BLACK BOX®
NETWORK SERVICES

Voice Trunking Gateways

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Chapter 1

Introduction

1.1 Overview

MT1200A, MT1201A and MT1207A are voice trunking gateway units that enable digital T1/E1 or analog voice channels to be compressed and extended over an IP or serial link. These units implement G.723.1, G.729 A, G.711 compression and TDMoIP or MPLS multiplexing algorithms to send up to 30/24 digital or four analog voice channels over an IP or n x 64 kbps network, with transparent CAS and CCS support.

MT1200A, MT1201A and MT1207A units utilize voice activity detection, silence suppression, echo cancellation and other techniques to improve voice quality. The gateways detects, generates and relays DTMF/MFR2/MFC signaling. In addition, they support fax relay and voice band data.

The units can be managed locally via an ASCII terminal or remotely via Telnet or SNMP-based network management applications.

Versions

The following voice trunking gateway unit models are available:

- **MT1200A** provides a single T1 port that can support up to 6 digital voice channels

- **MT1201A** provides FXS ports to support up to 4 analog voice channels

- **MT1207A** provides a single T1 port that can support up to 24 digital voice channels

- **MT120xAE** provides a single E1 port that can support up to 30 digital voice channels.

All the above models are also available in DC-powered versions

Note   *In this manual, the generic term **MT120xA** is used when the information is applicable to all equipment versions. The complete equipment designation is used only for information applicable to specific equipment versions.*

Applications

Figure 1-1 shows a central voice mux gateway operating opposite MT120xA units and another remote voice mux gateway, in a point-to-multipoint application over an IP network.
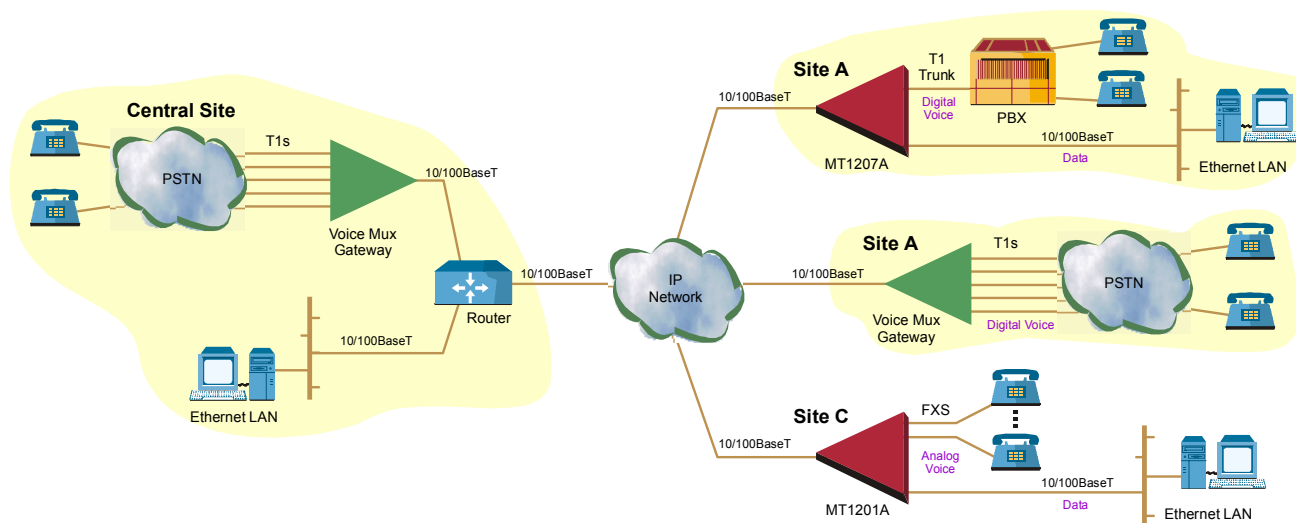
Figure 1-1. Transmitting LAN Data and Compressed Digital/Analog Voice in Point-to-Multipoint Application

Figure 1-2 shows MT120xAs in a point-to-point application over a satellite link. Here, the serial TDM link is employed to transmit the user LAN data and compressed voice in an n x 64 kbps bit stream, compatible with satellite transmission equipment.
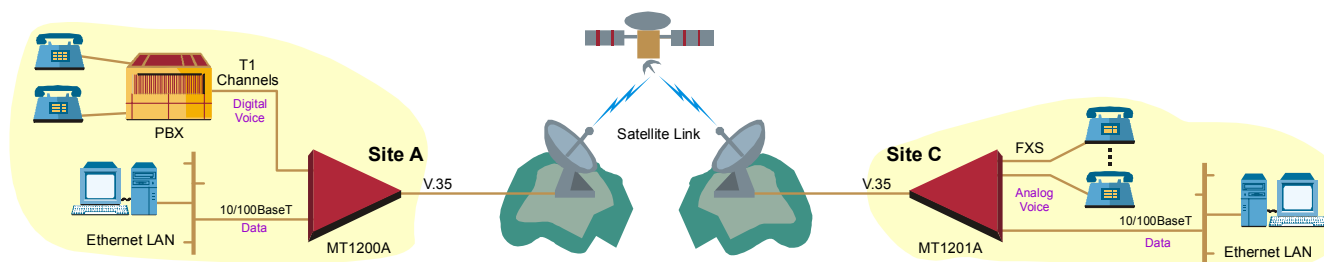
Figure 1-2. Data and Compressed Digital/Analog Voice over Satellite Link

Features

Ethernet Links

MT120xA provides two half/full duplex, 10/100BaseT Ethernet ports, each with autonegotiation support. One port functions as the uplink to the IP network, while the other is provided for connecting the user Ethernet LAN to the MT120xA unit. Together with the MT120xA's integral Ethernet switch, this allows integrating the user LAN traffic with the compressed voice, over a single uplink to the network.

If autonegotiation is disabled, the Ethernet ports can be configured to any of the following operation modes:

- 10BaseT – half or full duplex

- 100BaseT – half or full duplex.

The main link Ethernet port supports direct and indirect connection to the IP network.

Serial Main Link

MT120xA has a single TDM link with a RS-530 interface. This serial port supports n x 64 kbps data rates, from 64 to 2048 kbps.

In addition to the standard RS-530 interface, the following serial interfaces are supported by connecting an interface adapter cable to the MT120xA unit's RS-530 interface:

- X.21

- V.35

Voice Interface

MT1200A and MT1207 each have a single T1 digital voice interface, while MT1201 has four FXS analog voice channels and MT12**xAE** has a single E1 digital voice port. The voice interfaces control the T1 or E1 frames, use G.723.1 (6.4 kbps), G.723.1 (5.3 kbps), G.729 A (8 kbps) and G.711 compression algorithms, and handle CAS/CCS signaling transparently.

Voice Activity Detection mechanism allows optimizing bandwidth utilization, as MT120xA generates traffic only when voice activity is detected. MT120xA uses the G.723.1 A and G.729 B techniques for silence suppression and the G.168 standard for echo cancellation (up to 16 ms per channel). MT120xA detects, generates and relays DTMF/MFR2/MFC signals. In addition, MT120xA supports Group III fax relay (4.8, 9.6, 14.4 kbps) and transmits voice-band modem data.

TDMoIP Multiplexing

MT120xA encapsulates the payload bytes in a UDP frame that is transferred over IP and over Ethernet.

The number of TDM bytes in a multiplexed frame and packetizing interval are user-configurable.

A destination IP address can be configured for each bundle (see *Bundling*, below).

MPLS Multiplexing

When using non-IP based Ethernet networks or the Serial uplink, the MPLS format can be used instead of TDMoIP. The MPLS header is smaller than the TDMoIP header, saving about 5% in bandwidth.

Bundling

A bundle is a logical internal MT120xA port, containing up to 30 timeslots. MT120xA supports 12 bundles. A bundle is routed to a defined remote IP address. Each timeslot can be included in any bundle. At the remote site, it can be connected to any timeslot within a destination bundle.

Bundle QoS supports:

- Labeling IP level priority (ToS).

- VLAN tagging and priority labeling according to IEEE 802.1p&Q.

The user can configure the ToS (Type of Service) of the outgoing IP packets. This allows an en-route layer 3 router or switch that supports ToS to give higher priority to MT120xA traffic for delay-sensitive and secure applications.

MT120xA allows you to configure the whole ToS byte field, since different vendors may use different bits to tag packets for traffic prioritization. This also enables you to work according to various RFC definitions (for example RFC 2474, RFC 791).

Timing

Available timing modes for the T1/E1 voice ports are:

- **Loopback** – The transmit clock is derived from the TDM receive clock.

- **Internal** – MT120xA features an internal oscillator. When MT120xA is configured to operate with its internal clock, transmit (Tx) and receive (Rx) trunks use the clock supplied by its internal oscillator.

Available timing modes for the serial main link are:

- **DTE** – port accepts receive and transmit clock signals from the communication equipment, e.g., modem, connected to the main link. This operation requires an adaptor/cross-cable.

- **DCE** – MT120xA provides the transmit and receive clock signals, derived from its internal oscillator, to the communication equipment connected to the main link.

Diagnostics

MT120xA supports local (internal) and remote (external) loopback activation on the T1, E1, and FXS channels. The user can also perform tone injection towards the local PBX or analog equipment. In addition, a ping utility is included to confirm IP connectivity to the remote units.

Statistics Collection

MT120xA provides extensive statistics collection capabilities, which include Ethernet (as per RFC 1643) and HDLC statistics, voice, signaling, bundles, and CPU utilization.

Management

MT120xA can be managed via a local terminal, Telnet or SNMP network management systems. MT120xA has an RJ-45 port for the direct terminal connection. Alternatively, a supervisory terminal can be connected via a modem link.

Software upload and download and configuration can be performed via the local terminal or TFTP. Remote units are managed via Telnet or SNMP over an in-band management link.

MT120xA supports a four-level security and user-authentication system:

- **Administrator** – Allowed to configure all the MT120xA parameters.

- **Operator** – Allowed to perform all operations in the system except for user administration (adding/deleting users, changing user definitions).

- **Technician** – Allowed to test MT120xA and monitor its operation (for example, monitoring alarms).

- **Monitor** – Allowed to monitor the MT120xA operation.

When MT120xA is managed over Telnet, up to five simultaneous management sessions are allowed. Access to the MT120xA software can be limited to the ASCII terminal and SNMP management by disabling the Telnet access.

1.2 Physical Description

MT120xA is a 1U high, easy-to-install standalone device. *Figure 1-3* shows a 3D view of the unit.

The front panel includes LEDs which indicate power supply, alarm and Ethernet main link status. The front panel indicators are described in C*hapter 3*.

The rear panel is different for each model. *Figure 1-4* shows the rear panel of a MT1200A or MT1207A with a T1 voice port and AC power supply.
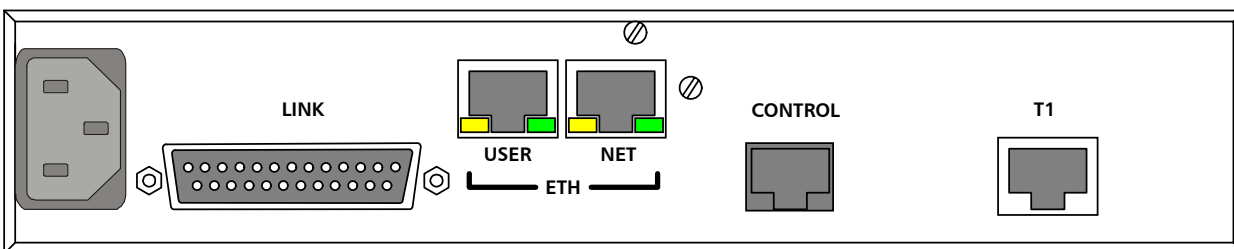
Figure 1-4. Rear Panel of MT1200A/MT1207A

The MT120xA rear panel includes the following:

- One of the following voice interfaces:

  - Single T1 digital voice port

  - Four FXS analog voice ports

  - Single E1 digital voice port

- Two Ethernet ports (one for the main link, one to connect to the user LAN)

- One serial uplink (V.35 interface to connect to TDM link)

- One control port (RJ-45 interface; used to connect to a management terminal)

- One power supply (either AC or DC)

The rear panel is described in detail in *Chapter 2*.

1.3 Functional Description

Figure 1-5 illustrates the block diagram of MT120xA.
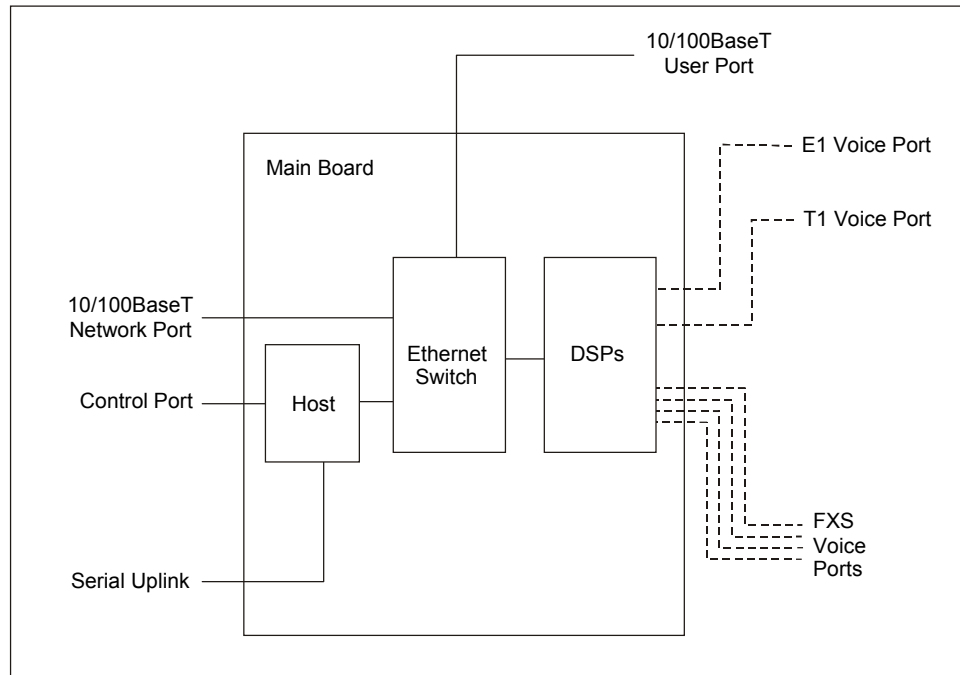
Figure 1-5. MT120xA Block Diagram

Voice Interface

Voice interface includes one of the following:

- MT1200 and MT1207: One T1 port, which receives T1 trunks from PBXs

- MT1201: Four FXS analog ports that connect to POTS or faxes.

- MT12**xAE:** One E1 port, which receives E1 trunks from PBXs

Signaling

Signaling information is processed according to signaling mode: CAS or CCS.

- **CAS** – The signaling data is processed by the unit's host by extracting the ABCD bits and reporting any change in their status to the host. The reporting format is similar to E1. In addition, the signaling DSP employs a refresh mechanism to update the host with the most recent status of the ABCD bits. The ABCD bits can be manipulated by using translation rules, which are defined by means of signaling profiles.

  A profile enables the user to select the translation of each individual signal bit. The available selections are A, B, C, D (value copied from the corresponding incoming bit), NOT A, NOT B, NOT C, NOT D (inverted value of corresponding incoming bit), 0 (always 0), and 1 (always 1).

  In addition to the translation of individual bits, the signaling profiles can also be used to define the signaling bit patterns that indicate the idle and OOS states.

- **CCS** – The signaling information is transferred transparently to the host, which encapsulates the HDLC frame with the proper IP header and sends it to the main link. The following protocols are supported: ISDN, QSIG and SS7. HDLC data can be extracted from any set of timeslots and sent to a single destination.

  When operating with SS7 signaling, it is possible to control the amount of keep-alive messages transferred over the signaling links.

Compression

The DSPs handle the voice traffic by compressing it according to G.723.1 (6.4 or 5.3 kbps) and G.729 A (8 kbps), or digitizes it according to the G.711 requirements (A-law and µ-law). Compression methods are user-selectable per bundle.

Note
*Every six voice timeslots are handled by a single DSP. Each DSP supports one compression method at any time. MT1200 and MT1201 are each equipped with a single DSP, while MT1207 has four and MT120*0xAE *has five.*

Voice Activity Detection

Voice Activity Detection (VAD) uses digital signal processing techniques to distinguish between silence and speech on a voice connection. VAD reduces the bandwidth requirements of a voice connection by generating traffic only during periods of active voice conversation. With Comfort Noise Generation supported at the remote site, VAD significantly reduces bandwidth consumption without degrading voice quality. VAD achieves additional bandwidth savings when combined with voice compression techniques.

TDMoIP Multiplexing

Compressed voice payload is multiplexed by using the TDMoIP technique. The multiplexing is performed by the MT120xA software. The DSPs send a continuous stream of voice packets; which are put together into a TDMoIP frame by adding AAL2 headers and a TDMoIP header. *Figure 1-6* illustrates the TDMoIP frame structure.
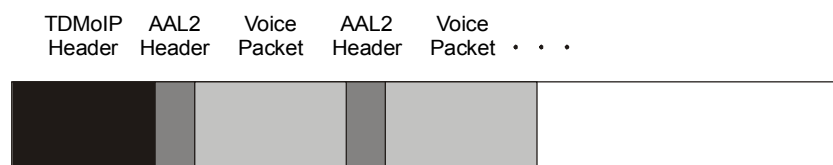
Figure 1-6. TDMoIP Frame Structure

The size of the TDMoIP frame is determined by the following parameters:

- Packetizing interval – The time interval allocated for the TDMoIP frame aggregation (10 to 90 msec).

- Maximum bytes per multiplexed frame – The maximum size of each frame (100 to 1461 bytes).

The MT120xA continues filling the TDMoIP frame until one of the conditions defined by the above parameters is met.

Ethernet Frame

At a later stage, the TDMoIP frame becomes a part of the standard Ethernet frame, which also includes a UDP header, IP header and MAC. The Ethernet frames are forwarded to the CPU, which sends them to the Ethernet and Serial main links. *Figure 1-7* illustrates the structure of the MT120xA Ethernet frame. *Table 1-1* describes the fields of the MT120xA Ethernet frame.

Ethernet	IP	UDP	TDMoIP	AAL2	Voice	AAL2	Voice	AAL2	Voice	Ethernet
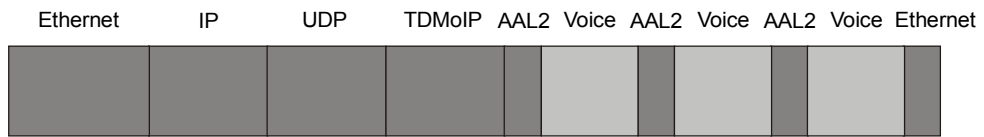
Figure 1-7. Ethernet Frame Structure

Note   *When using the Serial main link, an additional 4 bytes are added to the packet (HDLC framing).*

Table 1-1. Ethernet Frame Fields

	Field Length (bytes)	Field
MAC Layer	7	Preamble
	1	SFD
	6	Destination MAC Address
	6	Source MAC Address
LLC Layer	2	Type
IP Layer	1	Vers/HLEN
	1	Service Type
	2	Total Length
	2	Identification
	1	Flags/Fragment Offset (most)
	1	Fragment Offset (least)
	1	Time to Live
	1	Protocol
	2	Header Checksum
	4	Source IP Address
	4	Destination IP Address
UDP Layer	2	UDP Source Port
	2	UDP Destination Port
	2	UDP Message Length
	2	UDP Checksum
Data Layer	...	Payload
MAC Layer	4	CRC

IEEE 802.1p&Q VLAN Tagging (additional 4 bytes if enabled) — *(points to Type field)*

Note: The UDP source port field is used to transfer a destination bundle number. — *(points to UDP Source Port field)*

VLAN Support

MT120xA supports VLAN, according to IEEE 802.1p&Q. When VLAN support is enabled, MT120xA adds four bytes to the MAC layer of the Ethernet frame. The content of these bytes, MAC layer priority and VLAN ID, can be set by the user. In this mode, only VLAN format frames are sent and received by MT120xA. The following figure describes the VLAN tag format.
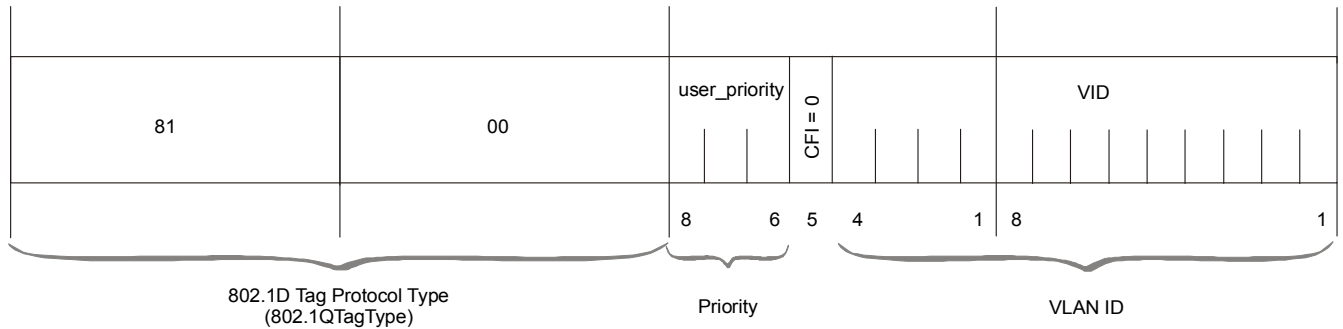
Figure 1-8. VLAN Tag Format

UDP Support

Table 1-2. UDP Source Port as Destination Voice Port

Field Length (Bits)	Field Description	Value
2 bytes	UDP Source Port*	2 – 497d
2 bytes	UDP Destination Port	2142d

* – The MSB of this field can be either 1 or 0 for inband end-to-end proprietary signaling.

Note *The UDP Source Port field is used for destination voice bundle indication. For example, if the destination is:*
Bundle 1 – 02, Bundle 2 – 03, Bundle 3 – 04, Bundle 4 – 05, etc.

For more information about VLAN tagging, see IEEE Std 802.1p&Q.

Ethernet Main Link (ETH NET Port)

The 10/100BaseT main link receives Ethernet frames from the voice modules via the Ethernet switch and forwards them to the remote device over the IP network. The 10/100BaseT main link supports full duplex transmission with autonegotiation and half duplex with the backpressure option.

Serial Main Link

The RS-530 serial main link receives Ethernet frames from the voice modules via the Ethernet switch and forwards them to the remote device over a TDM network or a leased line.

Ethernet User LAN (ETH USER Port)

The 10/100BaseT user LAN port receives Ethernet frames from the user's LAN via the internal Ethernet switch and forwards them to the remote device over the main link. This port supports full duplex transmission with autonegotiation and half duplex with the backpressure option.

Bandwidth Utilization when using TDMoIP

By using TDMoIP multiplexing and the voice activity detection, MT120xA supports a higher number of voice channels over TDM than it is possible by utilizing conventional compression methods alone. TDMoIP multiplexing and grouping the timeslots of compressed voice together into bundles with a common IP address reduces the actual bandwidth used per channel to as low as 4 kbps (up to 16:1), when all channels are active. Better compression, up to 20:1, is achieved when some of the voice channels are idle.

Note   *The actual compression achieved at any time depends on the voice activity on the network, the signaling system in use, and the number of modem/fax calls.*

The actual bandwidth utilization is determined by the following factors:

- Header sizes:
  - Ethernet – 18 bytes
  - IP – 20 bytes
  - UDP – 8 bytes
  - TDMoIP – 4 bytes
  - VLAN (if exists) – 4 bytes.
- Size of the voice packet:
  - G.723 – 31 bytes (AAL2 header [3 bytes] + voice header [4 bytes] + compressed voice payload [24 bytes])
  - G.729 – 17 bytes (AAL2 header [3 bytes] + voice header [4 bytes] + compressed voice payload [10 bytes]).
- Packet interval:
  - G.723.1 – 30 msec
  - G.729 – 10 msec.
- Number of timeslots in a bundle
- Silence percentage. Studies show that an average person speaks only 40% of the time during a telephone conversation. 50% of the time is spent listening to the other party, while the remaining 10% is spent quietly contemplating.
- Connectivity packets – 64 bytes per minute.

Calculating Approximate Bandwidth Utilization (TDMoIP)

Let us calculate an approximate bandwidth for 30 timeslots in one bundle with G.723.1 compression, 60 % of silence:

$$\left\{ \frac{[(50 \times 1000/40) + (30 \times 31 \times 1000/30 \times 0.4)] \times 8}{1000} \right\} + 0.00853 = 109.208 \text{ kbps}$$

where:

- 50 – size of Ethernet, IP, UDP, TDMoIP headers

- 1000/40 – packet per seconds (pps) transmission rate, calculated according to the packetizing interval chosen (40 msec in this example)

- 30 – number of timeslots

- 31 – size of the compressed G.732 packet plus AAL2 header and voice payload

- 0.4 – 60% of silence

- 8 – conversion from bytes to bits

- 1000 in the denominator – conversion from bits to kilobits

- 0.00853 – connectivity packets rate (64 bytes per minute) converted to kbps.

