



Alliance Series Modems Instruction Manual

- ❖ **Alliance V.34M**
- ❖ **Alliance V.34**
- ❖ **Alliance V.32/19.2M**
- ❖ **Alliance V.32/19.2**
- ❖ **Alliance V.32/14.4M**
- ❖ **Alliance V.32/14.4**
- ❖ **Alliance V.32M**
- ❖ **Alliance V.32**



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About the Alliance Series Modems:

The Alliance Series modems are easy to use and can operate in a variety of applications. Your modem is initially configured to operate in Hayes emulation mode, but can be easily reconfigured for other applications, as explained in Chapter 1.

Before operating the modem, it is advised that the applicable notices in Appendix F of this manual be read. Appendix F includes pertinent Government regulatory information and Government recommendations concerning operation of the modem.

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TABLE of CONTENTS

1. GETTING STARTED.....	Page 1
2. OPTIONS: CUSTOMIZING THE MODEM SETUP	Page 21
3. GENERAL OPERATION & SPECIAL FEATURES	Page 69
4. HAYES EMULATION MODE.....	Page 108
5. V.25bis AUTODIALER.....	Page 135
6. DIAGNOSTICS	Page 141
7. APPENDIX A – TECHNICAL DATA	Page 157
8. APPENDIX B – QUICK SETUP CONFIGURATION	Page 162
9. APPENDIX C – QUICK-CHANGE CONFIGURATION SCREENS.....	Page 173
10.APPENDIX D – CONNECTORS, ADAPTERS and JUMPERS	Page 184
11.APPENDIX E – LOW-PROFILE RACK-MOUNT MODEM.....	Page 190
12.APPENDIX F – REGULATORY NOTICES.....	Page 193
13.LIMITED WARRANTY	Page 196
14.RMA PROCEDURE	Page 197

CHAPTER ONE – GETTING STARTED

This instruction manual applies to the following Alliance Series modems:

- | | | | |
|--|---|----------------|--|
| • Alliance V.34M (ALX V.34M) | } | 28.8 Kbps max. | |
| • Alliance V.34 (ALX V.34) | | | |
| • Alliance V.32/19.2M (ALX V.32/19.2M) | } | 19.2 Kbps max. | |
| • Alliance V.32/19.2 (ALX V.32/19.2) | | | |
| • Alliance V.32/14.4M (ALX V.32/14.4M) | } | 14.4 Kbps max. | |
| • Alliance V.32/14.4 (ALX V.32/14.4) | | | |
| • Alliance V.32M (ALX V.32M) | } | 9600 bps max. | |
| • Alliance V.32 (ALX V.32) | | | |

The primary difference between the Alliance (ALX) models is the maximum speed (data rate), as indicated above. Another significant difference is that the ALX V.34 and V.34M comply with ITU-T Recommendation V.34, while all other models comply with ITU-T V.32/V.32bis. “M,” as in “ALX V.34M,” indicates that the modem is *network manageable* (it can be managed using Raymar-Telenetics’ network management software). Other differences are explained later in this manual.

For simplicity, all models are referred to in this manual as the “ALX modem” or “the ALX.” However, if a specific feature, option, etc., applies only to a specific model or models, this is clearly stated. Otherwise, all instructions and other information apply to all Alliance Series modems listed above.

All information applies to both the stand-alone and full-size rack-mount versions of the above-listed modems. Specialized low-profile rack-mount versions, designed for use in high-density rack enclosures, are described in Appendix E.

Quick Setups for a Quick Start

The simplest way to setup the ALX modem for immediate use is to select one of the factory-preset Quick Setup configurations. Quick Setups are explained beginning on page 8.

INSTALLATION

Unpacking

Keep the original shipping carton in case it is necessary to return the modem for any reason. Failure to comply may result in voiding the warranty.

In addition to the ALX modem, the shipping carton should contain:

- A power transformer (with cable attached)
- A two-conductor crossover cable (for a dial line connection)
- A four-conductor cable (for a leased line connection)

If the modem will be operated in a manual dial mode, you will also need a standard telephone set.

Cables

To connect the modem to a dial line, use the provided two-conductor cable. To connect the modem to a leased line, use the provided four-conductor cable. To set up the ALX for Leased Line Auto-Recovery, use *both* cables to connect the leased line and a (backup) dial line. **To connect the modem to the DTE (data terminal equipment, usually a computer), use a TIA/EIA RS-232 interface cable (not supplied).**

Connections

Figure 1-1 shows how the modem is connected to the computer or terminal, power, phone lines and handset (optional). **Do not install the modem more than 50 feet from the DTE.** DTE speeds greater than 19.2 Kbps require a much shorter low-capacitance DTE interface cable.

For all applications:

- Use a TIA/EIA RS-232 interface cable (not supplied) to connect the modem connector marked “DTE” to the computer or other DTE.
- Attach the power transformer cable to the modem receptacle marked “POWER,” and plug the other end into a 117 VAC power outlet.

For dialup applications:

- Use the supplied two-conductor crossover cable to connect the modem connector labeled “TX DIAL” to the dial telephone line modular wall jack. Do not bundle the phone cable and TIA/EIA interface cables together.
- Optional: If you want to use the telephone line for voice transmissions (when the ALX is not operating in data mode) or for manual dial operation, plug a standard telephone set into the jack in the rear of the modem labeled “PHONE.”

For leased line applications:

- Use the supplied four-conductor cable to connect the modem connector labeled “LEASED LINE” into the leased line modular wall jack (type USOC JM8). Do not bundle the leased line and TIA/EIA interface cables together.

If your application requires an 8-pin connector, use the alternate leased line connector shown in Figure 1-1 instead of the 6-pin “LEASED LINE” connector. To use the alternate connector, you will need to provide your own cable. (See Appendix A for pin-out information.)

The same cable is used whether the leased line is a 4-wire or 2-wire line. In a 4-wire application, the green and red wires are the TRANSMIT pair, and the yellow and black wires are the RECEIVE pair. For a 2-wire line, only the green and red wires are used.

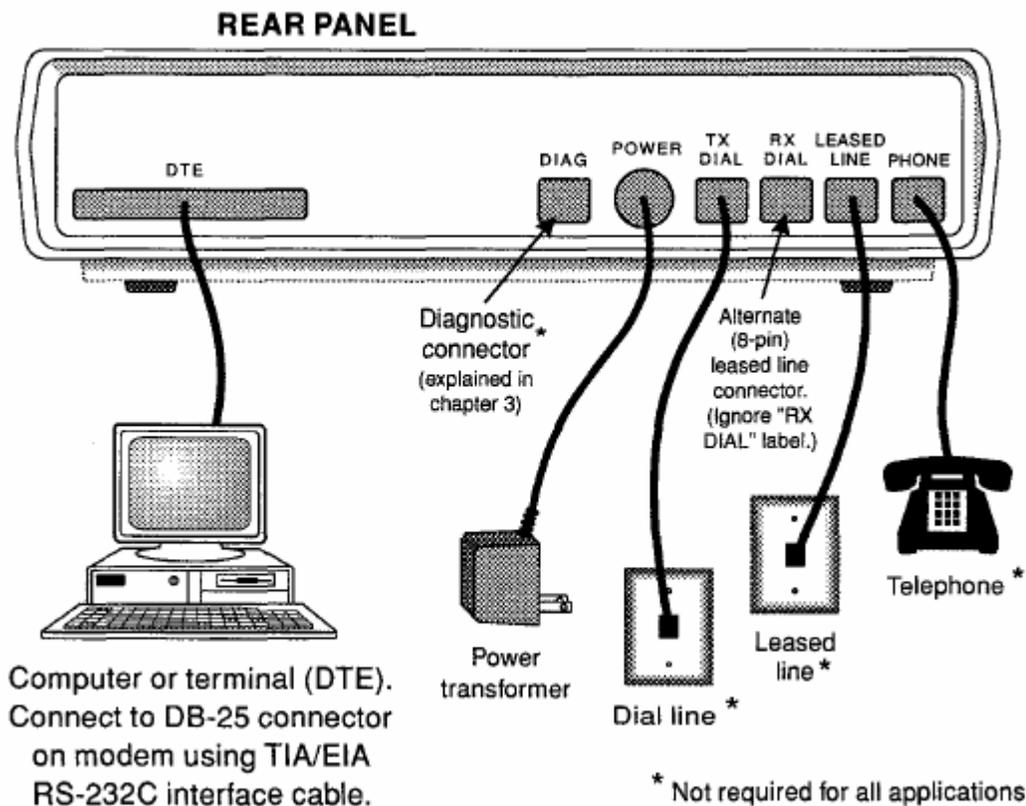


Figure 1-1. Installation of the ALX modem

Jumpers

For most applications, do not change the internal jumper switches. However, jumper switches must be changed if you need to connect frame ground to signal ground, switch from A/A1 control to MI/MIC control, change the function of TIA/EIA pin 25 (test mode indicator, by default) or use the ALX in a DC rack enclosure. For detailed jumper information, see Appendix D.

FRONT PANEL LCD and CONTROLS

This section explains how to use the liquid crystal display (LCD) and pushbuttons on the modem's front panel (Figure 1-2). You will need to use the LCD and pushbuttons to select a Quick Setup configuration, as explained in the next section.

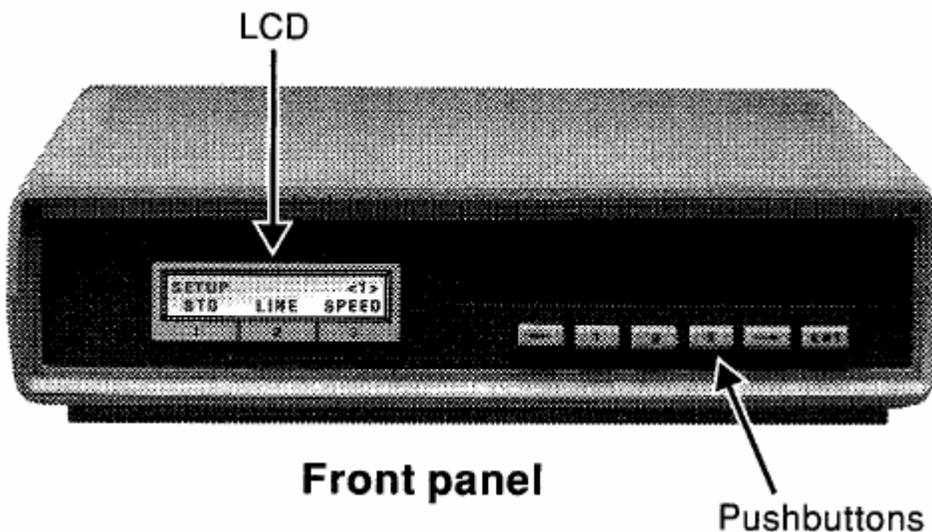


Figure 1-2. Pushbuttons and LCD on the modem's front panel

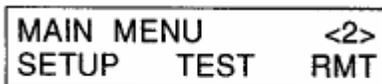
How to Use the Pushbuttons

By using the front panel pushbuttons, you can make selections as indicated on the LCD to choose option settings, initiate tests and perform other operations. (In Hayes mode, many of these features can be accessed via the front panel or by using AT commands.) The possible choices for each option are shown on the LCD and on the LCD flow chart in the back of this manual.

Arrow Pushbuttons

The left arrow (←) and right arrow (→) pushbuttons are used to display additional or previous screens that are part of the same menu. See Figure 1-3.

If a menu has more than one screen, each screen is numbered in the upper right corner, as follows: <2>. (See the screen represented below.) If a menu has no screen number, it has only one screen. Additional menu screens, where present, show additional option selections.

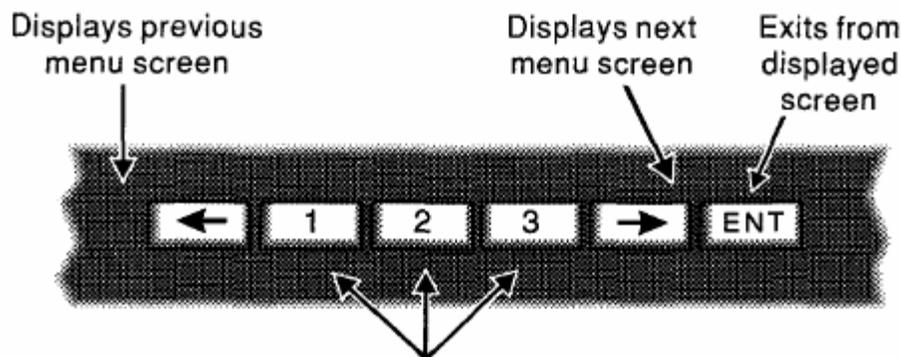


Here, the screen number is 2.

Numbered Pushbuttons

Pushbuttons 1, 2 and 3 correspond to segments 1, 2 and 3 of the LCD screen. These segments (left, middle and right positions of the LCD screen) are numbered on the modem's front panel. To make a selection from a menu screen, push the button with the same number as the selection you want.

With respect to how the LCD flow chart is organized, pushbuttons 1, 2 and 3 take you to a *lower level* – or, where there is no route to a lower level, select an option setting.



Used to select choice 1, 2 or 3 from the LCD

(Each of the possible selections on the bottom line of the LCD is identified as 1, 2 or 3 on the modem front panel, below the LCD.)

Figure 1-3. Summary of pushbutton control functions.

ENT Pushbutton

To exit from a displayed screen, press the ENT (enter) pushbutton. With respect to how the LCD flow chart is organized, pushing the ENT button moves you upward through the chart (toward the MAIN MENU).

If you become lost, press the ENT button repeatedly to return to screen 1 of the MAIN MENU. Pressing ENT repeatedly after you have arrived at MAIN MENU screen 1 causes the LCD to alternate between the TIA/EIA status screen and the MAIN MENU. (In the case of most tests, the ENT button cannot be used to exit the test screen once the test has been activated; you must first press the ENT button and then select OFF to end the test.)

Note: If you have selected a Quick Setup or have changed certain option settings, pressing the ENT button as you exit the SETUP menu causes the modem to rest.

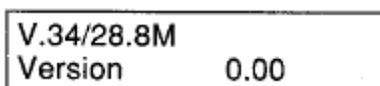
DEC/INC (Decrease/Increase) Screens

Many option screens show the abbreviations DEC and INC on the bottom line of the LCD display, with option settings shown on the top line (usually to the right). On most DEC/INC screens, you can cycle through the available option settings by pressing pushbutton 1 (DEC) or pushbutton 3 (INC). (DEC decreases numerical values, INC increases them.) When you see the setting you want, press pushbutton 2 to select it. The setting will flash, indicating that it is selected.

A few of the DEC/INC screens are used to enter or change a text or number string one digit or one character at a time (for example, the PHONE CELL, ADDRESS and PASSWORD screens). Special instructions for these screens are included later in this manual.

Power-On Screen

When the ALX modem is powered on, the LCD momentarily displays the power-on screen, which typically looks like this:



The top line identifies the modem type and model. The bottom line shows the revision level of the software used in the ALX modem. *If you need to call Raymar-Telenetics' Technical Support Group with a question or service problem, please be prepared to provide the software revision level of your unit.*

After showing the power-on screen for about 2 seconds, the ALX displays the TIA/EIA status screen.

TIA/EIA Status Screen

The TIA/EIA status screen, shown below, indicates the operational status of the ALX as well as the condition of certain TIA/EIA RS-232 leads. The abbreviations that may appear are identified below; however, typically, only a few of these abbreviations will be displayed during actual operation.

TIA/EIA status screen:

D	TR	MR	RS	CS	TD
9600	TM	ER	CD	RD	

Status screen abbreviations:

- D** Dial line occupied
- R** Ringing (R appears in same position as D)
- S** Connection secured by security handshake (S appears in same position as D. S and D may flash alternately.)
- TR** Data Terminal Ready
- MR** Data Set Ready
- RS** Request to Send
- CS** Clear to Send
- TD** Transmit Data
- 28.8, 19.2, 14.4, 9600, 4800, etc.** Transmitter (TX) data rate, or link rate in Kbps (thousand bits per second) or bps (bits per second). Speed of data transmission on the line.
- TM** Test mode
- ER** Error (poor signal quality)
- CD** Carrier Detect
- RD** Receive Data

Codes beginning with “H” (such as H-01) in the lower left corner of the status screen indicate that the ALX is handshaking with another modem (attempting to establish a connection). When the modem is off-line, the work “idle” is displayed in the same position.

(Additional status screens are described in Chapter 6.)

QUICK SETUP

To quickly set up the ALX modem for immediate use (or to quickly change the modem's configuration for an alternate mode of operation), select one of the factory-preset Quick Setup configurations (Table 1-1).

When a Quick Setup is selected, the ALX automatically sets all of its options to the settings that best suit the application type (Quick Setup) you have selected. Selecting a Quick Setup overwrites previously stored option settings but does not affect telephone numbers which may be stored in the modem's memory.

You may later customize a Quick Setup configuration by changing specific option settings (Chapter 2).

How to Select a Quick Setup

To select (activate) a Quick Setup configuration, follow the steps below. While doing so, it may be helpful to refer to the LCD flow chart in the back of this manual.

1. Press the ENT (enter) pushbutton on the modem's front panel.

Screen 1 of the MAIN MENU will be displayed:

```

MAIN MENU    <1>
TALK  QUICK  DIAL
  
```

You may have to press the ENT button two or more times to see screen 1 of the MAIN MENU. This will depend on which screen is displayed initially.

2. Press pushbutton 2.

Screen 1 of the QUICK SETUP menu will be displayed:

```

QUICK SETUP  <1>
2-W  DIAL  (HAYES)
  
```

3. Move to the QUICK SETUP screen that shows the configuration you want.

Use the right arrow button to move from QUICK SETUP screen 1 to the QUICK SETUP screen for the configuration you want. You may also use the left arrow button to move "backward" through the QUICK SETUP menu.

** There is a QUICK SETUP screen for each Quick Setup configuration. For a brief description of each Quick Setup configuration, see Table 1-1.

4. When the LCD shows the Quick Setup configuration you want, press pushbutton 2.

This will cause the bottom line of the display to flash on and off.

5. Press the ENT button twice.

As you do this, you will see SETUP screen 1; then - after you press the ENT button a second time – the modem will reset. (It is at this point that the selected Quick Setup actually takes effect.)

The modem is now set up for the Quick Setup configuration you have selected. All options will be set as shown in Appendix B. If you want to customize the Quick Setup configuration by changing individual options, see Chapter 2. For Hayes mode options, see Chapter 4.

Table 1-1. ALX Quick Setup Configurations

Quick Setup as Identified on LCD	Description
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <01> 2-W DIAL (HAYES) </div>	<p>2-WIRE DIAL HAYES EMULATION MODE – This Quick Setup (for communication over ordinary phone lines) allows the ALX modem to automatically dial (autodial) a previously stored phone number and respond to Hayes commands. This mode is compatible with communication software packages that use Hayes-style “AT” commands. <i>The Hayes mode Quick Setup is the factory default configuration for the ALX modem.</i></p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <02> V25 DIAL (Async) </div>	<p>2-WIRE DIAL V.25bis MODE, ASYNCHRONOUS – In V.25bis mode, the ALX operates in conformance with ITU-T¹ Recommendation V.25bis, allowing you to store and direct dial or autodial phone numbers from the DTE. Use Quick Setup 2 if the DTE connected to the modem is asynchronous.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <03> V25 DIAL (Syn_c) </div>	<p>2-WIRE DIAL V.25bis MODE, SYNCHRONOUS CHARACTER ORIENTED – Same as Quick Setup 2 except for data protocol. Use Quick Setup 3 if the DTE is synchronous character oriented (bisynchronous).</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <04> V25 DIAL (Syn_b) </div>	<p>2-WIRE DIAL V.25bis MODE, SYNCHRONOUS BIT ORIENTED – Same as Quick Setup 2 except for data protocol. Use Quick Setup 4 if the DTE is synchronous bit oriented (SDLC/HDLC).</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <05> 2-W DIAL (DUMB) </div>	<p>2-WIRE DIAL DUMB MODE – When the ALX is in Dumb mode, you can use the modem for dial answer-only applications, dial a previously stored telephone number from the front panel, or dial phone numbers via an external source (telephone).</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <06> 2-W LEASED (ORG) </div>	<p>2-WIRE LEASED LINE ORIGINATE MODE – In Leased Line mode, the ALX connects to the leased line and stands ready to send and receive data. Use Quick Setup 6 if the leased line is a 2-wire line and you want to configure the ALX as the originate modem.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> QUICK SETUP <07> 2-W LEASED (ANS) </div>	<p>2-WIRE LEASED LINE ANSWER MODE – Same as Quick Setup 6 except for modem answer/originate status. Use Quick Setup 7 if the leased line is a 2-wire line and you want to configure the ALX as the answer modem.</p>
<p>¹ International Telecommunications Union – Telecommunications Sector, formerly CCITT.</p>	

<p>QUICK SETUP <08> 4-W LEASED (ORG)</p>	<p>4-WIRE LEASED LINE ORIGINATE MODE – Same as Quick Setup 6 except for line type. Use Quick Setup 8 if the leased line is a 4-wire line and you want to configure the ALX as the originate modem.</p>
<p>QUICK SETUP <09> 4-W LEASED (ANS)</p>	<p>4-WIRE LEASED LINE ANSWER MODE – Same as Quick Setup 6 except for line type and answer/originate status. Use Quick Setup 9 if the leased line is a 4-wire line and you want to configure the ALX as the answer modem.</p>
<p>Quick Setups 10 – 16: Some ALX models do not support all Quick Setup modes. (All support Quick Setups 01-09.) If your model does not support a particular Quick Setup mode, you will not be able to access the Quick Setup screen for that mode. For details, see Table 1-2.</p>	
<p>QUICK SETUP <10> 4-WLL V.33</p>	<p>V.33 LEASED LINE OPERATION – This Quick Setup configures the ALX for V.33 operation.</p>
<p>QUICK SETUP <11> 2-W DIAL (208)</p>	<p>2-WIRE DIAL BELL 208 OPERATION – This Quick Setup configures the ALX for 2-wire dial operation compatible with Bell standard 208B.</p>
<p>QUICK SETUP <12> 2-W DIAL V34/208</p> <p style="text-align: center;">↑ (V32 on V.32 models)</p>	<p>2-WIRE DIAL V.3x/208 AUTO-DETECT MODE – This Quick Setup configures the ALX to automatically select V.34, V.32bis (V.13) or Bell 208 operation, depending on the mode of the originating modem.</p>
<p>QUICK SETUP <13> 4-WLL V.29</p>	<p>4-WIRE LEASED LINE V.29 MODE – This Quick Setup configures the ALX for V.29 operation, for compatibility with V.29 modems.</p>
<p>QUICK SETUP <14> V.29 FAST MASTER</p>	<p>V.29 FAST MASTER MODE – This Quick Setup configures the ALX for V.29 fast train master operation, for use in a multidrop network where multiple remote ALX (slave) modems share the master ALX as the host modem.</p>
<p>QUICK SETUP <15> V.29 FAST SLAVE</p>	<p>V.29 FAST SLAVE MODE – This Quick Setup configures the ALX for V.29 fast train slave operation, for use in a multidrop network where multiple remote ALX (slave) modems share the same ALX hose (master) modem.</p>
<p>QUICK SETUP <16> 2-W DIAL V.27</p>	<p>2-WIRE DIAL V.27 MODE- This Quick Setup configures the ALX for 2-wire dial operation in compliance with ITU-T V.27ter.</p>

Table 1-2. Quick Setup Modes
Supported by Specific ALX Models

Quick Setup Mode	ALX Models	
	V.32, V.32M	V.32/14.4, V.32/14.4M, V.32/19.2, V.32/19.2M, V.34, V.34M
Hayes (01) V.25bis (02-04) Dumb (05) Leased (06-09)	Y	Y
V.33 (10)	N	Y
Bell 208 (11-12)	N	Y
V.29 (13-15)	N	Opt.
V.27 (16)	N	Opt.
<p>Y - Yes; supported. N - No; not supported. Opt. - Optional; available only on certain versions of the listed model. V.26: Models with V.29/V.27 option also support V.26 operation. (However, there is no V.26 Quick Setup.)</p>		

BASIC OPERATION

To assist you in getting the ALX modem up and running, the following sections provide basic information for each of the modem's primary operating modes. For additional operating information, refer to the remaining chapters in this manual. If you encounter difficulty, refer to the section titled *If You Have Problems* at the end of this chapter.

