT (ignore messages about username configuration error).
2. In the File menu, select Connect to Remote Site.
3. Choose the Connection Medium: Serial or Ethernet Network Card.
4. If you selected Ethernet Network Card, enter the IP Address of the Remote Site.

   If you selected Serial, select the connection name you entered when you created the dial-up network connection.
5. For the Ethernet Remote System, select PRI Card / Universal NSU.
6. Click Connect.

   IMAT displays a confirmation of the connection (for example "Connected over Ethernet").
7. Press Okay.
8. In the File menu, select Load -> Database -> Sources -> PRI Card /NSU. This loads the IMAT with the database from the NSU.
9. Press Load.

IMAT provides a confirmation of the connection (for example “Database received”).

10. Press Okay.

11. In the File menu, select Load -> SW Versions -> Sources -> PRI Card /Universal NSU. This loads the IMAT with the Software version from the NSU.

12. Press Load.

IMAT provides a confirmation of the connection (for example “Software Version received”).

13. Press Okay.

14. Verify that the SW Version of the NSU matches the SW version listed in the FCI delivered with the latest SX-200 ICP load:

- In the Maintenance menu, select Software versions. Verify the package version that is listed against the FCI.
- If the package version and the FCI don't match, select SW Upgrade From IMAT (the NSU load is on the CD).
- After the Upgrade is completed, select Remote Site Reset.

15. Program the NSU Config for the links provided by your PRI provider:

- In the Config menu, select Site Options.
- Confirm the System Type: Universal NSU.
- Confirm the Connected Platform: SX200 EL/ML/ICP.
- If the following options are required, enable them: Qsig, Network Side Interface.
- In the Config menu, select PRI Link Characteristics.
- Verify BOTH links for Protocol type: DMS250, DMS100, 4ESS, NI2, QSIG.
- Verify BOTH links for Physical type: T1/CSU or T1/DSX1.
- Verify BOTH links for Characteristics: line coding, line length, framing, invert data, invert D channel.
- To get a view all of your settings, from the Config menu select View Database.

To save a database:

1. In the File menu, select Save, then Database.
2. In the Files box, type in the Destination of the database (if you have changed the database you can save it back to the PRI/Universal NSU and/or you can save a copy of the database to your PC) and give it a file name.
3. Click Save.

Note: If you save the database changes to the NSU, you must reboot the NSU. You can do this by selecting Maintenance -- Remote Site Reset. (This should be done after hours or when there is no traffic on the NSU.)

To convert a database:

If you are loading a database with a software version that is earlier than the current IMAT version, IMAT displays the Local Database Load window, which allows you convert the ISDN database to a newer version.

1. In the Local Database Load window, select the new database version from the Database Version drop-down menu.
2. Click OK.

Closing IMAT

Note: Always save any open databases before closing IMAT

Programming an Embedded PRI Trunk

1. Form 53, Bay Location Assignment
   - Assign the Dual T1/E1 Framer module a bay number.

Note: Reset the system after updating Form 53.

2. Form 1, System Configuration
   - Program the node type as ONB T1 NODE. Program the trunk card as T1 ISDN for the slots specified in the following table.

Module Location	Slot
MMC1	2 and/or 4
MMC2	6 and/or 8

Note: One link of the Dual T1/E1 Framer can be programmed for PRI (T1 ISDN) and the other for T1 (T1 Trunk).

Note: A trunk must be programmed in form 14 or 15 before it the will show as installed in Form 1.

3. Form 03, Class of Service (COS)
   - Create a separate COS for ISDN trunks.

Note: COS Level 7 in the default database has all COS options required by ISDN trunks enabled except for Option 246 (SMDR - Extended Record).

   - Enable the following COS options for the ISDN Trunks:

     246 – SMDR- Extended Record
     701 – No Dial Tone
     702 – SMDR - Overwrite Buffer. (Required if option 806 SMDR-Record Incoming Calls enabled)
     801 – Incoming Trunk Call Rotary
     802 – Limited Wait for Dial Tone
     811 – ANI/DNIS Trunk
     814 – SMDR - Record ANI/DNIS

Tip: Ensure that COS Option 800 (ANI Applies) is NOT enabled in the class of service of the ISDN trunks.

- For extensions (sets and stations), the following COS options must be set:

Table 18: Extension COS Options for Systems with embedded PRI

COS Option	Setting	Notes
236 – Outgoing Trunk Callback	Disable	
237 – Outgoing Trunk Campon	Disable	
502 – Display ANI/DNIS Information **and possibly** 613 – Display ANI information only	Enable	Must have 502 enabled for 613 to function.
503 – Enable Calling Name Display	Enable	
702 – SMDR Overwrite Buffer	Enable	Required if option 806 SMDR – Record Incoming Calls enabled

4. Form 04, System Options/System Timers

- Assign a one to five second value to System Option 48, Limited Wait for Dial Tone if ISDN trunks are present. Purchase and program the correct Number of Links (option 96), and if required, purchase and enable Remote LAN Access (option 93).

Notes:

1. Options 86, 91, 92, 94, and 95 are not available with embedded PRI.
2. A system reset may be required after some options are programmed. For example, changing the number of links in option 96 requires a reset.

3. Form 13, Trunk Circuit Descriptor

- Assign a T1 trunk circuit descriptor. To receive CLID or DDI digits, the PRI trunk must be a non-DISA trunk that is programmed with a T1 E&M trunk circuit descriptor.

4. Form 13, Options Subform
   - Set the Debounce Timer to 100 milliseconds.
   - Set the DTMF option to NO.
   - Set the Incoming Start Type to WINK.
   - Set the Outgoing Start Type to WINK.
5. Form 15, Dial-In Trunks
   - PRI trunks are Dial-In Trunks and are not normally used in a Non-Dial-in configuration.

     Search for the correct Bay/Slot/Circuit and enter the following for each trunk:
     - COS number – see previous requirements
     - COR number (if required)
     - Tenant number – unless site has tenanting set to 1
     - N – number of incoming DID digits – usually 4
     - M – number of digits to absorb – usually 0
     - X – digits to be inserted (up to 2 digits) or Feature Access Code 67 (Digit Translation Table Access) programmed on Form 02
     - CDN – Circuit Descriptor Number
     - Trunk Number – Enter a trunk number (1-200)
6. Form 16, Trunk Groups
   - Locate an empty Trunk Group and add the PRI trunks (trunk numbers programmed in Form 15) to the Trunk Group. (Program them in reverse order to prevent contention with incoming calls from the CO.)
   - Add a name to the Trunk Group for future reference.
   - Set Group Type to Terminal (recommended) or Circular.
   - Enable SMDR (outgoing only) if required.

7. Form 42, T1 Link Descriptor

- Create a Link Descriptor for the PRI trunks using the recommended settings in the following table:

Table 19: T1 Link Descriptor Values for PRI trunks

Descriptor	Value
Alarm debounce timer (300 –3200 ms)	2500
Line Coding (AMI, AMI&ZCS, B8ZS)	B8ZS
Line Build Out (0, -7.5, -15. –22.5 dB)	0 dB
Line Length (max 132, 265,398,533 or 655)	0 - 132
Framing (D4 or ESF)	ESF
Slip rate – maintenance limit (0 – 9000) /24 hrs	255
Slip rate – service limit (0 – 9000) /24 hrs	7000
Slip rate – network sync limit (0 – 9000) /24 hrs	7
BER – maintenance limit (10**-n , n = (3,4,5,6)) / hour	4
BER – service limit (10**-n , n = (3,4,5,6)) / hour	3
Framing losses – maintenance limit (0 – 9000) /24 hrs	255
Framing losses – service limit (0 – 9000) /24 hrs	9000
RTS timer – service limit exceeded (1- 255 min)	30
RTS timer – net slip limit exceeded (1- 255 min)	30
RTS timer – after alarm (0 – 300 sec)	10
Embedded PRI Protocol	DMS100
Embedded PRI Protocol Variant	None
Embedded PRI Network/User	User
Embedded PRI Unknown Numbering Plan	Disabled
Embedded PRI Bearer Capability Voice	Speech
Embedded PRI CLIR Voice	Allow
Embedded PRI Invert D Channel	No

8. Form 43, T1 Link Assignment

- Assign the ISDN trunk T1 Link Descriptor to the slot(s) specified in Form 1.

9. Form 44, Network Sync

- Enter the links according to their Bay/Slot/Circuit in the order that you want them to be used as the network sync source. Typically, CO's are the first choice for a sync source. When using both PRI and TI trunks, make the PRI trunk the clock source.

10. Form 22, Modified Digit Table

- DID Calling Party Number to the network interacts with the current SX-200 ICP system networking functionality and ignores programmed node-IDs in the Dual T1/E1 Framer module. The Node ID Information Element ("*8") for Analog Networking, if programmed in the Modified Digit Table, will be ignored by the module. If *6 is programmed in the digit modification table the DID calling extension number is sent to the module and can be sent to the network as the calling party. The extension must belong to a block of DID numbers purchased from the Network provider.

The following table shows how Analog Networking and Call-by-Call information co-exist in the Modified Digit Table.

Entry	Quantity to Delete	Digits to be Inserted	Comments
01	1	*4000*6*4*04	ISDN CxC and DID

In the "Digits to be Inserted" field, the definition of characters are:

*4	No SMDR for further modified digits
000	Call-by-Call digits, (speech, default O/G, clid)
*6	Send caller ID (DID to network)
*4	Start SMDR again for further modified digits
*04	Inserts Caller's Name (for calls over ISDN Trunks)

11. Complete ARS programming in CDE.

Note: If Calling Party Number (CPN) substitution is programmed, make sure that Form 22, ARS: Modified Digit Table, contains an entry with CPN enabled for embedded PRI. Entries for offboard PRI cards and NSUs should have CPN disabled.

Programming an Embedded T1 Trunk

1. Form 53, Bay Location
   - Assign the module or card a bay number.

Note: If two modules are installed, assign them to the same bay.

2. Form 01, System Configuration
   - If the module is in MMC slot 1, program a T1 Trunk card in slot 2 and/or 4 of the assigned bay. If the module is in MMC slot 2, program a T1 Trunk card in slot 6 and/or 8.

Note: One link of the Dual T1/E1 Framer can be programmed for PRI (T1 ISDN) and the other for T1 (T1 Trunk).

Note: A trunk must be programmed in form 14 or 15 before it the will show as installed in Form 1.

3. Form 03, COS Define
   - Enable COS Option 802, Limited Wait for Dial Tone.
4. Form 04, System Options and Timers
   - Program Option 48, Limited Wait for Dial Tone, and Option 96, Number of Links (0-8).
5. Form 13, Trunk Circuit Descriptors
   - Specify options for the T1 trunk types.
6. Forms 14 (Non-dial-in Trunks) and 15 (Dial-in Trunks)
   - Specify options for specific trunk circuits.

Note: CDE Form 14 and 15 do not accept programming changes if the T1 card is installed in the Peripheral Cabinet, and the T1 link is down but still active. To make a programming change, unplug the T1 card, make the change and then re-insert the card.

7. Form 43, T1 Link Assignment
   - Select a T1 link descriptor for the T1 link.
8. Form 42, T1 Link Descriptors
   - Specify options for the T1 link descriptors.
9. Form 44, Network Sync
   - Enter the links according to their Bay/Slot/Circuit in the order that you want them to be used as the network sync source. Typically, COs are the first choice for a sync source.

10. Forms 22, 23 and 26
    - Complete the ARS programming required to access the T1 trunks.
11. Form 16, Trunk Groups
    - Put the trunks in a trunk group.

Programming Analog Trunks

Non Dial-In trunks

1. Form 01, System Configuration
    - Program a trunk card that meets the trunk type requirements.
2. Form 13, Trunk Circuit Descriptor
    - Create a trunk circuit descriptor that corresponds to the type of trunk that you are programming.
3. Form 03, Class of Service
    - Assign trunk options only.
4. Form 14, Non-Dial-in Trunks
    - Assign COS and Tenant.
    - Assign the directory number or an abbreviated dial number which incoming calls will ring for Day Service, Night Service 1 and 2 modes.
    - Assign a Circuit Descriptor Number (links this form to Form 13).
    - Assign a Trunk Name if desired. This name appears on the consoles and on the set displays for incoming and outgoing calls.
    - Assign a Trunk Number in the range 1 to 200.

Note: For T1 cards or T1/E1 modules in Peripheral Cabinets - Form 14 does not accept trunk programming changes if the card or module is installed and the T1 link is down but active. To make a programming change for a T1 card, unplug the T1 card, make the programming change and then re-insert the T1 card. To make a programming change for a T1/E1 module, insert a Peripheral Interface Card (PIC) into the software location (slots 5 or 6) for that T1 link, make the programming change, and then remove the PIC from the slot to reset the T1 link.

5. Form 16, Trunk Groups
    - Assign to a trunk group if outgoing.

Programming a range of Non Dial-in Trunks

The RANGE PRGRM softkey allows block programming of trunks on the same card. You must program the first trunk in the range and then press RANGE PRGM to copy the values to the range of trunks that you specify. The following fields are copied from the first trunk in the range:

COS, TEN, DAY, N1, N2, CDN

The TK NAME and COMMENTS fields are left blank.

The trunk numbers are assigned in sequence, beginning with the first trunk in the range. If there are trunks that are already programmed within that range, those trunks are skipped. The trunk number sequence is incremented each time a trunk is skipped. If the trunk number is incremented to a value that is already used, the sequence continues to increment until a free number is found. The trunk numbers restart at 1 if necessary. An error message is displayed if there are no more free trunk numbers.

Note: BRI trunks are not supported.

To program a range of trunks:

1. Program the first trunk in the range. Enter values for the COS, TEN, DAY, N1, N2, CDN fields.
2. Press RANGE PRGRM.
3. The system displays: FROM BAY: SLOT: CIRCUIT:.
4. Enter valid Bay, Slot and Circuit numbers for the first trunk and press the ENTER softkey.
5. The system displays: TO BAY: SLOT: CIRCUIT:.
6. Enter valid Bay, Slot and Circuit numbers for the last trunk and press the ENTER softkey.
7. The system copies the values from the first trunk to all the trunks specified in the range.

Dial-in trunks

1. Form 01, System Configuration
   - Program a trunk card that meets the trunk type requirements.
2. Form 13, Trunk Circuit Descriptor
   - Create a trunk circuit descriptor that corresponds to the type of trunk that you are programming.
3. Form 03, Class of Service
   - Assign trunk options only.
4. Form 15, Dial-in Trunks
   - Assign COS, COR, and Tenant.

Note: Assign a separate COS for the Dial-In Trunk.

- Column N lists the number of expected digits.

IMPORTANT: Changing the N field of a working system from 0 to any other digit or vice versa removes the trunks from the trunk group.

Note: If this digit is 0, the system treats this as a Tie trunk. If this digit is not 0, the system treats this as a DID trunk.

- Column M lists the number of digits to absorb. To absorb no incoming digits, set to 0. To absorb n digits, enter n (a whole number).
- Column X defines the digits to insert.

Do not insert 0 as a blank. To insert no digits, leave blank.To insert digits, enter the actual digits.

- Assign a Trunk Name if desired. This name appears on the consoles and on the set displays for incoming and outgoing calls.

Note: For T1 cards or T1/E1 modules in Peripheral Cabinets - CDE Form 15 does not accept trunk programming changes if the T1 card or T1/E1 module is installed and the T1 link is down but active. To make a programming change for a T1 card, unplug the T1 card, make the programming change and then re-insert the T1 card. To make a programming change for a T1/E1 module, insert a Peripheral Interface Card (PIC) into the software location (slots 5 or 6) for that T1 link, make the programming change, and then remove the PIC from the slot to reset the T1 link.

5. Form 16, Trunk Groups
   - Assign to a trunk group if outgoing.

Programming a range of Dial-in Trunks

Follow the instructions on page 132 for range programming Non Dial-in Trunks.

DISA trunks

1. Form 01, System Configuration
   - Program a trunk card that meets the trunk type requirements.
2. Form 13, Trunk Circuit Descriptors
   - Select a DISA circuit descriptor to match hardware type.

Note: Assignment of a DISA circuit descriptor to a trunk changes the trunk to a DISA trunk.

3. Form 03, Class of Service
   - Assign trunk options only.
4. Form 15, Dial-In Trunks
   - Assign COS, COR, and Tenant.

Note: Assign a separate COS for the Dial-In Trunk.

   - Column N: set to 0
   - Column M: set to 0
   - Column X: leave blank
   - Assign a Trunk Name if desired. The name is what appears on the consoles and phone displays for incoming and outgoing calls.

Recommended Options for System Security

Form 03: Enable Option 808 (Special DISA).

Form 04: Enable Option 5 (Verified Account Codes) and specify a time for Option 54 (DISA Answer Timer).

Form 33: Enter appropriate DISA access codes.

Notes:

1. If the DISA trunk is a loop-start CO trunk, then loop- start interconnection rules apply and the restrictions on-loop start CO trunks applies.
2. Four-circuit/Eight-circuit LS/CLASS trunks can also be programmed as DISA trunks.

Programming T1 and PRI trunks as DISA trunks

1. Program the trunk(s) as T1 E&M. (A T1 E&M circuit descriptor is not required.)
2. Form 02, Feature Access Codes
   - Program Feature Number 19 (Direct Inward System Access) with a number that is within the DID range.
3. Form 03, COS Define
   - Enable COS Option 606, Telephone - Enhanced Answering Position (provides answer supervision to telco when the SX-200 ICP provides it dial tone).
4. Form 19, Call Rerouting Table
   - Program the DISA access code from Form 02 as the DISA Day Service Routing for this Tenant.

Programming ANI/DNIS on an Incoming trunk

Note: The following does not apply to PRI trunks.

ANI (Automatic Number Identification) - the local carrier sends the phone number of the calling party to the PBX.

DNIS (Dialed Number Identification Service) - the local carrier sends the digits dialed by the calling party to the PBX.

ANI/DNIS is available only to incoming trunks with trunk descriptor “T1-E&M” and “T1-DID/TIE”, which accept DTMF signaling and have the wink timer active.

Only MCI and US Sprint Standards are supported. MCI sends the ANI digits without delimiters. Sprint delimits the DNIS and ANI digits with asterisks.

DNIS digits on a dial-in trunk are used to route that trunk call, and no further digits will be expected.

1. Create an ANI/DNIS trunk by creating a separate COS. Enable the following options in the trunk's Class Of Service:
   - COS Option 802 - Limited Wait for Dial Tone
   - COS Option 811 - ANI/DNIS Trunk
   - COS Option 246 - SMDR Extended Record (for SMDR to report the ANI and DNIS digits).
2. In the Trunk Circuit Descriptor parameters set
   - DTMF = ENABLED
   - Incoming Start Type to Wink
   - Wink Timer to 100-350 for MCI and 140-290 for US SPRINT
   - Debounce Timer to 100 ms or greater.
3. To define which information will be displayed on the sets, ANI, DNIS, both, or none (standard trunk label display), select the required following COS options:
   - COS Option 502 - Display ANI/DNIS Information = ENABLE
   - COS Option 613 - Display ANI Information Only = ENABLE / DISABLE
4. To display ANI and DNIS digits on a console when talking to an ANI/DNIS trunk, enable COS Option 502 - Display ANI/DNIS Information for the console.

Notes:

1. Intercept reason (FROM xxx DND) and Forwarding Information (FWD FROM xxxx) take priority over DNIS.
2. Tenant Name and Calling Line ID take priority over ANI information (immediately following the word TRUNK).'
3. COS Option 613 - Display ANI Information Only does not apply to a console.

The following tables identify displays during each call state according to digits sent by the trunk and COS options selected for the display set.

Note: If a name is received on the incoming trunk in the scenario where you would see the DNIS in the ringing state, you will see the ANI instead.

Table 20: ANI/DNIS Digits on Phone Display (COS Option 502 Enabled and COS Option 613 Disabled)

COS Option 502 - Display ANI/DNIS = YES (enable) COS Option 613 - Display ANI only = NO (disable)		
	Phone display during ringing	Phone display after answer
ANI and DNIS sent	DNIS	ANI
ANI sent	ANI	ANI
DNIS sent	DNIS	DNIS
Neither sent	Trunk Number or Label	Trunk Number or Label

Table 21: ANI/DNIS Digits on Phone Display (COS Option 502 Enabled and COS Option 613 Enabled)

COS Option 502- Display ANI/DNIS = YES (enable) COS Option 613 - Display ANI only = YES (enable)		
	Phone display during ringing	Phone display after answer
ANI and DNIS sent	ANI	ANI
ANI sent	ANI	ANI
DNIS sent	Trunk Number or Label	Trunk Number or Label
Neither sent	Trunk Number or Label	Trunk Number or Label

The following table describes the set display for logged in ACD Agents with the delivery of ANI/DNIS digits on the incoming trunks.

Table 22: ANI/DNIS for ACD Agents

COS 502	COS 613	COS 654	Path Name	Ringing State	Talking State
Enabled	Enabled	Disabled	None	ANI	ANI
Enabled	Disabled	Disabled	None	DNIS	ANI
Disabled	Disabled	Disabled	None	Path Number	Trunk Name
Disabled	Enabled	Disabled	None	Path Number	Trunk Name
Disabled	Disabled	Enabled	None	Path Number	Path Number
Disabled	Enabled	Enabled	None	Path Number	Path Number
Enabled	Enabled	Enabled	None	ANI	Path Number
Enabled	Disabled	Enabled	None	DNIS	Path Number
Enabled	Enabled	Disabled	Yes	Path Name	ANI
Enabled	Disabled	Disabled	Yes	Path Name	ANI
Disabled	Disabled	Disabled	Yes	Path Name	Calling Trunk Name
Disabled	Enabled	Disabled	Yes	Path Name	Calling Trunk Name
Disabled	Disabled	Enabled	Yes	Path Name	Calling Path Name
Disabled	Enabled	Enabled	Yes	Path Name	Calling Path Name
Enabled	Enabled	Enabled	Yes	Path Name	Path Name
Enabled	Disabled	Enabled	Yes	Path Name	Path Name

CLASS trunks

1. Form 01, System Configuration
   - Program the ASU Trunk card, the LS/CLASS Trunk module, or the LS/CLASS Trunk card.
2. Form 03, Class of Service, Define for trunks.

   Assign a separate COS for the trunk.
   - To have Calling Line ID digits reported in the SMDR records, enable COS Option 806 (SMDR-Record Incoming Calls) and COS Option 814 (SMDR-Record ANI/DNIS/CLASS). Enable COS Option 702 (SMDR - Overwrite Buffer).
   - To have CLASS name reported in the SMDR records, enable COS Option 246 (SMDR-Extended Record) and COS Option 814 (SMDR-Record ANI/DNIS/CLASS).
3. Form 03, Class of Service, Define for SUPERSET sets.
   - To display Calling Line ID digits on a SUPERSET display set or console, enable COS Option 502 (Display ANI/DNIS/CLASS Information) in the class of service for the set/console. Enable COS Option 613 - Display ANI Information Only if required.
   - To display CLASS name before Calling Line ID digits on phones with 2-line displays, enable COS Option 503 (Display CLASS Name) in the class of service for the set.
4. Form 13, Trunk Circuit Descriptor
   - Assign the CLASS trunk with the circuit descriptor. LS/CLASS trunks in the controller or an ASU use ASU CLASS circuit descriptor. An LS/CLASS Trunk module in a Peripheral Cabinet uses “4-CIRCUIT CLASS” and an LS/CLASS Trunk card uses “8-CIRCUIT CLASS“.
   - Program the option “CLASS Trunk” in the circuit descriptor options subform for the appropriate ASU, 4-circuit, or 8-circuit CLASS trunk.
5. Form 14, Non-Dial-In Trunks or Form 15, Dial-in Trunks
   - Program the CLASS trunks. In Form 15 the CLASS trunk becomes a DISA trunk.
6. Form 04, System Options and Timers
   - Program the CLASS receivers for the LS/CLASS Trunk module. The LS/CLASS Trunk card provides its own CLASS receivers and does not require programming in Form 04.

Running the Line Quality Test for LS Trunks

Run the Line Quality test to measure and program optimum audio configuration settings (line length and impedance) for AMB CLASS circuits.

1. Form 13 (Audio Configuration subform)
   - Program the trunks so that one trunk provides milliwatt tone for all other trunks in a loopback setup when the test is performed.

     Sample setup (trunk 6 provides milliwatt tone):

Trunk #	Tel #	Milliwatt
1	1111001	6
2	1111002	6
3	1111003	6
4	1111004	6
5	1111005	6
6	1111006	1

Note: If the local CO provides a milliwatt tone number, do not configure the loopback setup described above. Instead, enter the milliwatt tone number in Form 13 (Trunk Circuit Descriptors) and run the Line Quality test.

2. Switch to MTCE.
3. Press

   DIAGNOSTICS
   LS_MEASURE
   select LINE_QUALITY (for one trunk) or BATCH_QUAL (for all trunks)

   Respond to the prompts to run the test.

   When the test is complete, LENGTH and IMPEDANCE are programmed automatically in Form 13 (Audio Configuration subform).

Note: LENGTH and IMPEDANCE must be set to AUTO in order to be programmed automatically when the test is run. Refer to the logs to determine the actual settings for AUTO. To view the logs, press DIAGNOSTICS > LS_MEASURE > TEST_RESULTS > ENTER.

Programming Symbol MiNET Wireless Phones (Optional)

A site survey by Symbol Technologies followed by the installation and configuration of Air Access Points (also by Symbol) precedes programming of the phones.

1. Complete programming on the SX-200 ICP.

   In Form 09 (Devices Assignments) enter the following information:

   - Device Type (WRLSS)
   - Directory Number
   - PIN (must be four digits)

   In Form 03 (COS Define), assign a Class of Service and Class of Restriction to the phone.

2. Install the Symbol NetVision MiNET phone administrator tool on a Windows NT or Windows 2000 PC (see below).

3. Upgrade the Symbol phone firmware to use the MiNET protocol. Refer to the Symbol NVP II MiNET Update Procedure document (Symbol MiNET.pdf) found on the SX-200 IPCP software CD.

   The instructions in the Update Procedure document refer to a configuration text file. Use the Minet_protocol.txt file provided on the SX-200 IP software CD. The file is located in the folder 3rd Party/Wireless/Administration_Tool/.

4. Configure the wireless phones using the Symbol NetVision MiNET Phone Administrator Tool.

Install Symbol NetVision MiNET Phone Administrator Tool

The tool is found on the SX-200 ICP software CD and must be installed on a PC that is running Windows NT or Windows 2000.

To install the tool:

1. Insert the software CD into the CD-ROM drive.
2. Click \3rd_Party\Wireless\Administration_Tool \MiNET<xxx>.exe.
3. Click Unzip to place files in C:\temp\symbol.

4. Click Close.
5. Open the C:\temp\symbol folder.
6. Click setup.exe.
7. Follow the instructions in the install wizard.

Twinning the Symbol phone with a wireline (desk) phone

Phone twinning provides concurrent ringing and message waiting indication on as many as five phones.

To set up twinning:

1. Form 02, Feature Access Codes
   - Program the Disable Twin Phone access code (61).
2. For BOTH the Primary Telephone (Symbol MiNET Wireless Phone) and Secondary Telephone(s)
   - In Form 03, enable Option 276, Twin Phone, and then assign the COS to the primary and secondary telephone(s).
3. For the Primary Telephone

Tip: In Form 09, ensure that the primary telephone has no key-line appearance in the system.

Note: The Symbol phone must be programmed as the primary phone.

4. For IP and DNIC Secondary Telephones
   - In Form 09, Expand Set Subform, assign a multicall line key to the primary DN and make the multiline key the preferred line (LINE PREF softkey) for incoming and outgoing calls. This is required to light the message waiting lamp on the secondary phones.
5. For ONS Secondary Telephones
   - In Form 09, program the Primary DN (i.e., the DN of the Symbol phone) in the ASSOC field.

Programming IP Sockets for Hotel/ Motel terminals and ACD Monitor

Note: Hotel/Motel front desk terminals, ACD Monitors and other applications that are not IP-enabled, and that require bi-directional data, must use an RS232-to-IP serial port converter, such as the Precidia Technologies Ether232 or iPocket232 (available from the vendor or its resellers), to connect to the SX-200 ICP. A dataset connection to a DNIC port or an RS-232 serial port on the SX-200 ICP controller will not work.

1. Form 03, COS Define
   - Select the COS number.
   - Enable the following COS Options:

     901 - DTRX Herald
     904 - DTRX Complete Message Text
     906 - Data SMDR - Does Not Apply
2. Form 29, DTE Profile
   - Select a DTE profile number. You will use this profile number in Form 12 - Data Assignment.
   - Select the SEL. Option Subform.
   - Enable: DTRX Echoplex, Editing, and Edit Character = 127.
3. Form 11, Data Circuit Descriptor
   - Select a Circuit Descriptor (CDN).

     Match the CDN values to those of the selected Terminal. For example, All Baud Rates = 9600, Parity = None, Character Length = 8, and Stop Bits = 1.
4. Form 12, Data Assignment
   - Program a SOCKET type data device to an available PLID in the following range:

PLID	Port	PLID	Port
1/13/20	61320	1/13/25	61325
1/13/21	61321	1/13/26	61326
1/13/22	61322	1/13/27	61327
1/13/23	61323	1/13/28	61328
1/13/24	61324		

In the Data Terminal Equipment profile (DTE) field, enter the DTE number you used in Form 29 and the same CDN you used in Form 11.

- Assign a Tenant, Extension number, COS, COR, and circuit descriptor number programmed in Form 11.

5. Program the RS232-to-IP serial port converter with the settings in Table 23 on page 145.

Note: For Remote Port, enter the port number programmed in Form 12, not 6830 as the table shows.

6. Connect the Hotel/Motel terminal or ACD Monitor computer to the Layer 2 switch using the RS232-to-IP serial port converter.

7. Verify that the device and SX-200 ICP are communicating. If they are communicating, you will see an exchange of ENQ (Enquire) and ACK (Acknowledge) commands at the device. If they are not communicating, see page 273 for troubleshooting information.

Programming Voice mail and PMS Integration

Requirements

- MOSS Option 124, Voice mail Property Management System.
- A Hyatt Encore or HIS compatible PMS.
- An RS232-to-IP serial port converter, such as the Precidia Technologies Ether232 or iPocket232 (available from the vendor or its resellers), is required to connect the customer's PMS computer to the Layer 2 switch. A dataset connection to a DNIC port or an RS-232 serial port on the SX-200 ICP controller will not work.

  Follow the instructions supplied with the converter to program its Ethernet and serial port settings. Programming for the Precidia programming is provided below. The Ethernet settings (converter IP address, Subnet Mask and Gateway IP address) to use depend on the LAN configuration. The serial port settings to use are as follows:

Table 23: RS232-to-IP Serial Port Converter Settings

Setting	Value
Protocol	Transparent tcp (tunnel)
Local Port	0
Port Speed	Varies with the PMS System: HIS - 2400 baud, Even Parity, 7 Data & 1 Stop Bit, No Flow Control Encore - 1200 baud, Even Parity, 7 Data & 1 Stop Bit, No Flow Control
Connection control	Net-Link
Remote IP	SX-200 ICP RTC IP Address
Remote Port	6830 (as programmed in CDE Form 12)
Terminators	Not required

SX-200 ICP programming

1. Form 04, System Options/System Timers
   - Enable Option 124, Voice mail Property Management System..

Note: Enabling Option 124 requires a system reset.

2. Form 49 - Voice mail Option
   - Select the PMS Protocol, Hyatt Encore or HIS.

Setting up the Ether232

1. Connect cables (power, Ethernet from Layer 2 switch to Ether232, and serial from PC to Ether232).

Note: The serial cable connecting the PC to the Ether232 must be a Null Modem (RS232-Crossover) cable.

2. Start a terminal program on the PC (such as Hyperterminal) and set the configuration to 9600-8-N-1.
3. Press and hold the Configure button on back panel of the Ether232 for several seconds until the Ether232 configuration menu appears on the terminal.
4. Assign the Ether232 a valid IP Address with Subnet Mask and Gateway IP Address.
5. Configure the Serial Port for the Ether232 with the settings in Table 23.
6. Set the remote IP address. This is the IP address of the SX-200 ICP.
7. Set the remote IP port to 6830.
8. Ensure that all remaining entries are set to zero. If they are not 0 set them to 0.
9. Save the configuration.
10. Unplug the PC from the Ether232 and connect the PMS computer in its place.
11. Press any key to establish communication with the SX-200 ICP.

Programming the PMS Interface on the SX-200 ICP

Requirements

- Purchase MOSS Option 108, Property Management System.
- Lodgistix PMS software package (or a package that follows the same protocol).
- An RS232-to-IP serial port converter, such as the Precidia Technologies Ether232 or iPocket232 (available from the vendor or its resellers), for PMS applications requiring serial connectivity to the SX-200 ICP. IP-enabled applications can connect via Telnet.

SX-200 ICP programming

1. Determine the customer's PMS communications protocol requirements: baud rate, parity, character length and number of stop bits.
2. Form 04, System Options
   - Program the following:

System Options / Timers	Status
04 Message Waiting and Message Register Clear Print	ENABLE
11 Automatic Wake-Up	ENABLE
13 Automatic Wake-Up Print	ENABLE
32 Outgoing Call Restriction	ENABLE
27 Room Status Audit	DISABLE
33 Room Status	DISABLE
34 Auto Room Status Conversion / Wake Up Print	DISABLE
108 - Property Management System	ENABLE
124 - Voice Mail Property Management System	ENABLE

3. Form 11, Circuit Descriptor

- Program to match the protocol.
- Select the Circuit Descriptor Options.

Option Name	Value
Session Inactivity Timer	0
Guard Timer	2
Minimum Baud Rate	match customer's PMS
Default Baud Rate	match customer's PMS
Maximum Baud Rate	match customer's PMS
Always use Default Baud Rate when called	YES
DTR Off Disconnect Timer	5
DTR to CTS Delay Timer	100
DTR Forced High	YES
RTS Forced High	YES
DSR Is held High when device is Idle	YES
CTS Is held High when device is Idle	YES
Originate a DTRX Call with Low - High transition of DTR	NO
Action taken if the Idle DTE has DTR Low (Auto-Answer)	REFUSE
ASYNC: Keyboard Origination Allowed (Auto Baud)	DISABLE
ASYNC: ADL Auto Baud	DISABLE
ASYNC: Flow Control	XON/XOFF
ASYNC: Break Key Function	Transparent
ASYNC: PBX Attention Character	0
ASYNC: Parity	match customer's PMS
ASYNC: Character Length	match customer's PMS
ASYNC: Number Of Stop Bits	match customer's PMS
DS2100: Operating Mode	ASYNCHRONOUS

4. Form 12, Data Assignment

- Program a SOCKET type data device to an available PLID in the following range:

PLID	Port	PLID	Port
1/13/20	61320	1/13/25	61325
1/13/21	61321	1/13/26	61326
1/13/22	61322	1/13/27	61327
1/13/23	61323	1/13/28	61328
1/13/24	61324		

- Assign a Tenant, Extension number, COS, COR, and circuit descriptor number.

5. Form 34, Directed I/O: program the PMS.

EXT NUM	PRINTOUT	PRINTOUT TYPE	GUARANTEED
From Form 12	PMS	AUTOPRINT	NO

6. Form 03, Class of Service Define

- Program the following table:

Device	COS Option	Status
Attendant Consoles	101 Attendant Outgoing Restriction / Room Status Set Up	ENABLE
	105 Attendant Guest Room Key	ENABLE
Room Phones	202 Alarm Call	ENABLE
	220 Do Not Disturb	ENABLE
	232 Message Waiting SETUP Lamp	ENABLE
	703 Message Register Applies	ENABLE
	239 Priority Dial 0 (optional - see step 6)	ENABLE
	244 Room Status Applies	DISABLE
	608 SUPERSET Status Display	DISABLE

7. Form 19, Call Rerouting

- Program "Station Dial 0" routing.

The "Station Dial 0" answer point for all tenants must be a Console LDN or Subattendant LDN. To allow the customer's PMS to set message waiting, you must program Day, Night 1, and Night 2 answer points to the same LDN.

[Tenant ___] Type Of Call	Day	N1	N2
Station Dial 0 Routing	Same LDN	Same LDN	Same LDN

- If you require different "Dial 0" answer points for Day, N1, and N2 use "Priority Dial 0" as an alternate method.

8. Form 34, Directed I/O: program the PMS.

EXT NUM	PRINTOUT	PRINTOUT TYPE	GUARANTEED
From Form 12	PMS	AUTOPRINT	NO

9. Do one of the following:

- Start a Telnet session on the PMS computer to the IP address of the SX-200 ICP and the socket port number programmed in Form 12.
- Connect the PMS computer to the Layer 2 switch using the RS232-to-IP serial port converter. Then, program the converter with the settings in Table 23 on page 145.

Note: For Remote Port, enter the port number programmed in Form 12, not 6830 as the table shows.

10. Verify that the customer's PMS computer communicates with the SX-200 ICP.

For serially-connected PMS computers, you will see an exchange of ENQ (Enquire) and ACK (Acknowledge) commands at the customer's PMS computer if it is communicating with the SX-200 ICP. If they are not communicating, see page 273 for troubleshooting information.

Programming for the 6010 Teleworker Solution

IMPORTANT: Basic I & M certification qualifies technicians to install a Mitel 6010 Teleworker for voice-only use. Installation in a converged voice and data network requires Advanced I & M certification.

Requirements

Support for the 6010 Teleworker on the SX-200 ICP requires the following:

- Mitel 6000 Managed Applications Server (MAS), Release 6.0 or higher

Note: The 6000 MAS must be on the same VLAN (subnet) as the SX-200 ICP.

- Mitel 6010 Teleworker Solution Blade (installs on the 6000 MAS), Release 6.0 or higher
- a valid Service Link account
- 5020 IP, 5212 IP, 5215 IP, 5220 IP, or 5224 IP Phone (with Boot Load 5.22 or later)
- an IP Phone license for each Teleworker phone

Installation and programming

Below is an overview of the installation and programming needed to implement the 6010 Teleworker Solution. For more information, see the Applications & Solutions section on the Mitel Customer Documentation website for documentation.

SX-200 ICP

- Form 09, Desktop Device Assignments
  - Assign set type (5020, 5212, 5215, 5220, or 5224), extension number, COS, COR, and name (optional) for each bay/slot/circuit that will host a Teleworker phone.

Note: Phones with low bandwidth connections should have Option 688 (IP Set Requires Compression) enabled in their Class of Service.

6000 MAS

In the 6000 MAS Server Manager web interface,

- enter the ICP Name, IP address, and System ID (from Form 04, Option 101) of the SX-200 ICP, and then select SX-200 ICP as the Mitel ICP type.
- enter the MAC address (printed on a label on the bottom of the phone) into the list of allowed MAC addresses on the 6010 Teleworker Solution blade panel in the 6000 MAS. When an unregistered remote IP Phone attempts to connect, the 6010 Teleworker Solution server will automatically register the MAC address.

Teleworker Phone

Register the phone by entering the following information:

- the IP Address of the 6010 server
- the Netmask or Subnet Mask for the office network (only required if giving the phone a static IP address).
- the Default Gateway IP Address for the office network.

Testing IP Phone connectivity and voice quality

The 6000 MAS includes a tool, the Teleworker Network Analyzer, that is used to test remote IP Phone connectivity to the 6010 Teleworker Solution and voice quality.

Programming SpectraLink Wireless Telephones

Requirements

- SX-200 ICP Release 2.1 or later software and one IP device license per Netlink phone.
- A properly configured and operational wireless LAN—includes compatible 802.11b wireless access points and SpectraLink Voice Priority Server (SVP).

Notes:

1. Software for the SpectraLink telephones is provided on the SX-200 ICP system software CD.
2. The push-to-talk feature of the NetLink i640 requires enabling multicasting on the subnet used for the wireless telephones and the SVP Server. Routers are typically configured with filters to prevent multicast traffic from flowing outside of specific domains. Where possible, the wireless LAN can be placed on a separate VLAN or subnet to reduce the effects of broadcast and multicast traffic from devices in other network segments.

Programming

SX-200 ICP

- In CDE Form 47, IP Networking, DHCP Options, Common Options subform, program the following options:
  - 3, Default Gateway IP address (default is 192.168.1.1)
  - 66, SpectraLink firmware TFTP server IP address (default is 192.168.1.2)
  - 129, SX-200 ICP (RTC) IP address (default is 192.168.1.2)
  - 130 - DHCP Server Identifier (default is MITEL IP PHONE)
  - 151, SVP server IP address.
- Register the telephones with the SX-200 ICP either in CDE Form 09 (Desktop Device Assignments) or from the telephones by entering the IP Set PIN Registration code and the desired directory number.

- Assign a Class of Service to each telephone in Form 09.
- (Optional) Associate the SpectraLink Wireless phone with the user's desk phone. See Phone Twinning for programming instructions.
- (Optional) Assign features and line appearances to keys on the phones.

