IWay™

HOPPER
ISDN Terminal Adapter

Model MTA128ST

MultiTech Systems

Owner's Manual
P/N 82052304 Revision E (9/22/97)
Model MTA128ST

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Revision	Description
E	New or revised AT commands and S-Registers (!Z=, &F, &M, &J, &K, #X, >D, S50, S52, S53); edited troubleshooting procedures; edited profile tables in Appendix A; and minor editorial, technical, and format changes made.

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C E

EMC, Safety, and Terminal Directive Compliance

The CE mark is affixed to this Multi-Tech product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;

and

Council Directive 91/263/EEC of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity.

each amended by

Council Directive 93/68/EEC of 22 July 1993 on the harmonization of CE marking requirements.

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Chapter 1--Introduction

Welcome to the world of ISDN communications. You have acquired one of the finest ISDN terminal adapters (TAs) available today, model MTA128ST from Multi-Tech Systems. The MTA128ST is a desktop TA with an S/T port to connect it to the ISDN network, and an analog port to connect it to a telephone, modem, or fax machine. It ships with a software configuration utility for Windows® 95, and ConfigMenu, a built-in configuration utility for DOS and Windows 3.x operating systems. In addition, the MTA128ST accepts AT commands, which enables it to use the same communications software as an analog modem.

The MTA128ST is compatible with the popular EuroISDN switch protocol. It communicates using ISDN BRI (2B+D) service, which provides up to 128K bps data and voice communications. It automatically detects whether an incoming call is voice or data, and handles it appropriately.

This owner's manual will help you install, configure, and operate your TA.

1.2   Features

The MTA128ST communicates over public ISDN telephone lines. Its features include:

• Compatibility with EuroISDN (ETSI/DSS1/NET3), German DBP 1TR6, French VN4, and Japanese INS64 switch protocols.
• Compatibility with V.110, V.120, ML-PPP, SoftBond, and X.75 protocols.
• ISDN BRI (2B+D) and analog ports.
• RS232E/V.24 serial port.
• Serial port speeds to 230.4K bps.
• Support of PPP (Point to Point Protocol) for high speed ISDN connections.
• Tone detection to allow use of a standard telephone for ISDN line access (an ISDN telephone is not required).
• Automatic detection of incoming calls as voice or data.
• A Windows 95 software utility and a firmware utility for easy ISDN line con-figuration.
• AT command and S-register controls, and result codes.

- Ability to use the same communications software as analog modems.
- Flash memory for easy firmware upgrades.

1.3   Manual Organization

This manual is divided into six chapters and one appendix:

Chapter 1 – Introduction and Description
Chapter 1 summarizes the product's features, lists its technical specifications, and provides an overview of the manual's organization.

Chapter 2 – Installation
Chapter 2 describes how to connect the Multi-Tech MTA128ST to the computer, to power, to the ISDN BRI line, and to an optional analog device. It also describes the functions of the front panel LED indicators.

Chapter 3 – Configuration Utilities
Chapter 3 describes how to configure and operate the MTA128ST using the Windows 95 software configuration utility and the firmware ConfigMenu utility.

Chapter 4 – AT Commands, S-Registers, and Result Codes
Chapter 4 describes the AT commands, S-registers, and result codes used to control the MTA128ST through popular communications programs.

Chapter 5 – Troubleshooting
Chapter 5 provides tips and advice if you think your terminal adapter isn't working correctly.

Chapter 6 – Warranty, Service, and Technical Support
Chapter 6 provides the terms of your five-year warranty, and describes how to get your TA serviced at the factory, should that be necessary. It also describes how to upgrade your terminal adapter using the FlashPro utility, and how to get technical support and information by phone, the Multi-Tech BBS, and CompuServe/Internet forums.

Appendix A – Configuration Profiles
Appendix A describes how to use the Quick Setup Factory Profiles that are stored in the MTA128ST's firmware, and lists the contents of each profile.

1.4   Technical Specifications

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Trade Name	IWay Hopper™
Model Number	MTA128ST (International)
Network Interface	Four-wire S/T interface
Switch Compatibility	EuroISDN (ETSI/DSS1/NET3), DBP 1TR6, VN4, INS64, NI-1, 5ESS, DMS-100
B-Channel Protocols	V.110, V.120, X.75, ML-PPP, SoftBond
Voice Coding	PCM: A-Law (Europe); μ-Law (US)
LED Indicators	10 front panel LED indicators: Transmit Data, Receive Data, Line Status, B1 Active (i.e., "Bearer" Channel), B2 Active, Terminal Ready, Off Hook (AUX port), 128K bps, P1 Active (i.e.,Protocol), P2 Active
Data Rates	300, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 56K, 57.6K, 64K, 115.2 , 230.4 and 460.8K bps
Async Data Format	7 bit data + odd/even parity + 1 start/stop. 36 baud rate/parity settings via S-Register. Baud rates of 300-460.8K bps with even, space, mark, odd, or no parity.
Data Connections	Two ISDN B-channels One ISDN D-channel One analog port for connecting a standard telephone, modem, or fax machine
Command Interface	AT commands, S-Registers, Result Codes, Config-Menu firmware configuration utility, Windows 95 software configuration utility, Windows 95 Dial-Up Networking (DUN)

Introduction/Description

Connectors	*ISDN:* RJ-45 female receptacle, 4-wire S/T (accepts the connection cable to the network provider's NT1 device) *AUX:* RJ-11 female receptacle, 2-wire voice service *Serial Port:* female DB-25 RS232E/V.24
Serial Interfaces	ITU-T V.24, EIA/TIA RS232E
Switches	Two-position power switch
Power Requirements	Two-prong outlet-mounted transformer (included), 240 VAC 50/60 Hz
Dimensions	15.0 cm × 10.7 cm × 2.8 cm (L × W × D)
Environmental	Temperature range 0°–50° C; Humidity range 20–90% (non-condensing)
Power Consumption	4 watts
Weight	224 g (8 oz)
Warranty	5 years

Chapter 2--Introduction

This chapter describes how to connect your MTA128ST terminal adapter (TA) to your computer, to power, to your network terminator, and to an auxiliary analog device. It also describes how to interpret the LED indicators. Please follow these instructions carefully to avoid damage to your TA.
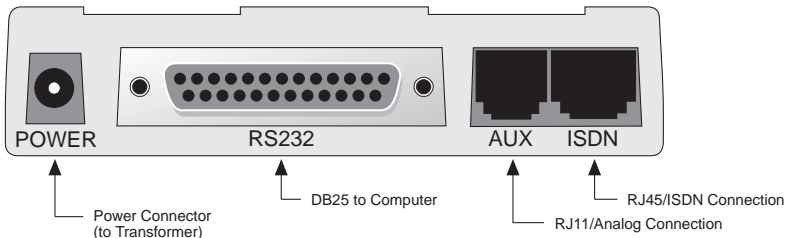
Figure 2-1. Connectors

2.2   Safety Warnings

⬜ Never install telephone wiring during a lightning storm.

⬜ Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.

⬜ Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

⬜ Use caution when installing or modifying telephone lines.

⬜ Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.

⬜ Do not use the telephone to report a gas leak in the vicinity of the leak.

⬜ Ports that connect to other apparatus are defined as SELV. To ensure conformity with EN 41003, ensure that these ports connect only to the same type of port on the other apparatus.

2.3   Connecting to Your Computer

1. Make sure your computer and any peripheral equipment connected to it are turned off. Failure to do so may damage both your TA and your computer.

2. Connect one end of a serial cable to the RS232/V.24 connector on your TA. Connect the other end of the cable to an RS232/V.24 serial port on your computer. Serial cables are readily available at most computer stores. The cable must have a male DB-25 connector on the end that connects to the MTA128ST. The connector on the other end may be a male DB-25 or a female DB-9, as required by your computer's serial port. Be sure to tighten the screws on your DB connectors.
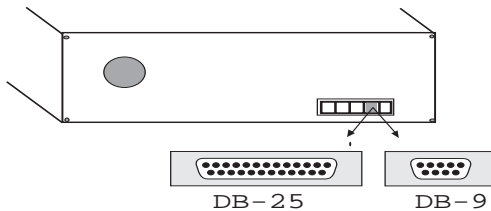
Figure 2-2. Serial Cable Connections

⊠**:** Cables attached to the computer must be shielded to reduce electrical interference.

2.4   Connecting to Power

1. Plug the power supply into the TA's POWER connector.

2. Plug the power supply into a live AC outlet.

3. Turn on the TA by sliding the power switch to ON.

4. Verify operation by observing the LED indicators on the front panel. The LEDs will flash in a self-test pattern, then the LS LED will remain on. (See the LED descriptions in section 2.7.) If your terminal adapter does not appear to be working, see Chapter 5 for troubleshooting help.

Caution: Use only the power supply shipped with your MTA128ST; any other power supply could damage the MTA128ST and void its warranty.

2.5   Configuring the MTA128ST

You must configure the MTA128ST before you connect it to your ISDN line. Before you begin, you should verify your switch type and TEI with your local ISDN provider, and have that information readily available. For detailed information on your configuration choices, see Chapter 3.

1. Disconnect the TA from your network terminator, if it is connected.

2. If you are running Windows 95 on your computer, turn on the computer and follow the directions on the label of the TA Configuration Utility disk. Skip steps 3 through 7, and proceed to the next section.

3. If you are using DOS, Windows 3.1, or another operating system, turn on your computer and start your data communications program.

4. Your TR (Terminal Ready) LED will light to indicate that your computer is ready to communicate with the TA. If you type **AT** in the communications program's terminal window and press ENTER, your TA should respond with *OK*. If it doesn't, see Chapter 5 for troubleshooting help.

5. To view your current configuration, type **AT!L** in the terminal window. You will see Switch Type (NET3) and Data Protocol (X.75) information. The fields for SPIDs (Service Provider Identification) and for Voice and Data Directory Numbers will be empty. Your TA ships with Auto-TEI (terminal endpoint identifier) as its default; consult your local ISDN provider to determine whether you need a fixed TEI.

6. To change one or more settings, type **AT@CONFIG**, press ENTER, and follow the ConfigMenu directions in Chapter 3. Alternately, use the AT command set described in Chapter 4.

7. Type **AT&W** and press ENTER to store your settings, then turn the TA off and on to reset it with the new configuration.

2.6   *Connecting to Your ISDN Network Terminator*

1. Before connecting your TA to your network terminator, you must configure the TA. See the preceding section.

2. If you need a longer cable than the one provided with your TA, you must select a cable that is wired straight through (pin 1 to pin 1; pin 2 to pin 2, etc.) with at least the middle four pins connected (pins 2, 3, 4, and 5).

3. Plug one end of the provided S/T cable into the ISDN jack on the TA, and the other end into the S/T jack on your network terminator.

⊠: The AUX jack and the ISDN jack are not interchangeable.

2.6.1   *Connecting to Analog Equipment*
You can connect an analog device, such as an analog telephone, modem, or fax machine to your TA. Simply plug the device's modular telephone cable into the RJ-11 AUX connector.

⊠: The AUX jack and the ISDN jack on the TA are not interchangeable.

2.7   LED Indicators

The MTA128ST has ten LED indicators (Figure 2-3) to report MTA128ST status and line activity.
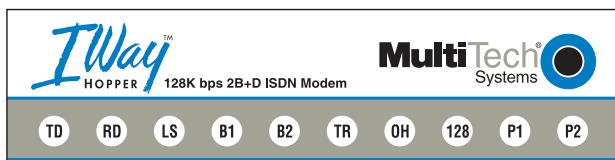
Figure 2-3. LED Indicators

Transmit Data. The TD LED flashes when data is being transmitted (on for a space, off for a mark).

Receive Data. The RD LED flashes when data is being received (on for a space, off for a mark).

Central Office Link.
On steady: Link with central office is established
(requires correct configuration of SPIDs)
Slow Blink: SPIDs have not been verified with central office
Fast Blink: One SPID has been verified with central office

B1

Bearer Channel 1.
On steady: Active data connection on the channel
Slow blink: Active analog connection on the channel
Fast blink: Ring (the connection is being made)

B2

Bearer Channel 2.
On steady: Active data connection on the channel
Slow blink: Active analog connection on the channel
Fast blink: Ring (the connection is being made)

TR

Terminal Ready. The TR LED lights to indicate that the computer is communicating with the MTA128ST, so the MTA128ST can answer an incoming call.

OH

Off Hook. The OH LED lights when analog equipment on the AUX port is active, or off-hook.

128

128K bps. The 128 LED lights to indicate that the B channels have been multiplexed into a single 128K bps communications link.

Data Protocol. The P1 LED lights in combination with the P2 and 128 LEDs to indicate which data protocol is in use (V.120, X.75, PPP, MLPPP), as shown in the following table.

Data Protocol. The P2 LED lights in combination with the P1 and 128 LEDs to indicate which data protocol is in use (V.120, X.75, PPP, MLPPP), as shown in the following table.

Data Protocol	128 LED	P1 LED	P2 LED
V.110	●	●	●
V.120	●	●	○
X.75 (1 Channel)	●	○	●
X.75 (2 Channel)	○	○	●
PPP (1Channel)	●	○	○
MLPPP (2 Channel)	○	○	○
● Off ○ On	**Note Protocol LEDs blink to indicate active Data Compression.**		

Figure 2-4.   Protocol Matrix

Chapter 3--Introduction

Before you connect the MTA128ST to your network terminator, you must configure the MTA128ST to match your ISDN service and the remote terminal adapter (TA). You can use any of four methods:

- *The ISDN TA Configuration Utility*
  This configuration utility is recommended for computers running Windows 95 and Windows NT versions 3.51 and 4.0 operating systems. Because it is a software-based utility, you can use it to create and store as many configurations as you wish.

- *ConfigMenu*
  This firmware-based configuration utility is recommended for computers running DOS or Windows 3.x. To run it, you must have a VT100/ANSI-compatible terminal or a data communication program that includes VT100/ANSI terminal emulation.

- *Windows 95 Dial-Up Networking*
  With Dial-Up Networking, you can gain access to shared information on another computer, even if your computer is not on a network. The computer you are dialing in to must be set up as a network server for you to use its shared resources. Windows 95 includes a remote-node client called Dial-Up Networking (DUN), and the MTA128ST can be configured to data communicate using this utility.

- *AT Commands*
  If you enjoy using AT commands, or wish to fine-tune the operation of your TA, you can configure your TA by using AT commands and S-registers, much as you would configure an analog modem. You must enter these commands in your data communication program's terminal mode. AT commands are described in detail in Chapter 4.