2-Wire Dial Hayes Mode

Two-wire dial Hayes emulation mode is the factory default configuration for the ALX modem. Hayes mode operation is explained in detail in Chapter 4.

To dial a telephone number in Hayes mode, type the Hayes command **AT D** on your computer or terminal keyboard followed by the number you want to call, for example:

AT D 5551212 [CR]

Dashes or spaces may be included for clarity, but they are not necessary. (The ALX will ignore them.) A carriage return [CR] or period is required at the end of each command line. (On most keyboards, the carriage return [CR] key is labeled "Enter" or "Return.") In response to the command line shown above, the ALX will dial the number 555-1212.

To dial an access code such as 9 to dial out of your building, insert the access code and a comma in the dial string:

AT D 9,5551212 [CR]

The comma causes the ALX to pause for 2 seconds after the access code before dialing the number.

When a phone number is successfully dialed, a "CONNECT" message appears on the computer screen, and the LCD on the ALX displays a status screen that typically looks like this:

D	TR	MR	RS	CS	TD
9600				CD	RD

TD and RD will flash (to indicate that the modem is transmitting and receiving data).

To terminate a call, first enter the escape sequence ++++. When the OK response appears on the DTE screen, enter the command **AT H**. An alternate method is to drop the DTR signal from the DTE. If you are using a computer with a communication software program, follow the program's instructions for initiating and terminating calls.

2-Wire Dial V.25bis Mode

The ALX modem supports three types of V.25bis operation – asynchronous, synchronous character oriented or synchronous bit oriented. There is a Quick Setup for each V.25bis type, as shown in Table 1-1. For V.25bis operation, **the modem must be configured to use the same data protocol** (asynchronous, synchronous character oriented or synchronous bit oriented) – **as the attached DTE**. If you have selected the correct V.25bis Quick Setup, the data protocol will be set automatically to the correct setting. V.25bis mode operation and commands are explained in detail in Chapter 5.

Asynchronous V.25bis Operation

For asynchronous V.25bis operation, the data format of the DTE should be set to **7 data bits with even parity and one stop bit**. (Note that the default DTE interface rate is 38.4 Kbps in asynchronous mode.)

In asynchronous applications, V.25bis commands (listed in Chapter 5) may be entered from the DTE keyboard. For example, the simplest command sequence is **CRN 3331234**. In response to this command, the ALX sends a VAL result code (indicating that the command has been accepted), dials the telephone number, 333-1234, and then waits for an answer tone from a distant modem. If no carrier is detected within a given time (45 seconds by default), the modem automatically releases the line and sends a CFI NT result code.

When a call is successfully connected, the TIA/EIA status screen on the ALX will typically look like this:

D	TR	MR	RS	CS
9600				CD

Synchronous V.25bis Operation

For synchronous V.25bis operation, set the data format of the DTE to **7 data bits with odd parity**.

In synchronous applications, the V.25bis commands can facilitate computer-controlled operations. Synchronous bit-oriented operation uses High Level Data Link Control (HDLC) formatting. In synchronous character-oriented operation, messages are framed by synchronous start-of-text and end-of-text characters, with the start-of-text character preceded by two synchronous (SY) characters.

2-Wire Dial Dumb Mode

Dumb mode is used primarily for manual call origination, answer-only applications and in conjunction with certain dial back security systems that utilize MI/MIC signals to place the modem on-line. (If you need to configure the modem for MI/MIC use, refer to Appendix D).

After the Quick Setup for 2-wire dial Dumb mode has been selected, the ALX is configured to automatically answer incoming calls. The only other requirement is that the DTE must provide the DTR signal (TR on the TIA/EIA status screen) to the modem *or* DTR must be set to TRUE (using the modem's DTR from EIA option screen).

For additional information on dumb mode, see Chapter 3 (*Front Panel Autodialing and Dumb Mode and Bell 208 Operation* sections).

Leased Line (2- or 4-Wire) Mode

This section does not apply to V.33 and V.29 leased line operation; these modes are covered in subsequent sections.

The following information applies to both 2-wire and 4-wire leased line operation:

- **The modem must be configured for the correct line type** – 2-wire or 4-wire. If you have selected the correct Leased Line Quick Setup, the line type will be set automatically to the correct setting.
- **One modem must be set to originate mode and the other to answer mode.** If you have selected the correct Leased Line Quick Setup, the answer/originate status will be set automatically to the correct setting.
- By default, V.34 leased line operation is restricted to data rates of 2400 bps or higher. V.32 operation leased line operation is restricted to data rates of 4800 bps or higher.
- Lines can be conditioned or unconditioned.
- Leased line modes default to synchronous data type, but may be changed to asynchronous. (If the data type is asynchronous, error correction may be used.)

After you select the appropriate Leased Line Quick Setup, the answer and originate modems will “handshake” and then connect. When the connection is established, the TIA/EIA status screen will be present. Typically this screen will look like this:

TR	MR	RS	CS	TD
9600			CD	RD

V.33 Leased Line Operation

All ALX models, except the ALX V.32 and ALX V.32M, support **V.33 operation**. All features, options and other information in this manual identified as V.33 mode-related apply only to models equipped for V.33 operation. If you are not sure if your modem supports V.33 operation, check the Quick Setup menu on the front panel LCD. Quick Setup 10 is present only on models that support V.33 operation.

V.33 operation is synchronous only and is restricted to speeds of 12.0 and 14.4 Kbps.

A 4-wire line must be used (conditioned or unconditioned), and both connected modems must be set for V.33 operation.

After the V.33 Leased Line Quick Setup has been selected, the ALX immediately begins the training sequence and is ready to communicate with the other modem. The second modem to come online automatically establishes the data link; this may be either the local or remote unit.

When the local modem has established a connection with the remote unit, the TIA/EIA status screen will be present. Typically this screen will look like this:

TR	MR	RS	CS	TD
14.4			CD	RD

2-Wire Dial Bell 208 Operation

All ALX models, except the ALX V.32 and ALX V.32M, support Bell 208 operation. All features, options and other information in this manual identified as Bell 208 mode-related apply only to models equipped for Bell 208 operation. If you are not sure if your modem supports Bell 208 operation, check the Quick Setup menu on the front panel LCD. Quick Setups 11 and 12 are present only on models that support Bell 208 operation.

Two Types of Bell 208 Operation

Two Bell 208 Quick Setups are available, as shown in Table 1-1. One configures the ALX for Bell 208 operation, exclusively; the other configures the ALX for V.3x/208 auto-detect mode.

Bell 208 Operation (Exclusive)

Quick Setup 11 configures the ALX for 2-wire dial synchronous operation compatible with Bell standard 208B. The data rate is fixed at 4800 bps, and the data type is set to synchronous. **Both connected modems must be set for 208B operation.**

Beginning with the section titled *Answering a Call Automatically*, all information in the *2-Wire Dial Dumb Mode* section also applies to Bell 208 operation.

V.3x/208 Auto-Detect Mode

Quick Setup 12 configures the modem for V.3x/208 auto-detect mode. V.3x indicates V.34 or V.32, depending on the ALX model:

- On the ALX V.34 and ALX V.34M, Quick Setup 12 is identified on the LCD as 2-W DIAL V.34/208. These two models automatically select V.34, V.32bis or Bell 208 mode, depending on the mode of the originating modem.
- On all other ALX modems (V.32 models), Quick Setup 12 is identified as 2-W DIAL V.32/208. The V.32 models automatically select V.32bis or Bell 208 mode, depending on the mode of the originating modem.

If the connection is a V.32bis connection, the ALX will default to V.13 mode (with the V.13 Operation option set to the TX AND RX selection). **The ALX will not handshake in V.22bis, V.21/V.22/V.23 or Bell 212/103 mode when it is configured for V.3x/208 auto-detect mode.**

For additional information on Bell 208 operation, see Chapters 2 (*Communication Standard* section) and 3 (section titled *Dumb Mode and Bell 208 Operation*).

4-Wire Leased Line V.29 Mode

V.29/V.27/V.26 capabilities are optional on certain models (as listed in Table 1-2). All features, options or information in this manual identified as V.29-, V.27-, V.26- related apply only to models that include the V.29/V.27/V.26 option. If you are not sure if your modem includes the V.29/V.27/V.26 option, check the Quick Setup menu on the front panel LCD. Quick Setups 13 through 16 (for V.29 and V.27) are present only on models that include the V.29/V.27/V.26 option.

The following information applies to 4-wire leased line V.29 operation:

- **The modem must be configured for use with a 4-wire line.**
If you have selected the 4-Wire Leased Line V.29 Quick Setup, the line type will be set automatically to the correct setting.
- **Operation is restricted to data rates of 4800, 7200 and 9600 bps.**
- Lines can be conditioned or unconditioned.

After you select the 4-Wire Leased Line V.29 Quick Setup, the ALX will send a training sequence and wait for a training response from the remote modem. The ALX will repeat the training sequence every 1.2 seconds until the remote modem responds.

When the local modem has established a connection with the remote unit, the TIA/EIA status screen will be present. Typically this screen will look like this:

TR	MR	RS	CS	TD
9600			CD	RD

Note: For point-to-point 4-wire leased line V.29 operation, the Auto-Retrain option should be enabled on both modems. (Auto-Retrain is enabled by default if you select the 4-Wire Leased Line V.29 Quick Setup.) If the Auto-Retrain option is disabled, the modem will not transmit a training sequence and will instead train on the data stream from the remote modem. Disabling Auto-Retrain in 4-wire leased line V.29 mode is recommended for test purposes only. If Auto-Retrain is disabled, it should be disabled on both modems.

V.34/V.32 Dial Backup

Dial backup can only be used in point-to-point applications.

To prevent service interruption in the event of poor leased line conditions, the ALX can be configured for V.29 leased line operation with V.34/V.32 dial backup. This means the ALX will use dial lines to automatically restore operation when conditions on the leased lines deteriorate. (The ALX V.34 and V.34M modems will use V.34 or V.32 modulation for dial backup. Other ALX models will use V.32 modulation.) To set up the ALX for V.29 leased line operation with dial backup, follow these steps:

1. Select the 4-wire leased line V.29 (4-WLL V.29) Quick Setup on both the local and remote modem.
2. One modem must be set to originate mode and the other to answer mode. To make this selection, use the ANS/ORG DEFAULT screen on the front panel LCD.
3. Configure the modems for leased line auto-recovery, as explained in Chapter 3.

V.29 Fast Master and Slave Modes (Quick Setups 14-15)

Modems used in a V.29 Fast Master and Slave (multidrop) configuration must be Alliance modems that support V.29 operation.

In multidrop operation (Figure 1-4), the master modem transmits to all of the slave (remote) modems. When the DTE at a slave site recognizes its own address in the polling protocol, it raises RTS to the slave transmitter. The slave responds by transmitting a special training sequence, then raising CTS and transmitting the data from the DTE. When the DTE has completed transmission, it lowers RTS and the modem will drop carrier to let the next modem on the poll list use the channel.

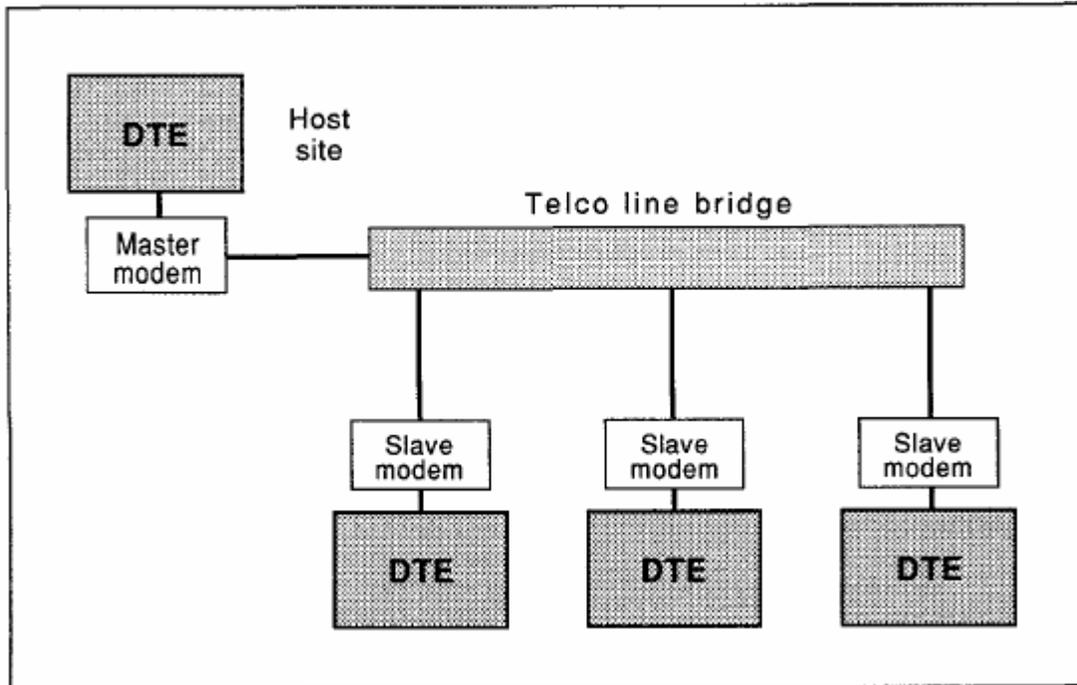


Figure 1-4. A typical multidrop configuration

The V.29 Fast Master and Fast Slave modes support data rates of 4800, 7200 and 9600 bps. The leased lines can be conditioned or unconditioned. The master modem must be set to originate mode, and the slave modem must be set to answer mode. (The Answer/Oriinate option is automatically set to these settings when the V.29 Fast Master and Fast Slave Quick Setups are used.)

Slave-to-Master (Inbound) Transmission

When the remote modems come on-line, they automatically synchronize to the incoming carrier and train on the data stream from the master modem. Slave-to-master transmission is always switched carrier operation under control of the RTS signal from the DTE. An anti-streaming timer built into the ALX modem will (if enabled) halt transmission if the DTE holds RTS on for more than 30 seconds. The assumption is that if RTS is held on for more than 30 seconds, there is a fault in the DTE.

If you access the TIA/EIA status screen on the LCD display when a slave modem is transmitting to the master modem, the status screen will typically look like this:

TR	MR	RS	CS	TD
9600			CD	RD

Typically TD, CD and RD will flash on the master modem, and RS, CS, TD and RD will flash on the slave modems.

2-Wire Dial V.27 Mode

When you select the 2-Wire Dial V.27 Quick Setup, the ALX is automatically configured for V.27ter operation. V.27ter operation supports a data rate of 4800 bps only.

For information on answering, originating and terminating a call in V.27 mode, see Chapter 3, *Front Panel Autodialing* section and the section titled *Manual Originate/Answer Operation* under *Dumb Mode and Bell 208 Operation*. These sections apply to V.27ter operation.

IF YOU HAVE PROBLEMS . . .

If you encounter difficulties in setting up or using the modem, try the remedies described below. If you suspect a system malfunction, follow the diagnostic procedures described below. If you suspect a system malfunction, follow the diagnostic procedures described in Chapter 6. If you cannot resolve the problem, call Raymar-Telenetics' Technical Support Group for assistance.

All Modes:

Make sure all cables are properly connected to the back of the modem.

All Dial Modes (Hayes, V.25bis, Dumb, Bell 208 and V.3x/208):

DTR (Data Terminal Ready) must be ON (received from DTE, or DTR from EIA option set to TRUE) if you want to use the modem's autodial or auto-answer features. (If DTR is ON, the TR indicator will be present on the TIA/EIA status screen.)

All Asynchronous Modes:

The modem's default DTE speed is 38.4 Kbps in asynchronous mode. If the local DTE does not support this speed, change the modem's DTE Speed option setting. In Hayes mode, the default DTE speed is automatically overridden when the ALX is autobauded (when the Hayes mode "AT" attention code is sent to the ALX).

Hayes Mode:

In Hayes mode, with default settings in effect, the ALX transmits result codes (messages) to the DTE. In some installations, this may cause undesirable interaction with the attached DTE. If such interaction occurs, result codes for incoming calls should be suppressed (using the command **AT Q2**).

All Leased Line Modes (2-Wire, 4-Wire, V.33 and V.29):

DTR (Data Terminal Ready) must be ON for the units to train on the leased line. (If DTR is ON, the TR indicator will be present on the TIA/EIA status screen.)

Leased Line (Excluding V.33 and V.29 Operation):

Make sure one modem has been set to originate mode and that the other has been set to answer mode. (If the correct Quick Setup has been selected, and not incorrectly modified, the answer/originate status should be correct.)

CHAPTER TWO – OPTIONS: CUSTOMIZING THE MODEM SETUP

METHODS for SELECTING OPTIONS

The ALX modem allows you to easily select (change) options in order to tailor the modem's operation to suit a particular application. Options can be selected in any of the following ways:

- **Quick Setup** (explained in Chapter 1) automatically sets all options according to a preset configuration.
- **Front panel option selection** This is the easiest method for selecting *individual option choices*. *Changes are made by accessing individual option screens on the front panel LCD and then making selections using the control pushbuttons.*
- **Summary Setup** This is the fastest way to selectively change multiple options. All options are accessed using just a few of the LCD screens. However, because these screens show numerical codes with very little explanation, Summary Setup is recommended only for experienced users. Summary Setup is explained in Appendix C.

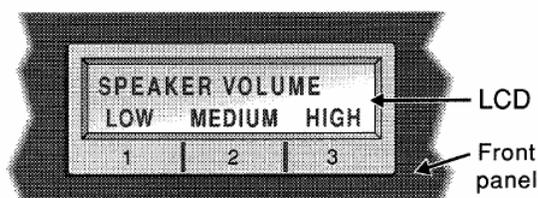
SELECTING OPTIONS FROM THE FRONT PANEL

This section explains how to select (change) option settings using the front panel LCD. It applies to all option screens on the LCD except the Quick Change configuration screens, which are explained in Appendix C.

* If you are not familiar with the front panel LCD and pushbuttons, see *Front Panel LCD and Controls* in Chapter 1 before you proceed.

Options are accessed from the SETUP menu. To access the SETUP menu, go to screen 2 of the MAIN MENU; then push button 1 to select SETUP. Then use the arrow pushbuttons to move between the six SETUP menu screens. (The SETUP menu screens and the path to each option are shown on the LCD flow chart in the back of this manual.)

Once you have located the screen that displays the option you want to view or change, select your choice by pushing the button with the same number as the selection you want. Each selection on the bottom line of the LCD is numbered either 1, 2 or 3 on the modem front panel (not on the LCD), as shown below. For example, to select HIGH from the screen shown below, press pushbutton 3.



To select a setting from a DEC/INC screen, use pushbutton 1 or 3 to cycle through the option settings, when you see the standard you want, use pushbutton 2 to select the desired setting.

When you select a setting from an option screen, your selection flashes on and off on the LCD. However, the selection does not take effect until you leave the SETUP menu.

Note the following important points –

- Selected options do not become active until you leave the SETUP menu.
- Changing most options will cause the modem to automatically reset.
- The option choices you select are automatically saved by the ALX when you leave the SETUP menu.
- If you access any screens from the SETUP menu and then use AT commands or V.25bis commands before exiting from the SETUP menu, you may change the modem's configuration with undesirable results. To prevent this, press the ENT pushbutton to exit the SETUP menu prior to issuing any AT or V.25bis commands.

Example of How to Select an Option

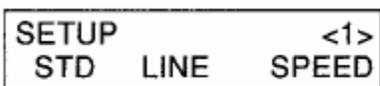
The example that follows illustrates how options are selected. As you follow the steps below, refer to the LCD flow chart in the back of this manual. When you are done, you can easily restore default settings for the type of application you will be using by selecting the appropriate Quick Setup (Table 1-1).

The example shows how to change the volume of the modem's speaker from LOW or HIGH (the default setting) to MEDIUM. To make this adjustment, you must locate the SPEAKER VOLUME screen on the LCD. To reach this screen, you must first access MAIN MENU screen 2, then SETUP screen 4 and then MODEM SETUPS screen 5, as explained below:

After powering on the modem, press ENT to get the first screen of the MAIN MENU. Press the right arrow pushbutton to go to screen 2 of the MAIN MENU (so the SETUP menu can be selected):



Press pushbutton 1 to access the first screen of the SETUP menu:



Now press the right arrow pushbutton three times; this will cause SETUP screen 4 to be displayed:

```

SETUP          <4>
TEST  EIA    MODEM
  
```

Press pushbutton 3 to select MODEM (for MODEM SETUPS). The first MODEM SETUPS screen will be displayed:

```

MODEM SETUPS  <1>
CDLVL          TXLVL
  
```

Press the right arrow pushbutton four times to reach MODEM SETUPS screen 5:

```

MODEM SETUPS  <5>
FP   SPK     SPKVOL
  
```

Press pushbutton 3 to select SPKVOL (speaker volume). The SPEAKER VOLUME screen will be displayed:

```

SPEAKER VOLUME
LOW  MEDIUM  HIGH
  
```

The currently selected setting will flash on and off. Press pushbutton 2 to switch the volume setting to MEDIUM. “MEDIUM” will flash on and off, indicating that this setting has been selected (although the new selection will not become active until you exit the SETUP menu). To return to the first screen of the MAIN MENU, press the ENT button several times.

How to Return to the TIA/EIA Status Screen

If you want to return to the TIA/EIA status screen, press the ENT pushbutton several times – exactly how many times will depend on which screen you are exiting from. (If the modem is in a test mode, you must, in most cases, press ENT and then select OFF to end the test before the ENT button can be used to exit the test screen.)

Automatic Configuration Save Feature

When you exit the SETUP menu, the ALX automatically saves its current configuration (i.e., option setups, including any changes you have selected) to its internal memory. The saved configuration will remain in effect until it is changed – even in the event of a loss of power.

How to Return to Default Settings

Quick Setup

The default settings are different for each of the Quick Setup configurations (2-wire dial Hayes, 2-wire dial V.25bis, etc.). To return to the Quick Setup default settings for any of these configurations, go to the QUICK SETUP menu and select the desired configuration. Selecting a Quick Setup will not delete stored phone numbers.

Factory Reset

A *factory reset* entirely reconfigures the modem to the state it was in when shipped from the factory. **All modem options are changed to the factory default settings, and any phone numbers stored in the modem's memory are deleted.** To effect a factory reset, push and hold in the right arrow pushbutton as you power up the modem until the words "FACTORY DEFAULT" appear on the LCD.

OPTIONS

The rest of this chapter describes the options available from the ALX front panel. The options are presented in the order in which they appear in the LCD chart (in the back of this manual). For each option, all possible choices (available selections) are explained.

The line of text immediately below each option heading indicates the applicability of the option: A mode (i.e., Quick Setup mode) is listed only if the option is effective in that mode and if it can be of practical use in that mode.

For a concise summary of the ALX options and option choices, see the LCD flow chart. *The default settings for each option are listed in Appendices B and C.*

- Quick Setups

All modes

The Quick Setups (one for each operating mode) are unique in that they affect the entire modem configuration. For complete details, see Chapter 1 and Appendix B.

- Communication Standard (STD on the LCD)

All modes

This option (available on all models except the ALX V.32 and ALX V.32M) allows you to select a communication standard: ITU-T V.34, V.32, V.33, V.29 or Bell 208. The standard you choose specifies the primary operating mode (or modulation) the modem will use. (If you

have selected a Quick Setup, the Quick Setup automatically selects an appropriate standard, and there is usually no reason to change the Communication Standard option.)

The ALX V.34 and ALX V.34M modems normally use V.34 modulation to communicate with other V.34 modems or fallback modulations to connect with non-V.34 modems. The remaining ALX models normally use V.32bis modulation. When necessary, all models automatically fall back to other modes. You can use the Communication Standard option to select an alternate modulation: V.33, V.29 or Bell 208 – depending on the specific ALX model. (Table 1-2 lists the primary operating modes supported by each model.)