SpectraLink Devices and Access Points

The following table summarizes the programming requirements for SpectraLink and other associated third-party devices. For detailed instructions, refer to the SpectraLink documentation on the SX-200 ICP software CD. See also the documentation supplied with the Access Points selected for the installation.

Notes:

1. The menus and options in the examples may vary slightly depending on the version of software in the device or the device type.
2. Settings not explicitly configured should be left at their default values.

Table 24: SpectraLink Installation Checklist

NetLink Telephones	
Parameter	**Requirement**
ESS ID	Ensure that ESSID matches Access Point ESSID. ***Example:*** ESS ID -> Static Entry -> 123456
License Management	Ensure that selected license setting allows for TFTP Server IP Address Input. ***Example:*** License Mgmt -> Set Current -> Type 014
Security	Ensure that selected security matches Access Point Security Settings. ***Example:*** Security -> WEP -> Authentication -> Open System Security -> WEP -> WEP On/Off -> WEP On Security -> WEP -> Key Information -> Default Key -> 1 Security -> WEP -> Key Information -> Key Length -> 40-Bit Security -> WEP -> Key Information -> Key #1 -> 1111111111 Security -> WEP -> Key Information -> Key #2 -> 2222222222 Security -> WEP -> Key Information -> Key #3 -> 3333333333 Security -> WEP -> Key Information -> Key #4 -> 4444444444 Security -> WEP -> Rotation Secret -> 1 **NOTE:** Please be aware that once a WEP Key has been entered, it will not be displayed when re-accessing that Key Information menu. CAREFULLY enter the required Key to prevent typos.
IP Addresses	Ensure that the defined IP addresses match the host Access Point subnet settings using either Static or DHCP configuration. ***Example:*** Static settings IP Addresses -> Static IP -> Phone IP -> 192.168.0.101 IP Addresses -> Static IP -> TFTP Server IP -> 192.168.0.15 IP Addresses -> Static IP -> Default Gateway -> 192.168.0.1 IP Addresses -> Static IP -> Subnet Mask -> 255.255.255.000 IP Addresses -> Static IP -> SVP IP Addr -> 192.168.0.20 IP Addresses -> Static IP -> RTC IP Addr -> 192.168.0.15 DHCP settings 003 (Default Gateway) - IP Address - 192.168.0.1 128 (TFTP Server IP Address) - IP Address - 192.168.0.15 129 (RTC IP Address) - IP Address - 192.168.0.15 130 (DHCP Server Identifier) - ASCII String - MITEL IP PHONE 151 (SVP Server) - IP Address - 192.168.0.20
	(Page 1 of 3)

Table 24: SpectraLink Installation Checklist (continued)

Access Point (Symbol)	
Parameter	**Requirement**
ESS ID & IP Addresses	Ensure that the correct IP settings for the Access Point, as well as the desired Net_ID (ESS ID), are configured correctly. ***Example:*** IP Address - 192.168.0.25 Gateway IP Address - 192.168.0.1 DNS IP Address - 192.168.0.200 Net_ID (ESS) - 123456 Additional DNS - 192.168.0.201
Special Functions	Ensure that the desired wireless security settings are defined correctly. ***Example:*** Configure Authentication and Encryption -> Pre-shared Key -> Enabled Configure Authentication and Encryption -> WEP -> 40 bit Configure Authentication and Encryption -> Configure WEP/KeyGuard -> Encryption Key ID -> 1 Configure Authentication and Encryption -> Configure WEP/KeyGuard -> WEP/KeyGuard Key Maintenance -> Key 1 -> 11111 11111 Configure Authentication and Encryption -> Configure WEP/KeyGuard -> WEP/KeyGuard Key Maintenance -> Key 2 -> 22222 22222 Configure Authentication and Encryption -> Configure WEP/KeyGuard -> WEP/KeyGuard Key Maintenance -> Key 3 -> 33333 33333 Configure Authentication and Encryption -> Configure WEP/KeyGuard -> WEP/KeyGuard Key Maintenance -> Key 4 -> 44444 44444
Set System Configuration	Ensure that Access Control is enabled in order to make the wireless network more secure. ***Example:*** Set System Configuration -> Access Control -> Allowed
Set Access Control List	Ensure that devices allowed on the wireless network have their MAC Address entered correctly in the list. ***Example:*** Set Access Control List -> Address Type -> Individual -> Add-[F2] -> 08:00:0F:01:02:03
(Page 2 of 3)	

Table 24: SpectraLink Installation Checklist (continued)

Netlink SVP Server	
Parameter	**Requirement**
SVP-II Configuration	Ensure that the proper settings for the NetLink wireless phones SpectraLink Voice Priority management are entered correctly. ***Example:*** SVP-II Configuration -> Phones per Access Point -> 4 SVP-II Configuration -> SVP-II Master -> 192.168.0.20 SVP-II Configuration -> First Alias IP Address: -> 192.168.0.21 SVP-II Configuration -> Last Alias IP Address: -> 192.168.0.24 SVP-II Configuration -> SVP-II Mode -> Netlink IP **NOTE**: Please ensure that the defined Alias IP Addresses Range does not overlap with any other device, including NetLink Wireless IP Phones, located on the same subnet.
Network Configuration	Ensure that the correct IP Settings for the SVP Server are configured correctly. ***Example:*** Network Configuration -> IP Address -> 192.168.0.20 Network Configuration -> Subnet Mask -> 255.255.255.000 Network Configuration -> Default Gateway -> 192.168.0.1 **IMPORTANT**: Ensure that the Access Point(s) in use is/are on the same subnet as the SVP Server. Each subnet must have its own SVP server:
(Page 3 of 3)	

Programming with MyAdministrator

The SX-200 MyAdministrator software application is used to perform basic changes to telephone and voice mail programming. It is also used to gather and display IP voice networking statistics related to IP trunk performance, delays during peak periods, and outages in the network.

Note: The SX-200 ICP supports MyAdministrator Release 3 and higher only.

The application software is the MyAdmin folder on the SX-200 ICP software CD. Run Setup.exe to install it.

MyAdministrator can manage the following device types:

- All Mitel IP Phones, and sub-attendant variants of the 5020, 5220, 5220 Dual Boot, and 5224 Dual Boot IP Phones
- Mitel 5310 IP Board Room Conference Unit (shown as 5020 IP Phones)
- ONS Stations
- SUPERSET 401 and 4001 (key programming is not supported)
- SUPERSET 410, 4105, 420, 4025, and 4125, 430, 4150, and their subattendant variants
- Programmable Key Modules
- SpectraLink NetLink e340, h340 and i640 Wireless Telephones

The application identifies but cannot program the following devices:

- PKM Interface Unit (DSS/BLF Interface Unit)
- SUPERSET 3DN and 4DN telephones
- DMP Units.

Requirements

- The SX-200 ICP requires purchasable System Option 80, MyAdministrator Access.
- A PC running Microsoft® Windows® 98, Windows 2000 Professional, Windows ME, a Windows NT 4.0 Workstation (Service Pack 4.0 or greater), or Windows XP.
- A LAN connection for the PC. Direct and modem connections to the SX-200 ICP are not supported.

Programming Call Forwarding - External

Call Forwarding - External forwards calls to an external destination by using a personal speed call key, system abbreviated dial number, or a key system personal speedcall.

Call Forwarding - External requires a receiver for dialing. If one is not available in Call Forward - Don't Answer, forwarding is ignored. If one is not available during a reroute, the caller is dropped or given reorder tone.

1. Program the following COS options in the extension's COS:
   - Enable COS Option 245 (Abbreviated Dialing Access).
   - Enable COS Option 208 (Call Forwarding External).

Note: The device which is calling the destination that is an external call forward must have COS Option 208, Call Forward External, enabled.

Note: Check for split forwarding COS 260 and COS 709.

   - Disable COS Option 200 (Account Code, Forced Entry - External Calls) to allow call forwarding to system abbreviated dial numbers.

2. Enable System Option 21 (Incoming to Outgoing Call Forward) for a trunk or party with a single party trunk on hold to forward externally.
3. Program a feature access code for Feature Access Code 03 (Call Forwarding - All Calls).
4. Form 30 (Device Interconnection Table) specifies which devices can be connected together. For external call forwarding that involves two trunks, verify that they can be connected together.

Toll Control applies to the calling party for Call Forwarding - External to personal speed call keys or to key system personal speedcalls.

Toll Control does not apply when forwarding to system abbreviated dial external numbers.

Toll Control does not apply to CO trunks which are externally call forwarded.

The forwarding destination is the current stored speedcall key number, personal abbreviated dial number, or system abbreviated dial number.

Note: On a Call Forward - Busy or Call Forward - Always call, the COS of the caller (trunk or extension) is checked. Keep this in mind when transferring calls to a phone which is externally Call Forwarded.

Feature Limitations

Table 25: SX-200 ICP Feature Limitations

Feature	Limitation
Maximum number of simultaneous calls	248
Maximum number of Call Park keys	24
Maximum number of Mailbox keys	748
Maximum number of speech paths or channels used by any call	2
Maximum number of simultaneous consultations	5
Maximum number of System Park Orbits	25
Maximum number of Specific Park Orbits	25
Maximum number of Voice mail Ports	16
Maximum number of Voice mail Boxes	748
Maximum number of simultaneous add-on (3-way) calls	DSP configuration dependent (see page 12)
Maximum number of simultaneous station-controlled conference calls	DSP configuration dependent (see page 12)
Maximum number of parties in conference at one time	5
Maximum number of calls that can simultaneously be camped on to a station, trunk group, or hunt group	247
Maximum number of simultaneous callbacks that can be enabled	100
Maximum number of simultaneous call forwards that can be enabled	650
Maximum number of simultaneous "Dial 0" calls	48
Maximum number of ONS telephones ringing simultaneously per bay	32
Maximum number of messages queued in the system	750

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Table 25: SX-200 ICP Feature Limitations (continued)

Feature	Limitation
Maximum number of hunt groups	99
Maximum number of hunt groups in ACD	99
Maximum number of ACD agents that may be defined	999
Maximum number of active agents in ACD per bay	25
Maximum number of calls that can be simultaneously connected to Music-on-Hold	unlimited
Maximum number of stations in a station hunt group	50
Maximum number of stations in a call pickup group	50
Maximum number of dial call pickup groups	50
Maximum number of trunks assignable to night stations	200
Maximum number of trunks in a trunk group	50
Maximum number of trunk groups	50
Maximum number of calls that can override a given extension	1
Maximum number of attendant consoles	11
Maximum number of attendant consoles on a Digital Line Card	4
Maximum number of calls that can be simultaneously held by one attendant	8
Maximum number of incoming calls that can be separately identified at the attendant console	8
Maximum number of LDNs that can be identified at the attendant console	9
Maximum number of LDNs	100
Maximum Number of Night Bells	25
Maximum number of calls waiting that can be displayed at console	99

(Page 2 of 4)

Table 25: SX-200 ICP Feature Limitations (continued)

Feature	Limitation
Maximum number of calls that can be waiting at console	200
Maximum number of abbreviated dial numbers	1000
Maximum number SUPERSET Speed Dial numbers	2212
Maximum number of trunk buffers for SMDR	200
Maximum number of DATA SMDR buffers	128
Maximum number of stations of SUPERSET 4001, SUPERSET 4015, SUPERSET 4025, SUPERSET 4125, SUPERSET 4150, SUPERSET 401+, SUPERSET 410, SUPERSET 420, SUPERSET 430, SUPERSET 3DN and 4DN telephones, DSS /BLF Interface Units, and ONS ports.	650
Maximum number of user devices (all sets, stations, trunks, consoles, stand alone datasets, and DMP units)	768
Maximum number of IP devices and other resources per system - IP trunks - IP phones - IP phone-to-IP phone calls (with voice compression)	 24 248 96
Compression channels	24
Maximum number of music sources	25
Maximum number of Door relays	3
Maximum number of ASU	2
Maximum number of lines: SX-200 Peripheral cabinet	96
Maximum number of TDM bays	7
Maximum number of ISDN bays	4
Maximum number of T1 links, including T1 D4 links, PRI links, and NSU links	8
Maximum Number of T1 links per system	8

(Page 3 of 4)

Table 25: SX-200 ICP Feature Limitations (continued)

Feature	Limitation
Maximum Number of Page Groups	50
Maximum Number of Paging Zones	9
Maximum Number of Stations in a Page Group	64
Maximum Number of Sub-attendants	25
Maximum Number of LDN Appearances	16
Maximum Number of Line Appearances	32

(Page 4 of 4)

CDE Cross Reference

DEVICE OR OPTION / FORM	01- System configuration	02 - Feature Access Codes	03 - COS Define	04 - System Options/System Timers	05 - Tenant Interconnection Table	06 - Tenant Night Switching Control	07 - Console Assignments	08 - Attendant LDN Assignments	09 - Desktop Device Assignments	10 - Pickup Groups	11 - Data Circuit Descriptor	12 - Data Assignment	13 - Trunk Circuit Descriptors	14 - Non-Dial-In Trunks	15 - Dial-In Trunks	16 - Trunk Groups	17 - Hunt Groups	18 - Miscellaneous System Ports	19 - Call Rerouting Table	20 - ARS: COR Group Definition	21 - ARS: Day Zone Definition	22 - ARS: Modified Digit Table	23 - ARS: Route Definition	24 - ARS: Route Lists	25 - ARS: Route Plans
ACD		A7	A4	A1	C	C					C	C		C	C				C						
ASU	A2								A3																
Compression			A2	A1																			A3		
Console	A1		B2	B	C	C	A2	B1						C	C				C	C		C	C	C	C
Dataset	A1	C	B1		C	C	C		C		A2	A3					C			C		C	C	C	C
DID Trunk	A1		B1		C	C		C	C				A2		A3				B	C					
DISA Dial In	A1	C	B1	C	C	C		C					A2		A3	B			B	A4		C	C	C	C
E&M "Tie Trk"	A1	C	B1		C	C		C					A2		A3	A4			B	A5		C	C	C	C
Hotel		C	B	A	C	C		C	B										C			C	C	C	C
IP Trunk	A2		A3	A1									A4		A5	A6						A8	A7	A6	
ISDN Device	A2		A5	A1					B			C	A3			B								B	
Key System	A1	C	B1		C	C		C	A2	C				C	C		C		C	C		C	C	C	C
Modem	A1		A4						A2		C	C					B								
MOH	A1		C		C	C												A2	B						
Multiline set	A1	C	B1		C	C		C	A2	C				C	C		C		C	C		C	C	C	C
Night Bell	A1													C	C			A2	C						
Non Dial In Trk	A1		B1		C	C		C	C				A2	A3		A4			C						
NSU	A2		A3	A4									A5		A6	A7						A13	A12	A11	
Pager	A1	B	C															A2							
Phonebook		B		A1					A3										A2						
Printer																									
RAD	A1		B1		C	C			A2								A3		C						
RAD (EMEM)			A3	A1													A4							C	
Single Line	A1	C	B1		C	C		C	A2	C				C	C		C		C	C		C	C		C
UCD		C	C		C	C			C					C			A1		A2						
Verified Acct.		A2		A3			C		C			C			C					B1			B2		
Voice mail (EMEM)	A2	A4	A3	A1													A5		A6						

Legend:
A Forms must have specific programming completed to perform the task.
B Forms have direct impact on device operation.
C Related to process, or device, but not mandatory.

Digits after the letters (A1, A2...) denote the required order of entry.

26 - ARS: ARS Digits	27 - ARS: Maximum Dialed Digits	28 - Form Access Restriction Def'n.	29 - DTE Profile	30 - Device Interconnection Table	31 - System Abbreviated Dial Entry	32 - CDE Data Print	33 - Account Code Entry	34 - Directed IO	35 - Global Find Access Code	36 - Modem Assignment	37 - Guest Rm SUPERSET KeysTemplate	38 - ACD Keys Template	39 - ACD Agent Groups	40 - ACD Supervisors	41 - ACD Paths	42 - T1 Link Descriptors	43 - T1 Link Assignment	44 - Network Synchronization	46 - Key System Toll Control	47 - IP Networking	48 - Voice Networking	49 - Voice Mail Options	50 - Mailboxes	51 - Voice Mail Distribution	52 - Email	53 - Bay Location Assignment	54 - Calling Party Number	55 - Digit Translation Table	FORM / DEVICE OR OPTION
								C				A5	A2	A3	A6														ACD
																										A1			ASU
																													Compression
C		C		C	C		C																						Console
C			A4				C	B		B																			Dataset
				B	C																					A	A	DID Trunk
C				B	C		B2																					DISA Dial In
C				A6	C		C																			A	A	E&M "Tie Trk"
C								C			B																	Hotel
																					A9					A	A	IP Trunk
																										A	A	ISDN Device
C					C		C												C									Key System
			C							A3																		Modem
																												MOH
C					C		C																					Multiline set
																												Night Bell
				B																						A	A	Non Dial In Trk
																A8	A9	A10								A1			NSU
																													Pager
																						B	A4						Phonebook
								B1																					Printer
																													RAD
																						A2							RAD (EMEM)
C					C		C												C										Single Line
																													UCD
							A1												C										Verified Acct.
																						A7	A8	C	C				Voice mail (EMEM)

Chapter 4

Advanced Installation and Programming

Overview

This chapter is for technicians who are installing the controller in an existing computer network or as a standalone IP networking for both voice and data.

IMPORTANT: Do not attempt the procedures in this chapter until you have successfully completed the Mitel Advanced SX-200 ICP I & M Course. For more information, see “SX-200 ICP Advanced Installation and Maintenance Course” on page 3.

Topics covered:

- ❒ Basic PC Networking
- ❒ Planning your LAN
- ❒ Implementing Virtual LANs (VLANs)
- ❒ Networking Mitel IP-PBXs
- ❒ Programming Unified Messaging

Planning your Installation

Adding PCs and data devices to a voice-only LAN or installing the SX-200 ICP into an existing data LAN requires careful planning.

Completing the following pre-installation questionnaire will help you select and implement a network configuration that best suits the needs of your customer.

Tip: Refer to the Engineering Guidelines document on the SX-200 ICP software CD-ROM on Mitel Online for more information on network planning and configuration.

Question	Answer
Will you connect to a private network or virtual private network (VPN)? What are the IP addresses, gateway address, and subnet mask required for the SX-200 ICP sub network? or Will you use an external DHCP server?	
Internal configuration questions	
How many IP phones are you connecting to the system?	
How many PCs are you connecting to the system?	
Are you connecting printers or file servers? How many?	
Will these PCs and other devices use the DHCP server in the SX-200 ICP controller?	
Are you providing internet access through the WAN port a Layer 2 switch port?	
External configuration questions	
What type of internet connection will you use? Dial-up, xDSL, cable, or other?	
Will you connect the system to an existing LAN?	
What type of authentication is required? Username Password PPP Security type	
Will you network with other SX-200 ICP or 3300 ICP systems?	

Basic PC Networking

The dual-port IP Phones (5010, 5020, 5212, 5215, 5220 and 5224) provide an inexpensive way to network a small number of PCs.

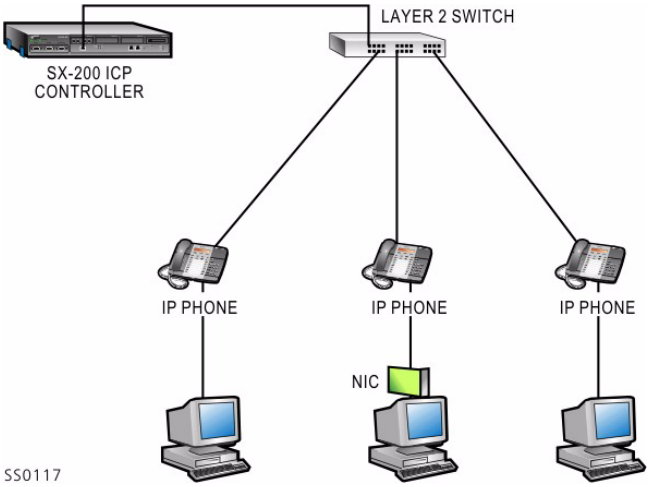

Figure 16: Basic PC Network

Enabling the (2nd) Port on IP Phones

IMPORTANT: To ensure optimum network performance, DO NOT connect servers to the 2nd port on IP phones.

1. Form 04, System Options/System Timers
   - Enable System Option 131, PC (2nd) Port on IP Phone.

Note: The option must be purchased (listed on the MOSS sheet).

2. Form 03, COS Define
   - Enable Option 280, PC (2nd) Port on IP Phone.

Virtual LANs (VLANs)

This section shows examples of the three most common, converged voice and data networks for an SX-200 ICP.

- Configuration 1: One DHCP Server per VLAN
- Configuration 2: One External DHCP Server for Two VLANs
- Configuration 3: Router on a Stick (one router interfacing multiple VLANs)

Configuration 1: One DHCP server per VLAN

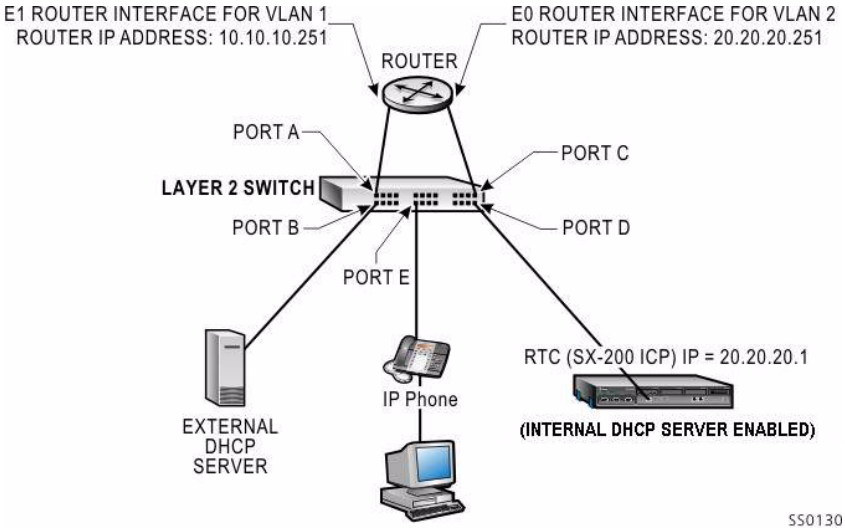

Figure 17: VLAN Configuration 1

DHCP Server Settings (Example)

The following settings must be programmed in the DHCP server:

- DHCP IP Address Range
- Subnet Mask
- Option 03 (Router)
- Option 128 (TFTP Server IP address)
- Option 129 (RTC IP)
- Option 130 (IP Phone DHCP Server)
- Option 132 (VLAN ID)
- Option 133 (Priority)

Table 26 shows the DHCP settings programmed for this configuration.

See “Configuring a Windows 2000 DHCP server” on page 178 for information on programming SX-200 ICP DHCP settings on a Windows 2000 DHCP server.

Table 26: DHCP Server Settings for Configuration 1 Example

Setting	DHCP Server on VLAN 1 (IP: 10.10.10.2) Scope 1	Internal DHCP Server on Controller Scope 1
DHCP	10.10.10.10 to 10.10.10.100	20.20.20.10 to 20.20.20.100
Subnet	255.255.255.0	255.255.255.0
Opt. 03	10.10.10.251	20.20.20.251
Opt.128	20.20.20.1	20.20.20.1
Opt. 129	20.20.20.1	20.20.20.1
Opt. 130	MITEL IP PHONE	MITEL IP PHONE
Opt. 132	2	2
Opt. 133	6	6

For information on programming the controller IP address and DHCP settings, see page 178.

Layer 2 Switch Settings (Example)

The following two tables show settings on a Cisco and an HP Layer 2 switch for the Configuration 1 example.

Note: These settings also apply for the other network configuration examples.

Table 27: Cisco Layer 2 Switch Settings for All Configuration Examples

Port	Use	Command
A	Access port for VLAN 1	None (by default, all ports belong to VLAN 1)
B		
C	Access port for VLAN 2	L2switch(config-if)#switchport mode access L2switch(config-if)#switchport access vlan 2
D		
E	Trunk port with Dot1q for IP Phone	L2switch(config)#interface fast 0/5 L2switch(config-if)#switchport mode trunk L2switch(config-if)#switchport trunk encapsulation dot1q

Table 28: HP Layer 2 Switch Settings for All Configuration Examples

Port	Use	Command (on HP VLAN menu)
A	Access port for VLAN 1	VLAN 1 = untagged VLAN 2 = NO
B		
C	Access port for VLAN 2	VLAN 1 = NO VLAN 2 = untagged
D		
E	Trunk port	VLAN 1 = untagged VLAN 2 = tagged

Configuration 2: One external DHCP server for two VLANs

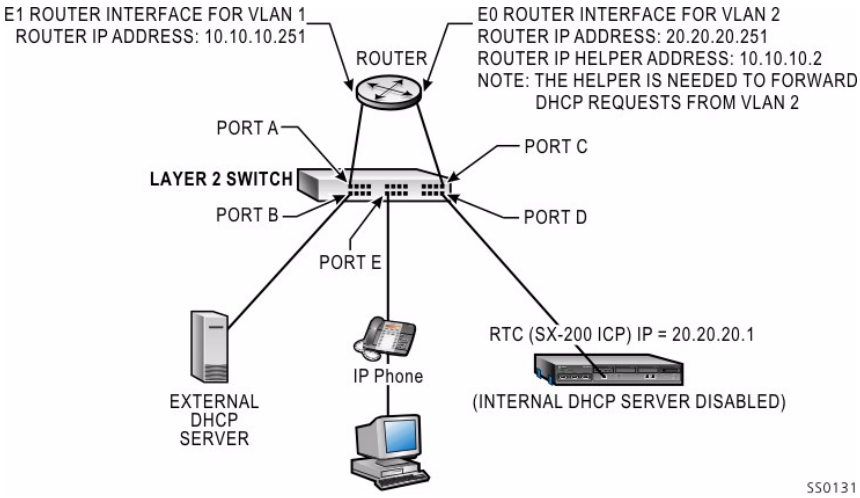

Figure 18: VLAN Configuration 2

To configure the SX-200 ICP system to use an external DHCP server (for example, Windows NT server or Windows 2000 server) through the Layer 2 switch port, you must use Form 47 to disable the controller's built-in DHCP server. The local phones and PCs on the SX-200 ICP LAN will then be able to receive IP addresses from the external server.

DHCP Server Settings (Example)

The following settings must be programmed in the DHCP server:

- DHCP IP Address Range
- Subnet Mask
- Option 03 (Router)
- Option 128 (TFTP Server IP Address)
- Option 129 (RTC IP)
- Option 130 (IP Phone DHCP Server)
- Option 132 (VLAN ID)
- Option 133 (Priority)

Table 29 shows the DHCP settings programmed for this configuration. See "Configuring a Windows 2000 DHCP server" on page 178 for information on programming SX-200 ICP DHCP settings on a Windows 2000 DHCP server.

Table 29: DHCP Server Settings for Configuration 2 & 3 Examples

	DHCP Server on VLAN 1 (IP: 10.10.10.2)	
Setting	**Scope 1**	**Scope 2**
DHCP	10.10.10.10 to 10.10.10.100	20.20.20.10 to 20.20.20.100
Subnet	255.255.255.0	255.255.255.0
Opt.03	10.10.10.251	20.20.20.251
Opt. 128	20.20.20.1	20.20.20.1
Opt. 129	20.20.20.1	20.20.20.1
Opt. 130	MITEL IP PHONE	MITEL IP PHONE
Opt. 132	2	2
Opt. 133	6	6

For information on programming the controller IP address and DHCP settings, see page 178.

Layer 2 Switch Settings (Example)

See "Layer 2 Switch Settings (Example)" on page 174.

Configuration 3: Router on a Stick

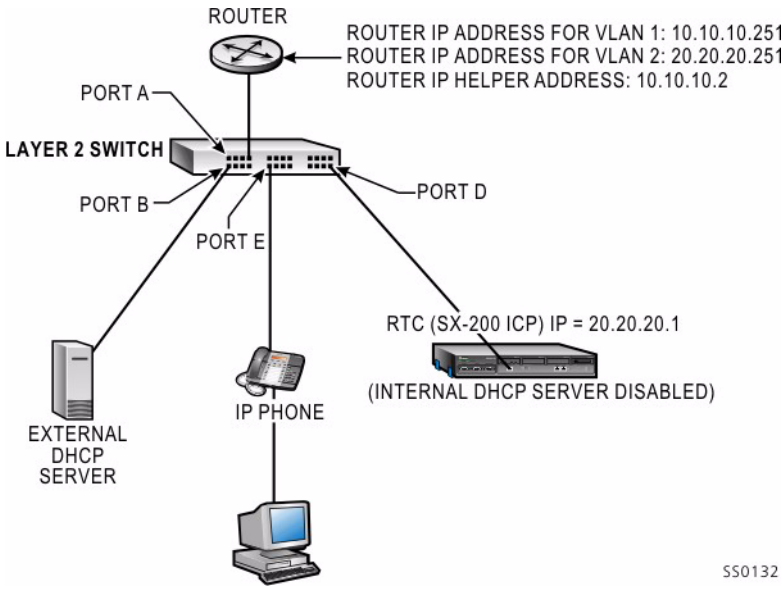

Figure 19: VLAN Configuration 3

DHCP Server Settings (Example)

See Table 29, “DHCP Server Settings for Configuration 2 & 3 Examples,” on page 176.

See “Configuring a Windows 2000 DHCP server” on page 178 for information on programming SX-200 ICP DHCP settings on a Windows 2000 DHCP server.

Layer 2 Switch Settings (Example)

See “Layer 2 Switch Settings (Example)” on page 174.

Programming the controller IP address and DHCP settings

The IP address of the SX-200 ICP and its DHCP settings are set at the factory. Use the following procedure if you need to change them.

To change the controller's IP address and DHCP settings:

1. Establish a serial connection to the Maintenance port on the SX-200 ICP Controller (see page 82 for instructions).
2. Log in to the CDE application.
3. In Form 47 (IP Networking), Subform 01 (SYSTEM IP)
   - Enter values for IP ADDRESS, IP NETMASK, IP GATEWAY, and other settings as required.
4. Press ENTER.
5. In Subform 02 (DHCP SERVER)
   - Enter the required values. See the SX-200 ICP Technical Documentation for information on values to use.
   - To disable the controller's DHCP server, press the DISABLE softkey; press ENABLE to re-enable it.
6. Press ENTER.
7. Reset the system (see page 197 for instructions).

Configuring a Windows 2000 DHCP server

You can modify a Windows 2000 DHCP server to support IP Phones. A DHCP server must be configured to support the IP Phones for each subnet. The following items must be configured:

- TFTP Server IP address (system IP address of the SX-200 ICP)
- IP address of the RTC card
- Mitel tag "MITEL IP PHONE"

To modify a Windows 2000 DHCP Server:

1. On the **Start** menu, point to **Programs**, then **Administrative Tools**, and click **DHCP**.
2. Highlight the Server name and point to **Action**, then click **Set Predefined Options**.

3. In the Predefined Options and Values window, click **Add**.
4. In the **Option Type** window, set the following:
   - **Name**: IP phone TFTP Server IP Address
   - **Type**: IP Address
   - **Code**: 128
     Click **OK**.
   - **Value**: enter the system IP address of the SX-200 ICP, then click **OK**.
5. In the Predefined Options and Values window, click **Add** again.
6. In the **Option Type** window, set the following:
   - **Name**: RTC IP Address
   - **Type**: IP Address
   - **Code**: 129
     Click **OK**.
   - **Value**: System IP Address of SX-200 ICP
     Click **OK.**
7. In the Predefined Options and Values window click **Add** again.
8. In the **Option Type** window, set the following:
   - **Name**: IP Phone DHCP Server
   - **Type**: String
   - **Code**: 130
     Click **OK**.
   - **Value**: MITEL IP PHONE.
     Click **OK**.

If you are using VLANs, do ALL of the following steps. If you are not using VLANs, do steps 13 to 18 and step 21

9. In the Predefined Options and Values window click **Add** again.
   - **Name:** VLAN ID
   - **Type:** Hex LONG (32 bit word)
   - **Code:** 132
     Click **OK**.
   - **Value:** enter a numeric value for the VLAN.

Note: The server will automatically convert the numeric value to Hex.

10. (Optional) In the Option Type window, set the following:

- **Name:** Priority
- **Type:** Hex LONG
- **Code:** 133.
  Click **OK**.
- **Value**: enter a value from 1 to 7; Mitel recommends 0x6.
  Click **OK**.

Note: The server will automatically convert the numeric value to Hex.

11. Highlight the **Scope** which contains the IP range for the IP Phones and select **Scope Options**.

12. In **Action**, click **Configure Options**.

13. In the General window, select option **003 Router** and enter the IP address of the default Gateway and then click **Add**.

14. Click **OK**.

Networking Mitel IP-PBXs

IP trunks allow you to interconnect multiple Mitel SX-200 ICP, SX-200 IP Nodes and 3300 ICP systems in a Wide Area Network (WAN). The IP trunks carry voice and signal messages through the Ethernet switch to the WAN.

The SX-200 ICP MX supports up to 30 IP trunks on a single “virtual” IP Trunk card programmed in Bay 1, Slot 6.

Notes:

1. The SX-200 ICP supports end-node functionality only, which means it can be connected to no more than one other node in the network.
2. This configuration requires dedicated, managed links to the Internet and is intended for larger implementations. For smaller implementations, cable or DSL links can be used if the IP trunks are carried within IPSec VPN tunnels with traffic shaping features. The Mitel 6042 Managed VPN is recommended.

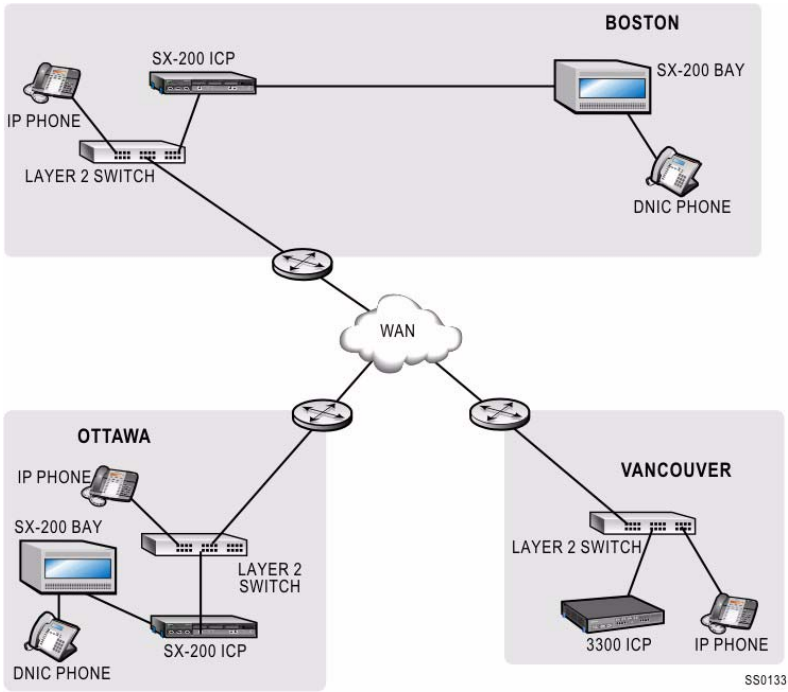

Figure 20: IP Trunking Example

SX-200 ICP Programming

1. Form 48, Voice Networking

- Enter the IP Node Number and IP Address of each IP-PBX and specify the maximum number of calls allowed to each.

Notes:

1. MAX CALLS must be greater than zero (the default); otherwise, no calls are allowed to the node.
2. Each IP-PBX in the network must be assigned a unique IP Node Number, which can be any number in the range 1 - 255.

The example below shows the Form 48 programming for a network of three IP-PBXs. Each IP-PBX (node) has a unique IP Node number that all the other IP-PBXs must have in their programming. The local site is always Bay 1; the other sites have no Bay association.

IP NODE NUM	IP BAY	IP ADDRESS	MAX CALLS	COMMENTS
1	1		20	Local Site
2		010.037.184.015	20	Branch Site 1 (3300)
3		010.037.024.210	20	Branch Site 2 (200ICP)

1-	2-	3-INSERT	4-	5-
6-QUIT	7-	8-	9-	0-

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2. Form 03, COS Define

- Enable the following COS options
  - 801, Incoming Trunk Call Rotary
  - 802, Limited Wait For Dial Tone
  - 811, ANI/DNI/CLASS Trunk
- It is also recommended that you enable COS option 702 to prevent calls from being denied access to trunks when the SMDR output is stopped. If you want to capture incoming SMDR, enable COS options 806 and 814.

Note: COS number 7 has the default IP Trunk settings.

3. In Form 04, System Options/System Timers, enable option 86, PRI Card - QSIG, to allow Calling Name and Number to be transmitted over IP trunks.
4. In Form 13, Trunk Circuit Descriptors
   - Set a descriptor to T1 E&M in the Options subform. Descriptor 7 in the default database has the correct settings for IP trunks. If selecting another descriptor, set options to the default values, except:

     set Incoming Start Type to **WINK**

     set Outgoing Start Type to **WINK**

     set QSIG Supplementary Services to **YES**

     set DTMF to **NO**.
5. Form 15, Dial-in Trunks
   - In the CDN field, enter the descriptor number that defines the T1 E&M trunk specified in Form 13.
6. Form 16, Trunk Groups
   - All IP Trunks must be programmed in the same group. To avoid collisions with incoming IP trunk calls, enter the trunks into the group in the opposite order that the far end has them entered.
7. Form 23, Route Definition
   - Program route definitions
   - In the Show IP subform, specify the routes of IP Trunk Groups.
8. If the connection to the PSTN is through embedded PRI (Dual T1/E1 Framer or T1/E1 Combo module), program Calling Party Number (CPN) substitution in the following Forms
   - Form 54, Calling Party Number
   - Form 19, Call Rerouting Table
   - Form 22, ARS: Modified Digit Table

Note: In Form 22, for all SX-200 ICP controllers in the network, program a modified digit entry with CPN enabled for external calls (calls destined to the PSTN through the embedded PRI). Program another entry with CPN disabled for internal network calls.

9. If you have not already done so, program the following Forms:
   - Form 26, ARS: Digit Strings.
   - Form 22, ARS: Modified Digit Table.

Uniform Numbering Plan

Optionally, you can configure the nodes in your network with a uniform numbering plan. For example, you can program nodes A, B, and C to share extensions 1000 to 1999.

1. Form 13, Trunk Circuit Descriptors
   - Set Present Node ID over IP Trunking to YES in the Options subform.
2. Form 02, Feature Access Codes
   - Program the Node ID (Feature 34).
3. On each node, program ARS leading digits containing node numbers for all other nodes in the network. This eliminates the need for users to insert digits when they return external calls from other nodes.

Programming Unified Messaging

The Unified Messaging feature package enables the SX-200 ICP to manage e-mail messages using SMTP (Simple Mail Transfer Protocol) and/or IMAP (Internet Message Access Protocol). Mitel's implementation of IMAP is known as Standard Unified Messaging.

Requirements

- MOSS Option 126, Email Messaging.
- Embedded voice mail for forwarding of voice mail to e-mail.
- Advanced certification for data networking.
- For SMTP, each user needs an account on an SMTP e-mail server. The server can be yours or one belonging to your Internet Service Provider (assumes that the SX-200 ICP is connected to the Internet).
- For IMAP, each user needs an account on the Unified Messaging blade installed in the 6000 MAS. Also, the 6000 MAS must be programmed to interact with the SX-200 ICP.

Note: E-mail notification only works with SMTP e-mail servers capable of forwarding emails.

Programming SMTP

Programming the SMTP client

1. Form 04, System Options/System Timers
   - Enable System Option 126, Email Messaging.
   - Program System Option 81, Enter offset from GMT (+/-hh:mm). Enter the difference in hours and minutes between the time zone that the SX-200 ICP is in and Greenwich Mean Time (GMT).
   - (Optional) Enable System Option 137, Mark SMTP Forwarded Voicemails as Read. If enabled, messages change from "new" to "read" state when forwarded. Otherwise, they remain in their original state (i.e, a "new" message will remain "new" after forwarding). Only "new" messages flash user's MWI lamp.

2. Form 47, Subform 01, System IP,
   - Enter a valid domain host name that is registered in your DNS or listed in the Hosts file of the SMTP e-mail server. The host name must be 49 characters or fewer and in the format aaa.zyz.com—for example, SX200icp.xyz.com.
3. Form 49, Voice Mail Options,
   - Enter the IP address of the SMTP server.
   - If authentication is required, enter the SMTP server username and password.

Programming to send voice mail and Record a Call messages to e-mail

1. Complete the SMTP programming described above.
2. Form 50, Mailboxes

   In the Email subform, select a mailbox, then select a forwarding option:
   - MANUAL FWD: Allows the user to forward voice messages to e-mail using a telephone. The messages are saved in the user's mailbox.
   - MAN FWD DEL: Allows the user to forward voice messages to e-mail using a telephone. After the messages are sent, they are deleted from the user's mailbox.
   - ALWAYS FWD: Causes the system to forward all of the user's voice messages to e-mail. The messages are saved in the user's mailbox.
   - ALL FWD DEL: Causes the system to forward all of the user's voice messages to e-mail. After the messages are sent, they are deleted from the user's mailbox.