3.2   Before You Start

Whatever method you use to configure your TA, consider your choices beforehand and record your selections on the following pages; then refer to them during the configuration procedure.

Network Configuration

❏ *Network Switch Type* _____

Select the network switch type your ISDN service provider uses at its local central office. You can set the MTA128ST to NET3 (DSS1), 1TR6, VN4, INS64, NI-1, AT&T 5ESS, or DMS-100. If you do not know the switch type, you can get the information from your ISDN service provider. *AT command: !C0=*.

❏ *Data TEI* _____

The Data TEI is the TEI that is assigned to the data channel. You can select "Auto TEI," a fixed TEI, or "Disable." A TEI (terminal endpoint identifier) is a number used by the central office switch to uniquely identify each device that is connected to the network. When it uses dynamic TEI assignments (Auto TEI), the central office switch assigns a TEI each time the TA connects to the network. However, the ISDN service provider may assign a fixed TEI at subscription time, in which case you must configure the TA with the fixed TEI number. You can also disable the channel, which may be useful when multiple TAs are attached to a network terminator bus. *AT command: !D3=*.

❏ *Voice TEI* _____

The Voice TEI is the TEI assigned to the voice channel. You have the same choices as for the Voice TEI: "Auto TEI," a fixed TEI number, or "Disable." *AT command: *!D3=*.

❏ *SPIDs and DNs* _____

The TA must be configured with the Service Profile Identifier (SPID). The SPID is assigned by the local phone company and is for the specific BRI line to which the TA will be attached. The SPID field will be empty prior to configuration. *AT commands*: **AT!C6=** and **AT*!C6=**.

The Directory Number (DN) is the phone number another user would call to contact this TA once it is attached to the ISDN. *AT commands*: **AT!N1=** and **AT*!N1=**.

Configuration Utilities

Call Control Configuration

▤ *Persistent DTR Dialing* _____

A high DTR (Data Terminal Ready) signal on the RS232/V.24 serial port indicates that your computer or terminal is ready to communicate with your TA. DTR normally goes high when a communication program starts or is ready to dial. Persistent DTR dialing enables the TA to automatically redial the number stored in memory location 0 whenever DTR is high and the serial port does not have an active call. You may enable or disable this feature. *AT command: $D*.

▤ *Auto Answer Data Calls* _____   *Rings to Answer* _____

Select Auto Answer if you want your TA to automatically answer all incoming data calls (this option does not affect the analog port). The Rings to Answer number, in the range of 1 to 255, selects the number of rings the TA waits before answering an incoming call. The default is one ring. *AT command: S0=*.

▤ *Dialing Method* _____

Select either the "Enbloc" or the "Overlap" dialing method for use when establishing a data call. Your ISDN provider determines the dialing method. The en bloc method is used for most ISDN dialing; however, you can select the overlap method if you are working with a private network. *AT command: %A97=*.

▤ *Data Protocol* _____

The data protocol, also known as the B-channel protocol and the rate adaption protocol, is the "language" that is spoken over each 64K bps channel between two ISDN devices. The devices on both ends of the ISDN link must use identical protocols. *AT command: !Z=*.

V.110 Protocol
The V.110 protocol is used to connect slower, pre-ISDN communications devices to high-speed ISDN lines. It handles rates only up to 38400 bps, and is used mostly in Europe. The devices on both ends of the link must be set to identical rates.

V.120 Protocol
The V.120 protocol is similar to the V.110 protocol, but provides rates up to 57600 bps on each B channel.

X.75 Protocol
X.75 is a packet-switched network protocol for international use. The layer 2 portion of this protocol is commonly used as a rate adaption protocol.

MLPPP Protocol

The MLPPP (Multi-Link PPP) protocol provides rates up to 64K bps per channel. This protocol uses both B channels at once, providing an aggregate data transmission speed of 128K bps.

▤ *Dialing Numbers* _____

The MTA128ST can Dial telephone number *S*, where *S* may up 20 characters. *AT command:* ***DS=***dial string (phone number and dial modifiers).

▤ *Stored Numbers* _____

The MTA128ST can optionally store as many as ten phone numbers of up to 20 characters each. *AT command:* ***&Z=***.

▤ *Dialing Stored Numbers* _____

The MTA128ST can dial a number previously stored in directory number *n* by the ***&Zn=x*** command. *AT command:* ***e.g., DS=3.***

Com Port Settings

Com port settings control how your TA communicates with your computer through the RS232/V.24 serial port.

▤ *Baud Rate or Bit Rate* _____

Select the initial speed at which your TA communicates with your computer. For the V.110 data protocol, the rates must be identical on the local and remote TAs, and may not exceed 38400 bps. For all other data protocols (V.120, MLPPP, X.75, etc.) the default initial baud rate is 115200 bps. Typically, in command mode, the MTA128ST selects a serial port speed of 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400 bps, depending on how fast the AT commands are coming from the computer or terminal. The $SBn command sets the default serial speed used when the TA first powers-up. Using the ***%S*** command, you can disable automatic speed selection and lock the serial port speed to 460800 bps. See Serial Port Configuration Commands in section 4.1.4 for more information. *AT commands:* ***$SB or %S***.

✉: Your computer must have a high speed serial port with a 16550AFN UART or equivalent to use ISDN's high speeds.

Configuration Utilities

🗐 **Flow Control** _____

Select the method by which your TA and computer control the flow of data between them. Unless you know that your computer has special requirements, select the default RTS/CTS method. The other choices is XON/XOFF. *AT command:* **&E**.

🗐 **Data Bits, Parity, and Stop Bits** _____

These settings further control initial communications between the TA and computer. Unless you know that your computer has special requirements, use the default settings of 8 data bits, no parity checking, and 1 stop bit (8-N-1). The TA sets these parameters automatically the first time it receives an AT command from the computer. *AT commands:* **@P4=**, **@P3=**, **@P6=**.

🗐 **DTR Detect Time** _____

This option sets the time, in 0.1-second increments, that DTR must remain low before the TA disconnects. The default value is 0.5 second; however, you may set it anywhere within the range 0–255 (0.05–25.5 seconds). *AT command:* **S25=**.

🗐 **DCD Drop Time** _____

This option sets the time, in 0.1-second increments, that a carrier must be lost before the TA disconnects. The default value is 0.7 second; however, you may set it anywhere in the range 0–254 (0–25.4 seconds). Setting DCD Drop Time to 255 causes the TA not to disconnect with loss of carrier when DCD Control is set to Momentary Drop. *AT command:* **S10=**.

🗐 **DTR Control** _____

A high DTR (Data Terminal Ready) signal on the RS232/V.24 serial port indicates that your computer or terminal is ready to communicate with your TA. It normally goes high when a communication program starts or is ready to dial. "Normal" causes the TA to break the link and go into command mode when DTR drops. "Ignore" causes the TA to ignore the DTR signal. "Reset on DTR" causes the TA to reset when DTR drops for the time specified in register S25. *AT command:* **&D**.

🗐 **CTS Control** _____

A high CTS (Clear to Send) signal on the RS232/V.24 serial port indicates that the TA is ready to receive data. Normally, it follows the state of the RTS signal. Select "Normal" to make CTS act normally. Select "Always On" to force CTS high when the TA is offline; when the TA is online, CTS still provides flow

control. Select "Momentary Drop" to cause CTS to drop momentarily when the link is lost, then to go high again. *AT command: **&R***.

▤ **DSR Control** _____

A high DSR (Data Set Ready) signal on the RS232/V.24 serial port indicates that your TA is ready to communicate with your computer or terminal. Normally, it follows the state of the DTR signal. Select "Normal" to make DSR act normally. Select "Always On" to cause the TA to ignore the state of the DTR signal. Select "Momentary Drop" to cause DSR to drop momentarily when the link is lost, then to go high again. *AT command: **&S***.

▤ **DCD Control** _____

Normally, the DCD (Data Carrier Detect) signal on the RS232/V.24 serial port goes high when the TA receives a connect message from a remote TA, and drops when the link is lost. Select "Always On" to satisfy a requirement by some software packages for this state to be constantly present. Select "Normal" for normal operation. Select "Momentary Drop" to cause DCD to drop momentarily when the link is lost, then to go high again. The length of the drop is governed by register S10. *AT command: **&C***.

▤ **Synchronous Mode** _____

The MTA128ST is capable only of asynchronous communications, so leave the default setting at "Asynchronous." *AT command: **&M***.

3.3   ISDN TA Configuration Utility

The ISDN TA Configuration Utility is for use only with computers running Windows 95 and Windows NT versions 3.51 and 4.0 operating systems. Because it is a software utility, you can use it to create and store as many different configurations as you wish.

Windows 95 and Windows NT version 4.0 ISDN Software
Configuration Utility Installation Procedure

1. When installing from your floppy disk, insert the Setup disk (provided in your MTA128ST package) into drive A or B. If you are installing from a network location, connect to it. (Make sure to write down the drive letter because you may need to use it if you run Setup again.)

2. Click the *Start* button, click *Settings*, and then click *Control Panel*.

3. Double-click the *Add/Remove* Programs icon.

4. On the *Install/Uninstall* tab, click the *Install* button.

5. Follow the Setup instructions on the screen.

Windows NT version 3.51 ISDN Software Configuration
Utility Installation Procedure

1. When installing from your floppy disk, insert the Setup disk (provided in your MTA128ST package) into drive A or B. If you are installing from a network location, connect to it. (Make sure to write down the drive letter because you may need to use it if you run Setup again.)

2. In the *Program Manager*, click *Run* (File menu).

3. Type the location you're installing plus **setup.exe** (e.g., type **C:\setup.exe** or **G:\setup.exe**).

4. Click OK, and then follow the Setup instructions on the screen.
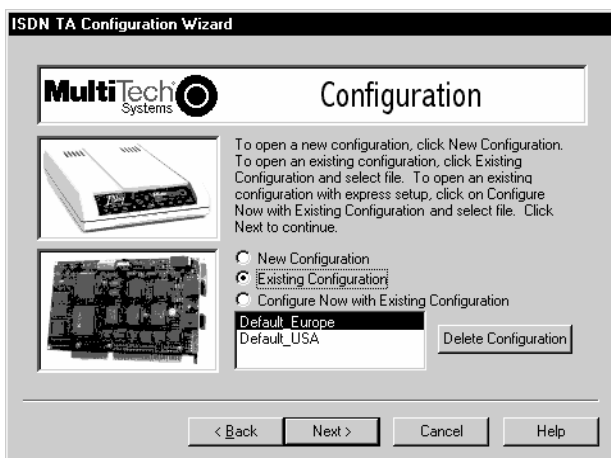
Figure 3-1. ISDN TA Configuration Utility

Configuration Utilities

How to Use the ISDN TA Configuration Utility

1. Before you start the ISDN TA Configuration Utility, disconnect the MTA128ST from the network terminator by removing the S/T cable from the MTA128ST's ISDN jack.

2. To start the utility, click the Start button, point to Programs, and click the ISDN TA Configuration Utility icon.

3. Read the message in the Welcome window, then click Next and follow the instructions in each window that appears in turn.

Note: In the Configuration window, select "Existing Configuration" and "Default_Europe"; if you select "Configure Now with Existing Configuration," you will not be able to change the configuration before it is loaded into the MTA128ST. Use "Configure Now with Existing Configuration" only to load a configuration that you know does not need to be changed.

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4. Refer to your notes in section 3.2, "Before You Start," as you configure the TA. If you have any questions about the choices in a window, click the window's Help button.

5. When you finish configuring the MTA128ST, quit the ISDN TA Configuration Utility.

6. Turn off the TA, reconnect it to the network terminator, and turn it on again.

3.4   ConfigMenu

Use the ConfigMenu configuration utility with computers running DOS or Windows 3.x. ConfigMenu is installed in the MTA128ST as part of its firmware.

Figure 3-2. ConfigMenu

How to Use ConfigMenu

1. Disconnect the MTA128ST from the network terminator by removing the S/T cable from the MTA128ST's ISDN jack.

2. Connect a VT100/ANSI-compatible terminal, or a computer that has a communications program that has VT100/ANSI terminal emulation, to the MTA128ST's serial port.

3. Turn on the MTA128ST. The MTA128ST automatically detects whether an ASCII or ANSI terminal is in use, and adjusts accordingly.

4. Start a data communication program and select the COM port the MTA128ST is connected to.

5. In the communications program's terminal window, type **AT@CONFIG** and press ENTER. ConfigMenu's Main Menu appears in the terminal window (see Figure 3-2).

6. To select a menu item, type its number and press ENTER. A submenu then appears from which you can make further selections. At the lowest level, you can change a configuration option by selecting a number or typing a value and pressing ENTER.

7. When you finish, quit the ConfigMenu.

8. Turn off the TA, reconnect it to the network terminator, and turn it on again.

9. Use the &W command to save your new configuration, and to select it to automatically load when the MTA128ST is turned on.

10. Turn off the TA, reconnect it to the network, and turn it on again.

ConfigMenu Menus

Network Configuration Menu

Select the Network Configuration menu to configure network parameters, such as the switch type, data and voice TEIs, and data and voice MSNs. When you have finished, select "Save Network Configuration" to save your work.

Call Control Configuration Menu

Select the Call Control Configuration menu to change how the MTA128ST originates and answers calls. Options include Auto Answer, Rings to Answer, Dialing Method, and Persistent DTR Dialing.

Data Protocols Menu

Select the Data Control menu to change the rate adaption protocol used by the MTA128ST.

Stored Numbers Menu

Select the Stored Numbers menu to store up to ten phone numbers with a maximum of 20 characters each. Stored number 0 is the phone number that will be dialed if persistent DTR dialing is enabled.

Port Control Configuration Menu

Select the Port Control Configuration menu to configure the MTA128ST's serial port, including how the MTA128ST responds to control signals on the RS232/V.24 interface.

Configuration Utilities

Help Menu
Select the Help menu for help on how to navigate through the MTA128ST menu system, or to see the MTA128ST's firmware version numbers.

3.5   Windows 95 Dial-Up Networking

Windows 95 includes a remote-node client called Dial-Up Networking (DUN). Follow the procedure below to install and operate this utility.