Bandwidth Utilization when using MPLS

When using non-IP based Ethernet networks or the Serial uplink, the MPLS format can be used instead of the TDMoIP multiplexing format. The MPLS header is smaller than the TDMoIP header (23 rather than 50 bytes), saving about 5% in bandwidth when compared to TDMoIP multiplexing.

The actual bandwidth utilization is determined by the following factors:

- Header sizes:
  - Ethernet – 18 bytes
  - MPLSoAAL2 – 5 bytes
- Size of the voice packet:
  - G.723 – 31 bytes (AAL2 header [3 bytes] + voice header [4 bytes] + compressed voice payload [24 bytes])
  - G.729 – 17 bytes (AAL2 header [3 bytes] + voice header [4 bytes] + compressed voice payload [10 bytes]).
- Packet interval:
  - G.723.1 – 30 msec
  - G.729 – 10 msec.
- Number of timeslots in a bundle
- Silence percentage. Studies show that an average person speaks only 40% of the time during a telephone conversation. 50% of the time is spent listening to the other party, while the remaining 10% is spent quietly contemplating.
- Connectivity packets – 64 bytes per minute.

Calculating Approximate Bandwidth Utilization (MPLS)

The approximate bandwidth for 30 timeslots in one bundle with G.723.1 (6.4 kbps) compression, 60 % of silence is calculated as follows:

$$\left\{ \frac{[(23 \times 1000/40) + (30 \times 31 \times 1000/30 \times 0.4)] \times 8}{1000} \right\} + 0.00853 = 103.80853 \text{ kbps}$$

where:

- 23 – size of Ethernet and MPLSoAAL2 headers
- 1000/40 – packets per second (pps) transmission rate, calculated according to the packetizing interval chosen (40 msec in this example)
- 30 – number of timeslots
- 31 – size of the compressed G.732 packet plus AAL2 header and voice payload
- 0.4 – 60% of silence
- 8 – conversion from bytes to bits
- 1000 in the denominator – conversion from bits to kilobits
- 0.00853 – connectivity packets rate (64 bytes per minute) converted to kbps.

1.4 Technical Specifications

Ethernet Links

Number of Links	2
Standards	IEEE 802.3, 802.3u, Ethernet 802.1p&Q
Data Rate	10 or 100 Mbps, half duplex or full duplex, autonegotiation support
Statistics	According to RFC 1643 or RFC 2665:

- Received frames – Correct Frames, Correct Octets, Alignment Errors, FCS Errors
- Transmitted frames – Correct Frames, Correct Octets, Single Collision, Multiple Collision, Deferred Transmission, Late Collision, Carrier Sense Error

Range	Up to 100m (328 ft) over UTP Cat.5 cable
Connectors	RJ-45, 8-pin per link

Serial Link

Interface
- RS-530
- V.35 (requires adapter cable)
- X.21 (requires adapter cable)

Data Rate	n x 64 kbps, for rates from 64 to 2048 kbps

Timing
- DCE
- DTE (requires adapter/cross cable)

Connector	DB-25, female

Voice Ports

Configuration
- MT1200A and MT1207A: One T1 digital voice port
- MT1201A: Four FXS analog voice ports
- MT120AE: One E1 digital voice port

T1 Port (MT1200A, MT1207A)

Number of Ports	One
Data Rate	1.544 Mbps
Standards	ANSI T1.403, ITU-T Rec. G.703
Line Code	AMI
Zero Suppression	B8ZS
Framing	D4, ESF

	Receive Signal Level	0 to -36 dB with CSU
		0 to -30 dB without CSU
	Transmit Signal Level	0, -7.5, -15, or -22.5 dB with CSU
		±2.7V (±10%) at 0–655 ft without CSU
	Jitter Performance	Per AT&T TR-62411, G.824
	Line Impedance	100Ω, balanced
	Connector	RJ-45, 8-pin
E1 Port	Number of Ports	One
(MT120xAE**)**	Data Rate	2.048 Mbps
	Standards	ITU-T Rec. G.703, G.704, G.706, G.732, G.823
	Framing	G.732S and G.732N with or without CRC-4, in compliance with ITU-T Rec. G.703, G.704, G.732 requirements
		HDB3
	Receive Signal Level	0 to -43 dB with LTU
		0 to -12 dB without LTU
	Transmit Signal Level	±3V (±10%)
	Jitter Performance	Per ITU-T G.823
	Line Impedance	120Ω, balanced
		75Ω, unbalanced
	Connector	RJ-45, balanced
		Two BNC coaxial, unbalanced

FXS Ports	*Number of Ports*	Four
(MT1201A)	*Analog Parameters*	ITU-T standards: G.713, 2-wire for voice and signaling

FXS Ports

(MT1201A)

Number of Ports Four

Analog Parameters ITU-T standards: G.713, 2-wire for voice and signaling

Nominal level: 0 dBm

Nominal impedance: 600Ω

Return loss (300 to 3400 Hz): better than 20 dB

Frequency response (Ref: 1020 Hz):

- 300 to 3000 Hz: ±0.5 dB
- 250 to 3400 Hz: ±1.1 dB

Level Adjustment, soft selectable:

- TX: +5 dBm to -10 dBm
- RX: +5 dBm to -10 dBm
- Steps: 2 dB (±0.1 dB), nominal

Signal to Total Distortion, G.712, G.713 method 2:

- 0 to -30 dBm0: better than 33dB
- +3 to -45 dBm0: better than 22dB

Idle channel noise: better than -70 dBm0 (+20 dBrnc)

Signaling Signaling type: EIA RS-464 Loop-Start

On-Hook/Off-Hook Threshold:

- 3V to 24V between TIP and RING at off-hook state
- Higher than 25V between TIP and RING at on-hook state

Feed Current: 24 mA ±10%

Ringer:

- Voltage: 50 VRMS (±10%), overload protected
- Frequency: 25 Hz (±10%)
- Cadence: 1 sec ON / 3 sec OFF (default), user-configurable

Connectors RJ-11 per port

Voice Processing	*Compression Algorithms*	G.723.1, G.729 A, G.711 (a-law/μ-law)
	Silence Suppression	G.723.1A, G.729B
	Echo Cancellation	16 ms per channel as per G.168
	Fax Relay	Group III: 4.8, 9.6, 14.4 kbps
	Voice-Band Modem	Transparent transfer
	MF Signaling Support	DTMF, MFR2, MFC detection, generation and relay
Control Port	*Standard*	V.24/RS-232 (DCE)
	Data Rate	9.6, 19.2, 38.4, 57.6 or 115.2 kbps
	Connector	RJ-45
Diagnostics	*Tests*	Local and remote loopbacks, tone injection towards local PBX, ping utility
	Statistics Collection	• Ethernet
		• CPU utilization
		• HDLC
		• Bundles
		• Voice
		• Voice Rx and Tx signaling
Indicators	*ALM (red)*	Alarm
	ETH (green)	Ethernet link status
	PWR (green)	Power
Power Supply	*Input*	AC Source: 100 to 240 VAC, 50/60 Hz, 40W
		DC Source: -36 to -72 VDC (-48 VDC, nominal)
	Consumption	MT1201A: AC: 13.5 W; DC: 12.5 W
		MT1200A, MT1207A, MT120AE: AC: 10.2 W DC: 9.0 W
Physical	*Height*	4.3 cm (1.7 in)
	Width	21.5 cm (8.5 in)
	Depth	23.7 cm (9.3 in)
	Weight	2.0 kg (4.4 lb)
Environment	*Operating Temperature*	0 to 50°C (32 to 122°F)
	Storage Temperature	-20 to 70°C (4 to 158°F)
	Humidity	Up to 90%, non-condensing

Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for the MT120xA device.

After installing the unit:

- Refer to *Chapter 3* for the operating instructions.
- Refer to *Chapter 4* for the detailed system configuration procedures using an ASCII terminal connected to the MT120xA control port.

If a problem is encountered, refer to *Chapter 6* and *Chapter 7* for test and diagnostic instructions.

> ⚠️
> **Warning**
>
> **Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.**
>
> **Always observe standard safety precautions during installation, operation, and maintenance of this product.**

2.1 Site Requirements and Prerequisites

The AC-powered MT120xA unit should be installed within 1.5 m (5 ft) of an easily-accessible, grounded AC outlet capable of furnishing the voltage in accordance with MT120xA nominal supply voltage.

The DC-powered MT120xA-DC unit requires a -48 VDC power source, which must be adequately isolated from the main supply.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of MT120xA is 0 to 50°C (32 to 122°F), at a relative humidity of up to 90%, non-condensing.

2.2 Package Contents

The MT120xA package includes the following items:

- One MT120xA unit

- MT120xA installation and operation manual

- CBL-RJ45/D9/F/STR cable for ASCII terminal connection

- AC power cord or DC power supply connector kit.

2.3 Installation and Setup

The MT120xA unit is designed for desktop or bench installation and is delivered as a fully assembled unit. No provisions are made for bolting the unit to a tabletop.

➤ **To install MT120xA:**

1. Determine the required configuration of MT120xA, in accordance with your application.
2. *MT120e1 only*: Set the E1 internal jumpers to match the E1 balanced or unbalanced connection type; set the ground reference jumpers.

3. Connect the voice port(s).

4. Connect the TDM main link to the 10/100BaseT (NET Ethernet) port or the serial V.35 port.

5. Connect the LAN to the USER Ethernet port.

6. Connect an ASCII terminal or a PC running a terminal emulation software.

7. Connect power to the unit.

Setting the E1 Voice Port Internal Jumpers (MT120xAE only)

Opening MT120e1A Case

In order to access internal jumpers of MT120e1A, you must open the unit's case.

➤ **To open the case:**
1. Disconnect the power cable from the electricity outlet.
2. Disconnect all cables from the MT120e1A.
3. Release the two screws on each side panel of the unit.

4. Release the screw on the rear panel of the unit.

5. Slide the top cover backward to open the case.

Setting the E1 Voice Port Internal Jumpers

If the MT120xAE uses the E1 voice port, you may need to set the internal jumpers to match the E1 connection type: balanced or unbalanced. In addition, the signal ground can be connected to the frame ground or floating. If the default factory settings described below fit your requirements, skip this section and proceed to the next section.

➤ **To set the internal jumpers:**

1. Release the two screws holding the DSP board (see *Figure 2-1*).
2. Remove the DSP board by lifting it straight up.

3. Set the MT120xAE internal jumpers (see *Figure 2-1* and *Table 2-1*).
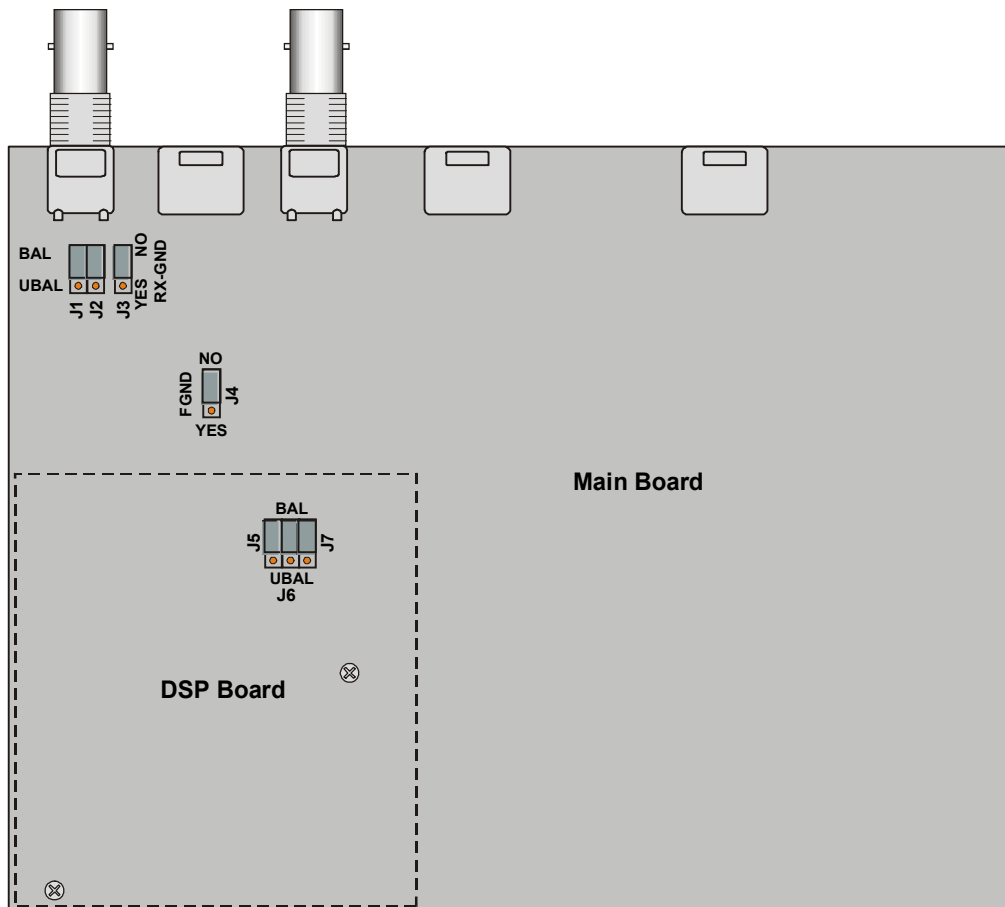
Figure 2-1. MT120xAE E1 Jumper Locations

Table 2-1. MT120xAE E1 Jumper Settings

Jumper	Description	Values	Factory Setting
E1 interface type jumpers, J1, J2, J5, J6, J7	Select the E1 interface type: balanced or unbalanced. *All the jumpers must be set to the same position (balanced or unbalanced).*	**BAL** – E1 balanced interface **UNBAL** – E1 unbalanced interface	BAL
Input BNC ground reference RX-GND, J3	Control the ground reference of the input BNC when the unbalanced interface is used. In accordance with ITU-T recommendations, this jumper should be set to NO (when the unbalanced interface is used, the input line is normally grounded at the other side). This also suits operation with the balanced interface.	**YES** – The input BNC shield is connected to the frame ground **NO** – The input BNC shield is floating	NO
Signal ground reference FGND, J4	Control the connection of pin 3 and pin 6 of the RJ-45 E1 connector to the frame ground.	**YES** – Pin 3 and pin 6 are connected to the frame ground **NO** – Pin 3 and pin 6 are not connected to the frame ground	NO

Closing MT120xAE Case

After completing the internal settings, close the unit case.

➤ **To close the case:**

1. Re-install the top cover.

2. Secure the top cover with the four side panel screws and one rear panel screw.

Connecting the Interfaces

Figure 2-2 shows the rear panel of an AC-powered MT120xAE. *Figure 2-3* shows the rear panel of a DC-powered MT1200A or MT1207. *Figure 2-4* shows the rear panel of an AC-powered MT1201A.
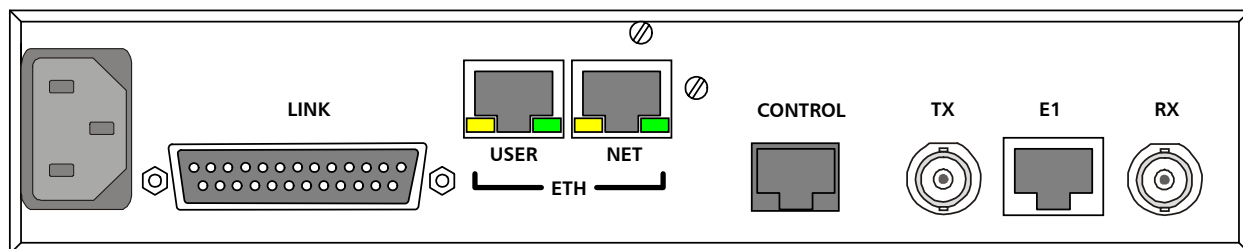
Figure 2-2. MT120xAE Rear Panel (E1 Voice Port and AC Power Supply)
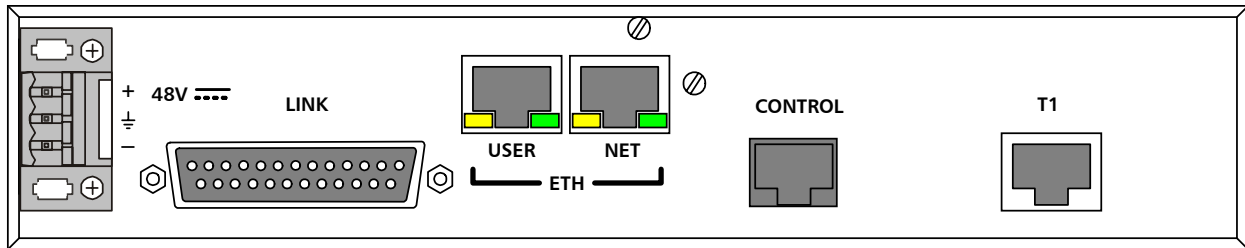
Figure 2-3. MT1200/MT1207A-DC Rear Panel (T1 Voice Port and DC Power Supply)
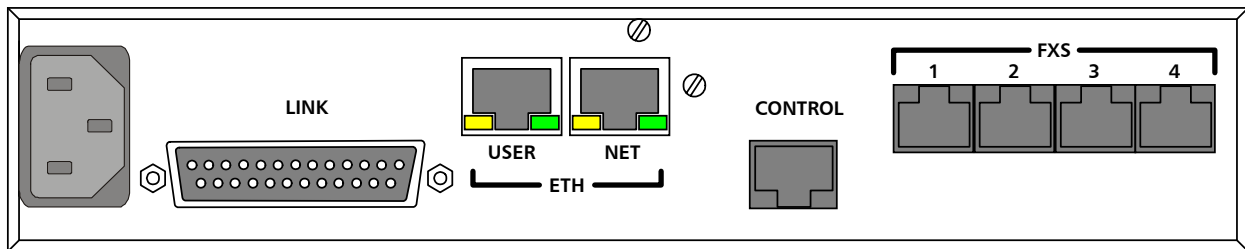
Figure 2-4. MT1201A Rear Panel (FXS Voice Ports and AC Power Supply)

Connecting the MT120xAE E1 Voice Port

The MT12**xAE**'s E1 voice port terminates in an RJ-45 balanced connector. *Appendix A* specifies the pinout of the E1 connector.

➤ **To connect the balanced E1 interface:**

- Connect the incoming E1 link to the RJ-45 connector on the MT12**xAE** rear panel, designated E1.

➤ **To connect the unbalanced E1 interface:**

1. Connect the receive line, using a 75Ω coaxial cable to the BNC connector labeled RX.

2. Connect the transmit line, using a 75Ω coaxial cable to the BNC connector labeled TX.

Connecting the MT1200A or MT1207A T1 Voice Port

The T1 voice port terminates in an RJ-45 balanced connector. *Appendix A* specifies the pinout of the T1 connector.

➤ **To connect the T1 interface:**

- Connect the incoming T1 link to the RJ-45 connector on the MT1200A or MT1207A rear panel, designated T1.

Connecting the MT1201A FXS Voice Ports

The FXS voice ports terminate in four RJ-11 connectors. *Appendix A* specifies the pinout of the FXS connectors.

➤ **To connect the FXS interface:**

- Connect each 2-wire line to one of the four RJ-11 connectors on the MT1201A rear panel, designated FXS.

Connecting the Main Link

The MT120xA Ethernet main link interfaces terminate in two 8-pin RJ-45 connectors. *Appendix A* specifies the pinout of the Ethernet connectors. The Ethernet main link port supports connection via straight and cross cables.

➤ **To connect the Ethernet main link:**

- Connect the IP uplink to the RJ-45 connector designated NET ETH.

➤ **To connect the serial main link:**

- Connect the serial V.35 link to the DB-25 connector designated LINK.

The serial main link interface terminates in a female DB-25 connector. *Appendix A* specifies the pinout of the serial connector.

Connecting the User LAN Port

The user LAN can be connected to one of the available Ethernet ports (the other can be used as the uplink to the IP network). *Appendix A* specifies the pinout of the Ethernet connectors.

➤ **To connect the Ethernet main link:**

- Connect the user LAN to the RJ-45 connector designated USER ETH.

Connecting the ASCII Terminal

The MT120xA control port terminates in an 8-pin RJ-45 connector. *Appendix A* specifies the pinout of the control port connector.

➤ **To connect the ASCII terminal directly to the CONTROL port:**

1. Connect the CBL-RJ45/D9/F/STR cable to the RJ-45 connector, designated CONTROL.

2. Connect the other side of the cable to the ASCII terminal, or PC running a terminal emulation software.

Connecting the Power

MT120xA includes AC or DC power supply. To connect MT120xA to the power source, refer to the appropriate section below, depending on your version of the unit (AC or DC).

⚠️ *Warning*

Before switching on this unit and connecting or disconnecting any other cable, the protective earth terminals of this unit must be connected to the protective ground conductor of the mains (AC or DC) power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Connecting AC Power

AC power is supplied to MT120xA through a standard 3-prong plug (see *Figure 2-2*).

AC power should be supplied through the 1.5 m (5 ft) standard power cable terminated by a standard 3-prong plug. The cable is provided with the unit.

➤ **To connect AC power:**

1. Connect the power cable to the power connector on the MT120xA rear panel.

2. Connect the power cable to the electricity outlet.

    The unit will turn on automatically upon connection to the electricity supply.

Connecting DC Power

➤ **To connect DC power:**

- Refer to the DC power supply connection supplement.

2.4 Installing MT120xA in a 19-Inch Rack

The MT120xA unit can be installed in a 19-inch rack. One or two MT120xA units can be installed in a single rack slot.

Installing MT120xA in a 19-inch rack requires the optional **MT1202** Rack-Mount Kit.

Rack-Mount Kit Contents

Rack adapter components for installing a single unit include:
- One short bracket
- One long bracket
- Four 6–32 UNC (3.5 mm) screws.

Rack adapter components for installing two units include:
- Two short side brackets
- Two long side adapters
- Two short side adapters
- Six 4–40 UNC (2.8 mm) screws
- Ten 6–32 UNC (3.5 mm) screws.

Equipment Needed

The installation procedure requires use of the following tools and components, which are not included in the Rack-Mount Kit:
- One 3 mm Philips screwdriver
- Four 5 mm Philips screws.

Installation

> ⚠️ **Disconnect all cables including the power cord from the unit before performing the installation procedures.**
>
> ***Warning***

➤ **To install a single MT120xA unit:**

1. Fasten the short bracket to the left side of the unit using two 6–32 UNC screws (see *Figure 2-5*).

2. Repeat step 1 to fasten the long bracket to the right side of the unit.

3. Place the unit in the rack and fasten the brackets to the side rails of the rack using two 5 mm Philips screws (not included in the kit) on each side.

Short Bracket

Long Bracket
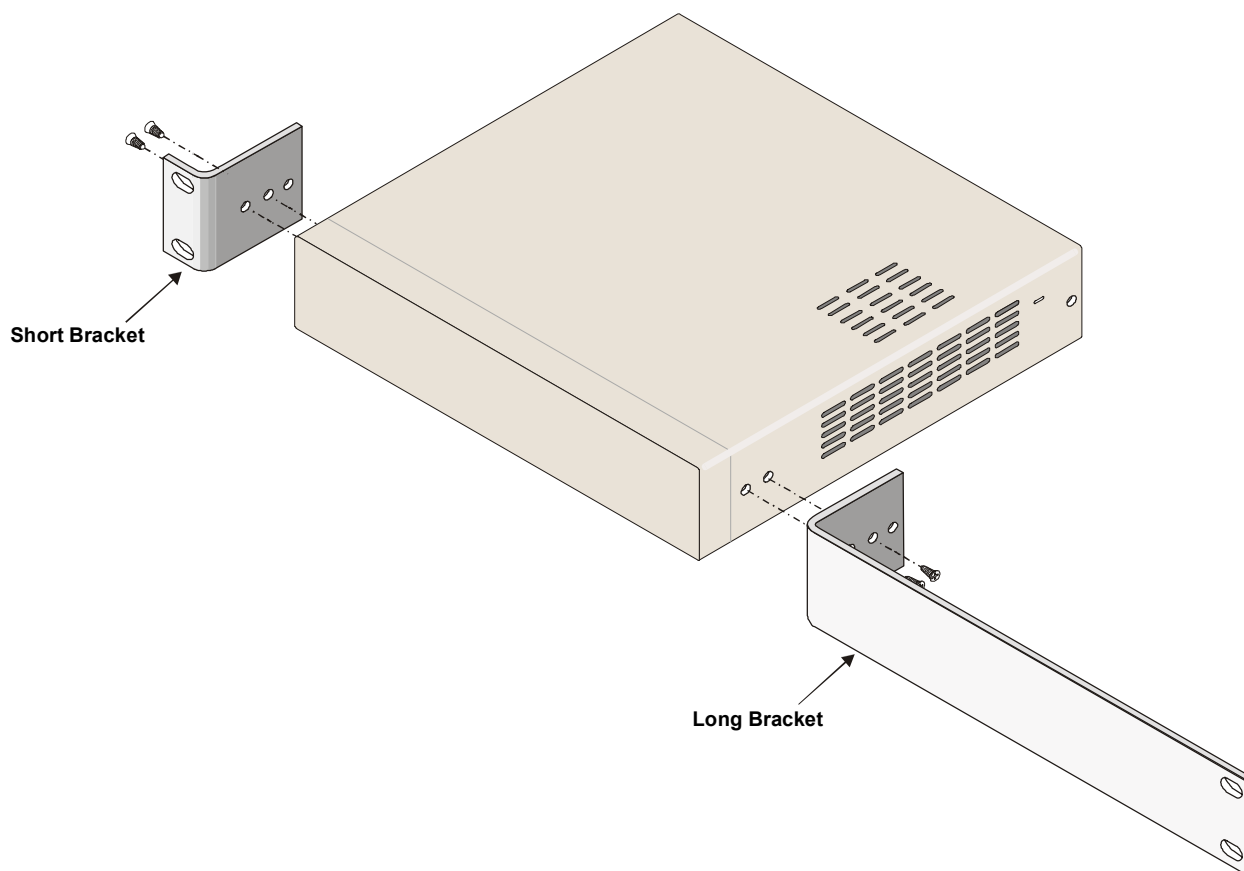
Figure 2-5. Bracket Assembly for Installing a Single MT120xA Unit in a 19-inch Rack

➤ **To install two MT120xA units:**

1. Attach the short brackets to the outer sides of the two units, as explained in step 1 of the single unit installation procedure (see *Figure 2-6*).