   Enter the e-mail address for voice messages.

   (Optional) Press SHOW MORE and enter the e-mail address for Record a Call messages. If no address is entered, Record a Call messages are sent to the e-mail address for voice messages.

Note: The user can update the forwarding option by entering a telephone command. The E-Mail subform of Form 50 displays the current forwarding option.

Example voice mail forward to e-mail message (SMTP)

```
---------------------------------------------------------------
From: 4105@sx200.mitel.com
Sent: Friday, May 09, 2004 10:03 AM
Subject: Voice mail Message
---------------------------------------------------------------
This email contains a voice message.
Double click on the attached file to listen.
"Part(s):  2.001.4107.wav audio/basic 154.89 KB"
```

Note: The Subject and body are in the language of the message recipient's voice mailbox—extension 4107 in the example—as programmed in Form 50.

Programming to send logs, alarms, and E911 notifications to e-mail

1. Complete the SMTP programming described above.
2. Form 52, Email
   - Enter the e-mail address(es) for system logs, alarms, and E911 call notifications.
   - In the COMMENTS field, enter information to help in the identification of the 911 caller's location—see example below.

Example E911 notification

```
---------------------------------------------------------------------------
From: E911@SX200.xyz.com
Sent: Friday, May 09, 2004 10:03 AM
❶ Subject: E911 Caller: R.Smith, 3702 4th Fl Stat A3
---------------------------------------------------------------------------
❷ Location: 350 Legget Dr, Kanata, ON
  6 story building, across from big parking lot
```

❶ The information after the extension number in the Subject Line of the message is from the Comments field in Form 09 and only appears in the e-mail if the comment begins with “@”. The language of the message is the DEFAULT LANGUAGE programmed in Form 49, Voice Mail Options.

❷ The Location portion comes from the Comments entered in Form 52.

The call is also recorded in the Maintenance logs and appears as follows (for example):

```
2003-OCT-12 10:40:42 IP LINE CARD 01 01 05 01 Ext 106
Called 911 Alarm Code = 17
```

3. Test the setup by sending an alarm, an E911 notification, and a log to e-mail. The messages for these events should be sent to the correct e-mail address. (Disconnect the system from the PSTN while testing E911.)

Programming IMAP (Standard Unified Messaging)

Programming the IMAP client

1. Form 04, System Options/System Timers
   - Enable System Option 126, Email Messaging.
   - (Optional) Enable System Option 137, Mark SMTP Forwarded Voicemails as Read. If enabled, messages change from "new" to "read" state when forwarded. Otherwise, they remain in their original state (i.e, a "new" message will remain "new" after forwarding). Only "new" messages flash user's MWI lamp.
2. Form 49, Voice Mail Options
   - Enter the IP address of the IMAP server.

Programming voice mail to e-mail forwarding

1. Complete the IMAP programming above.
2. Form 50, Mailboxes
   - In the Email subform, select a mailbox in the FWD column, then press the UNIFIED softkey.

Note: Configure user account information, including e-mail addresses and extension numbers, in the 6000MAS.

Example voice mail forward to e-mail message (IMAP)

From: 106 <voicemail@do-not-reply>
Sent: Tuesday, April 13, 2004 10:03 AM
To: 107
Subject: Voicemail message from 106 <ID: 1081872898>

This e-mail contains a voice message.
Double click on the attached file to listen.

Programming the 6000 MAS to support IMAP

In the 6000 MAS Server Manager web interface:

- On the Standard Unified Messaging panel,
  - enable the application
  - enter the IP address of the SX-200 ICP
  - enter the system ID (from Form 04, Option 101) of the SX-200 ICP
- On the Users panel, select Add user account and complete the form. Make sure the extension number matches the mailbox number programmed in the SX-200 ICP, and the password matches the value programmed in the user's e-mail client. Repeat for each new user.

Note: When adding a user account to the 6000 MAS, enter the extension number in the last portion of the Phone number field. See the 6000 MAS documentation for details.

Chapter 5
Routine Maintenance

Is the System Healthy?

System health checklist

- ❒ LEDs on controller and expansion units are the correct color
- ❒ Internal and external calls can be made from IP phones and DNIC and ONS sets
- ❒ Voice mailboxes are accessible
- ❒ Users have user guides for their phones
- ❒ Database is backed up

Checking the System

1. Check the controller and expansion units. Ensure that all LEDs indications are correct. See "Checking the System LEDs" on page 241.
2. Make internal and external calls from the IP phones and analog sets.
3. Call into the system on all line types and ensure that incoming calls ring (if programmed) the correct destination.
4. Review voice mail programming. Make calls to phones and check that they forward to voice mail.
5. Ensure the external call forwarding permissions are set correctly.
6. Ensure that remote system access is set up if you plan to perform remote programming. See "Secure Telnet Connection to the controller" on page 83.
7. Ensure that you have made recent backups. See "Performing Backups" on page 203.

Installing FRUs

Only persons who have successfully completed a Mitel Installation and Maintenance training course for the SX-200 ICP should perform removal and replacement procedures.

WARNING: INSTRUCTIONS MUST BE FOLLOWED EXPLICITLY WHEN THEY INVOLVE WORK WITH AND CHANGES TO THE PRIMARY POWER SUPPLY OF THE UNIT.

Precautions

Observe the following precautions when working on the system, particularly when handling PCB cards or using test equipment to measure voltages.

- When installing or replacing PCB cards turn power off, but maintain the ground connections to the equipment. Power must be OFF when inserting or removing cards. These cards are identified with appropriate warnings on their faceplates.
- Always wear an antistatic wrist strap when handling printed circuit cards. Handle PCB cards only by the edges and avoid contact with any exposed electrical connections. When removing a new card from its package, touch the package to the cabinet frame first to release any static voltage buildup, prior to removing the card and inserting it into the equipment.
- Conductive packages (antistatic packaging) should be grounded prior to opening them to remove the contents, and similarly grounded prior to placing a card in the package. Place suspected faulty cards in conductive packages to prevent further possible damage to the cards. Cards that are not correctly packed in antistatic packaging when returned will not be covered by any warranty.

Use proper fitting Phillips screwdrivers (#1 or #2) to prevent damaging components and fasteners.

Power Down System

The following chart describes system power down procedures.

Table 30: System Power Down

Step	Action	Comments
1.	Power Down the controller • Disconnect the power cord from the controller.	
2.	Power Down the NSU or ASU • Disconnect the power cord from the NSU or ASU.	
3.	Power Down Peripheral Cabinets • Unlock and open door. • Turn off Bay Power Supply switch and remove cabinet line cord from the wall outlet.	The system is now properly powered down.

Power Up System

The following chart describes system power up procedures.

Table 31: System Power Up

Step	Action	Comments
1.	Plug the controller power cord into the wall outlet.	
2.	Plug the NSU and ASU (if installed) line cord into the wall outlet.	
3.	Plug the Peripheral Cabinet (if installed) line cord into the wall outlet. Turn on Bay Power Supply switch.	
	Replace any covers or barriers that were removed previously. Close and lock the door.	The system is now properly powered up, and its door is closed and locked to prevent unauthorized access to equipment.

System Reset

The controller can be reset by:

- pressing the Reset button on the front panel
- using the RESTART_SYSTEM command from the Maintenance terminal
- powering the controller down then back up

When the system is reset, it stops all call processing activity, runs initialization tests. It also reloads software from the external CompactFlash card if it detects that the card was removed, and then reinserted.

CAUTION: Resetting the system drops all calls in progress. If a reset is required, do it during periods of low or no call traffic.

System Shutdown

A System Shutdown is required before moving the controller or replacing hardware in it. Shutdown terminates all calls (except calls between IP phones or calls carried on IP trunks) and disables the serial and IP interfaces.

CAUTION: The following procedure takes the system out of service.

To shut down the system:

1. Log into the Maintenance Terminal (serial connection only) and begin a Maintenance session.
2. Press the following softkeys:

   RE_START
   SHUTDOWN
   ENTER

After entering the command, wait for this message to display: "System shutdown complete." Then, unplug the power cord.

To return the system to service:

- Unplug it and plug it in again, or press the Reset button.

Re-initializing the Controller

Re-initializing the controller re-installs the system software and database. Perform a re-initialization to recover from a failed attempt to upgrade the system software or to return an unstable system to a known state.

You can re-initialize the controller two ways:

1. Re-install the software and a new, or previously backed-up database, from the external CompactFlash card. For instructions, see "Installing Software Using an External CompactFlash Card (Optional Initial Install)" on page 35
2. Use an FTP server to download the software and database to the controller. For instructions, see "Upgrading by FTP" on page 209.

IMPORTANT: Re-initializing a working system with a database that has different IP addressing information than the database it is replacing will force the IP Phones to reboot. The phones take 10 to 15 minutes to return to service once the system is re-initialized.

Replacing the Hard Drive or CompactFlash

Use this procedure to replace faulty internal media. To upgrade the media in a working system, follow the procedure on page 46, “Installing a hard drive.”

Note: Use Mitel-provided CompactFlash cards and hard drives only; those obtained elsewhere are not supported.

To replace the hard drive or internal CompactFlash

1. Remove the external CompactFlash card, if inserted.
2. Unplug the power cord from the controller.
3. Remove the cover.
4. If replacing the CompactFlash card, remove it, install the new one, and then skip to step 6.
5. If replacing the hard drive,
   a. Unplug the ribbon cable and the power cable from the old hard drive.
   b. Remove the old hard drive by unfastening the four small border screws. Keep the screws.

   c. Replace the drive with the new one.

Note: Ensure that the jumpers on the new drive are set to the Master setting.

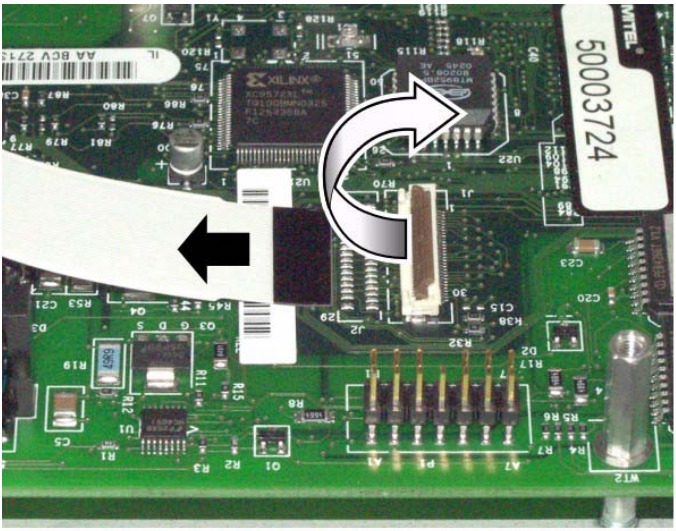
   d. Connect the ribbon cable and power cable to the new hard drive.

6. Replace the cover.
7. Restore power to the controller.
8. Perform an Initial (CompactFlash Card) installation from the software CD; see page 35 for instructions.

Note: When prompted for a database, select Custom to install a backup of the original database (if available).

Replacing the Analog Main Board

1. Unplug the power cord from the controller.
2. Remove the top cover.
3. Remove the front panel.
4. Disconnect the three power supply connectors.
5. Remove the ribbon cable by flipping up the clip on the connectors at each end of the cable as shown in the following figure.



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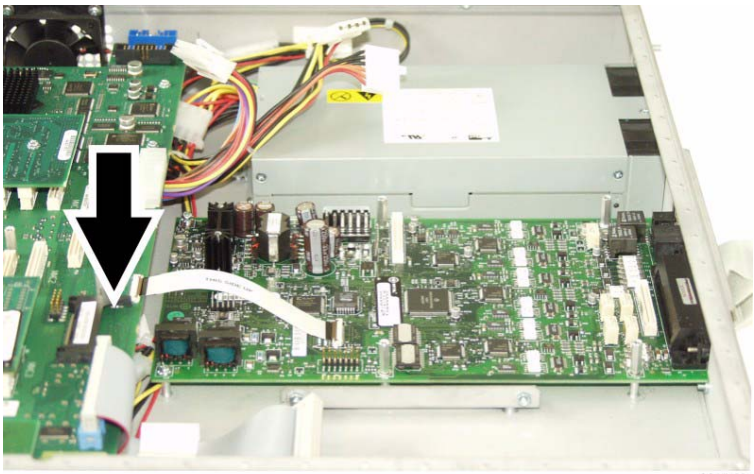
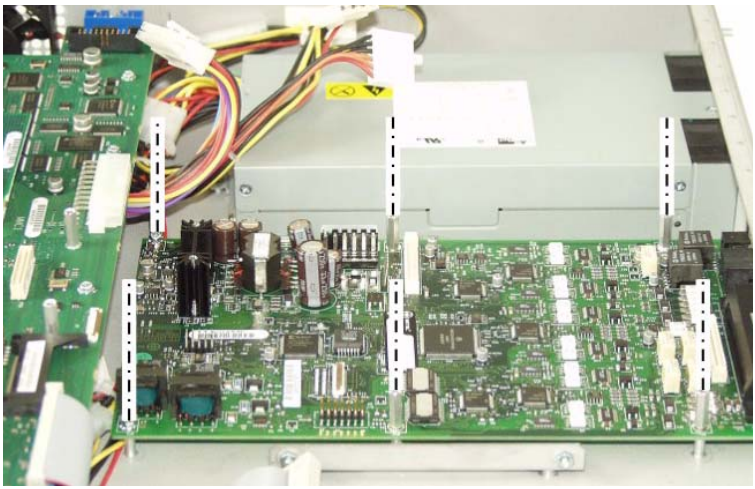
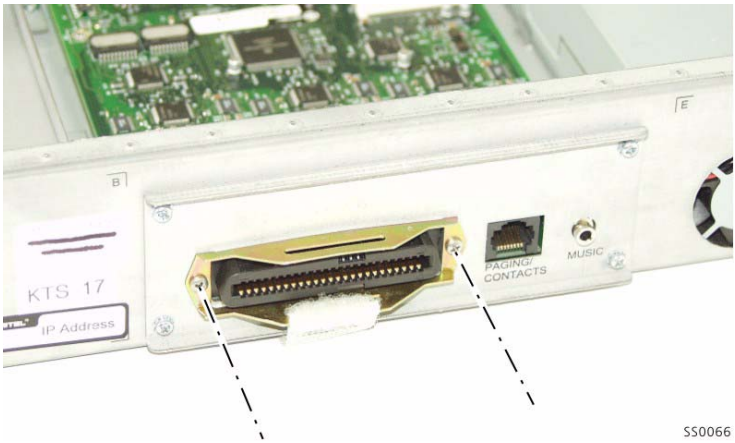
6. Remove the internal flash card as shown in the following figure.



7. Remove the four standoffs and two screws as shown in the following figure.



8. Remove the two screws at the back of the unit as shown in the following figure.



9. Remove the Analog Main Board.
10. Insert the new Analog Main Board.
11. Re-attach the two screws at the back of the unit.
12. Re-attach the two screws and the four standoffs.
13. Replace the flash card.
14. Replace the ribbon cable and snap the clips at both ends in place.
15. Replace the power supply connectors.
16. Snap the front panel back in place.
17. Replace the top cover.

Other FRUs

To replace the following, follow the installation procedure provided on the page indicated.

- Analog Option Board, see page 39
- DSP Module, see page 41
- Dual FIM Module, see page 43
- Quad CIM Module, see page 44
- Dual T1/E1 Framer Module, see page 45
- Stratum Clock Module, see page 48

Performing Backups

Backing Up a Database

The controller has three databases, one for CDE data, one for voice mail data (includes configuration, greetings, and user messages) and one for IP networking settings. All databases are maintained in flash memory (or on the hard drive, if installed) inside the controller. An FTP server is required to back up the databases. For information on setting up an FTP server, see page 75.

Note: Database backups do NOT include log files and trap files. Mitel Technical Support may request these files should you call for assistance; see ""Sending Logs and other System Files to an E-mail Address or FTP Server" on page 233" for more information.

It is recommended that you back up the database:

- after the system is first installed and the database is set up
- after changes have been made to the database
- before any software upgrades.

Before starting the backup, ensure that the FTP destination directory is writable (i.e., not read-only). Also, check that the FTP server IP address, username, and password in Form 47 are correct.

To back up the database:

1. Log in to the Maintenance Terminal (direct, secure Telnet, or SX-200 ICP Web Interface) and begin a Maintenance session.
2. Press

   SYSTEM
   DATABASE
   BACKUP
   FTP_SERVER
   FULL or MEDIUM
   CONFIRM (enter a a file name)
   CONFIRM

   FULL backs up everything; MEDIUM excludes voice mail messages. Full backups are recommended.

   Note: Voice mail is unavailable while the backup is progress.

   The system creates a backup to the specified FTP home directory.

Restoring a Database

IMPORTANT: If the IP addressing information in the old and new (restored) databases do not match, the IP Phones will reboot. Rebooting begins 10 to 15 minutes after the system resets (a reset is required following a database restore) and takes approximately two to three minutes to complete.

Before restoring, check that the FTP server IP address, username, and password in Form 47 are correct.

1. Log in to the Maintenance Terminal (direct, secure Telnet, or SX-200 ICP Web Interface) and begin a Maintenance session.
2. Press

   SYSTEM
   DATABASE
   RESTORE
   FTP_SERVER
   ENTER
   CONFIRM

   The system prompts you for the file name.
3. Enter the file name.
4. Press CONFIRM.

After the database file is restored, the system automatically resets and reboots.

Installing an Alternate Database

The software CD has two databases on it that you can use instead of the factory-installed default database. One is blank except for the IP settings in Form 47 which are the same as those in the default database; the other is for use with Premier Business systems. Another that has four-digit extension numbers is available on Mitel Online. You can also install databases that were programmed on other systems and backed up to a file.

To install an alternate database either:

- Re-install the system software and the required database to a CompactFlash card, and then use the card to re-initialize the controller. For more information, see “Installing Software Using an External CompactFlash Card (Optional Initial Install)” on page 35.

  Or

- Download the database to the controller via an FTP server.

Notes:

1. To avoid MOSS option conflicts, install the Premier database BEFORE enabling the MOSS options.
2. Advanced certification is required to install a Premier Business system.

Installing an alternate database via FTP

Before beginning the installation, Check that the FTP server IP address, username, and password in Form 47 are correct.

1. Establish a connection between the FTP server and the controller either through the Layer 2 switch or by connecting directly to the LAN port on the controller.
2. Copy the required .db file to the FTP server’s home directory.
3. Follow the instructions on page 204 to restore the database to the controller.

Upgrading the System Software

You can upgrade system software either from the external CompactFlash card or by FTP, unless upgrading from a Release 1.x system. The internal media in 1.x systems require repartitioning, which can only be done with a CompactFlash card that has an "Initial Installation" software load. Upgrading does not alter the currently installed database.

Release 1.x systems upgraded to Release 2.0 or later no longer require that the external CompactFlash remain in the controller at all times.

Note: De-program phantom bays programmed on the Release 1.x system before migrating to Release 2.0 or later.

Upgrading from Release 1.x to Release 2.0 or later

The recommended procedure for upgrading Release 1.x systems is as follows:

1. Back up the database to an FTP server. See page 203 for instructions.
2. Unplug the power cord from the controller.
3. Remove the external CompactFlash.
4. Run the Initial [CompactFlash card] Installation from the SX-200 ICP software CD-ROM. See page 35 for more detailed instructions.
5. Insert the CompactFlash card into the slot on the front of the controller.

   IMPORTANT: Use a Mitel-supplied 256 MB CompactFlash card. DO NOT partition the card and DO NOT copy files to it before proceeding with the software installation.
6. Power up the controller.
7. Wait for the CompactFlash status LED to turn GREEN, and for the phones to come up, indicating that the upgrade is complete.
8. Remove the CompactFlash card.
9. Update the IP settings to enable the database to be restored by FTP.
10. Restore the database. See page 204 for instructions.

    After the database file is restored, the system automatically resets and reboots.
11. To prevent unnecessary alarms, revise the Alarm Thresholds in Maintenance and check the bay number assignments in Form 53.

Upgrading from the External CompactFlash Card (Release 2.0 or later)

WARNING: THE UPGRADE PROCEDURE WILL INSTALL NEW SOFTWARE IN THE CONTROLLER.

Installer's PC requirements

- Windows NT 4.0, Windows 98, Windows 2000, Windows XP operating system running an FTP server.
- For serial connections, a VT100 terminal emulator (HyperTerminal)
- For remote or LAN-based connections, a secure Telnet client that supports SSL/TLS (Mitel Telnet client recommended), or a web browser to access the SX-200 ICP Web Interface
- A serial connection to the controller Maintenance port and/or a Network Interface Card (NIC) connected to the IP network
- A CompactFlash Card Reader/Writer
- 256M CompactFlash card (use Mitel-supplied card only).
- (Optional) System Option 109 - Remote Software Download in Form 04.

Note: Windows 2000 users must clear the browser cache.

You also need

- The IP address of the controller (default 192.168.1.2)
- The system software CD or access to the appropriate online resource.

Note: A typical upgrade requires approximately five minutes to complete once the new software is installed and the system rebooted. Add five minutes more if installing additional voice mail language files and another 10 minutes if the upgrade includes a new load of software for the Analog Main Board.

To upgrade the system from the CompactFlash card

1. Remove the external CompactFlash card from the controller (if installed).
2. Insert the CompactFlash card into the CompactFlash Reader/Writer.

IMPORTANT: Use a Mitel-supplied 256 MB CompactFlash card. DO NOT partition the card and DO NOT copy files to it before proceeding with the software installation.

3. Insert the system software CD-ROM into the PC or access the file online.
4. Run SX200ICP_SETUP.EXE from the CD.
5. Select Local Upgrade [Flash Card] Installation, then click Next.
6. Select languages for voice mail prompts if applicable. The default is English and is not selectable.
7. Select the CompactFlash Reader/Writer drive.
8. Select Format to format the CompactFlash card, then click Next.

Note: When formatting the CompactFlash card, select FAT as the file system.

9. Click Finish when prompted.
10. Wait until the computer completes writing to the CompactFlash card before ejecting it.

Notes:

- To avoid ending the writing operation before it finishes, DO NOT click STOP prior to EJECT.
- Certain PC CompactFlash readers have problems with cards larger than 128M. They report that copying is complete when in fact not all the files have been copied. If in doubt, eject the card, re-insert it, and then use Windows Explorer to confirm that all 37 files (64 if a second language for voice mail was installed) are present.

11. Remove the CompactFlash card from the Reader/Writer and insert it into the card slot on the front of the controller.
12. Log into the Maintenance Terminal and begin a Maintenance session.
13. Press

    SYSTEM
    RE_START
    RESET_SYSTEM

    The system boots from the CompactFlash card and installs the new software. Installation is complete when the phones are up and the LED next to the card slot turns green.
14. When prompted, log into the Maintenance Terminal in CDE mode and program all the purchased options from the MOSS sheet. (This step is not usually required for a software upgrade.)

15. Remove the CompactFlash card from the controller when the LED adjacent to the card slot turns green.

Upgrading by FTP

Before beginning the upgrade, check that the SX-200 ICP is programmed with the required FTP information in Form 47, Subform 01 (see “Setting up an FTP Server on a Maintenance PC” on page 75. Also, verify that the following additional requirements have been satisfied:

- existing database is backed up to the PC (for instructions, see page 203)
- Remote Software Download option (System Option 109 in Form 04) has been purchased and enabled
- external CompactFlash card is inserted in the SX-200 ICP (release 1.x systems only)

The upgrade takes about 3-4 minutes depending on the speed of the FTP connection. Double the time if installing additional languages for voice mail prompts.

To upgrade the SX-200 ICP Controller software from an FTP server:

1. Run SX200ICP_SETUP.EXE from the software CD or on-line source.
2. Select Remote Upgrade (FTP) Installation, and then click Next.
3. Select languages for voice mail prompts if applicable. The default is English and is not selectable.
4. Select the FTP server home directory, then click Next twice to begin the installation.
5. Click Finish when prompted.
6. Log in to the Maintenance Terminal (direct, secure Telnet, or SX-200 ICP Web Interface) and begin a Maintenance session.
7. Press

   SYSTEM
   DATABASE
   UPGRADE_SW
   CONFIRM
8. When prompted, press ENTER to begin the upgrade.
9. If the upgrade failed, consult the Maintenance Logs for the cause.

Upgrading the NSU or PRI Card Software

Use the IMAT application to upgrade the software for a PRI card or an NSU. For more information about using IMAT, refer to "IMAT Programming" on page 117.

To upgrade an NSU or PRI card to a new version of software or re-install the software:

1. Ensure that the NSU or PRI card is running by checking its status LEDs.
2. Connect a computer to the RS-232 serial port of the NSU or PRI card.
3. Run IMAT.
4. Click on File -> Connect to connect to the NSU or PRI card.
5. Download the software from Mitel Online or insert the software CD-ROM in the computer's CD-ROM drive.
6. Click on Maintenance -> Software Upgrade and proceed with the software upgrade or re-installation.
7. Click on Maintenance -> Remote Site Reset to reset the NSU or PRI card.

Migrating an SX-200 EL/ML to an SX-200 ICP MX

Except for the parts in the table below, most of the EL/ML system, including the customer database, is preserved in the migration to the SX-200 ICP MX.

Table 32: Retained and Surplus Parts

Retained Parts	Surplus or Unsupported Parts
main cabinet (becomes a peripheral bay)	control card in main cabinet
peripheral cabinets	SPINE Bays
customer database	IP Nodes
peripheral interface cards and modules	Control Dual and Triple FIMs/CIMs
telephones and other peripherals	ISDN Gateways COV cards/COV Vmail SUPERSET 3 and 4 telephones Datasets for PMS and ACD monitors

Notes:

1. This migration procedure will work only for an MX controller and not for a CXi controller.
2. An SX-200 LIGHT system must upgrade to an SX-200 EL/ML (LW, 19.3.2 or later) before migrating to an SX-200 ICP MX.
3. Mitel Express Messenger (MEM) data (programming, greetings and messages) are not included in the migration. If MEM is retained, MWI will not be lost. If you continue to use the MEM card, the database will remain operational provided that you enable System Option 98 (Support 3DN, 4DN and 400 series Set Types).
4. Call logs and callback requests are lost in the migration.
5. The IP bay (i.e., the controller) is bay number 1 by default. It becomes bay number 8 following the migration. All references in documentation are to the default.
6. The SX-200 ICP supports a maximum of 30 IP trunks. If Option 115 (Maximum IP Trunks) in Form 04 is programmed with more than the maximum, only the first available 30 IP trunks will function.
7. Migration causes phantom bays on the SX-200 EL/ML to become peripheral bays on the SX-200 ICP. You must manually re-program these bays as phantoms in Form 53.

Parts Required

- SX-200 ICP Release 2.0 software or later
- Peripheral FIM Carrier (PFC) or Peripheral CIM Carrier (PCC) for the SX-200 cabinets.
- Fiber Interface Module (FIM) or Cable Interface Module (CIM) with appropriate connector cables for the SX-200 ICP.

Note: The SX-200 ICP supports 1KM, 5KM, and 14KM FIMs.

Preparations

Before starting the migration,

- survey the existing EL/ML hardware to determine any potential configuration issues such as unsupported devices.
- ensure that there are enough FIMs or CIMs to connect the EL/ML cabinets.
- if the SX-200 EL/ML has T1 or PRI trunks, install a Stratum 3 clock in the SX-200 ICP
- compare MOSS sheets for both systems to ensure that sufficient bays have been purchased (System Option 133 - TDM Bays). Option 102 (Feature Level) of the SX-200 ICP MOSS sheet must be set to 6. Option 98 (Support 3DN, 4DN and 400 series Set Types) must be enabled if 400 series telephone sets or some 3rd-party DNIC voice mail systems are being used.

Migration Procedure

A typical migration requires approximately one hour to complete.

To migrate an SX-200 EL/ML to an SX-200 ICP MX:

1. Back up the database on the SX-200 EL/ML using Kermit.
2. Print CDE Forms 1 and 47 from the EL/ML for reference during programming.

CAUTION: The following step takes the system out of service.

3. Power down the SX-200 EL/ML control cabinet and peripheral cabinets.

4. Install the SX-200 ICP MX and optional modules (Stratum 3 clock, Quad CIM, Dual FIM, Dual T1/E1 Framer, etc.).
5. Power up the SX-200 ICP MX.
6. Restore the SX-200 EL/ML database to the SX-200 ICP using Kermit over the serial port.

   After the database file is restored, the system automatically resets.
7. Phantom bays on the SX-200 EL/ML become peripheral bays on the SX-200 ICP. Re-program these bays as phantoms in Form 53.
8. SPINE Bays or IP Nodes are no longer supported and will be converted to phantom bays. In CDE, reprogram any SPINE or IP Node bays as follows:
   - In Form 53, add new bay numbers for each SPINE or IP Node.
   - In Form 09, move each set on the SPINE bay to a PER Node and each set on the IP Node to the IP Bay.
   - Delete all SPINE Bay and IP Node device assignments in Form 18, Miscellaneous System Ports.
   - Delete each trunk on the SPINE Bay and IP Node and reprogram on the PER Node Bay and IP Bay respectively.
   - Remove ARS programming for IP Nodes in Forms 26 (including subform), 22, and 23.
   - In Form 48, modify all IP Node programming.
9. In Form 53, assign the PER Bays to CIM or FIM ports.
10. In Form 04, enter the Mitel Options Code (MOC) and Mitel Options Password (Option 100). Set all other options as required.
11. Reset the system (if prompted).
12. In Form 47, enter the IP networking information recorded in step 2.

Note: Voice Compression in Form 47 for the IP Node is a System Option in Form 04 (Option 120, Number of Compression Resources) in the SX-200 ICP.

13. (Optional) Program the embedded voice mail system with Mitel Express Messenger information (if installed in the EL/ML) or, if the MEM card is still being used, enable System Option 98 (Support 3DN and 4DN Set Types).

14. Disconnect the fiber cables from the EL/ML control cabinet. Label the Tx and Rx cables, identify the Bay that the cables connect to, and label the front of the SX-200 ICP MX controller to ensure that connections are made to the proper bays.
15. Remove the main control card from the EL/ML control cabinet.
16. Install the required peripheral CIM or FIM cards into the EL/ML cabinet(s).
17. Remove all CIM and FIM triple modules from the SX-200 EL/ML control cabinet.
18. Connect all bays to CIMs or FIMs.
19. Power up the EL/ML cabinet(s).

Note: A system with a BCC III may take as long as 20 minutes to come up following the upgrade. Subsequent reboots will not incur this delay.

20. Verify that the migration succeeded by placing calls to and from sets connected to the Peripheral Cabinet(s). Test the voice mail system by leaving, retrieving, and deleting messages. Verify that features function properly, especially call forwarding.
21. Back up the SX-200 ICP database using FTP. (See page 203.)
22. To prevent unnecessary alarms:
    - In Maintenance, revise the Alarm Thresholds.
    - In Form 53, check the bay number assignments. If a bay is assigned a bay number, it must be connected to a physical device; otherwise, it will generate an alarm. To prevent this problem, move disconnected bays from physical connections (CIMs and MMCs) to phantom bays.

Replacing IP Phones

To replace a registered IP phone, you can

- Replace it and retain all existing programming for that circuit, or
- Replace it and re-program the circuit.

Note: 5215 and 5010 IP phones will fail to register on a system that has a Default or Premier database because of the line appearances programmed on keys 8 and 10—keys that exist on the 5207 but not on the 5215 or the 5010. To register these phones, first delete the line appearances in Form 09, or follow the phone replacement procedure on the next page to delete all key programming.

To replace a registered IP phone and retain all programming for that circuit:

- From the phone
  - Dial the IP Set Replacement PIN (default ###) followed by the extension number of the phone.
- From the CDE terminal
  - Access Form 09, Desktop Device Assignments.
  - Select the circuit belonging to the IP phone that is to be replaced.
  - Press Show CESID.
  - Press Show MAC.
  - Delete the existing MAC address.
  - Disconnect the phone from the LAN and connect the new phone in its place.
  - Register the new phone by entering its MAC address in Form 09.

  Or

  Go to the phone and dial the IP Set Registration PIN (default ***) followed by the phone's extension number.

To replace a registered IP phone and re-program the circuit:

1. Access Form 09, Desktop Device Assignments.
2. Delete the extension number of the IP phone that you want to replace.

WARNING: IF YOU DELETE THE EXTENSION NUMBER OF A PHONE, ALL PROGRAMMED DATA FOR THAT CIRCUIT IS DELETED.

3. Assign a new extension number or reuse the old one.
4. Program the features for the IP phone.
5. Register the new phone by entering its MAC address in Form 09.

   Or

   Go to the phone and dial the IP Set Registration PIN (default ***) followed by the phone's extension number.

Restarting IP Phones

Restarting the IP Phones causes them to renegotiate their DHCP settings.

IMPORTANT: Because it takes two or three minutes for the phones to return to service, limit restarts to after hours.

To initiate a restart:

1. Log in to the Maintenance Terminal (direct, secure Telnet, or SX-200 ICP Web Interface) and begin a Maintenance session.
2. Press the following softkeys:

   RE_START
   IP_PHONES
   ENTER

Upgrading Set Firmware

Upgrade the firmware for SUPERSET™ 4025, SUPERSET 4090, SUPERSET 4125, and SUPERSET 4150 telephones, only if the revision on the system is higher than the set revision. The boot code and the firmware revision levels must be checked.

Boot Codes

The SUPERSET boot code must be at revision Boot 3.10 or greater or the SX-200 system cannot successfully upgrade the set's firmware.

The boot code appears when a set is first plugged in.

If you attempt to upgrade a set with a boot code lower than 3.10, the system will erase the set's firmware and you will not be able to download the new firmware. The set then becomes unusable.

Firmware Revision Levels

The firmware revision level of the set that you are upgrading must meet the firmware revision level stated in SYSTEM maintenance. Use the SET_FIRMWARE STATUS maintenance command to identify the revision level.

Firmware Commands

Access the firmware commands in the SYSTEM maintenance level and then choose SET_FIRMWARE to obtain the softkeys to qualify your target set. See the table below.

Table 33: Firmware Commands

Set_Firmware Qualifiers	Result
STATUS	Displays the software revision level the set is running and whether the set is scheduled for a download.
DOWNLOAD	Erases and updates the firmware on all specified sets. The set must be idle and the set's firmware revision must be older than the firmware to be downloaded.
ABORT_DOWNLOAD	Removes specified sets from the scheduled download.
FORCE_DOWNLOAD	Forces the download to occur even if the set firmware is newer than the firmware being downloaded. This command allows a set's firmware to be returned to a previous firmware version when required.

Measuring LS Trunks

The LS Measurement tool in Maintenance is used to test LS trunks before putting them into service. The test results determine the settings to program for optimum audio quality.

Table 34: LS Measurement Tool Tests

Test	Purpose
Line Quality	Measures the loss level and impulse response of the trunk and recommends Length and Impedance settings to program in Form 13 (Audio Configuration Table subform). If Length and Impedance are set to AUTO in Form 13, the recommended settings are programmed automatically when the test is run. The test results are posted to the maintenance logs, and e-mailed to the address specified in Form 52 (Email). **Line Length Settings:** Short, Long, and Extra Long. The Extra Long setting is only valid with AMB/AOB LS trunks. It provides additional gain for signals transmitted from the CO to the ICP but not for signals transmitted from the ICP to the CO. **Impedance Settings:** 600 Ohm, Complex, DSL, and Impedance A, B, C, and D. Impedance A can be used to match the controller to LS lines that have loading coils. Impedance B, C, and D are the same as 600 Ohm.
Distortion	Measures distortion on the line using an external silence (balance) termination number. Run this test only when instructed to do so by Mitel Product Support.
Echo	Measures the echo characteristics of the line using an external silence (balance) termination number. Run this test only when instructed to do so by Mitel Product Support.

Notes:

1. Run the test in VT100 mode, not TTY (line interface) mode.
2. The test can be run for a single trunk, or for all trunks (three minimum).
3. The test can be immediately, or scheduled for a later time.
4. Approximate test times:
   - Line Quality: 2 min / trunk
   - Distortion: 40 min / trunk
   - Echo: 5 min / trunk

Running the Line Quality Test

To run the Line Quality test:

1. Form 13 (Trunk Circuit Descriptors)
   - Enter the milliwatt tone and silence (balance) termination numbers provided by the CO.

Note: If the milliwatt tone number is unknown, program a second trunk to provide milliwatt tone in Form 13 (Audio Configuration Table subform). If the silence termination number is unknown, take no action; the termination will be generated automatically.

2. Switch to Maintenance mode.
3. Press

   DIAGNOSTICS
   LS_MEASURE
   select LINE_QUALITY (for one trunk) or BATCH_QUAL (for all trunks)

   Respond to the prompts to run the test.

   If the test is successful, the results are sent to the logs and emailed to the address specified in Form 52 (Email).
4. Switch to CDE mode.
5. Form 13 (Audio Configuration Table subform)
   - Use the recommended settings from the logs to program Length and Impedance for the trunk(s).

Note: If Length and Impedance are set to AUTO, the settings will be programmed automatically when the test is run. Refer to the logs to determine the actual settings for AUTO.

Running the Distortion Test

Note: This test requires an external silence (balance) termination number programmed in Subform 13, Circuit Descriptor Options.

To run the Distortion test:

1. Run the Line Quality test and program Length and Impedance for the trunk in Form 13 (Audio Configuration Table subform)
2. Log into the Maintenance Terminal and begin a Maintenance session.
3. Press

   DIAGNOSTICS
   LS_MEASURE
   select DISTORTION (for one trunk) or BATCH_DIST (for all trunks)

   Respond to the prompts to run the test.

   The results are sent to the logs and emailed to the address specified in Form 52 (Email).
4. Forward the test results to Mitel Product Support.

Running the Echo Test

Note: This test requires an external silence (balance) termination number programmed in Subform 13, Circuit Descriptor Options.

To run the Echo test:

1. Run the Line Quality test and program Length and Impedance for the trunk in Form 13 (Audio Configuration Table subform)
2. Log into the Maintenance Terminal and begin a Maintenance session.
3. Press

   DIAGNOSTICS
   LS_MEASURE
   select ECHO_TEST (for one trunk) or BATCH_ECHO (for all trunks)

   Respond to the prompts to run the test.

   The results are sent to the logs and emailed to the address specified in Form 52 (Email).
4. Forward the test results to Mitel Product Support.

Maintenance Commands

Maintenance Port Characteristics

8 bits/1 start/1 stop/no parity.

Baud rates: 300, 600, 1200, 2400, 4800, or 9600 (default).

Maintenance commands do not require the ESC sequence used with CDE commands.

Telnet Requirements

- For remote access over a TCP/IP network such as the Internet or the LAN, both the SX-200 ICP controller and the PC must be connected to the network. Remote connections require a secure Telnet client that supports SSL/TLS (Mitel Telnet client version 1.0.0.1 or later recommended), or a web browser (Internet Explorer 6 or Mozilla Firefox) to access the SX-200 ICP Web Interface.
- Host name or IP address of SX-200 ICP controller.

Connect to the controller through TCP port number 2000.

Entering Command Sequences

Maintenance commands are entered by selecting a softkey from a menu, and then selecting another softkey from the subsequent menu.

Start all maintenance sequences from the Maintenance screen.

Press the DELETE key to delete the most recently entered softkey or device number.

At the end of a command sequence, press ENTER.

Press the CANCEL softkey at any time to exit the current operation without committing (saving) any changes, or press the ENTER softkey, when it is available, to commit changes or initiate an activity.

For example, to show time:

1. Select SYSTEM from the Maintenance screen.
2. Select SHOW from the System screen.
3. Select TIME from the Show screen.
4. Select ENTER from the Show screen or Press ENTER at the keyboard.

Logging In

Serial Connection:

1. Launch the terminal or terminal emulator.
2. Press RETURN four times within 1 second, and then follow the prompts.
3. Select a Terminal Type.
4. Select 1 - MAINTENANCE.
5. Enter your username and password.

Secure Telnet Connection:

1. Launch the secure Telnet client.
2. Enter the hostname or IP address of the controller, and port 2000—for example, to open a connection from a Mitel Telnet client, enter: op 192.168.2.25 2000
3. Log in to SSL/TLS with login name 'installer' and default password '1000.'
4. Select a Terminal Type.
5. Select 1 - MAINTENANCE.
6. Log in to the application with your username and password.

SX-200 ICP Web Interface Connection:

1. Launch the web browser.
2. Enter https://<controller IP or hostname>:443

   For example, https://10.33.63.118:443
3. Log in to the SX-200 ICP Web Interface with login name 'installer' and default password '1000.'
4. Select a Terminal Type.
5. Select 1 - MAINTENANCE.
6. Log in to the application with your username and password.