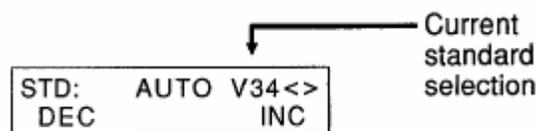
Although you can select the V.33, V.29 and Bell 208 communication standards independently of other options via the STD screen, it is recommended that you instead use the V.33, V.29, Bell 208 or V.3x/208 Quick Setup configuration, as explained in Chapter 1. This will automatically set all options as appropriate for the Quick Setup you have selected, and thereby ensure that the total modem configuration is suitable for the selected operating mode.

The Communication Standard option is not present on the ALX V.32 and V.32M. (These two models use V.32bis modulation or automatically fall back to other modes as necessary. On these two models you cannot select a communication standard, but you can limit operation to a desired speed range by means of the Speed Limit option.)

The standard selected via the Communication Standard option may affect the Speed Limit option settings. For further explanation, see the subsequent section titled *Effect on Speed Limit Option*.

Available Standard Selections

The available Communication Standard selections are listed below. Use pushbutton 1 (DEC) or 3 (INC) to cycle through the selections; when you see the standard you want, use pushbutton 2 to make your selection. The currently selected standard is displayed in the STD screen (upper right corner), as shown below:



AUTO V34 This selection – automatic V.34 operation – is available on the ALX V.34 and ALX V.34M only. It provides the broadest range of compatibility with other modems. When automatic V.34 operation is selected ...

- The modem can connect at data rates from 0-300 bps to 28.8 Kbps.
- Data rates and symbol rates can be independently specified.
(See *Speed Limit option later in this chapter*.)

- The ALX will use V.34 modulation to communication with other V.34 modems, but can also automatically fall back to V.32terbo, V.32bis or other modulations for compatibility with non-V.34 modems.

V34 This selection – available on the ALX V.34 and ALX V.34M only – stipulates “V.34 only” operation:

- The ALX will connect *only* in V.34 mode. If it cannot establish a call in V.34 mode, it will not connect.
- The modem can connect at all V.34 data rates – from 2400 bps to 28.8 Kbps – but will not fall back to support rates lower than 2400 bps.
- Data rates and symbol rates can be independently specified via the Speed Limit option.

AUTO V32 This selection specifies V.32/V.32bis/V.32terbo operation (data rates up to 19.2 Kbps):

- Training will start in V.32bis mode, and the ALX will use V.32/V.32bis modulation to communicate with other V.32 modems. It can also automatically fall back to V.32terbo or other modulations for compatibility with non-V.32 modems.
- The modem can connect at data rates from 0-300 bps to 19.2 Kbps (depending on the specific model).

V33 V.33 operation is available for 4-wire leased line synchronous operation only. The available data rates are 14.4 and 12.0 Kbps. Either of these rates may be set as the maximum or minimum by using the Speed Limit MAX DCE RATE and MIN DCE RATE screens. **Both connected modems must be set for V.33 leased line operation.**

Bell208 This selection provides Bell 208A compatibility for 2-wire or 4-wire leased line operation and Bell 208A compatibility for 2-wire dial operation. Operation is full duplex in 4-wire leased line mode only. In Bell 208B mode, synchronous V.25bis autodialing is available, but Hayes operation is not. Calls may be originated from the front panel. The data rate is fixed at 4800 bps for 208A/B operation, and the data type is synchronous only.

Both connected modems must be set for 208A/B operation. For 2-wire applications, the carrier option must be set for switched carrier operation (SWITCH) via the CARRIER screen, and CTS must be set to follow RTS (CTS to EIA option).

V3x/Bell208 This selection configures the ALX for V.3x/208 auto-detect mode (where V.3x indicates V.34 or V.32 mode): The ALX V.34 and V.34M will automatically answer in V.34, V.32bis or Bell 208 mode, depending on the mode of the originating modem. All other ALX models (i.e. V.32 models) will automatically answer in V.32bis or Bell 208 mode, depending on the mode of the originating modem.

Note –

- Selecting the V.3x/208 Quick Setup sets the Communication Standard option to V3x/Bell208.
- **When the Communication Standard option is set to V3x/Bell208, the ALX will not handshake in V.22bis, Bell 212/103 or V.21/V.22/V.23 mode.**
- All information in the Bell208 section above also applies to V.3x/208 auto-detect mode.

For further information on Bell 208 mode, see Chapter 3 (section titled *Dumb Mode and Bell 208 Operation*).

V.29 This selection is available only on models that include the V.29/V.27/V.26 option. It configures the ALX for V.29 operation (for data rates of 9600, 7200, or 4800 bps). To select a specific data rate, use the Speed Limit option to select 9600, 7200 or 4800 bps (only) as the minimum and/or maximum data rate (DCE RATE). In V.29 mode, the ALX does not support automatic rate adjustment (fallback) or error correction.

Effect on Speed Limit Option

When you select a communication standard, the Speed Limit option is automatically adjusted to the minimum and maximum data rates shown in Table 2-1. This ensures that the Speed Limit settings are within the appropriate range for the selected standard. After you select the standard, you can change the Speed Limit settings to narrow the speed range if you want.

Table 2-1. Effect of Communication Standard Selection on Speed Limit Setting

Selected Standard	Speed Limit setting: data rate, bps	
	Minimum	Maximum
AUTO V34	0-300	28.8 K
V34	2400	28.8 K
AUTO V32	0-300	19.2 K ¹
V33	12.0 K	14.4 K
Bell208	4800	4800
V3x/Bell208	4800	19.2 K ¹
V29	4800	9600
¹ ALX V.32/14.4 and V.32/14.4M: 14.4 K; ALX V.32 and V.32M: 9600 bps		

V.34 Options

The options listed in this section apply to V.34 operation only and are available on the ALX V.34 and ALX V.34M only.

For normal operation, the V.34 options should not be changed from the default settings. Other settings are intended only for troubleshooting purposes and should be used only by appropriately trained personnel.

Channel Probing Options

- Channel Probing

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

The Channel Probing option allows you to specify whether or not the modem will probe the phone line (channel) to determine the channel characteristics and adjust itself accordingly when establishing a V.34 connection.

ENABLE If channel probing is enabled, the modem will use periodic signals to examine the characteristics of the channel before making a connection, and adjust its symbol rate, carrier frequency and pre-emphasis filter settings accordingly. The modem can also adjust its transmit level, if necessary, if the Transmit Level Adjustable by Probing option is enabled.

DISABLE If channel probing is disabled, the symbol rate, carrier frequency, pre-emphasis filter selection and transmit level will be determined by the settings of these options (respectively): Symbol rate (MAX TX SYM), Mandatory Carrier, Pre-Emphasis Filter and Transmit Level.

- Transmit Level Adjustable by Probing (TX LEVEL ADJUST)

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

This option allows you to control whether or not the transmit level can be lowered as a result of probing.

ENABLE Transmit level can be lowered.

DISABLE Transmit level cannot be lowered.

Symbol Options

- Asymmetric Symbol Rates

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

This option allows you to specify whether the modem's transmitter and receiver symbol rates will always be equal (symmetric) or whether they may be different from one another (asymmetric).

(To set maximum and minimum symbol rates, see the *Speed Limit* section. To specify symmetric or asymmetric data rates, see *Asymmetric Data Rates* later in this section.)

ENABLE Allows the transmitter and receiver symbol rates to be different.

DISABLE Forces the symbol rates to be equal – both are equal to the lower symbol rate (i.e. transmitter rate or receiver rate).

- Optional Symbol Rates

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

Three symbol rate options are available through the OPTIONAL SYMBOL screen: These options allow you to specify whether or not optional symbol rates (3429, 2800 and 2743 sym/s) will be supported when the ALX makes V.34 connections. First select **3429, 2800** or **2743** from the OPTIONAL SYMBOL screen, and then select **ENABLE** or **DISABLE** for the selected rate. You can select Enable or Disable independently, in any combination, for the three symbol rates.

Other V.34 Options

- Asymmetric Data Rates

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

This option allows you to specify whether the modem's transmitter and receiver on-line data rates (28.8, 26.4, 24.0 Kbps, etc.) will be symmetric (always equal) or whether they may be different (asymmetric).

(To set maximum and minimum data rates, see the *Speed Limit* section. To specify symmetric or asymmetric symbol rates, see *Asymmetric Symbol Rates* in this section.)

ENABLE Allows the transmitter and receiver data rates to be different.

DISABLE Forces the data rates to be equal – both are equal to the lower data rate (i.e., transmitter rate or receiver rate).

- Trellis Coding Type

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

This option allows the user to define the type of trellis coding to be used by the modem receiver during V.34 connections. The available selections are **NEG** (Negotiable), **16S** (16 state), **32S** (32 state) and **64S** (64 state).

- Pre-Emphasis Filter (PRE-EMPH)

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

Pre-emphasis is an equalization method that compensates for amplitude distortion. The pre-emphasis filter option determines which type of pre-emphasis filter will be used by the remote modem transmitter during V.34 operation.

0 through **10** These selections – effective only if channel probing is disabled – specify that the selected filter (index 0 through 10) will be used.

NEGOTIABLE (NEG) The ALX will determine which pre-emphasis filter to use, based on channel probing.

INTELLIGENT (INT) This selection is reserved for future use.

- Mandatory Carrier

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

This option – effective only if Channel Probing is disabled – allows you to specify that the carrier frequency will be low or high.

- Precoding

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

Precoding is an equalization method that uses information provided by the remote modem to reduce equalizer noise enhancement caused by amplitude distortion.

NEGOTIABLE (NEG) The ALX determines whether precoding will be used or not.

ON Precoding is forced on (always on).

OFF Precoding is forced off (always off).

- **Shaping**

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

Constellation shaping is a method for improving noise immunity.

NEGOTIABLE (NEG) The ALX determines whether constellation shaping will be used or not.

ON Constellation shaping is forced on (always on).

OFF Shaping is forced off (always off).

- **Nonlinear Encoding (NONLIN ENCOD)**

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

Nonlinear encoding is a method for reducing signal distortion.

NEGOTIABLE (NEG) The ALX determines whether nonlinear encoding will be used or not.

NO Nonlinear encoding is forced on (always on).

OFF Nonlinear encoding is forced off (always off).

- **Phase 4 Training Constellation (PH4 CONST)**

Hayes, V.25bis, dumb, leased line modes (V.34 operation only)

The Phase 4 Training Constellation option allows you to specify a 4-point or 16-point signal constellation during the final phase of training (phase 4) – or you can configure the modem to make this determination.

NEGOTIABLE (NEG) The ALX determines whether the signal constellation will be a 4-point constellation or a 16-point constellation.

16 QAM The ALX will use a 16-point constellation.

4 QAM The ALX will use a 4-point constellation.

- End of V.34 Options -

- Line Type

All modes

2W-D 2-wire dial line; used for dialup applications.

2W-LL 2-wire leased line; for leased line applications that use 2-wire lines.

4W-LL 4-wire leased line; for leased line applications that use 4-wire lines.

- Speed Limit

All modes

The Speed Limit option (accessible by selecting SPEED from SETUP screen 1) allows you to set a minimum and maximum data rate. For V.34 operation (ALX V.34 and ALX V.34M only), you can also use this option to set a minimum and maximum symbol rate. For V.34 operation, you can also set independent data and symbol rate limits for the modem's transmitter and receiver.

The ALX will automatically operate at the highest possible data rate within the limits selected, depending on factors such as the capabilities of the modem at the other end of the communication link and line conditions.

Modem Speed / Speed Limit Option Terminology

DCE rate Data rate, measured in bits per second (bps) and kilobits per second (Kbps). Refers to the rate of data flow through the modem's transmitter and receiver. DCE stands for data communication equipment – a modem is one type of DCE.

Symbol rate Rate at which symbols that carry data are generated. Symbol rate limits and options apply only to the ALX V.34 and ALX V.34M.

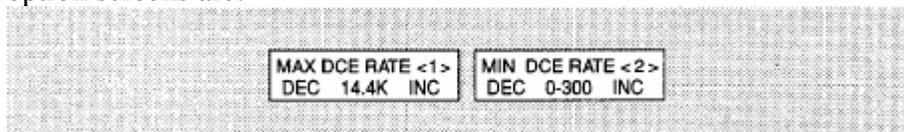
Asymmetric rates Different rates on the modem's transmitter and receiver. Using the Asymmetric Data Rates option and Asymmetric Symbol Rates, you can allow or disallow asymmetric data or symbol rates for V.34 operation only.

TX, RX Used to refer to the modem transmitter (TX) or transmit rate, and the modem receiver (RX) or receive rate.

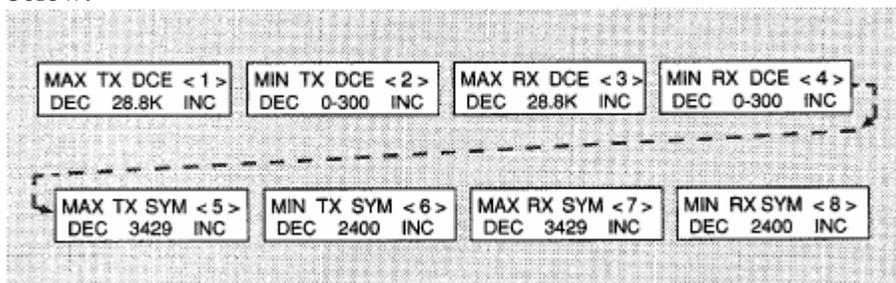
INC, DEC ALX modem interface controls for changing numerical values on the Speed Limit screens. Use pushbutton 1 on the front panel to decrease (DEC) a displayed value; use pushbutton 3 to increase (INC) a value. Then use pushbutton 2 to select the displayed value.

Speed Limit Screens

On the ALX V.32, V.32M, V.32/14.4, V.32/14.4M, V.32/19.2 and V.32/19.2M, the Speed Limit option screens are:



The ALX V.34 and ALX V.34M have eight Speed Limit screens, providing independent control over data rates and symbol rates for the modem's transmitter (TX) and receiver (RX), as shown below:



Available Data Rate Settings

The highest data rate (DCE RATE) you can select depends on the ALX model you have. (Your ALX model displays only the speeds it is capable of using.) The range of possible operating speeds for each ALX model is shown in Table 2-2. You can see the maximum and minimum data rate settings anywhere within these limits.

Table 2-2. Speed Range (Data Rate) for Various ALX Models

Model	Range (Minimum and maximum limits can be set within this range.)
ALX V.34, ALX V.34M	0-300 bps to 28.8 Kbps
ALX V.32/19.2, ALX V.32/19.2M	0-300 bps to 19.2 Kbps
ALX V.32/14.4, ALX V.32/14.4M	0-300 bps to 14.4 Kbps
ALX V.32, ALX V.32M	0-300 bps to 9600 bps

How the Data Rate Settings Are Applied

When the ALX connects with another modem, the modems engage in a “handshake” exchange to determine the other modem’s type, maximum speed capability, etc. The two modems then “negotiate” to determine the highest possible connect speed. The highest and lowest connect rates are constrained by the limits you set via the Speed Limit option.

The following points apply to the Speed Limit option and resultant connect speeds:

- The achievable connect rate depends on phone line quality. Some phone lines will not support rates of 14.4 Kbps and higher.
- ALX V.34 and ALX V.34M only: Different TX DCE and RX DCE rates are effective only if the Asymmetric Data Rates option is enabled. If this option is disabled, TX and RX rates are both determined by the TX DCE limits. (The RX DCE setting(s) is ignored.)
- ALX V.32/19.2 and V.32/19.2M only: To connect at 19.2 or 16.8 Kbps, the modem at the other end of the link must be a V.32terbo modem or a Raymar-Telenetics 19.2-Kbps modem manufactured prior to adoption of the V.32terbo specification.
- If the ALX is not in Hayes mode and is configured for “normal” (direct) operation (Buffer Mode and V.42 Mode disabled), the minimum speed should be set to the same speed as the DTE speed.
- If SYNC AFTER DIAL is enabled (using the Hayes mode **&Q1** command), the data rate will be negotiated between the maximum speed and 1200 bps.
- Leased line operation is restricted to data rates of 2400 bps or higher. On the non-V.34 ALX models, the default minimum speed limit for all leased line modes is 4800 bps. Therefore, if you want 2400 bps operation on the non-V.34 models, you must set both MAX DCE and MIN DCE to 2400 bps.
- For V.29 leased line operation, the only valid minimum and maximum rate selections are 4800, 7200, 9600 bps. Any other selection may cause the modem to malfunction.

- For 600- or 1200/75-bps operation, V.22bis/V.22/V.21/V.23 operating mode fallback option must be selected. To connect at 1200/75 bps, the minimum and maximum data rate must both be set at 1200/75 bps on both modems.

Related options: Buffer Mode / Speed Conversion, Speed Matching, Forward Rate Renegotiation, Asynchronous Overspeed Range, DTE Speed.

Symbol Rate Settings

The minimum and maximum symbol rate settings (“SYM” on the LCD) apply to V.34 connections only. The available selections are **3429, 3200, 3000, 2800, 2743, 2400** sym/s (symbols per second).

Where analog implemented carrier is used, more calls will connect successfully at symbol rates of 2743 and 2800 sym/s. On noisy T1 PCM digitally implemented connections, more calls will connect when the symbol rate is set to 3429-sym/s.

V.42 ERROR CORRECTION OPTIONS

The ALX supports both ITU-T V.42 and V.42bis error correction and Microcom Networking Protocol (MNP) error correction (classes 1 through 5). V.42 and MNP both provide end-to-end correction through an automatic repeat-transmission request algorithm. Both types of error correction enable the ALX to detect data transmission errors and automatically request retransmission of adversely affected data until it is received correctly.

Either error correction standard (V.42 or MNP) may be enabled for either dial or leased line operation (except V.33, V.29, V.27 and V.26 modes). However, error correction can only function if **all** of the following conditions are present:

- The modem the ALX is communicating with must be equipped with the same type of error correction (V.42/V.42bis or MNP).
- Both communicating modems must be configured for **asynchronous** data type.
- The same type of error correction (V.42/V.42bis or MNP) must be enabled at both ends of the communication link.
- The connected systems must support data flow control (data buffering).

Note –

- Error correction options cannot be changed when the modem is on-line.
- Disable error correction before running diagnostic tests to ensure valid results.

You can configure the ALX for V.42 (LAPM) error correction only, MNP error correction only, or V.42 error correction with MNP as the fallback (alternate) error correction protocol. Data compression may also be enabled by selecting either V.42bis or MNP class 5 error correction.

The available error correction options, described below, affect **the type of error correction selected via the V42 SELECTION screen** (see below), except that the MNP Class option is applicable only to MNP operation.

The following sequence is suggested for selecting error correction options: First select the type of error correction desired from the V.42 SELECTION screen. Next make a selection from the V.42 MODE screen. Then select other error correction options as appropriate for your application.

Three additional error correction options, Selective Retransmission, DCE Pass-through Flow Control and Link Flow Control are described near the end of this chapter, in the section titled, Options Accessible Only via Summary Setup.

- V.42 Mode

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

The V.42 Mode settings described below apply to the type of error correction selected via the V42 SELECTION screen. For example, if LAPM ONLY has been selected as the error correction protocol, and MANDATORY is selected from the V42 MODE screen, V.42 or V.42bis error correction will be activated – or if it cannot be, the ALX will hang up.

OFF Error correction is disabled.

MANDATORY Error correction is activated. If the modem cannot establish a connection using the type of error correction selected via the V.42 Selection option, it will hang up.

AUTO The ALX will fall back to buffer or non-buffer (normal) mode if conditions do not allow it to establish a connection using the selected type of error correction.

- MNP Class (Limit)

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option is effective only when MNP error correction is active. It limits MNP operation to the selected MNP class or lower. (MNP classes 1-5 are available.) In general, the higher MNP classes provide greater throughput.

- Break Handling

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

The Break Handling option applies only to asynchronous connections that use error correction or buffering, and it applies to the receive modem only. When error correction is active, a break signal from the DTE is relayed with a “break” packet. For buffer connections, the break signal is transferred as a period of space. The break handling option determines how the break packet is sent.

NONE No break packet or signal is sent. (This selection may be used for buffer connections to avoid disconnects due to long strings of null data.)

DESTRUCTIVE/EXPEDITED (DESTR/EXP) All data in the buffer is deleted; the break packet or signal is then passed through the channel.

NON-DESTRUCTIVE/EXPEDITED (NDT/EXP) The break packet or signal is passed through immediately, but data in the buffer is not deleted.

NON-DESTRUCTIVE/NON-EXPEDITED (NDT/NEXP) The break packet or signal is passed through the channel in sequence, and any data is buffered; this preserves the sequence of data and breaks received.

V.42 Selection Options

The following three options are available through the V.42 SELECTION screen:

- Protocol

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

LAPM/MNP The ALX will attempt to establish a connection using the V.42 link access protocol for modems (LAPM). If an LAPM connection cannot be established, the ALX attempts to establish a connection using MNP class 5 error correction.

Note: When operating in LAPM mode, the ALX uses V.42 error correction, or V.42bis error correction if the V.42bis option is enabled.

LAPM ONLY The modem will only attempt to establish an LAPM connection.

MNP ONLY The modem will only attempt to establish an MNP connection.

Note: If a connection cannot be established using the selected protocol (LAPM/MNP, LAPM ONLY or MNP ONLY), the action the ALX will take depends on the setting of the V.42 Mode option.

- V.42bis Operation

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

V.42bis operation provides error correction with data compression. Like V.42 error correction, V.42bis uses the link access protocol for modems (LAPM). V.42bis operation may be enabled or disabled.

- V.42bis Dictionary Size

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

The V.42bis dictionary stores recurrent data patterns which are used in V.42bis data compression. A larger dictionary generally increases performance, but if the dictionary is too large, performance may suffer. You may select a dictionary size of **2K, 4K, 8K** or **16K**.

- Buffer Mode/Speed Conversion

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option enables or disables speed conversion (for asynchronous operation only) between the DTE and modem when error correction is not used.

ENABLE Buffers about one screen full of data between the DTE and the modem, providing transmission speed conversion.

DISABLE Data is not buffered and speed conversion is not allowed. (This setting also disables flow control.) For “normal” (direct) operation, disable Buffer Mode/Speed Conversion and set the V.42 Mode option to OFF.

- DTE Speed

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option controls the DTE speed; however, it is effective only when the ALX is operating in V.42 mode, MNP mode or buffer mode. (If the ALX is not in one of these modes, the DTE speed will be the same as the connect rate.) The DTE speed can be set for **230.4, 115.2, 57.6, 38.4** or **19.2** Kbps or **9600, 4800, 2400, 1800, 1200, 600** or **300** bps. The default DTE speed is 38.4 Kbps.

DTE speed refers to the speed of data transfer between the DTE and the local modem – **it is not necessarily the same as the data transmission speed between the connected modems.** If flow control is disabled, the DTE speed must be equal to or less than the modem speed, and the local and remote DTE speeds must be equal.

For Hayes mode operation, this option sets the default DTE speed that will be effective after powerup or after a full modem reset. However, the default DTE speed is automatically overridden when the ALX is autobauded (when and “AT” attention code is sent to the ALX.)

Flow Control

The flow control options control the data flow according to the availability of memory “space” in the buffer. Flow control can be set independently for the terminal to the modem (DTE-DCE) and for the modem to the terminal (DCE-DTE). The flow control options include DTE-DCE, DCE-DTE and Pass-through Flow Control. Two additional flow control options are described later in this chapter.

Note the following:

- Flow control only applies to asynchronous connections with V.42 error correction or Buffer Mode enabled.
- **When flow control is disabled, the DTE data rate must be equal to or less than the modem data rate, and the local and remote DTE data rates must be equal.** (This precludes the need for flow control – which some DTE devices cannot handle – and avoids buffer overflow.)
- For DTE-DCE and DCE-DTE Flow Control options: When RTS or CTS flow control is used and a buffer connection has been established, conditions that will stop the data flow (e.g., dropped RTS) should not be permitted for long periods, if possible, to reduce the possibility of buffer overflow.