2. Attach the long and short side adapters to the inner panels using six 6–32 UNC screws (see *Figure 2-6*).

3. Fasten the two units together by sliding the side adapters into each other. Make sure that the protrusions of the long adapters enter their corresponding slots.

4. Secure the two units together by using six 4–40 UNC screws inserted into the top and bottom of each side adapter.

5. Place the two-unit assembly in the rack and fasten the brackets to the side rails of the rack using two 5 mm Philips screws (not included in the kit) on each side.
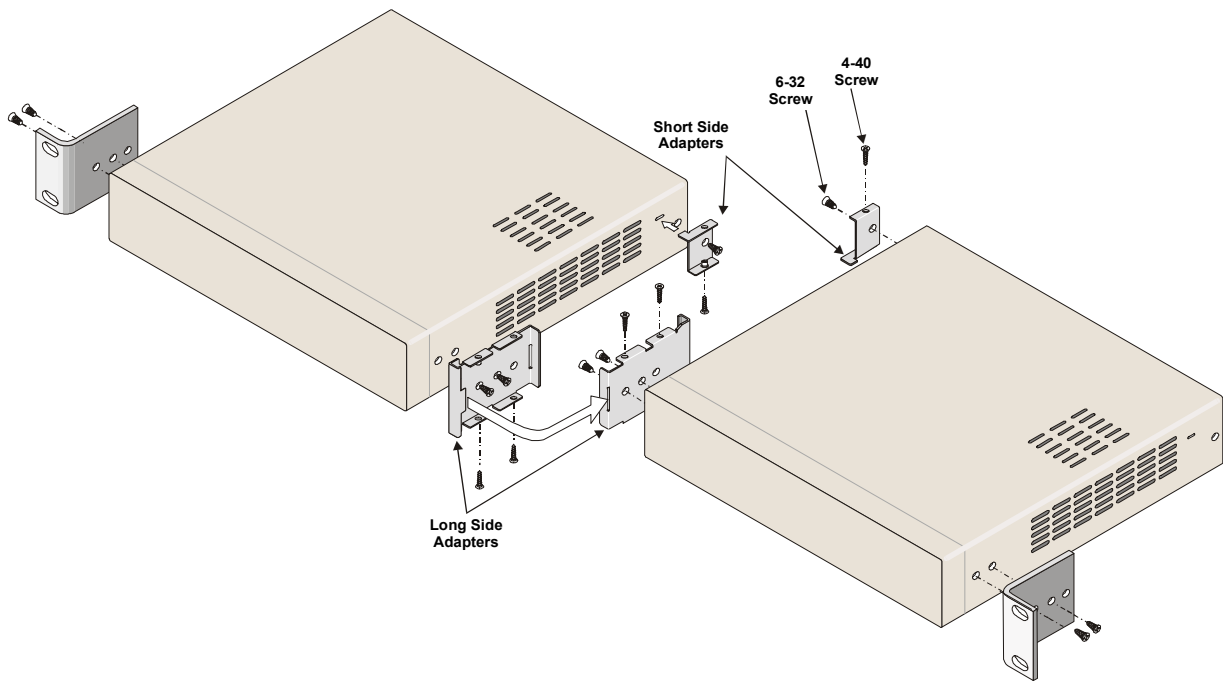
Figure 2-6. Bracket Assembly for Installing Two MT120xA Units Side by Side in a 19-inch Rack

Chapter 3
Operation

This chapter provides the following information for MT120xA:

- MT120xA front-panel indicators

- Operating procedures (turn-on, front-panel indications, performance monitoring and turn-off).

The installation procedures given in *Chapter 2* must be completed and checked before attempting to operate the MT120xA.

3.1 Front Panel Indicators

The MT120xA front panel includes a series of LED indicators that show the current operating status of the unit (see *Figure 3-1*). *Table 3-1* lists and describes the MT120xA indicators.

○ ALM

○ ETH

○ PWR
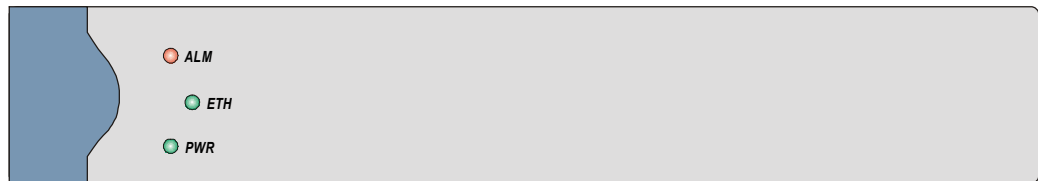
Figure 3-1. MT120xA, Front Panel

Table 3-1. MT120xA LEDs

Name	Function
ALM (red)	ON – Alarm is present
ETH (green)	ON – 10/100BaseT link is established on network port
PWR (green)	ON – Power supply is ON

3.2 Operating MT120xA

Turning On MT120xA

➤ **To turn on MT120xA:**

- Connect the power cable to the electricity outlet.

  The PWR indicator lights up and remains lit as long as MT120xA receives power.

Normal Indications

Table 3-2 shows the correct status of the indicators a few seconds after power-up.

Table 3-2. MT120xA Indicator Status

Indicator	Status
PWR	ON
ETH	ON
ALM	ON

If the above LED indications do not appear following initial power turn-on, refer to *Chapter 6* for the diagnostic test instructions.

Turning Off MT120xA

➤ **To turn off MT120xA:**

- Disconnect the power cable from the electricity outlet.

3.3 Default Settings

MT120xA is managed by an ASCII terminal or PC running a terminal emulation program via menu-driven embedded software. *Table 3-3* lists the default settings of the MT120xA configuration parameters.

Table 3-3. MT120xA Default Settings

Parameter	Default Value
System	
Set Host IP address	0.0.0.0
Set Subnet Mask	0.0.0.0
Set Default Gateway	0.0.0.0
Read	public
Write	Private
Trap	public

Table 3-3. MT120xA Default Settings (Cont.)

Parameter	Default Value			
Manager list	0.0.0.0			
Set Baud Rate (bps)	9600			
Timeout (min)	3			
Telnet	Enable			
Main Link	Serial Port			
Signaling Profile		A	B	C	D
	Idle	1	0	0	0
	OOS	1	0	0	0
SS7 Keep-Alive Suppression Rate	0% - No Suppression / Not SS7			
Switch LAN	(for both Network and User Ports)			
Set Auto Negotiation	Disable			
Set Max Capability	10BaseT half duplex			
Bundle				
Enter Bundle Number	1			
Connect	No			
Function	TDMoIP			
Max Bytes In Multiplexed Frame	500			
Destination IP	0.0.0.0			
Destination Bundle	1			
Packetizing Interval (msec)	30			
Connectivity Packet Rate	60			
Connectivity Timeout Cycles	3			
TOS Parameters (Precedence)	Routine			
TOS Parameters (Delay)	Normal			
TOS Parameters (Throughput)	Normal			
TOS Parameters (Reliability)	Normal Reliability			
Coder/Rate	G.723.1/6.4			
Modem	Disable			
Fax	Enable			
Fax Rate	14.4 kbps			
MF Relay	Disable			
Minimum Pulse Width	60 msec			
Minimum Power Level	-12 dBm			
VLAN Parameters (Vlan exists)	No			
VLAN Parameters (Vlan ID)	26			
VLAN Parameters (Vlan Priority)	0			

Table 3-3. MT120xA Default Settings (Cont.)

Parameter	Default Value			
T1 Port (MT1200A, MT1207A)				
Connect	No			
Clock Source	Lbt			
Frame	Esf			
Interface Type	Dsu			
Line Code	B8ZS			
Rx Sensitivity (CSU mode only)	LOW (-30 dB)			
Tx Gain Level (CSU mode only)	0 dBm			
Line Length (DSU mode only)	0-133 ft			
Restoration Time	1 second			
Idle Code	ff			
Signaling	CAS			
Profile	1			
E1 Port (MT120xAE)				
Connect	No			
Frame	732S			
Restoration Time	1 second			
Clock Source	Lbt			
Interface Type	Ltu			
Idle Code	ff			
Signaling	CAS			
Profile	1			
FXS Ports (MT1201A)				
Ring Timeout	120 seconds			
On hook duration in Flash	700 seconds			
Period #1: Ring	1 second (10 * 100 msec)			
Period #1: Silence	3 seconds (30 * 100 msec)			
Period #2: Ring	0			
Period #2: Silence	0			
TX gain	0			
RX gain	-10			
		A	B	C	D
FXS Signaling Parameters	On-hook	0	1	0	1
	Off-hook	1	1	0	1

Table 3-3. MT120xA Default Settings (Cont.)

Parameter	Default Value
Timeslots	
Update from Time Slot	1
To Time Slot	1
Type	N.C.
Bundle	1
Destination Port ID	1
Destination Time Slot	1
Serial Port	
Interface Type	V35
Connect	No
Speed	64 kbps
Clock Mode	DTE
Clock Invert	No
Control Signals	Ignore
Fragmentation	610

Chapter 4

Management from a Terminal

The configuration of MT120xA is performed via menu-driven embedded software, using a standard ASCII terminal or a PC running a terminal emulation application connected to the rear panel CONTROL port. Alternatively, you can configure MT120xA via Telnet connection, which also establishes an inband management link to the remote unit.

4.1 Preparing for the Control Session

This section describes how to prepare MT120xA and the supervisory terminal for the control session.

Control Port Interface Characteristics

MT120xA includes a V.24/RS-232 asynchronous DCE port, designated CONTROL. The port terminates in an RJ-45 connector. The control port continuously monitors the incoming data stream and immediately responds to any input string received through this port.

The terminal is connected directly to the MT120xA control port. Since terminals usually have DTE interfaces, the connection to the port is made by means of a straight cable, CBL-RJ45/D9/F/STR, supplied with the unit.

Preparing the Terminal

Any standard ASCII terminal (a "dumb" terminal or a personal computer running a terminal emulation application) equipped with a V.24/RS-232 communication interface can be used to configure MT120xA.

Initiating a Control Session

➤ **To initiate a control session:**

1. Connect the terminal cable to the CONTROL connector on the MT120xA back panel.

2. Connect the terminal cable to the serial port of the control terminal.

3. Turn the control terminal on.

4. Configure the terminal to the default communication parameters: 9.6 kbps, one start bit, eight data bits, no parity, one stop bit, no flow control, VT100 emulation.

5. Turn MT120xA on.

Levels of Security

MT120xA supports a four-level security and user authentication system:

- **Administrator** – Allowed to configure all the parameters of MT120xA.

- **Operator** – Allowed to perform all operations in the system, except for user administration (adding/deleting users, changing user definitions).

- **Technician** – Allowed to test MT120xA and monitor its operation (for example, monitoring alarms).

- **Monitor** – Allowed to monitor the MT120xA operation.

The maximum number of users supported by MT120xA is 20. When managing MT120xA over Telnet, up to five simultaneous management sessions are permitted. Only one administrator is allowed to enter the management session at a time.

MT120xA displays the management menus in accordance with a user's access rights. For example, configuration screens dealing with the unit configurations are not available to users who logged in as technicians or monitors.

Default Security Configuration

MT120xA is supplied with one administrator account:

- User name: admin

- Password: 12345.

When the first management session is initiated, it is recommended to create a new administrator account, and delete the default one.

Note *If the password is lost, consult your local Black Box distributor.*

4.2 Navigating the Management Menus

This section provides a general description of the software menu operation and conventions for navigating the menus. *Appendix C* lists all menus of the MT120xA management software.

Choosing Parameters

➤ **To choose an option:**

- Type the number corresponding to the option, and press **<Enter>**.

    The screen for the chosen option is displayed.

➤ **To correct an erroneous entry:**

- Press **<Backspace>** to clear the error, then enter the correct characters.

    Alternatively, press **<Esc>** to exit the current menu, and then return to the menu to re-enter the required value.

Saving and Aborting Configuration Changes

You must save the configuration changes by updating the MT120xA database. If the database is not updated, MT120xA discards all the user settings when it is reset. You can save changed values at any stage of the configuration procedure. Alternatively, you can abort the new settings and return to the previous values.

➤ **To save the changes:**

1. Type **@** (**Shift**+**2**) and press **<Enter>**.

    MT120xA displays the following confirmation message:

    Are you sure you want to update data base ?
    Press Y/N :

2. Type **Y** to save the changes.

    MT120xA displays the following message:

    Data base was changed. Press any key to continue.

3. Press any key to continue the management session.

Note   *Each time you update the MT120xA database, the management software analyzes the changes. If a major error is detected, MT120xA aborts the database update and displays the following message:*
    Data base wasn't changed. Sanity Error – Check alarm.
    In this case, check the sanity error, as described in Chapter 7, and re-enter the erroneous values.

➤ **To undo the changes:**

1. Type **#** (**Shift**+**3**) and press **<Enter>**.

    MT120xA displays the following confirmation message:

    Are you sure you want to undo data base ?
    Press Y/N :

2. Type **Y** to abort the changes and use the previous database settings.

4.3 Starting the Control Session

Once you have installed MT120xA, and completed the installation and operation procedures described in *Chapter 2* and *Chapter 3*, you can start the control session.

You have to enter a user name and password in order to start the MT120xA management software (see *Figure 4-1*).

```
  USER NAME:
  PASSWORD:



ESC – clear; & - exit
```

Figure 4-1. Password Request Screen

➤ **To enter the user name and password:**

1. Type in your user name, and press **<Enter>**.

2. Type in your password (up to eight characters), and press **<Enter>**.
   The Main menu is displayed (see *Figure 4-2*).

```
Main Menu

 1. Inventory[]
 2. Configuration>
 3. Monitoring>
 4. Diagnostics>










>

Please choose item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-2. Main Menu

4.4 Displaying the MT120xA Inventory

MT120xA inventory displays information on its hardware and software versions.

➤ **To display the MT120xA inventory:**

- From the Main menu, choose **Inventory**.

  The MT120xA inventory screen appears (see *Figure 4-3*).

```
Inventory

                  HW Revision  FW Revision  SW Revision

       MT120xA???      01.00        01.40        02.00
















>



@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-3. Inventory Screen for MT120xA

Note *The actual information shown in the Inventory screen depends on the MT120xA model in use.*

4.5 Configuring the MT120xA System

The MT120xA management software allows you to perform the following:

- Configuring parameters of the Ethernet management connection
- Managing the user database (adding/deleting/changing user details)
- Configuring control port for ASCII terminal connection
- Defining the signaling bits table (for CAS signaling)
- Configuring SS7 keep-alive suppression rate (for CCS signaling)
- Controlling the software versions (see *Appendix B*)
- Changing the real-time system clock settings
- Resetting MT120xA.

➤ **To display the System Configuration menu:**

1. From the Main menu, choose **Configuration**.

    The Configuration menu appears (see *Figure 4-4*).

```
Configuration

 1. System>
 2. Switch Lan Configuration>
 3. Voice Configuration>
 4. Serial Port Configuration>




>

Please choose item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-4. Configuration Menu (MT1200A/MT1207)

2. From the Configuration menu, choose **System**.

    The System menu appears (see *Figure 4-5*).

```
System

 1. Management>
 2. Control Port>
 3. Date & Time Update>
 4. Factory Default
 5. Show Partition Information
 6. Set Active Partition
 7. Reset Unit
 8. Open Internal Alarms>




>

Please choose item <1 to 8>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-5. System Menu

Configuring the Control Port

MT120xA allows you to configure the baud rate and the timeout of the rear panel CONTROL port.

Configuring the Data Rate

The MT120xA control data port supports baud rates in the range of 9.6 to 115.2 kbps.

➤ **To configure the baud rate:**

1. From the System menu (see *Figure 4-5*), choose **Control Port**.

    The Control Port menu appears (see *Figure 4-6*).

```
Control Port

 1. Set Baud Rate (bps)>   (9600)
 2. Timeout (minutes)[3 - 10]... (3)












>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-6. Control Port Menu

2. From the Control Port menu, choose **Set Baud Rate**.

    The Set Baud Rate menu appears.

3. Enter a new baud rate by typing the corresponding number from the Set Baud Rate menu, and then pressing **<Enter>**.

Configuring the Timeout

The timeout specifies a time interval after which MT120xA automatically disconnects from the supervisory terminal if no input from the user is detected. MT120xA supports 3–10 minute timeout.

➤ **To configure the timeout:**

1. From the Control Port menu, choose **Timeout**.

2. Enter the desired timeout value by typing the corresponding number, and then pressing **<Enter>**.

Configuring the Ethernet Management Connection

MT120xA can be managed by a network management station, which is located on the user LAN connected to the unit's 10/100BaseT port. In order to establish a proper connection, it is necessary to configure the following:

- Host IP address, subnets mask, default gateway, its trap, read and write communities.

- Manager IP addresses.

Configuring the Host IP

IP parameters of the management host are configured via the Host IP menu (see *Figure 4-8*). Unlike more complex Voice Mux Gateway systems, which use

separate IP addresses for their main link cards and T1/E1 groups, MT120xA

provides only one IP address. This IP address is used for management connection and for bundle routing.

➤ **To configure the IP host parameters:**

1. From the System menu, choose **Management**.

    The Management menu appears (see *Figure 4-7*).

```
Management

 1. Host IP>
 2. Manager List[]>
 3. Host Mux Name... ()
 4. User Administration>
 5. Signaling Configuration>
 6. Telnet>   (Enable)
 7. Main Link>   (Serial Port)




>

Please choose item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-7. Management Menu

2. From the Management menu, choose **Host IP**.

    The Host IP menu appears (see *Figure 4-8*).

```
Host IP

 1. Set Host IP address      ... (0.0.0.0)
 2. Set Subnet Mask          ... (0.0.0.0)
 3. Set Default Gateway      ... (0.0.0.0)
 4. Trap... (public)
 5. Read... (public)
 6. Write... (private)






>

Please choose item <1 to 6>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-8. Host IP Menu

3. From the Host IP, choose the following:

- **Set Host IP Address** to define the host IP
- **Set Subnet Mask** to define the subnet mask
- **Set Default Gateway** to set the default gateway IP address
- **Trap** to enter the name of a community to which the MT120xA will send traps
- **Read** to enter the name of a community with read-only authorization
- **Write** to enter the name of a community with write authorization.

4. Enter the desired value, and press **<Enter>**.

Defining the Manager List

You can define the network management stations to which the SNMP agent of the MT120xA will send traps. Up to ten managers can be defined. In addition, you can configure MT120xA to accept Telnet management traffic only from the management stations defined in the manager list (see *Configuring Telnet Access* below).

➤ **To define the manager list:**

1. From the Management menu, choose **Manager List**.

    The Manager List menu appears (see *Figure 4-9*).

```
Manager List


    Managers ID       IP Address
          1              0.0.0.0
          2              0.0.0.0
|         3              0.0.0.0
v         4              0.0.0.0
          5              0.0.0.0

 1. Change cell                    ... (0.0.0.0)




>



@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-9. Manager List Menu

2. Select a manager by pressing **<Shift> U** to choose the previous entry in the list or **<Shift> D** to choose the next entry in the list.

3. Choose **Change cell**.

4. Enter the desired IP address, and press **<Enter>**.

Configuring Telnet Access

You can disable Telnet access to MT120xA or allow access only to the management stations specified in the manager list (see *Defining the Manager List* above).

By disabling Telnet, you prevent unauthorized access to the system when security of the MT120xA IP address has been compromised. When Telnet access is disabled, MT120xA can be managed via an ASCII terminal or SNMP network management system.

➤ **To configure the Telnet access:**

1. From the Management menu (*Figure 4-7*), choose **Telnet**.

   The Telnet menu appears (see *Figure 4-10*).

```
Telnet (Enable)

 1. Disable
 2. Enable
 3. Enable Managers Only








>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-10. Telnet Menu

2. From the Telnet menu, choose **Disable** to disable Telnet access, choose **Enable** to enable it, or choose **Enable Managers Only** to grant the Telnet access only to the management stations specified in the manager list.

Managing the User Database

An administrator manages the database of users who are allowed to operate or monitor the MT120xA system. This allows the administrator to do the following:

- Add a new user

- Delete an existing user

- Change user's details, including the name, password or access level

- Display the list of users, including date and time.

Adding a New User to the Database

➤ **To add a new user:**

1. From the Management menu (see *Figure 4-7*), choose **User Administration**.

    The User Administration menu appears (see *Figure 4-11*).

```
User Administration

 1. Add New User>
 2. Delete User>
 3. Change User details>
 4. Show all users[]




>

Please choose item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-11. User Administration Menu

2. From the User Administration menu, choose **Add New User**.

    The Add New User menu appears (see *Figure 4-12*).

```
Add New User

 1. Enter UserName              ... ()
 2. Enter Access Level      >    (x)
 3. Enter Password           ...
 4. Confirm Password and save  ...




>

Please choose item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-12. Add New User Menu

3. From the Add New User menu, choose **Enter UserName**.

4. Type a new user name, and then press **<Enter>**.

   A new user name appears.

Note   *User names are case-sensitive.*

5. From the Add New User menu, choose **Enter Access Level** to define the new user access level.

6. Choose the desired value (Monitor, Technician, Operator or Administrator) by entering the corresponding number from the Enter Access Level menu.

   An access level of a new user is displayed.

7. From the Add New User menu, choose **Enter Password**.

8. Type the new user password (four to eight characters), and press **<Enter>**.

   MT120xA responds to the password entry with asterisks.

9. From the Add New User menu, choose **Confirm Password and save**.

10. Re-type the new user password, and press **<Enter>** to save it.

Deleting an Existing User from the Database

➤ **To delete an existing user:**

1. From the User Administration menu, choose **Delete User**.

   The Delete User menu appears (see *Figure 4-13*).

```
Delete User

 1. Enter UserName (to delete)              ... ()
 2. Confirm and delete                      ...


















>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-13. Delete User Menu

2. From the Delete User menu, choose **Enter UserName (to delete)**.

3. Type the name of the user that you intend to delete, and press **<Enter>**.

4. From the Delete User menu, choose **Confirm and delete**.

5. Enter the administrator password to confirm the deletion.

Changing the User Details

The administrator is allowed to change a user's password and access level.

➤ **To change user details:**

1. From the User Administration menu, choose **Change User Details**.

    The Change User Details menu appears (see *Figure 4-14*).

```
Change User details

 1. Enter UserName (to change)        ... ()
 2. Change password                   ...
 3. Confirm and save password         ...
 4. Change access level               >   (x)
 5. Confirm and save access level     ...










>

Please select item <1 to 5>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-14. Change User Details Menu

2. From the Change User Details menu, choose **Enter UserName (to change)**.

3. Type the name of the user whose details you want to change, and press **<Enter>**.

4. From the Change User Details menu, choose **Change password**.

5. Type the new password, and press **<Enter>**.

6. From the Change User Details menu, choose **Confirm and save password**.

7. Re-type the new password, and press **<Enter>** to confirm the change.

8. From the Change User Details menu, choose **Change access level**.

    The Change Access Level menu appears.

9. Enter a new access value (Monitor, Technician, Operator or Administrator) by entering the corresponding number from the Change Access Level menu.

10. From the Change User Details menu, choose **Confirm and save access level**.

11. Enter administrator password to confirm the change.

Displaying the User List

➤ **To display a list of registered users:**

- From the User Administration menu, choose **Show All Users**.

    The Show All Users screen appears (see *Figure 4-15*). Press **<D>** to scroll down the list; press **<U>** to scroll up the list.