Logging Out

1. Press QUIT (softkey 6).
2. Press key 6 (or wait for logout timer to time out).

Switching between Maintenance and CDE

You can switch between the Maintenance and CDE applications without having to exit and log in again.

From the top level CDE Form, press TO MTCE (requires correct access level)

From the top level Maintenance screen, press TO CDE.

Displaying the Card Configuration

From CDE mode:

- View Form 01, System Configuration

From Maintenance mode:

- Press:
  REPORTS
  SHOW
  CONFIG
  ALL

Showing the System Identity

From Maintenance mode:

- Press:
  SYSTEM
  SHOW
  IDENTITY
  ENTER

System Commands

Table 35: System Level Functions

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
1-SET	1-DATE [dd/mm/yy]			
	2-TIME [hh:mm]			
	3-PASSWORD	1-ATTENDANT		
		2-SUPERVISOR		

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Table 35: System Level Functions (continued)

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
		3-MAINT2		
		4-MAINT1		
		7-INSTALLER		
	4-SPEED	1-MAINT-PORT [speed]		
		8-PRINTER_PORT [speed]		
	8-RESET_TIME	1-AFTER_N_FLTS		
		2-DAY/TIME	1-MONDAY	1-TIME [hh:mm]
			2-TUESDAY	1-TIME [hh:mm]
			3-WEDNESDAY	1-TIME [hh:mm]
			4-THURSDAY	1-TIME [hh:mm]
			6-FRIDAY	1-TIME [hh:mm]
			7-SATURDAY	1-TIME [hh:mm]
			8-SUNDAY	1-TIME [hh:mm]
			9-DAILY	1-TIME [hh:mm]
		3-IMMEDIATELY		
	9-ALARM_THRESH	1-LINES	1-SYSTEM	8-CONFIRM
			2-BAY (enter Bay #)	8-CONFIRM
		2-TRUNKS	1-SYSTEM	8-CONFIRM
			2-BAY (enter Bay #)	8-CONFIRM
		3-RECEIVERS	1-SYSTEM	8-CONFIRM
			2-BAY (enter Bay #)	8-CONFIRM
2-SHOW	1-DATE			
	2-TIME			
	4-DEVICE	1-MAINT-PORT		
		4-DATASTN_PLID	1-BAY/SLOT/CCT	
			3-EXT-NUM	
		8-PRINTER_PORT		
	7-LN_APP_COUNT			
	8-RESET-TIME			
	9-IDENTITY			
3-DATABASE	1-BACKUP	1-KERMIT		

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Table 35: System Level Functions (continued)

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
		3-FTP_SERVER		
	2-RESTORE	1-KERMIT		
		3-FTP_SERVER		
	4-SHOW_PARAM			
	6-TRAP_BACKUP*			
	7-UPGRADE_SW			
	8-LOGS_BACKUP			
	9-SET_PARAM	1-DEFAULT		
		2-RETRIES		
		3-BLOCK_CHECK		
		4-RECEIVE	1-EOL_CHAR	
			2-8_BIT_CHAR	
			3-CTRL_CHAR	
			4-REPEAT_CHAR	
			6-PAD_CHAR	
			7-PACKET_SIZE	
			8-RX_TIMEOUT	
			9-NUM_PAD_CHAR	
		6-START CHAR		
		7-SEND DELAY		
4-MONITOR	1-SMDR			
	2-DATA_SMDR			
	7-LOGS	1-MAINT_PORT		
		2-SYS_PRINTERS		
5-SUSPEND_PRTR	7-PRINTER_PLID	1-BAY/SLOT/CCT/SCT		
		3-EXT-NUM		
	8-PRINTER_PORT			
6-QUIT				
7-RESUME_PRTR	7-PRINTER_PLID	1-BAY/SLOT/CCT/SCT		
		3-EXT-NUM		
	8-PRINTER_PORT			

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Table 35: System Level Functions (continued)

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
8-RE-START	2-RESET_SYSTEM			
	3-IP_PHONES			
9-STOP	7-LOGS			
0 MORE_ KEYS	1-SET_FIRMWARE	1-STATUS	1-BAY/SLOT/CCT	
			2-SET_TYPE	1-SS4150
				2-SS4025
			3-EXT_NUM	
			4-ALL	
		2-DOWNLOAD	1-BAY/SLOT/CCT	
			2-SET_TYPE	1-SS4150
				2-SS4025
				3-SS4090
			3-EXT_NUM	
			4-ALL	
		3 ABORT_DOWNLOAD	1-BAY/SLOT/CCT	
			2-SET_TYPE	1-SS4150
				2-SS4025
				3-SS4090
			3-EXT_NUM	
			4-ALL	
		4-FORCE_DOWNLOAD	1-BAY/SLOT/CCT	
			2-SET_TYPE	1-SS4150
				2-SS4025
				3-SS4090
			3-EXT_NUM	
			4-ALL	
	2-UPGRADE_BOOT			
	3-PING			

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Report Commands

Table 36: Report Level Functions

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
2-SHOW	1-CONFIG	1-BAY/SLOT/CCT		
		3-EXT-NUM [number]		
		4-ALL		
	2-ALARMS	2-DEVICE TYPE	1-LINES	
			2-TRUNKS	
			3-RECEIVERS	
			4-BAY	
		4-ALL	0-MORE	
	3-STATUS	1-BAY/SLOT/CCT	DEVICE STATUS	See Note
		2-SWID	1-SW_STATION	See Note
			2-SW_RECEIVER	See Note
			3-SW_CONSOLE	See Note
			4-SW_LINE	See Note
			6-SW_DTMF_GEN	See Note
			7-SW_SET	See Note
			9-SW_DATA_STN	See Note
			0-MORE_KEYS	1-SW_CO_TRUNK
				2-SW_DID_TRUNK
				3-SW_TIE_TRUNK
				4-SW_DISA_TRUNK
				6-SW_CAP
				7-SW_TRUNK_GRP
				8-SW_HUNT_GRP
				0-MORE_KEYS
		3-EXT-NUM [number]		
		4-ALL	1-CP_DWA	
			2-CP_DWA_MEM	
			3-LINK STATUS	
			6-MT_DWA	

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Table 36: Report Level Functions (continued)

COMMAND	PARAMETER	QUALIFIER	QUALIFIER	QUALIFIER
			7-MT_DWA_MEM	
			8-UP_1_PAGE	
			9-DOWN_1_PAGE	
		8-VOICEMAIL		
		9-IP_TRUNKS		
	6-CHANNEL-MAP	1-LOGICAL	1-CHANNEL NUM	
		2-PHYSICAL	1-BAY_NUM	
			2-LINK_NUMBER	
	7-ERRORS	2-DEVICE_TYPE	3-DIGITAL_SETS	
			4-HDLC	
			6-DATASETS	
			7-CONSOLE	
			9-T1_TRUNK	
3-CLEAR	7-ERRORS	1-BAY/SLOT/CCT		
		2-DEVICE_TYPE	3-DIGITAL_SETS	
			4-HDLC	
			6-DATASETS	
			7-CONSOLE	
			9-T1_TRUNK	
		3-EXT-NUM		
		4-ALL	8-CONFIRM	
6-QUIT				

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Note: The following softkeys are presented when a SWID selection is made: 1-CP_DWA, 2-CP_DWA_MEM, 3-LINK_STATUS, 6-MT_DWA, 7-MT_DWA_MEM, 8-UP_1_PAGE, 9-DOWN_1_PAGE. Press CP_DWA to view the device work area for the selected device.

Traffic Measurement Commands

Table 37: Traffic Measurement Level Functions

COMMAND	PARAMETER	QUALIFIER
1-SET	1-UNITS	1-CSS
		2-ERLANGS
	2- PERIOD	2-OFF
	3-DURATION	
	4-AUTOPRINT	1-ON
		2-OFF
	7-START_TIME	
	8-CONDENSED	1-ON
		2-OFF
2-SHOW	3-STATUS	
3-PRINT		
4-READ		
5-IP_MEAS	1-SET	1-SAMPLE
		2-PERIOD
		3-DURATION
		4-MAX_DELAY
	2-SHOW	3-STATUS
	3-PRINT	
	4-READ	
	5-TRAFFIC_MEA	
	7-START	
	8-TO_SERVER	
	9-STOP	
9-STOP	1-TRAFFIC_RPT	
	3-PRINT	

Log Commands

Table 38: Log Level Functions

COMMAND	PARAMETER	QUALIFIER
1-SET	4-AUTOPRINT	1-ON
		2-OFF
2-READ	1-NEWEST [number]	
	2-OLDEST [number]	
	4-ALL	
	8-LOGS_TEXT*	
	9-TRACE_INFO*	
3-PRINT	1-NEWEST [number]	
	2-OLDEST [number]	
	4-ALL	
	8-LOGS_TEXT*	
4-DELETE	1-NEWEST [number]	
	2-OLDEST [number]	
	4-ALL	
	9-TRACE_INFO*	
6-GET_SYS_LOGS		
7-TO_EMAIL		
8-STOP		
9-TO SERVER		

* LOGS_TEXT and TRACE_INFO are diagnostic tools that only MITEL personnel should use.

Diagnostic Function Commands

Table 39: Diagnostic Function Commands

COMMAND	PARAMETER	PARAMETER	QUALIFIER
1-RANGE_B_OUT			BAY/SLOT/CCT/SUBCCT
2-CLR_FEATURE	1-FORWARD	1-BAY/SLOT/CCT	
		3-EXT_NUM	
	2-DO_N_DISTURB	1-BAY/SLOT/CCT	
		3-EXT_NUM	
	3-CALL_BACK	1-BAY/SLOT/CCT	
		3-EXT_NUM	
	4-ALL	1-BAY/SLOT/CCT	
		3-EXT_NUM	
3-BUSY_OUT	1-BAY/SLOT/CCT		
	3-EXT-NUM		
4-LS_MEASURE	1-LOSS_LEVEL	BAY/SLOT/CCT	mW tone number
	2-IMPULSE_RESP	BAY/SLOT/CCT	Silence test number
	3-DISTORTION	BAY/SLOT/CCT	
	4-ECHO_TEST	BAY/SLOT/CCT	
5-RANGE_RTS			BAY/SLOT/CCT/SUBCCT
8-RET-TO-SVC	1-BAY/SLOT/CCT		
	3-EXT-NUM		
DISC_TRUNK	1-BAY/SLOT/CCT		

Backing up Log and Trap Files using Kermit

The Log file and Trap file are used for troubleshooting. Mitel Technical Support may request backups of these files should you call for assistance.

You can use Kermit to back up the files one at a time. Or, you can download them along with other system files using Kermit (see page page 234). You can also send them to an FTP server or e-mail address (see page 233).

Your communication package must support the Kermit protocol to perform a backup. HyperTerminal can be used for serial connections; a secure Telnet client that supports SSL/TLS and Kermit can be used for remote connections.

To back up log and trap files separately using Kermit:

1. Establish a connection (serial or secure Telnet) to the Maintenance Terminal and begin a Maintenance session.
2. Press,

   SYSTEM
   DATABASE
   TRAP_BACKUP or LOGS_BACKUP
   ENTER
   (Enter a file name — e.g., C:\Trap_Oct08.txt)
   CONFIRM
   ENTER

   The system then prompts you to exit to a local Kermit session. Ensure that the Kermit session is set to text mode, because the maintenance log entries must be copied into a text file.

Sending Logs and other System Files to an E-mail Address or FTP Server

To send logs and other system files to an e-mail address, program the SMTP server IP address in Form 49, the recipient's e-mail address in Form 52, and the system hostname in Form 47, Subform 01. (The system hostname must be a valid domain host name registered in your DNS, or listed in your SMTP e-mail server's Hosts file.)

To send logs to an FTP server, program the FTP server IP Address, Username, and Password in Form 47, Subform 01.

Also, System Option 126, Email Messaging must be enabled in Form 04, and System Option 81 should be set to the time zone that the SX-200 ICP is in.

Logs e-mailed or uploaded an to an FTP server are compressed in a .tar file. The estimated size of compressed file is no more than 1MB. Use WinZip® or other compression utility to open the file.

To e-mail logs:

- Press:
  LOGS
  TO_EMAIL
  ENTER
  CONFIRM

To send logs to an FTP server:

- LOGS
  TO_SERVER
  ENTER
  CONFIRM

Retrieving Logs and other System Files using Kermit

Use this procedure to retrieve the logs and system files via a direct or modem connection to the Maintenance port.

The files are compressed in a .tar.gz file. Use WinZip® or other compression utility to open the file.

Your communication package must support the Kermit protocol to retrieve logs and system files. HyperTerminal can be used for serial connections; a secure Telnet client that supports SSL/TLS and Kermit can be used for remote connections.

To download logs and other system files using Kermit:

1. Establish a connection (serial or secure Telnet) to the Maintenance Terminal and begin a Maintenance session.
2. Press,

   LOGS
   GET_SYS_LOGS
   ENTER
   (Enter a file name—e.g., C:\Sys_Logs_Oct08.tar.gz)
   CONFIRM
   ENTER

   The .tar.gz extension is mandatory.

   The system then prompts you to exit to a local Kermit session.

Maintenance Tips

- Keep regular backups.
- Ensure that you record your SysID module number and your MOSS number.
- Record all passwords.

Chapter 6

Basic Troubleshooting and Repair

About this Chapter

This chapter provides standard procedures for troubleshooting the most common problems in a voice-only SX-200 ICP.

More advanced procedures, including ones for troubleshooting SX-200 ICP systems installed in a converged voice and data network, are provided in the next chapter.

Go through this chapter before calling Mitel Technical Support.

Note: The maintenance and troubleshooting of your LAN/WAN network maintenance is the responsibility of your network provider. Mitel Product Support can help you isolate minor network problems; for more complex network problems, Mitel Product Support will escalate to Professional Services to assist you (this is a billable service).

IMPORTANT: Please see “Contacting Mitel” on page 6 before contacting Mitel Technical Support.

Troubleshooting Tools

The table below lists the tools available to help you troubleshoot a SX-200 ICP system.

Table 40: Troubleshooting Tools

Level	Tool Name	Location	Function	Applies to
Basic	Logs	SX-200 ICP Maintenance	Provides a history of the software logs.	SX-200 ICP software.
Basic	IMAT	Maintenance or IMAT PC.	Allows you to load a databases on the NSU PRI.	PRI/QSIG NSUs.
Basic	LEDs	Front of each unit.	To provide overall status of unit.	SX-200 ICP hardware.
Basic	NSU Shell	NSU Maintenance Port.	Lists NSU error messages.	All NSUs.
Basic	FTP server	Mitel On Line	Database Backups	SX-200 ICP database
Basic and Advanced	Phone Debug Option	IP Phones with display.	Allows you to: • Monitor the phone settings • Program a static IP address (see page 287). • Hard code connection speed and duplex mode (reboot while pressing 9). **Auto-negotiation is preferred.**	IP Phone with display.
Advanced	Network Analyser	3rd Party	Monitor, Characterize, Debug, and analyze the network for: • lost packets • runts	IP Phones, IP Trunking, Data on Customer Network.

Before you Contact Technical Support

If you cannot find the source of the problem in this chapter, please collect the required information listed in the applicable section(s) **before** calling Mitel Technical Support (see “Technical Support - Mitel Dealers” on page 7 for the number to call).

You will also need the additional information below before calling Technical Support:

- ❒ Serial number(s) of your equipment and software.
- ❒ Nature of the problem.
- ❒ What you were doing when the problem occurred.
- ❒ Troubleshooting steps taken.
- ❒ Troubleshooting results.
- ❒ Your network diagram.
- ❒ DHCP server configuration and settings.
- ❒ Layer 2 switch configuration and settings.
- ❒ Whether the problem is between IP and IP, IP and remote IP, remote IP and TDM, etc.
- ❒ SX-200 ICP log and trap files
- ❒ Alarm log details.
- ❒ NSU Maintenance log details (if applicable).

IMPORTANT: For voice-only SX-200 ICP systems supported by technicians with Basic certification, Mitel Technical Support is entitled to ask that devices other than Mitel telephones be disconnected from the Layer 2 switch to allow network characterization.

General Troubleshooting Steps

1. Verify the status of the LEDs (Power, 10/100 Base TX Auto-MDIX, CIM Expansion Ports, etc.) See "Checking the System LEDs" on page 241.
2. From the Maintenance Terminal, review the Alarm details. Identify and fix each alarm.
3. For IP Phone and physical network connectivity problems:
   - Verify that the device has power.
   - Verify the status of the port link integrity LEDs at each end of the cable.
   - Verify that each device transmits a link integrity pulse (LINK LED on).
   - Verify that proper cabling is installed between the end devices.
   - Verify that a crossover cable was not used to connect the IP Phone to the Layer 2 Switch instead of a straight-though cable.

   If the IP phone still fails, try plugging it into the port of a working IP Phone (isolates problem directly to phone or programming if phone fails to boot) or directly into the SX-200 ICP (do this after hours since all other phones will be out of service.)

Using the Phone Debug Option

To use the debug function on IP Phones that have displays:

1. Press both volume keys, and then release the **Volume Down** key.
2. While still pressing the **Volume Up** key, enter **cfg** (234) on the telephone key pad.
3. View detail for the following categories:
   - **Network Parameters** (View Current Values, View DHCP Values, View Static Values, Modify Static Values)
   - **Hardware Configuration** (View Current Port Setting, Modify Port Setting, Analog Line Config)
   - **Phone Mode** (Protocol, Config Teleworker)
   - **Tools and Features** (Erase PIN, Edit 802.1x Settings, Edit LLDP Settings, PING Test, DHCP Trace, Video Configuration, Port Options, Diagnostics, Restore Defaults)
   - **Version info** (Main Load, Boot Load, L2Boot Load)
4. Press **Superkey** to exit the debug menu.

Checking the System LEDs

Controller LEDs

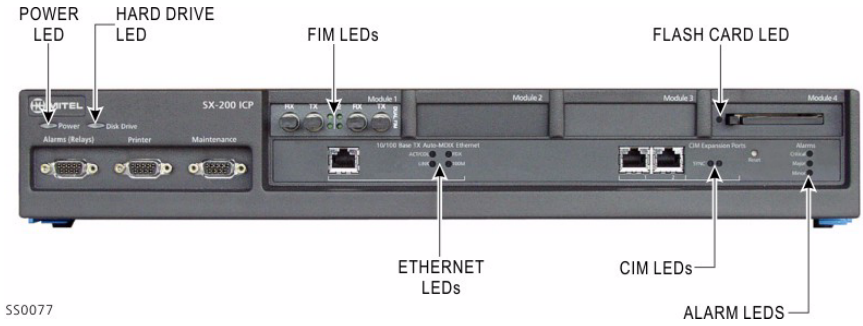


Figure 21: SX-200 ICP LEDs

Table 41: Controller Status LEDs

LED	LED Status	Meaning (All LEDs)
Power	ON	Unit plugged in and operating normally.
	OFF	Unit not plugged in OR unit is faulty.
Hard Drive	ON or Flashing	Reading/writing data to/from the flash card (internal or external) or to hard disk.
	OFF	No power OR no flash card or hard disk activity.
FIM		Top LED indicates the status of local FIM. Bottom LED indicates the status of remote FIM.
	ON	In frame synchronization
	Flashing	Out of synchronization OR Tx and Rx cables reversed.
	OFF	Power off OR held in reset.

(Page 1 of 2)

Table 41: Controller Status LEDs (continued)

LED	LED Status	Meaning (All LEDs)
CIM	ON	Communication link established and configured.
	Flashing	Link established but not configured.
	OFF	No power.
Flash Card	Orange	Flash card in use, do not remove.
	Orange (blinking)	Flash card has not been properly formatted and the platform is having difficulty accessing it.
	Green	Safe to remove Flash card.
	OFF	No Flash card detected.
Alarm LED - Minor	ON	There are problems affecting the system in a small proportion.
	OFF	No problem; system is functioning properly.
Alarm LED - Major	ON	There are problems causing a serious degradation of service.
	OFF	No problem; system is functioning properly.
Alarm LED - Critical	ON	There has been a very serious loss of call processing capability; an automatic system fail transfer (SFT) is invoked and the system is reset.
	OFF	No problem; system is functioning properly.

(Page 2 of 2)

Table 42: Ethernet Port (LAN/WAN) Status LEDs

LED	Normal	On Reset
ACT/COL	GREEN: Activity RED: Collision	RED
LINK	GREEN: Link	GREEN
FDX	GREEN: Full Duplex	GREEN
100M	GREEN: 100Mbs	GREEN

NSU LEDs

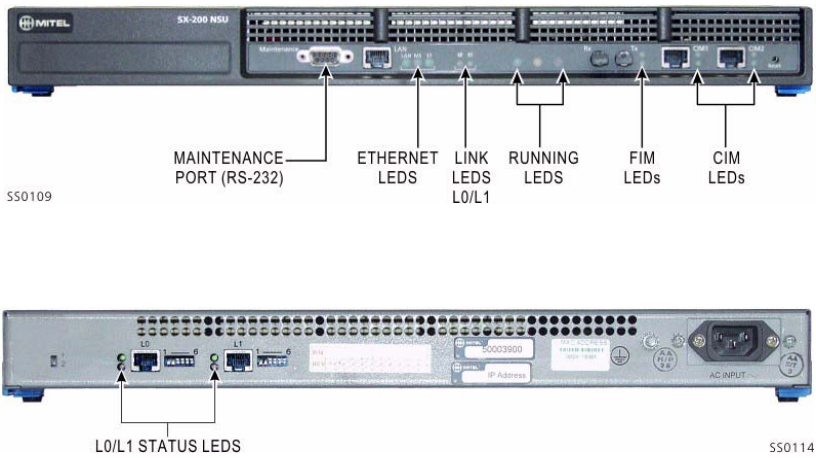


Figure 22: NSU LEDs

Table 43: NSU Ethernet Port (LAN) Status LEDs

LED	Status	Color	Meaning
LAN	Flashing	—	LAN activity.
MS (Message Status)	ON	Green	Message link open to the system.
	OFF	—	Message link not open to the system. OR With L0/L1 LEDs marching: downloading.
ST (Status)	ON	—	Card is booting. OR Card is not operating.
	Flashing	—	Operational (flashes in 0.5 seconds intervals).
	OFF	—	Not operational.

Table 44: NSU L0/L1 Status LEDs

LEDs		Meaning
Left	Right	
—	ON (Red)	No Layer 1.
ON (Green)	—	D-channel established (PRI). OR Layer 1 established (T1).
Flashing (Green)	ON (Yellow)	Alarm indication from far end.
OFF	ON (Yellow)	Blue alarm from card (this is normal during link startup; PRI NA or response to yellow).
Flashing (Green)	—	Layer 1 established (PRI).
Flashing (Green)	ON (Yellow)	Alarm indication from far end.
Flashing (alternating yellow and green)		Downloading (15-20 minutes).
Flashing (alternating yellow)		Decompressing and copying files (2-4 minutes).
—	OFF	No error.
OFF	—	No Link.

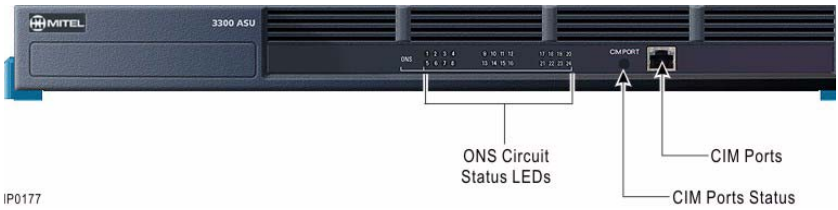
Table 45: NSU FIM Status LEDs

Top LED Status	Meaning for Local, Upper and Remote, Lower FIM
ON	In frame synchronization.
Flashing	Out of synchronization. OR Tx and Rx cables reversed.
OFF	Power off. OR Held in reset.

Table 46: NSU CIM Status LEDs

Top LED Status	Meaning (All LEDs)
ON	Communication link synchronized with controller.
Flashing	BSP running.
	When top and bottom LEDs are alternating, NSU is powering up. Do NOT interrupt.
OFF	No power.

ASU LEDs



LED	LED Status	Meaning (All LEDs)
CIM	ON	Communication link established and configured.
	Flashing	Link established but not configured.
	OFF	No power.
ONS Circuits	ON	Circuit is in use.
	Flashing (slow)	Circuit is not available (undergoing maintenance).
	Flashing (fast)	A fault has occurred with the circuit.
	OFF	Circuit is idle.

Troubleshooting Phones and Peripherals Problems

If you cannot solve the problem using the following table, go through the steps on page 240. If you still can't find the problem, call Mitel Technical Support.

Table 47: Phone Connection Problems Troubleshooting

Symptoms	Probable Causes	Corrective Action
All IP PHones are not receiving power	Controller not fully initialized	Wait for the controller to fully initialize. The Power LED should be solid green.
IP Phone won't boot. Display stuck at DHCP Discovery or IP address (i.e., fails to advance to "Enter PIN")	Phone cannot connect with the DHCP server	Check for the following: • Recycle the power to reboot the phone. • Verify that a crossover cable was not used to connect the IP Phone to the controller instead of a straight-though cable. • Try another phone. • If it still fails, plug the phone directly into the Ethernet port on the SX-200 ICP. • If it still fails call Mitel Technical Support.
	IP Phone Licences exceeded	Purchase more licences
	Failed to reset controller following installation of new system software.	Reset the controller
Can't make calls externally (display phone may show call barred).	COR restricted or ARS incorrectly programmed.	Identify the numbers dialed by the user, then check the route used in ARS. Remove the COR number from COR group table in COR assignment used in the route. OR Change the COR group number in the route assignment form. OR Modify ARS programming to allow call.

(Page 1 of 3)

Table 47: Phone Connection Problems Troubleshooting (continued)

Symptoms	Probable Causes	Corrective Action
Cannot make call over analog loop trunk (intermittent problem).	System is sending the dialing digits too fast for Telco's receiver on the LOOP trunk.	Insert a one or two second delay in ARS: Modified Digit Table (Form 22) for the route used by analog loop trunk.
No dial tone on set.	Set is not programmed.	In CDE, program the extension accordingly.
	Wrong wiring.	Check the wiring between the phone jack and the Peripheral Cabinet, MDF, etc.
	Faulty handset wire.	Replace the handset cord. Replace the handset. Replace the set.
	Circuit is manbusy.	Use the Maintenance DIAGNOSTICS > RET-TO-SVC command
	Circuit is locked out.	Verify the wiring between the phone and the patch panel.
If NONE of the sets are responding.	Problem with controller.	Check for the following: - No alarms - The program reboot is scheduled - There are no error logs - The database is backed up
Sets cannot receive DID calls.	Non-DID is enabled in Station Service Assignment form.	Disable non-DID in the set's COS. Check for NMX fields in Form 15 for Valid entries.
Sets take 10-12 seconds to receive incoming calls.	ANI/DNIS number delivery trunk option is enabled in T1 trunk's COS.	Disable the ANI/DNIS number delivery in the trunk's COS. **Tip**: You can assigned an unused COS to verify if this is the problem.
	Dialing digit conflict.	Check the following forms for any potential dialing conflict: - Desktop Device Assignments - Miscellaneous System Portst - Feature Access Code - ACD Agent Groups
IP to IP calls OK, but not IP to TDM calls (rings once, then call drops).	Problem with controller.	Call Mitel Technical Support

(Page 2 of 3)

Table 47: Phone Connection Problems Troubleshooting (continued)

Symptoms	Probable Causes	Corrective Action
Phone service is lost (IP Phones display SYSTEM BUSY when they go offhook), and a MOSS alarm appears in the CDE forms header.	A database from another system with different MOSS options has been installed in the controller.	Enable the correct options to restore phone service and clear the MOSS alarm. See "Enabling MOSS Options" on page 86..
DNIC set displays WAITING FOR SYNC or WAITING FOR COMM at 20 second intervals.	The set is having trouble communicating with the Peripheral Bay MCC. The likely cause is one of the following: • Defective Digital Line Card. • Defective bay controller card. • Defective set. • Loose or improperly installed wiring.	Check the wiring. If the problem persists, replace the set. If the problem affects multiple sets on the same card, replace the card. If the problem affects sets on different cards, and other causes can be ruled out, then replace the bay control card.
		(Page 3 of 3)

NSU/PRI Troubleshooting

If you cannot solve the problem using the following table, go through the steps on page 240. If you still can't find the problem, call Mitel Technical Support.

Table 48: NSU Troubleshooting

Symptoms	Probable Causes	Corrective Action
Can't make calls over NSU trunks.	CIM Cabling	CIM connection requires a CAT 5 crossover cable. Connect the cable to the left CIM port on the NSU only.
	FIM Module incompatible	FIM module in controller must be the 1K version.
	Incorrect switch settings on back of NSU	Single switch on left side should be in the down position. L0/L1 switches should have switch #4 down Switch #6 is typically in the up position if connected to the CO. If right L0/L1 LED is red (indicating No sync) try changing Switch 6. If left L0/L1 LED flashing green (indicating Sync but D-channel is not synchronized) ensure the correct protocol is programmed via IMAT.
	Incorrect CDE or IMAT programming	See "Programming an NSU or a PRI Card in a Peripheral Cabinet" on page 112" for required programming. NOTE: Be sure to check programming for all links.
	Wrong NSU software load	Check FCI for load requirements.
	Wrong IMAT version	Must be Release 7.3 or greater

PRI Debug Commands

Use the following commands to view logging and debugging information for PRI cards or NSUs connected to PRI trunks.

To run the PRI debug commands

1. Using a serial cable, connect a PC to the maintenance port of the PRI card or NSU.
2. Run a VT100 terminal emulator such as HyperTerminal. Settings: 8 bits, no parity, no flow control, 1 stop bit, 38400 baud rate.
3. PRI debug commands:

   Option +/- cause: Turns on/off output of cause codes

   Option +/- dispcall: Turns on/off calling/called party number display

   Option state: Shows the states of the links from the PRI card perspective

   Option state_help: Displays the state leter commands

Troubleshooting Analog Trunks

If you cannot solve the problem using the following table, go through the steps on page 240. If you still can't find the problem, call Mitel Technical Support.

Basic Troubleshooting

Table 49: Basic Analog Trunk Troubleshooting

Symptoms	Probable Causes	Corrective Action
Unable to make any external calls or frequently unable to access an external line	Service provider has not connected line	Try the following: • Unplug the cable that connects the trunk to the LS trunk port on the controller. • Plug a standard analog phone or test phone directly into the service provider's line jack. • Listen for dial tone, Check each line. If dial tone isn't present on all lines contact your service provider.
	Faulty wiring between MDF and controller	See Appendix D "System Cabling" on page 365 for tip & ring assignments.
	Faulty programming	Verify that the trunks are programmed correctly. See "Programming Analog Trunks" on page 131.
	Faulty Analog Main Board or Analog Option Board	Power down the controller. Remove and replace the suspect board. See

Troubleshooting Signaling Problems

The following section covers problems caused by faulty trunk signaling.

General Signaling & Supervision Concepts

All trunks share similar basic handshaking functions. The actual signaling mechanism will vary with the trunk type.

Seize: (request to make a call) The calling party initiates the call by requesting service from the called party.

Seize Acknowledgment: (ready to receive) The called party indicates that the call can commence.

This acknowledgment occurs when the calling party expects a response (Dial Tone) or when the called party needs time to establish appropriate resources (DTMF receivers).

Digits: (who to talk with) The calling party generates the rotary pulse or DTMF.

Stop Dial: (slow down, can't handle the pace) The called party generates a signal to indicate that digits are in risk of being lost.

Receipt of Digits: (status of call) The called party generates audible tones to indicate the status of the call (for example, Ringback, Busy, and Reorder).

Answer Supervision: (called party has answered) The called party indicates that the call has been answered. This signal is for billing purposes (Hotel/Motel), generation of SMDR reports, etc.

Disconnect Supervision: (release and go back to idle) Either party generates this signal to indicate the termination of a call and to return the trunk to the idle condition.

Loop Start Trunk

The Loop Start Line/Trunk serves the standard domestic applications and small businesses that have key systems and PBX applications.

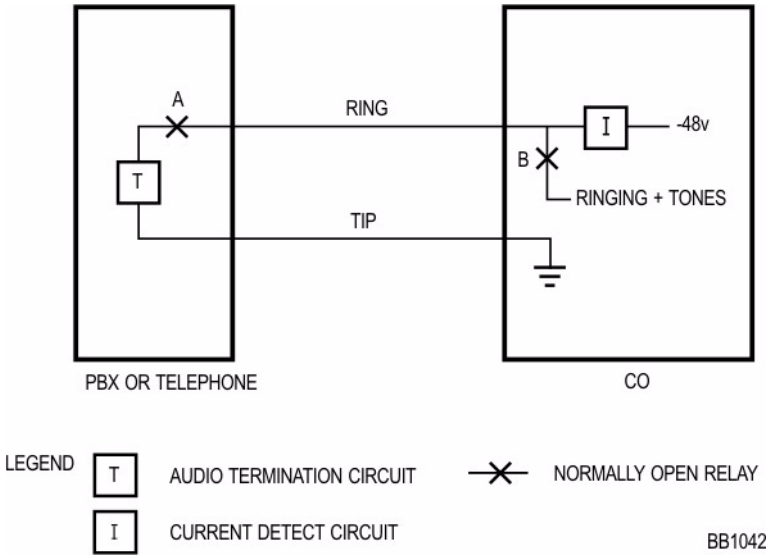


Figure 23: Loop Start Line/Trunk

Table 50: Loop Start Line/Trunk Summary

Signal	Loop Start Line PBX Outgoing	Loop Start Line PBX Incoming
Seize	Tip-Ring leads activated (shorted); Loop Current flows in line	90Vac is applied to Ring lead in 2 sec on, 4 sec off cadence
Seize Acknowledgment	Loop Current and/or dial tone generated	—
Digits	Loop Current toggled (Rotary) or DTMF	—
Stop Dial	—	—
Receipt of Digits	Audible Tones - Busy, Reorder, Ringback dependent upon digits dialed and called party condition	—
Answer Supervision	Some COs can reverse current flow	Tip-Ring leads activated (shorted); Loop Current flows in line
Disconnect Supervision	Near- end termination: PBX/ Telephone can break Loop Current	Near- end termination: PBX/Telephone can break Loop Current

Test/Verify (Loop Start)

- Verify far-end (CO) circuits by using a standard telephone set in place of the Loop Start trunk circuit.
- Verify near-end (PBX Loop Start) circuits by connecting to a local PBX ONS circuit.
- Check for appropriate voltages on Tip-Ring in each call state.
- During off-hook condition, 18 mA DC minimum should be drawn from the CO (typical 25-40 mA).
- Some Key/PBX systems may be polarity sensitive; reverse Tip-Ring to verify.

Ground Start Trunk

The Ground Start Trunk serves most PBX-CO connections in an analog environment.

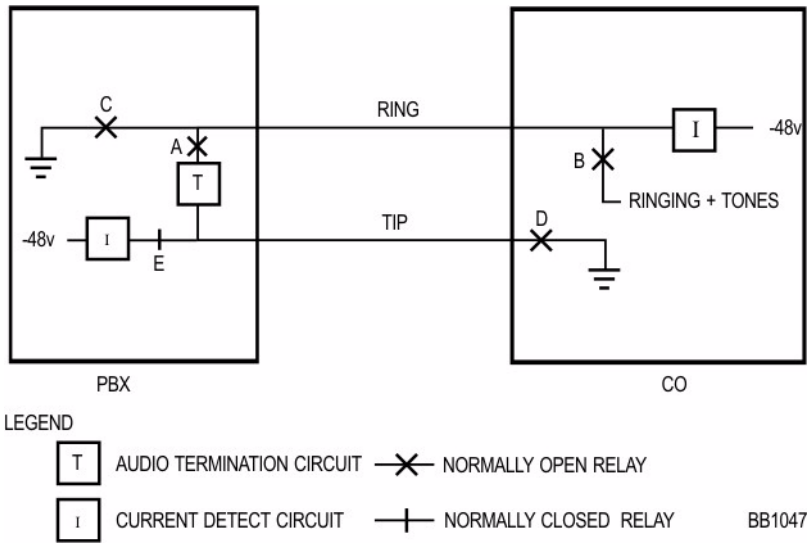


Figure 24: Ground Start Trunk

Table 51: Ground Start Trunk Summary

Signal	Ground Start Trunk PBX Outgoing	Ground Start Trunk PBX Incoming
Seize	Ring lead goes active. PBX grounds the ring lead	Tip lead goes active; 90 Vac is applied to Ring lead in 2 sec on, 4 sec off cadence
Seize Acknowledgment	Tip lead goes active; Audible Dial Tone generated; ground returned on tip	Tip-Ring leads activated (shorted); Loop Current flows in line
Digits	Loop Current toggled (Rotary) or DTMF	—
Stop Dial	—	—
Receipt of Digits	Audible Tones - Busy, Reorder, Ringback dependent upon digits dialed and called party condition	—
Answer Supervision	CO reverses current flow in Tip-Ring	—
Disconnect Supervision	Near-end: PBX opens loop Far-end: CO removes ground from ring	Near or Far-end termination: Loop Current is broken

Test/Verify (Ground Start)

- Verify the far-end (CO) circuits by using a standard telephone for incoming calls. Verify outgoing calls by using a Butt Set with a ground-start lead (momentarily shorting the ring lead to the ground will produce a dial tone from the far end).
- Verify the near-end (PBX Ground Start) circuits by connecting to known working far end Ground Start circuits.
- Verify that appropriate voltages are present on Tip-Ring in each call state.
- During off-hook condition, 18 mA DC minimum should be drawn from the CO (typical 35-40 mA).
- Tip-Ring is polarity sensitive. PBX will be unable to initiate calls if reversed. Reverse polarity to verify.

Direct Inward Dial (DID)/Loop Trunk

You use the Direct Inward Dial (DID)/Loop trunk primarily in analog DID applications; rarely in PBX-PBX Loop Tie trunk applications.

This trunk uses current reversal to signal supervision information and provides digit flow capability in both directions, when the trunk is in the loop/tie mode.

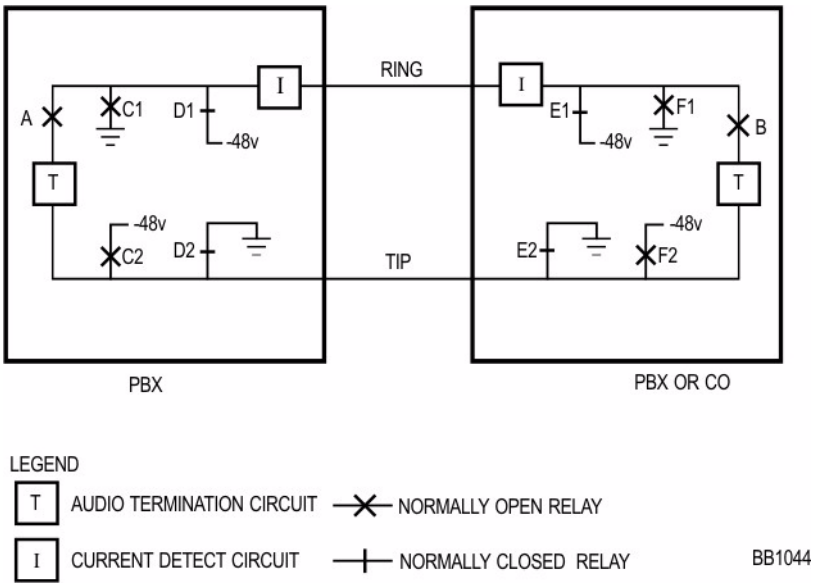


Figure 25: Direct Inward Dial (DID)/Loop Trunk

Table 52: Direct Inward Dial/Loop Trunk Summary

Signal	DID/Loop Trunk PBX Outgoing	DID/Loop Trunk PBX Incoming
Seize	Tip-Ring leads are activated (shorted); Loop Current flows in line	Tip-Ring leads are activated (shorted); Loop Current flows in line
Seize Acknowledgment	Immediate Dial - Tip-Ring leads stay active Outgoing Wink - Tip-Ring leads toggle Loop Current direction Delay Dial - Tip-Ring leads reverse Loop Current following seizure; reverse again when ready to go	Immediate Dial - Tip-Ring leads stay active. Incoming Wink - Tip-Ring leads toggle Loop Current direction
Digits	Loop Current toggled (Rotary) or DTMF	Loop Current toggled (Rotary) or DTMF
Stop Dial	Tip-Ring leads reverse Loop Current direction; forward again when ready	—
Receipt of Digits	Audible Tones - Busy, Reorder, Ringback dependent upon digits dialed and called party condition	Audible Tones - Busy, Reorder, Ringback generated and sent to calling party dependent upon digits received and state of called party
Answer Supervision	Current flow in Tip-Ring is reversed	Current flow in Tip-Ring is reversed
Disconnect Supervision	Near or Far-end termination: Loop Current broken	Near or Far-end termination: Loop Current is broken

Test/Verify (DID)

- Verify the far-end circuits by the use of a standard telephone for outgoing calls.
- Verify the near-end circuits by connecting to known working DID/Loop circuits.
- Verify that appropriate voltages are present on Tip-Ring in each call state.
- During off-hook condition, 20-25 mA should be drawn from the far-end.