To install and run Dial-Up Networking

1. Insert the Windows 95 CD-ROM into the CD ROM drive.

2. In Windows 95, click the **Start** button, then select **Settings**, **Control Panel**, and **Add/Remove Programs**.

3. Click the **Windows Setup** tab.

4. Check **Communications** in the **Components** list.

5. Click the **Details** button.

6. Check **Dial-up Networking** in the **Components** list.

7. Click **OK**. Your client computer accesses the Windows 95 CD-ROM.

8. When the installation is complete, reboot the client computer.

9. Double-click the **My Computer** icon.

10. Double-click the **Dial-Up Networking** icon.

11. Double-click the **Make New Connection** icon. When the connection is made, your Windows 95 client is ready to dial up a remote access server.

For further information on Dial-Up Networking, see Windows 95 Help.

3.6   AT Commands

You can configure the MTA128ST by using AT commands, just as you would configure an analog modem. Use this method if you prefer to work with AT commands, or if you have a special requirement that is not addressed by either of the configuration utilities.
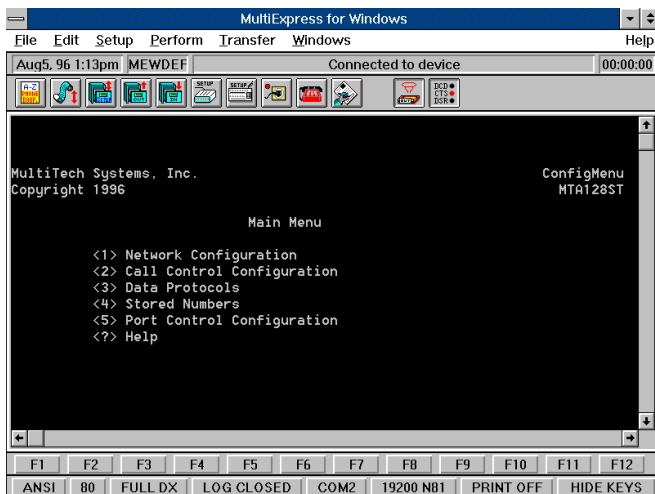
How to Use AT Commands to Configure the MTA128ST

1. Disconnect the MTA128ST from the network terminator by removing the S/T cable from the MTA128ST's ISDN jack.

2. Connect a VT100/ANSI-compatible terminal, or a computer that has a communications program that has VT100/ANSI terminal emulation, to the MTA128ST's serial port.

3. Turn on the MTA128ST. The MTA128ST automatically detects whether an ASCII or ANSI terminal is in use, and adjusts accordingly.

4. Start a data communication program and select the COM port the MTA128ST is connected to.

5. Refering to your notes in section 3.2, type the desired AT commands in the terminal window of the data communications program.

6. When you have finished making changes, use the *&W* command to save your new configuration, and to select it to automatically load when the MTA128ST is turned on.

7. Quit the data communications program.

6. Turn off the TA, reconnect it to the network terminator, and turn it on again.

For more information on the MTA128ST's AT commands, see Chapter 4.

Chapter 4--Introduction

One of the means by which you can communicate with and configure your MTA128ST is to use AT commands. AT commands are so-called because, with only a few exceptions, each command string must begin with the characters *AT*. Using AT commands, you can read and set parameters, and perform actions such as dialing.

4.1.1 Entering AT Commands

If your MTA128ST is connected to a computer terminal, you can send AT commands to the MTA128ST by typing them on the terminal keyboard. If your MTA128ST is connected to a computer, you can send AT commands to the MTA128ST by typing them in the terminal window of a data communications program such as HyperTerminal. You can also send some AT commands indirectly by configuring your data communications program.

Enter AT commands in the format *AT <command string> <CR>*. The characters *AT* cause the MTA128ST to interpret the following string as a command. The command string consists of one or more commands. The carriage return character, <CR>, sends the command string to the MTA128ST. If you are entering a command string in your communication program's terminal window, insert the carriage return character by pressing the ENTER key on your keyboard. If you are configuring a communications program, on the other hand, you typically must insert the carriage return character by adding "^M" to the end of the command string.

The MTA128ST has three modes of operation: offline command mode (the default state), online command mode, and data mode. The MTA128ST responds to AT commands only when it is in one of the command modes. After the MTA128ST establishes a connection and goes online in data mode, it interprets any further characters you enter as data, rather than as commands, and transmits them to the remote device.

When the MTA128ST is in data mode, you can switch it to online command mode by sending it an *escape sequence*. The MTA128ST responds to two types of escape sequences: in-band, in which the escape sequence is part of the data stream, and out-of-band, in which the escape sequence is outside the data stream. The in-band escape sequence is *+++AT<CR>*; the out-of-band escape sequence is *<Break >AT<CR>*. You can change the in-band escape character (+) by changing the

value in register **S2**. You can send the break signal in the out-of-band escape sequence only from software, *not* by pressing SHIFT+BREAK on your keyboard.

When it detects the escape sequence, the MTA128ST enters online command mode, in which it responds to commands while maintaining the connection with the remote device.

The MTA128ST's command buffer can store 80 characters, including spaces and other characters used in telephone numbers. If you mistype a command string, you can edit it by using the backspace or the delete key, but only before you press ENTER. As you type a command string, it appears on your monitor screen, letting you verify your input as you type it.

Table 4-1 lists the AT commands recognized by the MTA128ST. For an alphabetic list of AT commands, see "AT commands" in the index.

Table 4-1. AT Commands by Function

Command	Function	Section
Command Execution		**4.1.2**
AT	Attention code	
Return	Command execution	
+++AT<CR>	In-band escape code	
<BREAK>AT<CR>	Out-of-band escape code	
Switch Configuration		**4.1.3**
%A97	Dialing method	
!C0	Switch type	
!C6	Data SPID	
*!C6	Voice SPID	
!D3	SAPI-0 data TEI	
*!D3	SAPI-0 voice TEI	
!L	List DN, SPID, TEI, Data protocol and switch type	
>D=n	Embedded Protocol Analyzer	
!N1	Data directory number	
*!N1	Voice directory number	
!RXG	Receive gain	
!TXG	Transmit gain	
!Z=n	Rate adaptation protocol	

AT Commands/S-Registers

Serial Port Configuration   4.1.4
En	Command mode echo
L	List telephone numbers
L5	List current operating parameters
L6	List S-register values
Qn	Status displays
Sr=n	Set S-register
Sr?	Read S-register
Vn	Terse/verbose result codes
Xn	Connect messages
Zn	Restore parameters to current power-up profile
&Cn	DCD (Data Carrier Detect) control
&Dn	DTR (Data Terminal Ready) control
&En	Flow control
#Xn	Send Single Multiple Xoff Characters
&Fn	Load quick setup factory profile
&M	Asynchronous mode
&Rn	CTS (Clear To Send) control
&Sn	DSR (Data Set Ready) control
&Wn	Store active profile
&Zn=	Store telephone number
DSn	Dial Stored telephone number
$Dn	Persistent DTR dialing
$SBn	Serial port speed
&Kn	Data Compression
%En	Escape sequence options
%Sn	Serial port mode
@P3=	Parity
@P4=	Data bits
@P6=	Stop bits

Data Call Commands   4.1.5
A	Answer
D	Dial
&Jn	Channel Bundling
H	Hang up
In	Display product information
On	Return online
@Config	Start ConfigMenu

4.1.2   Command Implementation

Command: **AT**
Function: Attention Code
Values: n/a
Default: n/a

Description: This attention code precedes all command strings except the **A/**
command and escape codes.

Command: **RETURN**
Function: Command Execution
Default: n/a
Values: n/a

Description: Press the RETURN (ENTER) key to execute a command. The RE-
TURN key is frequently abbreviated <CR> in command examples.

Command: **+++AT<CR>**
Function: In-Band Escape Code
Values: ASCII
Default: + (43)

Description: The **+++AT** command causes the MTA128ST to enter command
mode, without disconnecting the call, when it is online with a remote device. The
default escape code is three + characters, followed by the letters *AT*, up to 80
command characters, and a RETURN (press ENTER). The MTA128ST escapes to
command mode, executes any commands in the string, and then remains in com-
mand mode. Use the **S2=** command to change the escape character.

Command: **<BREAK>AT<CR>**
Function: Out-of-Band Escape Code
Values: n/a
Default: n/a

Description: This command places the MTA128ST in command mode while
remaining online. Enter a break signal, the letters *AT,* up to 80 command charac-
ters, and a RETURN (press ENTER).

4.1.3   Switch Configuration Commands

Use the following commands to select your network switch type (e.g., EuroISDN Net3) and to specify other information required to make an ISDN connection.

Command: ***%A97=n***
Function: Dialing Method
Values: n = 0 or 1
Default: ***%A97=0*** (En bloc)

Description: Standardized ISDN signalling protocols, such as DSS1, DSS2, and SS7, support a "sending complete indication"; i.e., a signal that no more digits will follow. However, appending such a signal to a telephone number is often impractical; therefore, many private networks send the number of a called party by using a procedure called *overlap sending*, in which no sending complete indication is sent. Computer users, however, can automatically append the sending complete indication to the telephone number by choosing the *en bloc* method of sending, which results in faster call setup. Use the ***%A97=*** command to select between the two methods.

%A97=0   En bloc sending during call SETUP
%A97=1   Overlap sending during call SETUP

Command: ***!C0=n***
Function: Network Switch Type
Values: n = 0, 1, 2, 3, 4, 5, or 6
Default: ***!C0=2*** (Net3)

Description: Use the ***!C0=*** command to select one of the seven network switch types supported by the MTA128ST. The factory default setting is ***!C0=2*** (NET3).

!C0=0   AT&T 5ESS
!C0=1   Northern Telecom DMS-100
!C0=2   Euro-ISDN NET3
!C0=3   1TR6
!C0=4   INS64
!C0=5   US NI-1
!C0=6   VN4

Command: *!C6=n*
Function: Data SPID
Values: n = 0–20-character string
Default: null string

Description: Use the *!C6=* command to specify the data service profile identifier (SPID) that the ISDN service provider assigned at subscription time. The data SPID string can have up to 20 characters. *This command is not used if the switch type is set to NET3.*

✉: For DMS-100 switches, any ASCII character except the underline (_) character is valid. For NI-1 and AT&T switches, only the digits 0–9 are valid.

Command: **!C6=n*
Function: Voice SPID
Values: n = 0- to 20-character string
Default: null string

Description: Use the **!C6=* command to specify the voice service profile identifier (SPID) that the ISDN service provider assigned at subscription time. The voice SPID string can have up to 20 characters. *This command is not used if the switch type is set to NET3.*

✉: For DMS-100 switches, any ASCII character except the underline (_) character is valid. For NI-1 and AT&T switches, only the digits 0–9 are valid.

Command: *!D3=n*
Function: SAPI-0 Data TEI
Values: n = 0–63, 240 (auto), 241 (disable)
Default: *!D3=240* (Auto TEI)

Description: Use the *!D3=* command to set the terminal endpoint identifier (TEI) for the data channel. A TEI is a number used by the central office switch to uniquely identify each device that is connected to the network. When it uses dynamic TEI assignments (auto TEI), the central office switch assigns a TEI each time the TA connects to the network. However, the ISDN service provider may assign a fixed TEI at subscription time, in which case you must configure the TA with the fixed TEI

number. You can also use the *!D3=* command to disable the data channel, which may be useful when multiple TAs are attached to a network terminator bus.

!D3=0–63 Sets the TEI to a fixed value from 0 through 63
!D3=240 Sets the data channel for dynamic TEI negotiation
!D3=241 Disables TEI

Command:	*!D3=n*
Function:	SAPI-0 Voice TEI
Values:	n = 0–63, 240 (auto), 241 (disable)
Default:	*!D3=240* (Auto TEI)

Description: Use the *!D3=* command to set the MTA128ST's terminal endpoint identifier (TEI) for the voice channel. See the *!D3=* command description.

!D3=0–63 Sets the TEI to a fixed value from 0 through 63
!D3=240 Sets the voice channel for dynamic TEI negotiation (factory default)
!D3=241 Disables TEI

Command:	*!L*
Function:	Display Network Configuration
Values:	n/a
Default:	n/a

Description: Use the !L command to display the MTA128ST's current DN, SPID, TEI, Data protocol, and switch type.

!L   Displays the current network configuration

Command:	*>Dn*
Function:	Embedded Protocol Analyzer
Values:	0, 1, 2, 3, 4, 98 or 99
Default:	n/a

Description: The Embedded Protocol Analyzer records and analyzes various protocols on the B-channel, D-channel and DTE-DCE interface. The Embedded Protocol Analyzer is useful as a diagnostic tool, in that essential data messages are displayed. This offers the ability to observe interactive operations of the MTA128ST, Central Exchange, and remote communications equipment.

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>D0   Display B-channel traffic, decoded as V.120
>D1   Display D-channel traffic, decoding layers 2 and 3 (Q.921 and Q.931)
>D2   Display D-channel traffic, decoding layer 2 only (Q.921)
>D3   Display D-channel traffic, decoding layer 3 only (Q.931)
>D4   Display B-channel traffic, decoded as X.75
>D98   Disable Embedded Protocol Analyzer, buffered data unchanged
>D99   Enable Embedded Protocol Analyzer, clearing buffered data

Command: **!N1=n**
Function: Data Directory Number (DN)
Values: n = 24-character string
Default: null string
Description: The **!N1** command sets the directory number (DN) for the data channel. The directory number is a telephone number that is assigned to the MTA128ST at subscription time by the ISDN service provider. The DN is a string of up to 24 characters; valid characters are 0–9, the * character, and the # character.

!N1=n   Sets the DN for the data channel

Command: ***!N1=n**
Function: Voice Directory Number (DN)
Values: n = 24-character string
Default: null string

Description: This command sets the directory number (DN) for the voice channel. See the **!N1=** command description.

***!N1=n**   Sets the DN for the voice channel

AT Commands/S-Registers

Command: ***!RXGn***
Function: Receive Gain
Values: n = 0–10
Default: ***!RXG6*** (Medium volume)

Description: Use the ***!RXG*** command to control the speaker level of an analog telephone device connected to the AUX port. ***AT!RXG0*** selects the lowest level, ***AT!RXG10*** selects the highest level, and intermediate numbers select intermediate levels.

!RXG0   Lowest speaker volume
through
!RXG10   Highest speaker volume

Command: ***!TXGn***
Function: Transmit Gain
Values: n = 0–4
Default: ***!TXG0*** (No amplification)

Description: Use the ***!TXG*** command to amplify the microphone output of an analog telephone device connected to the AUX port. ***AT!TXG0*** selects no amplification, ***AT!TXG4*** selects the highest amplification, and intermediate numbers select intermediate amplification.