Figure 2-1 illustrates the available flow control options.

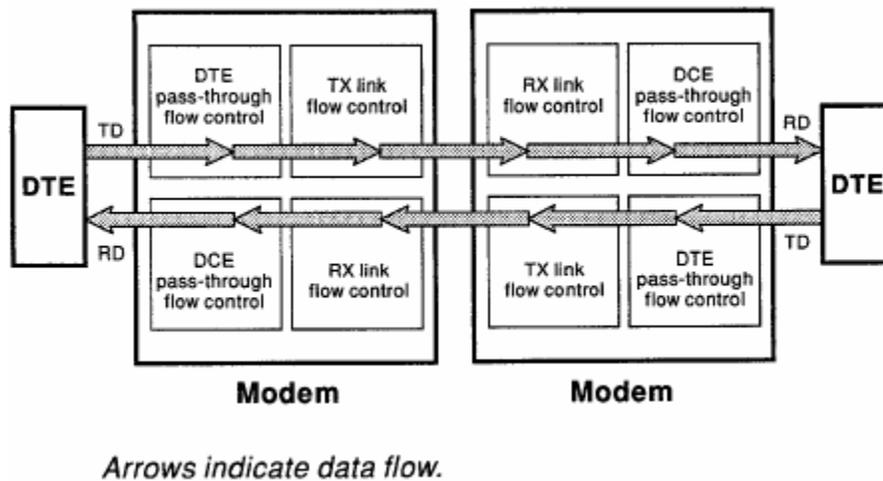


Figure 2-1. Flow control options

- DTE-DCE Flow Control

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

DC1/DC3 (XON/XOFF) Most common method of flow control. Inserts control characters ^S and ^Q into the data stream to stop (^S) and start/restart (^Q) the flow of data. (Also called software, logical, or in-band flow control.)

NONE No flow control. All flow control characters are passed through the communication channel.

RTS (RTS on/off) The Request to Send signal controls data flow from the modem to the DTE. (RTS flow control is also called hardware, physical or out-band flow control.) This selection enables flow control for the local modem only.

DC1/DC2 Inserts control characters ^R and ^Q into the data stream to stop (^R) and start/restart (^Q) the flow of data from a device. (Also called software, logical, or in-band flow control.)

Note: When using the modem for binary file transfer, in-band flow control (flow control using control characters) must be disabled. In this case, use hardware flow control or, as an alternate, lower the DTE speed to reduce the possibility of overflow.

- DCE-DTE Flow Control

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

All information given above under DTE-DCE Flow Control also applies to the DCE-DTE (modem to terminal) flow control option, except that the CTS, Clear to Send signal (not RTS), may be used to control DTE-DCE data flow.

- DTE Pass-through Flow Control (Passthru Mode)

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

Pass-through Flow Control affects DTE-DCE flow control only. This option determines whether flow control characters received from the local DTE will be passed to the remote modem (if control characters are used for flow control).

ENABLE Flow control characters are passed to the remote end of the communication connection after the modem acts upon them.

DISABLE Flow control characters are not passed.

ADDRESS ASSIGNMENT OPTION

- Address

All modes

The address screen allows you to set the address of the modem at your location. An address may be useful if the ALX will be used in a rack or in a network.

The available address numbers are 000,000 through 999,999. The three digits to the right of the comma are the unit address number; the three digits to the left are the group address number. The default address is 999,999.

To change the address, use the right and left arrow pushbuttons to go to the digit you want to change. Then use pushbutton 1 to decrease (DEC) the digit or pushbutton 3 to increase (INC) it. The new address takes effect when you exit the ADDRESS screen. (Unlike other DEC/INC screens, you do not have to press pushbutton 2 to select the new address.)

DIALER MODE OPTION

- Dialer

All modes

The ALX autodialer can operate in several modes, or it can be turned off. The dialer modes listed below can be selected from the DIALER screen.

HAYES The modem will automatically dial stored phone numbers and will respond to Hayes commands. For further information, see Chapter 4.

DTR Enables DTR dialing (which is explained in Chapter 3).

Note: DTR dialing for V.25bis mode can only be enabled by means of the Summary Setup feature, as explained in Chapter 5.

V25 Async Enables the V.25bis autodialer for asynchronous operation.

For V.25bis operation, select a V.25bis data protocol (V25 Async, V25 Syn_c or V25 Syn_b) that is appropriate for the DTE the ALX is connected to. A V.25bis Quick Setup is recommended. For detailed V.25bis information, see Chapter 5.

V25 Syn_c Enables V.25bis synchronous character oriented operation.

V25 Syn_b Enables V.25bis synchronous bit oriented operation (HDLC).

OFF Disables the autodialer, meaning the modem will operate in dumb mode only. Calls must be made using the front panel AUTO-DIAL function or they must be manually originated.

AUTO-ANSWER OPTION

- Auto-Answer

All dial line modes, leased line modes with Auto-Recovery (except V.33)

This option determines whether or not a call is automatically answered when the phone rings. Setting the Auto-Answer option to ENABLE resets Hayes mode register S0 to 1 (meaning that calls will be answered on the first ring).

- Data Format Options

V.25bis, dumb, leased line modes

The data type setting for the local modem and remote modem must be the same.

ASYNCHRONOUS Data is transmitted and received as character asynchronous data. The character length (next option) must be the same for both communicating modems.

SYNCHRONOUS Use this setting only if data is to be transmitted and received as synchronous data. In addition, the appropriate transmitter clocking setting must be selected – see *Transmitter Clocking* later in this chapter. **Synchronous data type is available only for the following data rates:**

ALX V.32 and V.32M: 9600, 7200, 4800, 2400, 1200 and 600 bps

ALX V.32/14.4 and V.32/14.4M: 14.4 and 12.0 Kbps; 9600, 7200, 4800, 2400, 1200 and 600 bps

ALX V.32/19.2 and V.32/19.2M: 19.2, 16.8, 14.4 and 12.0 Kbps; 9600, 7200, 4800, 2400, 1200 and 600 bps

ALX V.34 and V.34M: 28.8, 26.4, 24.0, 21.6, 19.2, 16.8, 14.4 and 12.0 Kbps; 9600, 7200, 4800, 2400, 1200 and 600 bps

Note: Error correction options and the Buffer Mode/Speed Conversion option are not effective when the Data Type is set to synchronous.

- Character Length

All modes (asynchronous operation only)

This option is used to select a character length of **9**, **10** or **11** bits for character asynchronous operation. The same character length must be selected for both the local and the remote modems. The most widely used character length setting is 10 bits.

9 BITS: 1 start bit, 7 data bits and 1 or more stop bits

10 BITS: 1 start bit, 8 data bits, including parity, and 1 or more stop bits

11 BITS: 1 start bit, 9 data bits, including parity, and 1 or more stop bits

- Parity

All modes (asynchronous operation only)

Parity selections will be effective only if error correction or Buffer Mode has been enabled or if the ALX is in 2-wire dial Hayes mode. For most applications, parity should be set to NONE.

The following parity options are available: **NONE** (no parity), **ODD**, **EVEN**, **MARK** (parity is always 1) and **SPACE** (parity is always 0). All parity settings except **NONE** automatically enable parity conversion (except in Hayes mode), meaning that the parity of received data will be converted to match the selected parity option.

In Hayes mode, autobaud overrides the front panel parity setting; this occurs when the modem receives the **AT** attention code. During data transfer, the receiving modem converts parity to the parity of the remote DTE.

DISCONNECT OPTIONS

When the modem is operating in V.25bis or dumb mode, it is necessary to disconnect the modem from the telephone circuit once communication is completed. The most common form of disconnection is by dropping the Data Terminal Ready (DTR) signal from the DTE. However, some applications may require one of the five available automatic disconnect methods listed below.

For all five disconnect options, disabled means the modem will not disconnect in the presence of the conditions specified below.

- RX (Receive) Space Disconnect

Hayes, V.25bis, dumb modes

If this option is enabled, reception of a continuous space of specified duration from the remote modem will cause the ALX to disconnect. The space required to cause a disconnect is either 1 second (or greater) or 2 seconds (or greater), depending on the setting of the TX/RX Space option.

- **TX (Transmit) Space Disconnect**

Hayes, V.25bis, dumb modes

When TX Space Disconnect is enabled, the ALX will transmit a continuous space prior to disconnecting from the line. The duration of this space is either 1.6 seconds or 4 seconds, depending on the setting of the TX/RX Space option. If RX space disconnect is enabled on the remote modem, TX Space Disconnect should be enabled on the local modem to ensure a clean disconnect.

- **Carrier Disconnect**

V.25bis, dumb modes

If Carrier Disconnect is enabled, a loss of carrier signal will cause the ALX to disconnect from the telephone line. The time (delay) from loss of carrier until the modem disconnects is determined by the value of S register S10. (A value of 255 in register S10 disables Carrier Disconnect and Line Current Disconnect.)

- **Line Current Disconnect**

V.25bis, dumb modes

If Line Current Disconnect is enabled, a loss of line current will cause the ALX to disconnect from the telephone line. (A value of 255 in register S10 disables Line Current Disconnect and Carrier Disconnect.)

- **RTS Disconnect**

Hayes, V.25bis, dumb modes

This option allows you to select a time period for RTS disconnect, which is applied as follows: If RTS is off (or low) for the time period selected by the RTS Disconnect option (20 to 140 seconds), the line will be disconnected. If you set RTS Disconnect to OFF, RTS may be off indefinitely without causing the line to be disconnected.

TEST OPTIONS

The test options affect certain tests (as explained below) but do not activate tests. These options may be used to prevent users (including remote users) from activating tests.

- DSR During Analog Loopback

All modes

When ON is selected, the Data Set Ready signal is forced on when the modem is in the analog loopback test mode. In general, this option should be left ON (the default selection).

- Remote Test

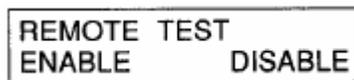
All modes

The Remote Test option allows you to prevent remote digital loopback or remote digital loopback self tests from being initiated on the local ALX modem from a remote modem.

ENABLE Tests can be initiated from a remote modem.

DISABLE The local ALX will ignore test initiation signals from a remote modem.

Note that there are two REMOTE TEST screens. One is for the option just described; the other is used for selecting remote digital loopback tests. The Remote Test option screen (for preventing or allowing remote testing) looks like this:



EIA OPTIONS

The seven options described below allow control over specific TIA/EIA interface signals.

- CTS to EIA

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

Regardless of the setting selected for this option, Clear to Send (CTS) goes low under the following conditions:

- When DCD goes high during a V.42 error correction handshake *or*
- When DCE-DTE flow control is set to CTS and a connection has been established with error correction or Buffer Mode enabled.

NORMAL The Clear to Send (CTS) signal is on while the modem is on-line. (In V.25bis mode, CTS follows DTR.)

RTS The CTS signal immediately follows the RTS signal with no delay.

TRUE The CTS signal follows DTR.

CTS can also be set to be always ON regardless of DTR by using the Summary Setup feature. (However, if CTS has been selected from DCE-DTE screen 1, V.42 flow control, while active, will override the CTS ON selection.) To set CTS ON, refer to the EIA INTERFACE OPTIONS diagram. Set the CTS option to 3 (ON). Note that if you set CTS to ON using Summary Setup and then make a selection from the CTS to EIA screen, the selection from the CTS to EIA screen will cancel the Summary Setup (CTS ON) selection.

- CD to EIA

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

NORMAL Carrier Detect (CD) is on while the modem is on-line.

TRUE CD follows DTR supplied from the DTE.

TOGGLE CD turns on whenever DTR is present and then toggles off for 500 ms upon DTR disconnect.

- DSR to EIA

All modes

This option allows the user to force the Data Terminal Ready (DTR) signal on (TRUE), which may be needed if your computer or communication software does not supply a DTR signal.

NORMAL DTR is supplied by the DTE. When DTR goes low, the ALX sends a space disconnect (if TX Space Disconnect is enabled) and goes on-hook.

TRUE The DTR signal is internally forced ON regardless of the DTR status at the interface.

- DTE Control of ALB (ALB- DTE Ctrl'ed)

All modes (except half-duplex and V.13)

Analog loopback (ALB) testing can be initiated from the DTE via pin 18. Positive voltage activates the test, whereas negative voltage results in normal operation. Disabling this option keeps the modem from responding to pin 18.

- DTE Control of RDL (RDL- DTE Ctrl'ed)

All modes

Remote digital loopback (RDL) testing can be initiated from the DTE via pin 21. Positive voltage activates the test, whereas negative voltage results in normal operation. Disabling this option keeps the modem from responding to pin 21.

- Test Mode (TM to EIA)

All modes

This option controls pin 25, the test mode (TM) indicator, on the RS-232 interface connector. (Alternately, pin 25 may be used for analog loopback control. For details, see Appendix D.)

NORMAL TM output is high (active) only during test modes.

TRUE TM output is always high.

MODEM SETUPS

The options listed below, through RTS-CTS Delay, are available via the MODEM SETUPS screens.

- Carrier Detect Level

All modes

This option selects the carrier detect level. To make a selection, first select either LEASED or DIAL from the CARRIER DET. LVL screen, depending on your application. The appropriate carrier detect level screen will then be displayed.

Note: When the ALX is operated in V.29 Fast Master mode, the carrier detect level is fixed at -26 dBm, regardless of the Carrier Detect option setting.

Leased Line Applications

For leased line use, the carrier detect level can be set for -26, -33 or -43 dBm. The default setting is -26 dBm.

Dialup Applications

For dial line use, the carrier detect level can be set for -26, -33 or -43 dBm. The default setting is -43 dBm.

- Transmit Level

All modes

This option controls the modem's transmit (transmission) level. To make a selection, first select LEASED or DIAL from the TRANSMIT LEVEL screen.

Leased Line Applications

For leased lines, the transmit level can be set between 0 and -15 dBm, in 1-dBm steps. The standard setting is 0 dBm.

Dialup Applications

The transmit level for dial lines can be set as either programmable (PROG) or permissive (PERMIS). The most common settings is permissive, which means the transmit level is fixed at -9 dBm maximum.

Note: (V.34 models only): If the Channel Probing and Transmit Level Adjustable by Probing options are enabled, the actual transmit level may be lower than the selected Transmit Level setting.

- Signal Quality

All modes

This option sets the threshold for the ER (error) indication during normal operation. You can choose either 10^4 , one error in 10,000 bits, or 10^6 , one error in 1 million bits. The settings of the Signal Quality and Carrier Detect Level options determine the threshold values the modem uses as criteria for entering Leased Line Auto-Recovery mode.

- **Compromise Equalizers (COMPR EQ)**

Hayes, V.25bis, dumb, leased line modes
(V.32/V.32bis, V.32terbo and V.33 modes only)

It is usually not necessary to adjust the modem's compromise equalizers. However, in the event that an equalizer adjustment is needed, any of four types of compromise equalization can be selected: **Type I** (T-I on the LCD), **Type II** (T-II), **Type III** (T-III) and **Type IV** (T-IV). The equalizers (located in the modem's transmitter) can also be turned **OFF**.

Where line conditions are atypical, it may be necessary to adjust the equalizers to optimize the signal quality. If adjustment is necessary, refer to the quality screen for a relative indication of the signal quality.

- **Trellis Code**

Hayes, V.25bis, dumb, leased line modes
(V.32bis, V.32terbo and V.33 modes only)

The modem's IUT-T compliant trellis coder provides enhanced performance. It is normally enabled at speeds of 7200 bps and above, but at 9600 bps or higher, may be negotiated off by a modem that is not equipped with a trellis coder. The trellis code option allows the user to enable or disable the trellis coder.

- **Transmitter Clocking**

All modes (synchronous operation only)

This option selects one of three possible sources for the transmitter timing signal:

INTERNAL The timing of the modem and data terminal transmitting circuits is provided by an internal clock within the modem.

RECEIVED (RX-CLK) The timing of the data received from the remote modem is used to control the timing of the transmitted data. This timing mode is used if the modem's transmit timing must be controlled by a remote source.

EXTERNAL The timing of the modem and data terminal transmitting circuits is synchronous to an external clock from within the data terminal and is provided to the modem via the DTE connector pin 24. This mode of clocking is used if the DTE must be in control of the modem's transmit timing. The modem's minimum and maximum speed (data rate) must be set to approximately the same speed as the DTE clock, using the Speed Limit option.

- T1 Timer

Hayes, V.25bis, dumb modes

The T1 Timer option is only effective if the Summary Setup Multimode Handshake option is set to 0 (T1 timer).

The T1 Timer option determines how long the ALX modem will attempt to handshake with a calling V.32/V.32bis modem before falling back to a lower speed. The available T1 Timer settings are **0, 0.3, 0.8, 1.6** and **3.0** seconds.

- Auto-Retrain

Hayes, V.25bis, dumb, leased line modes

In V.34, V.32terbo, 19.2 proprietary, V.32bis, V.32 or V.22bis mode, the ALX can request that the remote modem send a retrain sequence (if the receiver requires it).

ENABLE The modem can request a retrain sequence.

DISABLE The modem cannot request a retrain sequence.

- Answer/Originate Default

All leased line modes, except V.33 (also manual originate/answer dial operation)

This option sets the ALX to default to either answer or originate status when it makes a connection in V.34, V.32terbo, 19.2 proprietary, V.32bis, V.32 or V.22bis mode.

ANSWER Sets ALX to answer mode.

ORIGINATE Sets ALX to originate mode.

- Answer Tone

Hayes, V.25bis, dumb modes

The answer tone frequency is selectable only if the maximum data rate has been set to 1200 bps (via the Speed Limit option), in which case the answer tone can be set to either 2225 or 2100 Hz. Otherwise, the answer tone frequency will be 2100 Hz (the standard for V.32/V.32bis operation). In general, this setting should not be changed.

- Front Panel Control

All modes

For security purposes, this option may be used to make it difficult for unauthorized users to modify the modem's configuration. If Front Panel Control is disabled, the modem will not store Quick Setup selections or changes made through option screens accessed via the SETUP menus. In addition, Hayes configuration commands (and the **&W** and **&Z** Hayes commands) will have no effect, and stored user profiles (for Hayes mode) cannot be altered. Note that even if Front Panel Control is disabled, front panel screens that do not affect the modem configuration (such as AUTO-DIAL and test modes) will function.

SPEAKER

Two speaker options are available: Speaker Control and Speaker Volume.

- Speaker Control

All modes

OFF The speaker is off; the call cannot be audibly monitored.

TIL-CD (on until CD). The speaker remains on until a carrier signal (CD) is detected.

ON Speaker is on during the full modem handshake process and while the unit remains on-line.

- Speaker Volume

All modes

The speaker volume can be set to **LOW**, **MEDIUM** or **HIGH**.

- Guard Tones

Hayes, V.25bis, dumb modes

Some national regulatory agencies require guard tones on systems that use international telephone circuits (for V.22 and V.22bis modes only). Unless you will be using international circuits in one of these modes, you should set the guard tone option to **OFF**. If guard tones are

required, the guard tone frequency can be set to **550 Hz** or **1800 Hz** (the most commonly used guard tone frequency).

- V.8 Procedure

Hayes, V.25bis, dumb modes

The V.8 Procedure option selects either V.25 or V.8 procedures for starting data transmission sessions.

ENALBE Configures the ALX to use V.8 procedures.

DISABLE Configures the ALX to use V.25 procedures.

- V.13 Operation

V.25bis, dumb, leased line, V.3x/208 modes (synchronous operation only)

OFF V.13 operation is off. This setting allows normal full duplex operation. (All other selections are for enabling V.13 operation.)

TX ONLY Status of RTS will be sent to remote modem.

RX ONLY Carrier Detect (CD) will be controlled by V.13 signals from the remote modem.

TX AND RX Status of RTS will be sent to remote modem, and CD is controlled by V.13 signals from the remote modem.

To select one of the four V.13 options, press pushbutton 1 or 3 – with the V13 screen displayed – until the selection you want is displayed. For half duplex point-to-point applications, select TX AND RX. For multidrop-type applications, select RX ONLY for all host site modems and TX ONLY for all remote site modems.

Note: For V.13 operation, the RDL-DTE Ctrl'ed option must be disabled.

Note: If V.13 operation is enabled, the data type is automatically changed to synchronous. However, if you enable V.13 operation and later disable it, the data type does not automatically revert to asynchronous; to restore the asynchronous data type, you must use the Data Type option.

For further information on V.13 operation, see Chapter 3.

The PASSWORD screen (not present on the ALX V.32 and ALX V.32M) is explained in Chapter 3.

- Training Length

V.29, V.27 modes

If you select the 2-Wire Dial V.27 Quick Setup, the Training Length option is automatically set to TER (V.27ter).

For V.27bis leased line operation, select LONG if the line quality is poor. Select SHORT if the line quality is good.

For V.29 mode, the training length is set automatically when you select any of the three V.29 Quick Setup configurations (LONG for 4-Wire Leased Line V.29 mode, SHORT for the V.29 Fast Master/Fast Slave modes). For V.29 operation, do not change these automatic settings.

LONG The training length will be long, as specified by ITU-T Recommendation V.27bis.

SHORT The training length will be short, as specified by ITU-T Recommendation V.27bis.

TER This setting selects V.27ter training. The first train is long (to establish the connection), and subsequent ones are short.

- Carrier Type

V.33, 208, V.3x/208, V.29 modes (but not V.29 Fast Master/Fast Slave modes)

SWITCHED (SWITCH) Switched carrier operation. Required for 2-wire applications. For V.33 switched carrier operation, RTS must be high for the modems to train and for CD to go high.

CONSTANT Constant, or continuous carrier operation. Can only be used for 4-wire leased line applications (although 4-wire leased line applications may also use switched carrier.)

- CTS

V.33, 208, V.3x/208, V.29 modes (but not V.29 Fast Master/Fast Slave modes)

This option applies only to V.33 and V.29 leased line applications that use constant carrier and Bell 208 half-duplex modes.

RTS The CTS signal follows RTS.

ON CTS is always ON.

Note: The ALX also supports a CTS to EIA option, which is described earlier in this chapter under *EIA Options*.

- RTS-CTS Delay (CTS Delay)

V.33, 208, V.3x/208, V.29 modes

The available RTS-to-CTS delay settings are **0, 15, 50, or 150** ms. The delay occurs when RTS changes from low to high. However, note that –

The RTS-to-CTS Delay option is not effective if the CTS option is set to ON (always ON), and

The applicability and effect of the RTS-to-CTS Delay option depends on the operating mode, as explained below.

V.33 OPERATION

For V.33 operation, the RTS-to-CTS Delay option is only effective for 4-wire leased line applications that use constant carrier.

BELL 208 OPERATION

The only available delay choices for 208A/B operation are 50 and 150 ms. If 0 or 15 ms is selected, the actual delay in 208A/B mode will be 50 ms.

V.29, V.27 and V.26 MODES

For RTS-CTS delay times for V.29, V.27 and V.26 modes, see page 160.

Note that in V.29 mode, the RTS-to-CTS Delay option is only effective if the Carrier Type option is set to constant carrier. If the Carrier Type option is set to switched carrier, the RTS-to-CTS delay is fixed for all data rates, as follows:

253 ms for V.29 4-wire leased line and Fast Master modes
26 ms for Fast Slave mode

V.13 OPERATION

If the V.13 Operation option is set to TX ONLY or TX AND RX, the RTS-to-CTS delay time can be set for 0, 15, 50 or 150 ms. An actual delay time of 0 ms cannot be achieved exactly, but the delay will be the minimum delay possible for the data rate being used.

The PHONE screen for storing a telephone number and the Auto-Recovery options are discussed in Chapter 3.

- LCD Intensity

All modes

This option allows you to lighten or darken the characters on the LCD. For lighter characters, use pushbutton 1 (for DEC). For darker characters, use pushbutton 3 (INC). Use pushbutton 2 to select the desired intensity setting.