Ear & Mouth (E&M) Trunk

You use the E&M trunk in Tie Trunk applications. The E&M trunks support all the signaling information.

The Tip-Ring is used in a 2-wire operation shown in Figure 26, “E&M Trunk - Type (2-wire),” on page 260.

Note: Type 1 may be used in a 2-or 4-wire operation.

The Tip-Ring and Tip Rx-Ring Rx is used in a 4-wire operation shown in Figure 13 - E&M Trunk - Type V (4-wire).

Type I

Type 1 is used in applications when a telephone company is providing a transmission path between PBXs. The E&M circuits connect to Telco-provided Signaling circuits, which prepare the E&M signals for long distance use.

Each end is identical to the other; all required voltage translation is provided by the cable carrier.

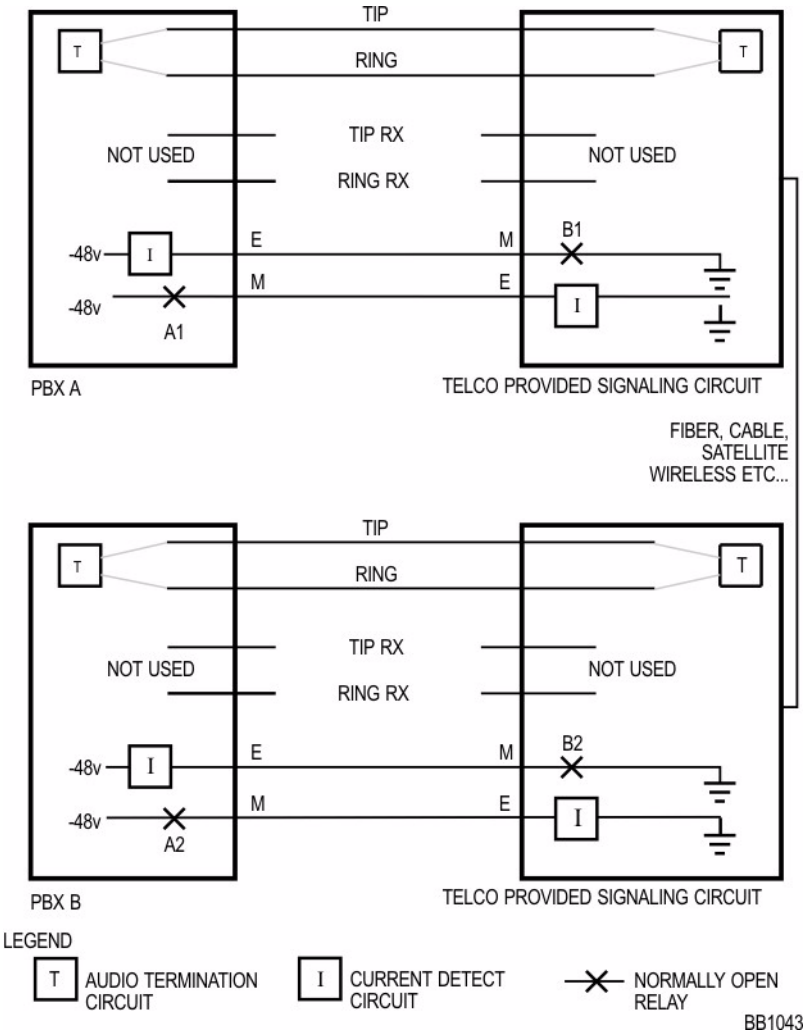


Figure 26: E&M Trunk - Type (2-wire)

Type V

Type V is used in applications where short distance direct back-to-back operation is desired. The M-lead invert is required at both ends.

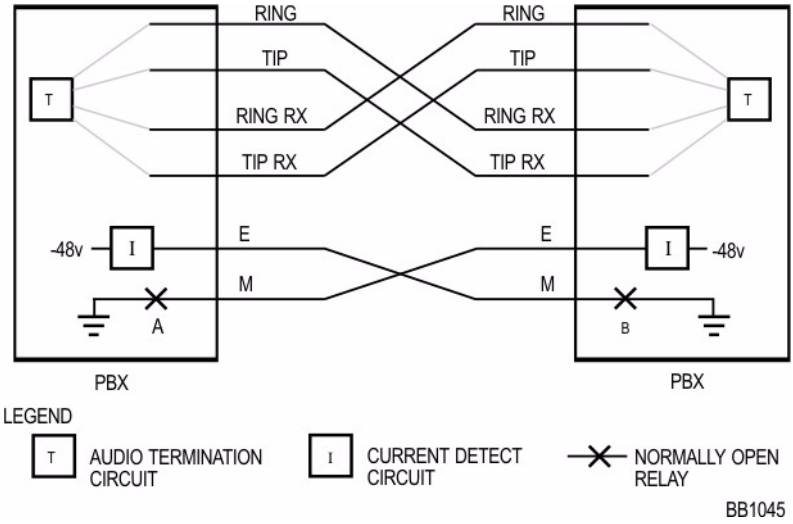


Figure 27: E&M Trunk - Type V (4-wire)

Table 53: E&M Trunk Summary

Signal	E&M Trunk PBX Outgoing	E&M Trunk PBX Incoming
Seize	M lead goes active (voltage is dependent on Type I or Type V operation)	E lead goes active
Seize Acknowledgment	Immediate Dial - E Lead stays idle. Outgoing Wink - E Lead toggles active/idle. Delay Dial - E Lead goes active following M; goes idle when ready to go	Immediate Dial - M Lead stays idle. Incoming Wink - M Lead toggles active/idle
Digits	M toggles (Rotary) or DTMF through audio path	E toggles (Rotary) or DTMF through audio path

(Page 1 of 2)

Table 53: E&M Trunk Summary (continued)

Signal	E&M Trunk PBX Outgoing	E&M Trunk PBX Incoming
Stop Dial	E lead goes active; goes inactive when ready to go	—
Receipt of Digits	Audible Tones - Busy, Reorder, Ringback dependent upon digits dialed and called party condition	Audible Tones - Busy, Reorder, Ringback generated and sent to calling party dependent upon digits received and called party condition
Answer Supervision	E lead goes active	M lead goes active
Disconnect Supervision	Near-end termination: M lead goes inactive; E follows Far-end termination: E lead goes inactive; M follows	Near-end termination: M lead goes inactive; E follows Far-end termination: E lead goes inactive; M follows

(Page 2 of 2)

Test/Verify (E&M)

- Loop back to self whenever more than 1 E&M type V circuit is available.
- Verify far-end circuits by activating near-end M lead and listening for far- end dial tone.
- Verify near-end circuits by activating near-end E lead and listening for near-end dial tone.
- Verify that appropriate voltages are present on E&M leads in each call state.

Troubleshooting T1 Trunks (D4 DS-1)

A T1 Trunk is a digital trunking standard that supports multiple users. Unlike analog trunks, the T-1 hardware signaling layer is independent of trunk usage; synchronization and signaling are dealt with separately.

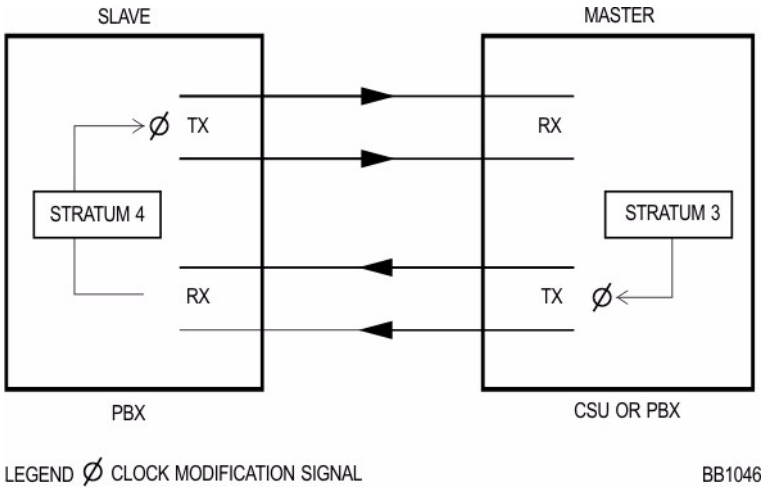


Figure 28: TI Trunk Synchronization

Synchronization

The T1 trunk establishes and maintains a connection between the two systems. Sampling clocks of each partner must be synchronized.

- The Master-Slave arrangement defines the leader and follower; if connecting to a Public Network T1, the PBX will always be a slave.
- The Stratum clock levels define the accuracy of the clock and the ability to match with the incoming master clock signal.The higher Stratum number synchronizes to the same or lower Stratum number. For example, a Stratum 4 (PBX) clock synchronizes to a Stratum 3 (CO/ PBX/Channel Service Unit) clock.
- When the PBX is connecting to more than one T-1 signal, choose the order of preference of clocking sources in CDE Form 44, T1 Network Sync (always choose a connection as close as possible to the defined master source clock).

Signaling Types

Channel Associated Signaling

T1 was originally designed to emulate 24 independent analog trunks. The Channel Associated signaling supports Loop Start, Ground Start, DID/ Loop, and E&M trunks. The function of each channel is decided and programmed at each end.

All handshake signaling is done with bits (A&B) taken from the bit stream which are used to emulate the various analog trunk signals, (off-hook, on-hook, current reversal, etc.).

Common Channel Signaling

The Handshake signaling for the first 23 channels is managed by the 24th channel. The Common Channel signaling allows for transmission of digital information and more advanced digital trunk applications (MITEL's MSDN, Bell Canada's Megalink, ISDN, etc.). Signaling protocol is defined by the type of service.

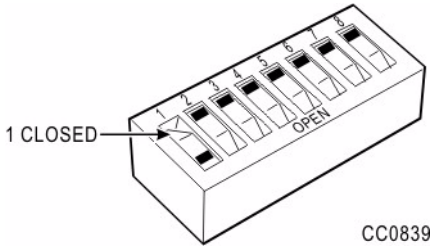
Test/Verify (T1)

Synchronization

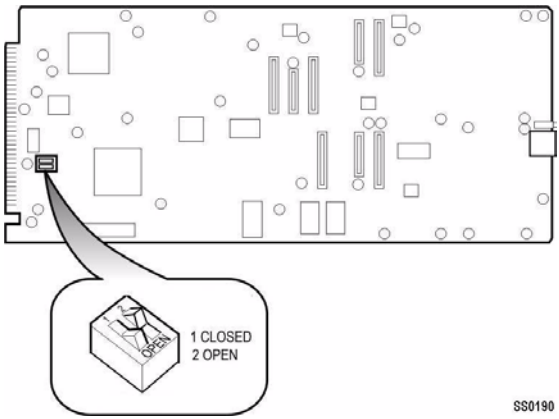
Most T1 issues are a result of connectivity problems.

- Verify that the incoming T1 signal is seen at both ends; verify all hardware connections. Failure at either end indicates loss of an incoming synchronizing signal.
- For T1 cards in peripheral cabinets, verify that the switch settings on the card are set for proper operation. For example: 1 is closed and 2-8 are open. The S1 Switch Settings for the T1 Trunk Cable Length (not loop length) are as follows:

  0-45.8 m (0-150 ft.): 1only closed (see figure below)
  45.8 - 137.3 m (150 - 450 ft.): 2, 3, 4 closed
  137.3 - 200.5 m (450 - 655 ft.): 5, 6, 7 closed



The S1 switch settings on the PRI Card shown in the following illustration inform the T1 module of the location of the clock source and must be set as indicated.



Loopback

Loopback is used to verify and locate the source of either a cable or a synchronization problem through the devices in a T1 transmission path. Devices in the T1 transmission path (PBX, CSU, Channel bank, smart jacks, etc.) will generally have some type of loopback mode. Loopback modes will typically have the effect of taking the input T1 stream and transmitting the stream back to the source; the nodes thereby verify that portion of the link.

In the absence of a loopback mode, the T1 transmits and receives pairs that can be directly connected together to physically create a loopback condition.

A&B bits

Taken from each of the 24 Channels to emulate the various analog trunk signalling conditions (off-hook, on-hook, disconnect supervision, etc.) in either Superframe or Extended Superframe (ESF) format.

Note: ESF is supported by the T1 module on the BCCIII card only.

Table 54: A-B Signaling States (Tie/E&M)

PBX Port Type	CSU Type	PBX port condition to channel	Transmit		Receive		CSU condition to analog facility
			A	B	A	B	
Tie Trunk (loop start)	DPO Tx	loop open	0	0	x	x	x
		loop closure	1	1	x	x	x
	DPO Rx	x	x	x	0	x	normal battery
		x	x	x	1	x	reverse battery
DID or Tie Trunk (loop start)	DPT Tx	normal battery	0	0	x	x	x
		reverse battery	1	1	x	x	x
	DPT Rx	x	x	x	0	x	loop open
		x	x	x	1	x	loop closure
TIE Trunk 4wire/2 wire E&M	E&M Tx	M-lead grounded or open	0	0	x	x	x
		M-lead battery	1	1	x	x	x
	E&M Rx	x	x	x	0	x	E-lead open
		x	x	x	1	x	E-lead grounded or open

Table 55: A-B Bit Signaling Example (T1/CO)

State	Transmit		Receive	
	A	B	A	B
Outgoing call - Basic Operation				
Idle state	0	1	1	*
PBX grounds ring (wait for dial tone)	0	0	1	*
CO ground tip (dial tone applied)	0	0	0	*
PBX closes loop and removes ring ground	1	1	0	*
Dial pulsing	DP	1	0	*
Completion of dialing	1	1	0	*
Incoming call - Basic Operation				
Idle state	0	1	1	*
CO ground tip (interval between ringing)	0	1	0	1
CO ground tip (during ringing application)	0	1	0	0
PBX presents call	0	1	0	1
PBX answers call	1	1	0	*
Talking state	1	1	0	*
CO disconnects				
Talking state	1	1	0	*
CO removes tip ground (far end hangs up)	1	1	1	*
PBX opens loop (idle)	0	1	1	*
PBX disconnects				
Talking state	1	1	0	*
PBX opens loop (near end hangs up)	0	1	0	*
CO removes tip ground (idle)	0	1	1	*

Troubleshooting Voice Mail

If voice mail is not working properly, refer to the chart below for suggestions on corrective action. If you are experiencing symptoms that are not listed here, call your dealer for assistance.

To check the amount of disk space voice mail messages are using and the status of the voice mail ports, use the Maintenance terminal REPORTS function.

Table 56: Voice Mail Troubleshooting

Symptom/Trouble	Corrective Action
Notification calls are configured for a mailbox, but don't seem to work.	Notification is not enabled at the system level (see Voice Mail Options Form 49) -or- CO line access is restricted for voice mail port extension numbers. -or- Notification call number incorrectly programmed. Try dialing the number from a telephone to see what happens.
Notification calls use the correct outside lines, but the pager never beeps.	Check the notification phone number and pager type in Form 50, Mailboxes.
The date and time that a message was left is incorrect.	Check the SX-200 ICP system clock.
The system is warning that the disk space is almost full.	Delete unused mailboxes and have subscribers clean out unnecessary saved messages.
Too much silence before or after a greeting or mailbox name.	When recording greetings and names, start speaking immediately after the tone and press any key as soon as you are finished.
When outside callers reach the auto attendant and press 0, either no phones ring or the incorrect phone rings.	Check that mailbox 0 is correctly associated with the operator's extension.
When outside callers reach the auto attendant and press 0, the operator's telephone rings and never forwards to voice mail.	Set Call Forward-Busy/No Answer on the Operator's phone to forward to voice mail.

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Table 56: Voice Mail Troubleshooting (continued)

Symptom/Trouble	Corrective Action
Internal callers occasionally reach the Operator (or other designated overflow point for the voice mail port hunt group) when calling the auto attendant.	All voice mail ports are busy. Try again later.
Outside callers occasionally reach the Operator (or other designated overflow point for the voice mail port hunt group) instead of the voice mail system.	All voice mail ports are busy. Try again later.
The voice mail system resets itself at times.	The voice mail system has the ability to automatically reset itself in the event of a critical error. The SX-200 ICP also automatically resets daily at 3:00 AM.
The message lights do not work.	Verify that you have the proper access code to turn the light on by dialing it from a phone **Note:** The ONS/CLASS circuits in the SX-200 ICP controller do not support Message Waiting lights.
No message light exists on the phone.	Set up message notification to ring the extension number whenever messages are received.
Prompt to “please leave a message" heard when a a busy or unanswered extension is reached repeats.	Bilingual prompts enabled (System Option 121) but only one language installed. Install the missing language. See “Installing Software Using an External CompactFlash Card (Optional Initial Install)” on page 35.
	(Page 2 of 2)

SX-200 ICP Property Management System Interface

The SX-200 ICP Property Management System (PMS) interface collects and sends the following Hotel/Motel information to a customer's PMS computer through the LAN.

- Maid and room status
- Guest check-in and check-out
- Guest name
- Auto wake-up and message waiting
- PMS related maintenance logs.

Property Management System Messages

A PMS message is a string of ASCII text characters.

For example, to light a message waiting lamp for guest room extension number 2129, the customer's PMS computer will send a string of ASCII keyboard commands to the PMS interface.

The PMS message sent is:
^B MW 1 2129^C

When the PBX's PMS interface receives and understands the message, it will send an **ACK**nowledge character back to the customer's PMS computer.

The following is a PMS message format that enables a telephone's message waiting lamp.

^B	M	W	space	1	space	space	2	1	2	9	^C

Start Transaction STX
The CTRL (^) B character signals the start of a PMS message

Function Code
The MW followed by a space indicates that the PMS requests a message waiting function

Status Code
1 followed by a space turns on the message waiting lamp. 0 turns the lamp off

Station's Extension (Room) Number
Identifies the extension number of the telephone on which the message waiting lamp lights. The PMS inserts leading space(s) to indicate that no number is present

End Transaction ETX
The CTRL (^) C character signals the end of a PMS message

Message Formats from PBX to PMS

Maid in Room status

Maid in Room status is sent as a 10-character message, as follows:

_ _ _ _ _ _ _ _ _ _

function code	STS
status code	n space (n is assigned room status code)
station number	nnnnn (with trailing spaces)

Message Registration of Outgoing Trunk Calls

Message Registration of Outgoing Trunk Calls status is sent as a 12-character message, as follows:

_ _ _ _ _ _ _ _ _ _ _ _

function code	MRspace
status code	nnnn (nnnn is a 4-byte peg count)
station number	nnnnn (with trailing spaces)

SX-200 ICP and PMS 5-digit Extension Number Formats

The extension number is sent between the SX-200 ICP and the PMS as a 5-digit number. Numbers that are fewer than 5 digits include spaces:

ICP to PMS - extension number nnnnn with trailing spaces

PMS to ICP- extension number nnnnn with leading spaces.

Table 57: PMS Keyboard Commands

Commands	PMS Keyboard Keys	Comments
Enquire (ENQ)	^E	^ = CTRL key
Acknowledged (ACK)	^F	
Not Acknow-ledged (NAK)	^U	
Start Transaction (STX)	^B	
End Transaction (ETX)	^C	
Check In	^BCHK1 XXXXX^C	XXXXX is the 5-digit extension number (use leading spaces).
Check Out	^BCHK0 XXXXX^C	
Add Name	^BNAM1 a-z XXXXX^C	a-z is the extension name, 20 characters in length (use trailing spaces), followed by a single space, followed by the extension number. Only the first 10 characters of the name are displayed.
Replace Name	^BNAM2 a-z XXXXX^C	
Delete Name	^BNAM3 a-z XXXXX^C	
Send Message	^BMW 1 XXXXX^C	Insert a space before and after the digit 1.
Delete Message	^BMW 0 XXXXX^C	Insert a space before and after the digit 0.
Set Wakeup	^BWKPTTTTXXXXX^C	TTTT is the time in hours:minutes. Use a 24-hour clock.

SX-200 ICP and PMS Cannot Communicate

If the SX-200 ICP PMS interface and the customer's PMS computer cannot communicate, the system will generate PMS related maintenance log messages. Typically, PMS maintenance log messages will identify

- Operating status of the PMS
- Invalid **start** (STX) and **end** (ETX) of text message characters
- Invalid **function** code message characters
- Invalid **status** code message characters
- Invalid **room number** message characters.

Testing the PMS Interface of the PBX

PMS problems typically occur in these areas:

- **PMS Protocol settings:** Ensure that the communication parameters between the systems match.
- **PMS Programming:** Verify that all the recommended PMS and Dataset programming is complete.
- **RS232-to-IP serial port converter:** Use a straight-through cable between the customer's PMS computer and the converter.

Test the SX-200 ICP PMS interface as follows:

1. Disconnect the customer's PMS computer from Ethernet-to-Serial converter.
2. Connect a personal computer to the converter.
   - Ensure that the communications parameters of the personal computer / terminal match those expected by the PBX's PMS interface.
   - Verify that you receive the **ENQ**uire character from the SX-200 ICP PMS interface. If not, verify that all the programming and the connections are correct.

3. Type the PMS message required to light a telephone's message waiting lamp, using CAPITAL letters only. See the following example.

^B	M	W	space	1	space	x	x	x	x	x	^C

Start Transaction STX (CTRL B)

Function Code

Status Code
1 = ON
0 = OFF

Station's Extension (Room) Number
Enter the telephone's extension number (5 digits with leading spaces).

End Transaction ETX (CTRL C)

4. Verify that the telephone's message waiting lamp is lit.

   If the lamp is not lit, check the PMS-related logs in Maintenance. The logs will indicate which section of the PMS message is invalid.

Note: For the PMS to light a lamp station the Dial 0 for that tenant must be a console, and the Dial 0 must be the same for Night 1 and Night 2.

5. Type the PMS message required to turn off the telephone's message waiting lamp.
6. Verify that the telephone's message waiting lamp is off.

Turning a telephone's message waiting lamp on and off from a PC confirms that the SX-200 ICP PMS interface works correctly.

If problems continue when you reconnect the customer's PMS computer, check the maintenance logs for PMS related information, identifying problems with the customer's PMS hardware/software.

Note: Faster PMS PCs may have to be forced to wait for a reply.

Chapter 7

Advanced Troubleshooting and Repair

About this Chapter

This chapter provides advanced procedures to help you identify and troubleshoot common problems involving the following:

- Network connectivity and performance
- IP Phone registration
- Audio quality
- IP trunking

Go through this chapter before calling Mitel Technical Support.

Note: The maintenance and troubleshooting of your LAN/WAN network maintenance is the responsibility of your network provider. Mitel Product Support can help you isolate minor network problems; for more complex network problems, Mitel Product Support will escalate to Professional Services to assist you (this is a billable service).

IMPORTANT: Please see “Contacting Mitel” on page 6 before contacting Mitel Technical Support.

General Network Troubleshooting

It is beyond the scope of this document to cover everything you need to know to diagnose and eliminate network faults. The information provided here is only an overview of network troubleshooting. For more information, see the SX-200 ICP Technical Documentation and the IP Technology Reference companion to the Advanced Installation and Maintenance Course.

Check List

❒ Do you have a Network topology diagram? If not, it is essential to obtain one or create one for your records.

- Is your network Managed or Unmanaged? Managed Layer 2 switches allow you to set up VLANs which are recommended, especially if you are experiencing problems with voice quality.
- What is your Layer 2 port setup: untagged, tagged, default VLAN, other VLAN setups?
- How is the router configured: route from one VLAN to another?
- Which Layer 2 switches are the routers, servers, and SX-200 ICP attached to?
- Is the network configured in a tree structure? Are there any roadblocks?
- Are your IP Phones distributed on all of the Layer 2 switches or one Layer 2 switch?
- Is the 2nd Port on the IP Phones enabled for PC connection? What type of IP Phones are being used?

- ❒ Do the PCs perform adequately on the network—i.e., is this only a problem affecting IP Phones?
  - Is the problem an IP configuration issue on the IP devices—i.e., DHCP on PCs, DHCP on IP Phones or VLAN issue?
  - Does it work by programming static IP addresses to the IP Phone? To PCs?
  - Can you route to the internet?
  - Can you ping from PCs to all shared network devices (servers, routers, printers, etc.)?
  - Are PC file transfers extremely slow?
- ❒ Where does the problem lie? Within the LAN infrastructure, WAN infrastructure, routing between subnets (VLAN's), certain Layer 2 switches, certain ports on the Layer 2 switch, connection to the SX-200 ICP, etc.?
- ❒ Isolate (if possible and after hours). If the problem is reproducible, then disconnect voice from the LAN (if it's a data problem) or the LAN from voice (if it's a voice problem) and retry scenario.
- ❒ Do you have a Network Analyzer (including an Ethernet Tap) that will capture information such as broadcasts being received, runts, collisions, network utilization, etc.?
  - Is the problem experienced on one part of the network or throughout? Don't assume only the person complaining has the problem (try different areas of the network.
  - Make connections or calls to the problem area with the Network Analyzer attached and capturing information (one capture from source, one capture from destination).

Troubleshooting IP Phone Connectivity

Using a network analyzer to debug

If a network analyzer is required to debug an IP Phone it will be necessary to use an Ethernet tap to ensure that the port settings are not compromised or changed. For example: using a shared hub to allow the analyzer to "see" packets being delivered to a Layer 2 port will change connectivity to the port to 10 MB half-duplex.

If the analyzer indicates there are excessive collisions:

- check for duplex mismatch problems at the Ethernet port on SX-200 ICP. The Layer 2 port attached to SX-200 ICP should be set to 100 Full and not auto.
- check that for dual-port phones the NIC card of the attached PC to the IP set is not 10 MB half-duplex. The NIC card should be 100 MB full-duplex.
- for CRC errors: check if there is a faulty NIC card or flow-control.
- if there are excessive runt frames, check for bad cables, duplex mismatches or bad PC NIC.

Connectivity problems

For IP Phone network connectivity problems, identify the path between two end devices (example: IP Phone and SX-200 ICP) by doing the following:

- Execute a ping test from an IP Phone. Do this when the phone is unable to register with its DHCP server (either the one in SX-200 ICP or an external one if that is how the network is set up).

Note: This step is not to be confused with the section on Troubleshooting IP Phone Registration.

  - Disconnect power from the phone.
  - Reconnect power WHILE pressing the Superkey button.
  - Press the "v" (volume down key) until INPUT IP Address.
  - Enter an IP address on the same subnet as the device you will be pinging (avoid conflicting addresses).
  - If a mistake is made, press the "^" (volume up key) and start over.

Note: All digits must be entered for the IP Address; example 192.168.001.011

- Press “v” repeatedly until the INPUT MASK prompt appears.
- Enter the same mask as set for your network— example, 255.255.255.000
- Press “v” repeatedly until the INPUT GATEWAY appears.
- Enter the IP address of your Gateway—example, 192.168.1.1
- Press “v” repeatedly until PERFORM PING TEST prompt appears.
- Press “#” to indicate Yes.
- At “INPUT DEST IP ADDRESS” enter the IP Address of the device that you are proving a connection for (see following step). Example, SX-200 ICP: 192.168.001.002.
- The phone will show: Pinging 1 to 5, and then show the results—e.g., 5 Pings Successful; 0 Pings failed.
- The phone will have to be powered on and off in order to execute another ping or boot up normally.
- PING the following devices (in order):

  SX-200 ICP
  3rd party DHCP if any
  Local gateway.

  Remote gateway
  Remote IP.

Troubleshooting IP Phone Registration

To troubleshoot IP Phone Registration:

1. Record the error message on the IP Phone display, then go through IP Phone Registration Troubleshooting.

Note: To rule out DHCP problems, and isolate network-related issues, we recommend that you program the IP Phone with a static IP Address in Form 47 or from the phone itself; see page 287 for instructions.

2. If you cannot solve the problem using the IP Phone Registration Troubleshooting Table, go through the General Troubleshooting Steps on page 240.

3. If you still can't find the problem, call Mitel Technical Support.

IMPORTANT: Make sure you have the following information on hand before calling:

- Is the problem with the local or remote subnet?
- DHCP server(s) settings
- Layer 2 switch configuration and settings
- Router configuration and settings
- Network Diagram
- IP addressing scheme
- VLAN configuration and settings

Table 58: IP Phone Registration Troubleshooting

Error Message on Display	Probable Cause	Corrective Action
Invalid VLAN ID	DHCP Option not set correctly.	1. Identify the location of DHCP server and which DHCP server is assigned IP address for the corresponding subnet. 2. For an external Microsoft DHCP server (NT server, etc.), make sure that the option type is set to LONG. 3. For a Cisco Router DHCP server, make sure that the option type is set to hex, and padded with 0s (for example, 0x00000002 for VLAN 2). 4. For the controller internal DHCP server, set the option type to numeric.
Duplicated IP	Existing data device owns the IP address.	1. Check the IP address on the phone display. 2. Disconnect the IP Phone. 3. From a PC on the same subnet, ping the suspected IP Phone. If there is a response, identify the data device, and resolve the conflict.
	Corrupted DHCP server.	On the suspected DHCP server, disable then recreate the scope. If this is a Microsoft DHCP server, reboot the server.

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Table 58: IP Phone Registration Troubleshooting (continued)

Error Message on Display	Probable Cause	Corrective Action
DHCP discovery OR DHCP OFFER X REJ	DHCP Option 130 (MITEL IP PHONE) is not programmed.	Identify the location of DHCP server and set to Option 130 as String type with value of “MITEL IP PHONE”.
	DHCP server does not have enough IP addresses.	Create a larger scope with more IP addresses on the DHCP server.
	DHCP server is acting up and cannot assign IP addresses for the corresponding subnet, even though there are enough IP addresses.	For a Microsoft DHCP server, reboot the server. For the controller internal DHCP server, disable DHCP and rebuilt the scope.
	L2 switch port is shut down or not configured properly.	Check the L2 switch, and ensure that the port is not shut down. Ensure that this port can access the DHCP server subnet (that is, access the port for the same VLAN, etc.).
DHCP Discovery OR DHCP OFFER X REJ (VLAN) (after releasing the first IP from the native DHCP server)	DHCP Option 130 (MITEL IP PHONE) is not programmed up on the second scope of the DHCP server (or on the second DHCP server). OR VLAN ID is not assigned properly.	1. Identify if there is one DHCP server for both VLANs, or if there is one DHCP server per VLAN. 2. For one DHCP server for both VLANs, ensure that option 130 is programmed in the scope of Voice LAN as String type with value of “MITEL IP PHONE”. 3. For one DHCP server per VLAN, ensure that option 130 is defined in both DHCP servers properly. 4. Verify that option 132 is set to assign to the proper VLAN ID.
	One DHCP server for two VLANs network configuration: IP helper (sometimes called DHCP Relay) address on the router interface is not set up correctly.	On the router interface (in which DHCP is not residing), enter the IP helper address and specify the IP address of the DHCP server on the other side of the subnet (that is, always set up IP helper address on the DHCP client side). Ensure the second scope is created for the corresponding VLAN.

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Table 58: IP Phone Registration Troubleshooting (continued)

Error Message on Display	Probable Cause	Corrective Action
DHCP Discovery OR DHCP OFFER X REJ (VLAN) (after releasing the first IP from the native DHCP server)	The DHCP server is acting up and cannot assign IP addresses for the corresponding subnet even though there are enough IP addresses.	For a Microsoft DHCP server, reboot the server. For the controller internal DHCP server, disable DHCP and rebuild the scope.
	The L2 switch port for the phone interface is shut down or not configured properly.	Check the L2 switch and ensure that the port is not shut down. For a Cisco L2 switch, ensure that this is a trunk port with Dot1q encapsulation, and that this trunk port allows both native and Voice LAN to pass through. For an HP L2 switch, ensure that Native Lan is untagged, and that Voice LAN is tagged
	The L2 switch port for the router interface is shut down or not configured properly.	Identify if there are two physical interfaces to the router (one per VLAN), or a router on a stick configuration (one physical with virtual sub- interfaces). Ensure that the port(s) on both sides (L2 switch and router) are not shut down. If there is a physical interface on the router for each VLAN, make sure that the L2 switch is set to access port for the corresponding VLAN/ subnet correctly. OR If there is one physical interface on the router for multiple VLANs, ensure that this is a trunk port on the L2 switch, and ensure that this trunk port allows both native and voice LAN to pass through. On the router subinterface, ensure that the proper VLAN is associated to the remote subinterface.
	The DHCP server does not have enough IP addresses.	Create a larger scope with more IP addresses on the DHCP server.

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Table 58: IP Phone Registration Troubleshooting (continued)

Error Message on Display	Probable Cause	Corrective Action
TFTP load failure	Option 128 is not set up to point to the right TFTP server (Controller).	Check the DHCP server, and confirm that option 128 is pointing to the right TFTP server (usually the SX-200 ICP system IP address).
	No network connectivity between the controller and the phone.	Confirm that the controller is connected to the network. For a Cisco L2 switch: verify that the L2 switch is access port (Voice LAN). For an HP L2 switch: verify that the L2 switch is untagged (Voice LAN). If the router is involved, make sure that router's MTU is set to 600 or more.
	Firmware on controller is missing or corrupted.	Verify that the firmware is in the sysro/tftp directory (particularly if the user has manually copied the firmware). Confirm if TFTP on the controller is corrupted (this can be verified by connecting the IP Phone directly on the controller, or by observing the behavior of other IP Phones). **Tips**: If you have Option 132/133 programmed on the controller's internal DHCP server, disable them before trying Step 2.
Waiting for link	Option 129 is not programmed correctly.	Check Option 129 on DHCP to confirm that the IP address of the SX-200 ICP controller is correctly programmed.
	The Layer 2 switch port may be running spanning tree.	Turn port fast on or disable Spanning tree (whichever is possible).
	The application server is broadcasting or multicasting on IP Phone port or on PC behind the IP Phone.	Turn off multicasting.
	The PC behind the IP Phone is changing speed 100/10.	Depending on the NIC, you may need to hardcode to 100 MB instead of auto negotiation.

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Table 58: IP Phone Registration Troubleshooting (continued)

Error Message on Display	Probable Cause	Corrective Action
Waiting for link OR Lost link to Server	IP phone fails to receive Keepalive message in 30 seconds.	Verify if the network or the controller is down.
	There is electrical interference.	Verify the power source, and change the location of the power source.
TFTP Fail (Remote IP phone (statically programmed IP address) cannot access the SX-200 ICP across the WAN).	The Layer 2 switch port for the phone interface is shut down or not configured properly.	Check the Layer 2 switch and ensure that the port is not shut down. For a Cisco Layer 2 switch: verify that this is a trunk port with Dot1q encapsulation, and ensure this trunk port allows both native and voice LAN to pass through. For an HP Layer 2 switch: verify that Native Lan is untagged and Voice Lan is tagged.
	The Layer 2 switch port for router interface is shut down or not configured properly.	Verify which configuration you have Ensure the port(s) on both sides (Layer 2 switch and router) are not shut down. If there is physical interface on the router for each VLAN, make sure that the Layer 2 switch is set to access port for the corresponding VLAN/subnet correctly; OR If this is a router on a switch, verify that this is a trunk port on L2 switch, and ensure this trunk port allows both native and voice LAN to pass through. On the router's subinterface, verify that the proper VLAN is associated to the subinterface.
	Typo in IP address, VLAN ID, gateway.	Delete and reprogram the static IP address. If there is no VLAN or priority, don't put 0 and leave them as blank. Verify that the gateway IP address is correct.

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Assigning Static IP Addresses to IP Phones

To navigate through the set prompts:

- Use the Volume Down key to move to the next field.
- Use the Volume Up key to go back to the previous field.
- Use the * key to move backwards within a field (to correct an error).
- Use the # key to insert a decimal character and move to the next IP address field.

To set static IP address on the IP telephones:

1. Ensure that the set you want to program is not connected to the network and there is no power supplied to the set.
2. Hold down the Volume Up key for 3 seconds and at the same time, plug the set Ethernet cable and power into the set to display the STATIC IP SETUP MODE.

   The SET STATIC IP PARAM? prompt appears.
3. To begin entering static IP address information, press #.

   Wait a few seconds for the USE PRESENT SETTINGS prompt to appear.
4. Press # to enter IP data. To revert back to DHCP from static parameters, press *.

   The INPUT VLAN ID prompt appears.
5. If you are using VLANS, enter the VLAN ID that will be inserted into packets sent by the phone. Then press the Volume Down key to move to the next field. If you are not using VLANS, enter nothing and press the Volume Down key.

   The INPUT PRIORITY prompt appears.
6. Enter 6 if you are using priorities, or leave the field blank. Press the Volume Down key to move to the next field.

   The INPUT IP ADDRESS prompt appears.
7. Enter the customer-supplied static IP address (for example: 10.30.27.191).

Note: Enter two-digit portions of IP addresses as three-digit numbers with leading zeros. For example, enter '10.12.67.30' as '010.012.067.030.

Note: If you see the INVALID IP ADDRESS message, press the Volume Up key to return to the field with the incorrect entry. Edit the entry.

The INPUT PDA ADDRESS prompt appears.

8. Enter the customer-supplied static IP PDA address. Press the Volume Down key to move to the next field.

   The INPUT SUBNET MASK prompt appears.

9. Enter the subnet mask and press the Volume Down key to move to the next field.

   The INPUT DEFAULT GATEWAY prompt appears.

10. Enter the IP address of the Router and press the Volume Down key to move to the next field.

    The INPUT RTC ADDRESS prompt appears.

11. Enter the IP address of the RTC and press the Volume Down key to move to the next field.

    The INPUT TFTP ADDRESS prompt appears.

12. Enter the IP address of the TFTP server that is used to download the main-load and boot-load images. Press the Volume Down key to move to the next field.

    The INPUT DNS ADDRESS appears.

13. Enter the IP address of the server that will be used during Web browsing to resolve host names into IP addresses. Press the Volume Down key to move to the next field.

    The INPUT WINS ADDRESS prompt appears.

14. Enter the Windows Internet Name Services (WINS) server IP address. For more information about this address, consult your Microsoft Windows documentation. Press the Volume Down key to move to the next field.

    The INPUT PROXY ADDRESS prompt appears.

15. Enter the IP address of the proxy server. Press the Volume Down key to move to the next field.

    The INPUT PROXY PORT prompt appears.

16. Enter the Proxy Port number and press the Volume Down key to move to the next field.

    The TECHNICIAN IP ADDR? prompt appears.

17. To enter the IP address of the debugging utility, press #, enter the address and then press the Volume Down key to move to the next field. If you do not want to enter this information, press *.

    The STORE IN NVRAM? prompt appears.

18. To store parameters in non-volatile RAM, press #

    This ensures that your static settings will be used when the set is powered-up and when the FLASH software is upgraded. If you do not want to store the static settings in NVRAM, press *.

The set reboots and applies the new static IP data.

Removing Static IP Addresses on the IP Sets

To return to using DHCP when static parameters were previously enabled:

1. Plug the set cable and power into the set while holding down the Volume Up key for 3 seconds to display the STATIC IP SETUP MODE.
2. At the USE PRESENT SETTINGS screen, select * = DISABLE to revert back to DHCP from static parameters.

IP Phone Analyzer

The Mitel IP Phone Analyzer is a software tool for troubleshooting IP phones. It installs on a PC from the SX-200 ICP software CD. The PC needs Windows 98, NT, 2000 or XP and a connection on the same network as the SX-200 ICP.

Installing the IP Phone Analyzer

1. In Form 47 (DHCP Parameters) add Option 131: IP Phone Debug Window IP to the list of Common Options.

   For the IP address, enter the one belonging to the PC that has the Analyzer installed on it.
2. Insert the SX-200 ICP software CD-ROM in the PC's CD drive.
3. Open the Tools folder, and then the IP Phone Analyzer folder.
4. Double-click Setup.exe. Follow the prompts to complete the installation.

Launching the IP Phone Analyzer

1. Click Start on the Windows taskbar.
2. Point to Programs.
3. Click Mitel IP Phone Analyzer.

For detailed information on using the IP Phone Analyzer, refer to its Online Help.

Enabling Tool Analysis

From the IP Phone Analyzer Tool:

1. Select Commands, and then Register Set.
2. Enter the IP address of the IP phone.

From the IP phone:

- Reboot the phone (by removing and restoring power) to add the IP address of the PC to the phone.

  The IP address will appear in the IP Phone Analyzer Status View window.

  The phone will be out of service while it resets.

Disabling Tool Analysis

From the PC hosting the Analyzer Tool:

- Access the Status View window, left-click on the IP address, right-click, and then select Delete.

From the CDE/Maintenance Terminal:

- In Form 47 (DHCP Parameters), delete Option 131 to disable IP messaging to the Analyzer Tool.

  There will be a service outage while the phones reset.

From the IP phone:

- Restart the set to clear PC's IP address from the phone.

Troubleshooting Phone Audio Quality

To Troubleshoot Phone Audio Quality:

1. Go to the table below.
2. If you cannot solve the problem using the table, go through the steps on page 240.
3. If you still can't find the problem, call Mitel Technical Support.