CAUTION: Do not adjust the gain unless absolutely necessary. It is very large at non-zero levels. Adjust only for special equipment that provides very low-level signals to the analog port.

!TXG0   No microphone amplification
through
!TXG4   Highest microphone amplification

AT Commands/S-Registers

Command: **!Z=n**
Function: Rate Adaption Protocol
Values: *n* = 5, 6, 9, or 12
Default: **!Z=6** (V.110)

Description: The **!Z** command selects the rate adaption protocol used to communicate with another terminal adapter. The local and remote terminal adapters must be set to the same protocol for communication to take place.

!Z=5 V.120 protocol
!Z=6 V.110 protocol
!Z=9 ML-PPP protocol
!Z=12 X.75 protocol

4.1.4 Serial Port Configuration Commands

Use the following commands to control the interaction between the MTA128ST and the computer that is connected to it.

Command: **En**
Function: Command Mode Echo
Values: n = 0 or 1
Default: **E1** (Echo on)

Description: Normally, when you enter commands on the keyboard, the MTA128ST echoes the characters back to the computer or terminal, where they are displayed on the monitor. Use the **E** command to turn this feature on and off.

E0 Echo off
E1 Echo on

Command: **L5** and **L6**
Function: List Active Profile
Values: n = 5 or 6
Default: none

Description: The **L5** command lists the current operating parameters of your MTA128ST. This information can be very useful when you are changing communications software or when you are changing default settings. **ATL5** lists the AT command parameters, and **ATL6** lists the values currently stored in the S-Registers. (See section 4.1.5 for more information on S-Registers).

AT Commands/S-Registers

Command: **Qn**
Function: Enable/Disable Result Codes
Values: n = 0, 1, or 2
Default: **Q0** (Enable result codes)

Description: The **Q** command controls whether the MTA128ST sends result codes to the computer. (Use the **V** command to select the format of the result codes.)

Q0   Enable result codes.
Q1   Disable result codes (quiet mode) for applications such as computer-controlled auto dialing.

Command: **Sr=n**
Function: Set S-Register
Values: r = 0, 2–5, 7, 10, 25, 32, 50-53; n varies
Default: None

Description: Use the **Sr=n** command to set the value of an S-register, where **r** is the number of the S-register, and **n** is the value you want to set. See "S-Registers" in this chapter for further information.

Command: **Sr?**
Function: Read S-Register
Values: r = 0, 2–5, 7, 10, 25, 32, 50-53; n varies
Default: None

Description: Use the **Sr?** command to read the value of an S-register, where **r** is the number of the S-register. See "S-Registers" in this chapter for further information.

AT Commands/S-Registers

Command: ***Vn***
Function: Terse/Verbose Result Codes
Values: n = 0 or 1
Default: ***V1*** (Verbose)

Description: Use the ***V*** command to control whether the MTA128ST's result codes are displayed as digits (terse) or as words (verbose). (Use the ***Q*** command to enable or disable the display of result codes.)

V0   Enable terse result codes.
V1   Enable verbose result codes.

Command: ***Xn***
Function: Connect Messages
Values: n = 0, 1, or 2
Default: ***X2*** (Enable all messages)

Description: Use the ***X*** command to select which result code messages the MTA128ST sends to the computer.

X0   Enable the messages *OK, CONNECT, RING, NO CARRIER,* and *ERROR* (terse result codes *0–4*).
X1   Enable all messages except *BUSY* (terse result codes *0–5, 10–14, 17–19, 28,* and *32*). If a call is placed to a busy line, the message *NO CARRIER* is displayed.
X2   Enable all messages (terse result codes *0–5, 7, 10–14, 17–19, 28,* and *32*).

Command: ***Zn***
Function: Reset to Stored Profile
Values: none
Default: none

Description: The ***Z*** command resets the MTA128ST to its current power-up profile and clears the command buffer. The result is the same as turning the modem off and on. When you type **ATZ**, the state of the ***&W*** command determines where the default values originate. ***&W0*** defaults come from the customized configuration in NVRAM, and ***&W1*** defaults come from the factory default configuration in ROM. Because ***Z*** clears the command buffer, it must be the last command in a command string; normally it is issued by itself: **ATZ**.

AT Commands/S-Registers

Note that whereas the **&F0** reset command always restores the factory default profile, the **Z** reset command restores either the factory default or the stored profile, depending on how the **&W** command is set.

Command:	**&Cn**
Function:	DCD Control
Values:	n = 0, 1, or 2
Default:	**&C1** (DCD normal)

Description: The **&C** command controls the behavior of the DCD (Data Carrier Detect) signal (pin 8 on the RS232E/V.24 interface). Normally, DCD goes high when the MTA128ST establishes a connection, and drops when the connection is lost. However, you can also force DCD to remain high at all times, or to remain high except for a brief drop following a disconnect.

&C0	DCD is forced high at all times.
&C1	DCD goes from low to high when the MTA128ST establishes a connection (DCD normal).
&C2	DCD drops briefly following a disconnect, then goes high again. Register S10 defines how long the DCD signal remains low after a disconnect.

Command:	**&Dn**
Function:	DTR Control
Values:	n = 0, 1, 2, or 3
Default:	**&D1** (Exits Data Mode and re-enters AT command mode)

Description: The **&D** command controls how the MTA128ST responds to the DTR (Data Terminal Ready) signal on pin 20 of the RS232E/V.24 interface. A high DTR signal tells the MTA128ST that the connected computer is ready to communicate.

&D0	The MTA128ST ignores the DTR signal.
&D1	When DTR goes low, the MTA128ST exits data mode and re-enters AT command mode.
&D2	If DTR goes low when the MTA128ST is online, the MTA128ST hangs up, returns to command mode, and disables autoanswer. If the MTA128ST is offline, it neither answers nor dials while DTR is low.

&D3   When DTR goes low, the MTA128ST resets the data port and disables autoanswer. If DTR goes low when the MTA128ST is online, the MTA128ST hangs up, resets the active configuration to the stored configuration, and disables autoanswer.

✉: If the user wishes to accept calls while DTR is low, the MTA128ST must be configured to ignore DTR. This is accomplished by entering AT&D0<cr>. With this configuration, the MTA128ST is able to accept calls while DTR is low. If this configuration setting is not made, the TA rejects incoming calls until DTR is high while the calls comes in.

Command: ***&En***
Function: Flow Control
Values: n = 3–7, 12, 13
Default: ***&E4, &E7, &E13***

Description: The ***&E*** command selects the method by which the MTA128ST controls the flow of data to and from the computer, to prevent either device from accepting data faster than it can handle. The MTA128ST provides flow control in both directions. When the MTA128ST halts data flow, it's called *flow control*; when the computer halts data flow, it's called *pacing*.

&E3   Disable flow control by the MTA128ST.

&E4   Hardware flow control. ***&E4*** causes the MTA128ST to use the CTS signal on pin 5 of the RS232E/V.24 interface to regulate flow control. When CTS goes low, data flow from the computer is suspended until CTS goes high again. This method works with pacing, which uses the RTS signal on pin 4. Hardware flow control cannot be enabled unless an error correction protocol is selected.

&E5   XON/XOFF flow control. This is an in-band method, in which the XON and XOFF characters (^Q and ^S respectively) are inserted into the data stream, rather than using separate control lines. When an XOFF character is detected, the data stream is suspended until an XON character is detected. The drawback to this method is that some files may contain these characters, causing the file transfer to be suspended indefinitely.

&E6   When XON/XOFF pacing is active, the MTA128ST responds to and discards the XON/XOFF characters from the computer.

&E7   When XON/XOFF pacing is active, the MTA128ST responds to the XON/XOFF characters and passes them through the communications link to the remote device, thereby pacing the remote terminal adapter as well.

&E12   Disables pacing

&E13   Enables pacing.

Command: ***#Xn***
Function: Send Single/Multiple Xoff Characters
Values: n = 0 or 1
Default: ***#X0***
Description: The #X command allows the MTA128ST to send either a single or multiple Xoff characters to exert flow control to the terminal. The #X0 command (factory default setting) causes one Xoff to be sent until the MTA128ST's buffer reaches the Xon level. The #X1 command causes an Xoff to be sent for every character received after the MTA128ST reaches its buffer full level.

#X0   One Xoff character sent until the buffer reaches the Xon level (default)

#X1   Multiple Xoff characters sent for every character received after buffer reaches the full level.

Command: ***&Fn***
Function: Load Quick Setup Profile
Values: n = 0–4
Default: ***&F0***

Description: For quick setup, the MTA128ST includes five Quick Setup Profiles, each of which contains configuration parameters for a specific type of port opera-tion. You can load a Quick Setup Profile into active memory by using the com-mand ***&Fn,*** in which *n* is the number of the profile you wish to load. If you wish, you can then customize the profile and store it, using the ***&W*** command, so that it loads automatically on power-up or reset. These profiles are stored in permanent memory and are not user-configurable. (See Appendix A.)

&F0	Profile 0 — Modem-like operation (default)
&F1	Profile 1 — V.110 async operation
&F2	Profile 2 — V.120 async operation
&F3	Profile 3 — X.75 async operation
&F4	Profile 4 — MLPPP async operation

Command: *&Mn*
Function: Asynchronous Mode
Values: n = 0 or 1
Default: *&M0* (Asynchronous)

Description: Use the *&Mn* command to set the MTA128ST for synchronous or asynchronous transmission. Note that synchronous transmission is not presently supported, and this command is included for future use only.

&M0   Asynchronous mode transmission.
&M1   Synchronous mode transmission—not presently supported.

Command: *&Rn*
Function: CTS Control
Values: n = 0, 1, or 2
Default: *&R1* (CTS forced high)

Description: The *&Rn* command lets you control the state of the CTS (Clear to Send) signal on the RS232E/V.24 interface. Normally the CTS signal follows the state of the RTS signal when the MTA128ST is online.

&R0   CTS acts normally; that is, it follows RTS.
&R1   CTS is forced high, but still provides online flow control.
&R2   CTS is forced high, but it drops on disconnect for the period of time set by S10. CTS still provides flow control when the MTA128ST is online.

Command:	**&Sn**
Function:	DSR Control
Values:	n = 0, 1, or 2
Default:	**&S1** (DSR normal)

Description: The **&Sn** command controls the state of the DSR (Data Set Ready) signal on the RS232E/V.24 interface. A high DSR signal indicates to the computer that the MTA128ST is ready to transmit data.

&S0   DSR is always high.

&S1   DSR acts normally; that is, it follows the state of the CD signal, which goes high when the MTA128ST detects a carrier signal, and goes low when the carrier signal is lost.

&S2   DSR is always high, except on disconnect, when it drops for the period of time set by S10 and then goes high again.

Command:	**&Wn**
Function:	Store Active Profile
Values:	n = 0 or 1
Default:	**&W1** (Use factory default profile)

Description: The **&W** command stores your active profile, or configuration, in memory, so you won't lose your custom settings when you turn off the MTA128ST or reset it.

&W0   Stores all current AT command and S-register values in nonvolatile random access memory (NVRAM) and configures the MTA128ST so that it reads your custom settings in NVRAM when the modem is turned on or when it is reset with the **Z** command. (The **&F** reset command continues to read the factory default settings in ROM.)

&W1   Erases your custom settings in NVRAM the next time the MTA128ST is turned off or reset, causing the MTA128ST to read the factory default settings in ROM whenever it is turned on or reset.

AT Commands/S-Registers

Command: ***&Zn=x***
Function: Store Telephone Number
Values: n = 0–9; x = dial string
Default: n/a

Description: The ***&Z=*** command lets you store a telephone number in a memory register for faster dialing. To store a number, type ***&Z***, the register number (0–9) where you want to store the number, the **=** character, and the dialing string that you want stored; then press ENTER. The dialing string can have up to 80 characters. To read a stored number, type **AT&Zn?** (e.g., **AT&Z4?**) where *n* is the number of the register you want to read. To display a list of all numbers stored in memory, type **ATL** and press RETURN:

0	*14082345678*
1	*16125551212*
2	*14089876543*
3	
4	*6313551*
5	
6	*4258513*
7	
8	*16126313550*
9	*12138880123*

Command: ***DS=n***
Function: Dialing a Stored Telephone Number
Values: n = 0–9
Default: n/a

Description: To dial a stored telephone number, type ***&DS=n*** in terminal mode, where *n* is the location of the number you wish to dial. For example, type **ATDS=3 <CR>** dials a telephone stored in memory register 3 location.

AT Commands/S-Registers

Command: **$Dn**
Function: Persistent DTR Dialing
Values: n = 0, or 1
Default: **$D0** (Disabled)

Description: The **$Dn** command enables or disables persistent DTR dialing (PDD). PDD causes the terminal adapter to automatically and continuously redial stored telephone number 0 when the port has no active calls and DTR is high.

$D0   Disables PDD.
$D1   Enables PDD.

Command: **$SBn**
Function: Serial Port Speed
Values: n = 3, 12, 24, 48, 96, 192, 384, 576, 1152, 2304, or 4608
Default: **$SB1152**
Description: In command mode, the MTA128ST detects the computer's speed and parity, and matches it, except when the **%S1** command is active. The **$SBn** command sets the default serial speed to be used when the TA first powers up. If the TA powers up with $SB460800 set, the TA powers up in %S1 mode (locked at 460.8K bps). If $SBn is set to any other value at power-up, the TA powers up in %S0 mode (AT auto-detect-- maximum auto-detect speed is 230.4K bps). Example: To configure the TA to operate at 460.8K on the serial port at power-up, use the following initialization string: AT $SB460800 &W0<cr> For clarity, you can add "00" to each command. For example, **$SB576** and **$SB57600** both set the initial serial port speed to 57,600 bps.

$SB3	Set serial port speed to 300 bps
$SB12	Set serial port speed to 1200 bps
$SB24	Set serial port speed to 2400 bps
$SB48	Set serial port speed to 4800 bps
$SB96	Set serial port speed to 9600 bps
$SB192	Set serial port speed to 19200 bps
$SB384	Set serial port speed to 38400 bps
$SB576	Set serial port speed to 57600 bps
$SB1152	Set serial port speed to 115200 bps
$SB2304	Set serial port speed to 230400 bps
$SB4608	Set serial port speed to 460800 bps

AT Commands/S-Registers

Command: **%Sn**
Function: Serial Port Mode
Values: n = 0 or 1
Default: **%S0**

Description: Typically, in command mode the MTA128ST selects a serial port speed of 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400 bps, depending on how fast the AT commands are coming from the computer or terminal. Using the **%S** command, you can disable automatic speed selection and lock the serial port speed to 460800 bps. The serial port speed remains locked until the MTA128ST receives a **%S0** command. Another method for changing from %S1 to %S0 mode is to send a break at 460.8K. (This method is for cases where the TA was configured on a terminal capable of 460.8K and later moved to a terminal that cannot operate at 460.8K. A break sent at any speed slower than 460.8K will be interpreted as a break at 460.8K, as will some characters sent at slower speeds.)