OPTIONS ACCESSIBLE ONLY VIA SUMMARY SETUP

SETUP screen 6 provides access to three special configuration screens: the Summary Setup screen, AT PROFILES screen and S-REG (S register) screen. These screens (recommended for experienced users only) allow you to quickly change multiple option settings for S register values. For instructions on using these screens, see Appendix C.

This section (below) describes the ALX options that can only be changed through the Summary Setup screen. For most applications, it is not necessary to change these options – they are intended primarily for specialized applications. *For an explanation of how to change these options, available option settings, and the default setting for each option, see Appendix C.*

Dial Line Options

(The numbers used to select different settings for each option on the Summary Setup LCD screen are arranged according to option groups – dial line options, V.42 error correction options, etc. For details, see Appendix C.)

- Wait for Carrier

V.25bis, dumb modes

The time the modem will wait for a carrier signal when originating a call can be set for 30, 45, 60, or 75 seconds. (Note: In Hayes mode, the wait for carrier time is determined by the value in register S7.)

- Pulse Dialing Rate

All dial line modes

This option allows you to select a pulse dialing rate of 10 or 20 pulses per seconds. The standard rate in most countries is 10 pps (the default setting).

EIA INTERFACE OPTIONS

- CD and DSR Delay

All leased line modes (except V.33 and V.29)

Enabling this option may prevent unnecessary time-outs on certain systems when a line condition such as a line hit results in a loss of the Carrier Detect (CD) signal from the modem while the ALX retrains. If the CD and DSR Delay option is enabled, CD and Data Set Ready (DSR) will remain high for an additional 20 seconds after a loss of carrier by the modem.

If the CD and DSR Delay option is enabled, the CD to EIA and DSR to EIA options should be set to NORMAL.

The CD and DSR Delay option does not have to be set the same way on the local and remote modems. If one modem is configured for CD and DSR Delay (enabled) and the other is not, the delay will be applied only for the modem configured for the delay.

If the V.13 Operation option is set for RX only, the modem will ignore the CD and DSR Delay option. (CD will be controlled by V.13 signals from the remote modem.)

V.42 Error Correction Options

- Selective Retransmission

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option allows the ALX to communicate with certain modems that are not able to respond to the MNP selective retransmission command.

ENABLE This setting allows the ALX to request retransmission of a single information frame (in the event of a transmission error).

DISABLE Data can only be retransmitted in a series of information frames.

- DCE Pass-through Flow Control

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option affects DCE-DTE flow control only. It is only effective if error correction or Buffer Mode/Speed Conversion is enabled.

ENABLE The ALX will pass flow control characters received from the remote modem to the local DTE.

DISABLE The ALX will not pass flow control characters from the remote modem to the local DTE.

Note: DCE Pass-through Flow Control will be disabled (regardless of ENABLE/DISABLE selection) if DCE-DTE Flow Control is set to NONE or CTS.

- **Link Flow Control**

Hayes, V.25bis, dumb, leased line modes (except V.33 and V.29)

This option is only effective if Buffer Mode/Speed Conversion is enabled and a buffer link without error correction is established. Do not enable Link Flow Control if binary data will be transmitted or received.

ENABLE The ALX will check for XON/XOFF (DC1/DC3) flow control characters received from the remote modem to determine whether to stop or start/restart data transmission to the remote modem. A DC3 control character will cause the ALX to stop data transmission and hold data in its buffer until it receives a DC1 (“resume transmission”) control character.

If Link Flow Control is enabled with DTE-DCE flow control set to RTS and DCE-DTE flow control set to CTS on both the originating and answering modems, and both modems establish a buffer mode connection, the modems will exchange flow control signals across the link in the form of DC1 and DC3 characters. If the data being exchanged contains a DC3 character (e.g; binary or executable files), this will signal the remote modem to halt and buffer all data from the remote DTE until the local DTE sends a DC1 character.

DISABLE The ALX will ignore XON/XOFF (DC1/DC3) flow control characters received from the remote modem.

SLAVED Link Flow control is controlled by the DCE-DTE Flow Control option. If DCE-DTE Flow Control is set to NONE or CTS, Link Flow Control is disabled. Otherwise it is enabled.

- **“PASSWORD?” Query Message**

Hayes mode

This option applies only to manual-response password protection (MPP) – it does not apply to automatic password protection (APP). It will only have an effect if a password has been implemented using the /A or /P security command, as explained in Chapter 3.

ENABLE If an MPP password has been implemented, the ALX will cause the DTE to display a PASSWORD? query message when a remote modem attempts to call the local ALX.

DISABLE The PASSWORD? query message will be suppressed. With the query suppressed, unauthorized users are not informed that a password is required; however a password will nonetheless be required if an MPP password has been implemented. The only difference will be the absence of the PASSWORD? query message.

- Alternate V.42/MNP CONNECT Codes

Hayes mode

In Hayes mode, the ALX modem displays the result codes (depending on the result code set specified by the Hayes mode X command.) If desired, the Alternate V.42/MNP CONNECT Codes option may be used to display additional information with the CONNECT result code, as follows:

Alternate CONNECT Code	Meaning
CONNECT nnnn/REL	“Reliable.” MNP connection (any MNP class)
CONNECT nnnn/LAP-M ACTIVE	V.42/V.42bis connection
CONNECT nnnn	Normal or buffer mode connection
nnnn is in the connection speed, e.g., 9600 (bps) or 28.8 (Kbps)	

NORMAL Normal CONNECT codes will be displayed.

ALTERNATE V.42/MNP CONNECT CODES The alternate CONNECT codes shown above will be displayed.

- Auto-Recovery Compatibility

All leased line modes (except V.33)

This option affects the Return from Leased Line Auto-Recovery option. It allows you to select compensated timing for the Return from Leased Line Auto-Recovery option, to ensure full compatibility when interoperating with earlier generation Alliance Series modems.

DISABLE Selects standard timing.

ENABLE Selects compensated timing. Use this setting only for operation with earlier Alliance Series modems.

Data Pump Options

Speed Fallback is explained on page 75. The Speed Fallback option allows you to enable or disable Speed Fallback.

- Auxiliary Channel

All modes

When an ALX V.32M, ALX V.32/14.4M, ALX V.32/19.2M or ALX V.34M modem is used to remotely control another ALX V.32M, ALX V.32/14.4M, ALX V.32/19.2M or ALX V.34M via a phone link (as explained in Chapter 3), the modems use an auxiliary channel. If desired, this channel may be disabled.

- Phase Reversals in Answer Tone

All modes

When enabled, the Phase Reversals in Answer Tone option signals the telephone network to turn off its echo cancellers. For virtually all applications, phase reversals should be enabled (the default settings).

- Satellite Delay

208, V.3x/208 modes

This option facilitates transmission over satellite links (but does not permit fast turnaround operation). When the Satellite Delay option is enabled, RTS is inhibited for 275 ms after the answer tone stops and after the DSR signal comes on. This delay occurs at both the originating and answering modems, allowing the echo suppressers on the telephone link to be enabled.

- Turnaround Delay

208, V.3x/208 modes

This option is intended for circuits where echo is a problem. It prevents the ALX from receiving an echo of its own transmitted data. When the Turnaround Delay option is enabled, CD (pin 8) is held low for 150 ms after RTS is turned off. If the modem detects an energy loss during the delay, it turns CD on 52 ms after the end of the delay. The modem ignores any energy loss during the first 8.5 ms.

Rate Renegotiation Procedure (RRP) is explained on page 74.
The Rate Renegotiation option allows you to enable or disable RRP.

- 208 Phase Detection

208, V.3x/208 modes

NORMAL Conditions the modem's 208 receiver for normal modulation detection.

COMPENSATED Conditions the 208 receiver for compensated modulation detection for improved performance with older 208 modems.

- Retrain Threshold

Hayes, V.25bis, dumb modes

This option allows you to select either of two settings which implement pre-defined thresholds for Speed Fallback, retrain and rate renegotiation (RRP). The default Retrain Threshold setting (0) corresponds to a probability of error of 10^4 , or one error in 10,000 bits. The alternate setting (1) corresponds to a probability of error of 10^6 , or one error in 1 million bits. The alternate (more conservative) setting is recommended if an adaptive differential pulse code modulation (ADPCM) connection is likely – for example, if the connection is trans-Atlantic or trans-Pacific.

- Forward Rate Renegotiation

Hayes, V.25bis, dumb modes

This option allows you to enable or disable forward rate renegotiation during RRP (Rate Renegotiation Procedure). If Forward Rate Renegotiation is disabled, the ALX cannot automatically fall forward to a higher data rate during RRP – it can only fall back to a lower rate.

- Fast Connect 103 Mode

Hayes, V.25bis, dumb modes

This option allows you to configure the ALX so it can connect very quickly to an incoming call from another modem operating in Bell 103 mode. If Fast Connect 103 Mode is enabled, when the ALX detects an incoming signal with a frequency of 1270 Hz (characteristic of Bell 103 mode), it will immediately stop sending answer tone and connect in Bell 103 mode, without the usual multimode handshake. When this option is disabled, the ALX will handshake normally and will therefore take longer to complete a Bell 103 connection.

- V.22bis S1 Duration

Hayes, V.25bis, dumb modes

This option affects the duration of the S1 signal during a V.22bis handshake. To allow the ALX to connect properly with certain manufacturers' V.22bis modems that require an extended S1 signal duration, the ALX's S1 signal duration may have to be changed from the default setting, 100 ms, to 150 ms. The IUT-T V.22bis Recommendation specifies an S1 duration of 100 ms.

- V.3x/208 Auto-Detect Mode

208, V.3x/208 modes

When V.3x/208 auto-detect mode is enabled, the ALX automatically selects V.34, V.32bis or Bell 208 mode, depending on the ALX model and the mode of the originating modem. (Only the ALX V.34 and V.34M can operate in V.34 mode; all other models will select V.32bis or Bell 208 mode.)

ENABLE Enables V.3x/208 auto-detect mode – if the Communication Standard option is set to V3x/Bell208. (If you select the V.3x/208 Quick Setup, the ALX automatically sets the Communication Standard and V.3x/208 Auto-Detect Mode options to enable V.3x/208 auto-detect mode.)

To enable V.3x/208 auto-detect mode, it is recommended that you use the V.3x/208 Quick Setup instead of the V.3x/208 Auto-Detect Mode option, because the Quick Setup sets all modem options to the most suitable settings.

DISABLE Disables V.3x/208 auto-detect mode. (The disable setting overrides previous V.3x/208 auto-detect mode selections made via the Communication Standard option or Quick Setup. However, the disable setting will be overridden if you subsequently enable auto-detect mode using the Standard option or V.3x/208 Quick Setup.)

- **V.27bis 2400-bps Alternatives**

[Not applicable to any Quick Setup mode]

This option is for V.27bis leased line operation only, and it applies only to 2400-bps operation.

ALTERNATIVE I The V.27bis 2400-bps equalizer conditioning pattern is the same as for V.27bis at 4800 bps.

ALTERNATIVE II The V.27bis 2400-bps equalizer conditioning pattern is special (as defined in Recommendation V.27bis – it is not the same as the pattern for 4800 bps).

- **Echo Protection Tone**

V.27 mode

If this option is enabled, the ALX will send an unmodulated carrier signal (short or long, user selectable) prior to the training and data signals, to disable the telephone network echo suppressor.

- **V.26 Digit Encoding**

[Not applicable to any Quick Setup mode]

This option is useful for V.26 operation only. It allows you to select between the two digit encoding schemes described in ITU-T Recommendation V.26 as alternatives A and B.

- Anti-Streaming Timer

V.29 and V.27 modes

If the ALX is operating in switched carrier mode, this option, if enabled, will protect against a streaming terminal. If RTS is high for more than 30 seconds, the modem will turn its transmitter off and ignore RTS until RTS goes low again. This option is useful for multidrop applications where one drop (slave modem) continuously transmitting would disrupt the entire multidrop circuit. To prevent such disruption, enable the Anti-Streaming Timer on all of the drops (slaves).

- V.26 Scrambler

[Not applicable to any Quick Setup mode]

This option is useful for V.26 operation only. When enabled, the V.26 Scrambler option provides a V.26 scrambler in the data path.

Miscellaneous Options

Operating Mode Fallback is explained on page 73. The Operating Mode Fallback option allows you to select V.22bis/Bell 212A/Bell 103 or V.22bis/V.22/V.21/V.23 fallback operation.

- TX/RX Space

Hayes, V.25bis, dumb modes

This option allows you to specify long or short TX/RX spaces for application to the TX Space Disconnect and RX Space Disconnect options. Selecting long or short specifies (1) the duration of the TX space that will be transmitted by the ALX if the TX Space Disconnect option is enabled and (2) the duration of the RX space required to cause a disconnect if RX Space Disconnect is enabled, as follows:

LONG The TX space will be 4 seconds, and the RX space required for disconnect is 2 seconds or greater.

SHORT The TX space will be 1.6 seconds, and the RX space required for disconnect is 1 second or greater.

- **V.25bis DTR Dialing**

V.25bis mode

This option enables or disables DTR dialing for V.25bis mode only. V.25bis DTR dialing will function only if this option is enabled and the V.25bis autodialer is enabled (via the V.25bis Dialer Modes option).

ENABLE Enables DTR dialing for V.25bis mode.

DISABLE Disables DTR dialing for V.25bis mode.

- **Speed Matching**

Hayes, V.25bis (asynchronous only), dumb modes

If speed conversion is not desired, enable Speed Matching. When Speed Matching is enabled, the DTE interface rate follows the rate at which the modem connected (i.e., DTE rate=DCE rate). To select speed matching, change the Speed Matching setting to 1 (enable). **Note: Speed matching is effective only for dial applications and will only function if error correction or Buffer Mode is enabled.**

- **Analog Loopback Make Busy**

All modes

If the Analog Loopback Make Busy option is enabled, the ALX will provide a busy indication to the dial line interface when the ALX is in analog loopback test mode.

- **Answer Tone Detection**

208, V.3x/208 modes

ENABLE Conditions the originating modem's receiver to wait for answer tone detection before going on-line.

DISABLE Conditions the originating modem to go on-line without requiring answer tone detection. This setting accommodates operation with automatic calling units that connect the modem to the line at the end of answer tone.

- **Multimode Handshake**

Hayes, V.25bis, dumb modes

This option – effective only when the ALX cannot use V.8 procedure – determines how long the ALX will attempt to handshake with a V.34/V.32/V.32bis modem before falling back to a lower speed.

The ALX will use V.8 procedure to start a data session if the V.8 Procedure option is enabled and it detects a V.8-compliant signal from the remote modem. If the ALX cannot use V.8 procedure, it will use the selected Multimode Handshake setting.

T1 TIMER If the T1 timer setting is selected, the ALX will attempt to handshake with a calling V.32/V.32bis modem for the time specified by the T1 Timer option.

V.32bis ANNEX A If the V.32bis Annex A setting is selected, the modem will handshake according to the conventions established in Annex A of the ITU-T V.32bis Recommendation. Handshaking using the Annex A selection will generally be faster than handshaking based on the T1 timer.

- **Keyboard Abort**

Hayes, V.25bis (asynchronous only) modes

When the Keyboard Abort option is enabled, pressing any key on the DTE connected to the answer ALX will abort handshaking (and thereby prevent a connection from being made).

- **Asynchronous Overspeed Range**

All modes (asynchronous operation only)

This option may be used to extend the asynchronous overspeed range for modem handshaking from +1% to +2.3%.

NORMAL The ALX will handshake at speeds ranging from -2.5% of the nominal connect speed (underspeed) to +1% of the nominal connect speed (overspeed).

EXTENDED The ALX will handshake at speeds ranging from -2.5% underspeed to +2.3% overspeed.

- Remote RTS Signaling

All leased line modes (except V.33 and V.29)

This option provides remote RTS signaling in asynchronous mode. When the Remote RTS Signaling option is on, the state of the Ready to Send (RTS) signal is transferred across the modem link (for diagnostic purposes) without affecting normal operation. The Remote RTS Signaling option allows control over the remote Carrier Detect (CD) signal as described below.

Note the following restrictions for Remote RTS Signaling: The two modems must be connected at a data rate of 7200 bps or higher. The V.13 Operation option must be off. The DTE-DCE and DCE-DTE Flow Control options should not be set to RTS on/off.

ON The state of RTS input (TIA/EIA pin 4) will be signaled to the remote modem's CD output, and the CD (pin 8) on the local modem will follow the state of the remote modem's RTS input. (The typical propagation delay is less than 800 ms.)

OFF This setting allows for normal operation: The state of RTS at the local modem will not be signaled to the remote modem.

- Leased Line Interrupt

All leased line modes (except V.33)

The Leased Line Interrupt option controls an ALX designated as the answer modem and configured for Leased Line Auto-Recovery (Chapter 3) as stated below.

ON The ALX answer modem will answer incoming calls, regardless of the state of the leased line (CD ON or OFF).

OFF This setting allows for normal operation: If Carrier Detect (CD) is ON, this means the leased line is trained and working, and the ALX answer modem will ignore any incoming calls on the dial line.

- Wait for MNP Link Request

Hayes, V.25bis (async only), dumb, leased line modes (except V.33 and V.29)

When a remote originating modem attempts to establish an MNP connection with an ALX, the ALX (answer modem) will wait up to 3 seconds, by default, to receive the MNP link request. This option allows the user to configure the ALX to wait longer (7 seconds) for an MNP link request. The longer wait time allows the ALX to establish MNP connections under conditions that require multiple link requests.

- **CFI AB Response on Disconnect**

V.25bis mode

In V.25bis mode, the originate modem sends a CFI AB result code when a call is aborted because the user has selected HANGUP from the front panel or because of DTR loss. If the CFI AB Response on Disconnect option is enabled, the originate modem will also send a CFI AB result code upon call disconnect.

- **Low-Profile DIAG LED Function**

All modes

This option may be used to change the function of the DIAG LED on low-profile ALX models (Appendix E), as explained below.

CONNECT STATUS DIAG LED on indicates the modem's diagnostic port is actively connected. DIAG LED off indicates the diagnostic port is not connected.

DTR STATUS DIAG LED on indicates DTR is high. DIAG LED off indicates DTR is low.

CHAPTER THREE – GENERAL OPERATION and SPECIAL FEATURES

This chapter describes the following ALX features and operational modes (listed here in the order in which they are presented):

- Quick reset
- Front panel autodialing
- Automatic fallback and RRP
- Dumb mode and Bell 208 operation
- V.13 operation
- V.26/V.26bis operation
- DTR dialing
- Dial Line Auto-Recovery
- Leased Line Auto-Recovery
- Security operation
- Modem-controlled remote control
- Diagnostic port control
- Software downloading

The status screens, which display data concerning the operational status of the modem, are discussed in Chapter 6. Instructions for using the pushbutton controls and LCD are included in Chapter 2.

QUICK RESET

For a quick rest of the ALX modem, use the front panel LCD to select RESET from MAIN MENU screen 3. As the modem resets, it will display the power-on screen for a few seconds and then the TIA/EIA status screen. A quick reset clears the modem's active memory for a new start but does not change option settings or erase stored phone numbers. This feature enables you to reset the modem without powering down the unit.

FRONT PANEL AUTODIALING

The front panel PHONE CELL: screen allows you to store up to 50 telephone numbers to be used later for –

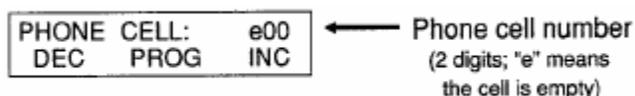
- Autodialing from the front panel (in any mode)
- Autodialing from the DTE using Hayes or V.25bis commands
- DTR dialing, or
- Leased line or dial line auto-recovery.

How to Store a Phone Number

This section explains how to store phone numbers using the modem's front panel controls. To store numbers using the DTE keyboard, in Hayes and V.25bis modes, see Chapter 4 (Hayes mode) and 5 (V.25bis mode).

To store a phone number using the modem's front panel controls, follow these steps:

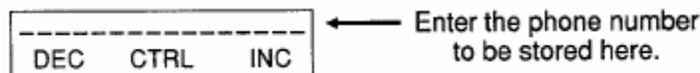
1. **Select PHONE from SETUP screen 5.** The ALX will display this screen:



2. **Specify the phone cell (i.e., memory storage location) where you want to store the number:** Use DEC (pushbutton 1) or INC (pushbutton 3) to cycle through the two-digit phone cell numbers (0-49), which appear in the upper right corner of the screen.

You may store a number in an empty cell, which is indicated by the letter "e" to the left of the storage cell number, or you may change (edit) a previously stored number. (A # symbol next to a cell number indicates that a number is stored in the cell.)

3. **Select PROG (program) from the PHONE CELL: screen.** The LCD will display this screen:



If a number has been previously stored, the number will be displayed on the top line of the LCD (instead of dashes, as shown above).

4. **Enter the number to be stored by using the front panel pushbuttons as follows:**

- Use the **right and left arrow pushbuttons** to place the LCD cursor in the cell (i.e., character space) where you want to enter or change a number or character. The cell or character where the LCD cursor is located flashes on and off.
- Use **pushbutton 1** to decrease a number at the current cursor location or **pushbutton 3** to increase a number.
- Use **pushbutton 2 (CTRL)** to cycle through the dialing modifiers. The dialing modifiers are listed in Table 4-2. Dialing modifiers can be saved with a phone number to perform the functions listed in Table 4-2 when the number is dialed.

(A period may be used to indicate the end of a phone number stored via the ALX front panel. The autodialer ignores any characters that follow the period (e.g., characters remaining from a previously stored long number.)

The phone number is saved when you return to the MAIN MENU.

A phone number stored via the front panel will be displayed if Hayes or V.25bis commands are used for storing phone numbers or viewing stored phone numbers.

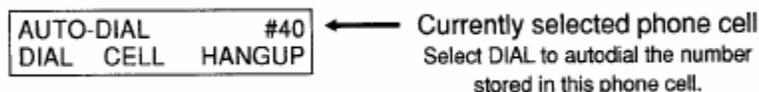
Phone Number Storage Capacity

Each phone cell can hold up to 50 characters; however, there is not enough memory for all 50 phone cells to hold 50 characters each. The following are approximate guidelines: You can load 50 cells with 35 characters in each cell, or load 35 cells with 50 characters in each cell (maximum). Other combinations which cumulatively do not exceed these numbers may also be used (i.e., approximately 1,750 characters total); for example, you could load 40 cells with 40 characters each.

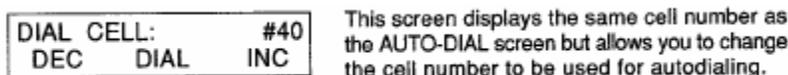
If the available memory becomes full, you will get an ERROR message – and any entry stored in the phone cell where you tried to store a number will be deleted. A possible solution is to issue the **&W** command (in Hayes mode only). This will compress the data (phone numbers) stored in memory and may thereby create enough space for additional numbers to be stored.

How to Autodial a Stored Number

To autodial a stored number (in any mode), press the ENT button until MAIN MENU screen 1 is displayed. Then press pushbutton 3 (to select DIAL from MAIN MENU screen 1). The ALX will display the AUTO-DIAL screen:



If you select DIAL (pushbutton 1), the ALX will dial the number stored in the phone cell displayed in the upper right corner of the screen. (The # symbol indicates that a number is stored in the cell; if an “e” appears to the left of the phone cell number, the cell is empty.) To select a different phone cell for autodialing, select CELL (pushbutton 2). The ALX will display the DIAL CELL: screen:



To select a different phone cell for autodialing, use DEC (decrease; pushbutton 1) or INC (increase; pushbutton 3) to cycle through the two-digit phone cell numbers (0-49). The phone

cell number will change on the DIAL CELL: screen and on the AUTO-DIAL screen. The ALX will autodial the number stored in the currently displayed phone cell when DIAL is selected from the DIAL CELL: screen or from the AUTO-DIAL screen.

When the local modem has successfully established a connection with the remote unit, the TIA/EIA status screen should be present. Typically this screen will look like this:

D	TR	MR	RS	CS	TD
9600				CD	RD

If the modem's LCD displays an AUTO-DIAL FEATURE message, refer to the explanations listed below.