IMPORTANT: Make sure you have the following information on hand before calling:

- Setup scenario
- Is there a common denominator (router, only one side of subnet, etc.)?
- Other call scenarios (IP to IP, IP to TDM, etc.)
- Layer 2 switch configuration and settings
- Router configuration and settings
- Network diagram
- IP addressing scheme
- VLAN configuration and settings
- Layer 2 switch port statistics for FCS, collision and duplex mismatch.

Table 59: Audio Quality Problems Troubleshooting

Symptoms	Probable Cause	Corrective Action
Excessive noise	Faulty cabling	Check for cabling problems.
One way audio between Remote IP to TDM (VM)	No gateway IP address programmed in the controller.	Make sure that the gateway IP address is programmed properly.
Distorted audio only on NSU	Voice encoding is not inverted.	1. For T1, enable invert for Voice encoding in link descriptor. 2. For CEPT or API, enable ADI invert for voice encoding. (This does not apply to Embedded PRI.)
Echo	Echo between LS trunks and IP phones.	Measure the loss level and impedance for LS trunks connected to onboard ASUs (See "Diagnostic Function Commands" on page 231). If necessary, update the Options subform of Form 13 with matching settings.
	Handsfree mode is used.	Check if far end is using handsfree. Switch to Handset mode to see if this corrects it, or lower the handsfree's volume.
	Echo Canceller is beyond specifications.	1. Identify the path between the two end points, and verify if Trunk is always involved. 2. Check with Telco to see if the trunk is within specs. On a typical T1, the input signal should be -15 dB. If it is too high (-5 dB for example), echo may result. 3. If this is the case, keep an echo log to isolate the problem.
	Network jitter issue.	If the problem only occurs between IP devices, check network jitter issue below.

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Table 59: Audio Quality Problems Troubleshooting (continued)

Symptoms	Probable Cause	Corrective Action
Broken Audio, intermittent (IP trunks only)	Handsfree on the far end.	Ensure that neither device is using Handsfree. Some handsfree phones only operate at half duplex.
	Packet loss, jitter via network.	1. Identify the speech path between the two end points, including router, switch WAN in the audio stream. 2. The network administrator needs to apply QOS/TOS to minimize jitter over slow speed interface (T1, Frame Relay, etc.), and give voice traffic priority over data.
	Limited bandwidth and too many calls across router, or combination data and voice.	1. Limit the number of calls to remote subnets. 2. The network administrator needs to apply QOS/TOS to give voice traffic priority over data.
	Physical port error (CRC, faulty cable, duplex mismatch, HUB).	1. Identify the speech path between the two end points, including router, switch WAN in the audio stream. 2. Verify that there is no duplex mismatch in each port settings and/or faulty cable, or faulty port. 3. Make sure that the IP Phone is not plugged into a HUB.
	Compression enabled	Compression will save bandwidth, but may cause noticeable clipping. If not sure, disable compression to see if it makes a difference.
	Router's CPU is exhausted or congested.	Router may be running excessive filtering. The network administrator may need to monitor the performance of the router.
Echo between IP Phones	Layer 2 switch setting problem.	1. Check the L2 switch for duplex mismatch and spanning tree. 2. Turn off if possible.

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Troubleshooting IP Trunks

The tools and techniques used to troubleshoot connectivity problems with IP Phones also apply to IP trunks. Other problems with IP trunks, such as poor voice quality and traffic congestion, are often the result of incorrect CDE programming or insufficient bandwidth.

The following sections summarize the programming requirements and provide guidance on addressing problems with connectivity and other quality of service concerns. For more detailed information, see the SX-200 ICP Technical Documentation, especially the section entitled "Maintaining Voice Quality of Service."

CDE Check List

❒ Form 01, System Configuration

Ensure that the IP trunk card is programmed in Bay 1 Slot 6.

❒ Form 03, Class of Service

Ensure that the following options are enabled in COS 7:

- 801 Incoming Trunk Call Rotary
- 802 Limited Wait for Dial Tone
- 811 ANIS/DNIS/Class Trunk
- 702 SMDR Overwrite Buffer

❒ Form 04, System Options/System Timers

Ensure that IP trunk-related options are programmed as follows

- Option 86, PRI Card: QSIG: Enabled.
- Option 115, Maximum IP Trunks: 1-30 depending on traffic.
- Option 120, Compression Resources: Compression is recommended with IP trunks to conserve bandwidth.
- Option 132, DSP Configuration Option: Business 1, Business 2, Hotel, Analog 1, Analog 2, or Analog 3.

  Does the DSP Configuration match the hardware installed and Compression Resources purchased? It may be necessary to purchase an additional DSP card(s) to satisfy DSP Configuration and Compression requirements. For more information, see "DSP Configuration Options" on page 12.

- ❒ Form 13 Trunk Circuit Descriptor
  - There should be a descriptor number with Trunk Type T1 E&M for the IP Trunks. All IP trunks enabled should be programmed here and have a Comment identifying them as IP trunks for future reference.
- ❒ Form 15 Dial In Trunk
  - Ensure that COS 7 is programmed for the IP Trunks along with the correct Circuit Descriptor (CDN) that was created in Form 13. Verify other settings (COR, Ten, N, M, X) and add a Comment identifying the trunks as IP trunks for future reference.
  - Enable QSIG Supplementary Services.
- ❒ Form 16 Trunk Groups
  - Ensure there is a trunk group for the IP Trunks.
- ❒ Form 23 ARS - Route Definition
  - Ensure that there is a route for every remote node networked using IP trunks. For example, if there is a 3300 ICP and another SX-200 ICP in the network, then there should be two routes.

Note: When the cursor is on a route for an IP Trunk, a softkey labelled SHOW IP will appear. Press the softkey to list all routes programmed for IP Trunks. Ensure that Concurrent Call, Compression, Remote Profile and IP Node are all programmed. If the far end is a 3300, Remote Profile must be set to 1.

- ❒ Form 26 ARS - Digit Strings
  - Make sure there is a digit string programmed which will route calls (see Form 23 for the correct Route number) to the remote ICP systems.
- ❒ Form 48 - Voice Networking
  - Make sure that the correct IP Node is entered. Each IP-PBX (node) has a unique IP Node number that all the other IP-PBXs must have in their programming. The form lists the local site as Bay 1 with no IP address; the other sites have no Bay association. Comments should be entered with information such as the location and IP-PBX type. Knowing the amount of traffic expected to each remote node will determine what the Max Calls field should be set at to avoid congestion.

Note: MAX CALLS must be greater than zero (the default); otherwise, no calls are allowed to the node.

Considerations:

a. Is one IP Trunk route the primary route used, and if the far end node is down, will it use the other IP Trunking Route (assumes a three node network)? If so, then Max calls could be set to 24 on both routes since you will only use one route at any given time.

b. If both routes will be used and traffic is assumed to be higher (e.g., eight calls per route at any given time), then the Max calls would more likely be set to 12 or lower.

IP Check List

Refer to "Maintaining Voice Quality of Service" in SX-200 ICP Documentation for more information on the subject matter discussed in this section.

- ❒ Communicate with the engineer responsible for remote node(s) and gather information about the IP Trunk requirements.
- ❒ Gather information about the "pipe" between your location and the far location.
  - Is it ADSL? ADSL has fast download speeds but slow upload speeds, plus it usually relies on DHCP to provide local addressing, which affects the programming in CDE (SX-200 ICP must have a fixed IP Address that won't change at the far end IP Trunk connections).
  - What is the bandwidth? How much of the bandwidth will be used for data? Are there any times of the day when the bandwidth is utilized more than other times? Is the pipe ever removed for general maintenance or is it susceptible to weather or environmental impacts (anything that will affect your ability to provide proper service). Do I need Compression Options based on my findings (refer to the CDE Checklist at beginning of the section)?
- ❒ Gather the IP Addresses for the far end. Ping from both ends to ensure there is a connection.
- ❒ Using ARS, get the far end to call you and you call them.
  - Refer to SMDR to get information on what you are dialing and what is being dialed from the other end.

Appendix A
Default Database Values

Default Database

Table 60: CDE Forms

FORM NUMBER	FORM NAME
01	System Configuration
02	Feature Access Codes
03	COS Define
04	System Options/System Timers
05	Tenant Interconnection Table
06	Tenant Night Switching Control
07	Console Assignments
08	Attendant LDN Assignments
09	Desktop Device Assignments
10	Pickup Groups
11	Data Circuit Descriptor
12	Data Assignment
13	Trunk Circuit Descriptors
14	Non-Dial-In Trunks
15	Dial-In Trunks
16	Trunk Groups
17	Hunt Groups
18	Miscellaneous System Ports
19	Call Rerouting Table
20	ARS: COR Group Definition
21	ARS: Day Zone Definition
22	ARS: Modified Digit Table
23	ARS: Route Definition
24	ARS: Route Lists
25	ARS: Route Plans
26	ARS: Digit Strings
27	ARS: Maximum Dialed Digits
28	Form Access Restriction Def'n.
29	DTE Profile
30	Device Interconnection Table
31	System Abbreviated Dial Entry

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Table 60: CDE Forms (continued)

FORM NUMBER	FORM NAME
32	CDE Data Print
33	Account Code Entry
34	Directed IO
35	Global Find Access Code
36	Modem Assignment
37	Guest Rm SUPERSET Keys Template
38	ACD Keys Template
39	ACD Agent Groups
40	ACD Supervisors
41	ACD Paths
42	T1 Link Descriptors
43	T1 Link Assignment
44	Network Synchronization
45	Not Used
46	Key System Toll Control
47	DHCP Parameters
48	Voice Networking
49	Voice mail
50	Mailboxes
51	Voice mail Distribution Lists
52	Email
53	Bay Location Assignment
54	Calling Pary Number
55	Digit Translation Table

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Default Database Values

This section lists the values in the default CDE database. Only forms with data in them are listed.

Note: The controller is identified as the “IP Bay” in some CDE forms. The default bay number of the IP bay is bay 1. However, when an SX-200 EL/ML database is installed to migrate the system to an SX-200 ICP, the IP bay becomes bay number 8.

Form 01 - System Configuration

BAY	SLT	CCT	PROGRAMMED	COMMENTS
01	01	IP LINE CARD	IP LINE CARD	
01	02	IP LINE CARD	IP LINE CARD	
01	03	IP LINE CARD	IP LINE CARD	
01	04	IP LINE CARD	IP LINE CARD	
01	05	IP LINE CARD	IP LINE CARD	
01	06	IP TRUNK CARD	IP TRUNK CARD	
01	07	IP LINE CARD	IP LINE CARD	
01	08	---	---	
01	09	IP LINE CARD	IP LINE CARD	
01	10	IP LINE CARD	IP LINE CARD	
01	11	VOICE MAIL CARD	VOICE MAIL CARD	
01	12	VOICE MAIL CARD	VOICE MAIL CARD	
01	13	ONBOARD ASU	ONBOARD ASU	

Form 02 - Feature Access Codes

FEATURE	FEATURE NAME	ACCESS CODE
01	Account Code Access	*01
02	Auto-Answer Activation	
03	Call Forwarding - All Calls	*03
04	Call Forwarding - Internal Only	*04
05	Call Forwarding - External Only	*05
06	Call Forwarding - I'm Here	*06
07	Call Forwarding - Cancel I'm Here	*07
08	Dial Call Pickup	*08
09	Directed Call Pickup	*09
10	Do Not Disturb	*10
11	Extension General Attendant Access	0

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FEATURE	FEATURE NAME	ACCESS CODE
12	Paging Access To Default Zone(s)	*12
13	Paging Access To Specific Zones	*13
14	TAFAS - Any	*14
15	TAFAS - Local Tenant	*15
16	Hold Pickup Access (Attendant Hold Slots)	*16
17	Console Lockout Access Code	
18	Maintenance Functions (Test Line)	
19	Direct Inward System Access	
20	Callback Busy <<single digit>>	
21	Call Hold	*21
22	Call Hold Retrieve (Local)	*22
23	Call Hold Retrieve (Remote)	*23
24	Abbreviated Dial Access	*24
25	Clear All Features	*25
26	SUPERSET Telephone Loopback Test	
27	Tone Demonstration	
28	ADL Call Setup	
29	ADL Disconnect	
30	Last Number Redial	*30
31	Executive Busy Override <<single digit>>	
32	Automatic Wake-up	
33	Call Park	*33
34	Node ID	
35	Maid In Room	
36	SUPERSET Room Status Display	
37	Direct To ARS	
38	UCD Agent Login/Logout	
39	Analogue Network Accept Callers Extension	
40	SUPERSET Maid In Room Status Display	
41	Send Message	*41
42	Call Message Sender of Oldest Message	*42
43	Callback - No Answer	
44	ACD Login/Logout	
45	Silent Monitoring	
46	Flash over Trunk	
47	Program Feature Key	
48	Key System - Direct Paging	*48

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FEATURE	FEATURE NAME	ACCESS CODE
49	Key System - Group Page - Meet Me Answer	*49
50	Key System - Direct CO Line Select	
51	Key System - Store Personal Speed Call	*51
52	Key System - Retrieve Personal Speed Call	*52
53	Double Flash over Trunk	
54	Analog Network Accept Call Forward Data	
55	Analog Network Accept Call Forward Reason	
56	Headset Mode On/Off	
57	Call Park Orbit Retrieve	*57
58	IP Set Registration PIN	***
59	IP Set Replacement PIN	###
60	IP Set Language Selection	
61	Disable Twin Phone	
62	Call Park Remote	*62
63	Call Park and Page - Telephone	*63
64	Call Park and Page - PA	*64
65	Phonebook	*65
66	Open Door	*66
67	Digit Translation Table Access	
68	Secure Hot swap/unswap	

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Form 03 - Class of Service

OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
100	Attendant Bell Off				X			
101	Attendant O/G Restriction/Room Status Setup				X			
102	Attendant Display of System Alarms				X			
103	Attendant DISA Code Setup				X			
104	Attendant Flexible Night Service Setup				X			
105	Attendant Guest Room Key				X			
106	Attendant New Call Tone			X	X			

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OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
107	Attendant Automatic Call Forward - No Answer				X			
108	Attendant Audible Alarm				X			
109	Attendant Serial Call				X			
110	Attendant Abbr. Dial Confidential Number Display				X			
111	Attendant Abbreviated Dial Programming			X	X			
112	Attendant Station Busy-Out				X			
113	Attendant Call Block Key				X			
114	Attendant Trunk Busy-Out				X			
115	Attendant-Timed Recall (No Ans) 5 -240 s; 0=Disable	30	30	30	30	30	30	30
116	Attendant-Timed Recall (Hold) 5 - 240 s; 0=Disable	30	30	30	30	30	30	30
117	Attendant-Timed Recall (Camp-On) 5 - 240 s; 0=Disable	30	30	30	30	30	30	30
118	Attendant Call Forward - No Answer Timer 10 - 240 s.	30	30	30	30	30	30	30
119	Attendant Tone Signaling			X	X			
120	Attendant Conference Disable				X			
121	Attendant Station Do Not Disturb				X			
122	Setup Time/Date							
123	Attendant Call Forward Setup and Cancel			X	X			
124	Attendant Hold Position Security							
125	Attendant Multi-New Call Tone			X	X			
126	Apply Key Line Conference Warning Tone	X	X	X	X	X	X	X
150	Sub-Attendant Station Setup Advisory Messages				X			
151	RESERVED							
152	RESERVED							
153	RESERVED							
200	Account Code, Forced Entry - External Calls							
201	Account Code, Forced Entry - Long Distance Calls							
202	Alarm Call							
203	Broker's Call							
204	Call Block Applies (Room To Room)							
205	Flash For Waiting Call							

OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
206	Call Forwarding - Busy	X	X	X	X			
207	Call Forwarding - No Answer	X	X	X	X			
208	Call Forwarding - External	X	X	X	X			
209	Call Forwarding – Always	X	X	X	X			
210	Call Forwarding Inhibit on Dial-In Trunks							
211	Call Hold and Retrieve Access	X	X	X	X			
212	Can Flash If Talking to an Incoming Trunk	X	X	X	X		X	
213	Can Flash If Talking to an Outgoing Trunk	X	X	X	X			
214	Cannot Dial a Trunk after Flashing							
215	Cannot Dial a Trunk if Holding or in Conference with One							
216	Data Security						X	
217	Direct To ARS							
218	Directed Call Pickup	X	X	X	X			
219	Discriminating Dial Tone	X	X	X	X			
220	Do Not Disturb	X	X	X	X			
221	Clear All Features				X			
222	Call Forward Inhibit on Hold Timeout	X		X	X			
223	Flash Disable							
224	Flash for Attendant							
225	Hold Pickup (Attendant Paged Access)	X		X				
226	Inward Restriction (DID)							
227	Lockout Alarm Applies							
228	Manual Line (Dial 0 Hotline)							
229	Voice Mail Port						X	X
230	Message Register Overflow Alarm							
231	Message Waiting Setup - Bell							
232	Message Waiting Setup - Lamp		X					
233	Never a Consultee							
234	Never a Forwardee							
235	Originate Only							

OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
236	Outgoing Trunk Callback							
237	Outgoing Trunk Camp-On							
238	Override Security						X	
239	Priority Dial 0						X	
240	Line Privacy	X	X	X	X	X	X	X
241	Receive Only							
242	Repeated Camp-On Beep							
243	Non-Busy Extension							
244	Room Status Applies							
245	Abbreviated Dialing Access	X	X	X	X		X	X
246	SMDR - Extended Record							
247	SMDR - Record Meter Pulses							
248	TAFAS Any Access	X		X				
249	TAFAS Access Tenant	X		X				
250	TAFAS Access During Day Service	X		X				
251	Transfer Dial Tone	X	X	X	X		X	
252	Broker's Call with Transfer							
253	Call Forward - Don't Answer Timer (2 - 6 Rings)	3	3	3	3	3	3	3
254	Call Hold Recall Timer (PBX Telephones) 0 - 10 Minutes	1	1	1	1	1	1	1
255	Repeated Camp-On Beeps Timer (5 - 15 Seconds)	10	10	10	10	10	10	10
256	UCD Music On Hold Timer (0 - 50 Minutes)	0	0	0	0	0	0	0
257	Flash Over Trunk							
258	Display Prime as Forwarder	X	X	X	X	X	X	X
259	Message Sending	X		X	X		X	X
260	Internal / External Split Call Forwarding							
261	ONS Voice Mail Port							
262	Ignore Forward Busy with Free Appearance	X		X				
263	Delay Ring Timer (2 - 6 Rings)	3	3	3	3	3	3	3
264	Half Fwd NA timer for DID call with VM msg on							
265	Voice Mail System Speed Dial Index (0-255)							

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OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
266	Camp-on before Forward on Busy							
267	Softkey Support for Voice Mail	X		X				
268	Record a Call in Voice Mail							
269	Record a Call: Start Recording Automatically							
270	Record a Call: Start Recording on Hangup							
271	Privacy Released at Start of Call							
272	Guest Suite Extension							
273	Display Held Caller ID to ONS/CLASS							
274	ONS Ring Group Member							
275	Single Button Transfer to Voice mail			X	X			
276	Twin Phone							
277	Automatic Mailbox Creation	X		X	X			
278	Intercom Mode							
279	Display Account codes on Phone	X		X	X			
280	PC (2nd) Port on IP Phone	X						
300	Automatic Callback							
301	Camp-On	X		X	X		X	X
302	Flash-in Conference	X	X	X	X			
303	Paging Zone 1 Access	X	X	X	X			
304	Paging Zone 2 Access							
305	Paging Zone 3 Access							
306	Paging Zone 4 Access							
307	Paging Zone 5 Access							
308	Paging Zone 6 Access							
309	Paging Zone 7 Access							
310	Paging Zone 8 Access							
311	Paging Zone 9 Access							
312	Paging Default (0 - 9) (0 Gives All Enabled Zones)	0	0	0	0	0	0	0
313	CO Trunk to CO Trunk Connect			X	X			
314	CO Trunk to TIE Trunk Connect			X	X			

OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
315	CO Trunk to DID Trunk Connect			X	X			
316	TIE Trunk to TIE Trunk Connect			X	X			
317	TIE Trunk to DID Trunk Connect			X	X			
318	DID Trunk to DID Trunk Connect			X	X			
319	Extension Non-CO Trunk to Trunk Connect			X	X			
320	Transparent Multi-Console Operation							
321	Ignore Call Forward After Transfer							
322	Confirm Wakeup by Off-hook							
323	RESERVED							
324	RESERVED							
325	RESERVED							
326	Account Code, Forced Entry - Data Internal Calls							
327	Account Code, Forced Entry - Data External Calls							
328	Account Code, Forced Entry - Data Long Distance Calls							
329	RESERVED							
330	RESERVED							
331	RESERVED							
400	Contact Monitor							
401	Call Park	X	X	X	X			
402	Long Loop (Off-Premise Extensions Only)							
403	Trunk Recall Partial Inhibit							
404	Recording Failure to Hangup Timer (1 - 255 Seconds)	30	30	30	30	30	30	30
405	Can Initiate Call Monitor							
406	Allow To Be Monitored (0=dis, 1=no beep, 2=beeps)	0	0	0	0	0	0	0
407	RESERVED							
500	Override				X			
501	Override Announce							
502	Display ANI/DNIS/CLASS Information	X		X	X		X	
503	Display CLASS Name	X		X	X			
504	SUPERSET 420 Optional Class Display							

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OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
505	ONS Stations Support CLASS		X					
506	ONS Positive Disconnect	0	0	0	0	0	0	0
507	Station/Set: Allow My Number to be Displayed	X	X	X	X	X	X	X
508	Station/Set: Show Internal Numbers on My Phone		X					
509	Display Caller ID for Non-Prime Lines	X		X				
510	ONS Stations Support CLASS Visual Call Waiting		X					
511	COV Voice Mail Displays Calling							
600	Telephone - Auto-Answer							
601	Telephone - Auto-Hold Disable							
602	Telephone - Background Music			X				
603	Telephone - Disconnect Alarm							
604	Telephone - Automatic Outgoing Line							
605	Telephone - Message Program							
606	Telephone - Enhanced Answering Position							
607	Telephone - Associated Modem Line							
608	Telephone - Room Status Display							
609	Telephone - Night Service Switching			X	X		X	
610	Telephone - Guest Room Template (0 - 3) (DN)	0	0	0	0	0	0	0
611	Telephone - Limited New Call Ring	X		X				
612	Telephone - Headset Operation							
613	Display ANI Information Only	X		X	X		X	
614	Telephone - Handset Volume Saved	X		X				
615	Telephone - Offhook Voice Announce	X		X				
616	Alarm Monitor Point							
617	Immediate Off Hook Alarm							
618	Alarm Audio Level for Sets	Ringer	Ringer	Ringer	Ringer	Ringer	Ringer	Ringer
619	Direct Speak@Ease Access							
620	SUPERSET Telephone - Max Call Logs Allowed <0-20>	0	0	0	0	0	0	0
621	Call Logging - Multiple CO/DTS							

OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
650	ACD - Agent Template (0 - 3; 0 = Disable)	0	0	0	0	0	0	0
651	ACD - Supervisor Template (0 - 3; 0 = Disable)	0	0	0	0	0	0	0
652	ACD - Senior Supervisor Template (0 - 3; 0 = Disable)	0	0	0	0	0	0	0
653	ACD - Agent Always Auto-Answer							
654	ACD - Display Path Always							
655	Allow Continuous Monitor							
680	Key System - Direct CO Access							
681	Key Set/Sub Att. - Call Hold Notify Timer (0 -600 s)							
682	Key System - Auto Answer - Internal Calls (For SUPERSET 3DN and 4DN only)							
683	Key System - Direct Paging Handsfree Answerback	X		X	X			
684	Can Make All Set Page	X		X	X			
685	Can Receive All Set Page	X		X	X			
686	Group Page Includes Overhead Paging							
687	All Set Page Includes Overhead Paging							
688	IP Set Requires Compression							
689	DTS/CO Line Transfer Call Handling							
690	Hold And Page							
691	Telephone - Day/Night1 Switching							
692	Secure Hot Swapping							
700	SMDR - Does Not Apply							
701	No Dial Tone							X
702	SMDR - Overwrite Buffer	X	X	X	X	X	X	X
703	Message Register Applies							
704	Incoming / Internal Modem Pooling Access							
705	Automatic Overflow From Attendant							
706	RESERVED							
707	RESERVED							
708	RESERVED							
709	Follow External Call Forward							

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OPTION NUMBER	COS OPTION / NAME	COS1 - IP SET	COS2 - ONS	COS3- SUB-ATT.	COS4 - CONSOLE	COS5 - LS TRUNK	COS6 - VOICE MAIL	COS7 - IP TRUNK
710	RESERVED							
800	ANI Applies							
801	Incoming Trunk Call Rotary							X
802	Limited Wait for Dial Tone					X		X
803	SMDR - Drop Calls < n Digits (0... 11, 0 = disable)	0	0	0	0	0	0	0
804	SMDR - Drop Incomplete Outgoing Calls							
805	Trunk No Dial Tone Alarm							
806	SMDR - Record Incoming Calls							
807	SMDR - Display Private Speedcall							
808	Special DISA							
809	Standard Ring Applies							
810	DISA During Night Service Only							
811	ANI/DNIS Trunk				X			X
812	Loop Start Trunk to ACD Path Connect							
813	Delay ONS Ring - Wait for Network Name (0-6 s)	0	0	0	0	0	0	0
814	SMDR - Record ANI/DNIS/CLASS							X
815	DTS/CO LINE KEY Honors Forwarding							
816	CENTREX Flash over Trunk							
900	Data Station Queuing							
901	DTRX Herald							
902	DTRX Message Code							
903	DTRX Message Code Text							
904	DTRX Complete Message Text							
905	DTRX Herald Text Select (1- 4)	1	1	1	1	1	1	1
906	DATA SMDR - Does Not Apply							
907	DATA SMDR - Extended Record							
908	DATA SMDR - Overwrite Buffer							

Form 04 - System Options

OPTION NUMBER	SYSTEM OPTIONS	STATUS
01	Clock Format (example 16:00, 4:00, 4:00a)	12HR AM
02	Message Lamp Test Enable	DISABLED
03	Single Paging Amplifier	DISABLED
04	Message Waiting & Message Register Clear Print	DISABLED
05	Verified Account Codes	DISABLED
06	Analogue Networking SMDR	DISABLED
07	Cancel 24-hour Message Waiting	DISABLED
08	Five Digit SMDR	DISABLED
09	Attendant Call Block	DISABLED
10	Attendant Conference Beep	DISABLED
11	Automatic Wake-up	DISABLED
12	Automatic Wake-up Alarm	DISABLED
13	Automatic Wake-up Print	DISABLED
14	Automatic Wake-up Music	DISABLED
15	Data Demultiplexer	DISABLED
16	IP Set Voice Encryption	ENABLED
17	Discriminating Ringing	ENABLED
18	Discriminating Ringing Always	DISABLED
20	Holiday Messages	DISABLED
21	Incoming to Outgoing Call Forward	DISABLED
22	Last Party Clear - Dial Tone	DISABLED
23	Message Reg. Count Additional Supervisions	DISABLED
24	Message Register Audit	DISABLED
25	Message Register Zero After Audit	DISABLED
26	No Overlap Outpulsing	ENABLED
27	Room Status Audit	DISABLED
28	SMDR Indicate Long Calls	DISABLED
29	Telephone Last Number Redial	ENABLED
31	Satellite PBX	DISABLED
32	Outgoing Call Restriction	DISABLED
33	Room Status	DISABLED
34	Auto Room Status Conversion/Auto Wake-up Print	DISABLED
35	DSS/BLF Call Pickup	DISABLED
36	End of Dial Character (#)	DISABLED
37	Calibrated Flash	DISABLED
38	Switch-Hook Flash	ENABLED
39	DATA SMDR Indicate Long Calls	DISABLED
40	Message Register Follows Talker	DISABLED
42	Silent Monitoring	DISABLED
43	ACD Silent Monitoring Beeps	DISABLED
44	ACD Reports	DISABLED
		(Page 1 of 3)

OPTION NUMBER	SYSTEM OPTIONS	STATUS
45	Disable PMS Logs	ENABLED
46	Rotary Dial Digit Translation Plan 0-3	0
47	ARS Unknown Digit Length Time-out 2-60 seconds	5
48	Limited Wait For Dial Tone 1-15 seconds	5
49	Pseudo Answer Supervision Timer 10-60 seconds	20
50	Dialing Conflict Timer 2-10 seconds	5
51	Final Ring Time-out 1-30 minutes	1
52	Minimum Flash Timer 20-50 ms (10 ms inc)	20
53	Maximum Flash Timer 20-150 ms (10 ms inc)	100
54	DISA Answer Timer 1-8 seconds	8
55	Account Code Length Variable or 2-12 digits	6
56	Auto Room Stat Conver/Wakeup Print timer(HH:MM)	00:00
57	Vacant/Reserved Room Default Call Restriction	INTERNAL
58	Occupied Room Default Call Restriction	INTERNAL
59	Receivers Reserved For Non-Auto-Attendant Use	UNKNOWN
60	Tone Plan	NA
61	Class Receivers in Spine Bay #1 (0..5)	3
62	Class Receivers in Spine Bay #2 (0..5)	3
63	Class Receivers in Spine Bay #3 (0..5)	3
64	Class Receivers in Spine Bay #4 (0..5)	3
65	Class Receivers in Spine Bay #5 (0..5)	3
66	Class Receivers in Spine Bay #6 (0..5)	3
67	Class Receivers in Spine Bay #7 (0..5)	3
69	DTMF ON Timer 5-15 (in 10 ms inc)	9
70	DTMF OFF Timer 5-15 (in 10 ms inc)	9
71	Slot 10 FIM Capacity (2 or 3 Bays)	2
72	Slot 11 FIM Capacity (2 or 3 Bays)	2
73	Advance to Daylight Savings Time (mm:dd:hh)	00:01:00
76	Go Back to Standard Time (mm:dd:hh)	00:01:00
79	Daylight - Standard Time difference (30-240min)	60
80	MyAdministrator Access	DISABLED
81	Enter offset from GMT (+/-hh:mm)	-05:00
82	Use DSP Echo Canceller	DISABLED
84	Multiple Guest Suite Phones	DISABLED
85	Speak@Ease Integration	DISABLED
86	PRI Card: Q.sig	DISABLED
87	Record a Call	DISABLED
88	TAPI Desktop (0..50 in increments of 5)	0
89	Class Functionality for ONS Sets	DISABLED
90	ACD Real Time Events	DISABLED
91	PRI Card: NFAS	DISABLED
92	PRI Card: D Channel Backup	DISABLED
93	PRI Card: Remote LAN Access	DISABLED
		(Page 2 of 3)

OPTION NUMBER	SYSTEM OPTIONS	STATUS
94	PRI Card: Min/Max	DISABLED
95	PRI Card: Auto Min/Max	DISABLED
96	Number of Links (0-8)	0
97	Support Softkey Access to Voicemail	DISABLED
98	Support 3DN, 4DN and 400 series Set Types	DISABLED
99	Fax Tone Detection	DISABLED
100	Mitel Options Password	18642413
101	System Identity Code	17591
102	Feature Level (0..99)	0
103	Maximum Devices	32
104	Maximum ACD Agents	0
105	Mitel Application Interface	DISABLED
106	Automated Attendant	ENABLED
107	Lodging	DISABLED
108	Property Management System	DISABLED
109	Remote Software Download	ENABLED
110	Maximum BNIC Cards (0..40)	0
111	Maximum BONS Cards (0..40)	0
112	SS4000 Series Sets	ENABLED
113	Centralized Attendant/VoiceMail	DISABLED
114	Maximum IP Sets	20
115	Maximum IP Trunks	0
120	Number of Compression Resources (0-24)	0
121	Voicemail License for Bilingual Prompts	DISABLED
122	Voicemail License for Personal Contact Numbers	DISABLED
123	Voicemail License for DID Server	DISABLED
124	Voicemail Property Management System	DISABLED
125	Licensed Embedded Voicemail Boxes (0-748)	20
126	Email Messaging	DISABLED
127	Autoselect Park Orbits	ENABLED
128	Phonebook	DISABLED
129	Attendant Park and Page Key	DISABLED
130	Paging Tone	ENABLED
131	PC (2nd) Port on IP Phone	DISABLED
132	DSP Configuration Option	BUSINESS1
133	TDM Bays (0-2)	0
134	Voicemail Recorded Announcement Device	DISABLED
135	Voicemail Control of MWI by DTMF Tones	DISABLED
136	Dual Function Key Timer (1-5)	2
137	Mark SMTP Forwarded Voicemails as Read	ENABLED
138	Country Variant For Disconnect Tone Control	DISABLED
		(Page 3 of 3)

Form 05 - Tenant Interconnection Table

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
01	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02	*	O		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*	*
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*	*
21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*	*
22	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*	*
23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*	*
24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O	*
25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	O

Form 06 - Tenant Night Switching Table

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
01	O	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Form 07 - Console Assignments

BAY	SLT	CCT	EXT NUM	COS	COR	TENANT	COMMENTS	CESID
1	13	02	198	04	01	01		

Form 09 - Desktop Devices Definition

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/01/01	1	100	1	1	5220	01			
1/01/02	1	101	1	1	5220	01			
1/01/03	1	102	1	1	5220	01			
1/01/04	1	103	1	1	5220	01			
1/01/05	1	104	1	1	5220	01			
1/01/06	1	105	1	1	5220	01			
1/01/07	1	106	1	1	5220	01			
1/01/08	1	107	1	1	5220	01			
1/01/09	1	108	1	1	5220	01			
1/01/10	1	109	1	1	5220	01			
1/01/11	1	110	1	1	5220	01			
1/01/12	1	111	1	1	5220	01			
1/01/13	1	112	1	1	5220	01			
1/01/14	1	113	1	1	5220	01			
1/01/15	1	114	1	1	5220	01			
1/01/16	1	115	1	1	5220	01			
1/01/17	1	116	1	1	5220	01			
1/01/18	1	117	1	1	5220	01			
1/01/19	1	118	1	1	5220	01			
1/01/20	1	119	1	1	5220	01			
1/01/21					5020				
1/01/22					5020				
1/01/23					5020				
1/01/24					5020				
1/02/01					5020				
1/02/02					5020				
1/02/03					5020				
1/02/04					5020				
1/02/05					5020				
1/02/06					5020				
1/02/07					5020				
1/02/08					5020				
1/02/09					5020				
1/02/10					5020				
1/02/11					5020				
1/02/12					5020				
1/02/13					5020				

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/02/14					5020				
1/02/15					5020				
1/02/16					5020				
1/02/17					5020				
1/02/18					5020				
1/02/19					5020				
1/02/20					5020				
1/02/21					5020				
1/02/22					5020				
1/02/23					5020				
1/02/24					5020				
1/03/01					5020				
1/03/02					5020				
1/03/03					5020				
1/03/04					5020				
1/03/05					5020				
1/03/06					5020				
1/03/07					5020				
1/03/08					5020				
1/03/09					5020				
1/03/10					5020				
1/03/11					5020				
1/03/12					5020				
1/03/13					5020				
1/03/14					5020				
1/03/15					5020				
1/03/16					5020				
1/03/17					5020				
1/03/18					5020				
1/03/19					5020				
1/03/20					5020				
1/03/21					5020				
1/03/22					5020				
1/03/23					5020				
1/03/24					5020				
1/04/01					5020				
1/04/02					5020				
1/04/03					5020				
1/04/04					5020				

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/04/05					5020				
1/04/06					5020				
1/04/07					5020				
1/04/08					5020				
1/04/09					5020				
1/04/10					5020				
1/04/11					5020				
1/04/12					5020				
1/04/13					5020				
1/04/14					5020				
1/04/15					5020				
1/04/16					5020				
1/04/17					5020				
1/04/18					5020				
1/04/19					5020				
1/04/20					5020				
1/04/21					5020				
1/04/22					5020				
1/04/23					5020				
1/04/24					5020				
1/05/01					5020				
1/05/02					5020				
1/05/03					5020				
1/05/04					5020				
1/05/05					5020				
1/05/06					5020				
1/05/07					5020				
1/05/08					5020				
1/05/09					5020				
1/05/10					5020				
1/05/11					5020				
1/05/12					5020				
1/05/13					5020				
1/05/14					5020				
1/05/15					5020				
1/05/16					5020				
1/05/17					5020				
1/05/18					5020				
1/05/19					5020				

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/05/20					5020				
1/05/21					5020				
1/05/22					5020				
1/05/23					5020				
1/05/24					5020				
1/07/01					5020				
1/07/02					5020				
1/07/03					5020				
1/07/04					5020				
1/07/05					5020				
1/07/06					5020				
1/07/07					5020				
1/07/08					5020				
1/07/09					5020				
1/07/10					5020				
1/07/11					5020				
1/07/12					5020				
1/07/13					5020				
1/07/14					5020				
1/07/15					5020				
1/07/16					5020				
1/07/17					5020				
1/07/18					5020				
1/07/19					5020				
1/07/20					5020				
1/07/21					5020				
1/07/22					5020				
1/07/23					5020				
1/07/24					5020				
1/09/01					5020				
1/09/02					5020				
1/09/03					5020				
1/09/04					5020				
1/09/05					5020				
1/09/06					5020				
1/09/07					5020				
1/09/08					5020				
1/09/09					5020				
1/09/10					5020				

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/09/11					5020				
1/09/12					5020				
1/09/13					5020				
1/09/14					5020				
1/09/15					5020				
1/09/16					5020				
1/09/17					5020				
1/09/18					5020				
1/09/19					5020				
1/09/20					5020				
1/09/21					5020				
1/09/22					5020				
1/09/23					5020				
1/09/24					5020				
1/10/01					5020				
1/10/02					5020				
1/10/03					5020				
1/10/04					5020				
1/10/05					5020				
1/10/06					5020				
1/10/07					5020				
1/10/08					5020				
1/10/09					5020				
1/10/10					5020				
1/10/11					5020				
1/10/12					5020				
1/10/13					5020				
1/10/14					5020				
1/10/15					5020				
1/10/16					5020				
1/10/17					5020				
1/10/18					5020				
1/10/19					5020				
1/10/20					5020				
1/10/21					5020				
1/10/22					5020				
1/10/23					5020				
1/10/24					5020				
1/11/01	1	301	6	1	VMAIL		VMAIL 1		

B/S/CCT	TEN	EXTN	COS	COR	TYPE	PAGE	NAME	ASSOC	COMMENTS /CESID/MAC
1/11/02	1	302	6	1	VMAIL		VMAIL 2		
1/11/03	1	303	6	1	VMAIL		VMAIL 3		
1/11/04	1	304	6	1	VMAIL		VMAIL 4		
1/11/05	1	305	6	1	VMAIL		VMAIL 5		
1/11/06	1	306	6	1	VMAIL		VMAIL 6		
1/11/07	1	307	6	1	VMAIL		VMAIL 7		
1/11/08	1	308	6	1	VMAIL		VMAIL 8		
1/11/09	1	309	6	1	VMAIL		VMAIL 9		
1/11/10	1	310	6	1	VMAIL		VMAIL 10		
1/11/11	1	311	6	1	VMAIL		VMAIL 11		
1/11/12	1	312	6	1	VMAIL		VMAIL 12		
1/12/01	1	313	6	1	VMAIL		VMAIL 13		
1/12/02	1	314	6	1	VMAIL		VMAIL 14		
1/12/03	1	315	6	1	VMAIL		VMAIL 15		
1/12/04	1	316	6	1	VMAIL		VMAIL 16		
1/12/05	1	317	6	1	VMAIL		VMAIL 17		
1/12/06	1	318	6	1	VMAIL		VMAIL 18		
1/12/07	1	319	6	1	VMAIL		VMAIL 19		
1/12/08	1	320	6	1	VMAIL		VMAIL 20		
1/12/09	1	321	6	1	VMAIL		VMAIL 21		
1/12/10	1	322	6	1	VMAIL		VMAIL 22		
1/12/11	1	323	6	1	VMAIL		VMAIL 23		
1/12/12	1	324	6	1	VMAIL		VMAIL 24		
1/13/01	1	199	3	1	Sub	01			
1/13/03	1	200	2	1	Stn				
1/13/04	1	201	2	1	Stn				
1/13/05					Stn				
1/13/06					Stn				

Form 09 - Desktop Line Appearance Definition

KEY	TYPE	DIR	RING	SEC	DSS	EXT NUM	TRK NUM	LABEL	R#
*01	Prime	In/Out	Immed	No		100			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		101			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		102			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		103			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		104			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9

KEY	TYPE	DIR	RING	SEC	DSS	EXT NUM	TRK NUM	LABEL	R#
*01	Prime	In/Out	Immed	No		105			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		106			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		107			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		108			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		109			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9

KEY	TYPE	DIR	RING	SEC	DSS	EXT NUM	TRK NUM	LABEL	R#
*01	Prime	In/Out	Immed	No		110			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		111			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		112			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		113			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		114			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9