%S0   Automatic speed mode (300-230,400 bps)
%S1   460800 bps mode

Command: **&Kn**
Function: Data Compression Mode
Values: n = 0 or 1
Default: **&K0**

Description: Enter AT&K1<CR> to enable data compression mode. Since the Hi/fn™ algorithm needs an error correction channel between the compression and decompression processes, it can only work with error correction competence. V.120 is such a protocol that can be used together with Hi/fn data compression. Enter AT&K0<CR> to disable Data Compression mode.

&K0   Disable Data Compression mode
&K1   Enable Data Compression mode

✉ Data compression is not active in X.75 and ML-PPP protocols, but will be in later firmware releases. The compression ratio for Hi/fn is typically 4:1. If you presently have a Universal Asynchronous Receiver/Transmitter (UART) that is compromising data through-puts, we recommend that it be replaced with a special I/O card.

AT Commands/S-Registers

Command: **%En**
Function: Escape Sequence Options
Values: n = 0–5
Default: **%E1** and **%E4**

Description: By default, the modem responds only to the +++ escape method. However, you can use the **%E** command to set the modem to respond only to the <BREAK> method, to respond to either the +++ or the <BREAK> method, or to ignore both methods and not escape.

%E0	Modem won't escape.
%E1	+++ escape method.
%E2	<BREAK> escape method.
%E3	Both +++ and <BREAK> escape methods.
%E4	Disable *OK* response to +++.
%E5	Enable *OK* response to +++.
%E1 %E5	Enable +++ method and *OK* response to +++.
%E3 %E5	Enable +++ or <BREAK> method and *OK* response to +++

Command: **@P3=n**
Function: Parity at Power-Up
Values: n = 0–4
Default: **@P3=4** (None)

Description: Use this command only to set the type of parity the MTA128ST uses when it is turned on. Once the MTA128ST receives an AT command from the computer, it automatically adjusts to the parity the computer is using.

@P3=0	Odd
@P3=1	Even
@P3=2	Mark
@P3=3	Space
@P3=4	None

Command: **@P4=n**
Function: Data Bits
Values: n = 7 or 8
Default: **@P4=8** (8 data bits)

Description: Use this command only to set the number of data bits the MTA128ST uses when it is turned on. Once the MTA128ST receives an AT command from the computer, it automatically adjusts to the number of data bits the computer is using.

@P4=7   7 data bits
@P4=8   8 data bits

Command: **@P6=n**
Function: Stop Bits
Values: n = 1 or 2
Default: **@P6=1** (1 stop bit)

Description: Use this command only to set the number of stop bits the MTA128ST uses when it is turned on. Once the MTA128ST receives an AT command from the computer, it automatically adjusts to the number of stop bits the computer is using.

@P6=1   1 stop bit
@P6=2   2 stop bits

4.1.5   Data Call Commands

Use these commands to make or configure data calls.

Command: **A**
Function: Answer Call
Values: none
Default: none

Description: The **A** command forces the MTA128ST to answer an incoming call. To cause the MTA128ST to autoanswer, set register **S0** to a value higher than 0.

AT Commands/S-Registers

Command: **D**
Function: Dial
Values: none
Default: none

Description: The **D** command causes the MTA128ST to dial a telephone number (e.g., **ATD785-3500 <CR>**).

Command: **Hn**
Function: Hang Up
Values: n = 0 or 1
Default: **H0**

Description: The **H** command forces the MTA128ST to go off-hook (to take control of the telephone line) or to go on-hook (hang up). Since the MTA128ST goes off-hook automatically when it dials, the **H** command is normally used only to hang up. To hang up, you must first escape to command mode (**+++AT <CR>**), then type **ATH** (or **ATH0**) **<CR>**. You can also include the hang up command in the escape sequence: **+++ATH <CR>**.

H0   Go on-hook (hang up).
H1   Go off-hook.

Command: **In**
Function: Display Product Information
Values: *n* = 0, 1, and 2
Default: none

Description: The **I** command displays the following MTA128ST product information.

I0   Product ID (e.g., "247")
I1   Firmware version number (e.g., "1.00")
I2   MTS internal use

AT Commands/S-Registers

Command: *O*
Function: Return Online
Values: none
Default: none

Description: The *O* command returns the MTA128ST to online mode from the online command mode. When the MTA128ST makes a data connection, it enters online data mode. The MTA128ST typically remains in this mode until it receives an escape sequence or until the call is ended. When it detects an escape sequence, the MTA128ST enters online command mode, in which it can accept AT commands while retaining the online connection. To return the MTA128ST to online mode from the online command mode, enter the command *ATO* and press ENTER.

Command: *@CONFIG*
Function: Start ConfigMenu
Values: none
Default: none

Description: The *@CONFIG* command starts the MTA128ST's internal configuration utility, which you can then use to customize the MTA128ST's configuration for your particular application. You must enter the command while in your communication program's terminal mode.

4.2 *S-Registers*

S-Registers are sections of memory in which values are stored that affect how the MTA128ST operates. S-Registers are so-called because each has a name that begins with the character *S*. Use the *S* command to assign a value to or to read the current value of an S-register. To assign a value to an S-register, use the command *Sr=n*, in which *r* is the register number, and *n* is the value you want to assign to the register, e.g., *S7=45*. To read an S-register value, use the command *Sr?*, in which *r* is the register number, e.g., *ATS7?*.

Table 4-2. S-Register Summary

S-Register	Function
S0	Rings Until Answer
S1	Ring Count
S2	Escape Character
S3	Carriage Return Character
S4	Line Feed Character
S5	Backspace Character
S7	Wait for Connection (Abort Timer)
S10	DCD Drop Time
S25	DTR Drop Time
S32	Escape Sequence Timeout
S50	Caller Line ID ("CLI")
S52	Auto-Protocol Detection
S53	Maximum Frame Size (X.75)

AT Commands/S-Registers

S-Register: **S0**
Function: Number of Rings Until Answer
Unit: 1 ring
Range: 0–255
Default: 1

Description: **S0** sets the number of rings the MTA128ST waits for before it answers and begins its connect sequence. **S0=0** turns off the ability to automatically answer a call. **S0=1** causes the MTA128ST to automatically answer after 1 ring. Note that if the **S0** value is set too high, the calling device may time out before the MTA128ST answers the call. For autoanswer, **S0** must have a non-zero value, DTR must be high (**&D** command), and the MTA128ST must be offline.

S-Register: **S1**
Function: Ring Count
Unit: 1 ring
Range: 0–255
Default: 0

Description: **S1** counts the number of rings that have occurred, up to a maximum of 255. It is a read-only register and is seldom, if ever, used in typical operation. If you set **S1** to a value other than its default value of zero, or if the value is increasing with rings, this new value remains stored in **S1** for eight seconds after the last ring is counted, after which time the value reverts to zero.

S-Register: **S2**
Function: Escape Character
Unit: Decimal ASCII code
Range: 0–127
Default: 43 (+)

Description: **S2** specifies the character used by the MTA128ST to escape from data mode and return to command mode.

S-Register: **S3**
Function: Carriage Return Character
Unit: Decimal ASCII code
Range: 0–127
Default: 13 (^M)

Description: **S3** specifies the character used by the MTA128ST to indicate the end of a command line.

S-Register: **S4**
Function: Line Feed Character
Unit: Decimal ASCII code
Range: 0–127
Default: 10 (^J)

Description: **S4** specifies the character used by the MTA128ST to indicate the end of a status message.

S-Register: **S5**
Function: Backspace Character
Unit: Decimal ASCII code
Range: 0–32, 127
Default: 8 (^H)

Description: **S5** specifies the character used by the MTA128ST to delete the previous character in the command line.

S-Register: **S7**
Function: Wait for Connection (Abort Timer)
Unit: 1 second
Range: 0–255
Default: 45

Description: **S7** sets the Abort Timer delay time, which is the length of time the MTA128ST waits for a connection after dialing. If no connection is established during the specified time, the MTA128ST ends the call.

AT Commands/S-Registers

S-Register: **S10**
Function: DCD Drop Time
Unit: 50 ms
Range: 0–254, 255
Default: 20

Description: **S10** sets the time after a carrier signal is lost before the MTA128ST disconnects. (The **&C2** command must be in effect.) The default setting is one second. Maximum delay is 25.4 seconds (**S10=254**). Set **S10** to 255 to cause the MTA128ST not to disconnect with loss of carrier.

S-Register: **S25**
Function: DTR Drop Time
Unit: 100 ms
Range: 0, 1–255
Default: 5

Description: **S25** sets the time that DTR must remain low before the MTA128ST disconnects. The **S25** unit value for 0 is 50 ms. For values from 1 through 255, the unit value is 100 ms.

S-Register: **S32**
Function: Escape Sequence Timeout
Unit: 100 ms
Range: 0–255
Default: 20

Description: **S32** sets the time allowed in an escape sequence from the receipt of the *A* in *AT* to the receipt of the carriage return. If the **S32** time interval expires before you press ENTER, the escape sequence ends. The default time is 2 seconds.

S-Register: ***S50***
Function: Caller Line ID "CLI"
Unit: Decimal ASCII code
Range: 0 or 1
Default: 1(enabled)

Description: ***S50*** sets whether the mechanism for identifying the two endpoints of a connection is enabled or disabled.   Since RING messages only appear for ISDN data calls, the CLI feature does not define a means of conveying Calling Party information to the terminal for ISDN voice calls. The CLI information is only included with the first RING message for a given incoming call, and appears as follows:

<div align="center">

RING
FM: 5552000 TO: 5551000

</div>

If the Calling Party Number information is not included in the incoming SETUP message, the RING message appears as follows:

<div align="center">

RING
TO: 5551000

</div>

If the Called Party Number information is not included in the incoming SETUP message, the RING message will appear as follows:

<div align="center">

RING
FM: 5552000

</div>

If neither the Called Party Number, nor the Calling Party Number is included in the incoming SETUP message, the RING message will contain no additional information.

S-Register: **S52**
Function: Auto-Protocol Detection
Unit: Decimal ASCII code
Range: 0 or 1
Default: 1

Description: **S52** sets whether the mechanism for identifying V.110, V.120, X.75, MLPPP, or SoftBond operation is enabled or disabled. This is applicable for an ISDN data call; and once determined by the MTA128ST the protocol used by means of the information conveyed by the SETUP message, then the indicated protocol is activated. The default setting is 1, which enables the Auto-Protocol Detection function.

S-Register: **S53**
Function: Maximum Frame Size (X.75)
Unit: Decimal ASCII code
Range: 0-2048
Default: 2048

Description: **S53** sets the maximum size of data frames in X.75 mode. This register can be configured to contain as many as 2048 characters per frame, and is the MTA128ST's default value

4.3   Result Codes

When the MTA128ST receives an AT command from the computer or terminal, it attempts to execute the command, then sends a status message to the computer or terminal that reports the result of the command. The MTA128ST provides you with several of these response messages, or *result codes,* which can be displayed on your monitor or intercepted and used by your communications software. Using the **V** command, you can select whether the result codes are *terse* (numbers) or *verbose* (words).

The MTA128ST's result codes are listed in the following table. Note that the speed of an ISDN channel is always either 56K bps or 64K bps. *CONNECT* messages indicate the speed of the connection between the MTA128ST and your computer or terminal.

Table 4-3. Result Codes

	Terse	Verbose	Definition
0	OK		The MTA128ST executed the command without error.
1	CONNECT		The MTA128ST has established an ISDN connection.
2	RING		The MTA128ST has detected a ring caused by an incoming call.
3	NO CARRIER		The MTA128ST did not detect a carrier within the time allotted by register S7.
4	ERROR		There was an error in the AT command.
5	CONNECT 1200		The MTA128ST has connected at 1200 bps.
6	NO DIALTONE		The MTA128ST has a poor connection to the ISDN network.
7	BUSY		The MTA128ST has detected a busy signal.
8	CONNECT 300		The MTA128ST has connected at 300 bps.
10	CONNECT 2400		The MTA128ST has connected at 2400 bps.
11	CONNECT 4800		The MTA128ST has connected at 4800 bps.
12	CONNECT 9600		The MTA128ST has connected at 9600 bps.
14	CONNECT 19200		The MTA128ST has connected at 19200 bps.
28	CONNECT 38400		The MTA128ST has connected at 38400 bps.
32	CONNECT 48000		The MTA128ST has connected at 48000 bps.
17	CONNECT 56000		The MTA128ST has connected at 56000 bps.
18	CONNECT 57600		The MTA128ST has connected at 57600 bps.
19	CONNECT 64000		The MTA128ST has connected at 64000 bps.
20	CONNECT VOICE		The MTA128ST has made a voice connection.
57	CARRIER 56000		The MTA128ST has detected a 56000 bps carrier.
59	CARRIER 64000		The MTA128ST has detected a 64000 bps carrier.
78	SOFTBONDING PROTOCOL		The MTA128ST is using the SoftBonding protocol.
79	PPPC PROTOCOL		The MTA128ST is using the Point-to-Point protocol.
82	V.110 PROTOCOL		The MTA128ST is using the V.110 rate adaption protocol.
83	V.120 PROTOCOL		The MTA128ST is using the V.120 rate adaption protocol.
84	X.75 PROTOCOL		The MTA128ST is using the X.75 rate adaption protocol.
86	V.120 PROTOCOL COMPRESSED		The MTA128ST is using the V.120 rate adaption protocol with Hi/fn compression.
96	CHANNEL B1		Channel B1 is in use.
97	CHANNEL B2		Channel B2 is in use.

4.4   Using AT Commands to Operate the MTA128ST

You can configure and operate the MTA128ST entirely with AT commands, if you like. Remember, you can issue AT commands only from a terminal or from a computer running a communications program in terminal mode. This section describes how to use AT commands for basic operations, such as calling, answering a call, and hanging up.

4.4.1   Modes of Operation

The MTA128ST has three modes of operation: offline command mode, online command mode, and data mode.