Failure message	Explanation
NO DTR	DTR is not present
NO LINE CURR	Loss of line current.
LINE OCCUPIED	The data line is already in use.
DIAL NOT ALLOWED	Modem is configured for leased line operation.

Note: The phone number stored in the phone cell identified in the upper right corner of the AUTO-DIAL screen is the number the ALX will dial for –

- Front panel autodial (when DIAL is selected from the AUTO-DIAL screen)
- Dial line auto-recovery (Chapter 3)
- Leased line auto-recovery (Chapter 3)
- DTR dialing (Chapter 3 and 5).

AUTOMATIC FALLBACK

The ALX incorporates three automatic fallback features that can be controlled by the user:

- **Operating Mode Fallback** – Provides compatibility with modems that utilize any of several different operating modes.
- Two options for automatic data rate adjustment: **Rate Renegotiation Procedure (RRP)** and **Speed Fallback** – These features allow the ALX to automatically select the highest possible data rate, depending on the signal quality.

Operating Mode Fallback

This section applies to Hayes, V.25bis and dumb mode only.

When the ALX modem originates or answers a call, it determines from the “handshake” routine with the other modem the most efficient operating mode supported by the other modem and automatically enters that mode (subject to maximum and minimum speed limits you can select via the Speed Limit option).

The Alliance Series modems will attempt to use V.34/V.32terbo/V.32bis/V.32 modulation (in that order of preference) to connect at the highest possible rate, depending on the modulations supported by the ALX and the modem at the other end of the communication link. (Fallback operation may also be affected by the selected communication standard. For further information, see the Communication Standard option in Chapter 2.)

For situations where the other modem does not support V.34, V.32terbo, V.32bis or V.32 modulation, the ALX modem supports two fallback alternatives: V.22bis/Bell 212A/Bell 103 fallback operation (the default setting) and V.22bis/V.22/V.21/V.23 fallback operation. **For communication within the United States, use the default setting for Operating Mode Fallback – V.22bis/Bell 212A/Bell 103.**

Operating mode fallback functions when the modem is in either manual or automatic originate mode or manual or automatic answer mode.

Default Fallback Operation

The preferred operating mode is V.34 (28.8 Kbps – 2400 bps) for the ALX V.34 and V.34M, and V.32terbo/V.32bis/V.32 (19.2 Kbps – 4800 bps) for the ALX V.32/19.2 and V.32/19.2M. For all other ALX models, the preferred mode is V.32/V.32bis. However, if the other modem does not support any of these modes, the ALX will fall back to one of the modes listed below. The fallback modes are listed in the order in which they are attempted by the ALX in normal operation:

V.22bis/Bell 212A/Bell 103 Fallback (Default):

MODE	DESCRIPTION
V.22bis	2400 bps asynchronous/synchronous
Bell 212A	1200 bps asynchronous/synchronous
Bell 103	0-300 bps asynchronous

All modes are full duplex.

Alternate Fallback Operation

If V.22bis/V.22/V.21/V.23 (alternate) fallback operation is enabled (as explained in the next section), the fallback modes listed below are available (for situations where V.34/V.32terbo/V.32bis/V.32 modes cannot be used). The modes are listed in the order in which they are attempted by the ALX modem.

V.22bis/V.22/V.21/V.23 Fallback:

MODE	DESCRIPTION
V.22bis	2400 bps asynchronous/synchronous
V.22	1200 and 600 bps asynchronous/synchronous
V.21	300 bps asynchronous
V.23	1200/75 bps asynchronous

All modes are full duplex.

Configuring the ALX for V.22bis/V.22/V.21/V.23 Fallback

To configure the modem for V.22bis/V.22/V.21/V.23 fallback operation, refer to Appendix C and the MISCELLANEOUS OPTIONS diagram. Change the Operating Mode Fallback setting from 0 (the factory setting) to 1. (This is the only way the Operating Mode Fallback setting can be changed.)

Changing the Operating Mode Fallback setting to 1 has the following effects:

- The modem will be configured for V.22bis 2400 bps/ V.22 1200 and 600 bps/V.21 300 bps/V.23 1200/75 bps fallback operation. As a result, 600 and 1200/75 bps will appear as additional selections on the Speed Limit data rate screens. (For 600- or 1200/75- bps operation, the Speed Limit option maximum data rate must be set to the desired speed on both modems.)
- Fallback to V.22bis Bell 212A and Bell 103 compatibility is disabled.

Automatic Rate Adjustment

Rate Renegotiation Procedure (RRP)

This section applies only to V.34, V.32terbo and V.32bis operation.

If Rate Renegotiation Procedure (RRP) is enabled, the ALX will automatically fall back or fall forward to a lower or higher data rate at any time during data transmission (without retraining) in response to changes in signal quality. Data rate adjustments are limited to the range from 2400 bps (V.34) or 4800 bps (V.32bis) to the modem's highest possible data rate (as listed for each

model in Chapter 2) and are also limited by the Speed Limit option minimum and maximum data rate and symbol rate settings. If satisfactory performance cannot be attained at any of the available data rates, the ALX will initiate a GSTN clear-down (line disconnect). If the originate modem attempts to negotiate a rate that is lower than the minimum rate setting of the answer modem, the answer modem will initiate a GSTN clear-down.

The default setting for RRP is enabled. To change the RRP option, refer to Appendix C and the DATA PUMP OPTIONS diagram. Change the Rate Renegotiation Procedure (RRP) setting shown in the diagram to 0 (disable) or 1 (enable). (This is the only way the RRP option can be changed.)

When RRP is disabled, Speed Limit Fallback will function as described below (only during handshaking or retraining).

Speed Fallback

This section applies only to Hayes, V.25bis, dumb and leased line modes (except V.29).

Speed Fallback applies only to V.34/V.32/V.32bis/V.32terbo and 19.2 Kbps proprietary operation. When Speed Fallback is enabled (the default setting), the ALX modem will automatically select the highest possible connect rate (data rate), depending on the signal quality during handshaking, as explained below:

For these models...	...the modem will automatically select:	...or will fall back to:
ALX V.34, ALX V.34M	28.8 Kbps	26.4, 24.0, 21.6, 19.2, 16.8, 14.4, or 12.0 Kbps or 9600, 7200, 4800 or 2400 bps
ALX V.32/19.2, ALX V.32/19.2M	19.2 Kbps	16.8, 14.4 or 12.0 Kbps or 9600, 7200 or 4800 bps
ALX V.32/14.4, ALX V.32/14.4M	14.4 Kbps	12.0 Kbps or 9600, 7200 or 4800 bps
ALX V.32, ALX V.32M	9600 bps	7200 or 4800 bps

The error rate threshold is one error in 10,000 bits. If the error rate exceeds this threshold, the ALX will fall back to a lower connect rate. *Fallback may also occur during retrain sequences.*

Speed fallback functions when the modem is in manual or automatic originate mode or manual or automatic answer mode.

To disable or enable automatic Speed Fallback, refer to Appendix C and the DATA PUMP OPTIONS diagram. (This is the only way the Speed Fallback setting can be changed.)

Note: All models can fall back to speeds lower than those listed in the above table. See previous *Operating Mode Fallback* section. The criterion for speed fallback is signal quality,

whereas operating mode fallback is determined by the modes supported by both communicating modems.

DUMB MODE and BELL 208 OPERATION

Bell 208 operation is available on all models except the ALX V.32 and ALX V.32M.

For additional information on dumb mode, see Chapter 1. For additional Bell 208 information, see Chapter 1 and the Communication Standard section in Chapter 2.

Both modes: For information on storing and autodialing phone numbers, see Front Panel Autodialing earlier in this chapter. For dialing parameters that can be used to modify dialing operations, see Table 4-2.

Manual Originate / Answer Operation

When the ALX modem is operating in dumb mode or configured for Bell 208 operation, data calls may be manually originated from a phone set. (Plug the phone into the modem jack marked “PHONE.”)

For manual originate/answer operation, configure the remote modem for automatic or manual answer. Use the dumb mode, Bell 208 or V.3x/208 Quick Setup to configure the modem. (The dumb mode Quick Setup defaults to asynchronous operation; the Bell 208 and V.3x/208 Quick Setups default to synchronous operation.)

Any of these three Quick Setups will set the modem to originate mode. If you want to set your modem to answer mode, use the front panel controls to access the ANS/ORG DEFAULT screen (MODEM SETUPS screen 4). Then select ANSWER (answer mode).

Originating a Data Call Manually

To manually originate a data call, select TALK from MAIN MENU screen 1. The ALX will display the MANUAL-DIAL screen. Select TALK again. This puts the ALX in talk mode. Lift the handset, listen for the dial tone, and dial the phone number of the remote modem.

When you hear a high-pitched answer tone, select DATA from the MANUAL-DIAL screen, and place the handset back on the cradle. The LCD displays the status of the communication; typically it will appear as follows:

D	TR	MR	RS	CS
9600				CD

The data link between the two modems is now established, and data transfer can begin.

Answering a Data Call Manually

An incoming call may be answered manually or automatically; although to answer a data call manually, the Auto-Answer option must be disabled (or S register S0 must be set to 0). Before the call is received, the ALX must be set to TALK, as explained in the previous section. The unit that will be switched to DATA mode first must be set for answer mode (using the answer/originate option). The other unit must be set for originate mode. **Note:** If you set the ALX modem to talk mode, the phone will ring, but the ALX will not answer, even if the Auto-Answer option is enabled.

After the phone rings, and you answer it, you must set the ALX for data mode: With the MANUAL-DIAL screen still displayed, select DATA. This puts the ALX in data mode.

The first person to go to data mode will hear the telephone disconnect as the modem connects. The other person must wait until he or she hears an answer tone, and then switch to data mode (select DATA). When both modems are in data mode, data communication begins. The LCD displays the status of the connection.

Terminating a Data Call

There are several ways to terminate a data call. One way is through communication software – by following the software manufacturer’s instructions. Alternate methods are:

- Select TALK (talk mode) from the MANUAL-DIAL screen.
- Select HANGUP from the AUTO-DIAL screen.
- Drop the DTR signal from the DTE (by software control or by turning the DTE off).

V.3x/208 Auto-Detect Mode

This section applies only to models that support Bell 208 operation, and it applies to the answer modem only.

When V.3x/208 auto-detect mode is enabled, the ALX will automatically select V.34, V.32bis or Bell 208 operation. (Only the ALX V.34 and V.34M can operate in V.34 mode; all other models will automatically select V.32bis or Bell 208 mode.)

V.32 Operation

If an answering ALX in V.3x/208 mode detects a V.32 handshake, it will operate with the following options set as shown:

- Data format – synchronous
- V.13 operation – TX and RX
- Carrier type – constant
- CTS to EIA – RTS (CTS follows RTS)

For successful data transfer, these options must be set in the same way on the originating modem as well – and the speed of the originating modem must be 4800 bps or higher.

Bell 208 Operation

If an answering ALX in V.3x/208 mode detects a Bell 208 modem, it will operate with the following options set as shown:

- Data format – synchronous
- V.13 operation – off
- Carrier type - switched

The originating Bell 208 modem must be configured to detect the Bell 208 answer tone before it goes to data mode. (Some 208 modems may not have this option.)

Automatic Fallback

When the ALX is configured for V.3x/208 auto-select mode and is in answer mode, it will not handshake in V.22bis, Bell 212/103 or V.21/V.22, V.23 mode.

V.13 OPERATION

The ALX modem can be configured for ITU-T V.13 operation (which emulates half duplex operation) for either point-to-point or multidrop applications. (For configuration details for these applications, see *V.13 Operation* in Chapter 2.) The ALX normally operates in full duplex; however, some applications (such as certain network environments) may require control of a remote CD signal by a local Request to Send (RTS) signal. V.13 operation allows a local RTS control of a remote CD signal without actual ON-OFF switching of the modem carrier.

The following explains how the ALX modem will respond to RTS signals when it is configured for V.13 operation:

When RTS is raised high by the terminal, the V.13 ON PATTERN will be sent. The modem will then raise CTS (and data can be sent). When the RTS is brought low, the V.13 IDLE PATTERN will be sent, and the modem will drop CTS. (If V.13 TX is enabled but the modem data pump is not ready to send, i.e., if it is training or retraining, raising RTS will cause CTS to be raised, but the V.13 ON PATTERN will not be sent.) When V.13 RX is enabled, CD will turn ON if the V.13 ON PATTERN is detected; CD will turn OFF if the V.13 IDLE PATTERN is detected or if the modem retrains, loses carrier or is reset.

V.26/V.26bis OPERATION

The ALX modem can be configured for ITU-T V.26 or V.26bis operation. These two operating modes are described below:

- V.26 mode – 4-wire leased line, 2400 bps, full duplex
- V.26bis mode – 2-wire dialup line, 2400 bps, half duplex

Note that these modes do not support automatic rate adjustment (fallback), the ALX Speed Limit option, error correction or ALX diagnostics.

Configuration for V.26 (Leased Line) Mode

To configure the ALX modem for V.26 (leased line) operation, follow these steps:

1. Use the procedure explained on page 8 to select Quick Setup 13, 4-WLL V.29 (4-wire leased line V.29 mode).
2. Use the front panel LCD to change the Communication Standard option to V.26.
3. Use the LCD to change the Carrier Type option to switched (SWITCH).

Configuration for V.26bis (Dial Line) Mode

To configure the ALX modem for V.26bis (dial) operation, follow these steps:

1. Follow steps 1, 2 and 3 above (under *Configuration for V.26 (Leased Line) Mode*).
2. Use the LCD to change the Line Type option to 2W-D (2-wire dial).

DTR DIALING

Note: To use DTR dialing in V.25bis mode, you must use the Summary Setup feature, as explained in Chapter 5.

Dialing a Stored Number

DTR dialing allows you to set up the ALX modem to automatically dial a stored number even when the autodialer has not been enabled.

To enable DTR dialing, select DTR from the DIALER option screen.

When DTR dialing is enabled, an OFF-to-ON transition of DTR causes the ALX to automatically dial the number stored in the phone cell displayed in the front panel AUTO-DIAL screen. DTR must remain on for at least 50 ms to affect automatic dialing. A 50-ms drop of DTR will abort the process or disconnect the call. When DTR goes high again for at least 50 ms, the automatic dialing process will begin again.

Answer Mode Operation

If the modem is set for DTR dialing, it will automatically answer without DTR. However, it will not be able to transfer data until DTR goes high. The call may be terminated by dropping DTR.

DIAL LINE AUTO-RECOVERY

The Dial Line Auto-Recovery feature allows you to set up the modem for a dial-up application so it will automatically redial to restore a broken connection if the modem goes on-hook. In this way, the Dial Line Auto-Recovery feature emulates the reliability of a leased line connection.

Setting up the ALX for Dial Line Auto-Recovery

Three steps are required to set up the modem for Dial Line Auto-Recovery:

1. Store the phone number to be dialed and include the **/R** (dial line auto-recovery) command.
2. Specify the phone cell where the number to be dialed for auto-recovery is stored.
3. Enable Dial Line Auto-Recovery.

Storing the Phone Number With /R Command

To configure the modem for Dial Line Auto-Recovery from the front panel, access the PHONE CELL: screen and use the PROG selection to store the phone number to be dialed for auto-recovery. Include the **/R** command immediately after the phone number:

T555-4545/R		
DEC	CTRL	INC

An alternate way to store a phone number for Dial Line Auto-Recovery (in Hayes mode only) is to use the Hayes AT &Z command to store the phone number and the **/R** command in a phone cell by entering:

AT &Zc=T555-4545/R

where c is the number of the phone cell (0-49) where the number will be stored.

Specifying the Phone Cell to be Used for Auto-Recovery

The phone number that will be used for Dial-Line Auto-Recovery is the number stored in the phone cell currently displayed in the AUTO-DIAL screen. (For Dial Line Auto-Recovery to function, the selected phone cell must include a phone number and the /R command.) To view the AUTO-DIAL screen or change the phone cell currently selected for auto-recovery (and front panel autodialing), see page 71.

Enabling Dial Line Auto-Recovery

Dial Line Auto-Recovery will not be active until you select DIAL from the front panel AUTO-DIAL screen (or, in Hayes mode, use the command **AT DS=c** – or, in V.25bis mode, use the command **CRS c** – where c is the number of the phone cell where the phone number for auto-recovery is stored). To disable Dial Line Auto-Recovery, select RESET from MAIN MENU screen 3.

Recovery Procedure

If Dial Line Auto-Recovery is enabled and the modem goes on-hook, it will redial the stored phone number up to 10 times. It will redial 5 times at 30-second intervals, wait 2 hours, and then redial 5 additional times at 30-second intervals. The modem stops redialing after 10 attempts.

If a connection has been broken and re-established and is then broken again, the full sequence of 10 redial attempts will not occur unless the modem has been on-line for more than 1 hour. The modem will redial, but it is programmed not to exceed more than 10 redial attempts in 1 hour.

LEASED LINE AUTO-RECOVERY

Leased Line Auto-Recovery allows the ALX to automatically restore operation for a leased line application by using dial lines as a backup when conditions on the leased line deteriorate. The ALX uses signal quality and loss of carrier detect to determine if line conditions are unsatisfactory. Leased Line Auto-Recovery is accessed via the front panel AUTO-RECOVERY screen.

The following conditions are required for Leased Line Auto-Recovery:

- Leased Line Auto-Recovery must be enabled (using the Leased Line Auto-Recovery Select option) on both communicating modems.
- The Leased Line Auto-Recovery Select, Return and Test options must be set correctly on both communicating modems, as explained in the following sections.
- A dial backup line (or lines) must be installed.
- The phone number to be dialed (the backup line) must be stored in the originate modem.

The phone number that will be used for Leased Line Auto-Recovery is the number stored in the phone cell currently displayed in the AUTO-DIAL screen of the originate modem. To view the AUTO-DIAL screen or change the phone cell currently selected for auto-recovery (and front panel autodialing), see page 71.

- Auto-answer must be enabled on the answer modem.

Autodial Backup

The ALX will automatically dial the stored number to connect over the backup line if it detects poor signal quality (ER) or a loss of carrier detect (CD) on the leased line. The criteria used by the ALX in assessing the condition of the leased line depend upon the settings of the Signal Quality option (one error in 10^4 of 10^6 bits) and the Carrier Detect Level option (-26, -33 or -43 dBm).

Dial Backup Message

When dial backup occurs (either automatically or by operator intervention), the following message will flash on the front panel LCD of both modems if the TIA/EIA status screen is displayed:

<p>ATTENTION: DIAL BACKUP</p>

This message will clear when the modem returns to the leased line. If you want to clear the message while the modem is still in dial backup mode, press the ENT pushbutton.

Exit From Leased Line Auto-Recovery

If the Leased Line Auto-Recovery Return option is enabled (see below), the modem will automatically exit the Auto-Recovery mode when the leased line conditions are satisfactory. Any normal disconnects (such as loss of carrier or line current) may also disconnect the dial connections and return communication to the leased line.

To ensure the proper disconnect capabilities for Leased Line Auto Recovery mode, both of the following disconnect options must be enabled on both modems: line current disconnect (CURRENT DISC'T screen) and carrier disconnect (CARRIER DISC'T).

To manually exit the Leased Line Auto-Recovery mode and return to leased line operation, select DIAL from MAIN MENU screen 1, and then select HANGUP from the AUTO-DIAL screen.

Leased Line Auto-Recovery Options

The following options allow you to specify the criteria the ALX will use in determining when to enter and exit the Leased Line Auto-Recovery mode:

- Leased Line Auto-Recovery Select (SELECT)

This option determines the type of Leased Line Auto-Recovery desired. “DIAL IF BAD > (1, 2, 3 or 4) min” or “DIAL IF BACK > 30 s (seconds)” means dial backup will occur if bad line conditions are present for the specified (selected) time period. To disable Leased Line Auto Recovery, select NO AUTO RECOVERY. A sixth option, Manual Recovery, is discussed below.

Note: If “DIAL IF BAD > (1, 2, 3 or 4) min (or 30 s)” is selected, the Select option settings of the answer and originate units must be the same.

Manual Recovery

If both modems are set for MANUAL RECOVERY, the originate unit can be used to autodial the number stored via the PHONE screen without having to change the LINE TYPE setting on either unit. To autodial, access the AUTO-DIAL screen and select DIAL. To return to the leased line, select HANGUP from the AUTO-DIAL screen.

- Return from Leased Line Auto-Recovery (RETN)

This option determines the criteria for exiting Leased Line Auto-Recovery mode.

“RETURN IF GOOD > (10, 40, 60 or 120) s” means the modem will automatically exit the Leased Line Auto-Recovery mode when it tests and finds the leased line in good condition for more than the time period specified (10, 40, 60 or 120 s). If the Return option is set to OFF, the modem will stay in the Auto-Recovery mode indefinitely, unless you select HANGUP from the AUTO-DIAL screen or unless a loss of line current or other normal disconnect occurs. Either event will return communication to the leased line.

Notes: The Return option setting must be the same on both communicating units. For operation with older Alliance Series modems, see Chapter 2.

- Test Interval (Test)

If the Return option has been enabled (> 10, 40, 60, or 120 s), the Test Interval selections control how frequently the ALX will test the leased line conditions to determine if exit from the Leased Line Auto-Recovery mode is desirable (based on the criteria selected for return from Auto-Recovery). The ALX can be set to test every 10, 20, 40 or 60 minutes.

Note: The Test option setting must be the same on both units. In asynchronous mode, with error correction or buffering enabled, no data can be transmitted or received during the test period.

- Test Type for Leased Line Auto-Recovery

This option is available only on special ALX models equipped for non-interruptive dial backup. These special models can perform a continuous non-interruptive test of the leased line while the ALX is in dial backup mode.

The non-interruptive test allows the modem to return to the leased line as soon as the leased line is good, rather than waiting a specified period of time and then having to interrupt the data flow to check the leased line. This test checks for leased line continuity – it does not verify the signal quality as the interruptive test does.

INTER Allows an interruptive test to determine the line condition. This is the normal Auto-Recovery mode used by ALX models without the non-interruptive test capability.

NON-INT Enables the continuous non-interruptive test when the ALX is in dial backup mode.

SECURITY OPERATION

NOTE: The security features described in this manual provide a deterrent to unauthorized access. No communications system can be made perfectly secure. Raymar Information Technology, Inc. cannot guarantee the invulnerability of any communications system.

Two types of security operation are available to screen incoming calls:

- **Automatic password protection (APP).** Users do not have to enter a password, but both modems must be correctly configured to exchange the same password (as part of a security handshake), or they will not be able to connect. The originating and answer modems must both be Raymar-Telenetics ALX V.32M, V.32/14.4M, V.32/19.2M or V.34M modems.
- **Manual-response password protection (MPP).** Remote users attempting to connect to the ALX are required to enter a password. Incoming calls are accepted only if the user enters a valid password. *MPP is available on all ALX models, in Hayes mode only.*

APP and MPP may be programmed to include or not include security callback.

Automatic Password Protection (APP)

APP, which uses the ALX security handshake, is available on the ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M only.

The ALX can be configured for two types of APP:

- **APP without callback** – The ALX can be configured so that each time it receives a connect request from another modem, it automatically employs a security handshake which includes a user-assigned password. Connect requests will be accepted only from modems that have been preprogrammed with the same password. *APP without callback functions in any operating mode that uses trellis coding.*
- **APP with callback** – This type of password protection is the same as described above, except that the answer ALX connects with the originating modem by calling it back. The connection can only be made if both modems are preprogrammed with the same password and if the answer ALX is preprogrammed with the number of the originating modem (the callback phone number). *APP with callback is for dialup applications only (synchronous or asynchronous).*

With either type of APP, each incoming call is password protected, yet there is no need for users to enter a password. Passwords are preprogrammed, sent over the modem's auxiliary channel, and automatically compared by the ALX. The only time manual intervention is required is when the password (and callback number, if used) is established or changed.

If desired, the password can be disabled. This allows the ALX to accept calls from modems that have not been programmed to send the correct password – including modems that do not support the ALX security handshake.

The automatically invoked password (and callback phone number, if used) is stored in nonvolatile memory, so it will be maintained in the event of a power loss or quick (soft) reset. **However, a factory reset will clear the automatic password (and callback number, if used) from memory.**

Note: When APP is used, the ALX will not fall back to speeds that do not use trellis coding.