KEY	TYPE	DIR	RING	SEC	DSS	EXT NUM	TRK NUM	LABEL	R#
*01	Prime	In/Out	Immed	No		115			
02	CO Line	In/Out	Immed	No			1		9
04	CO Line	In/Out	Immed	No			2		9
06	CO Line	In/Out	Immed	No			3		9
08	CO Line	In/Out	Immed	No			4		9
10	CO Line	In/Out	Immed	No			5		9
12	CO Line	In/Out	Immed	No			6		9
*01	Prime	In/Out	Immed	No		116			
*01	Prime	In/Out	Immed	No		117			
*01	Prime	In/Out	Immed	No		118			
*01	Prime	In/Out	Immed	No		119			
*01	Prime	In/Out	Immed	No		301			
*01	Prime	In/Out	Immed	No		302			
*01	Prime	In/Out	Immed	No		303			
*01	Prime	In/Out	Immed	No		304			
*01	Prime	In/Out	Immed	No		305			
*01	Prime	In/Out	Immed	No		306			
*01	Prime	In/Out	Immed	No		307			
*01	Prime	In/Out	Immed	No		308			
*01	Prime	In/Out	Immed	No		309			
*01	Prime	In/Out	Immed	No		310			
*01	Prime	In/Out	Immed	No		311			
*01	Prime	In/Out	Immed	No		312			
*01	Prime	In/Out	Immed	No		313			
*01	Prime	In/Out	Immed	No		314			
*01	Prime	In/Out	Immed	No		315			
*01	Prime	In/Out	Immed	No		316			
*01	Prime	In/Out	Immed	No		317			
*01	Prime	In/Out	Immed	No		318			
*01	Prime	In/Out	Immed	No		319			
*01	Prime	In/Out	Immed	No		320			
*01	Prime	In/Out	Immed	No		321			
*01	Prime	In/Out	Immed	No		322			
*01	Prime	In/Out	Immed	No		323			
*01	Prime	In/Out	Immed	No		324			
*01	Prime	In/Out	Immed	No		199			
02	Recall		Immed					RECALL	
04	Hold Pos								
06	Hold Pos								
08	Hold Pos								

Form 09 - Paging Groups

[PAGING GROUP: 01] [ ]	EXTN	BAY	SLT	CCT	COMMENTS
	100	01	01	01	
	101	01	01	02	
	102	01	01	03	
	103	01	01	04	
	104	01	01	05	
	105	01	01	06	
	106	01	01	07	
	107	01	01	08	
	108	01	01	09	
	109	01	01	10	

Form 10 - Pickup Groups

****** CDE DATA PRINT OPTION 10 FORM IS EMPTY ******

Form 11 - Data Circuit Descriptor

[DESCRIPTOR NUMBER : 1] PARAMETER	VALUE
Session Inactivity Disconnect Timer 0 - 255 minutes	0
Guard Timer 0 - 99 seconds	2
Minimum Baud Rate	110
Default Baud Rate	9600
Maximum Baud Rate	19200
Always Use Default Baud Rate When Called	NO
DTR Off Disconnect Timer 0 - 99 seconds	5
DTR To CTS Delay Timer 0 - 9900 msec (100 msec inc)	100
DTR Forced High	NO
RTS Forced High	NO
DSR Is Held High When Device Is Idle	YES
CTS Is Held High When Device Is Idle	YES
Originate A DTRX Call With A Low->High Transition of DTR	NO
Action Taken If The Idle DTE Has DTR Low (Auto Answer)	REFUSE
Pooled Modem Communication Established Indicator	DCD
First Modem Tone (2025 Hz, 2100 Hz, 2225 Hz)	2025Hz
Second Modem Tone (2025 Hz, 2100 Hz, 2225 Hz)	2225Hz
ASYNC: Keyboard Origination Allowed (Auto Baud)	YES
ASYNC: ADL Auto Baud	NO
	(Page 1 of 2)

[DESCRIPTOR NUMBER : 1] PARAMETER	VALUE
ASYNC: Flow Control	XON/OFF
ASYNC: XON Character (0 - 127, decimal value of ASCII code)	17
ASYNC: XOFF Character (0 - 127, decimal value of ASCII code)	19
ASYNC: Break Key Function	SYSATT
ASYNC: PBX Attention Character (0 - 127)	4
ASYNC: Parity	ODD
ASYNC: Character Length (7 - 8 ; 8 bits implies no parity)	7
ASYNC: Number of Stop Bits (1 - 2)	1
ASYNC: Autobaud To Host Character 1 (0 - 127)	13
ASYNC: Autobaud To Host Character 2 (0 - 127)	0
ASYNC: Delay Between Autobaud Characters 0-1270 msec (10msec inc)	100
DS2100: Operating Mode (ASYNC, SYNC)	ASYNC.
SYNC: Rate Adaptation Scheme (MiNET, X.31)	MiNET
SYNC: Clock Source (INTERNAL, SYSTEM, TX EXT, TX & RX EXT)	INTERNAL
	(Page 2 of 2)

Form 11 - Data Circuit Descriptor Review

****** CDE DATA PRINT OPTION 11* FORM IS EMPTY ******

Form 12 - Data Assignment Table

BAY	SLT	CCT	TYPE	TEN	EXT	NUM	COS	COR	CDN	DTE	AVL	HOTLINE	COMMENTS
1	13	01											
1	13	02											
1	13	19											
1	13	20											
1	13	21											
1	13	22											
1	13	23											
1	13	24											
1	13	25											
1	13	26											
1	13	27											
1	13	28											

Form 13 - Trunk Circuit Descriptor

[AMB TRUNK: 1] OPTION NAME [SUPERVISION PARAMETER]		STATUS
Reverse to Idle		NO
Far-end gives answer supervision		NO
Inhibit automatic supervision		NO
No seize alarm		NO
No release alarm		NO
Line length		LONG
Save Busy-Out Status		YES
Impedance		COMPLEX
Calling party disconnect timer	1 - 12 minutes	5
Ignore remote disconnect		NO
Disconnect timer	100 - 9900 ms (100 ms inc)	500
Supervision direction: incoming trunk calls also		NO
Guard timer	0 - 3000 ms (100 ms inc)	800
Class trunk		YES
Ring cycle timer	6 - 10 seconds	6
Ignore line reversal during seizure		YES
Ringing expected		YES
Ringing debounce timer	5 - 12 seconds	6
Seize timer	10 - 60 s (10 s inc)	60
Flash timer	200 - 700 ms (100 ms inc)	300
Flash over trunk		NO
Direct access on CO Line Keys: bypass Key System Toll Control		NO

[T1 E&M TRUNK: 7] OPTION NAME		STATUS
Reverse to Idle		NO
Far-end gives answer supervision		NO
Inhibit automatic supervision		NO
No seize alarm		NO
No release alarm		NO
Line Length		LONG
DTMF		NO
Save Busy-Out Status		YES
Disconnect timer	1 - 12 minutes	5
Release acknowledge timer	2 - 240 s (2 s inc)	40
Guard timer	200 - 1000 ms (100 ms inc)	800
Incoming start type		WINK
Debounce timer	20 - 150 ms (10 ms inc)	100

(Page 1 of 2)

[T1 E&M TRUNK: 7] OPTION NAME		STATUS
Wink timer	150 - 300 ms (50 ms inc)	200
Outgoing start type		WINK
Digit outpulsing ratio		60/40
Outpulse delay timer	100 - 2000 ms (100 ms inc)	800
Flash timer	200 - 700 ms (100 ms inc)	300
Flash type		LOOP FSH
Flash over trunk		NO
Interdigit timer	300 - 800 ms (100 ms inc)	800
Wait for delay timer	300 - 5000 ms (100 ms inc)	5000
Remote end is a satellite		NO
Remote end is a satellite with OPS lines		NO
Direct access on CO Line Keys: bypass Key System Toll Control		NO
Release Link Trunk		NO
QSIG Supplementary Services		YES
Present Node ID over IP Trunking		NO
		(Page 2 of 2)

Form 13 - Audio Configuration Table

TRK	BAY	SLT	CCT	LENGTH	IMPEDANCE	TEL NO	MWT	COMMENTS
1				AUTO	AUTO			
2				AUTO	AUTO			
3				AUTO	AUTO			
4				AUTO	AUTO			
5				AUTO	AUTO			
6				AUTO	AUTO			

Form 13 - Trunk Circuit Descriptor Review

[AMB TRUNK: 1]	TRK NUM	BAY	SLT	CCT	COMMENTS
	1	1	13	7	
	2	1	13	8	
	3	1	13	9	
	4	1	13	10	
	5	1	13	11	
	6	1	13	12	

Form 14 - Non Dial-In Trunks

BAY	SLT	CCT	COS	TEN	DAY	N1	N2	CDN	TK NUM	TK NAME	COMMENTS
1	06	01									
1	06	02									
1	06	03									
1	06	04									
1	06	05									
1	06	06									
1	06	07									
1	06	08									
1	06	09									
1	06	10									
1	06	11									
1	06	12									
1	06	13									
1	06	14									
1	06	15									
1	06	16									
1	06	17									
1	06	18									
1	06	19									
1	06	20									
1	06	21									
1	06	22									
1	06	23									
1	06	24									
1	06	25									
1	06	26									
1	06	27									
1	06	28									
1	06	29									
1	06	30									
1	13	07	5	1				1	1	LINE 1	
1	13	08	5	1				1	2	LINE 2	
1	13	09	5	1				1	3	LINE 3	
1	13	10	5	1				1	4	LINE 4	
1	13	11	5	1				1	5	LINE 5	
1	13	12	5	1				1	6	LINE 6	
1	13	13									
1	13	14									
1	13	15									
1	13	16									
1	13	17									
1	13	18									

Form 15 - Dial-In Trunks

BAY	SLT	CCT	COS	COR	TEN	N	M	X	CDN	TK NUM	TK NAME	COMMENTS
1	06	01										
1	06	02										
1	06	03										
1	06	04										
1	06	05										
1	06	06										
1	06	07										
1	06	08										
1	06	09										
1	06	10										
1	06	11										
1	06	12										
1	06	13										
1	06	14										
1	06	15										
1	06	16										
1	06	17										
1	06	18										
1	06	19										
1	06	20										
1	06	21										
1	06	22										
1	06	23										
1	06	24										
1	06	25										
1	06	26										
1	06	27										
1	06	28										
1	06	29										
1	06	30										
1	13	13										
1	13	14										
1	13	15										
1	13	16										
1	13	17										
1	13	18										

Form 16 - Trunk Groups

[GRP:01-LOCAL] [SMDR][TERM]	TK NUM	BAY	SLT	CCT	COMMENTS
	6	01	13	12	
	5	01	13	11	
	4	01	13	10	
	3	01	13	09	
	2	01	13	08	
	1	01	13	07	

Form 17 - Hunt Groups

[GRP 01:300] [TERM]STN/SET]	EXT NUM	BAY	SLT	CCT	COMMENTS
	301	01	11	01	
	302	01	11	02	
	303	01	11	03	
	304	01	11	04	

Form 17 - Hunt Group Options

[GRP 01:300] [TERM] STN/SET]	OPTIONS
Name	VMail
Overflow	
Record-a-Call: Maximum Port Usage (1-20)	0
System Greeting (1-8)	1

Form 18 - Miscellaneous System Ports

ENTRY	DESCRIPTION	BAY	SLT	CCT	SCT	DIR	PAGER	EXT #
01	Music On Hold	01	13	29	01			
02	Pager 1	01	13	30	02	1		
03	Pager 2							
04	Pager 3							
05	Pager 4							
06	Pager 5							
07	Pager 6							
08	Pager 7							
09	Pager 8							
10	Pager 9							
11	Minor Alarm							
12	Major Alarm							
13	Critical Alarm							
14	Night Bell 01	01	13	29	01			340
15	Night Bell 02							
16	Night Bell 03							
17	Night Bell 04							
18	Night Bell 05							
19	Night Bell 06							
20	Night Bell 07							
21	Night Bell 08							
22	Night Bell 09							
23	Night Bell 10							
24	Night Bell 11							
25	Night Bell 12							
26	Night Bell 13							
27	Night Bell 14							
28	Night Bell 15							
29	Night Bell 16							
30	Night Bell 17							
31	Night Bell 18							
32	Night Bell 19							
33	Night Bell 20							
34	Night Bell 21							
35	Night Bell 22							
36	Night Bell 23							
37	Night Bell 24							
38	Night Bell 25							
39	Door Relay 1							
40	Door Relay 2							
41	Door Relay 3							
42	Door Relay 4							

Form 19 - Call Rerouting Table

[TENANT : 01] TYPE OF CALL	DAY	N1	N2
Station Dial 0 Routing	100	100	100
Priority Dial 0 Routing	100	100	100
DID Recall Points On Busy			
DID Recall Points On No Answer			
DID Routing For Calls Into This Tenant			
DID Illegal # Intercept For This Tenant			
DID Vacant Number Routing For This Tenant			
DID Attendant Access Night Points	-----		
Non-Dial-In Trunks Alternate Recall Points			
Dial-In Tie Recall Points On Busy			
Dial-In Tie Recall Points On No Answer			
Dial-In Tie Routing For Calls Into This Tenant			
Dial-In Tie Illegal # Intercept For This Tenant			
Dial-In Tie Vacant Number Routing For This Tenant			
Dial-In Tie Attendant Access Night Point	-----		
DND Intercept Routing For This Tenant			
Automatic Wake-up Routing For This Tenant			
Personal Wake-up Routing For This Tenant			
UCD/Attendant Recording For This Tenant			
UCD On Hold Time-Out For This Tenant			
DISA Day Service Routing For This Tenant		-----	-----
Station Vacant Number Routing For This Tenant			
CO Line Routing Points On No Answer	300	300	300
Music Sources For This Tenant			
Record a Call Voicemail Destination For This Tenant			
Station Illegal Number Routing For This Tenant			
Speak@Ease Number For This Tenant			
Call Forward Busy Number For This Tenant	300	300	300
Call Forward No Answer Number For This Tenant	300	300	300
Voicemail Number For This Tenant			
ONS Notification Number For 911 Calls and Lockouts			
Phonebook Number for This Tenant			
Message Key Routing For This Tenant			

Form 20 - ARS COR Group Definition

COR GROUP	COR GROUP MEMBERS (SEPARATE WITH SPACES)	COMMENTS
01	1	

Form 21 - ARS Day Zone Definition

DAY ZONE	SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
01	*	*	*	*	*	*	*
02							
03							

Form 27- ARS Maximum Number of Dialed Digits

COR	MAXIMUM NUMBER OF DIALED DIGITS
1	Unlimited
2	Unlimited
3	Unlimited
4	Unlimited
5	Unlimited
6	Unlimited
7	Unlimited
8	Unlimited
9	Unlimited
10	Unlimited
11	Unlimited
12	Unlimited
13	Unlimited
14	Unlimited
15	Unlimited
16	Unlimited
17	Unlimited
18	Unlimited
19	Unlimited
20	Unlimited
21	Unlimited
22	Unlimited
23	Unlimited
24	Unlimited
25	Unlimited

Form 28- Form Access Restriction

FORM NAME	INST	MAINT1	MAINT2	SUPER	ATT
01 = SYSTEM CONFIGURATION	R/W	R/W	none	none	none
02 = FEATURE ACCESS CODES	R/W	R/W	none	none	none
03 = COS DEFINE	R/W	R/W	none	none	none
04 = SYS OPTIONS/SYS TIMERS	R/W	R/W	none	none	none
05 = TENANT INTERCONNECTION	R/W	R/W	none	none	none
06 = TENANT NIGHT SWITCHING	R/W	R/W	none	none	none
07 = CONSOLE ASSIGNMENTS	R/W	R/W	none	none	none
08 = ATTENDANT LDN ASGN	R/W	R/W	none	none	none
09 = DESKTOP DEVICE ASSIGNMENTS	R/W	R/W	none	none	none
10 = PICKUP GROUPS	R/W	R/W	none	none	none
11 = DATA CIRCUIT DESCRIPTOR	R/W	R/W	none	none	none
12 = DATA ASSIGNMENT	R/W	R/W	none	none	none
13 = TRUNK CIRCUIT DESC	R/W	R/W	none	none	none
14 = NON-DIAL-IN TRUNKS	R/W	R/W	none	none	none
15 = DIAL-IN TRUNKS	R/W	R/W	none	none	none
16 = TRUNK GROUPS	R/W	R/W	none	none	none
17 = HUNT GROUPS	R/W	R/W	none	none	none
18 = MISC SYSTEM PORTS	R/W	R/W	none	none	none
19 = CALL REROUTING TABLE	R/W	R/W	none	none	none
20 = ARS: COR GRP DEFINITION	R/W	R/W	none	none	none
21 = ARS: DAY ZONE DEFINITION	R/W	R/W	none	none	none
22 = ARS: MODIFIED DGT TABLE	R/W	R/W	none	none	none
23 = ARS: ROUTE DEFINITION	R/W	R/W	none	none	none
24 = ARS: ROUTE LISTS	R/W	R/W	none	none	none
25 = ARS: ROUTE PLANS	R/W	R/W	none	none	none
26 = ARS: DIGIT STRINGS	R/W	R/W	none	none	none
27 = ARS: MAXIMUM DIALED DIGITS	R/W	R/W	none	none	none
28 = FORM ACCESS RESTRICTION	R/W	R/W	none	none	none
29 = DTE PROFILE	R/W	R/W	none	none	none
30 = DEVICE INTERCON TABLE	R/W	R/W	none	none	none
31 = SYSTEM ABBREV DIAL ENTRY	R/W	R/W	none	none	none
32 = CDE DATA PRINT	R/W	R/W	none	none	none
33 = ACCOUNT CODE ENTRY	R/W	R/W	none	none	none
34 = DIRECTED IO	R/W	R/W	none	none	none
35 = GLOBAL FIND ACCESS CODE	R/W	R/W	none	none	none
36 = MODEM ASSIGNMENT	R/W	R/W	none	none	none
37 = GUEST RM SUPERSET KEYS TEM	R/W	R/W	none	none	none

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FORM NAME	INST	MAINT1	MAINT2	SUPER	ATT
38 = ACD KEYS TEMPLATE	R/W	R/W	none	none	none
39 = ACD AGENT GROUPS	R/W	R/W	none	none	none
40 = ACD SUPERVISORS	R/W	R/W	none	none	none
41 = ACD PATHS	R/W	R/W	none	none	none
42 = T1 LINK DESCRIPTORS	R/W	R/W	none	none	none
43 = T1 LINK ASSIGNMENT	R/W	R/W	none	none	none
44 = NETWORK SYNCHRONIZATION	R/W	R/W	none	none	none
45 = BRI TRUNK ASSIGNMENTS	R/W	R/W	none	none	none
46 = KEY SYSTEM TOLL CONTROL	R/W	R/W	none	none	none
47 = IP and DHCP PARAMETERS	R/W	R/W	none	none	none
48 = VOICE NETWORKING	R/W	R/W	none	none	none
49 = VOICEMAIL OPTIONS	R/W	R/W	none	none	none
50 = MAILBOXES	R/W	R/W	none	none	none
51 = VOICEMAIL DISTRIBUTION LIS	R/W	R/W	none	none	none
52 = EMAIL	R/W	R/W	none	none	none
53 = BAY LOCATION ASSIGNMENT	R/W	R/W	none	none	none
					(Page 2 of 2)

Form 29 - DTE Profile Table

[PROFILE NUMBER : 1] DTE OPTION	VALUE
Terminal type	VIDEO TERM
Language	ENGLISH
DTRX Echoplex	DISABLED
Editing	DISABLED
Editing character delete (0 - 127, Decimal value of ASCII code)	0
Editing line display (0 - 127, Decimal value of ASCII code)	0
Inject <LF> after <CR>	ALWAYS
Number of pads after <CR> (0 - 7)	0
Number of pads after <LF> (0 - 7)	0
DTRX Inactivity Timer 1 - 60 seconds	10

Form 30 - Device Interconnection Table

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
01	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08	*	*	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Form 30 - Device Interconnection Translation Table

ENTRY NUM	DEVICE TYPE DESCRIPTION	INTERCONNECT NUM
01	Station/Set	1
02	Console	2
03	Loop Start Trunk	3
04	Ground Start Trunk	4
05	DID/Tie Trunk	5
06	E&M Trunk (2-Wire or 4-Wire)	6
07	RESERVED	7
08	RESERVED	8
09	RESERVED	9
10	RESERVED	10
11	RESERVED	11
12	RESERVED	12
13	RESERVED	13
14	RESERVED	14
15	RESERVED	15
16	RESERVED	16
17	RESERVED	17
18	RESERVED	18
19	RESERVED	19
20	RESERVED	20
21	RESERVED	21
22	RESERVED	22
23	RESERVED	23
24	RESERVED	24
25	RESERVED	25

Form 34 - Directed IO Table

EXT NUM	PRINTOUT	PRINTOUT TYPE	GUARANTEED
Printer Port	SMDR	Autoprint	NO
Printer Port	CDE Data Print	Directed	NO

Form 35 - Global Find Access Code Table

ACCESS CODE	DEFINED	BAY	SLT	CCT	SCT	MULTIPLE APP.
0	Feature Access Code					N/A
100	SUPERSET	1	01	01	1	N/A
101	SUPERSET	1	01	02	1	N/A
102	SUPERSET	1	01	03	1	N/A
103	SUPERSET	1	01	04	1	N/A
104	SUPERSET	1	01	05	1	N/A
105	SUPERSET	1	01	06	1	N/A
106	SUPERSET	1	01	07	1	N/A
107	SUPERSET	1	01	08	1	N/A
108	SUPERSET	1	01	09	1	N/A
109	SUPERSET	1	01	10	1	N/A
110	SUPERSET	1	01	11	1	N/A
111	SUPERSET	1	01	12	1	N/A
112	SUPERSET	1	02	01	1	N/A
113	SUPERSET	1	02	02	1	N/A
114	SUPERSET	1	02	03	1	N/A
115	SUPERSET	1	02	04	1	N/A
116	SUPERSET	1	02	05	1	N/A
117	SUPERSET	1	02	06	1	N/A
118	SUPERSET	1	02	07	1	N/A
119	SUPERSET	1	02	08	1	N/A
198	Console	1	13	02	1	N/A
199	SUPERSET	1	13	01	1	N/A
200	Station	1	13	03		N/A
201	Station	1	13	04		N/A
300	Hunt Group # 1					N/A
301	SUPERSET	1	11	01	1	N/A
302	SUPERSET	1	11	02	1	N/A
303	SUPERSET	1	11	03	1	N/A
304	SUPERSET	1	11	04	1	N/A
305	SUPERSET	1	11	05	1	N/A
306	SUPERSET	1	11	06	1	N/A
307	SUPERSET	1	11	07	1	N/A
308	SUPERSET	1	11	08	1	N/A
309	SUPERSET	1	11	09	1	N/A
310	SUPERSET	1	11	10	1	N/A

ACCESS CODE	DEFINED	BAY	SLT	CCT	SCT	MULTIPLE APP.
311	SUPERSET	1	11	11	1	N/A
312	SUPERSET	1	11	12	1	N/A
313	SUPERSET	1	12	01	1	N/A
314	SUPERSET	1	12	02	1	N/A
315	SUPERSET	1	12	03	1	N/A
316	SUPERSET	1	12	04	1	N/A
317	SUPERSET	1	12	05	1	N/A
318	SUPERSET	1	12	06	1	N/A
319	SUPERSET	1	12	07	1	N/A
320	SUPERSET	1	12	08	1	N/A
321	SUPERSET	1	12	09	1	N/A
322	SUPERSET	1	12	10	1	N/A
323	SUPERSET	1	12	11	1	N/A
324	SUPERSET	1	12	12	1	N/A
340	Night Bell	1	13	29	1	N/A
*01	Feature Access Code					N/A
*03	Feature Access Code					N/A
*04	Feature Access Code					N/A
*05	Feature Access Code					N/A
*06	Feature Access Code					N/A
*07	Feature Access Code					N/A
*08	Feature Access Code					N/A
*09	Feature Access Code					N/A
*10	Feature Access Code					N/A
*12	Feature Access Code					N/A
*13	Feature Access Code					N/A
*14	Feature Access Code					N/A
*15	Feature Access Code					N/A
*16	Feature Access Code					N/A
*21	Feature Access Code					N/A
*22	Feature Access Code					N/A
*23	Feature Access Code					N/A
*24	Feature Access Code					N/A
*25	Feature Access Code					N/A
*30	Feature Access Code					N/A
*33	Feature Access Code					N/A
*41	Feature Access Code					N/A
*42	Feature Access Code					N/A

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ACCESS CODE	DEFINED	BAY	SLT	CCT	SCT	MULTIPLE APP.
*48	Feature Access Code					N/A
*49	Feature Access Code					N/A
*51	Feature Access Code					N/A
*52	Feature Access Code					N/A
*57	Feature Access Code					N/A
*62	Feature Access Code					N/A
*63	Feature Access Code					N/A
*64	Feature Access Code					N/A
*65	Feature Access Code					N/A
*66	Feature Access Code					N/A
***	Feature Access Code					N/A
###	Feature Access Code					N/A
000	ARS Leading Digit					N/A

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Form 36 - Modem Assignment Table

BAY	SLT	CCT	CDN	BAY	SLT	CCT	EXTN	TEN	DTE	COS	COR	MODE	DIAL	COMMENTS
1	13	05												
1	13	06												

Form 42 - T1 Link Descriptors

[LINK DESCRIPTOR NUMBER : 1]	IN / OUT GOING	VALUE
Alarm debounce timer	(300 - 3200 ms)	2500
Line Coding	(AMI, AMI&ZCS, B8ZS)	AMI&ZCS
Line Build Out	(0, -7.5, -15, -22.5 DB)	0 DB
Line Length	(max 132, 265, 398, 533 or 655)	266-398
Framing	(D4 or ESF)	D4
Slip rate - maintenance limit	(0 - 9000) /24 hrs	255
Slip rate - service limit	(0 - 9000) /24 hrs	7000
Slip rate - network sync limit	(0 - 9000) /24 hrs	7
BER - maintenance limit	(10**-n , n = (3,4,5,6)) / hour	4
BER - service limit	(10**-n , n = (3,4,5,6)) / hour	3
Framing losses - maintenance limit	(0 - 9000) /24 hrs	255
Framing losses - service limit	(0 - 9000) /24 hrs	9000
RTS timer - service limit exceeded	(1 - 255 min)	30
RTS timer - net slip limit exceeded	(1 - 255 min)	30
RTS timer - after alarm	(0 - 300 sec)	10

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[LINK DESCRIPTOR NUMBER : 1]	IN / OUT GOING	VALUE
Termination mode	(LT or NT)	NT
Protocol	(DMS250, NI2, 4ESS, DMS100)	DMS100
Protocol Variant	(NI2-Bellcore, NI2-5Ess, and NI2-GTD5, None)	None
Network/User	(Network, User)	User
Unknown Numbering Plan	(Enabled, Disabled)	Disabled
Bearer Capability Voice	(Per-Call, 3.1 kHz, Speech)	Speech
CLIR Voice	(Per-Call, Restrict, Allow)	Allow
Invert D Channel	(Yes, No)	No
		(Page 2 of 2)

Form 44 - Network Synchronization

DESCRIPTION	BAY	SLOT	CCT	COMMENTS
First clock source				
Second clock source				
Third clock source				
Fourth clock source				
Fifth clock source				
Sixth clock source				
Seventh clock source				
Eighth clock source				

Form 46 - Key System Toll Control

DIGITS TO BE ANALYZED	QTY TO FOLLOW	DESIGNAT	TERM TYPE AND NUM		COR GROUP
011	Unknown	LOCAL	GROUP	1	1
1	Unknown	LOCAL	GROUP	1	1
976	4	LOCAL	GROUP	1	1

Form 47 Subform 01 - System IP

SYSTEM IP	VALUE
System IP Address	192.168.1.2
System Netmask	255.255.255.000
System Gateway IP	192.168.1.1
L2 Switch IP Address	192.168.1.1
Hostname	sx200icp.xyz.com
FTP Server	192.168.1.9
FTP Username	ftp
FTP Password	@
DiffServ Code Point	44 (upgrades) 46 (new installations)

Form 47 Subform 02 - DHCP Server

SUBNET NAME [BAY 1-DHCP SERVER ENABLED]	SUBNET IP	BIT MASK
192_168_1_subnet	192.168.001.000	255.255.255.000

Form 47 Subform 02 - Expand DHCP Subnet

NAME [BAY 1]	IP RANGE [192_168_1_subnet]	LEASE TIME
192_168_1_range	192.168.001.010 - 192.168.001.250	08 HOURS

Form 47 Subform 02 - DHCP Options

OPTIONS [COMMON]	FORMAT	VALUE [BAY 1]
3-Router	IP ADDRESS	192.168.1.1
128-IP Phone TFTP Server	IP ADDRESS	192.168.1.2
129-ICP Ip Address	IP ADDRESS	192.168.1.2
130-DHCP Server Identifier	ASCII	MITEL IP PHONE
134-DiffServ Code Point	NUMERIC	44

Form 47 Subform 02 - DHCP Ranges

RANGE IP [192_168_1_subnet]	VALUE [BAY 1]
Name	192_168_1_range
Range Start	192.168.001.010
Range End	192.168.001.250
Protocol	DHCP
Clients class ID must match name	NO
Lease Time (minimum 5 minutes)	08 HOURS

Form 49 - Voice Mail Options

VOICEMAIL OPTION	VALUE
Default Language	ENGLISH
Alternate Language	ENGLISH
Bilingual Option	DISABLED
Language Change Number	8
FAX Destination Number	
Send Notification Calls	DISABLED
Digital Pager Callback Number	
Auto Att Xfer to any Extn	ENABLED
Auto Att Xfer Restrictions	
Directory Voice Prompt	LAST NAME
Automatic Route Select Code	RESERVED
Generate Account Codes in SMDR	DISABLED
Personal Contact Numbers	DISABLED

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VOICEMAIL OPTION	VALUE
DID Server	RESERVED
Automatic DID Number Assignment	RESERVED
Synchronization of Greetings	SYSTEM DAY/NIGHT
Open Time (HH:MM)(Sun..Sat)	00:00 09:00 09:00 09:00 09:00 09:00 00:00
Close Time (HH:MM)(Sun..Sat)	00:00 18:00 18:00 18:00 18:00 18:00 00:00
Length of Mailbox Numbers (2-5)	3
Length of Passwords (3-6)	4
PMS Protocol	HYATT ENCORE
SMTP Server	
IMAP Server	

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Form 50 - Mailboxes

MBOX#	TYPE	EXTENSION	OPERATOR	LANG	ENV	MAX	DEL	NEW	OLD
0	EXTEN	0		SYST	Y	10	15		
100	EXTEN	100		SYST	Y	10	15		
101	EXTEN	101		SYST	Y	10	15		
102	EXTEN	102		SYST	Y	10	15		
103	EXTEN	103		SYST	Y	10	15		
104	EXTEN	104		SYST	Y	10	15		
105	EXTEN	105		SYST	Y	10	15		
106	EXTEN	106		SYST	Y	10	15		
107	EXTEN	107		SYST	Y	10	15		
108	EXTEN	108		SYST	Y	10	15		
109	EXTEN	109		SYST	Y	10	15		
110	EXTEN	110		SYST	Y	10	15		
111	EXTEN	111		SYST	Y	10	15		
112	EXTEN	112		SYST	Y	10	15		
113	EXTEN	113		SYST	Y	10	15		
114	EXTEN	114		SYST	Y	10	15		
115	EXTEN	115		SYST	Y	10	15		
116	EXTEN	116		SYST	Y	10	15		
117	EXTEN	117		SYST	Y	10	15		
118	EXTEN	118		SYST	Y	10	15		
119	EXTEN	119		SYST	Y	10	15		
999	ADMIN								

Form 50 Subform - Notification

MBOX#	NOTIFICATION #	NOTIF TYP	N SCHED	U ACC	RESERVED
0		EXTENSION	OFF	N	
100		EXTENSION	OFF	N	
101		EXTENSION	OFF	N	
102		EXTENSION	OFF	N	
103		EXTENSION	OFF	N	
104		EXTENSION	OFF	N	
105		EXTENSION	OFF	N	
106		EXTENSION	OFF	N	
107		EXTENSION	OFF	N	
108		EXTENSION	OFF	N	
109		EXTENSION	OFF	N	
110		EXTENSION	OFF	N	
111		EXTENSION	OFF	N	
112		EXTENSION	OFF	N	
113		EXTENSION	OFF	N	
114		EXTENSION	OFF	N	
115		EXTENSION	OFF	N	
116		EXTENSION	OFF	N	
117		EXTENSION	OFF	N	
118		EXTENSION	OFF	N	
119		EXTENSION	OFF	N	
999					

Form 50 Subform - EMAIL

MBOX#	FWD	EMAIL ADDRESS FOR SMTP FORWARD OF VOICEMAIL
0	NO	
100	NO	
101	NO	
102	NO	
103	NO	
104	NO	
105	NO	
106	NO	
107	NO	
108	NO	
109	NO	
110	NO	
111	NO	
112	NO	

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MBOX#	FWD	EMAIL ADDRESS FOR SMTP FORWARD OF VOICEMAIL
113	NO	
114	NO	
115	NO	
116	NO	
117	NO	
118	NO	
119	NO	

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Form 52 - EMAIL

OWNER	EMAIL ADDRESS [SMTP SERVER: 000.000.000.000]
E911	
E911	
E911	
Alarms	
Alarms	
Alarms	
Logs	

Form 53 - Bay Location Assignment

BAY	IP BAY	CIM 1	CIM 2	MMC 1 (xxx)	MMC 2 (xxx)	PHANTOM
01	*					
02		*				
03			*			
04				1		
05				2		
06					1	
07					2	
08						
09						
10						
11						
12						
13						
14						
15						

Form 54 Calling Party Number

EXT NUMBER	DEFINED	CALLING PARTY NUMBER
100	SUPERSET	
101	SUPERSET	
102	SUPERSET	
103	SUPERSET	
104	SUPERSET	
105	SUPERSET	
106	SUPERSET	
107	SUPERSET	
108	SUPERSET	
109	SUPERSET	
110	SUPERSET	
111	SUPERSET	
112	SUPERSET	
113	SUPERSET	
114	SUPERSET	
115	SUPERSET	
200	Station	
201	Station	
202	Station	
203	Station	
301	SUPERSET	
302	SUPERSET	
303	SUPERSET	
304	SUPERSET	
305	SUPERSET	
306	SUPERSET	
307	SUPERSET	
308	SUPERSET	
309	SUPERSET	
310	SUPERSET	
311	SUPERSET	
312	SUPERSET	
313	SUPERSET	
314	SUPERSET	
315	SUPERSET	
316	SUPERSET	
317	SUPERSET	

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EXT NUMBER	DEFINED	CALLING PARTY NUMBER
318	SUPERSET	
319	SUPERSET	
320	SUPERSET	
321	SUPERSET	
322	SUPERSET	
323	SUPERSET	
324	SUPERSET	

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Form 55 Incoming Digits

INCOMING DIGITS	DAY	N1	N2

Appendix B
Part Numbers

Table 61: Hardware (Options, Spares and FRUs)

Part Number	Description	Notes
50004357	SX-200 ICP MX Controller	With internal hard drive
50003724	Analog Main Card	
50003725	Analog Option Card	
50003726	Stratum 3 Clock Module	
50003727	CompactFlash Memory Interface MMC	
50003728	Dual DSP MMC	
50004154	CompactFlash - 256M	
50003884	Fan	
50003885	Power Supply	
50003900	SX-200 NSU	
50001267	SX-200 ASU	
50004151	Hard Drive 40 GB	Unformatted
50001248	Dual FIM MMC - 1 km (820 nm, multi-mode)	
50003695	Dual FIM MMC - 5 km (1300 nm, multi-mode)	
50003696	Dual FIM MMC - 14 km (1300 nm, single-mode)	
50004451	Quad CIM MMC	
50003560	Dual T1/E1 Framer MMC	
50004402	T1/E1 Combo MMC	
50002979	Quad DSP MMC	
50004150	SX-200 ICP Rack Mount Brackets	MX Only
50000690	24VAC Power Adapter for 5010 IP, 5020 IP, 5215 IP and 5220 IP Phones	
50002070	-48V Power Brick for 5200 series IP Phones	
PD-6024/AC	PowerDsine 24PT In-line Power Unit for 5200 series IP Phones	

Table 62: Software

Part Number	Description	Notes
50005112	Rel. 2 CD-ROM	

Table 63: Software Options

Part Number	Description	Notes
9109-531-015-NA	ACD Agents (11-15)	
9109-531-005-NA	ACD Agents (1-5)	
9109-531-025-NA	ACD Agents (16-25)	
9109-531-050-NA	ACD Agents (26-50)	
9109-531-075-NA	ACD Agents (51-75)	
9109-531-010-NA	ACD Agents (6-10)	
9109-531-100-NA	ACD Agents (76-100)	
9109-532-013-NA	ACD Real Time Events	
9109-532-001-NA	Auto-Attendant	
54000925	Compression Resources (2)	
54000890	Compression Resources (8)	
54000924	Digital Bay (1)	
54000131	Guest Suites	
54000661	IP Network Channel	
54000660	IP Set (1)	
54000923	IP Set (4)	
54000310	MyAdministrator	
54000929	PC (2nd) Port on IP Sets	
54000928	Phonebook	
54000927	Recorded Announcement Device	
54000050	Speak@Ease	
54001353	Standard Unified Messaging	
54000921	Voice Mail Box (1)	

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Table 63: Software Options (continued)

Part Number	Description	Notes
54000922	Voice Mail Boxes (4)	
54000930	Voice Mail PMS	
9109-532-006-NA	Centralized Voice Mail & Attendant S/W	
9109-532-022-NA	CLASS Sets	
54000931	Email (SMTP) Client	
9109-532-010-NA	Fax Tone Detect	
540001230	Feature Level 6	
54001134	Hospitality	
54001152	IP Network Channel (12)	
54001151	IP Network Channel (2)	
9109-533-002-NA	Max Digital Line Cards	
9109-533-101-NA	Max ONS Line Cards	
9109-532-002-NA	MiTAI	
9109-532-016-NA	PRI Card Auto Min/Max	
9109-532-018-NA	PRI Card D Channel Backup	
9109-532-015-NA	PRI Card Min/Max	
9109-532-017-NA	PRI Card NFAS	
9109-532-020-NA	PRI Card Q.SIG	
9109-532-019-NA	PRI Card Remote LAN Access	
9109-532-021-NA	Record a Call	
9109-532-005-NA	Remote S/W Download	
9109-532-007-NA	SS4000 Sets	
9109-532-012-NA	Support 3DN, 4DN and 400 series Set Types	
9109-532-011-NA	Support Softkey Access to Voicemail	
54000950	Voice Mail Bilingual Prompts	
54000951	Voice Mail Personal Contacts	
54001761	Your Assistant Starter Kit	Software and single user license

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Table 63: Software Options (continued)

Part Number	Description	Notes
54002200	Your Assistant Upgrade Kit	Single user
54002202	Your Assistant Lite	Single user
54002201	Your Assistant Softphone	Single user

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Table 64: Packages

Part Number	Description
50003723 50003883 50003724 50003728 50003727 50004154	**SX-200 ICP MX Basic System** MX Controller Analogue Main Card Dual DSP MMC CompactFlash Memory Interface MMC 256M CompactFlash Memory card
52001320 50003723 50003812 50002818 50002821 50004002 54000920 54000923 54000922 54000310 9109-532-001-NA 9109-532-005-NA 9109-532-007-NA 9109-532-010-NA 9109-532-011-NA 9109-533-201-NA 54000970	**SX-200 ICP MX Basic System (6x20x8) Package - See Note** SX-200 ICP MX Basic System 5207 IP Phone dark grey (Qty - 7) 5220 IP Phone dark grey (Qty. - 1) PKM 12 SX-200 ICP Rel. 1 SW Kit Feature Level 5 IP Set Licenses Voice Mail Box Licenses MyAdministrator SW Option Auto-Attendant Software Remote Download Software SUPERSET 4000 Telephones Support Option FAX Tone Detection Option Voicemail Softkeys Option 1st Digital Link Option TDM Device Licenses

Note: SX-200 ICP Basic & Advanced I & M Certification required.

Table 64: Packages (continued)

Part Number	Description
52001430	**SX-200 ICP Premier System (6X8X4) Package - See Note**
50002818	5220 IP Phone Dark Grey (Qty 4)
50002821	IP PKM 12 Kit Dark Grey
50003723	SX-200 ICP Basic System
54000923	IP Phone Licenses
54000922	Voicemail Box Licenses
54000970	TDM Device Licenses
54000661	IP Channel Licenses
540001230	Feature Level 6
54000310	MyAdministrator SW Option
54000920	Feature Level 5
54000929	PC (2nd) Port on IP Sets
9109-531-005-NA	5 ACD Agents Option
9109-532-001-NA	Auto-Attendant Software
9109-532-004-NA	PMS Option
9109-532-005-NA	Remote Download Software
9109-532-007-NA	SUPERSET 4000 Telephones Support Option
9109-532-010-NA	FAX Tone Detection Option
9109-532-002-NA	Mitel Application Interface
9109-532-011-NA	Voicemail Softkeys Option
9109-532-021-NA	Record a Call
9109-533-201-NA	1st Digital Link Option

Note: SX-200 ICP Basic & Advanced I & M Certification required.