Offline Command Mode

In offline command mode, the MTA128ST communicates with the terminal or computer and responds to AT commands. There is no data communications link with a remote device.

Data Mode

The MTA128ST enters data mode when it makes a successful data communications link with a remote device. In data mode, the MTA128ST can send and receive data, but it does not respond to AT commands. Instead, it treats them as data, and transmits them to the remote device.

Online Command Mode

In online command mode, the MTA128ST responds to AT commands while maintaining a data communications link; however, transmission of data is suspended. To enter online command mode from data mode, type the escape sequence **+++AT<CR>**. To return to data mode from online command mode, type **ATO<CR>**.

4.4.2   Making a Call

Before you can place a data call, you must configure the MTA128ST for the local switch type, serial port speed, and the data type of the ISDN device you want to call. See Chapter 3, "Configuration Utilities."

AT Commands/S-Registers

Dialing

To dial a number using AT commands, you must first start a data communications program. In the program's terminal mode, type **ATDxxxxxxx<CR>,** where xxxxxxx is the telephone number you want to dial, and <CR> is the carriage return character that is sent when you press the ENTER key, e.g, **ATD7853500<CR>**. The dial string can contain up to 80 characters.

To place an ML-PPP call, use an ampersand character ($\&$) to join two telephone numbers, e.g., **ATD7853500&7853502<CR>**. The telephone numbers can be the same or different. Using this method, two B-channels are activated to transmit data at an aggregate speed of 128K bps.

To make it easier to read the dial string, you can use hyphens, spaces or parentheses. These characters are ignored by the MTA128ST. For example, the MTA128ST would read the following dial strings the same way:

ATD16127853500 <CR>
ATD 1-612-785-3500 <CR>
ATD 1 (612) 785-3500 <CR>

Channel Bundling Flag Dialing

The command AT&Jn is used to indicate whether outgoing calls should be made on two B-channels by default. The command AT&J1&W0<CR>, configures the MTA128ST to place a call dialing on two B-channels by default; if no second number is given in the dial string, that single number is dialed twice. This is done to compensate for the interworking issues with Windows 95. On the other hand, if the user explicitly indicates two numbers in the dial string, then two numbers are dialed (e.g., **ATD7853500&7853502<CR>**). The command AT&J0&W0<CR>, disables automatic call bundling. Note other valid characters joining two telephone numbers include a Plus Sign (**+**), and an Exclamation Mark (**!**).

⊠ In Windows 95, if the "Use Country Code and Area Code" box is checked in the **Properties** window for dial-up connection, the bundling modifier (i.e., &, + or !) is removed from the dialing string when the user attempts to make a connection. The solution is to not check the "Use Country Code and Area Code" box, or to simply add the bundling dial modifier to the phone number at the time of connection.

Canceling a Call

To cancel a call before the MTA128ST makes a connection, press any key.

Storing a Telephone Number

To store a telephone number, type *&Zn=x* in terminal mode, where *n* is the number of the memory register in which the number is to be stored, and *x* is the dial command string that you want to store. For example, type **AT&Z9=612-785-3500 <CR>** to store the number 612-785-3500 in memory register 9.

Dialing a Stored Telephone Number

To dial a stored telephone number, type *&DS=n* in terminal mode, where *n* is the location of the number you wish to dial. For example, type **ATDS=3 <CR>** dials a telephone stored in memory register 3 location.

Displaying a Stored Number

To display a stored telephone number, type *&Zn?* in terminal mode, where *n* is the memory register in which the number is stored. For example, type **AT&Z5? <CR>** to display the telephone number in memory register 5. To list all ten telephone numbers stored in memory, type **ATL <CR>**.

4.4.3 Answering a Call

You can answer incoming calls to the MTA128ST either manually or automatically. When the MTA128ST detects an incoming call, it turns on the RI signal on the V.24 interface, and sends a *RING* result code to the computer or terminal after each ring. If autoanswer is enabled, the MTA128ST will automatically answer the call. You can also manually answer the call by using the *A* command. Both methods are described below.

Answering Manually

If your communication program is in terminal mode when the *RING* result code appears on your monitor, you can manually answer the call by typing *ATA <CR>*.

Answering Automatically

To cause the MTA128ST to automatically answer a call:

1. Enable autoanswer by setting register *S0* to the ring on which you want the MTA128ST to answer (e.g., in terminal mode, type *S0=4* to make the

MTA128ST answer on the fourth ring). You can also use either of the configuration utilities to the turn autoanswer on and set the number of rings.

2. Make sure that the MTA128ST is offline.

The MTA128ST will answer the call after the number of rings specified by *S0*. To disable autoanswer, use a configuration utility or the command *S0=0*.

✉: If the user wishes to accept calls while DTR is low, the MTA128ST must be configured to ignore DTR. This is accomplished by entering AT&D0<cr>. With this configuration, the MTA128ST is able to accept calls while DTR is low. If this configuration setting is not made, the TA rejects incoming calls until DTR is high while the calls comes in.

4.4.4   Hanging Up

To hang up a call, first escape to online command mode (*+++AT<CR>*), then enter the *H* command (*ATH<CR>*). The escape sequence and hang up command can be combined into one command string: *+++ATH<CR>*.

Chapter 5--Introduction

This chapter describes some basic problems you may run into with your MTA128ST and how to solve them.

5.2   Troubleshooting

Your MTA128ST was thoroughly tested at the factory before it was shipped. If you are unable to make a successful connection, or if you experience data loss during your connection, it is possible that the MTA128ST is defective. However, it is more likely that the source of your problem lies elsewhere. Problems you may encounter include the following:

   • None of the LEDs light when the MTA128ST is on.
   • The MTA128ST does not respond to commands.
   • The MTA128ST dials but cannot make a connection.
   • You can place data calls but not voice calls, or vice versa.
   • You cannot place two simultaneous data calls.
   • The MTA128ST disconnects while online.
   • The MTA128ST cannot connect when answering.
   • File transfer appears slower than it should be.
   • Data is being lost.
   • There are garbage characters on the monitor.

If you experience problems, please check the following possibilities before calling Tech Support (see Chapter 6).

None of the LEDs Light When the MTA128ST Is On

When you turn on the MTA128ST, the LED indicators on the front panel should flash briefly as the MTA128ST runs a self-test. If the LEDs remain off, the MTA128ST is probably not receiving power.

▸ Make sure the MTA128ST's power switch is on, especially if you normally turn on the MTA128ST by turning on a power strip.

Troubleshooting

‣ If the power supply is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.

‣ Make sure the power supply module is firmly connected to the MTA128ST and to the wall outlet or power strip.

‣ If the power strip is on and the MTA128ST is switched on, try moving the MTA128ST power supply to another outlet on the power strip.

‣ Test that the outlet is live by plugging a lamp into it.

‣ The MTA128ST or power supply may be defective. If you have another Multi-Tech MTA128ST, try swapping MTA128STs. If the problem goes away, the first MTA128ST or power supply may be defective. Call Tech Support for assistance.

CAUTION: Do not under any circumstances replace the power supply module with one designed for another product, as it may damage the MTA128ST and void your warranty.

The MTA128ST Does Not Respond to Commands

‣ Make sure the MTA128ST is plugged in and turned on. (See "None of the LEDs Light When the MTA128ST Is On.")

‣ Try resetting your MTA128ST by turning it off and on.

‣ Make sure you are issuing the MTA128ST commands from the data communications software, either automatically, or manually in terminal mode. (You cannot send commands to the MTA128ST from the DOS prompt.)

‣ Make sure you are in terminal mode in your data communications program, then type **AT** and press ENTER. If you get an *OK* response, your connections are good and the problem likely is in your phonebook entry or session settings.

‣ If you don't get an *OK*, the problem may still be in the communications software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communications programs connect to the COM port automatically. Some connect when the software loads, and remain connected until the program ends. Others, like MultiExpress Terminal, can disconnect without ending the program (make sure the Connect icon looks plugged in). MultiExpress Terminal also allows multiple terminals to be open, but only one

can access the MTA128ST at a time. If MultiExpress Terminal reports that it cannot make a connection, yet the MTA128ST's *TR* indicator is on, click on the Window menu to see if more than one terminal is open. The MTA128ST's *TR* indicator shows that the software has made a connection with the MTA128ST through the COM port.

‣ Your communications software settings may not match the physical port the MTA128ST is connected to. The serial cable may be plugged into the wrong connector—check your computer documentation to make sure. Or you may have selected a COM port in your software other than the one the MTA128ST is physically connected to—compare the settings in your software to the physical connection.

‣ If the MTA128ST is on, the cable is plugged into the correct port, the communications software is configured correctly, and you still don't get an *OK*, the fault may be in the serial cable. Make sure it is firmly connected at both ends.

‣ Is this the first time you have used the cable? If so, check the cable description on the packaging to make sure the cable is correct for your computer.

‣ Peripheral expansion cards, such as bus mouse and sound cards, may include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communications port. Be sure to disable any unused ports.

To look for address or IRQ conflicts if you use Windows 3.1x, select *File*, Run in Program Manager, type **MSD**, and press ENTER. Then select *Mouse*, *COM Ports*, and *IRQ Status* and note the addresses and IRQs that are in use. If you find an IRQ conflict, note which IRQs are not being used, then change one of the conflicting devices to use one of the unused IRQs. If you find an address conflict, change the address of one of the conflicting devices.

To change a port address or IRQ in Windows 3.1x, double-click the *Control Panel* icon, then the *Ports* icon. Click on the port you want to change, click *Settings*, click *Advanced*, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

If you use Windows 95, right-click on *My Computer*, select *Properties* from the menu, click on the *Device Manager* tab, double-click on *Ports*, then double-click on the *Communications Port* your MTA128ST is connected to. In the port's

Properties sheet, click on the *Resources* tab to see the port's Input/Output range and Interrupt Request. If another device is using the same address range or IRQ, it will appear in the Conflicting Device List. Uncheck Use Automatic Settings to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device, refer to the device's documentation.

‣ The serial port may be defective. If you have another serial port, install the MTA128ST on it, change the COM port setting in your software, and try again.

‣ The MTA128ST may be defective. If you have another Multi-Tech MTA128ST, try swapping MTA128STs. If the problem goes away, the first MTA128ST is possibly defective. Call Tech Support for assistance (see Chapter 6).

The MTA128ST Dials But Cannot Make a Connection

There can be several reasons the MTA128ST fails to make a connection. Possibilities include

- Lack of a proper physical connection to the communication line.
- A busy signal.
- A wrong number.
- No terminal adapter at the other end.
- A faulty communications device, computer, or software at the other end.
- Incompatibility between communications devices.
- An improperly configured MTA128ST.

You can narrow the list of possibilities by using extended result codes. To enable them, enter **ATV1X2** and press ENTER while in terminal mode, or include **V1X2** in the MTA128ST's initialization string (**V1X2** is enabled by default). When you dial again, the MTA128ST will report the call's progress.

‣ If the MTA128ST reports *NO DIALTONE*, check that the MTA128ST's ISDN S/T cable is securely connected to both the MTA128ST's ISDN jack (not the AUX jack) and the ISDN network terminator or wall jack. If the cable looks secure, try replacing it. If that doesn't work, the problem may be in your building's telephone installation. Make sure ISDN cables on all devices are wired straight-through (pin 1 to pin 1, pin 2 to pin 2, etc.) and do not have reversed

pairs. The cable must have at least the middle four pins (pins 2, 3, 4, and 5) connected. A reversed pair on the U (phone company) side is not important, but a reversed pair on the S/T (your) side can create problems if you have more than one device, since multiple devices attached to the S/T interface must all have the same polarity.

‣ If the MTA128ST reports *BUSY*, the other number may be busy, in which case you should try again later.

‣ If the MTA128ST reports *NO CARRIER*, no connection was made. You might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your MTA128ST is working. Also, check that you accurately configured the MTA128ST with the correct switch type, TEIs, data protocols, and other parameters needed for a successful call (see Chapter 3).

You Can Place Data Calls But Not Voice Calls, or Vice Versa

‣ You might not have ordered both voice and data service from your ISDN provider. Check your contract or latest statement of service from your ISDN provider.

‣ Your ISDN provider may have programmed the switch incorrectly. Call the provider.

You Cannot Place Two Simultaneous Data Calls

‣ You might not have ordered an ISDN line configuration that supports two simultaneous calls. Check your contract or latest statement of service from your ISDN provider. Also, your ISDN provider may have programmed the switch incorrectly. Call the provider.

‣ You may have misconfigured your MTA128ST to dial two simultaneous data calls. The command AT&J1&W0<CR> is used to indicate whether outgoing calls should be made on two B-channels by default.

‣ You may be using the wrong "bundling" dial modifier (e.g., ATD7853500**&**7853502<CR>). The ampersand in this command string is correct. Note other valid characters joining two telephone numbers include a Plus Sign (**+**), and an Exclamation Mark (**!**).

⊠ In Windows 95, if the "Use Country Code and Area Code" box is checked in the **Properties** window for dial-up connection, the bundling modifier (i.e., &, + or !) is removed from the dialing string when the user attempts to make a connection. The solution is to not check the "Use Country Code and Area Code" box, or to simply add the bundling dial modifier to the phone number at the time of connection.

The MTA128ST Disconnects While Online

▸ Check for loose connections between the MTA128ST and the computer, the ISDN jack, and AC power.

▸ The problem may have originated at the other end of the line. Try again.

▸ If you were online with a BBS or online service, it may have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

The MTA128ST Cannot Connect When Answering

▸ Autoanswer may be disabled. Turn on autoanswer in your data communications program, or send the command **ATS0=1** to your MTA128ST in terminal mode.

⊠: If the user wishes to accept calls while DTR is low, the MTA128ST must be configured to ignore DTR. This is accomplished by entering AT&D0<cr>. With this configuration, the MTA128ST is able to accept calls while DTR is low. If this configuration setting is not made, the TA rejects incoming calls until DTR is high while the calls comes in.

File Transfer Appears Slower Than It Should Be

▸ If you presently have a Universal Asynchronous Receiver/Transmitter (UART) that is compromising data throughputs, we recommend that it be replaced with a special I/O card.

▸ If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, COMM.DRV, to take full advantage of the UART's speed.

‣ Check the serial port baud rate in your communications software, and make sure it is set as high as your UART allows.

Data Is Being Lost

‣ Your UART may not be reliable at serial port speeds over 9600 bps or 19,200 bps. Reset your serial port speed to a lower rate, or replace your serial port with a faster one.

‣ Check the serial port baud rate in your communications software, and make sure it is set as high as your UART allows.