After a connection has been established using the security handshake and automatic password (and callback phone number, if used), a flashing “S” will be displayed in the top left corner of the TIA/EIA status screen to indicate that a secure connection has been made. (If the modem is in a dial mode, “S” – and “D” for dial line occupied – will flash alternatively.)

The APP process is summarized below. *Answer modem* (or ALX) refers to the local ALX; *originating modem* refers to a remote modem when it calls or attempts to call the answer modem.

- An originating modem calls the answer modem.
- Originating modem automatically sends the preprogrammed password via the security handshake.
- If the answer ALX is configured for APP without callback, it confirms the password and connects.

For APP without callback, this is the end of the process.

For APP with callback, the process continues:

- Both modems go on-hook.
- Answer ALX calls the originating modem back.
- Modems exchange security handshake (again) and connect.

Configuring Modems for APP

The procedures for configuring the originating and answer modems for both types of APP are summarized below and then explained in detail in the subsequent sections.

APP without Callback

- Enter the same password in the front panel password screen (on the LCD) of the originating modem and answer modem.

APP with Callback

- Enter a password in the front panel password screen of the originating modem (the user password).
- A password must be entered in the front panel password screen of the answer ALX (*the master password*). Any password will do (even a single character), *except that it should not be the same as the user password, and it should **not** be the same as any other password stored in the answer modem's memory (for APP or MPP)*. APP with callback will not function if the master password is removed.
- Use the Hayes **AT &Z** command to store the user password and callback phone number in the answer modem's memory.

Password Screens

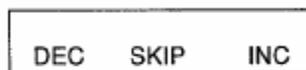
For either type of APP, a password must be preprogrammed through the PASSWORD screen of both the answer and originating modems, as explained below. (The PASSWORD screen is displayed only on the ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M.)

For APP without callback, use the same password on both modems. For APP with callback, do not use the same password – see the preceding section.

Establishing or Changing the Automatic Password

The automatic password can be changed (or initially established) using the front panel password screens shown below. These screens are accessed via the PASSWORD screen.

CHANGE-PASSWORD SCREEN:



CLEAR-PASSWORD CONFIRMATION SCREEN:



Note: The change-password and clear password confirmation screens will not be displayed if the front panel is disabled. (See *Front Panel Control* in Chapter 2.)

To change or establish the automatic password, select CHANGE from the PASSWORD screen. The change-password screen will be displayed. If a password has been previously programmed, it will be displayed.

Use the right and left arrow pushbuttons to move from one character position to the next. The character at the current location will flash on and off. Use pushbutton 1 to change the character at the current cursor location to the next descending character or pushbutton 3 to change it to the next ascending character. Use pushbutton 2 to skip through groups of characters (ascending). Use the arrow pushbuttons to move on to the next character to be changed.

Valid Password Characters

The following paragraph applies to all APP passwords except the user password entered in the originating modem for APP with callback:

Valid password characters are A through Z (upper case or lower case), 0 through 9 and the following symbols: ! “ # \$ % & ‘ () * + , - . / **Spaces function as valid password characters; therefore, a password that includes spaces will only match another password with spaces in the same positions. Note, however, that a space in the first character position will disable the password.** When the LCD cursor is in the same position as a space, the space is shown on the LCD as a flashing black rectangle: ■ ; otherwise, spaces appear as void spaces.

The following paragraph applies only to the user password entered in the originating modem when configuring modems for APP with callback:

The only valid password characters are capital A through Z. If any characters outside this range are used, callback operation will not function. No spaces between the letters are allowed, except that the user password (as entered on the front panel) must end with a space (■).

Entering the Selected Password

When the new password is correctly displayed on the LCD, press the ENT pushbutton. This will cause the new password to take effect.

The modems are configured for APP without callback when matching passwords are entered in the front panel password screens of both modems.

APP with Callback: Storing the Password with Callback Number

This section applies only to APP with callback.

If you have followed these instructions to this point, the user password will be stored in the front panel password screen of the originating modem, and a different password (the master password) will be stored in the front panel password screen of the answer ALX. (The master password should be different from the user password, because it can be used to access the answer ALX directly, without callback. The master password allows access for troubleshooting from a remote site.)

The final setup in configuring the modems for APP with callback is to store the user password in the answer modem's memory, along with the callback phone number, as explained below.

From the DTE, use the Hayes **AT &Z** command and /S (a special command) to store the user password (capital A through Z, no spaces) and callback number in a specific phone cell. Phone cells 2-49 may be used. The following example shows how to store a user password and callback number in phone cell 3:

Enter

```
AT &Z3=T5551212/SGRAPE
```

The callback number (phone number of the originating modem) in this example is 555-1212 (with **T** used to specify tone dialing). The user password is GRAPE. (When the user password is entered on the front panel password screen of the originating modem, a space is required at the end. Do not use a space at the end when storing the password with the **AT &Z** command.)

A remote user can now call from the specified callback number, 555-1212. The originating ALX will send the preprogrammed password GRAPE as part of the security handshake. The answer ALX will confirm the password and connect by calling the originating modem back.

Disabling APP

Temporarily Disabling APP

To temporarily disable either type of APP, select CHANGE from the PASSWORD screen. The change-password screen will be displayed. With the cursor in the first character position, press pushbutton 2 (SKIP) until a space appears (flashing: ■). Then press ENT. The password will be disabled.

With the password disabled, the answer ALX can connect to another modem that is not equipped to use or is not configured to use APP (i.e., if a password has not been entered in the front panel change-password screen). However, it will not be able to connect to a modem that is programmed with a password for APP without callback. To restore the password, replace the space with the first character of the password and press ENT.

Clearing the Password

To clear the front panel password from memory, select CLEAR from the PASSWORD screen. The clear-password confirmation screen will be displayed. Press pushbutton 2 to confirm that you want to clear the password.

If no password is stored, the ALX will be able to connect to other modems that are not equipped to use or are not configured to use an automatic password APP. To *temporarily* disable the automatic password, see the previous section.

Manual-Response Password Protection (MPP)

MPP is available on all ALX models in asynchronous 2-Wire-Dial Hayes emulation mode only. MPP will function only for connections made using error correction (V.42/V.42bis or MNP) or buffer mode.

The ALX can be configured for two types of MPP:

- **MPP without callback** – The ALX will pass a connection on to the DTE interface only after it receives a valid password.
- **MPP with callback** – The answer ALX will call back an authorized user after he or she enters a valid password.

Both types of security operation provide security on incoming calls by requiring remote users to manually enter a valid password. In addition, access to Hayes-compatible commands for viewing and storing phone numbers is password protected.

The MPP process is summarized below:

- A remote (originating) modem calls the local (answer) ALX modem.
- Local modem answers.
- Remote user sends carriage return [CR].
- Answer modem sends PASSWORD? query to remote DTE display.
- Remote user sends unique password (assigned to remote modem).
- Answer modem confirms password and grants access (if programmed for MPP without callback) or initiates security callback (if programmed for MPP with callback).

Commands for Enabling MPP

Modem configuration for MP is controlled from the DTE by a special set of password commands. These commands are implemented by using the Hayes AT &Z command to store them in memory. **If an administrative password has been implemented, the front panel will be disabled and the AT &Z command will not function until it (the AT &Z command) is unlocked. (The procedure for unlocking the AT &Z command is explained in the subsequent section titled *How to Use Password Commands*.)**

The ALX modem incorporates 50 phone cells (memory locations) for storing telephone numbers. Phone cells may also be used to store passwords and/or the MPP password commands listed in Table 3-1. To implement a security command, use the Hayes **AT &Z** command to store the command in a specific phone cell. The password commands are listed in Table 3-1 and explained in detail in the sections that follow.

Command	Function	Example ¹	Phone cell ²
/A	Set/change administrative password; password-protects use of certain Hayes commands	&Z1=/ASECURITY	1
/P	Set password for – MPP without callback..... or MPP with callback.....	&Z2=/PYELLOW &Z2=4443535/PRED	2-49
/U	User-defined text string. Used to send a response to the remote terminal user after a valid password is received.	&Z0=/UHELLO	0
¹ Command string stored using AT &Z command. ² Each command will function only in the listed phone cells.			

Rules for Using Passwords and Password Commands (MPP)

- Phone cells 0 and 2-49 may be used for storing phone numbers; phone cells 2-49 may be used to store passwords.
- The entire command string, including the **AT &Z** command, cannot exceed 64 characters.

Passwords

- Passwords and commands may be entered in capitals or lowercase letters. (However, they will be stored and subsequently displayed as capitals.) Do not include numbers or spaces.
- For MPP without callback, / must be the first character in a phone cell; for MPP with callback operation, a phone number must be listed first in a phone cell.
- A phone number cannot be stored after / .

Commands

- Only one command (/A, /P, or /U) can be stored in each phone cell.
- Do not leave a space after a command.
- When using the /U command, store /U and the specified text string only in cell 0. Do not include spaces or dialing modifiers in the text string.

How to Use Password Commands

To Establish or Change the Administrative Password:

An administrative password is not required for security operation, but for greatest security, an administrative password should be used. When implemented, the administrative password controls access to the Hayes-compatible **&V** and **&Z** commands. These commands are required to view or modify the modem's security configuration (as explained in the following sections).

To establish or change an administrative password, enter

```
AT &Z1=/ASECURITY
```

but replace SECURITY with the password of your choice.

Notes: The administrative password may only be stored in phone cell 1. The command line, including **AT &Z1=**, cannot exceed 64 characters.

To Unlock the &V and &Z Commands:

If an administrative password has been implemented, the Hayes-compatible **&V** and **&Z** commands cannot be accessed unless they are first unlocked using the current administrative password. (**&V** is used to view the active modem configuration, stored phone numbers, password commands and passwords; **&Z** is used to store phone number, password commands and passwords). To unlock the **&V** and **&Z** commands, enter

```
AT &Z1=/ASECURITY
```

or substitute other current password in place of SECURITY.

The **&V** and **&Z** commands will now be accessible.

To re-lock the **&V** and **&Z** commands, enter **AT Z**. The DTE will respond with **OK**, and the **&V** or **&Z** commands will not function until they are unlocked.

To Program MPP without Callback Operation:

Use the commands **AT &Z** and **/P** to specify the password to be used for MPP without callback operation. For example, the following command string programs phone cell 5 for MPP without callback:

```
AT &Z5=/PYELLOW
```

The password is YELLOW. After the modems connect, the remote user presses the DTE Enter key once. The DTE will then prompt the user to enter the assigned password by displaying the PASSWORD? query. If the user enters the correct password, YELLOW, the call will be connected.

Note: MPP passwords may only be stored in phone cells 2 through 49.

To Program MPP with Callback Operation:

Use the commands **AT &Z** and **/P** to specify the callback phone number and password to be used. For example, the following command string programs phone cell 35 for callback operation:

```
AT &Z35=T5551212/PCANARY
```

The callback number in this example is 555-1212 (with T used to specify tone dialing); the password is CANARY. A remote user can now call from the specified callback number, 555-1212. After the modems connect, the remote user presses the DTE Enter key once. The DTE will then prompt the user to enter the assigned password by displaying the PASSWORD? query.

Upon receipt of the correct password, CANARY, the local ALX will call back the remote user at 555-1212. Once this connection is established, data may pass freely.

Note: MPP passwords and callback numbers may only be stored in phone cells 2 through 49.

To Program a Response to a Correct Password:

Enter

```
AT &Z0=/UMESSAGE
```

But replace MESSAGE with the message of your choice.

The DTE will respond with the specified message when the modem receives a correct password.

Note: The /U command and message can only be stored in phone cell 0.

To Suppress the PASSWORD? Query Message:

For an added measure of security, the PASSWORD? query message may be disabled. With the query message suppressed, unauthorized users will not be informed that a password is required; however, a password will nonetheless be required if an MPP password has been implemented. The only difference will be the absence of the PASSWORD? query message.

To suppress the PASSWORD? message, refer to Appendix C and the V.42 ERROR CORRECTION OPTIONS diagram. Change the PASSWORD? query message setting shown in the diagram, from 1 (the factory setting) to 0.

Disabling Security Operation

To clear the modem security configuration, and thereby deactivate security operation (APP or MPP), initiate a factory reset as follows: Push and hold in the right arrow pushbutton on the front panel as you power up the modem until the words “FACTORY DEFAULT” appear on the LCD. **This will reconfigure the modem to the state it was in when shipped from the factory. Security operation will be permanently disabled – unless the modem is later reconfigured for security operation. Note that a factory reset will delete any phone numbers stored in the modem’s memory.**

MODEM-CONTROLLED REMOTE CONTROL

Certain ALX modems can be used to remotely control other ALX modems. Alternately, ALX modems may be remotely controlled from a computer or other DTE. This section explains modem-controlled remote control. Remote control from a DTE is explained later in this chapter, in the *Diagnostic Port Control* section.

Only ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M modems can be used to remotely control other ALX modems. Which ALX models can be remotely controlled depends on the type of remote control employed, as stated in the following sections.

Two types of modem-controlled remote control are possible:

- **Direct modem-to-modem control** – One modem can be used to control the front panel of another modem through a phone link.
- **Control through a rack controller** – A modem in a rack enclosure equipped with an intelligent rack controller can control -

Another modem in the same rack *or*
A remote modem connected to any modem in the rack.

For both types of remote control, the controlling modem and the controlled (remote) modem must be connected at a data rate that uses trellis coding. (This does not apply, however, if both modems are installed in the same rack and the rack is equipped with a rack controller.)

Direct Modem-to-Modem Remote Control

REMOTE screen 1 on the LCD allows you to use one ALX modem to control the front panel of another ALX modem via a phone link. **Specifically, an ALX V.32M, V.32/14.4M, V.32/19.2M or V.34M modem may be used to control the front panel of another ALX V.32M, V.32/14.4M, V.32/19.2M or V.34M.** (REMOTE screen 2 is discussed in the subsequent section titled *Remote Control through a Rack Controller*.)

Control Procedure (Modem-to-Modem)

Enabling Modem-to-Modem Remote Control Mode

To remotely control a modem connected by a direct phone link, access REMOTE screen 1 (shown below). This screen is only present on the ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M.



If you select CONTROL, you will be able to control the front panel of the remote modem from the front panel of the modem you are using. When you select CONTROL, you will see (on the LCD of the modem you are using) whatever is currently displayed on the LCD of the remote modem. The characters on the LCD will be displayed in lower case – this is to let you know you are actually looking at a “copy” of the LCD of the remote modem. Buttons pressed on the front panel of the controlling modem will affect the controlled modem (and not the controlling modem). When you are remotely controlling another modem, the LCD will not change as quickly as it normally does.

Note: While an ALX modem is being remotely controlled by another modem or is remotely controlling another modem, its diagnostic port cannot be used for other purposes – commands from the diagnostic port will be ignored.

(You can also access two remote test options from REMOTE 1 screen by selecting TEST. These test options, remote digital loopback and remote digital loopback self test, are described in Chapter 6.)

Exiting from Remote Control Mode

To exit from remote control mode, press the ENT pushbutton 5 times in succession on the front panel of the controlling modem. (If the remote modem resets as a result of a configuration change, the local modem will appear to have no control. To remedy this situation, press the ENT button 5 times.)

Remote Control through a Rack Controller

When installed in a rack enclosure equipped with an intelligent rack controller, an ALX V.32M, V.32/14.4M, V.32/19.2M or V.34M can be used to control –

- Another modem in the same rack or
- A remote modem connected to any modem in the rack (address control mode only).

Remote control through a rack controller is an especially valuable capability for modems used in Raymar-Telenetics’ high-density 16-slot rack enclosures. The low-profile modems specially designed for these racks are manufactured without an LCD user interface or control pushbuttons. (These modems are described in Appendix E.) One way to access the low-profile modems to monitor, test or configure them is by using the modem control feature described below.

The controlling modem must be an ALX V.32M, V.32/14.4M, V.32/19.2M or V.34M modem equipped with a front-panel LCD and pushbuttons. (Low-profile rack-mount versions of these modems cannot be used as controlling modems because they do not have LCDs and pushbuttons.) **The controlling modem can control the following modems: ALX V.32 (model 2432 or newer), V.32M, V.32/14.4, V.32/14.4M, V.32/19.2, V.32/19.2M, V.34 and V.34M – with or without LCDs and pushbuttons.**

Control Procedure (Using a Rack Controller)

Enabling Remote Control through a Rack Controller

The main screen used to control other modems through a rack controller is REMOTE screen 2 (shown below). This screen is only present on the ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M.



This screen is used as follows:

1. Select address control or slot control

To control a modem in the same rack as the controlling modem, or to control a connected remote modem, you must first specify the address or slot number (location in the rack) of the modem you want to control. If you want to specify the modem by its address, select ADDR/C (address control) on the bottom line of REMOTE screen 2. (Note: Each modem must have a unique address.) If you want to specify the modem by its slot number, select SLOT/C. (For slot 16, use 00 or 16, whichever is displayed on your modem.) Press pushbutton 2 to toggle between ADDR/C and SLOT/C (slot control).

2. Enter the address or slot number

To enter the address or slot number of the modem to be controlled, press pushbutton 3. If ADDR/C is displayed on REMOTE screen 2, a screen showing ADDRESS: 000,000 on the top line will be displayed. If SLOT/C is displayed on REMOTE screen 2, a screen showing SLOT NUMBERS: 01 on the top line will be displayed.

Enter the address or slot number as follows: Use the right and left arrow pushbuttons to go to the digit you want to change. Then use pushbutton 1 to decrease (DEC) a number or pushbutton 3 to increase (INC) it.

If SLOT/C is selected, only modems in the same rack as the controlling modem may be specified (slots 1-16). However, if ADDR/C is selected, you can specify any modem in the same rack with the controlling modem or a remote modem connected to any modem in that rack (Figure 3-1). The remote modem may be in a rack without a rack controller, or it may be a stand-alone modem.

When the address or slot number you want is shown, press ENT. The LCD will return to REMOTE screen 2.

3. Initiate control

After entering the address or slot number of the modem to be controlled, select CTRL from REMOTE screen 2. “CTRL” will flash on and off for about 7 seconds until the connection to the specified modem is made. When the connection is made, all characters on the LCD of the controlling modem will be in lowercase instead of capitals – this indicates that the screens displayed are for the controlled modem. Buttons pressed on the front panel of the controlling modem will affect the controlled modem (and not the controlling modem).

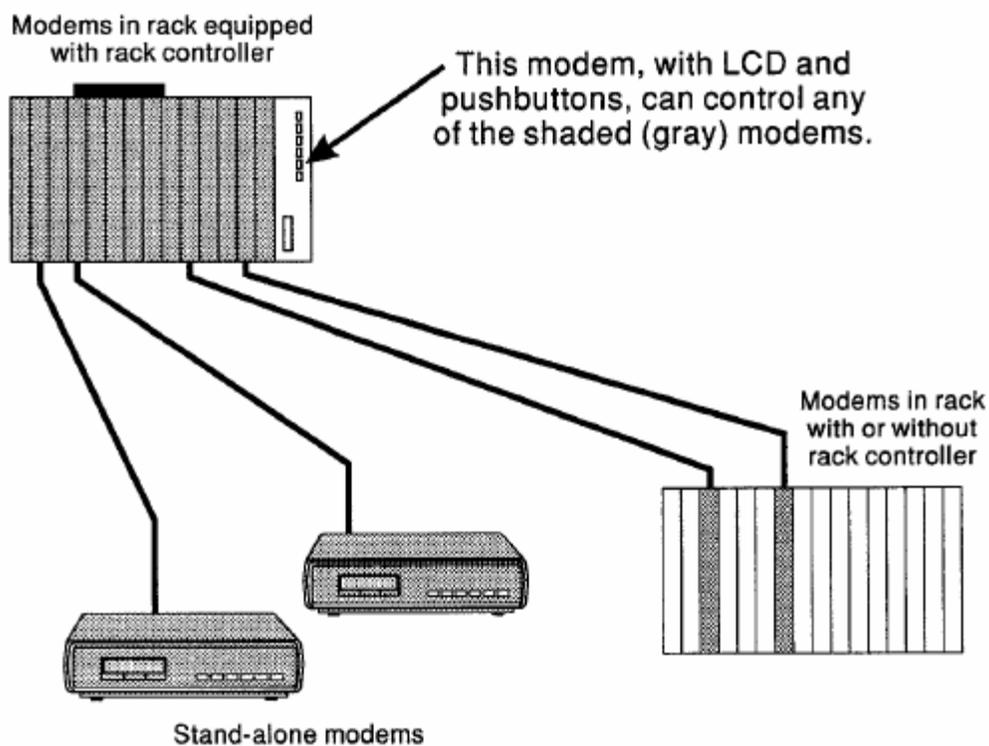


Figure 3-1. Remote control—address control mode

If the specified modem is not present or is not working, the LCD will display a “NO RESPONSE” message. If a rack controller is not installed on the rack enclosure or is not working, “CTRL” will continue to flash on and off indefinitely (until you exit from the address or slot control mode).

Exiting from Remote Control Mode

To **exit** from the address or slot control mode, press the ENT button five times in succession. (If the remote modem resets as a result of a configuration change, the local modem will appear to have no control. To remedy this situation, press the ENT button 5 times.)

DIAGNOSTIC PORT CONTROL

The ALX modem supports a special set of commands known as *control commands*. These commands, listed in Table 3-2, may be used to configure an ALX modem (from either a local or remote location) or to monitor the modem for diagnostic purposes. The control commands are entered from a DTE keyboard. They can only be used when the ALX is configured for diagnostic port control.

Configuration for Diagnostic Port Control

There are three ways you can set up a control link that will enable the ALX modem to respond to control commands:

- Connect a cable from the DTE to the ALX diagnostic port. (Pin assignments for the diagnostic port are listed in Appendix D.)
- Enter a command to switch the modem's (DB-25) DTE connector to function as a diagnostic port.
- For a modem installed in a rack enclosure, make sure the rack is equipped with an intelligent rack controller, and connect the DTE (serial port) to the rack controller.

In addition to the physical connection, a control link requires that the DTE be configured as follows: **8-bit character length, no parity, 1 stop bit and a data rate of 9600 bps** (or rate selected by **-P** command, if applicable). (Typically a communication software program is used to configure the DTE.)

Method 1: DTE-to-Diagnostic Port Cable

The ALX diagnostic port is an 8-pin RJ-45 connector that allows you to configure or control the ALX from a connected computer or other DTE. The location of the diagnostic connector is shown in Figure 1-1.

The diagnostic connector requires a cable with an RJ-45 modular connector on the modem end and a DB-25 connector on the DTE end. If you need to fabricate this cable, you can find the pin assignments for the diagnostic connector in Appendix A.

Method 2: Switching the Modem's DTE Connector Function

As an alternative to using an additional cable to the diagnostic port (as described above), the Hayes mode command **-N1 (AT -N1)** can be issued to change the function of the modem's DTE connector. This command switches to the modem's DB-25 connector from its normal function as DTE connector to instead function as the diagnostic port. (It also disables the physical diagnostic port, until the normal DTE connector function is restored.)

After issuing the **-N1** command, you can send control commands to the ALX, but you will not be able to transfer data. To return the DTE connector to its normal function, issue the control command **JMP**.

If you have used the **-P** command (explained below) to change the diagnostic port data rate, the rate will revert to 9600 bps when you issue the **JMP** command. However, if you add an **X** to the **JMP** command (**JMPX**), the diagnostic port data rate selected via the **-P** command will remain effective until the modem is powered down or reset.

Method 3: Modem in a Rack Enclosure

For information on connecting the DTE to the rack controller, see the rack controller instruction manual.

Control Link Data Rate

You can specify the diagnostic port data rate by using the Hayes mode **-P** command (**AT -P**), as follows:

-P0	9600 bps (default)	-P3	57.6 Kbps
-P1	19.2 Kbps	-P4	115.2 Kbps
-P2	38.4 Kbps		

The **-P** command must be issued prior to issuing the **-N1** (switch DTE connector) or **CONNECT (CON)** command (described below), and it should be issued separately (not in the same command line with **-N1** or **CONNECT/CON**).