```
Show all users


            UserName    Access Level     DBchange date     DBchange time
      1       admin     Administrator      3/1/2056           17:08:27
      2       qwerty       Monitor
|     3
v     4
      5
      6
      7
      8
      9
     10




>



@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-15. Show All Users Screen

Setting the Date and Time

You can set the time on the MT120xA internal real-time clock.

➤ **To set date and time:**

1. From the System menu (see *Figure 4-5*), choose **Date & Time Update**.

    The Date & Time Update menu appears (see *Figure 4-16*).

```
Date & Time Update

 1. Set Time (hh:mm)... (22:39)
 2. Set Date (dd/mm/yyyy)... (10/1/2056)










>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-16. Date & Time Update Menu

2. From the Date & Time Update menu, choose **Set Time**.

3. Type the new time value in the hh:mm format, and then press **<Enter>**.

4. From the Date & Time Update menu, choose **Set Date**.

5. Type the new date value in the dd/mm/yyyy format, and then press **<Enter>**.

Assigning a Name to the MT120xA Unit

The MT120xA management software allows you to assign a name to the unit to distinguish it from the other devices installed in your system.

➤ **To assign a name:**

1. From the Management menu (*Figure 4-7*), choose **Host Mux Name**.

2. Type the name you want to use to identify this MT120xA device, and then press **<Enter>**.

    The assigned name appears at the top of each terminal screen.

4.6 Configuring Signaling Information

MT120xA allows you to configure the signaling parameters according to the chosen signaling mode: CAS for E1, Robbed Bit MF for T1 or CCS for T1/E1. The signaling mode is configured via the T1/E1 Parameters menu of the voice card (see the *Configuring the T1 Voice Port* section below).

- **CAS**/**Robbed Bit MF** – You must configure a signaling profile and signaling table associated with it (ABCD bits, idle code and OOS signals).

- **CCS** – When working with CCS-SS7, you can configure the fill-in signal unit (FISU) packets flow by choosing the SS7 keep-alive suppression rate.

Note *When changing from CCS to CAS signaling, the MT120xA unit must be rebooted.*

Configuring Signaling Profiles

If you are using CAS signaling, you must configure the MT120xA signaling system to make it compatible with the signaling method used by the PBXs connected to the voice T1 or E1 port. The management software allows you to manipulate the ABCD signaling bits and methods of representation of the idle code and out-of-service signals generated by the PBXs (see *Table 4-1*). Signaling conversion is used to connect to PBXs that use different signaling formats.

You can store up to five signaling profiles; MT120xA uses only one of them at a time. The signaling profile is configured via the T1/E1 Parameters menu of the T1/E1 card (see the *Configuring the T1 Voice Port* section below).

| *Note* | *The signaling profile configuration is available only for the units operating with CAS signaling.* |

➤ **To configure the signaling profile:**

1. From the Management menu (see *Figure 4-7*), choose **Signaling Configuration**.

    The Signaling Configuration menu appears (see *Figure 4-17*).

```
Signaling Configuration

 1. Signaling Profile Configuration>
 2. SS7 Keep-Alive Suppression rate>   ( 0% - No Suppression / Not SS7)









>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-17. Signaling Configuration Menu

2. From the Signaling Configuration menu, choose **Signaling Profile Configuration**.

    The Signaling Profile Configuration menu appears (see *Figure 4-18*).

```
Signaling Profile Configuration

 1. Profile Number To Configure[1 - 5]      ... (1)
 2. Signaling Table Configuration          []>








>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-18. Signaling Profile Configuration Menu

3. From the Signaling Profile Configuration menu, choose **Profile Number To Configure**.

4. Type the number of the signaling profile that you want to configure by typing a number from **1** to **5**, and then press **<Enter>**.

5. From the Signaling Profile Configuration menu, choose **Signaling Table Configuration**.

    The Signaling Table Configuration screen appears (see *Figure 4-19*).

```
Signaling Table Configuration

                 A Bit     B Bit    C Bit     D Bit
    ABCD BITS      A         B         C         D
    IDLE SIGNAL    1         0         0         0
    OOS  SIGNAL    1         0         0         0

 1. 0             9. D
 2. 1            10. NOT D
 3. A
 4. NOT A
 5. B
 6. NOT B
 7. C
 8. NOT C
>

Please select item <1 to 10>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-19. Signaling Table Configuration Screen

6. In the signaling table, select the signaling bit that you want to configure by pressing **<Tab>**.

7. Configure the signaling bit by typing a number corresponding to the desired value (see *Table 4-1*), and then pressing **<Enter>**.

Table 4-1. Signaling Bits Configuration

Parameter	Description	Value
A, B, C, D Bit	Chooses which incoming bit (from the remote side) to transmit on the A bit toward the MT120xA's local PBX.	**0** – Transmits zero **1** – Transmits one **A** – Transmits the incoming A bit **B** – Transmits the incoming B bit **C** – Transmits the incoming C bit **D** – Transmits the incoming D bit **NOT A** – Inverts the incoming A bit and transmits it **NOT B** – Inverts the incoming B bit and transmits it **NOT C** – Inverts the incoming C bit and transmits it **NOT D** – Inverts the incoming D bit and transmits it
IDLE SIGNAL	Chooses the code transmitted on A, B, C, and D bit when the channel is idle	**0** – Transmits zero **1** – Transmits one
OOS SIGNAL	Chooses the code transmitted on A, B, C, and D bit when the channel is out of service	**0** – Transmits zero **1** – Transmits one

Configuring Keep-Alive Suppression Rate

When MT120xA with CCS signaling is connected to PBXs operating with SS7 signaling, the PBXs use one timeslot to transmit signaling information. The signaling information is passed over the signaling link in the form of the following signal units:

- **Message signal units** (MSUs) provide all signaling associated with call setup and tear down, database query and response, and SS7 network management.

- **Link status signal units** (LSSUs) provide information on the link status between the network nodes (initiation of link alignment, quality of the signaling traffic etc).

- **Fill-in signal units** (FISUs) carry no information payload. They occupy the link, when there are no MSUs or LSSUs to send. FISUs are also referred to as "keep-alive" messages.

Often, in the absence of signaling traffic, the signaling links become flooded with the FISUs, causing communication disruptions. In order to prevent this, you can instruct MT120xA to drop a specified amount of FISUs (up to 90%). You can also disable the FISU dropping by configuring the keep-alive suppression rate to 0%. This is necessary when working with non-SS7 CCS signaling (for example, ISDN), or if the FISUs are used to acknowledge the receipt of signaling messages. In the latter case, system performance may become unsatisfactory.

➤ **To configure the keep-alive suppression rate:**

1. From the Signaling Configuration menu (see *Figure 4-17*), choose **SS7 Keep-Alive Suppression Rate**.

   The SS7 Keep-Alive Suppression Rate menu appears (see *Figure 4-20*).

```
SS7 Keep-Alive Suppression rate ( 0% - No Suppression / Not SS7)

 1.  0% - No Suppression / Not SS7
 2. 10%
 3. 20%
 4. 30%
 5. 40%
 6. 50%
 7. 60%
 8. 70%
 9. 80%
10. 90%




>

Please select item <1 to 10>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-20. SS7 Keep-Alive Suppression Rate Menu

2. From the SS7 Keep-Alive Suppression Rate menu, type the number corresponding to the desired value, and then press **<Enter>**.

4.7 Configuring the Main Links

It is recommended to configure the main link in the following order:

1. Choose the main link interface you want to use.

2. Configure the main link.

Choosing the Main Link Interface

The main link on the MT120xA can be connected to either the Ethernet interface or the Serial interface.

➤ **To specify the main link interface:**

1. From the Management menu (see *Figure 4-7*), choose **Main Link**.
   The Main Link menu appears.

2. Choose the interface to which the main link is connected:
   - Serial Port
   - Lan

Configuring the Main Link

Either one of the two Ethernet network ports or the serial port can be configured as the main link for the MT120xA.

Configuring the Ethernet Network Port

The Ethernet ports of the MT120xA main link support auto-negotiation. If the auto-negotiation is disabled, the Ethernet ports can be configured to operate in 10BaseT (half duplex or full duplex) or 100BaseT (half duplex or full duplex) mode.

➤ **To configure the Ethernet Network port:**

1. From the Configuration menu, choose **Switch Lan Configuration**.

   The Switch Lan Configuration menu appears (see *Figure 4-21*)

```
Switch Lan Configuration

 1. Network Port Configuration>
 2. User Port Configuration>











>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-21. Switch Lan Configuration Menu

2. To configure the Ethernet main link, choose **Network Port Configuration**

   The Network Port Parameters menu appears (see *Figure 4-22*).

```
Network Port Configuration

 1. Set Auto Negotiation     (Disable)
 2. Set Capability  >   (10baseT Half Duplex)










>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-22. Network Port Parameters Menu

3. From the Network Port Parameters menu, choose **Set Auto Negotiation** to toggle the auto-negotiation setting between *enable* and *disable*.

4. If auto-negotiation is disabled, choose **Set Capability** from the Network Port Parameters menu.

    The Set Capability menu appears.

5. Choose the desired LAN operation mode (10BaseT half duplex, 10BaseT full duplex, 100BaseT half duplex, 100BaseT full duplex), by typing the corresponding number and then pressing **<Enter>**.

Configuring the Serial Port

The serial port can be configured as the main link of the MT120xA to n x 64 kbps networks.

➤ **To configure the Serial port:**

1. From the Configuration menu, choose **Serial Port Configuration**.

    The Serial Port Configuration menu appears (see *Figure 4-23*)

```
Serial Port Configuration

 1. Interface Type >   (V35)
 2. Connect>    (No)
 3. Speed (N*64)[1 - 32]... (64)
 4. Clock Mode >   (DTE)
 5. Clock Invert>   (No)
 6. Control Signals>   (Ignore)
 7. Fragmentation [200 - 1550]... (610)




>

Please select item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-23. Serial Port Configuration Menu

2. From the Serial Port Configuration menu, configure the following parameters:

- Interface Type:

  □ **V35** for V.35

  □ **X21** for X.21

  □ **EIA-530** for RS-530

  □ **EIA-530-A** for RS-530A

- Connect:

  □ **Yes** (port is connected)

  □ **No** (port is not connected).

- Speed (port data rate, in rates of n x 64 kbps between **64** and **2048** kbps)

- Clock Mode:

  □ **DTE** (MT120xA transmit and receive timing is according to clock received from the connected communication equipment)

  □ **DCE** (MT120xA provides the transmit and receive clock signals, derived from its internal oscillator, to the communication equipment connected to the link).

- Clock Invert (In a few rare cases, even though the Serial uplink is correctly configured, there are problems with line synchronization. In this case, inverting the clock often resolves the line synchronization problem.

  □ **Yes** (Invert the clock)

  □ **No** (Clock is not inverted).

- Control Signals (Available only in DTE clock mode. Determines whether MT120xA monitors the control signals. For example, if the CD signal is not

sensed, MT120xA will know there is a problem with the line connection and will trigger the TRUNK IS DOWN alarm.):

- □ **Ignore** (Do not monitor the control signals)

- □ **Obey** (Monitor the control signals).

▪ Fragmentation (MT120xA chops up the Ethernet packets directed from the LAN to the Serial uplink. This parameter specifies the size of the chopped-up Ethernet packets. Specify a value between 200 and 1550.)

4.8 Configuring the Voice Ports

It is recommended to configure the voice port in the following order:

1. Configure the voice port at a bundle level (frame size, destination IP, destination bundle, packetizing interval, TOS parameters, compression method, fax relay, VLAN parameters).

2. Configure the voice port at the physical level (framing mode, restoration time, clock source, interface type, idle code, signaling type, signaling profile).

3. Configure the timeslots (voice or data, mapping to specific bundles, routing to a remote Voice Mux Gateway's ports and timeslots).

Configuring Bundles

Voice timeslots are grouped together into bundles. MT120xA supports 12 bundles, with a maximum of 31 timeslots per bundle.

Before configuring bundles, you must add at least one bundle.

➤ **To add a bundle for the T1/E1 port (MT1200A, MT1207A and MT120xAE):**

1. From the Configuration menu (*Figure 4-4*), choose **Voice Configuration**.

   The Voice Configuration menu appears (*Figure 4-24*).

```
Voice Configuration

 1. Bundles Parameters>
 2. T1 Parameters>
 3. Distribution Of Framer Time Slots>




>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-24. Voice Configuration Menu

> 2. From the Voice Configuration menu, choose **Bundles Parameters**.
>
>   The Bundles Parameters menu appears (see *Figure 4-25*).

```
Bundles Parameters

 1. Display Bundles[]
 2. Bundle Configuration >




>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-25. Bundles Parameters Menu

> 3. From the Bundles Parameters menu, choose **Bundle Configuration**.
>
>   The Bundle Configuration menu appears (see *Figure 4-26*).

```
Bundle Configuration

 1. Add Bundle[1 - 12]... (1)
 2. Delete Bundle[1 - 12]... (1)
 3. Edit Bundle>

>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-26. Bundle Configuration Menu

4. From the Bundle Configuration menu, choose **Add Bundle**.

5. Type the number to assign to the bundle you are adding and then press **<Enter>**. The bundle number must be in the range from 1 to 12.

➤ **To add a bundle to an FXS port (MT1201A only):**

1. From the Main Menu (Figure 4-2), choose Configuration.

   The Configuration menu (*Figure 4-27*) is displayed.

```
Configuration

 1. System>
 2. Switch Lan Configuration>
 3. FXS Configuration>
 4. Serial Port Configuration>

>

Please choose item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-27. Configuration Menu for MT1201A

2. From the Configuration menu (*Figure 4-27*), choose **FXS Configuration**.

   The FXS Configuration menu appears (see *Figure 4-28*).

```
FXS Configuration

 1. Bundles Parameters>
 2. Timeouts          >
 3. Ringer Profile    >
 4. Ports Distribution>
 5. Port Configuration>




>

Please select item <1 to 5>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-28. FXS Configuration Menu

3. From the FXS Configuration menu, choose **Bundles Parameters**.

The Bundles Parameters menu appears (see *Figure 4-25*).

4. Continue using the procedure above for the T1/E1 voice port.

➤ **To configure an existing bundle on an T1/E1 port (MT1200A, MT1207A and**

MT120xAE):

1. From the Bundle Configuration menu (see *Figure 4-26*), choose **Edit Bundle**.

The Edit Bundle menu appears (see *Figure 4-29*).

```
Edit Bundle
 1. Enter Bundle Number[1 - 12]... (1)
 2. Connect>   (Yes)
 3. Function>   (TDMoIP)
 4. Max Bytes In Multiplexed Frame[100 - 1461]... (500)
 5. Destination IP... (0.0.0.0)
 6. Destination Bundle[1 - 30]... (1)
 7. Packetizing Interval (msec)[10 - 90]... (30)
 8. Connectivity Parameters>
 9. TOS Parameters>
10. Voice Parameters>
11. VLAN Parameters>
12. Bundle Name... ()


>

Please select item <1 to 12>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-29. Edit Bundle Menu for MT120xA with T1/E1 Port

2. From the Edit Bundle menu, type **1**, press **<Enter>**, and then enter the number of the bundle you want to configure.

3. Configure the following parameters of the selected bundle:

- Connect:

  □ **Yes** (bundle is connected)

  □ **No** (bundle is not connected)

- Function:

  □ **TDMoIP** (Uses the TDMoIP protocol to transmit the voice and data over the network. For IP-based networks, this option must be used.)

  □ **AAL2oMPLS** (Uses the MPLS protocol to transmit the voice and data over the network. This option, which requires less bandwidth than TDMoIP, may be used for non-IP networks.)

- Max Bytes In Multiplexed Frame (size of a multiplexed TDMoIP frame in bytes):

  □ **100** to **1461** bytes

- Destination IP (IP address of the destination MT120xA or Voice Mux Gateway group)

- Destination Bundle (number of the destination bundle of the group with the IP address specified in the previous step)

  □ **1** to **30**

- Packetizing Interval (msec) (time interval allocated for the TDMoIP frame aggregation):

  □ **10** to **90** msec

- Connectivity parameters (keep-alive messages configuration)

```
Connectivity Parameters

 1. Connectivity-packet rate (sec)[1 - 60]... (60)
 2. Connectivity timeout cycles[1 - 5]... (3)

>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-30. Connectivity Parameters Menu

MT120xA constantly monitors the status of all connected bundles, by sending 64-byte keep-alive messages to the remote device. Connectivity is confirmed by receiving a reply from the remote unit. This process is similar to pinging remote IP hosts. If a reply is not received, usually due to a main link failure, MT120xA disconnects the bundle and generates the BUNDLE IS OOS (Out Of Service) alarm. When the BUNDLE IS OOS alarm is generated, MT120xA notifies the PBX by sending "all 1s" string (CCS signaling) or the OOS message (CAS signaling) on all timeslots of the disconnected bundle. This notification allows the attached PBX to stop transmitting over a faulty link and to switch to a backup link.

You can specify the following connectivity parameters:

- **Connectivity packet rate** (frequency of sending the keep-alive packets, from one packet per **1** second to one packet per **60** seconds)

- **Connectivity timeout cycles** (number of attempts within which MT120xA expects to receive at least one reply from the remote device).

For example, if you set the connectivity packet rate to 60 seconds and connectivity timeout to 3, MT120xA disconnects a bundle from which it did not receive at least one reply within 180 seconds.

Note *In IP networks, where delays are more common, it is recommended to set the connectivity parameters to their maximum values.*

- TOS Parameters (standard Type of Service parameters of the outgoing IP frames):

```
TOS Parameters

 1. Precedence >   (Routine)
 2. Delay      >   (Normal)
 3. Throughput >   (Normal)
 4. Reliability>   (Normal Reliability)




>

Please select item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-31. TOS Parameters Menu

- **Precedence** (Routine, Priority, Immediate, Flash, Flash Override, Critic/Ecp, Internetwork Control, Network Control)

- **Delay** (Normal, Low)

- **Throughput** (Normal, High)

□ **Reliability** (Normal, High).

▪ Voice Parameters (see *Figure 4-32*):

```
Voice Parameters

 1. Coder/Rate (kbps)>   (G.723.1/6.4)
 2. Volume>   (0 dB)
 3. Fax/Modem>
 4. MF Parameter>
 5. Custom Tone Detection>
 6. Echo Canceller>   (Enable)
 7. Coding>   (A-Law)




>

Please select item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-32. Voice Parameters Menu for T1/E1 Port

□ Coder/Rate (compression algorithm and corresponding rate):

G.723.1/6.4 (as per G.723.1 requirements at 6.4 kbps)

G.723.1/5.3 (as per G.723.1 requirements at 5.3 kbps)

G.729A/8 (as per G.729 A requirements at 8 kbps)

G.711 a LAW (as per G.711 requirements, A-law companding)

G711 u LAW (as per G.711 requirements, μ-law companding).

□ Volume (sets the volume gain transmitted from the DSPs). For example, if the gain received from the voice switch/PBX is very low, you may set the volume to +3 dB, thereby amplifying the TX voice volume without the need to change the configuration of the voice switch. **-6** dB to **+6** dB in steps of 1 dB.

□ Fax/Modem (configure fax and modem settings)

Modem–enable/disable the modem signal identification and relay

Fax–enable/disable the fax signal identification and relay

Fax Rate–set the fax transmission rate (in kbps): **4.8**, **9.6**, **14.4**.

□ MF Parameter (configure MF parameters)

MF Relay–enable/disable MF tone relay

Minimum Pulse Width–minimum pulse width of the MF tone to be detected and relayed: **30** to **32676** msec

Minimum Power Level–minimum power level of the MF tone to be detected and relayed: **0** to **–35** dBm.

Compelled–enable/disable Multi-frequency compelled (MFC). If your PBX uses MFC, set this parameter to **Enable**.

□ Custom Tone Detection (set tone detection parameters)

Tone Detection–enable/disable tone detection. Enable if the PBX/Voice switch checks the line quality before establishing a call on a specific timeslot. The line is checked by sending a 2000 Hz tone on the line. Since MT120xA compresses the Voice, the tone is usually also compressed and as a result the PBX may fail to detect the originated 2000 Hz tone. When Tone Detection is enabled, upon detecting a 2000 Hz tone, the DSP sends a message to the remote DSP to generate this specific 2000 Hz tone (tone relaying).

Select Tone–the frequency of the tone to be detected: **2000** Hz.

□ Echo Canceller (disable the built-in echo canceller, which provides up to 16 msec delay).

If you have an external echo canceller on your telephone network, disable the built-in MT120xA DSP echo canceller.

□ Coding (set the coding used by your PBX):

A-Law (usually used for E1)

U-Law (μ-Law, usually used for T1)

Note | *If you intend to change the voice parameters, it is recommended to disconnect a bundle before configuring it. The bundle must be disconnected at the local and remote sites. If you do not disconnect the bundle, you must reset the local and remote voice interfaces carrying the links whose timeslots belong to the bundle. The voice interfaces must be reset after you complete configuring the voice parameters.*

▪ VLAN Parameters (enable/disable virtual LAN tagging, specify VLAN number, and its priority):

```
VLAN Parameters

 1. Vlan Exist >    (Yes)
 2. Vlan Id      [26 - 4094]... (26)
 3. Vlan Priority [0 - 7]... (1)









>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-33. VLAN Parameters Menu

□ Vlan Number: **26** to **4094**

□ Vlan Priority: **0** (minimum) to **7** (maximum).

▪ Bundle Name (assign an identification name to a bundle).

➤ **To configure an existing bundle on an FXS port (MT1201A only):**

1. From the Bundle Configuration menu (see *Figure 4-26*), choose **Edit Bundle**.
   The Edit Bundle menu appears.

```
Edit Bundle

 1. Enter Bundle Number[1 - 4]... (1)
 2. Connect>   (Yes)
 3. Function>   (TDMoIP)
 4. Max Bytes In Multiplexed Frame[100 - 1472]... (500)
 5. Destination IP... (172.17.172.171)
 6. Destination Type>   (PBX)
 7. Destination Bundle[1 - 60]... (1)
 8. Packetizing Interval (msec)[10 - 90]... (30)
 9. Connectivity Parameters>
10. TOS Parameters>
11. Voice Parameters>
12. VLAN Parameters>
13. Bundle Name... ()
>

Please select item <1 to 13>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-34. Edit Bundle Menu for MT1201A

2. From the Edit Bundle menu, type **1**, press **<Enter>**, and then enter the number of the bundle you want to configure.

3. Configure the following parameters of the selected bundle:

   ▪ Connect:

   □ **Yes** (bundle is connected)

   □ **No** (bundle is not connected)

   ▪ Function:

   □ **TDMoIP** (Uses the TDMoIP protocol to transmit the voice and data over the network. For IP-based networks, this option must be used.)

   □ **AAL2oMPLS** (Uses the MPLS protocol to transmit the voice and data over the network. This option, which requires less bandwidth than TDMoIP, may be used for non-IP networks.)

   ▪ Max Bytes In Multiplexed Frame (size of a multiplexed TDMoIP frame in bytes):

   □ **100** to **1461** bytes

   ▪ Destination IP (IP address of the destination MT120xA or Voice Mux Gateway group)

- Destination Type (The type of device connected to this bundle)

  □ **PBX**

  □ **Phone**

- Destination Bundle (number of the destination bundle of the group with the IP address specified in the previous step)

  □ **1** to **30**

- Packetizing Interval (msec) (time interval allocated for the TDMoIP frame aggregation):

  □ **10** to **90** msec

- Connectivity parameters (keep-alive messages configuration)

  MT120xA constantly monitors the status of all connected bundles, by sending 64-byte keep-alive messages to the remote device. Connectivity is confirmed by receiving a reply from the remote unit. This process is similar to pinging remote IP hosts. If a reply is not received, usually due to a main link failure, MT120xA disconnects the bundle and generates the BUNDLE IS OOS (Out Of Service) alarm. When the BUNDLE IS OOS alarm is generated, MT120xA notifies the PBX by sending "all 1s" string (CCS signaling) or the OOS message (CAS signaling) on all timeslots of the disconnected bundle. This notification allows the attached PBX to stop transmitting over a faulty link and to switch to a backup link.

  You can specify the following connectivity parameters:

  □ **Connectivity packet rate** (frequency of sending the keep-alive packets, from one packet per **1** second to one packet per **60** seconds)

  □ **Connectivity timeout cycles** (number of attempts within which MT120xA expects to receive at least one reply from the remote device).

  For example, if you set the connectivity packet rate to 60 seconds and connectivity timeout to 3, MT120xA disconnects a bundle from which it did not receive at least one reply within 180 seconds.

Note   *In IP networks, where delays are more common, it is recommended to set the connectivity parameters to their maximum values.*

- TOS Parameters (standard Type of Service parameters of the outgoing IP frames):

  □ **Precedence** (Routine, Priority, Immediate, Flash, Flash Override, Critic/Ecp, Internetwork Control, Network Control)

  □ **Delay** (Normal, Low)

  □ **Throughput** (Normal, High)

  □ **Reliability** (Normal, High).

- Voice Parameters

```
Voice Parameters

 1. Coder/Rate (kbps)>   (G.723.1/6.4)
 2. Fax/Modem>
 3. MF Relay>   (Disable)
 4. VAD>   (Conservative)
 5. Echo Canceller>   (Enable)




>

Please select item <1 to 5>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-35. Voice Parameters Menu for FXS Port (MT1201A)

□ Coder/Rate (compression algorithm and corresponding rate):

G.723.1/6.4 (as per G.723.1 requirements at 6.4 kbps)

G.723.1/5.3 (as per G.723.1 requirements at 5.3 kbps)

G.729A/8 (as per G.729 A requirements at 8 kbps)

G.711 a LAW (as per G.711 requirements, A-law companding)

G711 u LAW (as per G.711 requirements, µ-law companding).