Table 65: SX-200 Peripheral Cabinets, Interface Cards, and Modules

Common Name	Part Number	Comments
ONS/CLASS Line Card	9109-110-001-NA	For Rotary and DTMF Telephones (12 circuits per card)
ONS/CLASS Line Card (Blue Faceplate)	9109-110-002-NA	For Rotary and DTMF Telephones (12 circuits per card)
OPS Line Card	9109-040-000-SA	6 OPS Circuits per card
Digital Line Card (Blue Faceplate)	9109-012-002-NA	12 DNIC Circuits per card
Digital Line Card	9109-012-001-NA	12 DNIC Circuits per card
LS/CLASS Trunk Card	50001730	8 CO Trunk Interfaces (Loop Start only)
LS/GS Trunk Card - CSA	9109-011-001-SA	6 CO Trunk Interfaces
DID Trunk	9109-031-000-SA	6 DID Circuits per card
Universal Card	9109-005-000-SA	supports: • E&M Trunk Module • Music-on-Hold/Pager Module • Receiver/Relay Module
E&M Trunk Module	9109-013-000-SA	1 E&M Trunk Circuit per Module
Music-on-Hold/Pager Module	9109-018-000-SA	Music Input, Paging Preamp Output, and Relay to control external amplifier
Receiver/Relay Module	9109-016-000-SA	4 DTMF Receivers and 2 General Purpose Relays

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Table 65: SX-200 Peripheral Cabinets, Interface Cards, and Modules (continued)

Common Name	Part Number	Comments
Mitel Express Messenger Card (2-port)	9109-080-001-NA	All models use the same card and the number of ports enabled is determined by the software. For example, you can upgrade a 2-port card to a 4-port card by enabling the software with a passcode. Refer to the Mitel Express Messenger System Administration Manual (PN 9109-080-005-NA) for instructions.
Mitel Express Messenger Card (4-port)	9109-080-002-NA	
Mitel Express Messenger Card (6-port)	9109-080-009-NA	
Mitel Express Messenger Card (8-port)	9109-080-008-NA	
SX-200 Per Bay Cabinet - Drk Gry	50004041	
SX-200 Per Node BCCII - Drk Gry,110V	52001550	
SX-200 Per Node BCCIII - Drk Gry,110V	52001551	
SX-200 Per Node BCCIII - Drk Gry, 220V	52001552	
SX-200 Drk Gry Rack Mount Bracket FRU	50002891	

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Table 66: Digital Control and Digital Services Cards Modules, and Spares for SX-200 Peripheral Cabinets

Marketing Name	Part Number	Comments
Bay Control Card II	9109-017-001-SA	
Bay Control Card III	9109-117-001-NA	
DSP Module (single)	9180-510-006-NA	
Bay Power Supply 120 V ac	9109-008-000-SA	
Bay Power Supply 230 V ac	9109-008-002-NA	
System ID Module	50002212	
Peripheral FIM Carrier II	9109-612-001-NA	
Peripheral Interface Module Carrier Card	9109-616-001-NA	Installs in any SX-200 rack-mount cabinet
FIM Module 820NM Multi-mode	9180-510-001-NA	
FIM Module 1300NM Multi-mode	9180-510-002-NA	
FIM Module 1300NM Single-mode	9180-510-003-NA	
CIM	9180-510-010-NA	Copper Interface Module
CIM Cable	9125-100-106-NA	Peripheral Interconnect Cable (15 ft.)
T1 Trunk Card	9109-021-001-NA	
T1 Trunk Card	9109-021-000-SA	Includes T1 Trunk Adapter
T1 Trunk Adapter	9400-100-302-NA	
Dual T1 Trunk Adapter	9400-100-304-NA	for 2 links
T1/E1 Module	9180-510-004-NA	Dual link, for PRI card or the BCC III

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Table 66: Digital Control and Digital Services Cards Modules, and Spares for SX-200 Peripheral Cabinets (continued)

Marketing Name	Part Number	Comments
PRI Card Package	50002285	Includes: • PRI card • Dual link T1 PRI Module • software
PRI Card	9109-615-001-NA	The carrier card for the PRI
PRI Card Software	9125-070-001-NA	
Fan Assembly - SX-200 RM Cabinet	9109-631-001-NA	

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Table 67: Peripherals

Part Number	Description	Notes
50002815	5201 IP Phone	Dark Gray FRU
50003812	5207 IP Phone	Dark Gray
50004890	5212 IP Phon	Dual Port Dark Gray
50002817	5215 IP Phone	Dual Port Dark Gray
50002818	5220 IP Phone	Dual Port Dark Gray
50002819	5220 IP Phone	Dual Port Red
50004894	5224 IP Phone	Dual Port Dark Gray
50004895	5224 IP Phone	Dual Port Red
50002821	5412 PKM	PKM Kit (12 Key) Dark Gray
50002822	5412 PKM	PKM FRU (12 Key) Dark Gray
50002823	5448 PKM	PKM Kit (48 Key) Dark Gray

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Table 67: Peripherals (continued)

Part Number	Description	Notes
50002824	5448 PKM	PKM FRU (48 Key) Dark Gray
50002825	5422 PKM Interface Module	
50001900	Mitel 5303 Conference Phone	Black
50001903	Mitel 5303 Conference Phone	Silver
50002828	5310 IP Boardroom Conference Unit	Silver (includes 5220 IP Phone)
50002829	5310 IP Boardroom Conference Unit	Black (includes 5220 IP Phone)
50002830	5310 IP Boardroom Conference Unit	Silver with Dark Gray (includes 5220 IP Phone)
50002831	5310 IP Boardroom Conference Unit	Black with Dark Gray (includes 5220 IP Phone)
9189-000-300-NA	SUPERCONSOLE 1000 attendant console	Light Gray
9189-000-301-NA	SUPERCONSOLE 1000 attendant console	Dark gray with a tilted, back-lit LCD display, English and French text available
9189-888-001-NA	Console Handset Amplifier	Provides volume control for the SUPERCONSOLE 1000 handset.
50001754	5485 IP Paging Unit	

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Table 67: Peripherals (continued)

Part Number	Description	Notes
	Plantronics Headsets	For use with Mitel 4000 and 5000 series telephones, except the 5207 (see Note).
9132-800-500-NA (single) 50000602 (12 pack)	Monaural over the head	
50000607 (single) 50000601 (12 pack)	Binaural over the head with voice tube	
9132-800-501-NA (single) 50000603 (12 pack)	Monaural over the ear	
50000606 (single) 50000604 (12 pack)	Binaural over the head with the noise canceling mike	
		(Page 3 of 3)

Note: Mitel 5207 IP Phones DO NOT support the direct connection of a headset. Use of a headset with this phone requires a Plantronics M12 Vista Universal Amplifier. The amplifier plugs into the handset port on the underside of the phone. Plantronics models P51, P81, P101N and Supra NC headsets are the ONLY headsets approved by Mitel for use with the 5207 IP Phone through the Plantronics M12 Vista.

Table 68: Documentation

Part Number	Description
50004003 Rev. D	SX-200 ICP Technician's Handbook Release 2 .0

Appendix C
System Cabling

Table 69: SX-200 ICP, Onboard Analog/DNIC Tip & Ring Assignments (Back Panel Amphenol Connector)

Pins	Pairs	Circuit type	Bay/Slot/ Circuit	Comments
1/26	W-BL / BL-W	ONS/CLASS	1/13/3	Default Extension #: 200
2/27	W-O / O-W	ONS/CLASS	1/13/4	Default Extension #: 201
3/28	W-G / G-W	ONS/CLASS	1/13/5	Available as upgrade option
4/29	W-BR / BR-W	ONS/CLASS	1/13/6	Available as upgrade option
5/30	NOT USED			
6/31	R-BL / BL-R	DNIC	1/13/1	Subattendant Default Extension #: 199
7/32	R-O / O-R	DNIC	1/13/2	SUPERCONSOLE 1000 Default Extension #: 198
8/33 - 10/35	NOT USED			
11/36 - 16/41	BK-BL / BL-BK	LS/CLASS	1/13/7 - 1/13/12	Trunks circuits 1/13/7 and 1/13/8 are System Fail Transfer trunks. They connect to ONS circuits 1/13/3 and 4 respectively.
17/42 - 22/47	Y-O / O-Y	LS/CLASS	1/13/13 - 1/13/18	Available as upgrade option
48/23 - 50/25	NOT USED			

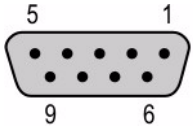
Table 70: Maintenance RS-232 Cable

D-Sub Connector Pin	Signals	DIN Connector Pin
2	RXD	5
3	TXD	3
4	DTR	7
5	GND	4*
6	DSR	6
7	RTS	1
8	CTS	2
		8*

Notes:

1. The pins with * are connected together.
2. Pin 1 and 9 of the D-Sub connector are not used.

Table 71: Relay Connector Pinouts (Front Panel DB-9)



Pin	Bay/Slot/Circuit	Function
1	1/13/30/1 (See Note)	Generic Relay Contact (normally open)
2		Generic Relay Contact Return
3		Not Used
4	1/13/29/2	Generic Relay Contact (normally open)
5		Generic Relay Contact Return
6		Not Used
7	1/13/29/1	Generic Relay Contact (normally open); see Note
8		Generic Relay Contact Return
9		Not Used

Note: Programmed for Auxiliary Ringer (Night Bell) use in the default database.

Table 72: Paging Pinouts (Rear Panel RJ45)

Pin	Function
1	Paging Relay Contact A (normally closed)
2	Paging Relay Common
3	Paging Relay Contact B (normally open)
4	Paging Wire1 (pager audio)
5	Paging Wire2 (pager audio)
6	Factory test control (not for customer use)
7	Unused
8	Unused

Table 73: CIM Port Pinouts

Pin	Signals	Pin	Signal
1	RX +	5	
2	RX -	6	TX -
3	TX +	7	
4		8	

Note: The CIM ports are the same whether the card has a control end connection or a peripheral end connection. Connections from the control cabinet to the peripheral cabinet require Category 5 UTP (unshielded twisted pair) cable, with TX and RX pairs reversed.

Table 74: T1/E1 Framer - Tip and Ring Pinouts

Pin	Signal	NT/LT Settings	
		NT (Default)	LT
1		Rx Ring	Tx Ring
2		Rx Tip	Tx Tip
3	N/C		
4		Tx Ring	Rx Ring
5		Tx Tip	Rx Tip
6	N/C		
7	N/C		
8	N/C		

Table 75: Ethernet Port Pinouts

Pin	Signal	Pin	Signal
1	TX +	5	
2	TX -	6	RX -
3	RX +	7	
4		8	

Table 76: NSU PRI - Pinouts for T1Line/Network Termination

Pin	Line Termination Mode	Network Termination Mode
1	Tx Ring	Rx Ring
2	Tx Tip	Rx Tip
3	Unused	Unused
4	Rx Ring	Tx Ring
5	Rx Tip	Tx Tip
6	Unused	Unused
7	Unused	Unused
8	Unused	Unused

Table 77: ASU Tip/Ring Assignments

Pin	Pair	Signal
1/26	W-BL / BL-W	ONS Tip 1 / Ring 1
2/27	W-O / O-W	ONS Tip 2/ Ring 2
3/28	W-G / G-W	ONS Tip 3 / Ring 3
4/29	W-BR / BR-W	ONS Tip 4 / Ring 4
5/30	S-W / W-S	ONS Tip 5 / Ring 5
6/31	R-BL / BL-R	ONS Tip 6 / Ring 6
7/32	R-O / O-R	ONS Tip 7 / Ring 7
8/33	G-R / R-G	ONS Tip 8 / Ring 8
9/34	BR-R / R-BR	ONS Tip 9 / Ring 9
10/35	S-R / R-S	ONS Tip 10 / Ring 10
11/36	BK-BL / BL-BK	ONS Tip 11 / Ring 11
12/37	O-BK / BK-O	ONS Tip 12 / Ring 12
13/38	G-BK / BK-G	ONS Tip 13 / Ring 13
14/39	BR-BK / BK-BR	ONS Tip 14 / Ring 14
15/40	S-BK / BK-S	ONS Tip 15 / Ring 15
16/41	BL-Y / Y-BL	ONS Tip 16 / Ring 16
17/42	O-Y / Y-O	ONS Tip 17 / LS Ring 17
18/43	G-Y / Y-G	ONS Tip 18 / LS Ring 18
19/44	BR-Y / Y-BR	ONS Tip 19 / LS Ring 19
20/45	S-Y / Y-S	ONS Tip 20 / LS Ring 20
21/46	BL-V / V-BL	ONS Tip 21 / LS Ring 21
22/47	O-V / V-O	ONS Tip 22 / LS Ring 22
23/48	G-V / V-G	ONS Tip 23 / LS Ring 23
24/49	BR-V / V-BR	ONS Tip 24 / LS Ring 24
25/50	V-S	N/C

Table 78: SX-200 EL or SX-200 ML (RM) Tip and Ring Assignments

J1, J2, J3, and J4			Lead Designation									
Slot / Plug	Pin	Pair	Cct	ONS or DLC	Cct	LS/GS	Cct	LS/ CLASS	Cct	COV	Cct	OPS or DID
	26	W-BL	1	T1	1	T1	1	T1	1	T1	1	T1
	1	BL-W		R1		R1		R1		R1		R1
	27	W-O	2	T2		MM1	2	T2	2	T2		
2-J1	2	O-W		R2		M1		R2		R2		
or	28	W-G	3	T3	2	T2	3	T3	3	T3	2	T2
4-J2	3	G-W		R3		R2		R3		R3		R2
or	29	W-BR	4	T4		MM2	4	T4	4	T4		
6-J3	4	BR-W		R4		M2		R4		R4		
or	30	W-S	5	T5	3	T3			5	T5	3	T3
8-J4	5	S-W		R5		R3				R5		R3
	31	R-BL	6	T6		MM3			6	T6		
	6	BL-R		R6		M3				R6		
	32	R-O	7	T7	4	T4	5	T5			4	T4
	7	O-R		R7		R4		R5				R4
	33	R-G	8	T8		MM4	6	T6				
	8	G-R		R8		M4		R6				
	34	R-BR	9	T9	5	T5	7	T7			5	T5
	9	BR-R		R9		R5		R7				R5
	35	R-S	10	T10		MM5	8	T8				
	10	S-R		R10		M5		R8				
	36	BK-BL	11	T11	6	T6					6	T6
	11	BL-BK		R11		R6						R6
	37	BK-O	12	T12		MM6						
	12	O-BK		R12		M6						
	38	BK-G	SPARE									

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Table 78: SX-200 EL or SX-200 ML (RM) Tip and Ring Assignments (continued)

J1, J2, J3, and J4			Lead Designation									
Slot / Plug	Pin	Pair	Cct	ONS or DLC	Cct	LS/GS	Cct	LS/ CLASS	Cct	COV	Cct	OPS or DID
	13	G-BK	SPARE									
	39	BK-BR	1	T1	1	T1	1	T1	1	T1	1	T1
	14	BR-BK		R1		R1		R1		R1		R1
	40	BK-S	2	T2		MM1	2	T2	2	T2		
1-J1	15	S-BK		R2		M1		R2		R2		
or	41	Y-BL	3	T3	2	T2	3	T3	3	T3	2	T2
3-J2	16	BL-Y		R3		R2		R3		R3		R2
or	42	Y-O	4	T4		MM2	4	T4	4	T4		
5-J3	17	O-Y		R4		M2		R4		R4		
or	43	Y-G	5	T5	3	T3			5	T5	3	T3
7-J4	18	G-Y		R5		R3				R5		R3
	44	Y-BR	6	T6		MM3			6	T6		
	19	BR-Y		R6		M3				R6		
	45	Y-S	7	T7	4	T4	5	T5			4	T4
	20	S-Y		R7		R4		R5				R4
	46	V-BL	8	T8		MM4	6	T6				
	21	BL-V		R8		M4		R6				
	47	V-O	9	T9	5	T5	7	T7			5	T5
	22	O-V		R9		R5		R7				R5
	48	V-G	10	T10		MM5	8	T8				
	23	G-V		R10		M5		R8				
	49	V-BR	11	T11	6	T6					6	T6
	24	BR-V		R11		R6						R6
	50	V-S	12	T12		MM6						
	25	S-V		R12		M6						

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Table 79: SX-200 EL or SX-200 ML (RM) Universal Card Tip and Ring Assignments

J1, J2, J3, and J4			Lead Designation					
Slot / Plug	**Pin**	**Pair**	**Cct**	**MOH/ Pager**	**Cct**	**DTMF Relay**	**Cct**	**E&M Trunk**
	26	W-BL	1	MIA1	1		1	T1
	1	BL-W		MIB1				R1
	27	W-O		POA1		K5A1		TR1
2-J1	2	O-W		POB1		K5B1		RR1
or	28	W-G		PKA1		K6A1		E1
4-J2	3	G-W		PKB1		K6B1		M1
or	29	W-BR	2	MIA2	2		2	T2
6-J3	4	BR-W		MIB2				R2
or	30	W-S		POA2		K5A2		TR2
8-J4	5	S-W		POB2		K5B2		RR2
	31	R-BL		PKA2		K6A2		E2
	6	BL-R		PKB2		K6B2		M2
	32	R-O	3	MIA3	3		3	T3
	7	O-R		MIB3				R3
	33	R-G		POA3		K5A3		TR3
	8	G-R		POB3		K5B3		RR3
	34	R-BR		PKA3		K6A3		E3
	9	BR-R		PKB3		K6B3		M3
	35	R-S	4	MIA4	4		4	T4
	10	S-R		MIB4				R4
	36	BK-BL		POA4		K5A4		TR4
	11	BL-BK		POB4		K5B4		RR4
	37	BK-O		PKA4		K6A4		E4
	12	O-BK		PKB4		K6B4		M4
	38	BK-G	SPARE					

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Table 79: SX-200 EL or SX-200 ML (RM) Universal Card Tip and Ring Assignments (continued)

J1, J2, J3, and J4			Lead Designation					
Slot / Plug	**Pin**	**Pair**	**Cct**	**MOH/ Pager**	**Cct**	**DTMF Relay**	**Cct**	**E&M Trunk**
	13	G-BK	SPARE					
	39	BK-BR	1	MIA1	1		1	T1
	14	BR-BK		MIB1				R1
	40	BK-S		POA1		K5A1		TR1
1-J1	15	S-BK		POB1		K5B1		RR1
or	41	Y-BL		PKA1		K6A1		E1
3-J2	16	BL-Y		PKB1		K6B1		M1
or	42	Y-O	2	MIA2	2		2	T2
5-J3	17	O-Y		MIB2				R2
or	43	Y-G		POA2		K5A2		TR2
7-J4	18	G-Y		POB2		K5B2		RR2
	44	Y-BR		PKA2		K6A2		E2
	19	BR-Y		PKB2		K6B2		M2
	45	Y-S	3	MIA3	3		3	T3
	20	S-Y		MIB3				R3
	46	V-BL		POA3		K5A3		TR3
	21	BL-V		POB3		K5B3		RR3
	47	V-O		PKA3		K6A3		E3
	22	O-V		PKB3		K6B3		M3
	48	V-G	4	MIA4	4		4	T4
	23	G-V		MIB4				R4
	49	V-BR		POA4		K5A4		TR4
	24	BR-V		POB4		K5B4		RR4
	50	V-S		PKA4		K6A4		E4
	25	S-V		PKB4		K6B4		M4

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Table 80: Music-on-Hold/Pager Unit Pinouts (Peripheral Cabinets)

Wire	Signal	Color	Description
32	MOH-	R-O	Music-on-Hold Inputs
7	MOH+	O-R	
34	PAGE-	R-BR	Paging Input/Output
9	PAGE+	BR-R	
36	PAGEREL(NC)	BK-BL	Page Relay, Normally Closed contact
11	PAGEREL(C)	BL-BK	Page Relay Common
37	PAGEREL(NO)	BK-O	Page Relay, Normally Open contact
12	PAGEREL(C)	O-BK	Page Relay Common
39	NIGHTBELL1-	BK-BR	Night Bell 1 relay contacts
14	NIGHTBELL1+	BR-BK	
41	NIGHTBELL2-	Y-BL	Night Bell 2 relay contacts
16	NIGHTBELL2+	BL-Y	
45	ALARM-	Y-S	Alarm relay contacts
20	ALARM+	S-Y	
50	RING	V-S	Connection to DNIC Line
25	TIP	S-V	Connection to DNIC Line

Appendix D
Phones and Features

Table 81: Mitel Phones and Features

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Abbreviated Dial	✔	✔	✔	✔	✔	✔
Account Codes - Do Not Display	✔	✔	✔	✔	✔	✖
Account Codes	✔	✔	✔	✔	✔	✔
Add Held	✔	✖	✖	✔	✖	✖
Auto-Answer	✔	✖	✔	✔	✔	✖
Auto-Hold	✔	✖	✔	✔	✔	✖
Auto Latch Microphone	✔	✖	✖	N/A on Symbol/ Spectralink	✔	✖
ACD - Sets: Supervisor	430/4150	✖	✔	✔	✔	✖
ACD - Sets: Agent	430/4150	✖	✔	✔	✔	✖
Background Music	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Broker's Call (Swap)	See Swap-Trade	✔	See Swap-Trade	See Swap-Trade	✔	
Broker's Call With Transfer (Transfer With Privacy)	See Swap-Trade	✔	See Swap-Trade	See Swap-Trade	See Swap-Trade	✔
Busy Lamp Field	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Calculator	✔	✖	✖	✖	✖	✖
Call Forwarding - Busy	✔	✔	✔	✔	✔	✔
Call Forwarding - Busy/No Answer	✔	✔	✔	✔	✔	✔

* Includes Dual Mode versions (Page 1 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Call Forwarding - Display Prime as Forwarded	✔	✖	✔	✔	✔	✖
Call Forwarding - No Answer	✔	✔	✔	✔	✔	✔
Call Forwarding - External	✔	✔	✔	✔	✔	✔
Call Forwarding - Always	✔	✔	✔	✔	✔	✔
Call Forwarding - Forced Call Forward	✔	✖	✔	✔	✔	✖
Call Forwarding - Forward Calls	✔	✖	✔	✔	✔	✖
Call Forwarding - I'm Here	✔	✔	✔	✔	✔	✔
Call Forwarding - Internal / External Split	✔	✔	✔	✔	✔	✔
Call Forwarding - Toggle Keys	✔	✖	✔	N/A on Symbol	✔	✖
Call Logging		✖	✖	N/A on Symbol	✖	✖
Call Monitor	✔	✔	✔	✔	✔	✖
Call Park from Single-line Sets	✖	✔	✖	✖	✖	✔
Call Park from Multi-line Sets	✔	✖	✔	✔	✔	✖
Call Park - Destination Phone	✔	✔	✔	✔	✔	✔

* Includes Dual Mode versions (Page 2 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Call Park - Specific Orbit	✔	✖	✔	N/A on Symbol	✔	✖
Call Park System Orbit	✔	✖	✔	N/A on Symbol	✔	✖
Callback	✔	✔	✔	✔	✔	✔
Callback - Busy	✔	✔	✔	✔	✔	✔
Callback - No Answer	✔	✔	✔	✔	✔	✔
Calling Party Number (CPN) Substitution	✔	✖	✔	✔	✔	✖
Campon	✔	✔	✔	✔	✔	✔
Campon Priority Over Call Forward Busy	✔	✖	✔	✔	✔	✖
Campon Warning Tone	✔	✔	✔	✔	✔	✔
CENTREX™ Compatibility (Double Flash Over Trunk)	✔	✔	✔	✔	✔	✔
CENTREX Compatibility (Single Flash Over Trunk)	✔	✔	✔	✔	✔	✔
CLASS (station side) for Analog Telephones	✖	✖	✖	✖	✖	ONS class
CLASS for Digital Sets	✔	✖	✔	✔	✔	✖
Clear All Features	✔	✔	✔	✔	✔	✔

* Includes Dual Mode versions (Page 3 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
CO Line Group Key	✔	✔	✔	✔	✔	✖
CO Line Key	✔	✔	✔	✔	✔	✖
CO Line - Select Direct	✔	✔	✔	✔	✔	✖
CO Line Type - Direct Access - Bypass Key System Toll Control	✔	✔	✔	✔	✔	✖
Conference	✔	✔	✔	✔	✔	✔
Date and Time Setup	✔	✖	✖	✔	✖	✖
Direct Inward Dialing (DID) Translation	✔	✔	✔	✔	✔	✔
Direct Station Page/Busy Lamp Field	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Direct Station Select (DSS) Key	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Direct Station Select / Busy Lamp Field (DSS/BLF) Call Pickup	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Direct Trunk Select	✔	✖	✔	N/A on Symbol	✔	✖
Disconnect Alarm	✔	✔	✔	✔	✔	✖

* Includes Dual Mode versions (Page 4 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Display Caller ID on Non-Prime Lines	✔	✖	✔	N/A on Symbol	✔	✖
Display Keys	✔	✖	✔	N/A on Symbol	✔	✖
Distinctive Ring Tones	✔	✖	✔	✔	✔	✖
Do Not Disturb	✔	✔	✔	✔	✔	✔
DTS/CO LIne Transfer Call Handling	✔	✖	✔	✔	✔	✖
Emergency Call Handling	✔	✔	✔	✔	✔	✔
Emergency Calls (911) Reporting and Detection to Display Sets	✔	✖	✖	✔	✖	ONS class only
Expensive Route Warning	✔	✔	✔	✔	✔	✔
Feature Keys	✔	✖	✔	✔	✔	✖
Flash - Calibrated	✖	✖	✖	✖	✖	✔
Flash Control	✔	✔	✔	✔	✔	✔
Flash Disable	✔	✔	✔	✔	✔	✔
Flash For Dial 0 (Attendant)	✔	✔	✔	✔	✔	✔
Flash For Waiting Call	✖	✔	✖	✖	✖	✔
Forward Campon	✔	✖	✔	N/A on Symbol	✔	✖

* Includes Dual Mode versions (Page 5 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Group Listening	4150 only	✖	N/A on 4015/ 5010	N/A on Symbol/ Spectralink	✖	✖
Handset Mute	4150 only	✖	✔	N/A on 420 or Symbol	✔	✖
Handset Receiver Volume Control	✔	✔	✔	✔	✔	✖
Handsfree Announce	4150 only	✖	✖	N/A on 420, Symbol or Spectralink	✔	✖
Handsfree Answerback to a Directed Page	✔	✖	5215 only	N/A on Symbol/ Spectralink	✔	✖
Handsfree Answerback to an Intercom Call	✔	✖	5215 only	N/A on Symbol/ Spectralink	✔	✖
Handsfree Operation	✔ (Full duplex)	✖	✔ (Half duplex)	N/A on Symbol/ Spectralink	✔ (Half duplex)	✖
Headset Mode Feature Key	✔	N/A on 401+/4001/ 5201	✔	N/A on Symbol/ Spectralink	✔	✖
Headset Mode - Automatic	4150 only	✖	✔	N/A on Symbol	✖	✖
Headset Operation	✔	N/A on 4001/5201	✔	N/A on Symbol	Requires external amplifier	✖
Headset With In-line Switch Operation	4150 only	N/A on 4001/5201	✔	N/A on Symbol/ Spectralink	✖	✖
Hold	✔	✔	✔	✔	✔	✔

* Includes Dual Mode versions (Page 6 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Hold and Page	✔	✔	✔	N/A on Symbol/ Spectralink	✔	✖
Hold Reminder	✔	✔	✔	✔	✔	✔
Holiday Messages	✔	✖	✔	✔	✔	✖
Hot Line	✔	✔	✔	✔	✔	✔
I Hold You Hold	✖	✖	N/A on 4015	5020 & 5220	✔	✖
Inhibit Trunk Ring-Me-Back During Dialing	✖	✖	✖	✖	✖	✔
Intercom Calls	✔	4001 only	✔	N/A on Symbol/ Spectralink	✔	✖
Language Change	✔	✖	✔	N/A on Symbol	✔	✖
Last Number Redial	✔	✔	✔	✔	✔	✔
Last Party Receives Dial Tone	✔	✔	✔	N/A on Symbol/ Spectralink	✔	✔
Line Lockout	✔	✔	✔	✔	✔	✔
Line Preference	✔	✖	✔	✔	✔	✖
Line Privacy	✔	✔	✔	✔	✔	✔
Line Selection	✔	✔	✔	✔	✔	✖
Line Types and Appearances	✔	✖	✔	✔	✔	✖
Logical Lines	✔	✖	✔	✔	✔	✖

* Includes Dual Mode versions (Page 7 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Mailbox Key	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Manual Line (Dial 0 Hotline)	✔	✔	✔	✔	✔	✔
Messaging - Advisory	✔	✖	✔	✔	✔	✖
Messaging - Call Me Back	✔	✔	✔	✔	✔	✔
MILINK™ Data Module	430 only	✖	✖	420 only	✖	✖
Names	✔	CDE only	✔	✔	CDE only	CDE only
Never a Consultee	✔	✔	✔	✔	✔	✔
Never a Forwardee	✔	✔	✔	✔	✔	✔
New Call Ring	✔	✔	✔	✔	✔	✖
Night/Day Switching	✔	✖	✖	✔	✖	✖
Non-Busy Extension	✔	✔	✔	✔	✔	✔
Off-Hook Alarm to Display Sets	✔	✖	✖	✔	✖	✖
Off-Hook Voice Announce	4150 only	✖	✖	N/A on 420, Symbol or Spectralink	✖	✖
Off-Premises Extension	✖	✖	✖	✖	✖	✔
ONS Ring Groups	Master only	✖	Master only	Master only	Master only	Master or member

* Includes Dual Mode versions (Page 8 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Originate Only Extensions	✔	✔	✔	✔	✔	✔
Override (Intrude)	✔	✔	✔	✔	✔	✔
Override Security	✔	✔	✔	✔	✔	✔
Paged Party Ring Tone	✔	401 & 4001 only	✔	N/A on Symbol/ Spectralink	✔	✖
Paging - PA	✔	✔	✔	✔	✔	✔
Paging - Telephones	✔	✔	✔	✔	✔	✖
Paging - PA and Telephones	✔	✔	✔	✔	✔	✖
Paging - All Set Page	✔	✔	✔	✔	✔	✖
Park and Page	✔	✖	✔	N/A on Symbol	✔	✖
Personal Speed Call	✔	✔	✔	✔	✔	✖
Phonebook	✔	✔	✔	✔	✔	✖
Phone Twinning	✔	✔	✔	✔	✔	✔
Pickup - Local and Directed	✔	✔	✔	✔	✔	✔
Priority Dial 0	✔	✔	✔	✔	✔	✔
Privacy Enable / Privacy Release	✔	✖	✔	✔	✔	✖
Programmable Key Module (PKM)	✔	✖	✖	N/A on Symbol/ Spectralink	✖	✖

* Includes Dual Mode versions

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Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Receive Only Extensions	✖	✖	✖	✖	✖	✔
Record a Call	4150 only	✖	✔	N/A on 420 or Symbol	✔	✖
Reminder	✔	✔	✔	✔	✔	✔
Reminders - Multiple	✔	✔	✔	✔	✔	✔
Ringer Control	✔	✔	✔	✔	✔	✖
Ringing - Discriminating	✔	✔	✔	✔	✔	✔
Secretarial Line	✔	✖	✔	N/A on Symbol/ Spectralink	✔	✖
Secure Hot Swap	✔	✔	✔	✔	✔	✔
Single Button Transfer to Voice mail	✔	✔	✔	✔	✔	✖
Speak@Ease Support	N/A on 4DN	✖	✔	✔	✔	✖
Speaker Volume Control	✔	✖	✔	✔	✔	✖
Speed Call Key	✔	✔	✔	N/A on Symbol	✔	✖
Split	✔	✖	✖	✔	✖	✖
Subattendant - Basic Function	✔	✔	✔	N/A on Symbol/ Spectralink	✔	✖
Subattendant - Enhanced Functions	✔	✖	✖	5020/5220/ 5224 only	✖	✖

* Includes Dual Mode versions (Page 10 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Subattendant - Abbreviated Dial Programming	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Advisory Message Setup	✔	✖	✖	✖	✖	✖
Subattendant - Automatic Call Wakeup	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Call Blocking	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Call Forward Setup and Cancel	✔	✖	✖	✖	✖	✖
Subattendant - Call Logging	✔	✖	✖	✖	✖	✖
Subattendant - Calls Waiting Indication	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Centralized Answering Position (RLT)	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Date and Time Setup	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Hold Positions	✔	✖	✖	✖	✖	✖
Subattendant - LDN Keys	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - New Call Ring	✔	✖	✖	5020/5220/ 5224 only	✖	✖

* Includes Dual Mode versions (Page 11 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Subattendant - Paged Hold Access	✔	✖	✖	✖	✖	✖
Subattendant - Recall	✔	✖	✖	5020/5220/ 5224 only	✖	✖
Subattendant - Station DND Setup	✔	✖	✖	5020/5220/ 5224 only	✖	✖
SUPERET 3DN and SUPERSET 4DN Auto-Answer For Directed Page Calls	✖	✖	✖	✖	✖	✖
SUPERSET 3DN and SUPERSET 4DN Option	✖	✖	✖	✖	✖	✖
SUPERSET LCD Display	✔	✖	✔	✔	✔	✖
Swap (Trade Calls)	✔	✔	✔	✔	✔	✔
Swap Campon	✔	✔	✔	✔	✔	✔
System Fail Transfer (SFT)	✔	✔	✔	✔	✔	✔
TAPI Support Over DNIC	4150 only	✖	✖	4125 only	✖	✖
Tone Demonstration	✔	✔	✔	✔	✔	✖
Transfer	✔	✔	✔	✔	✔	✔
Transfer Dial Tone	✔	✔	✔	✔	✔	✔
Transfer Security (Recall)	✔	✔	✔	✔	✔	✔

* Includes Dual Mode versions (Page 12 of 13)

Table 81: Mitel Phones and Features (continued)

Feature	SS430 SS4150	SS401 SS4001 5201 IP	SS4015 5010 IP 5212 IP* 5215 IP*	SS420 SS4025 SS4125 5020 IP 5220 IP* 5224 IP* Symbol Spectralink	5207 IP	ONS
Trunk Answer From Any Station (TAFAS)	✔	✔	✔	✔	✔	✔
Trunk Operation - Direct Inward System Access (DISA)	✔	✔	✔	✔	✔	✔
Uniform Call Distribution	✔	✔	✔	✔	✔	✔
Voice mail Prompts - Display	✔	✔	✔	✔	✔	✖
Whisper Announce - From	✔	✔	✔	✔	✔	✖
Whisper Announce - To	✔	✖	✖	N/A on Symbol/ Spectralink	✔	✖

* Includes Dual Mode versions (Page 13 of 13)

Appendix E
Handling Fiber Optic Cables

Guidelines for Handling Fiber Optic Cable

- Never touch the tip of a fiber connector. Cleanliness of the connector ferrule (tip) is important for error-free transmission.
- Always place the dust caps onto the connectors immediately after disconnecting.
- You can clean the ferrule tips on the connectors with ethyl alcohol.
- Fiber optic cables are often more easily installed and pulled than copper because of their light weight and flexibility. However, take care not to exceed the minimum bend radius or maximum tensile strength.
- Procedures for the repairing, splicing, or assembling of fiber optic cables are available from fiber component manufacturers (many offer training courses).

WARNING: FIBER OPTIC SOURCES EMIT INFRARED LIGHT THAT IS INVISIBLE TO THE HUMAN EYE. NEVER LOOK DIRECTLY INTO A SOURCE OR INTO THE END OF A FIBER ENERGIZED BY A SOURCE BECAUSE IT CAN DAMAGE THE RETINA. WHEN WORKING WITH RAW FIBER OPTIC CABLE, BE CAREFUL OF THE FIBER ENDS OR SLIVERS THAT CAN PUNCTURE THE SKIN OR CAUSE IRRITATION.

Specifications

At each end of a fiber optic cable is a Fiber Interface Module (FIM). At the transmitting end, the FIM converts electrical signals into pulses of light to be transmitted over the cable. At the receiving end, the FIM converts the pulses of light back into electrical signals usable by the node.

The FIM connects the controller to a peripheral cabinet, or NSU. Each FIM variant may be identified by its optical wavelength and fiber type (indicated on the FIM faceplate). The same FIM variant must be used at each end of a fiber optic cable. However, a node may be equipped with different FIM variants to suit the length of each cable run.

See the SX-200 ICP Technical Documentation for Fiber Interface Module specifications.

Operation

The FIM has three functional sections: a transmitter, a receiver, and a control section.

The transmitter section accepts data from the node in which it is installed. The data is converted to byte-interleaved format, and a checksum is calculated. The checksum byte is combined with the data and the frame synchronization information. The frame is encoded as serial data and transmitted on the fiber.

The receiver section converts the incoming data to parallel format, extracts the frame synchronization information, and decodes the data. Control and status information is extracted and further decoded. The checksum is verified and an error counter updated. The status information and data are combined, frame-aligned, and re-formatted for output.

The control section generates control signals and the transmit clocks. This section also regenerates the telephony clocks for the peripheral nodes, and provides status information for the Main Controller.

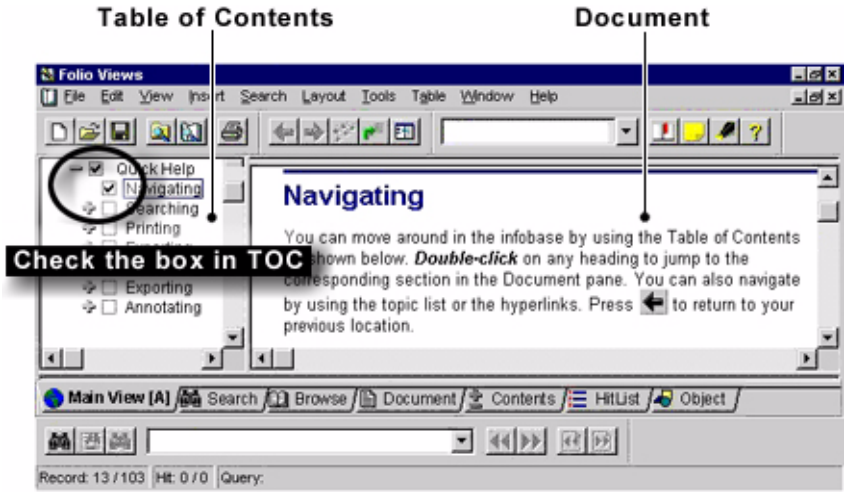
Two LEDs indicate the detection of local and remote clocks.

Appendix F
Folio Views (E-Docs) Tips

About Folio Views

The documentation CD-ROM contains all of the technical information in an electronic file called an “infobase”. Folio Views, the infobase viewer, has powerful search capabilities that let you find information quickly and easily. Once you've found the information that you need, you can read it online, print sections, or export segments to word processing files.

How do I print a procedure from the infobase?



1. In the **Table of Contents**, select the check box of the section that you want to print.
2. On the **File** menu, click **Print**.
3. Click the **Print Document** tab.
4. Click **Section**.

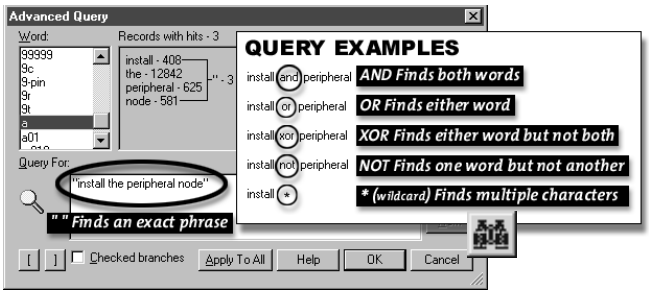
   CAUTION:Do not click all or you will print the entire infobase.
5. Click **OK**.

How do I export a section of the infobase to a word processing file?

1. In the **Table of Contents**, select the check box of the section that you want to export.
2. On the **File** menu, click **Export**.
3. In the **Save In list**, select the save location.
4. In the **File name** box, type a name.
5. In the **Save as type** list, select a file type.
6. In the **Export Range** list, select **Checked Branches**.
7. Click **Export**.

How do I search the entire infobase?

1. Click **Advanced Query** .
2. In the **Query For** box, type your search criteria.



3. Click **OK**.

To view the next hit, click **Next Hit** 

To view the previous hit, click **Previous Hit**  .

How do I search a section of the infobase?

1. In the Table of Contents, select the check box of the section that you want to search.
2. Click **Advanced Query**  .
3. In the Query For box, type your search criteria.
4. Ensure that the **Checked branches** check box is selected.
5. Click **OK**.

   To view the next hit, click **Next Hit**  .

   to view the previous hit, click **Previous Hit**  .

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