‣ Make sure the flow control method you selected in software matches the method selected in the MTA128ST.

There Are Garbage Characters on the Monitor

‣ Your computer and the remote computer may be set to different parities. Check with the remote system with which you are communicating, and set your communications software to use the same parity as the remote system.

Chapter 6--Introduction

This chapter begins with the terms of your MTA128ST's five-year warranty. Read carefully the next section, "Technical Support," if you have questions or problems with your terminal adapter. It includes the technical support telephone numbers, space for recording information about your MTA128ST, and information on how to send in your terminal adapter should you require service. The final sections explain how to get information and technical support from our BBS, how to upgrade the MTA128ST via flash PROM, and information on the CompuServe/Internet forums.

6.2   Limited Warranty

Multi-Tech Systems, Inc. (*"MTS"*) warrants that its products will be free from defects in material or workmanship for a period of five years from the date of purchase, or if proof of purchase is not provided, five years from date of shipment. MTS MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by the customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period, or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS.

6.3   Technical Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, call Technical Support at (612) 717-5863. The model and serial numbers are silkscreened on the bottom of your MTA128ST. To display the firmware version, type **ATI1** in terminal mode. Software versions are printed on the diskette labels. Before calling Technical Support, please note the status of your terminal adapter. Include LED indicators, screen messages, diagnostic test results, problems with a specific application, etc.

6.3.1   On-line Warranty Registration

To register your Multi-Tech product on-line, click on the following link:

http://www.multitech.com/support/register.htm

6.3.2   Service

If your tech support specialist decides that service is required, MTA128ST may be sent (freight prepaid) to our factory. Return shipping charges will be paid by Multi-Tech Systems (within North America).

Include the following with your TA:

- a description of the problem.
- return billing and return shipping addresses.
- contact name and phone number.
- check or purchase order number for payment if the MTA128ST is out of warranty. (The standard repair charge is $95. This price is valid at the time of this publication but could change in the future. Check with your technical support specialist.)
- if possible, note the name of the technical support specialist with whom you spoke.

Service

If you need to inquire about the status of the returned product, be prepared to provide the **serial number** of the product sent (see Section 6.3.1).

Send MTA128STs to this address:

<div align="center">

MULTI-TECH SYSTEMS, INC.
2205 WOODALE DRIVE
MOUNDS VIEW, MINNESOTA 55112
ATTN: SERVICE OR REPAIRS

</div>

6.4   *The Multi-Tech BBS*

Multi-Tech maintains a bulletin board system (BBS) for its customers. Information available from the BBS includes new product information, product upgrade data, and problem-solving tips. There is also a message service that lets you request additional information. The phone number for the Multi-Tech BBS is (612) 785-3702.

The BBS can be accessed by any asynchronous modem operating at 1200 bps to 33,600 bps at a setting of 8 bits, no parity, and 1 stop bit (8-N-1).

Logging on to the Multi-Tech BBS

To log on to the Multi-Tech BBS, perform the following steps:

1. Set your communications program to **8-N-1**.

2. Dial our BBS at +(612) 785-3702.

3. At the prompts, type your first name, last name, and password; then press RETURN. If you are a first time caller, the BBS will ask if your name is spelled correctly. If you answer yes, a questionnaire will appear. You must complete the questionnaire to use the BBS on your first call.

4. Press RETURN until the Main Menu appears. From the Main Menu you have access to three main areas: the Files Menu, the Message Menu, and Bulletins. For help on menu commands, type **?**.

Downloading a File

If you know the file name

1. From the Main Menu, type **F** to access the Files Menu, then type **D**.

2. Enter the name of the file you wish to download from the BBS.

3. If a password is required, enter the password.

4. Answer **Y** or **N** to the automatic logoff question.

5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).

6. If you select Zmodem, the transfer will begin automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data-comm programs, the PAGE DOWN key initiates the download.)

If you don't know the file name

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L** twice. (If you do not type the second *L*, you will list all of the files on the BBS.)

2. Mark the file areas you would like to examine by typing each file area's list number and a RETURN.

3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list, and **P** to go back.

4. Mark one or more files for download by entering **M**, the list numbers of the files, and a RETURN.

5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.

6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).

7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself. (In MEWTERM and many other communications programs, the PAGE DOWN key initiates the download.)

8. When the download is complete, enter **S** to return to the File Menu.

Service

Reading a Message

When you log on, the BBS will tell you if you have a personal message (mail). At the prompt *Would you like to read it now?,* type **R** to read the message. This is the only point at which you can read your mail, since you cannot read any messages from the Message Menu.

Leaving a Message

The Multi-Tech BBS has no public discussion area. To leave a personal message, select the Message Menu by typing **M** at the Main Menu. Type **E**, then press RE-TURN to select the Sysop conference. Enter the name of the recipient (or "Sysop"), the subject, and the message text. Press ESCAPE to finish, then type **S** to save the message and exit. To abort the message at any point, leave any of the fields blank and press RETURN.

Bulletins

When you log on, the BBS will ask if you would like to view the bulletin menu. The bulletins are menu-driven; to read a bulletin, enter its number. You can also access the bulletins by typing **B** at the Main Menu.

6.5   Upgrading the MTA128ST with FlashPro

The MTA128ST has a flash PROM, which contains firmware code for the hardware. At various times, Multi-Tech may add enhancements and/or fixes to the firmware. The flash technology used in the MTA128ST lets you load these upgrades into the PROM through the MTA128ST's serial port.

Using FlashPro to Upgrade Firmware

1.   Download FLASHPRO.ZIP and a new .HEX file from the Multi-Tech BBS.

2.   Unzip the FLASHPRO.ZIP file. Place this unzipped file and the .HEX file in the same directory.

3.   Run FlashPro by typing FLASHPRO, a space, **-M** and hitting ENTER at the DOS prompt.

4. Highlight the "Configure" option in the MAIN MENU and hit ENTER. Highlight "Active Port" and select the COM port to which the MTA128ST is connected. Highlight "Baud Rate" and select the rate at which you want to program. Press ESC when finished.

5. Highlight the "Select File to Program" option in the MAIN MENU. Highlight the .HEX file. Press ESC when finished.

6. Highlight the "Program Firmware" option in the MAIN MENU. When you are prompted to confirm the file to program, press "Y."

7. If you need more assistance programming FlashPro, contact our Technical Support department.

6.6   About CompuServe/Internet

In addition to the BBS, Multi-Tech provides technical support through CompuServe's Modem Vendor Forum (*GOMODEMVEN*) under *GO MULTITECH*. Refer to your CompuServe documentation for special operating procedures. Multi-Tech is a commercial provider on the Internet, and we retrieve e-mail messages from the following mailboxes on a periodic basis:

tsupport@multitech.com	Technical Support
mtsmktg@multitech.com	Marketing Dept.
mtssales@multitech.com	Sales Dept.
international@multitech.com	International Marketing & Sales
writers@multitech.com	Publications Dept.

Multi-Tech's presence includes a Web site at:

http://www.multitech.com

and an ftp site at:

ftp://ftp.multitech.com

The ftp server mirrors the Multi-Tech BBS.

Appendix A--Configuration Profiles

Quick Setup Factory Profiles

For quick setup, the MTA128ST includes five Quick Setup Factory Profiles, each of which is configured for a specific type of port operation. You can load a Quick Setup Factory Profile into active memory by using the command *&Fn,* in which *n* is the number of the profile you wish to load. If you wish, you can then customize the profile and store it, using the *&W* command, so that it loads automatically when the MTA128ST is turned on or reset. These profiles are stored in permanent memory and are not user-configurable as such.

&F0   Profile 0—Modem-like asynchronous operation (default)

&F1   Profile 1—V.110 asynchronous operation

&F2   Profile 2—V.120 asynchronous operation

&F3   Profile 3—X.75 asynchronous operation

&F4   Profile 4—ML-PPP asynchronous operation

Quick Setup Example

The following procedure assumes that you wish to load, modify, and store Quick Setup Factory Profile 2 as your default configuration. (The parameters for Profile 2 are listed in Table A-3.)

1. Select the profile closest to the requirements of your application, in this case, Quick Setup Factory Profile 2.

2. In terminal mode, type *AT&F2* and press ENTER. Quick Setup Profile 2 loads into the MTA128ST's active memory.

3. Enter any additional AT commands that you need to customize the selected profile to your application (see Chapter 4, "AT Commands, S-Registers, and Result Codes").

4. Type *AT&W0* and press ENTER to save your customized port configuration.

5. Your customized profile will now load automatically whenever the MTA128ST is turned on or reset.

Configuration Profiles

Table A-1. Profile 0 (&F0)—Modem-Like Asynchronous Operation

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E7	Pass through XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 50 ms
S32=20	Set escape sequence guard time to 2 seconds
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages

Configuration Profiles

Table A-2. Profile 1 (&F1)—V.110 Asynchronous Operation

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E7	Pass through XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 50 ms
S32=20	Set escape sequence guard time to 2 seconds
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB384	Select 38,400 bps for DTE interface
V1	Select verbose messages
!Z=6	Enable V.110 data protocol

Configuration Profiles

Table A-3. Profile 2 (&F2)—V.120 Asynchronous Operation

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E7	Pass through XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 50 ms
S32=20	Set escape sequence guard time to 2 seconds
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=5	Enable V.120 data protocol

Configuration Profiles

Table A-4. Profile 3 (&F3)—X.75 Asynchronous Operation

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E7	Pass through XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 50 ms
S32=20	Set escape sequence guard time to 2 seconds
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=12	Enable X.75 data protocol

Table A-5. Profile 4 (&F4)—ML-PPP Asynchronous Operation

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E7	Pass through XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 50 ms
S32=20	Set escape sequence guard time to 2 seconds
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 38,400 bps for DTE interface
V1	Select verbose messages
!Z=9	Enable MLPPP data protocol

MTA128ST/Revision D PC Board
MTA128NT/Revision B PC Board

Product Update

This update supersedes information documented in your Owner's Manual.

The following supersedes currently documented information in Chapter 1 of your Owner's Manual (model MTA128ST only) entitled <u>Features</u> in Section 1.2, and <u>Technical Specifications</u> in Section 1.4:

Update Features

The MTA128ST communicates over public ISDN telephone lines. Its features include:

- Compatibility with EuroISDN (ETSI/DSS1/NET3), German DBP 1TR6, French VN4, and Japanese INS64 switch protocols.
- Compatibility with V.110, V.120, ML-PPP, SoftBond, and X.75 protocols.
- ISDN BRI (2B+D) and analog ports.
- RS232E/V.24 serial port.
- Serial port speeds to 460.8K bps.
- Support of PPP (Point to Point Protocol) for high speed ISDN connections.
- Tone detection to allow use of a standard telephone for ISDN line access (an ISDN telephone is not required).
- Automatic detection of incoming calls as voice or data.
- A Windows 95 software utility and a firmware utility for easy ISDN line configuration.
- AT command and S-Register controls, and Result Codes.
- Ability to use the same communications software as analog modems.
- Flash memory for easy firmware upgrades.

Product Update

Update Technical Specifications

Trade Name	IWay Hopper™
Model Number	MTA128ST (International)
Network Interface	Four-wire S/T interface
Switch Compatibility	EuroISDN (ETSI/DSS1/NET3), DBP 1TR6, VN4, INS64, NI-1, 5ESS, DMS-100
B-Channel Protocols	V.110, V.120, X.75, ML-PPP
Voice Coding	PCM: A-Law (Europe); µ-Law (US)
LED Indicators	10 front panel LED indicators: Transmit Data, Receive Data, Call Status, B1 Active, B2 Active, Terminal Ready, Off Hook (AUX port), P1 Active Data Protocol, P2 Active Data Protocol, 128K bps
Data Rates	300, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 56K, 57.6K, 64K, 115.2K, 230.4K and 460.8K bps
Async Data Format	7 bit data + odd/even parity + 1 start/stop (V.110), 8 bit no parity. 36 baud rate/parity settings via S-register. Baud rates of 300–230.4K bps with even, space, odd, or no parity.
Data Connections	Two ISDN B-channels One ISDN D-channel One analog port for connecting a standard telephone, modem, or fax machine
Command Interface	AT commands, S-Registers, Result Codes, Config-Menu firmware configuration utility, Windows 95 software configuration utility
Connectors	*ISDN:* RJ-45 female receptacle, 4-wire S/T (accepts the connection cable to the network provider's NT1 device) *AUX:* RJ-11 female receptacle, 2-wire voice service *Serial Port:* female DB-25 RS232E/V.24
Serial Interfaces	ITU-T V.24, EIA/TIA RS232E
Switches	Two-position power switch

Power Requirements	Two-prong outlet-mounted transformer (included), 240 VAC 50/60 Hz
Dimensions	15.0 cm × 10.7 cm × 2.8 cm (L × W × D)
Environmental	Temperature range 0°–50° C; Humidity range 20–90% (non-condensing)
Power Consumption	4 watts
Weight	224 g (8 oz)
Warranty	5 years

Update LEDs

The following supersedes currently documented information in your Owner's Manual entitled, <u>LED Indicators</u> in Section 2.7:
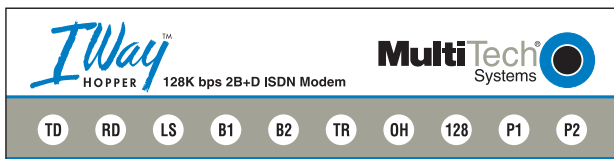
Transmit Data. The TD LED flashes when data is being transmitted (on for a space, off for a mark).

Receive Data. The RD LED flashes when data is being received (on for a space, off for a mark).

Product Update

(LS)

Power. The LS LED lights when the TA is turned on.

(B1)

Bearer Channe1 1.
Indicates an active data or voice connection on Bearer Channel 1 when lit.

(B2)

Bearer Channel 2.
Indicates an active data or voice connection on Bearer Channel 2 when lit.

(TR)

Terminal Ready. The TR LED lights to indicate that the computer is communicating with the TA, so the TA can answer an incoming call.

(OH)

Off Hook. The OH LED lights when analog equipment on the AUX port is active, or off-hook.

128K bps. The 128 LED lights to indicate that the B channels have been multiplexed into a single 128K bps communications link.

Data Protocol. The P1 LED lights in combination with the P2 and 128 LEDs to indicate which data protocol is in use (*V.110, V.120, X.75, PPP, MLPPP), as shown in the following table.