□ Fax/Modem (configure fax and modem settings)

Modem–enable/disable the modem signal identification and relay

Fax–enable/disable the fax signal identification and relay

Fax Rate–set the fax transmission rate (in kbps): **4.8**, **9.6**, **14.4**.

□ MF Parameter (configure MF parameters)

MF Relay–enable/disable MF tone relay

Minimum Pulse Width–minimum pulse width of the MF tone to be detected and relayed: **30** to **32676** msec

Minimum Power Level–minimum power level of the MF tone to be detected and relayed: **0** to **–35** dBm.

Compelled–enable/disable Compelled.

□ Echo Canceller (disable the built-in echo canceller, which provides up to 16 msec delay).

If you have an external echo canceller on your telephone network, disable the built-in MT120xA DSP echo canceller.

- VLAN Parameters (enable/disable virtual LAN tagging, specify VLAN number, and its priority):
  - Vlan Number: **26** to **4094**
  - Vlan Priority: **0** (minimum) to **7** (maximum).
- Bundle Name (assign an identification name to a bundle).

Configuring the T1 Voice Port (MT1200A and MT1207A)

MT1200A and MT1207A each provide a single T1 port, which receives voice traffic from the PBX.

➤ **To configure the T1 port:**

1. From the Voice Configuration menu (see *Figure 4-24*), choose **T1 Parameters**.

   The T1 Parameters menu appears (see *Figure 4-36*).

```
T1 Parameters

 1. Connect>    (Yes)
 2. Clock Mode>   (Lbt       (Local))
 3. Frame>    (Esf)
 4. Interface Type>   (Dsu)
 5. Line Code>   (B8ZS)
 6. Line Length>   (0-133 Feet)
 7. Restoration Time>   (1 Second (Fast))
 8. Idle Code[1 - ff]... (44)
 9. Signaling>   (Robbed bit MF)
10. Profile[1 - 5]... (1)




>

Please select item <1 to 10>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-36. T1 Parameters Menu

2. From the T1 Parameters menu, configure the following T1 parameters:
   - Connect:
     - **Yes** (T1 link is enabled)
     - **No** (T1 link is disabled).
   - Clock Mode:
     - **Lbt** (derived from the received T1 signal)
     - **Internal** (received from the MT120xA internal oscillator).
   - Frame (T1 framing mode):
     - **Esf** (24 frames per multiframe)
     - **SF (D4)** (12 frames per multiframe).
   - Interface Type:

- □ **DSU** (DSU interface)

- □ **CSU** (CSU interface).

- ▪ Line Code (line code and zero suppression method used by the port):

  - □ **B8ZS** (B8ZS coding)

  - □ **AMI** (AMI coding).

- ▪ Line Length (DSU mode only, length of a cable in feet between the MT120xA T1 port connector and the network access point):

  - □ 0–133 Feet

  - □ 133–266 Feet

  - □ 266–399 Feet

  - □ 399–533 Feet

  - □ 533–655 Feet.

- ▪ Rx Sensitivity (CSU mode only, maximum attenuation of the Rx signal that can be compensated for by the port Rx path, to obtain BER performance required by the standards):

  - □ **Low** (-30 dB) (-30 dB relative to the nominal transmit level of 0 dB)

  - □ **High** (-36 dB) (-36 dB relative to the nominal transmit level of 0 dB).

- ▪ Tx Gain Level (CSU mode only, relative T1 output transmit level):

  - □ **0 dB** (no attenuation)

  - □ **7.5 dB** (attenuation of 7.5 dB relative to the nominal transmit level)

  - □ **15 dB** (attenuation of 15 dB relative to the nominal transmit level)

  - □ **22.5 dB** (attenuation of 22.5 dB relative to the nominal transmit level)

- ▪ Restoration Time (time required for the E1 port to return to normal operation after sync loss):

  - □ **1 Second** (after 1 second, fast)

  - □ **10 Second** (as per requirements of AT&T TR-62411)

  - □ **CCITT** (as per requirements of ITU-T Rec.G.732).

- ▪ Idle Code (code transmitted to fill unused timeslots in the E1 frames): **00** to **ff**.

- ▪ Signaling (select a signaling mode for the T1 links):

  - □ **Robbed Bit MF**

  - □ **CCS**.

- ▪ Profile (select the signaling profile). When operating with RBMF signaling, it is necessary to assign a signaling profile to the T1 link. The profile must be compatible with the PBX signaling (signaling profile configuration is explained in Configuring Signaling Profiles, above).

Note *If you intend changing the T1 signaling configuration, it is recommended to disconnect a bundle to which the T1 timeslots are assigned before configuring the signaling mode. The bundle must be disconnected at the local and remote sites. If*

you do not disconnect the bundle, you must reset the local and remote voice modules carrying the T1 links after you complete configuring the T1 signaling.

➤ **To configure the T1 timeslots:**

1. From the Voice Configuration menu (see *Figure 4-24*), choose **Distribution Of Framer Time Slots**.

   The Distribution Of Framer Time Slots menu appears (see *Figure 4-37*).

```
Distribution Of Framer Time Slots

 1. Display Time Slots Configuration[]
 2. Configure Time Slots>








>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-37. Distribution Of Framer Time Slots Menu

2. From the Distribution Of Framer Time Slots menu, choose **Configure Time Slots**.

   The Configure Time Slots menu appears (see *Figure 4-38*).

```
Configure Time Slots

 1. Update from Time Slot[1 - 31]... (1)
 2. To TimeSlot[1 - 31]... (1)
 3. Type>   (N.C)
 4. Bundle[1 - 12]... (1)
 5. Destination Port ID[1 - 4]... (1)
 6. Destination Time Slot ID[1 - 31]... (1)
 7. Update Time Slot





>

Please select item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-38. Configure Time Slots Menu

3. From the Configure Time Slots menu, configure the following parameters:

   ▪ Define the range of timeslots you want to configure:

      □ Set **Update from Time Slot** to the number of the first timeslot in the range.

      □ Set **To Time Slot** to the number of the last timeslot in the range.

      To configure a single timeslot, set both parameters to the number of the timeslot you want to configure.

   ▪ Set the timeslot type by choosing **Type**:

      □ **N.C.** (timeslot is not connected)

      □ **Voice** (timeslot transmits voice)

      □ **HDLC** (timeslot transmit data, for example, signaling information).

   ▪ Assign the timeslot(s) to a bundle on the local MT120xA, by choosing **Bundle**, and entering a bundle number.

   ▪ Specify a Voice Mux Gateway destination port, by choosing **Destination Port**, and entering a port number.

Note *For applications when MT120xA operates opposite remote MT120xA, the destination port ID is always 1.*

   ▪ Define the destination timeslots to which the local timeslots are routed. You have to specify only a starting timeslot; the rest of the destination timeslots are configured automatically in accordance with the number of timeslots set in steps 1 and 2 of the Time Slot Configuration (see *Figure 4-38*). To define a destination timeslot, choose **Destination Time Slot ID** and then enter the number of the first timeslot in the range, on the remote MT120xA or Voice Mux Gateway.

   ▪ Save the changes that you made to the timeslots, by choosing **Update Time Slot**.

Note *Make sure to save the changes that you have made to the timeslot configuration.*

4. Check the resulting timeslot configuration by choosing **Display Time Slots Configuration** from the Distribution Of Framer Time Slots menu.

   The Display Time Slots Configuration screen appears (see *Figure 4-39*).

```
Display Time Slots Configuration

    Ts#     Type    Bundle   Dest Port    Dest Ts
    1       N.C       0         1            0
    2       Voice     1         4            1
|   3       Voice     1         4            2
v   4       Voice     1         4            3
    5       Voice     1         4            4
    6       N.C       0         1            0
    7       N.C       0         1            0
    8       N.C       0         1            0
    9       N.C       0         1            0
    10      N.C       0         1            0




>



@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-39. Display Time Slots Configuration Screen

Configuring the E1 Voice Port (MT120xAE)

MT120**x**AE provides a single E1 port, which receives voice traffic from the PBX.

➤ **To configure the E1 port:**

1. From the Voice Configuration menu (see *Figure 4-24*), choose **E1 Parameters**.
   The E1 Parameters menu appears (see *Figure 4-40*).

```
E1 Parameters

 1. Connect>    (No)
 2. Frame>    (G.732S)
 3. Interface Type>    (Ltu)
 4. Restoration Time>    (1 Second (Fast))
 5. Clock Source>    (Lbt        (Local))
 6. Idle Code[1 - ff]... (ff)
 7. Profile[1 - 5]... (1)







>


Please select item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-40. E1 Parameters Menu

2. From the E1 Parameters menu, configure the following E1 parameters:
   - Connect:

□   **Yes** (E1 link is enabled)

□   **No** (E1 link is disabled).

▪   Frame (E1 framing mode):

□   **G.732N** (256N multiframe, 2 frames per multiframe, CRC-4 function disabled)

□   **G.732N-CRC4** (256N multiframe, 2 frames per multiframe, CRC-4 function enabled)

□   **G.732S** (256S multiframe, 16 frames per multiframe, CRC-4 function disabled)

□   **G.732S-CRC4** (256S multiframe, 16 frames per multiframe, CRC-4 function enabled).

Note   *By choosing an E1 framing mode, you also set the signaling mode:*

- *G.732N/G.732N-CRC4 framing – CCS signaling*
- *G.732S/G.732S-CRC4 framing – CAS signaling.*

▪   Interface Type (maximum attenuation of the Rx signal that can be compensated for by the port Rx path, to obtain BER performance required by the standards):

□   **Ltu** (maximum attenuation of 43 dB, relative to the nominal transmit level of 0 dB, operates at longer ranges)

□   **Dsu** (maximum attenuation of 12 dB, relative to the nominal transmit level of 0 dB).

▪   Restoration Time (time required for the E1 port to return to normal operation after sync loss):

□   **1 Second** (after 1 second, fast)

□   **10 Second** (as per requirements of AT&T TR-62411)

□   **CCITT** (as per requirements of ITU-T Rec.G.732).

▪   Clock Source:

□   **Lbt** (derived from the received E1 signal)

□   **Internal** (received from the MT120xA internal oscillator).

▪   Idle Code (code transmitted to fill unused timeslots in the E1 frames): **00** to **ff**.

▪   Signaling profile for the CAS signaling (**1** to **5**). The profile must be compatible with the PBX signaling (signaling profile configuration is explained in the *Configuring Signaling Information* section, above).

| *Note* | *If you intend changing the E1 signaling configuration, it is recommended to disconnect a bundle to which the E1 timeslots are assigned before configuring the signaling mode. The bundle must be disconnected at the local and remote sites. If you do not disconnect the bundle, you must reset the local and remote voice interfaces carrying the E1 links after you complete configuring the E1 signaling.* |

➤ **To configure the E1 timeslots:**

1. From the Voice Configuration menu (see *Figure 4-24*), choose **Distribution Of Framer Time Slots**.

   The Distribution Of Framer Time Slots menu appears (see *Figure 4-37*).

2. Continue using the same procedure as for the T1 timeslots. For more information, see *Configuring the T1 Voice Port*, above.

Configuring the FXS Voice Ports (MT1201A only)

MT1201A provides four analog FXS voice ports. If the FXS ports connect to a telephone handset, the FXS ports need to be configured to function like the PBXs at the location. The DSP on the MT1201A is capable of producing all of the tones and signals that a PBX usually sends to a telephone handset.

➤ **To configure an FXS port:**

1. From the Configuration menu (*Figure 4-4*), choose **FXS Configuration**.

   The FXS Configuration menu appears (see *Figure 4-28*).

2. From the FXS Configuration menu, choose **Timeouts**.

   The Timeouts menu appears (see *Figure 4-41*).

```
Timeouts

 1. Ring Timeout (sec)[60 - 600]... (120)
 2. On hook duration in Flash (mSec)[10 - 2000]... (700)
















>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-41. Timeouts Menu

3. Set the timeouts:

   ▪ **Ring Timeout** (the number of seconds for which MT120xA waits for a telephone handset to be answered)

> - **On hook duration in Flash** (the duration of Flash—the Flash key on the phone keypad—in msec. Different PBXs have different Flash durations, so you can configure this parameter according to the PBX in use. The Flash is a fast ON HOOK and OFF HOOK operation.)

4. From the FXS Configuration menu, choose **Ringer Profile**.

    The Ringer Profile menu appears (see *Figure 4-42*).

```
Ringer Profile

 1. Period #1: Ring (100 mSec)[1 - 50]... (10)
 2. Period #1: Silence (100 mSec)[1 - 50]... (30)
 3. Period #2: Ring (100 mSec)[0 - 50]... (0)
 4. Period #2: Silence (100 mSec)[0 - 50]... (0)




>

Please select item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-42. Ringer Profile menu

5. The ringer profile determines the ring tone. Use this menu to configure the ring tone to match the standard ring tone at the location. To define a ringer profile, set the first two, or all four, parameters (specify **0** to **50**, in units of 100 mSec):

    - **Period #1 Ring** (the length of the first ring tone)

    - **Period #1 Silence** (the length of the first silence period; for locations that have only one ring tone, specify the period of silence between rings; for locations that have a double ring tone, specify the silence between the two ring tones)

    - **Period #2 Ring** (the length of the second ring tone)

    - **Period #2 Silence** (the length of the silence between each set of double ring tones).

6. From the FXS Configuration menu, choose **Port Configuration**.

    The Port Configuration menu appears (see *Figure 4-43*).

```
Port Configuration

 1. Port Number>    (Port #1)
 2. Gains>
 3. FXS Signaling Parameters[]>




















>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-43. Port Configuration Menu

7. Choose **Port Number** and then select the number of the port you want to configure.

8. Choose **Gains** and then set the following gains:

- **TX gain** (the gain to apply to the transmit signals (signals sent out from the MT120xA); commonly used to amplify a weak signal or reduce a signal that is too strong)

- **RX gain** (the gain to apply to receive signals (signals transmitted from the handset or PBX to the MT120xA)).

9. Choose **FXS Signaling Parameters**.

The FXS Signaling Parameters screen appears (see *Figure 4-44*).

```
FXS Signaling Parameters >Port #1

                A Bit     B Bit    C Bit    D Bit
       ON HOOK      0        1        0        1
       OFF HOOK     1        1        0        1

  1. 0
  2. 1








>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-44. FXS Signaling Parameters Screen

10. Set the A, B, C and D bits that make up the on-hook and off-hook signals. To set a value, press **<Tab>** to select the value to be changed, and then choose the appropriate menu option to make the desired setting.

➤ **To configure the FXS timeslots:**

1. From the FXS Configuration Menu (see *Figure 4-28*), choose **Ports Distribution**.

    The Ports Distribution menu appears (see *Figure 4-45*).

```
Ports Distribution

 1. Display Time Slots Configuration[]
 2. Configure Time Slots>












>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-45. Ports Distribution Menu

2. Continue using the same procedure as for the T1 timeslots. For more information, see *Configuring the T1 Voice Port*, above.

4.9 Configuring the User Ethernet Port

The MT120xA has two Ethernet ports. One port may be used to connect the main link; the other Ethernet port can be used to connect the local user network. The MT120xA includes a switch that routes the voice and data intelligently.

➤ **To configure the user Ethernet port:**

1. From the Switch Lan Configuration menu (see *Figure 4-21*), choose **User Port Configuration**.

    The User Port Configuration menu appears. This menu is identical to the Network Port Configuration menu (see *Figure 4-22*).

2. Configure the user Ethernet port. The procedure is the same as configuring the main link network port (see Configuring the Ethernet Network Port, above).

4.10 Restoring Default Settings

You can restore the voice port settings of the MT120xA to the factory default settings. Restoring the defaults erases defined bundles and assigned timeslots. The system parameters are not affected.

➤ **To restore the MT120xA to the defaults:**

1. From the System menu (see *Figure 4-5*), choose **Factory Default**.

    MT120xA displays the following message:

    Are you sure you want to initialize to default configuration(Y/N)?

2. Type **Y**, and then press **<Enter>**.

    MT120xA restores configuration of the voice port(s) to the default settings.

4.11 Resetting the MT120xA

The MT120xA management software allows you to re-initialize the main board CPU of the unit.

➤ **To reset the MT120xA components:**

1. From the System menu, choose **Reset Unit**.

    MT120xA displays the following message:

    Are you sure you want to reset the MT120xA ? Press Y/N

2. Type **Y**, and then press **<Enter>**.

    The unit is re-initialized; its active software is decompressed and loaded into the RAM.

Chapter 5

Configuring a Typical Application

This chapter gives detailed instructions for configuring MT120xA for a typical application in which two MT120xA units operate opposite a central Voice Mux Gateway unit over an IP network.

5.1 Application Requirements

Figure 5-1 illustrates a typical TDM application, in which two MT120xA units operate opposite a central Voice Mux Gateway over an IP network.
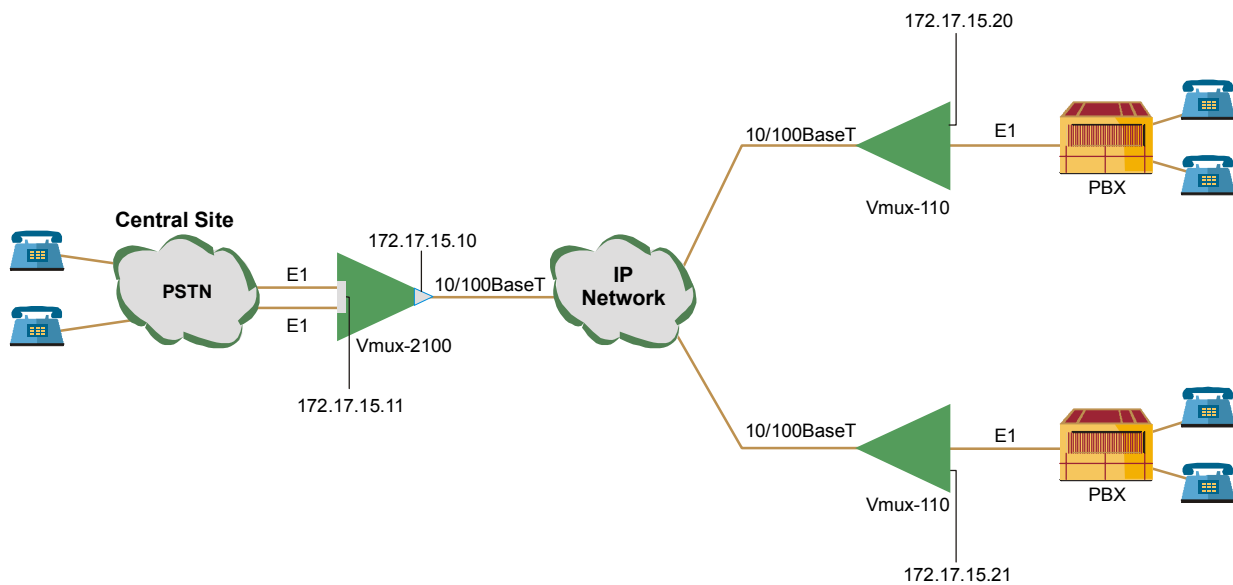
Figure 5-1. Typical Application

The following network requirements exist:

- Two E1 trunks are transmitted by the central Voice Mux Gateway over IP network to two remote MT120xA units. Both E1s belong to the same group.
- Each local timeslot carries voice. It is routed to the same timeslot of the corresponding E1 at the remote site
- CAS signaling or CCS signaling
- G.732S or G.732N framing mode, without CRC-4 bits generation
- G.729 A voice compression
- Loopback timing
- Fax relay at 9.6 kbps.

5.2 Outline of Configuration Procedure

The recommended configuration procedure for this application includes the following steps:

1. Configure the local Voice Mux Gateway.

2. Configure the IP host parameters for both remote MT120xA units via an ASCII terminal connection.

3. Install the two MT120xA units at their locations.

4. Configure one of the MT120xA units.

5. On the management station, save the configuration file (**cnfg110.dat**) of the configured MT120xA unit. This is done by running a TFTP client application on the management station.

6. Download the configuration file to the second MT120xA unit. This is done by running a TFTP client application on the management station.

7. Update the relevant parameters on the second MT120xA unit.

5.3 Configuring the Local Voice Mux Gateway

This section provides only a summary of the parameters necessary for the voice E1 configuration of the central Voice Mux Gateway. Refer to appropriate sections of the *Voice Mux Gateway Installation and Operation Manual* for more detailed instructions.

➤ **To configure the central Voice Mux Gateway:**

1. Assign the 172.17.15.11 IP address to the E1 group 1.

2. Add two bundles and configure them as follows:
    - Connect – Yes
    - Function – TDMoIP
    - Max Bytes In Multiplexed Frame – 500
    - Destination IP:
        □ Bundle 1 – 172.17.15.20
        □ Bundle 2 – 172.17.15.21
    - Destination Bundle – 1
    - Packetizing Interval – 30
    - Coder Rate – G723.1/6.4
    - Fax/modem – Enable at 9.6 kbps.

3. Configure external E1 parameters:
    - Connect – Yes
    - Frame – G.732S
    - Restoration – CCITT

- Clock Source – Lbt
- Interface Type – Dsu
- Idle Code – 7E
- Profile – 1.

4. Assign timeslots of the first external E1:
   - Update from Time Slot – 1
   - To Time Slot – 31
   - Type – Voice
   - Bundle – 1
   - Destination Port ID – 1
   - Destination Time Slot ID – 1.

5. Configure timeslots of the second external E1 to the same parameters, except for the following:
   - Assign the timeslots to bundle 2

Now you can proceed with configuration of remote MT120xA units.

5.4 Configuring MT120xA for Operation with CAS Signaling

Most of the configuration procedures are performed on one of the units, except for the defining IP parameters of the second MT120xA.

Configuration procedure is divided into three main stages:

- Defining system parameters.
- Configuring main link parameters.
- Setting voice E1 parameters.

Note   *You must save the selected values by updating the MT120xA database. If the database is not updated, MT120xA discards all the user settings when it is reset. You can save selected values at any stage of the configuration procedure.*

Configuring System Parameters

➤ **To configure the MT120xA system parameters:**

1. Configure an ASCII terminal to: 115.2 kbps, one start bit, eight data bits, no parity, one stop bit, no flow control, VT100 emulation.

2. Connect the terminal to the first MT120xA RJ-45 CONTROL port.

3. Initiate the control session by entering the user name and password.

4. Display the Host IP menu and enter the IP address (172.17.15.20), its subnet mask and default gateway values (**Main Menu** > **Configuration** > **System** > **Management** > **Host IP**).

5. Repeat step 2 to step 4 for the second MT120xA unit, and assign the 172.17.15.21 IP address to it.

Note

The rest of the configuration procedure refers to the first unit. Information applicable to both units (or only to the second MT120xA) is explicitly identified.

6. Display the Signal Profile Configuration menu, enter a desired signaling system profile number (1) and configure it according to the system used by the PBX connected to the E1 port (**Main Menu** > **Configuration** > **System** > **Management** > **Signaling Configuration**> **Signaling Profile Configuration**).

Configuring Voice E1 Parameters

➤ **Configuring the voice E1 parameters:**

1. Display the Bundle Configuration menu, and add bundle 1 to the system (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **Bundles Parameters** > **Bundle Configuration** **> Add Bundle**).

2. Display the Edit Bundle menu, and configure the bundle 1 parameters to the following values (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **Bundles Parameters** > **Bundle Configuration** > **Edit Bundle**):

   - Connect – Yes

   - Function – TDMoIP

   - Max Bytes In Multiplexed Frame – 500

   - Destination IP – 172.17.15.11

   - Destination Bundle – 1

   - Packetizing Interval – 30

   - Coder/Rate – G723.1A/6.4

   - Fax/Modem – Enable at 9.6 kbps.

3. Display the E1 Parameters menu, and set the E1 port parameters to the following values (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **E1 Parameters**):

   - Connect – Yes

   - Frame – G.732S

   - Restoration – CCITT

   - Clock Source – Lbt

   - Interface Type –Dsu

   - Idle Code – 7E

   - Profile – 1.