Data Protocol. The P2 LED lights in combination with the P1 and 128 LEDs to indicate which data protocol is in use (*V.110, V.120, X.75, PPP, MLPPP), as shown in the following table.

* V.110 protocol is not applicable in model MTA128NT

Product Update

Data Protocol	128 LED	P1 LED	P2 LED
V.110	●	●	●
V.120	●	●	○
X.75 (1 Channel)	●	○	●
PPP (1Channel)	●	○	○
MLPPP (2 Channel)	○	○	○

● Off   Note Protocol LEDs blink to indicate
○ On   active Data Compression.

Protocol Matrix

Update ISDN TA Configuration Utility

The following supersedes currently documented information in your Owner's Manual entitled, <u>ISDN TA Configuration Utility</u> in Section 3.3, Figure 3-1:
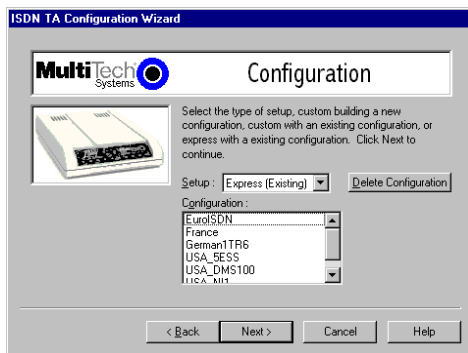
Figure 3-1. ISDN TA Configuration Utility

Update Switch Configuration Commands

The following supersedes currently documented information in your Owner's Manual entitled, <u>Switch Configuration Commands</u> in Section 4.1.3:

Command: **>Dn**
Function: Embedded Protocol Analyzer
Values: 0, 1, 2, 3, 4, 5, 6, 98 or 99
Default: n/a

Description: The Embedded Protocol Analyzer records and analyzes various protocols on the B-channel, D-channel and DTE-DCE interface. The Embedded Protocol Analyzer is useful as a diagnostic tool, in that essential data messages are

displayed. This offers the ability to observe interactive operations of the TA, Central Exchange, and the remote communications equipment.

>D0	Display B-channel traffic, decoded as V.120
>D1	Display D-channel traffic, decoding layers 2 and 3 (Q.921 and Q.931)
>D2	Display D-channel traffic, decoding layer 2 only (Q.921)
>D3	Display D-channel traffic, decoding layer 3 only (Q.931)
>D4	Display B-channel traffic, decoded as X.75
>D5	Display RS-232 traffic, decodes asynchronous PPP packets
>D6	Display B-channel traffic, decodes synchronous PPP packets
>D98	Disable Embedded Protocol Analyzer, buffered data unchanged
>D99	Enable Embedded Protocol Analyzer, clearing buffered data

Command:	**!Z=n**
Function:	Rate Adaption Protocol
Values:	*n* = 5, 6, 9, or 12
Default:	**!Z=5** (V.120)

Description: The **!Z** command selects the rate adaption protocol used to communicate with another terminal adapter. The local and remote terminal adapters must be set to the same protocol for communication to take place.

!Z=5	V.120 protocol
***!Z=6**	V.110 protocol
!Z=9	ML-PPP protocol
!Z=12	X.75 protocol

* V.110 protocol is not applicable in model MTA128NT.

Product Update

Update Serial Port Configuration Commands

The following supersedes currently documented information in your Owner's Manual entitled, <u>Serial Port Configuration Commands</u> in Section 4.1.4:

Command: ***Sr=n***
Function: Set S-Register
Values: r = 0–5, 7, 10, 25, 32, 34, 44, 46, 50, 52, 53; n varies
Default: None

Description: Use the ***Sr=n*** command to set the value of an S-register, where ***r*** is the number of the S-register, and ***n*** is the value you want to set. See "S-Registers" in this chapter for further information.

Command: ***Sr?***
Function: Read S-Register
Values: r = 0–5, 7, 10, 25, 32, 34, 44, 46, 50, 52, 53; n varies
Default: None

Description: Use the ***Sr?*** command to read the value of an S-register, where ***r*** is the number of the S-register. See "S-Registers" in this chapter for further information.

Command: ***&En***
Function: Flow Control
Values: n = 3–7, 12, 13
Default: ***&E4, &E6, &E13***

Description: The ***&E*** command selects the method by which the TA controls the flow of data to and from the computer, to prevent either device from accepting data faster than it can handle. The TA provides flow control in both directions. When the TA halts data flow, it's called *flow control*; when the computer halts data flow, it's called *pacing*.

&E3   Disable flow control by the TA.
&E4   Hardware flow control. ***&E4*** causes the TA to use the CTS signal on pin 5 of the RS232E/V.24 interface to regulate flow control. When CTS goes low, data flow from the computer is suspended until CTS

goes high again. This method works with pacing, which uses the RTS signal on pin 4. Hardware flow control cannot be enabled unless an error correction protocol is selected.

&E5   XON/XOFF flow control. This is an in-band method, in which the XON and XOFF characters (^Q and ^S respectively) are inserted into the data stream, rather than using separate control lines. When an XOFF character is detected, the data stream is suspended until an XON character is detected. The drawback to this method is that some files may contain these characters, causing the file transfer to be suspended indefinitely.

&E6   When XON/XOFF pacing is active, the TA responds to and discards the XON/XOFF characters from the computer.

&E7   When XON/XOFF pacing is active, the TA responds to the XON/ XOFF characters and passes them through the communications link to the remote device, thereby pacing the remote terminal adapter as well.

&E12   Disables pacing

&E13   Enables pacing.

Command: ***&Fn***
Function: Load Quick Setup Profile
Values: n = 0–3 (NT)
n = 0–4 (ST)
Default: ***&F0***

Description: For quick setup, this TA includes six Quick Setup Profiles, each of which contains configuration parameters for a specific type of port operation. You can load a Quick Setup Profile into active memory by using the command ***&Fn,*** in which *n* is the number of the profile you wish to load. If you wish, you can then customize the profile and store it, using the ***&W*** command, so that it loads automatically on power-up or reset. These profiles are stored in permanent memory and are not user-configurable. (See Appendix A.)

MTA128NT

&F0   Profile 0 — Modem-like operation (default)
&F1   Profile 1 — V.120 async operation
&F2   Profile 2 — X.75 async operation
&F3   Profile 3 — MLPPP async operation

Product Update

MTA128ST

&F0	Profile 0 — Modem-like operation (default)
&F1	Profile 1 — V.110 async operation
&F2	Profile 2 — V.120 async operation
&F3	Profile 3 — X.75 async operation
&F4	Profile 4 — MLPPP async operation

Command: **$SBn**
Function: Serial Port Speed
Values: n = 3, 12, 24, 48, 96, 192, 384, 576, 1152, 2304, or 4608
Default: **$SB1152**

Description: In command mode, this TA detects the computer's speed and parity, and matches it, except when the **%S1** command is active. The **$SBn** command sets the default serial speed to be used when the TA first powers up. If the TA powers up with $SB460800 set, the TA powers up in %S1 mode (locked at 460.8K bps). If $SBn is set to any other value at power-up, the TA powers up in %S0 mode (AT auto-detect--maximum auto-detect speed is 230.4K bps). Example: To configure the TA to operate at 460.8K on the serial port at power-up, use the following initialization string: AT $SB460800 &W0<cr> For clarity, you can add "00" to each command. For example, **$SB576** and **$SB57600** both set the initial serial port speed to 57,600 bps.

$SB3	Set serial port speed to 300 bps
$SB12	Set serial port speed to 1200 bps
$SB24	Set serial port speed to 2400 bps
$SB48	Set serial port speed to 4800 bps
$SB96	Set serial port speed to 9600 bps
$SB192	Set serial port speed to 19200 bps
$SB384	Set serial port speed to 38400 bps
$SB576	Set serial port speed to 57600 bps
$SB1152	Set serial port speed to 115200 bps
$SB2304	Set serial port speed to 230400 bps
$SB4608	Set serial port speed to 460800 bps

Product Update

Command: **%Sn**
Function: Serial Port Mode
Values: n = 0 or 1
Default: **%S0**

Description: Typically, in command mode this TA selects a serial port speed of 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400 bps, depending on how fast the AT commands are coming from the computer or terminal. Using the **%S** command, you can disable automatic speed selection and lock the serial port speed to 460800 bps. The serial port speed remains locked until the TA receives a **%S0** command. Another method for changing from %S1 to %S0 mode is to send a break at 460.8K. (This method is for cases where the TA was configured on a terminal capable of 460.8K and later moved to a terminal that cannot operate at 460.8K. A break sent at any speed slower than 460.8K will be interpreted as a break at 460.8K, as will some characters sent at slower speeds.)

%S0   Automatic speed mode (300-230,400 bps)
%S1   460800 bps mode

Update S-Registers

The following supersedes currently documented information in your Owner's Manual entitled, <u>S-Registers</u> in Section 4.2:

Table 4-2. S-Register Summary

S-Register	Function
S0	Rings Until Answer
S1	Ring Count
S2	Escape Character
S3	Carriage Return Character
S4	Line Feed Character
S5	Backspace Character
S7	Wait for Connection (Abort Timer)
S10	DCD Drop Time
S25	DTR Drop Time
S32	Escape Sequence Timeout
S34	Maximum Escape Sequence Length
S44	POTS Port Ring Frequency
S46	Pulse-Dial Recognition
S50	Caller Line ID ("CLI")
S52	Auto-Protocol Detection
S53	Maximum Frame Size (X.75)

S-Register:	*S34*
Function:	Maximum Escape Sequence Length
Unit:	Decimal ASCII code
Range:	0–10
Default:	2

Description: *S34* sets the maximum character length of the escape sequence, not including '+++AT'. For example a character length of S34=2 allows 2 characters after '+++AT' (e.g., '+++ATH0'). Conversely, an invalid escape sequence (too many characters placed in the command string) would be passed through as data (e.g.,'+++ati1i2'). The maximum length of the escape sequence is 10 characters. The default is 2.

Product Update

S-Register: **S44**
Function: POTS Port Ring Frequency
Unit: Decimal ASCII code
Range: 2-4
Default: 2 (25Hz)

Description: **S44** controls the ring frequency from the POTS port. S44=n where:

    n = 2—25Hz ring frequency (default)
    n = 3—20Hz ring frequency
    n = 4—16.67Hz ring frequency

S-Register: **S46**
Function: Pulse-Dial Recognition
Unit: Decimal ASCII code
Range: 0-3
Default: 0 or *1

Description: **S46** controls pulse-dial recognition for New Zealand, Sweden, and the de facto standard for the rest of the world (England, France, India, and USA). The S-register S46 selects the country where the TA is being used to recognize pulse-dialing.

S46=n where:

    n = 0—disable pulse-dialing (default)
    n = 1—England, France, India, USA, etc.
    (# pulses = digit dialed except 0 is 10 pulses)
    n = 2—New Zealand—(# pulses = 10 - digit dialed)
    n = 3—Sweden—(#pulses = digit dialed + 1)

* Default for model MTA128NT is n = 1.

Product Update

UpdateTechnical Support

The following supersedes currently documented information in your Owner's Manual entitled, <u>Technical Support</u> in Section 6.3:

Technical Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, call Technical Support at (612) 785-5863.

Update Configuration Profiles

The following supersedes currently documented information in your Owner's Manual entitled, <u>Configuration Profiles</u> in Appendix A:

<u>MTA128NT</u>

&F0	Profile 0 — Modem-like operation (default)
&F1	Profile 1 — V.120 async operation
&F2	Profile 2 — X.75 async operation
&F3	Profile 3 — MLPPP async operation

<u>MTA128ST</u>

&F0	Profile 0 — Modem-like operation (default)
&F1	Profile 1 — V.110 async operation
&F2	Profile 2 — V.120 async operation
&F3	Profile 3 — X.75 async operation
&F4	Profile 4 — MLPPP async operation

Product Update

Profile 0 (&F0*)* Modem-Like Asynchronous Operation

(models MTA128NT/MTA128ST)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=x	The data protocol is not modified

Product Update

Profile 1 (&F1*)* V.110 Asynchronous Operation(model MTA128ST)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB384	Select 38,400 bps for DTE interface
V1	Select verbose messages
!Z=6	Enable V.110 data protocol

Product Update

Profile 1 (&F1*)*—V.120 Asynchronous Operation

(model MTA128NT)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=5	Enable V.120 data protocol

Product Update

Profile 2 (&F2*)*—V.120 Asynchronous Operation

(model MTA128ST)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=5	Enable V.120 data protocol

Product Update

Profile 2 (&F2*)*—X.75 Asynchronous Operation

(model MTA128NT)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=12	Enable X.75 data protocol

Product Update

Profile 3 (&F3*)*—X.75 Asynchronous Operation

(model MTA128ST)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=12	Enable X.75 data protocol

Profile 3 (&F3)—ML-PPP Asynchronous Operation

(model MTA128NT)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=9	Enable MLPPP data protocol

Product Update

Profile 4 (&F4)—ML-PPP Asynchronous Operation

(model MTA128ST)

AT Command	Description
&C1	DCD functions normally
$D0	Disable persistent DTR dialing
&D1	Hang up when DTR drops
E1	Enable command mode echo
&E4	Enable hardware flow control
&E6	Discard XON/XOFF characters
&E13	Enable pacing
#X0	Disable Sending Multiple Xoff Characters
&J0	Disable Automatic Channel Bundling
&K0	Disable Data Compression
%E1	Enable +++ escape method
%E1	Enable +++ escape method
%E4	No OK response to +++ or <BREAK> escape
&M0	Asynchronous mode
@P3=4	No parity at power-up
@P4=8	8 data bits
@P6=1	1 stop bit
&R1	CTS always high
S0=1	Answer after 1 ring
S2=43	Set escape character to + (ASCII 43)
S3=13	Set carriage return character to CR (ASCII 13)
S4=10	Set line feed character to LF (ASCII 10)
S5=8	Set backspace character to BS (ASCII 8)
S7=45	Wait 45 seconds for connection before aborting
S10=20	Set DCD drop time to 700 ms
S25=5	Set DTR detect time to 500 ms
S32=20	Set escape sequence guard time to 2 seconds
S34=2	Set maximum escape sequence character length
S50=1	Caller Line ID Enabled
S52=1	Auto-Protocol Detection Enabled
S53=2048	Maximum Frame Size 2048 Characters
&S1	DSR follows DCD
$SB1152	Select 115,200 bps for DTE interface
V1	Select verbose messages
!Z=9	Enable MLPPP data protocol

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<u>**Symbols**</u>

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