4. Display the Time Slot Configuration menu, and configure the timeslots belonging to the external port 1 of group 1 (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **Distribution Of Framer Time Slots** > **Time Slot Configuration**):

   - Update from Time Slot – 1

   - To Time Slot – 31

   - Type – Voice

   - Bundle – 1

- Destination Port ID – 1
- Destination Time Slot ID – 1.

Note *MT120xA displays timeslot 16 as 'Not Connected' (NC), because it carries CAS signaling information.*

5. Update the timeslot database from the Time Slot Configuration menu.

Figure 5-2 summarizes the external E1 bundle and timeslot configuration of the local and remote units.
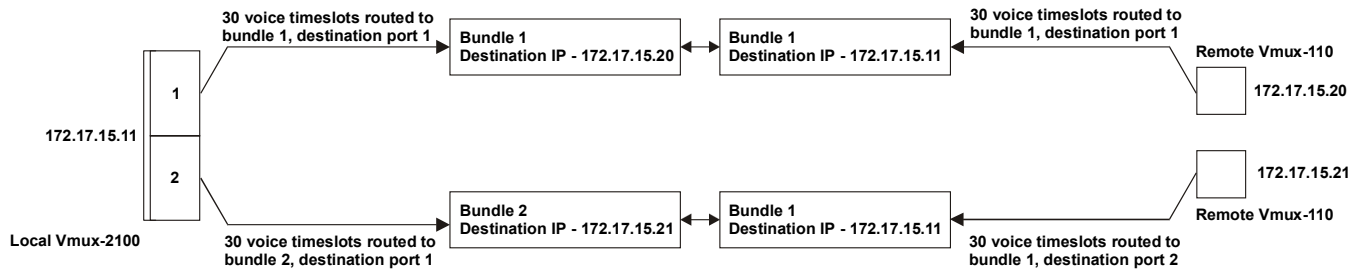
Figure 5-2. E1 Bundle and Timeslot Configuration

Transferring Database to the Second MT120xA

➤ **To transfer the database to the second MT120xA:**

1. Upload the **cnfg110.dat** file from the first MT120xA to the management station via the TFTP protocol.

2. Download the **cnfg110.dat** file to the second MT120xA via the TFTP protocol.

3. Establish a Telnet connection to the second MT120xA unit.

4. Display the Time Slot Configuration menu and set the **Destination Port ID** parameter to **2**.

5. Update the second MT120xA database by typing @.

  Now both remote MT120xA units are ready for operation.

Note *The host IP and the main link values do not change when you download the new configuration and update the database.*

5.5 Configuring MT120xA for Operation with CCS Signaling

Configuration of the MT120xA units operating with the CCS signaling is similar to the configuration for operation with the CAS signaling, except for the following:

1. From E1 Parameters menu, set the E1 framing type to G.732N (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **E1 Parameters**).

2. Display the Time Slot Configuration menu, and configure the timeslots (**Main Menu** > **Configuration** > **E1 Voice Configuration** > **Distribution Of Framer Time Slots** > **Time Slot Configuration**):

- Update from Time Slot – 1

- To Time Slot – 30

- Type – Voice

- Bundle – 1

- Destination Port ID – 1

- Destination Time Slot ID – 1.

3. Once you assign all timeslots to carry voice, assign one of them (for example, timeslot 31) to carry signaling information:

- Update from Time Slot – 31

- To Time Slot – 31

- Type – HDLC

- Bundle – 1

- Destination Port ID – 1

- Destination Time Slot ID – 31.

4. Update the timeslot database from the Time Slot Configuration menu.

5. When working with CCS-SS7, you can instruct MT120xA to drop certain amount of fill-in signal units (FISUs) by selecting the appropriate SS7 keep-alive suppression rate (**Main Menu** > **Configuration** > **System** > **Management** > **Signaling Configuration**> **SS7 Keep-Alive Suppression Rate**).

6. Set all relevant parameters of the central Voice Mux Gateway in a similar manner (see Voice Mux Gateway installation and operation manual).

Chapter 6

Diagnostics

This chapter describes the MT120xA diagnostic functions, which include:

- Tone injection (not on MT1201)

- Local and remote loopbacks (not on MT1201)

- Ping utility.

6.1 Tone Injection

The test tone is a data sequence at a rate of 1 kHz. This data sequence is identical to the data sequence that would have been generated if a 1 kHz signal having a nominal level 0 dBm were applied to the input of the channel speech processor. The tone should be received clearly by the corresponding subscriber connected to the PBX at the nominal receive level. MT120xA supports tone injection towards the local side only (see *Figure 6-1*).

The tone injection is activated individually per timeslot. However, multiple tone injections can be run at the same time. MT120xA allows you to set the tone injection timeout causing the tone relay to deactivate automatically after the desired period of time.
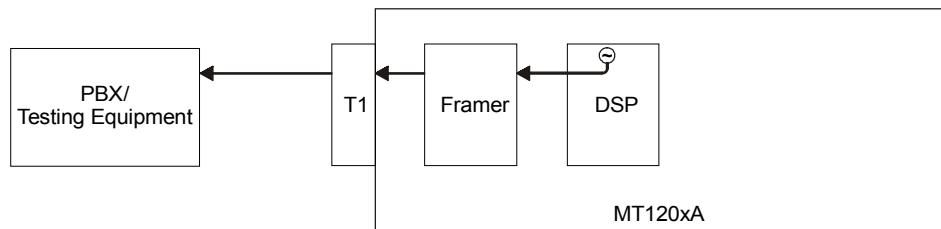
Figure 6-1. Local Tone Injection

Note *Before performing tone injection, make sure that the timeslot to which you intend to inject the tone belongs to the properly configured T1/E1 port.*

➤ **To activate tone injection:**

1. From the Main menu, select **Diagnostics**.

The Diagnostics menu appears (see *Figure 6-2*).

```
Diagnostics

 1. Inject Tone test>
 2. Local Loop test>
 3. Remote Loop test>
 4. Display Active tests
 5. Ping >




>

Please select item <1 to 5>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 6-2. Diagnostics Menu

2. From the Diagnostic menu, select **Inject Tone Test**.

The Inject Tone Test menu appears (see *Figure 6-3*).

```
Inject Tone test

 1. Time Slot[1 - 31]... (1)
 2. Direction>   (Local)
 3. Time Out(seconds, 0=forever)[0 - 60]... (0)
 4. Activate>




>

Please select item <1 to 4>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 6-3. Inject Tone Menu

3. From the Inject Tone Test menu, perform the following steps to complete the tone injection activation:

▪ Select a timeslot for the tone injection.

▪ Specify the direction of the tone injection:

    □ **Local** (towards the local PBX, see *Figure 6-1*)

   ■ Define the tone injection timeout (period of time after which the tone injection stops automatically):

    □ **0 seconds** (forever) to **60 seconds**

   ■ Activate the tone injection by choosing **Activate**, and then selecting **Yes** from the Activate menu.

   ■ Repeat the procedure for all timeslots that you intend to test.

Note *You can display information on all tests running at a time by selecting Display Active Tests from the Diagnostics menu.*

6.2 Loopback Tests

MT120xA supports activation of local and remote loopbacks. The purpose of these tests is to determine the source of a break in the data flow. The loopbacks are activated via voice port (T1, E1 or FXS).

Local Loopback

MT120xA can be set to a local loopback to test the connection between the voice port and the local side PBX. In this mode, data coming from the PBX is looped back to the PBX (see *Figure 6-4*).
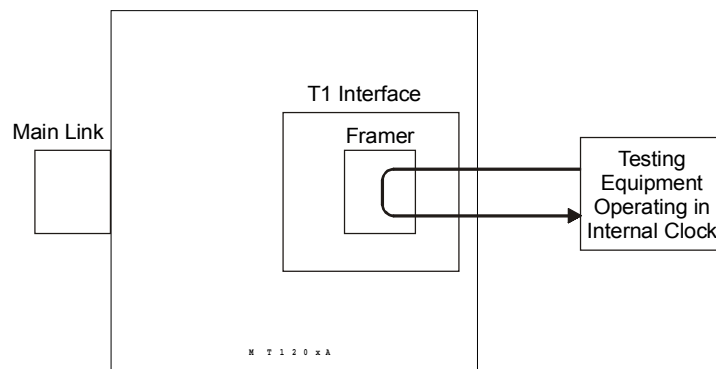
Figure 6-4. Local Loopback

➤ **To activate a local loopback:**

1. Configure the testing equipment to internal clock.

2. From the Diagnostics menu, select **Local Loop Test**.

  The Local Loop Test menu appears (see *Figure 6-5*).

3. From the Local Loop Test menu, activate the local loopback by choosing **Activate**, and then choosing **Yes** from the displayed menu.

```
Local Loop test

 1. Activate>




>

Please select item <1 to 1>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 6-5. Local Loop Test Menu

Remote Loopback

MT120xA can be set to a remote loopback to test the internal connection between the voice port and the main link. In this mode, data coming from the IP network is looped back to the network (to the remote side), see *Figure 6-6*.

➤ **To activate a remote loopback:**

1. From the Diagnostics menu, select **Remote Loop Test**.

   The Remote Loop Test menu appears.

2. From the Remote Loop Test menu, activate the remote loopback by choosing **Activate**, and then choosing **Yes** from the displayed menu.
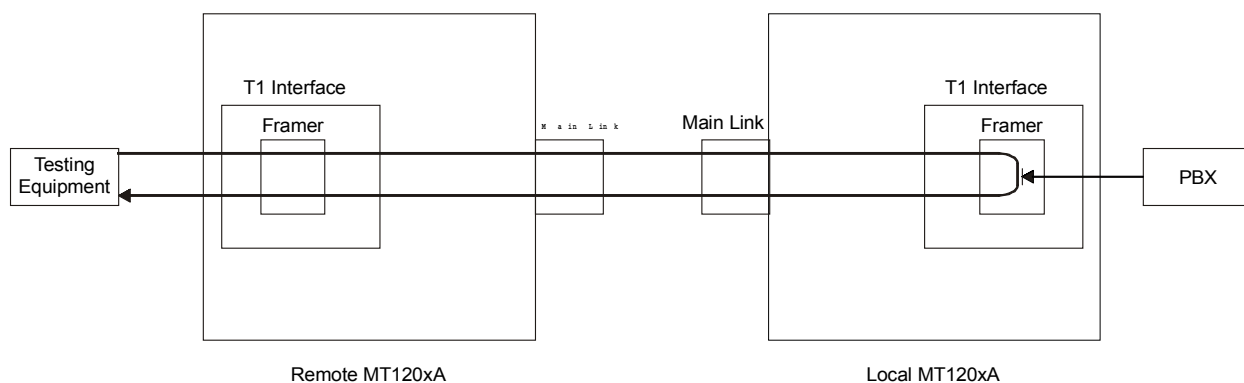
Figure 6-6. Remote Loopback

6.3 Pinging Remote Devices

The ping utility is used to confirm IP connectivity by pinging other IP hosts. The connectivity is confirmed be receiving a reply from the remote (pinged) hosts.

➤ **To ping a host:**

1. From the Diagnostics menu, choose **Ping**.

   The Ping menu appears (see *Figure 6-7*).

2. From the Ping menu, choose **IP Address**, and then enter the desired host IP address.

3. From the Ping menu, choose **Number of Pings**, and then enter the number of pings.

4. From the Ping menu, choose **Activate** to activate the pinging.

```
Ping

 1. Ip Address... (0.0.0.0)
 2. Number Of Pings[1 - 16]... (1)
 3. Activate




>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 6-7. Ping Menu

6.4 Displaying the Active Tests

The MT120xA management software allows you to display tone injection and loopbacks currently in progress.

➤ **To display all active tests:**

- From the Diagnostics menu, choose **Display Active tests**.

  MT120xA displays a list of active tests, specifying the timeslot being tested (for tone injection only).

Chapter 7

Monitoring and Statistics Collection

This chapter describes the alarms, sanity checks (configuration errors and warnings), main link and voice module statistics supported by MT120xA.

7.1 Alarms

MT120xA detects fault conditions and initiates alarms and events to alert the user:

- **Alarms** (major and minor) have two statuses, ON and OFF. Alarm status changes to OFF, when a fault condition that caused it is cleared.

- **Events** have only ON status.

Alarm Buffer

MT120xA maintains two alarm buffers:

- **Temporary buffer**, represented as the Display All Alarms screen. All alarms, including active alarms, can be deleted from this display.

- **Permanent buffer**, represented as the Alarm Status screen. Only inactive alarms can be deleted from the Alarm Status screen.

An alarm simultaneously enters both the Display All Alarms log and the Alarm Status log, and the ALM LED lights to indicate the condition. In addition, MT120xA displays the ALARM ON indication in the top right-hand corner of the terminal screen. When the event that caused the alarm is cleared, the alarm status changes to OFF, enabling the alarm to be deleted from the permanent buffer.

Working with the Temporary Alarm Buffer

The temporary alarm buffer is represented as the Display All Alarms screen.

➤ **To access the Display All Alarms screen:**

1. From the Main menu, choose **Monitoring**.

    The Monitoring menu appears (see *Figure 7-1*).

2. From the Monitoring menu, choose **Status**.

    The Status menu appears (see *Figure 7-2*).

3. From the Status menu, choose **Display**.

    The Display menu appears (see *Figure 7-3*).

```
Monitoring

 1. Status>
 2. Statistics>




>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-1. Monitoring Menu

4. From the Display menu, choose **Display All Alarms** to view the alarms.

MT120xA displays the temporary alarm buffer (see *Figure 7-4*).

The display includes the alarm identification code, its severity, its status, and the generation date and time.

➤ **To delete alarms from the temporary buffer:**

• From the Display menu, choose **Display & Clear Alarms** to view and delete the current alarms.

MT120xA displays the current alarms and deletes them from the buffer when the user exits the screen.

```
Status

 1. Display>
 2. Clear>
 3. Display Sanity>




>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-2. Status Menu

```
Display

 1. Display all Alarms
 2. Display & Clear Alarms
 3. Display Alarm status




















>

Please select item <1 to 3>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-3. Display Menu

```
(88)          AIS RED ALARM                    MAJOR  10-03-2001 01:50:16
(88)          AIS RED ALARM                    OFF    10-03-2001 01:50:1
(20)          INTERNAL ERROR                   Event  10-03-2001 01:48:15














 Press 'y' To Continue...
 Press 'n' To Stop.

@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-4. Temporary Alarms Buffer (Display All Alarms Screen)

Working with the Permanent Buffer

The permanent buffer is represented by the Alarm Status screen.

➤ **To access the Alarm Status screen:**

• From the Display menu (see *Figure 7-3*), select **Display Alarm Status**.

MT120xA displays the permanent alarm buffer (see *Figure 7-5*).

> ➤ **To delete inactive alarms from the permanent buffer:**

1. From the Status menu, select **Clear**.

   The Clear menu appears.

2. Confirm the alarm deletion by choosing **Clear All Alarms** from the Clear menu.

   MT120xA deletes all alarms in the OFF state and events from the permanent buffer.

```
(81)          EXCESSIVE ERROR RATIO                MAJOR
(81)          EXCESSIVE ERROR RATIO                OFF
(20)          INTERNAL ERROR                       Event









 Press 'y' To Continue...
 Press 'n' To Stop.

@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-5. Permanent Buffer (Alarm Status Screen)

List of MT120xA Alarms

Table 7-1 lists the MT120xA alarms according to their identification codes.

Table 7-1. MT120xA Alarms

ID Code	Terminal Message	Description	Severity
18	DB UPDATE OCCURRED	MT120xA database has been updated	Event
20	INTERNAL ERROR	Software error	Event
		*Note: The INTERNAL ERROR alarm is used for software debugging. To receive detailed description of each internal alarm, enable 'Open Internal Alarms' from the System menu (**Main menu** > **Configuration** > **System** > **Open Internal Alarms**).*	
80	BPV ERROR HAS OCCURRED	A bipolar violation error has been detected on the E1 port	Event
81	EXCESSIVE ERROR RATIO	The bit error rate of the port exceeds 1×10^{-3}	Major

Table 7-1. MT120xA Alarms (Cont.)

ID Code	Terminal Message	Description	Severity
82	ALARM INDICATION SIGNAL	AIS is being detected at the E1 port	Major
83	EXCESSIVE BIPOLAR VIOLATION	Excessive BPVs at the E1 port	Major
84	T1/E1 FRAME SLIP HAS OCCURRED	A frame slip occurred at the E1/T1 port	Event
87	T1/E1 SIGNAL LOSS	Loss of input signal at the E1/T1 port	Major
88	AIS RED ALARM	Local loss of frame synchronization at the T1 port caused by AIS condition	Major
89	LOC SYNC LOSS (RED ALARM)	Local loss of frame synchronization at the E1 port	Major
90	REM SYNC LOSS (YELLOW ALARM)	Remote loss of frame synchronization at the E1 port	Major
97	LOCAL MULTIFRAME ALARM	Local loss of multiframe synchronization at the E1 port	Minor
98	REMOTE MULTIFRAME ALARM	Remote loss of multiframe synchronization at the E1 port	Minor
100	CRC ERROR OCCURRED	CRC-4 error in the E1 port receive signal	Minor
130	OVERFLOW	The required bandwidth exceeds the available bandwidth on the serial main link	Major
131	TRUNK IS DOWN	A fault exists on the line. This alarm applies only to the serial main link port with the DTE clock mode configured and control signals enabled.	Major
195	BUNDLE IS OOS	Bundle is out of service due to the network connectivity problems	Major

7.2 Sanity Checks

Configuration errors and mismatches are rendered by the MT120xA management software as sanity checks. Their main purpose is to maintain the database validity. MT120xA supports two types of the sanity check messages:

- **Error** – major configuration error, which prevents the MT120xA database from updating and saving changes.

- **Warning** – minor configuration error, which allows the user to update the database and save the changes.

Displaying the Sanity Errors and Warnings

Every time you update the MT120xA database, the management software analyses the changes. If a major error is detected, MT120xA aborts the database update and displays the following message:

Data base wasn't changed. Sanity Error   - Check alarm.

If a minor error is detected, MT120xA updates the database and displays the following message:

Sanity Warning - Check alarm.

➤ **To display the sanity errors and warnings:**

1. From the Status menu (see *Figure 7-2*), choose **Display Sanity**.

   The Display Sanity menu appears (see *Figure 7-6*).

```
Display Sanity

 1. Error
 2. Warning









>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-6. Display Sanity Menu

2. From the Display Sanity menu, choose **Error** to display the sanity errors or choose **Warning** to display the sanity warnings.

   The sanity error or warning list is displayed.

List of Sanity Errors and Warnings

Table 7-2 lists all sanity errors and warnings generated by MT120xA, in alphabetical order.

Table 7-2. Sanity Errors and Warnings

Display	Type	Description
BUNDLE DESTINED TO A PHONE HAS DEST TS OUT OF RANGE	Error	The destination type is a phone and the specified destination timeslot exceeds 4. Specify a timeslot between 1 and 4, since the FXS supports 4 phones.
BUNDLE IS NOT CONNECTED	Warning	A timeslot is assigned to a bundle which is not connected
CCS TS NOT RELATED TO THE SAME BUNDLE	Error	At least two timeslots of the E1/T1 port with the CCS signaling are assigned to different bundles. To avoid it, assign all timeslots of the same E1/T1 port with the CCS signaling to the same bundle.
CCS TS NOT RELATED TO THE SAME PORT	Error	At least two timeslots of the E1/T1 port with the CCS signaling are assigned to different destination slots. To avoid it, assign all timeslots of the same E1/T1 port with the CCS signaling to the same destination slot.
CODER PROBLEM	Error	Conflict in the DSP capacity and timeslot configuration. Since each DSP handles six timeslots, every six consecutive timeslots must be configured to use the same voice compression method.
CONNECTIVITY VALUES MUST BE THE SAME FOR ALL GROUP BUNDLES	Error	Connectivity values of all bundles which belong to the same group (have the same source IP) must be the same.
DEST TS IS OUT OF RANGE (DEST PHONE)	Error	The destination type is a phone and the specified destination timeslot exceeds 4. Specify a timeslot between 1 and 4, since the FXS supports 4 phones.
DISCONNECT BUNDLE BEFORE CHANGING CODER RATE	Error	Voice compression type was changed for a connected bundle. A mismatch between a voice compression type of an active local bundle and that of the destination bundle may cause problems at a DSP. To avoid this, do the following: 1. Disconnect a bundle of the local MT120xA. 2. Disconnect destination bundle of the remote MT120xA. 3. Change the voice compression method for both bundles. 4. Reconnect the bundles.
DOUBLE ROUTE	Error	More than one timeslot is connected to the same destination timeslot
EMPTY ADMINISTRATOR LIST	Error	The last administrator account is deleted from the user database.
EXTERNAL NOT CONNECTED	Warning	A timeslot is assigned to an E1/T1 port which is not connected

Table 7-2. Sanity Errors and Warnings (Cont.)

Display	Type	Description
ILLEGAL DESTINATION IP ADDRESS	Error	Destination IP address for a bundle is not defined
ILLEGAL RINGER PROFILE PERIOD #2	Error	One of the parameters in the second ringer period is set to zero. Either both parameters must be set to zero, or both parameters must be set to non-zero values.
		The first parameter represents the ring period of the second ring; the second parameter represents the silence period that follows the second ring.
TS INCOMPATIBLE WITH E1 TYPE	Error	Timeslot 16 is configured to HDLC when E1 is set to the G.732S framing mode. Timeslot 16 configuration must be changed to N.C.
TOO MANY CONFIGURED TS	Error	Number of timeslots assigned to carry voice exceeds the number of timeslots supported by the unit
TS 16 SHOULD BE DISCONNECTED IN CAS MODE	Error	Timeslot 16 is configured to Voice when operating MT120xA with CAS signaling. Timeslot 16 configuration must be changed to N.C.

7.3 Collecting Statistics

This section explains how to display performance data collected on the MT120xA main link and voice ports. You can access performance data via the Statistics menu (see *Figure 7-7*).

```
Statistics

 1. Bundles statistics>
 2. Voice statistics>
 3. Voice Rx Signaling statistics
 4. Voice Tx Signaling statistics
 5. E1/T1 Hdlc statistics>
 6. Serial Port statistics>
 7. Ethernet statistics>




>

Please select item <1 to 7>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-7. Statistics Menu

➤ **To display the Statistics menu:**

- From the Monitoring menu (see *Figure 7-1*), choose **Statistics**.

  The Statistics menu appears.

Displaying Bundle Statistics

The management software enables you to evaluate the performance of each of the 12 MT120xA bundles (see *Figure 7-10*). *Table 7-3* describes the bundle statistics values.

The bundles may have one of the following statuses:

- **Connect** – The bundle is connected

- **Disconnected** – The bundle is disconnected

- **Echo Wait** – There is physical connection, but the remote bundle is not active.

- **IP OOS** – There is no physical connection between the bundles. The reason for this may be an illegal IP address of the destination E1/T1 group.

➤ **To display the bundle statistics:**

1. From the Statistics menu, select **Bundles Statistics**.

   The Bundles Statistics menu appears (see *Figure 7-8*).

2. From the Bundles Statistics menu, choose **Bundle Number**, type the number of the bundle whose statistics you want to view, and then press **<Enter>**.

```
Bundles statistics

 1. Bundle Number[1 - 12]... (1)
 2. Mode>




















>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-8. Bundles Statistics Menu

3. From the Bundles Statistics menu, choose **Mode**.

   The Mode menu appears (see *Figure 7-9*).

```
Mode

 1. Clear
 2. Display









>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-9. Mode Menu

4. From the Mode menu, choose **Display**.

    The Bundle Statistics screen is displayed (see *Figure 7-10*). *Table 7-3* describes the bundle statistics values.

5. Press **<Y>** to refresh the display.

6. Press **<ESC>** to exit the Bundle Statistics screen.

```
Statistics on Bundle: 1, State: DISCONNECT
                    Rx statistics
Total Frames   :[          0 ]   Total Bytes      :[          0 ]
60 sec Frames  :[          0 ]  60 sec Bytes      :[          0 ]
                    Tx statistics Type
Total Frames   :[          0 ]    Total Bytes     :[          0 ]
60 sec Frames  :[          0 ]   60 sec Bytes     :[          0 ]
Tx on Timeout  :[          0 ]    Tx Max Size     :[          0 ]
60 sec Timout  :[          0 ]    60 sec Max Size :[          0 ]
                    Data Type
Total - Rx Sg :[         0 ] Rx Voice :[          0 ] Rx Hdlc :[         0 ]
60 sec- Rx Sg :[         0 ] Rx Voice :[          0 ] Rx Hdlc :[         0 ]
Total - Tx Sg :[         0 ] Tx Voice :[          0 ] Tx Hdlc :[         0 ]
60 sec- Tx Sg :[         0 ] Tx Voice :[          0 ] Tx Hdlc :[         0 ]
Silence percent on bundle - Rx :[        10 ]  Tx :[        10 ]

Press 'Y' for refresh , ESC - for exit.


ESC-prev.menu; !-main menu; &-exit
```

Figure 7-10. Bundle Statistics

Table 7-3. Bundle Statistics Values for Voice Port

Field	Description
Rx Total Frames	Total number of packets received
Rx Total Bytes	Total number of data octets of all packets received
Rx 60 sec Frames	Number of packets received during the last 60 seconds
Rx 60 sec Bytes	Number of data octets received during the last 60 seconds
Tx Total Frames	Total number of packets transmitted
Tx Total Bytes	Total number of data octets of all packets transmitted
Tx 60 sec Frames	Number of packets transmitted during the last 60 seconds
Tx 60 sec Bytes	Number of data octets transmitted during the last 60 seconds
Tx on Timeout	Number of packets transmitted as a result of reaching the maximum packetizing interval
Tx Max Size	Number of packets transmitted as a result of reaching the maximum frame size
60 sec Timeout	Number of packets transmitted as a result of reaching the maximum packetizing interval during the last 60 seconds
60 sec Max Size	Number of packets transmitted as a result of reaching the maximum frame size during the last 60 seconds
Total - Rx Sg	Total number of received signaling bits
Total - Rx Voice	Total number of received voice bits
Total - Rx Hdlc	Total number of received HDLC bits
60 sec - Rx Sg	Number of signaling packets received during last 60 seconds
60 sec - Rx Voice	Number of voice packets received during last 60 seconds
60 sec - Rx Hdlc	Number of HDLC packets received during last 60 seconds
Total - Tx Sg	Total number of transmitted signaling bits
Total - Tx Voice	Total number of transmitted voice bits
Total - Tx Hdlc	Total number of transmitted HDLC bits
60 sec - Tx Sg	Number of signaling packets transmitted during last 60 seconds
60 sec - Tx Voice	Number of voice packets transmitted during last 60 seconds
60 sec - Tx Hdlc	Number of HDLC packets transmitted during last 60 seconds
Silence percent on bundle Rx	Average percentage of silence on all the received timeslots connected to the bundle
Silence percent on bundle Tx	Average percentage of silence on all the transmitted timeslots connected to the bundle

➤ **To clear the bundle statistics registers:**

1. From the Bundles Statistics menu (see *Figure 7-8*), choose **Mode**.

   The Mode menu appears (see *Figure 7-9*).

2. From the Mode menu, choose **Clear**.

Displaying Timeslot Voice Statistics

The MT120xA software enables you to evaluate performance of a separate timeslot and the DSP used by it (see *Figure 7-12*). *Table 7-4* describes the timeslot voice statistics values.

➤ **To display the timeslot voice statistics:**

1. From the Statistics menu (see *Figure 7-7*), select **Voice Statistics**.

   The Voice Statistics menu appears (see *Figure 7-11*).

```
Voice statistics

 1. Time Slot[1 - 31]... (1)
 2. Mode>




















>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-11. Voice Statistics Menu

2. From the Voice Statistics menu, choose **Time Slot**, type the number of the timeslot whose statistics you want to view, and then press **<Enter>**.

3. From the Voice Statistics menu, choose **Mode**.

   The Mode menu appears (see *Figure 7-9*).

4. From the Mode menu, choose **Display**.

   The Timeslot Voice Statistics screen is displayed (see *Figure 7-12*). *Table 7-4* describes the timeslot voice statistics values.

5. Press **<Y>** to refresh the display.

6. Press **<ESC>** to exit the Bundle Statistics screen.

```
Voice Statistics Time Slot: 1

Dsp Mode       :[             IDLE]
Total Rx Voice :[         0 ]   Total Tx Voice  :[         0 ]
Total Rx Sid   :[         0 ]   Total Tx Sid    :[         0 ]
Total Rx Fax   :[         0 ]   Total Tx Fax    :[         0 ]
Total Underun  :[         0 ]   Total Overrun   :[         0 ]
Max jitter len :[       150 ]
Silence percent since last clear: Rx: [        10 ]  Tx: [        10 ]


Press 'Y' for refresh , ESC - for exit.







ESC-prev.menu; !-main menu; &-exit
```

Figure 7-12. Timeslot Voice Statistics Screen

Table 7-4. Timeslot Voice Statistics Values

Field	Description
DSP Mode	• IDLE – DSP is idle • VOICE – DSP is transmitting voice packets • DATA – DSP is transmitting HDLC packets • FAX –DSP is relaying fax signal • VOICEBAND – DSP is transmitting voiceband data (modem)
Total Rx Voice	Total number of voice packets received from the DSP
Total Tx Voice	Total number of voice packets transmitted to the DSP
Total Rx Sid	Total number of silence packets received from the DSP
Total Tx Sid	Total number of silence packets transmitted to the DSP
Total Rx Fax	Total number of fax packets received from the DSP
Total Tx Fax	Total number of fax packets transmitted to the DSP
Total Underrun	Total underrun of the jitter buffer (in packets)
Total Overrun	Total overrun of the jitter buffer (in packets)
Max jitter len	Max length of the jitter buffer (in msec)
Silence percent since last clear: Rx	Average percentage of silence carried by the received timeslot since buffer was last cleared
Silence percent since last clear: Tx:	Average percentage of silence carried by the transmitted timeslot since buffer was last cleared

➤ **To clear the timeslot voice statistics registers:**

1. From the Voice Statistics menu, choose **Mode**.

2. From the Mode menu, choose **Clear**.

Displaying the Voice Signaling Statistics (MT1200A, MT1207A, MT120xAE)

When operating with the CAS signaling (E1 or T1 voice port only), MT120xA transmits signaling information in one of the timeslots. You can display the mapping of the ABCD bits used by each timeslot inside the signaling timeslot (see *Figure 7-13* and *Figure 7-14*).

- **Rx signaling** – Signaling transmitted from the E1/T1 trunk or PBX

- **Tx signaling** – Signaling transmitted towards the E1/T1 trunk or PBX.

➤ **To display the signaling statistics:**

1. From the Statistics menu, choose **Voice Rx Signaling Statistics** to display the Rx signaling statistics, or choose **Voice Tx Signaling Statistics** to display the Tx signaling statistics.

    The Voice Rx Signaling Statistics screen (see *Figure 7-13*) or Voice Tx Signaling Statistics screen (see *Figure 7-14*) appears.

2. Press **<Y>** to refresh the display.

3. Press **<ESC>** to exit the signaling statistics screen.

```
Voice Rx Signaling Statistics

Ts1  :[      0000 ]   Ts2  :[      0000 ]   Ts3  :[      0000 ]
Ts4  :[      0000 ]   Ts5  :[      0000 ]   Ts6  :[      0000 ]
Ts7  :[      0000 ]   Ts8  :[      0000 ]   Ts9  :[      0000 ]
Ts10 :[      0000 ]   Ts11 :[      0000 ]   Ts12 :[      0000 ]
Ts13 :[      0000 ]   Ts14 :[      0000 ]   Ts15 :[      0000 ]
Ts17 :[      0000 ]   Ts18 :[      0000 ]   Ts19 :[      0000 ]
Ts20 :[      0000 ]   Ts21 :[      0000 ]   Ts22 :[      0000 ]
Ts23 :[      0000 ]   Ts24 :[      0000 ]   Ts25 :[      0000 ]
Ts26 :[      0000 ]   Ts27 :[      0000 ]   Ts28 :[      0000 ]
Ts29 :[      0000 ]   Ts30 :[      0000 ]   Ts31 :[      0000 ]

Press 'Y' for refresh , ESC - for exit.




ESC-prev.menu; !-main menu; &-exit
```

Figure 7-13. Voice Rx Signaling Statistics

```
Voice Tx Signaling Statistics

Ts1  :[        0000 ]   Ts2  :[       0000 ]   Ts3  :[       0000 ]
Ts4  :[        0000 ]   Ts5  :[       0000 ]   Ts6  :[       0000 ]
Ts7  :[        0000 ]   Ts8  :[       0000 ]   Ts9  :[       0000 ]
Ts10 :[        0000 ]   Ts11 :[       0000 ]   Ts12 :[       0000 ]
Ts13 :[        0000 ]   Ts14 :[       0000 ]   Ts15 :[       0000 ]
Ts17 :[        0010 ]   Ts18 :[       0010 ]   Ts19 :[       0010 ]
Ts20 :[        0010 ]   Ts21 :[       0010 ]   Ts22 :[       0010 ]
Ts23 :[        0010 ]   Ts24 :[       0010 ]   Ts25 :[       0010 ]
Ts26 :[        0010 ]   Ts27 :[       0010 ]   Ts28 :[       0010 ]
Ts29 :[        0010 ]   Ts30 :[       0010 ]   Ts31 :[       0010 ]


Press 'Y' for refresh , ESC - for exit.




ESC-prev.menu; !-main menu; &-exit
```

Figure 7-14. Voice Tx Signaling Statistics

Displaying the FXS Signaling Statistics (MT1201A only)

MT1201A records statistics about the FXS analog voice ports.

➤ **To display the FXS signaling statistics:**

• From the Statistics menu (see *Figure 7-7*), choose **FXS Signaling Statistics**.

The FXS Signaling Statistics screen is displayed. Press **<Enter>** to refresh the display. Press **<ESC>** to exit the FXS signaling statistics screen.

```
FXS Signaling statistics

   Ts#    Type   Bundle   Dest Type   Dest Port   Dest Ts         State
    1     N.C      0         PBX          1           0       BOTH_ON_HOOK
    2     N.C      0         PBX          1           0       BOTH_ON_HOOK
    3     N.C      0         PBX          1           0       BOTH_ON_HOOK
    4     N.C      0         PBX          1           0       BOTH_ON_HOOK









>



@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 7-15. FXS Signaling Statistics Screen

The State of the FXS port can be one of the following:

• BOTH_ON_HOOK (both local and remote handsets are on-hook)

- RINGBACK (ring-back signal is being sent from remote handset)
- ACTIVE_CALL (call is in progress)
- LOCAL_ON_HOOK (local handset is on-hook, remote handset is not on-hook)
- REMOTE_ON_HOOK (remote handset is on-hook, local handset is not on-hook)
- RINGING (remote handset is ringing)

Displaying HDLC Statistics

When the timeslots of the E1/T1 voice ports are configured to carry the HDLC data, MT120xA collects HDLC traffic statistics (see *Figure 7-16*). *Table 7-5* describes the HDLC statistics values.
HDLC statistics are not relevant for MT1201A units.

➤ **To display the HDLC statistics:**

1. From the Statistics menu, choose **E1/T1 Hdlc Statistics**.

    The E1/T1 HDLC Statistics menu appears.

2. From the HDLC Statistics menu, choose **Display**.

    The HDLC Statistics screen is displayed (see Figure 7-16). *Table 7-5* describes the HDLC statistics values.

3. Press **<Y>** to refresh the display.

4. Press **<ESC>** to exit the HDLC Statistics screen.

```
                         Hdlc Statistics
                          Rx statistics
Total Frames    :[          0 ]    Total Bytes      :[          0 ]
60 sec Frames   :[          0 ]     60 sec Bytes     :[          0 ]
Length Error    :[          0 ]     NonOctet Aligned :[          0 ]
Aborted Frames :[          0 ]     Crc Error        :[          0 ]
Overrun         :[          0 ]
                          Tx statistics
Total Frames    :[          0 ]     Total Bytes      :[          0 ]
60 sec Frames   :[          0 ]      60 sec Bytes    :[          0 ]
Underrun        :[          0 ]

Tx Queue - Max Frames  :[          0]  Current Frames :[          0]
Freed Frames    :[          0]

Press 'Y' for refresh , ESC - for exit.




ESC-prev.menu; !-main menu; &-exit
```

Figure 7-16. HDLC Statistics Screen

Table 7-5. HDLC Statistics Values

Field	Description
Rx Total Frames	Total number of HDLC packets received
Rx Total Bytes	Total number of data octets of all packets received
Rx 60 sec Frames	Number of HDLC packets received during last 60 seconds
Rx 60 sec Bytes	Number of data octets received during last 60 seconds
Length Error	Number received frames with length violations
NonOctet Aligned	Number of received frames which contain a number of bits not divisible by eight
Aborted Frames	Number of aborted sequences. The counter is incremented by one when at least seven consecutive ones are received during frame reception
Crc Error	Number of received frames with CRC errors
Rx Overrun	Number of received HDLC packets discarded due to lack of buffer resources
Tx Total Frames	Total number of HDLC packets transmitted
Tx Total Bytes	Total number of data octets of all packets transmitted
Tx 60 sec Frames	Number of HDLC packets transmitted during last 60 seconds
Tx 60 sec Bytes	Number of data octets transmitted during last 60 seconds
Tx Underrun	Number of transmitted HDLC packets discarded due to lack of buffer resources
Tx Queue - Max Frames	Maximum number of the transmitted HDLC packets ever accumulated in the FIFO buffer
Tx Queue - Current Frames	Current number of the transmitted HDLC packets in the FIFO buffer
Freed Frames	Number of frames discarded from the FIFO buffer when the number of stored frames exceeded buffer capacity

➤ **To clear the HDLC statistics registers:**

• From the E1/T1 HDLC Statistics menu, choose **Clear**.

Displaying the Serial Port Statistics

MT120xA evaluates performance of the Serial port (see *Figure 7-18*). *Table 7-6* describes the Serial port statistics values.

➤ **To display the Serial port statistics:**

1. From the Statistics menu, choose **Serial Port Statistics**.

   The Serial Port Statistics menu appears (see *Figure 7-17*).

```
Serial Port statistics

 1. Clear
 2. Display













>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-17. Serial Port Statistics Menu

2. From the Serial Port Statistics menu, choose **Display**.

The Serial Port Statistics screen is displayed (see *Figure 7-18*). *Table 7-6* describes the Serial port statistics values.

```
                     Serial Port Statistics
                         Rx statistics
Total Frames   :[         0 ]    Total Bytes     :[         0 ]
60 sec Frames  :[         0 ]     60 sec Bytes    :[         0 ]
Length Error   :[         0 ]    NonOctet Aligned :[         0 ]
Aborted Frames :[         0 ]    Crc Error        :[         0 ]
Overrun        :[         0 ]     Freed Rx Frames  :[         0 ]
                         Tx statistics
Total Frames   :[         0 ]     Total Bytes     :[         0 ]
60 sec Frames  :[         0 ]      60 sec Bytes    :[         0 ]
Underrun       :[         0 ]     Freed Tx Frames :[         0 ]
Tx Voice Q - Current Frames :[        0] Max Frames :[        0]
Tx Data Q  - Current Frames :[        0] Max Frames :[        0]
Tx Mng Q   - Current Frames :[        0] Max Frames :[        0]

BandWidth To Line - Average:[        0] Max:[        0] (bit/Sec)

Press 'Y' for refresh , ESC - for exit.


ESC-prev.menu; !-main menu; &-exit
```

Figure 7-18. Serial Port Statistics Screen

Table 7-6. Serial Port Statistics Values

Field	Description
Rx Total Frames	Total number of HDLC packets received
Rx Total Bytes	Total number of data octets of all packets received
Rx 60 sec Frames	Number of HDLC packets received during last 60 seconds
Rx 60 sec Bytes	Number of data octets received during last 60 seconds
Rx Length Error	Number received frames with length violations
Rx NonOctet Aligned	Number of received frames which contain a number of bits not divisible by eight
Rx Aborted Frames	Number of aborted sequences. The counter is incremented by one when at least seven consecutive ones are received during frame reception
Rx Crc Error	Number of received frames with CRC errors
Rx Overrun	Number of received HDLC packets discarded due to lack of buffer resources
Freed RX Frames	Number of frames discarded from the FIFO buffer when the number of stored frames exceeded buffer capacity
Tx Total Frames	Total number of HDLC packets transmitted
Tx Total Bytes	Total number of data octets of all packets transmitted
Tx 60 sec Frames	Number of HDLC packets transmitted during last 60 seconds
Tx 60 sec Bytes	Number of data octets transmitted during last 60 seconds
Tx Underrun	Number of transmitted HDLC packets discarded due to lack of buffer resources
Freed Tx Frames	Number of frames discarded from the FIFO buffer when the number of stored frames exceeded buffer capacity
Tx Voice Q - Current Frames	Current number of the transmitted HDLC voice packets in the FIFO buffer
Tx Voice Q - Max Frames	Maximum number of the transmitted HDLC voice packets ever accumulated in the FIFO buffer
Tx Data Q - Current Frames	Current number of the transmitted HDLC data packets in the FIFO buffer
Tx Data Q - Max Frames	Maximum number of the transmitted HDLC data packets ever accumulated in the FIFO buffer
Tx Mng Q - Current Frames	Current number of the transmitted HDLC management packets in the FIFO buffer
Tx Mng Q - Max Frames	Maximum number of the transmitted HDLC management packets ever accumulated in the FIFO buffer

Displaying the Ethernet Statistics

MT120xA evaluates performance of the 10/100BaseT Ethernet port (see *Figure 7-20*). *Table 7-7* describes the Ethernet statistics values.

➤ **To display the Ethernet statistics:**

1. From the Statistics menu, choose **Ethernet Statistics**.

   The Ethernet Statistics menu appears (see *Figure 7-19*).

```
Ethernet statistics

 1. Clear
 2. Display

>

Please select item <1 to 2>
@ - Db Update; # - Db Undo
ESC-prev.menu; !-main menu; &-exit
```

Figure 7-19. Ethernet Statistics Menu

2. From the Ethernet Statistics menu, select **Display**.

   The Ethernet Statistics screen is displayed (see *Figure 7-20*). *Table 7-7* describes the Ethernet statistics values.

3. Press **<Y>** to refresh the display.

4. Press **<ESC>** to exit the Ethernet Statistics screen.

```
                    Switch Statistics
                  Network Port      User Port
Rx Total Frames    :[           0 ]  [            0 ]
Rx 60sec Frames    :[           0 ]  [            0 ]
Tx Total Frames    :[           0 ]  [            0 ]
Tx 60sec Frames    :[           0 ]  [            0 ]
PHY Err Count      :[           0 ]  [            0 ]
PHY 60sec Err Count:[           0 ]  [            0 ]

Freed Rx Frames  (Network & User): [            0 ]

Press 'Y' for refresh , ESC - for exit.




ESC-prev.menu; !-main menu; &-exit
```

Figure 7-20. Ethernet Statistics Screen

Table 7-7. Ethernet Statistics Values

Field	Description
Network Port: Rx Total Frames	Total number of packets received on Network port
Network Port: Rx 60 sec Frames	Number of packets received during last 60 seconds on Network port
Network Port: Tx Total Frames	Total number of packets transmitted on Network port
Network Port: Tx 60 sec Frames	Number of packets transmitted during last 60 seconds on Network port
Network Port: PHY Err Count	Total number of errors on Network port
Network Port: PHY 60 sec Err Count	Number of errors during the last 60 seconds on Network port
User Port: Rx Total Frames	Total number of packets received on User port
User Port: Rx 60 sec Frames	Number of packets received during last 60 seconds on User port
User Port: Tx Total Frames	Total number of packets transmitted on User port
User Port: Tx 60 sec Frames	Number of packets transmitted during last 60 seconds on User port

Table 7-7. Ethernet Statistics Values (Cont.)

Field	Description
User Port: PHY Err Count	Total number of errors on User port
User Port: PHY 60 sec Err Count	Number of errors during the last 60 seconds on User port
Freed Rx Frames (Network & User	Total number of frames freed due to errors

➤ **To clear the Ethernet statistics registers:**

- From the Ethernet Statistics menu, choose **Clear**.

Appendix A

Interface Connector Specifications

A.1 Voice Ports

T1/E1 Interface Connector (MT1200A, MT1207A, MT120xAE)

The balanced T1/E1 voice port interface terminates in a RJ-45 connector. *Figure A-1* illustrates the pin location in the RJ-45 connector. *Table A-1* lists the T1/E1 connector pin assignment.
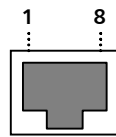
Figure A-1. RJ-45 Connector Pin Location

Table A-1. T1/E1 RJ-45 Connector Pinout

Pin	Function
1, 2	Receive (input)
4, 5	Transmit (output)

FXS Interface Connectors (MT1201A only)

The FXS interfaces terminate in RJ-11 connectors. *Figure A-2* illustrates the pin location in the RJ-11 connector. *Table A-2* lists the FXS connector pin assignment.
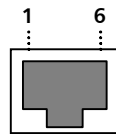
Figure A-2. RJ-11 Connector Pin Location

Table A-2. FXS Connector Pinout

Pin	Function
3	Ring
4	Tip

A.2 Ethernet Interface Connectors

The 10/100BaseT user and network port interfaces also terminate in RJ-45 connectors (previously illustrated in *Figure A-1*). *Table A-3* lists the Ethernet connector pin assignment.

Table A-3. Ethernet Connector Pinout

Pin	Signal	Function
1	TD (+)	Transmit Data (positive)
2	TD (-)	Transmit Data (negative)
3	RD (+)	Receive Data (positive)
6	RD (-)	Receive Data (negative)

Note   *Ethernet main link port supports connection via straight and cross cables.*

A.3 Serial Port

Serial Port Connector

The MT120xA Serial port terminates in an RS-530/DCE interface with a female DB-25 connector. *Table A-4* lists the pin assignment of the Serial port DB-25 connector.

Table A-4. DB-25 Serial Port Connector Pin Assignment

Pin Number	Function	Direction
1	Ground Signal	–
2	TXDa	In
3	RXDa	Out
4	RTSa	In
5	CTSa	Out
6	DSRa	Out
7	Ground Signal	–
8	DCDa	Out
9	RXCb	Out
10	DCDb	Out
11	E-CLKb	In
12	TXCb	Out
13	CTSb	Out
14	TXDb	In
15	TXCa	Out
16	RXDb	Out
17	RXCa	Out
18	–	–
19	RTSb	In
20	DTRa	In
21	–	–
22	DSRb	Out
23	DTRb	In
24	E-CLKa	In
25	–	–

Additional interfaces are supported via interface adapter cables that convert the MT120xA Serial port's RS-530/DCE interface to the target Serial interface. *Table A-5* lists the supported Serial interfaces and the name of the associated Serial interface cable. The pin assignment of the Serial interface adapter cables are provided in the sections that follow.

Table A-5. Serial Interfaces supported by MT120xA

Serial Interface	Adaptor Cable	Interface Adapter Cable Pin Assignment
RS-530/DCE	none required	–
RS-530/DTE	MT1205	*Table A-6*
RS-530A/DCE	none required	–
RS-530A/DTE	MT1205	*Table A-6*
V.35/DCE	MT1203	*Table A-7*
V.35/DTE	MT1204	*Table A-8*
X.21/DCE	CBL-VM110/X21/DCE	*Table A-9*
X.21/DTE	CBL-VM110/X21/DTE	*Table A-10*

RS-530/DTE Interface Adapter Cable

The **MT1205** interface adapter cable converts the MT120xA Serial port into an RS-530/DTE Serial interface. The interface adapter cable terminates in a female D-25 connector. *Table A-6* lists the pin assignment at each end of the interface cable.

Table A-6. MT1205 Interface Cable Pin Assignment

Pin on DB-25 Connector (Vmux-110 Serial Port Side)	Pin on DB-25 Connector (User Equipment Side)
1	1
7	7
22	23
6	20
23	22
20	6
10	10
8	8
19	13
4	5
13	19
5	4
24	9
11	17
12	12
15	15
9	11
17	24
14	16
2	3
16	14
3	2

V.35/DCE Interface Adapter Cable

The **MT1203** interface adapter cable converts the MT120xA Serial port into a V.35/DCE Serial interface. The interface cable terminates in a male V.35 connector. *Table A-7* lists the pin assignment at each end of the interface cable.

Table A-7. MT1203 Interface Cable Pin Assignment

Pin on DB-25 Connector	Pin on V.35 Connector
1	A
3	R
16	T
2	P
14	S
24	U
11	W
17	V
9	X
15	Y
12	AA(a)
5	D
4	C
20	H
7	B
8	F
6	E

V.35/DTE Interface Adapter Cable

The **MT1204** interface adapter cable converts the MT120xA Serial port into a V.35/DTE Serial interface. The interface cable terminates in a male V.35 connector. *Table A-8* lists the pin assignment at each end of the interface cable.

Table A-8. MT1204 Interface Cable Pin Assignment

Pin on DB-25 Connector	Pin on V.35 Connector
1	A
3	P
16	S
2	R
14	T
24	V
11	X
17	U
9	W
15	Y
12	AA(a)
5	C
4	D
20	E
7	B
8	F
6	H

X.21/DCE Interface Adapter Cable

The CBL-VM110/X21/DCE interface adapter cable converts the MT120xA Serial port into an X.21/DCE Serial interface. The interface cable terminates in a female D-15 connector. *Table A-9* lists the pin assignment at each end of the interface cable.

Table A-9. X.21/DCE Interface Cable Pin Assignment

Pin on DB-25 Connector	Pin on D-15 Connector	Comments
1	1	
7	8	
4	3	Twisted
19	10	
8	5	Twisted
10	12	
15	6	Twisted
12	13	
2	2	Twisted
14	9	
3	4	Twisted
16	11	
24	7	Twisted
11	14	

X.21/DTE Interface Adapter Cable

The CBL-VM110/X21/DTE interface adapter cable converts the MT120xA Serial port into an X.21/DTE Serial interface. The interface cable terminates in a male D-15 connector. *Table A-10* lists the pin assignment at each end of the interface cable.

Table A-10. X.21/DTE Interface Cable Pin Assignment

Pin on DB-25 Connector	Pin on D-15 Connector	Comments
1	1	
7	8	
8	3	Twisted
10	10	
4	5	Twisted
19	12	
24	6	Twisted
11	13	
3	2	Twisted
16	9	
2	4	Twisted
14	11	

A.4 CONTROL Connector

The control terminal interface terminates in a V.24/RS-232 8-pin RJ-45 connector. Connection to an ASCII terminal is made via CBL-RJ45/D9/F/STR cable. *Table A-11* lists the cable pin assignment.

Table A-11. CBL-RJ45/D9/F/STR Cable Pin Assignment

RJ-45		DB-9	
Pin 4	GND	Pin 5	GND
Pin 5	RX (out)	Pin 2	RX
Pin 6	TX (in)	Pin 3	TX
Pin 7	CTS	Pin 8	CTS
Pin 8	RTS	Pin 7	RTS

Appendix B
Boot Manager and Software Downloading

B.1 Introduction

This chapter describes the MT120xA boot software and provides instructions for software downloading via XMODEM or TFTP applications.

The MT120xA software is stored in the flash memory in two sections: boot and file system. The boot sector holds a boot program that calls up the rest of the program from the file system.

The file system can hold two compressed copies of the MT120xA application software. One copy is referred to as **active partition** (usually partition 1), the other – as **backup partition** (usually partition 0). The active partition is decompressed and loaded into the MT120xA RAM upon power-up. The backup file is used whenever the active file is missing or corrupted.

B.2 Booting MT120xA

MT120xA boots up automatically. After power-up, no user intervention is required, except when the user wants to access the file system to modify or update the MT120xA application software.

Boot Sequence

The following is a description of the boot sequence. If the system is working normally, the entire process is completed within two minutes.

1. The boot program searches for the active partition in the file system. If the file exists, the program continues.

   If the file does not exist, the boot program searches for the backup file. If the backup is found, it is used instead of the active partition, and the boot process continues.

   If there is no backup file, you must download a file via the XMODEM protocol. The received file is saved as the active file in the file system.

2. Active and backup partitions are compressed and automatically decompressed into the RAM before execution begins.

3. After decompression, the MT120xA software starts to execute and the user can begin working.

Accessing the File System

The file system menu is an option that allows the user to perform basic file transfer operations. These operations are all optional.
When working with the File System menu, configure the ASCII terminal rate to 115.2 kbps.

➤ **To access the File System menu:**

- Press **<Enter>** several times immediately after powering MT120xA up.

    The File System menu is displayed (see *Figure B-1*).

```
RAD VMUX_110 Boot Version 1.40 (Jun 16 2002)

RAD Boot Manager Version 4.30 (Jun 16 2002)

0 – Exit Boot-Manager

1 – Show partitions information

2 – Set the active partition

3 – Erase a partition

4 – Download an application by XMODEM

5 – Select an application to run temporarily

6 – Erase all partitions

7 – Show basic hardware information

8 – System configuration

9 – Download an application by TFTP

Select:
```

Figure B-1. File System Menu

From the File System menu, you can:

- Show the partition information.

- Set the active partition.

- Erase a partition.

- Download an application via XMODEM application (see the *Downloading Application Files via XMODEM* section below).

- Select a partition for a temporary (one-time) use.

- Erase all partitions.

- Display the basic hardware information (RAM, ROM size etc)

- Assign IP values to MT120xA for the client TFTP application (see the *Downloading Application Files using the TFTP* section below).

- Download application software via client TFTP application (see the *Downloading Application Files using the TFTP* section below).

Notes
- *Partition information displayed via the File System menu, does not include the application software of the voice interface. Use the 'Show Partition Information' menu (**Main Menu** > **Configuration** > **System** > **Show Partition Information**) to display complete information on the MT120xA application software.*

- *You can also exchange the active and backup partitions via the 'Set the Active Application' menu (**Main Menu** > **Configuration** > **System** > **Set the Active Partition**).*

B.3 Downloading the Application and Configuration Software

New application software releases are distributed as ***.img** files, which are downloaded to MT120xA using the XMODEM protocol or client TFTP application from the File System menu of the boot software. Alternatively, you can download a new software release via TFTP protocol, when the MT120xA management software is already running.

The TFTP protocol can also be used for uploading configuration files which contain the MT120xA database to the management station. Administrators can use this capability to distribute verified configuration files to all other units which use the similar configuration.

Downloading Application Files via XMODEM

Downloading application files using the XMODEM protocol is performed from the File System menu of the boot software.

➤ **To download application file via XMODEM:**

1. Configure your ASCII terminal or terminal emulation utility running on your PC to the 115.2 kbps data rate.

2. Access the File System menu (see the *Accessing the File System* section above).

   The File System menu appears (see *Figure B-1*).

3. From the File System menu, select **Download an application by XMODEM**.

   MT120xA displays the following message:
   Select partition to download

4. Select the backup partition by typing its number, **1**.

   MT120xA requires confirmation of the partition deletion:
   The partition is full. Do you want to erase it (y/n)

5. Type **Y**.

   MT120xA responds with the following string:
   Please start the XMODEM download.

6. Send the ***.img** file to MT120xA using the XMODEM utility of you terminal application.

    Once the downloading is completed, MT120xA saves the new release as an active partition, the former active partition turns into backup, and the boot sequence continues normally.

    If a failure occurs during the download, the partially downloaded software is erased. In this case, only active software is left in the Flash memory.

Downloading Application Files using the TFTP Server

Downloading application files using the TFTP server application is performed from the File System menu of the boot software.

1. Access the File System menu (see the *Accessing the File System* section above).
    The File System menu appears (see *Figure B-1*).

2. From the File System menu, select **System configuration**.

3. Enter IP address of MT120xA, and press **<Enter>**.

4. Enter IP mask of MT120xA, and press **<Enter>**.

5. Enter default gateway of MT120xA, and press **<Enter>**.

6. Reset MT120xA.

7. Access the File System menu.

8. From the File System menu, select **Download an application by TFTP**.

9. Enter the application file name (**vmux110.img**), and press **<Enter>**.

10. Enter IP address of the TFTP server, and press **<Enter>**.

    MT120xA starts downloading application software.
    MT120xA automatically erases the backup partition (it takes about 25 seconds). Once the downloading is completed, MT120xA saves the new release as an active partition, the former active partition turns into backup.

11. Restart the unit.

Downloading Application Files using the TFTP Client

The application software is downloaded when MT120xA has completed the boot-up procedure and the management software is running.

➤ **To download application file via TFTP:**

1. Start a TFTP client application.

2. Configure the communication parameters as follows:
   - Connection timeout – more than 20 seconds to prevent an automatic disconnection during the backup partition deletion (about 15 seconds).

   - Block size – 512 bytes.

   - UDP port – 69.

3. Select a local ***.img** file to download.

4. Set remote file name to **vmux110.img**.

5. Enter the MT120xA IP address.

6. Start downloading.

   MT120xA automatically erases the backup partition (it takes about 15 seconds). Once the downloading is completed, MT120xA saves the new release as an active partition, the former active partition turns into backup.

7. Restart the unit.

Uploading/Downloading Configuration Files using the TFTP Client

You can upload a MT120xA configuration file (**cnfg110.dat**) to the management station for further distribution to all other units which use the similar configuration.

➤ **To upload application file via TFTP:**

1. Start a TFTP client application.

2. Set remote file name to **cnfg110.dat**.

3. Enter the MT120xA IP address.

4. Start uploading.

   When the uploading is completed, you can download the **cnfg110.dat** file to other MT120xA units. After the downloading, make sure to update the new database software by typing **@**.

Note   *The system and the main link values do not change when you download the new configuration and update the database.*

Appendix C

Configuration Menus

This appendix lists all menus of the MT120xA management software.

Figure C-1. MT120xA Menu Tree, Inventory and Configuration Menus

BLACK BOX
NETWORK SERVICES

From
Sheet 1

Sheet 2

3. Voice Configuration

1. Bundles Parameters
- 1. Display Bundles
- 2. Bundle Configuration
  - 1. Add Bundle
  - 2. Delete Bundle
  - 3. Edit Bundle
    - 1. Enter Bundle Number
    - 2. Connect
    - 3. Function
      - 1. TDMoIP
      - 2. AAL2oMPLS
    - 4. Max Bytes In Multiplexed Frame
    - 5. Destination IP
    - 6. Destination Bundle
    - 7. Packetizing Interval
    - 8. Connectivity Parameters
      - 1. Connectivity-packet rate
      - 2. Connectivity timeout cycles
    - 9. TOS Parameters
      - 1. Precedence
      - 2. Delay
      - 3. Throughput
      - 4. Reliability
    - 10. Voice Parameters
      - 1. Coder/Rate
      - 2. Volume
      - 3. Fax/Modem
      - 4. MF Parameter
      - 5. Custom Tone Detection
      - 6. Echo Canceller
      - 9. Coding
    - 11. VLAN Parameters
      - 1. Vlan Exist
      - 2. Vlan Id
      - 3. Vlan Priority
    - 12. Bundle Name

2. E1 Parameters
- 1. Connect
- 2. Frame
- 3. Interface Type
- 4. Restoration Time
- 5. Clock Source
- 6. Idle Code
- 7. Profile

2. T1 Parameters
- 1. Connect
- 2. Clock Mode
- 3. Frame
- 4. Interface Type
- 5. Line Code
- 6. Line Length
- 6. Rx Sensitivity
- 7. Tx Gain Level
- 8. Restoration Time
- 9. Idle Code
- 10. Signaling
- 11. Profile

3. Distribution of Framer Time Slots
- 1. Display Time Slots Configuration
- 2. Configure Time Slots
  - 1. Update from Time Slot
  - 2. To TimeSlot
  - 3. Type
  - 4. Bundle
  - 5. Destination Port
  - 6. Destination Time Slot ID
  - 7. Update Time Slot

Figure C-2. Voice Configuration Menus for E1 and T1 Voice Ports

From
Sheet 1

3. FXS Configuration

1. Bundles Parameters
- 1. Display Bundles
- 2. Bundle Configuration
  - 1. Add Bundle
  - 2. Delete Bundle
  - 3. Edit Bundle
    - 1. Enter Bundle Number
    - 2. Connect
    - 3. Function
      - 1. TDMoIP
      - 2. AAL2oMPLS
    - 4. Max Bytes In Multiplexed Frame
    - 5. Destination IP
    - 5. Destination Type
    - 6. Destination Bundle
    - 7. Packetizing Interval
    - 8. Connectivity Parameters
      - 1. Connectivity-packet rate
      - 2. Connectivity timeout cycles
    - 9. TOS Parameters
      - 1. Precedence
      - 2. Delay
      - 3. Throughput
      - 4. Reliability
    - 10. Voice Parameters
      - 1. Coder/Rate
      - 2. Fax/Modem
      - 3. MF Relay
      - 4. VAD
      - 5. Echo Canceller
    - 11. VLAN Parameters
      - 1. Vlan Exist
      - 2. Vlan Id
      - 3. Vlan Priority
    - 12. Bundle Name

2. Timeouts
- 1. Ring Timeout
- 2. On hook duration in Flash

3. Ringer Profile
- 1. Period #1: Ring
- 2. Period #1: Silence
- 3. Period #2: Ring
- 4. Period #2: Silence

4. Ports Distribution
- 1. Display Time Slots Configuration
- 2. Configure Time Slots
  - 1. Update from Time Slot
  - 2. To TimeSlot
  - 3. Type
  - 4. Bundle
  - 5. Destination Port ID
  - 6. Destination Time Slot ID
  - 7. Update Time Slot

5. Port Configuration
- 1. Port Number
- 2. Gains
  - 1. TX gain
  - 2. RX gain
- 3. FXS Signaling Parameters

Figure C-3. FXS Configuration Menus for FXS Voice Ports

Sheet 4

**From
Sheet 1**

4. User Administration
  1. Add New User
    1. Enter UserName
    2. Enter Access Level
      1. Monitor
      2. Technician
      3. Operator
      4. Administrator
    3. Enter Password
    4. Confirm Password and save
  2. Delete User
    1. Enter UserName (to delete)
    2. Confirm and delete
  3. Change User details
    1. Enter UserName (to change)
    2. Change password
    3. Confirm and save password
    4. Change access level
      1. Monitor
      2. Technician
      3. Operator
      4. Administrator
    5. Confirm and save access level
  4. Show all users

Figure C-4. User Administration Menus

From
Sheet 1

3. Monitoring

1. Status

1. Display

1. Display all Alarms

2. Display & Clear Alarms

3. Display Alarm status

2. Clear

1. Clear all Alarms

3. Display Sanity

1. Error

2. Warning

2. Statistics [E1/T1]

1. Bundles statistics

1. Bundle Number

2. Mode

1. Clear

2. Display

2. Voice statistics

1. Time Slot

2. Mode

1. Clear

2. Display

3. Voice Rx Signaling statistics

4. Voice Tx Signaling statistics

5. E1/T1 Hdlc statistics

1. Clear

2. Display

6. Serial Port statistics

1. Clear

2. Display

7. Ethernet statistics

1. Clear

2. Display

2. Statistics [FXS]

1. Bundles statistics

1. Bundle Number

2. Mode

1. Clear

2. Display

2. Voice statistics

1. Time Slot

2. Mode

1. Clear

2. Display

3. FXS Signaling statistics

4. Serial Port statistics

1. Clear

2. Display

5. Ethernet statistics

1. Clear

2. Display

From
Sheet 1

4. Diagnostics

1. Inject Tone test

1. Time Slot

2. Direction

3. Time Out

4. Activate

2. Loal Loop test

1. Activate

3. Remote Loop test

1. Activate

4. Display Active tests

5. Ping

1. IP Address

2. Number Of Pings
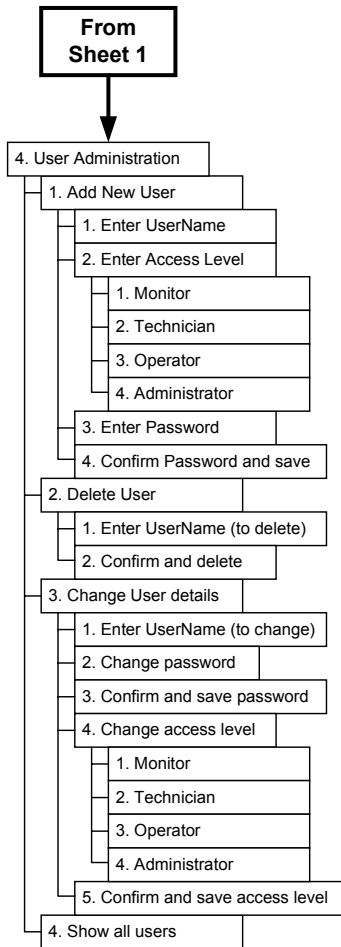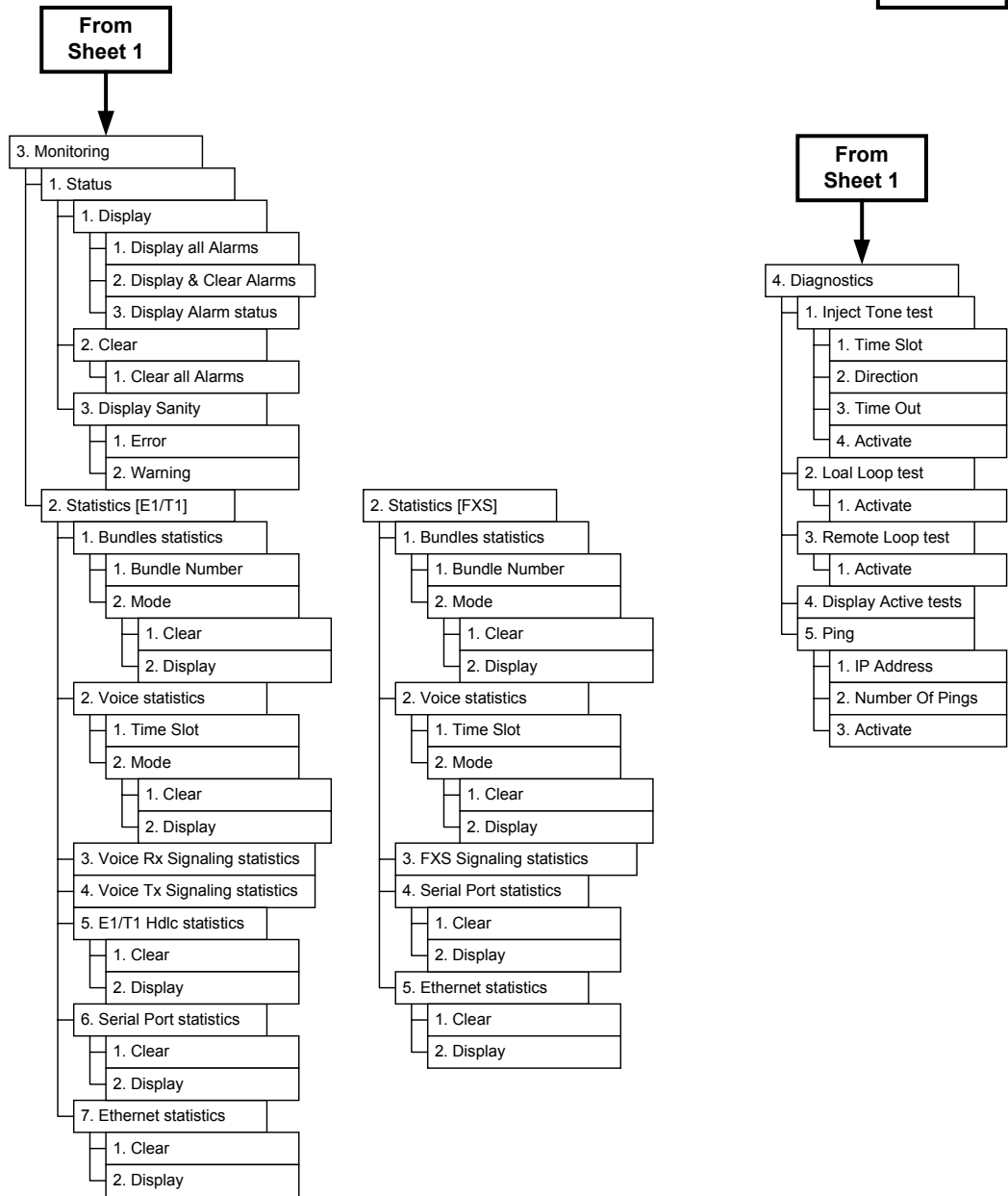
3. Activate

Figure C-5. Monitoring and Diagnostics Menus

SUPPLEMENT

## DC Power Supply Connection – Terminal Block Connector

Note: Ignore this supplement if the unit is AC-powered.

Certain DC-powered units are equipped with a plastic 3-pin *VDC-IN* power input connector, located on the unit rear panel. Different variations of the connector are shown in *Figure* 1. All are functionally identical.

Supplied with such units is a kit including a mating Terminal Block (TB) type connector plug for attaching to your power supply cable.

Connect the wires of your power supply cable to the TB plug, according to the voltage polarity and assembly instructions provided below.

Caution: Prepare all connections to the TB plug before inserting it into the unit's VDC-IN connector.
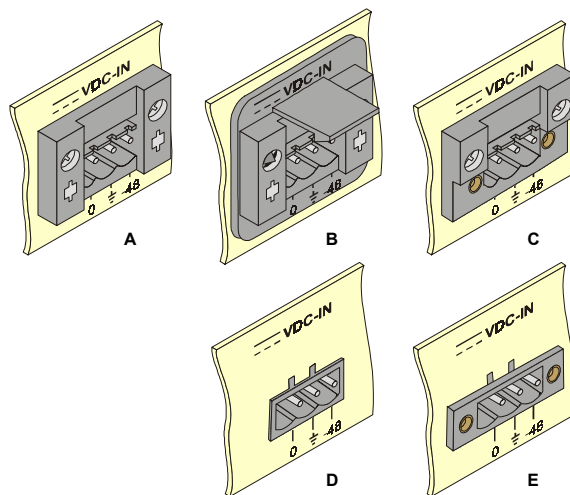

Figure 1. TB DC Input Connectors Types Appearing on Unit Panels

### Preparing and Connecting the Power Supply Cable with the TB Plug

Refer to *Figure 2* for assistance.

1. Strip the insulation of your power supply wires according to the dimensions shown.

2. Place each wire lead into the appropriate TB plug terminal according to the voltage polarity mapping shown in *Figure 4*. (If a terminal is not already open, loosen its screw). Afterwards, tighten close the three terminal screws.

3. Pull a nylon cable tie (supplied) around the power supply cable to secure it firmly to the TB plug grip, passing the tie through the holes on the grip.

4. Isolate the exposed terminal screws/wire leads using a plastic sleeve or insulating tape, to prevent the possibility of short-circuit.

5. Connect the assembled power supply cable to the unit by inserting the TB plug into the unit's *VDC-IN* connector until it snaps into place.
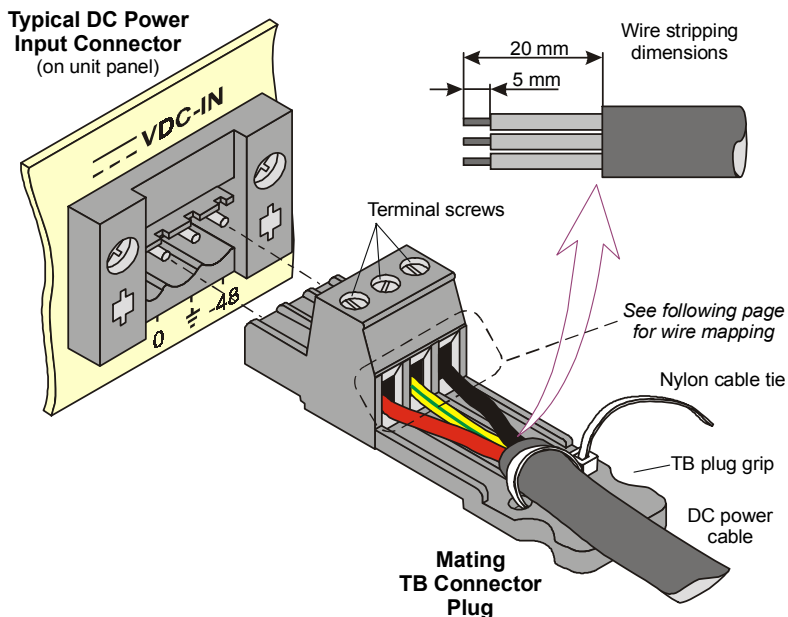
Figure 2. TB Plug Assembly

Note: Certain TB plugs are equipped with captive screws for securing the assembled cable's TB plug to the unit's *VDC-IN* connector (C and E types only). To secure the plug, tighten the two screws on the plug into the corresponding holes on the sides of the input connector as shown in *Figure 3*.
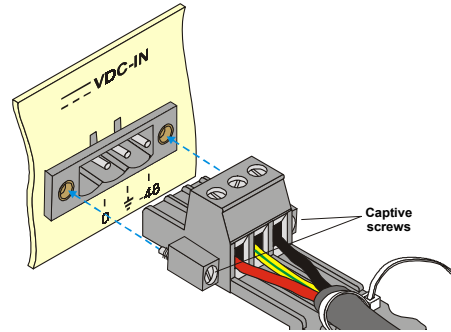

Figure 3. TB Plug with Captive Screws (optional)

DC Power Supply Wire Voltage Polarity

Refer to *Figure 4* for proper mapping of the power supply wire leads to the TB plug's three terminals.

⚠️ *Warning:*

- *Reversing the wire voltage polarity can cause damage to the unit!*
- *Always connect a ground (earth) wire to the TB plug's Chassis (frame) Ground terminal. Connecting the unit without a protective ground, or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can cause harm to the unit or to the equipment connected to it!*
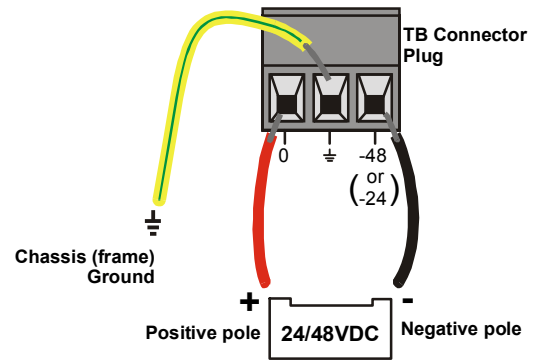
Figure 4. Power Supply Wire Mapping to TB Plug