Note: The diagnostic port does not support flow control. Therefore, if the port on the DTE cannot support the selected data rate without flow control, you may experience data loss. If this occurs, try a lower data rate.

Control Commands

The diagnostic software built into the ALX supports the control commands listed in Table 3-2. These commands can only be used when the ALX is configured for diagnostic port control.

Connect Command Syntax

As detailed in Table 3-2, the **CONNECT** or **CON** command is used to connect to the diagnostic port of an ALX modem. The syntax for this command is explained below:

When an address is specified with the **CONNECT** or **CON** command, leading zeros are ignored, meaning that any of the following forms will work:

CONNECT 3,22

CONNECT 003,022

CON 000003,22

If a group or unit address is not specified, it is assumed to be zero. For example, **CONNECT, 3** is equivalent to **CONNECT 0,3**. Note that a comma is required, even if a group or unit number is not used.

Rest Commands

If you use the **FRESET** (factory reset) control command (or **RESET** selected from the front panel LCD), you will have to use the **CONNECT** command (long form) to reestablish the control link. (This does not apply to the **RESET** command, because **RESET** does not break the control link.)

Table 3-2. Control Commands

Command	Function
CONNECT g,u	Connect to diagnostic port of modem at group address g, unit address u. An address must be specified unless the wildcard character * is used: CONNECT * (meaning “Connect to local modem; address unknown/unspecified.”). When the connection is made, the DTE will display the modem’s address. Echo, line feed and Auto-Display are enabled.
CON g, u	CON performs same functions as CONNECT command, except that echo, line feed and Auto-Display are disabled. The wildcard character * may be used: CON * .
<i>NOTE: The remaining commands listed in this table will only function if CONNECT or CON (with address or *) has been previously issued.</i>	
D	Displays the current front panel LCD screen of the connected modem on the DTE monitor.
E	Exits from screen. (Same function as front panel ENT button.)
1, 2, 3	Perform same functions as corresponding buttons on front panel. (Select choice 1, 2, or 3 from LCD.)
> or .	Performs same function as right arrow on the modem front panel. (Displays next menu screen.)

< or ,	Performs same function as left arrow on the modem front panel. (Displays previous menu screen.)
RESET	Resets the modem without changing option settings. (Does not disconnect the control link.)
FRESET	Effects factory reset. (Reconfigures modem to Hayes mode default settings.) Disconnects the control link.
JMP	Switches DTE connector from diagnostic port function to its normal function. (Breaks the control link.) Add X – JMPX – to retain speed selected by Hayes mode –P command.
Notes: A carriage return [CR] is required at the end of a command line except when the command line consists of only one single-character command. Commands can be entered in upper or lower case.	

Responses to Control Commands

In response to the control commands (Table 3-2), the ALX may display the responses listed in Table 3-3 on the DTE monitor.

Table 3-3. Responses to Control Commands

Response	Meaning
ERROR	Command error (incomplete, wrong syntax, etc.). (If CONNECT or CON is issued without an address or * , the modems will not connect and there will be no ERROR message.)
ADDRESS g,u	ALX has connected with diagnostic port of modem at address g, u (group and unit). Address may be preceded by A, S or both – see below.
A	One or more modem alarms have been detected. An alarm indicates a condition that may require attention (power loss, loss of carrier, etc.)
S	Valid statistics have been collected on a call or attempted call. Statistics include information such as duration of a call, signal quality level, etc.
RESET	Response to RESET command. Prompt (>) appears when reset is complete.

DTE Displays

Auto-Display

When Auto-Display is enabled, an update of the LCD is automatically displayed on the DTE screen each time a command (**E**, **1**, **2**, **3**, **< or >**) is entered to control the front panel LCD on the connected modem. Auto-Display is enabled when the long-form connect command (**CONNECT**) is used.

Auto-Display is disabled when the **CON** command is used. However, even with Auto-Display disabled, the **D** command can be used to display the LCD screen.

Echo and Line Feeds

The **CONNECT** command also enables echo and line feed on the DTE screen, whereas both are disabled when **CON** is used. This means that data from the connected modem will be easier to read when **CONNECT** is used; however, data throughput will be faster if **CON** is used.

Display of Selected Options (Flashing Characters)

On the ALX front panel LCD, a selected option choice flashes on and off so it can be easily identified as the current selection. When an LCD display is sent to the DTE in response to the **CONNECT** command, characters that are flashing on the actual LCD are indicated on the DTE screen by asterisks. An asterisk appears below each flashing character. In the example below, the selected CTS to EIA option is **TRUE** (and therefore “**TRUE**” will flash on and off.)

ACTUAL LCD ON CONNECTED MODEM:



DTE DISPLAY:

```

CTS to EIA
NORM  RTS  TRUE
          ****
  
```

Asterisks denoting flashing characters will also be displayed if the **D** command is used to request a display of the LCD, provided the connect command last used was **CONNECT** and not **CON**. Even with the **CON** command is used (meaning that the LCD of the connected modem will not be automatically displayed), a computer reading data from the diagnostic port will be able to determine which characters are flashing because bit 7 (MSB) will be set in each flashing character.

If you change option settings on the connected modem, it will reset when you leave SETUP menu. This will disable Auto-Display. To re-enable Auto-Display, disconnect and reconnect using the **CONNECT** command (long form).

To Disconnect from a Control Link

To prevent unauthorized access, you are advised to disconnect the control link when you are finished using it. There are several ways to disconnect from a modem-DTE control link:

To disconnect from the control link *and not establish a new link ...*

- Issue the **CONNECT** command without an address, or
- Select RESET from the modem's front panel LCD.

The method that follows will work only if the modems are controlled by a rack controller. To disconnect *and then connect to another modem ...*

- Issue the **CONNECT** command followed by the address of the modem you want to connect to. The DTE will disconnect from the first modem and immediately connect to the one you have specified.

SOFTWARE DOWNLOADING

Raymar-Telenetics continually updates its modem software to provide new features and the highest possible level of performance. By using the ALX modem's software downloading capability, you can update the modem's internal software to the latest available revision level at a fraction of the cost of buying a new modem.

This section explains local downloading, meaning the new modem software is downloaded from a DTE that is locally connected to the ALX. All Alliance models shipped with this manual can be upgraded by local downloading. The ALX V.32M, V.32/14.4M, V.32/19.2M and V.34M modems can also be remotely upgraded using Raymar-Telenetics' network management system (NMS). Upgrading modems through the NMS is covered in the NMS instruction manual.

For local downloading, no special connection is necessary; the software is transferred through the DTE interface to flash EPROM (erasable programmable memory) within the ALX.

Safeguards

The downloading procedure described below includes several safeguards to ensure a successful software transition: The actual download (i.e., transfer of the new software to the modem) does not occur until step 6 (below), and then will proceed only after the modem checks the new

software file for compatibility and correct file type. If for any reason the download procedure is aborted, the modem remains operational (in Hayes mode), with the original software intact.

The modem preserves existing option settings and stored phone numbers so these remain unchanged after you upgrade the software via downloading.

Preparation

The software file to be downloaded must be present on the DTE. (Typically, you would download the software to a hard disk on the DTE or copy it from a floppy disk to the hard disk prior to downloading it to the modem.)

The download procedure requires a password. This password is provided with the software file to be downloaded. If you do not know the password, contact Raymar-Telenetics' Technical Support Team.

You will need a communication software program to send the modem software file(s) from the DTE to the ALX.

A DTE speed of 115.2 Kbps or higher is recommended. At lower DTE speeds, downloading will be very slow.

Downloading Procedure

You can use the following procedure to download new software to –

- The modem controller (user interface software)
- The modem's data pump (line interface software), or
- The controller and data pump in a single operation.

Follow these steps:

1. Make sure the modem is in Hayes emulation mode.
2. From the DTE keyboard, issue the command **AT****.

The DTE will display a screen that shows data identified as Hardware Type, Software Version, etc., for the Controller and Data Pump (Boot and Operational). This information is for use by servicing personnel and/or technical support personnel.

At the bottom of the DTE display, you will see this message:

Enter your password to continue or Enter to exit.

3. If you want to exit, press Enter. The modem will resume normal operation in Hayes mode.

To continue with the download procedure, type the password provided with the new software file, then press Enter.

The DTE display will show this message:

Permission granted.

4. Review steps 5 and 6; then enter one of the following commands (followed by Enter):

AT *C	Download controller software only.
AT *P	Download data pump software only.
AT *M	Download controller and data pump software.

5. Wait until you see this message on the DTE display:

Ready to download.

6. **You now have 30 seconds** (after the Ready to download message) to enter a send / upload command from your communication program, to upload the new software file from the DTE to the ALX. (For example, if you are using Crosstalk, use **Send filename**; if you are using Procomm, use **PgUp**, then enter the filename when prompted.) Use a generic ASCII file transfer protocol. If you miss the 30-second window, you can begin again, starting with step 2.

After you enter the send / upload file command, the download process is automatic: The ALX checks the file for compatibility with the modem's hardware. It also makes sure the file type (controller, pump or both) corresponds to the command you have sent (**AT *C**, **AT *P**, or **AT *M**). If these checks indicate a problem, you will be advised by a message on the DTE screen, and the modem will return to normal operation using the original software. **If the file passes the checks, the download begins.**

While downloading takes place, you will see a rotating asterisk (*) on the DTE screen. (The asterisk will rotate briefly, then pause for about 20 seconds while the modem checks the new software file, then rotate until the download is complete.)

At 115.2 Kbps, the controller download takes about 2 to 3 minutes; the pump download takes about 1 minute; and the combined controller and pump download takes 3 to 4 minutes.

When the download is complete, the DTE displays this message:

Download successful.

This message indicates that you have successfully downloaded the new software. The ALX automatically resumes normal operation in Hayes mode, using the new software.

If for any reason downloading cannot proceed, the DTE will display a **Download aborted** message that will include the reason for the failure, and the modem will resume normal operation. If you encounter this message or any other difficulty, contact Raymar-Telenetics' Technical Support Team.

CHAPTER FOUR – HAYES EMULATION MODE

The main topics covered in this chapter are –

- Hayes mode autodialer
- Hayes-compatible commands
- S registers
- Selecting options in Hayes mode
- User profiles
- Facsimile (fax) transmission
- Hayes mode reference tables (listed below)

For easy reference, the following tables appear together at the end of this chapter:

- Hayes-Compatible Commands (Table 4-1)
- Dialing Modifiers (Table 4-2)
- Hayes Mode Result Codes (Table 4-3)
- S Register Functions (Table 4-4)

HAYES MODE AUTODIALER

When the Hayes emulation mode is enabled, the ALX modem emulates a Hayes autodialer and functions much like a Hayes modem. Commands are issued from the computer keyboard (or other DTE), and the ALX modem is compatible with software written to drive a Hayes-style “AT” command set.

Enabling the Hayes Mode Autodialer

The Hayes mode autodialer can be enabled in either of two ways – by using the Quick Setup feature or by selecting HAYES from the DIALER screen:

Quick Setup If you select 2-Wire Dial (Hayes) by using the Quick Setup feature, the Hayes mode autodialer will be enabled, and all modem options will be automatically set to a preset configuration suitable for typical Hayes mode applications. To select the 2-wire dial Hayes Quick Setup, access QUICK SETUP screen 1 on the LCD and press pushbutton 2.

Dialer mode If you enable the Hayes mode autodialer using the Dialer Mode option, no other options will be changed. To enable the autodialer this way, select DIALER from SETUP screen 2. Then select HAYES from the DIALER screen.

Command Guidelines

The following guidelines for using Hayes-compatible AT commands also provide a summary of Hayes mode autodialer operation.

Escape sequence (+ + +) The escape sequence causes the modem to escape from the data transfer mode so it can interpret commands. (Alternate characters for the escape sequence can be assigned via S register S2.)

Attention code AT, the attention code, *must begin all command lines. There are a few exceptions – but only a few.*

Command sequence For dialing, a command line begins with **AT** and is followed by a **D** and the phone number. Other commands should be placed before the dial command – or after the dial command if it is terminated with a semicolon – for example:

```
AT M2 V1 D 555-1212; S2=1O
```

This instructs the ALX to: Keep speaker on (**M2**), send word result codes (**V1**), dial (**D**) 555-1212, end dial command (;), set register 2 to 1 (**S2=1**), and go on-line and wait for carrier (**O**).

Dashes or spaces can be included in the telephone number to make it easier to read:

```
AT DT 9,(212)555-1234 or AT DT 9, 212 555 1234
```

A/ command Repeats the commands included in the previous command line. Because the **AT** is also repeated, no **AT** is needed to begin this command, nor is a carriage return needed. **A/** is useful for redialing a telephone number.

Carriage return [CR] A carriage return (Enter or Return key) is required at the end of the command line. The modem will not execute a command without it. A carriage return is sent from the DTE keyboard; a period, which may be entered via the modem's front panel (PHONE LCD screen), has the same function.

Dial command modifiers The dialing modifiers listed in Table 4-2 can be used with the **D** (dial) command to alter dialing operations. An example of a command line using **D** with two dial modifiers is:

AT DT 9,555-1212

The modifier **T** instructs the modem to tone dial, and the comma instructs it to pause after dialing 9 before dialing the remaining digits. A [CR] or period must be used at the end of a dial string.

Missing parameter A missing parameter is interpreted as a zero. For example, the **E** command (echo) can be sent as either **E0** or **E1**, but if an **E** alone is sent, the ALX will interpret it as if an **E0** was sent.

Command line length The command buffer can hold a maximum of 64 characters. If the command line exceeds 64 characters, the modem refuses to execute any portion of the command line and sends an error message. The **AT** at the beginning of the command line, control characters, and spaces do not take up space in the command buffer. Punctuation (except for spaces) does take up space in the command buffer.

Result Codes

Result codes (Table 4-3) are messages sent by the modem to the DTE monitor in response to your commands. (Result codes are sometimes referred to as call progress.) Result code options are selected using the **V** and **X** commands.

Result codes may be words (**V1** command) or digits (**V0**).

Result codes 0-4 comprise the basic result code set: OK, CONNECT, RING, NO CARRIER and ERROR. Codes 5 and higher provide additional response information, as explained in Table 4-3. Various combinations of these codes can be enabled or disabled by using the **X** command and its five parameters, as explained in Table 4-4 (under X-SELECT RESULT CODE).

Note: With the default Hayes mode settings in effect, the ALX transmits result codes to the DTE. In some installations, this may cause undesirable interaction with the attached DTE. If such interaction occurs, result codes for incoming calls should be suppressed (using the command **AT Q2**).

Transmission Speed

This section applies only to connections made without error correction or buffering (V.42/V.42bis, MNP and Buffer Mode options).

Transmission speed is governed by the speed of the receiving system. You must set the transmission speed of your computer by setting a switch in the hardware or by issuing a software command. (Refer to your computer documentation.) When the ALX modem originates a call, it automatically detects and adjusts to the transmission speed set when the communication port was initialized.

When answering a call, the ALX determines the transmission speed from the carrier signal of the originating modem. Change the speed (baud) setting of your equipment to match that of the remote system. Otherwise, unintelligible data will appear on your screen. (Depending on the parameter used with the **X** command, the speed will be indicated by the CONNECT result code.)

Autobaud

When a call is originated in Hayes mode, the AT attention code causes the ALX to autobaud. The speed at which the ALX autobaud defines the speed limit for subsequent connections and overrides any front panel DTE Speed setting. If the unit is not autobauded, the default interface rate is 38.4 Kbps. (**Note:** If AT is entered at one speed and followed by a carriage return [CR] at another speed, the modem will not recognize any further commands until a [CR] is entered at the same speed as the AT.)

HAYES-COMPATIBLE COMMANDS

All Hayes-compatible commands that can be used with the ALX modem are listed in Table 4-1. More detailed information is provided below for selected Hayes commands – particularly those used to answer and originate calls, and other commonly used commands. For Hayes commands that control modem options, additional information on options may be found in Chapter 2. Commands are listed in alphabetical order in this section and in Table 4-1.

For most commands there are parameters – numerical values used with the command that specify the function of the command. For example, the command **L** controls the modem's speaker volume. **L2** sets the volume to medium. The default value is a predetermined value which is in effect the first time the ALX is powered up or when a reset command is given. The possible parameters and default value for each command are shown in Table 4-1.

A – Answer The **A** command immediately puts the modem into answer mode. The modem will not execute commands included in the command line after **A**.

The **A** command is used to manually answer an incoming call or to transfer a call between two individuals to a communication between their computers: One person enters **AT A** while the other enters **AT D**.

A/ - Repeat previous command **A/** is most commonly used to redial a telephone number that results in a busy signal. The **AT** prefix is not used with **A/**, and no [CR] is required. Commands are available for repetition in the command buffer only until **AT** is entered or power to the unit is turned off. **A/** will not work following an **AT** or power OFF-power ON.

D – Originate mode for dialing The modem dials the number that follows and attempts to go on-line. The dial command **D** is followed by –

- A telephone number to be dialed, or
- A string consisting of a phone number and dialing modifiers (e.g., **T**, **P** and **;**).

An example of the **D** command is

```
AT D3331234
```

In response to this command, the ALX dials the telephone number 333-1234, and then waits for a carrier tone from the distant modem (default wait time, 30 seconds). If the modem is able to establish a call, it gives a **CONNECT** result code, indicating that it is on-line. If it cannot connect, it issues a different result code, such as **NO CARRIER**, **BUSY**, or **NO DIALTONE**.

The characters that can be dialed are 0 through 9, A, B, C, D, # and * ; however, A, B, C, D, # and * can be tone dialed only.

The dialing modifiers are listed in Table 4-2.

The dial command without a telephone number – **AT D** – causes the modem to pick up the telephone line without dialing a number.

DS – Dial stored number The **DS** command (**D** command with **S** modifier) instructs the ALX to dial a phone number or dial string previously stored using the **&Z** command. The syntax is **DS=c**, where **c** specifies the phone cell (memory location) where the number to be dialed will be stored. Up to 50 numbers may be stored in phone cells 0-49. **S=c** may be placed anywhere in the dial string; for example, **AT D2345S=27** will dial 2345 and the number stored in phone cell 27. However, if the characters specified after **AT D** (2345 in this case) plus the contents of the specified cell (contents of cell 27) exceed 50 characters, you will get an error message when you try to dial.

H – Telephone switch hook The **H** command (on-hook) is used to terminate a call. (On-hook corresponds to off-line.) **H** may also be used to alternate between voice and data transmission during the same call (if your communication software supports this capability).

The **H1** command (off-hook) activates the telephone line relay, causing a dial tone to be sent (after a 2-second delay). For most purposes this command is not necessary, since the switch hook is automatically activated when the modem originates or answers a call.

L – Link The **L** dialing modifier is used to link a phone number specified for dialing to an alternate (stored) phone number so the ALX will dial the alternate number if a connection cannot be made to the primary number specified. You can link several phone numbers for sequential dialing, or you can link the same phone number so the modem will automatically redial.

You must include the **L** modifier after a phone number, and prior to a [CR] or period. Include a number immediately after the **L** (e.g., **L5**) to specify the phone cell (0-49) that contains the alternate number to be linked to the first number.

```
AT D 321-1212 L5
```

This command line instructs the modem to dial 321-1212; and if it cannot connect, to call the alternate phone number stored in phone cell 5 (**L5**).

Phone cells may be linked in a cyclic fashion to alternate dialing until a connection is established:

Contents of phone cell 0:	555-1212 L1
Contents of phone cell 1:	444-1234 L2
Contents of phone cell 2:	888-5555 L0

With the phone cells loaded as shown above, if the command **AT DS=0** is issued, the autodialer will go to phone cell 0 and dial the stored number. If unable to connect, the **L1** command stored in cell 0 will direct the autodialer to dial the number in cell 1. Likewise, the **L2** stored in cell 1 directs the autodialer to cell 2 (assuming a connection cannot be made); and the **L0** command stored in cell 2 directs the autodialer back to cell 0. The numbers will be dialed in a loop until a connection is established or until 10 calls have been attempted. (The L modifier can be used 9 times in succession, meaning that up to 10 linked calls can be attempted. The time between call attempts is 3 seconds.)

O – Forced on-line This command applies to asynchronous operation only. When the modem is on-line, you can return to the command state by entering the escape sequence (+ + +). After the desired command has been executed, enter **AT O** to force the modem from the command state to the on-line state.

P – Pulse dial The P command instructs the modem to pulse dial. It can be entered anywhere in the dialing string: **AT DP5551212**; or it can be entered alone, followed by a [CR](**AT P**), in which case all subsequent telephone numbers will be pulse dialed. If the dial command does not specify which dialing mode to use, the modem defaults to the last mode specified.

S= - Modify S register This command is used to write information to a specified S register. The syntax is **Sr=n**, where r is the number of the register to be modified and n is the value to be written to it; for example:

```
AT S7=30
```

This command would change the value of register S7 to 30. If you enter just **=5**, the autodialer will change the value of the last register used to 5. More information on S registers is included later in this chapter.

S? – Read S register This command instructs the autodialer to read the contents of the specified S register. The syntax is **Sr?**, where **r** specifies the register to be read. For example, **S7?** reads the value of register S7. The value is displayed on the computer or terminal monitor. If you enter **?** by itself, the autodialer will display the value of the last register used; if **=** is entered by itself, the autodialer will display the number of the last register used (e.g., S2). For information on how to interpret S register values, see Table 4-4.

T – Tone dialing This command causes a telephone number in the dial command string to be dialed using tone signals. (See the **P** command above for additional information.)

W – Wait for dial tone The **W** (or colon) dialing modifier is used in a dial string to instruct the modem to wait for a dial tone before proceeding. The wait time (30 seconds by default) can be adjusted by changing the value in register S7. If no dial tone is detected within the specified time, the modem will hang up and give a NO DIALTONE result code (if this result code is enabled by the **X** command).

Z – Recall stored user profile The **Z** command recalls a profile of the modem configuration settings previously saved using the **&W** command, resets the modem and makes the recalled profile (profile 0 or 1) active. A user profile is designated as profile 0 or profile 1 when it is saved using the **&W** command.

, - Pause A comma causes the modem to pause for 2 seconds (or time specified in register S8) before processing the next character in a dial string or command. This command is used to place an outside call through a PBX switchboard, where 9 has to be dialed to gain outside access – the pause allows time for the dial tone to occur before the modem dials the number:

```
AT D9,3331234
```

Similarly, a comma may be used to cause the ALX to pause before beginning to dial a telephone number. Multiple commas may be used to increase the pause time.

; - Forced command state A semicolon placed at the end of a dial command causes the ALX to return to the command state after dialing without disconnecting.

The following examples illustrate how the **;** command is used:

The first example is a banking transaction: The command **AT D333-1234;** dials the bank's phone number and returns the ALX to the command state. After the **OK** prompt is displayed on the DTE, the command **AT D T 0901#** is entered. This transmits the identification number 0901 to the bank, and again returns the ALX to the command state. An account number and other data may be transmitted in the same way.

The second example illustrates one method of autodialing: Enter a dial string that ends with a semicolon, for example, **AT DT9, 3331234;** During the ring signal or when the call is answered, pick up the phone and enter **AT H**. You may then use a telephone connected to the ALX modem for voice communication.

@ - Wait for silence before dialing The @ dialing modifier is used to gain access to a system that does not provide a dial tone. It tells the modem to wait for 30 seconds or the time specified by register S7 for one or more rings followed by 5 seconds of silence before processing the next symbol in the dial string.

! – Initiate flash hook The ! dialing modifier causes the modem to go on-hook for ½ second. This has the same effect as holding the switch-hook button on your telephone down for ½ second. You may be able to use this modifier for transferring calls.

&F – Recall factory configuration Using data stored in ROM, the **&F** command restores the ALX modem active profile to the original factory configuration – except that **&F** does not change stored user profiles (0 and 1). *This change is not permanent.* If the modem is turned off or reset, the configuration recalled from ROM will be replaced with the default stored profile. (See **&Y** command.)

&V – View active configuration, etc. This command displays the active modem configuration, user profiles stored using the **&W** command, and phone numbers stored using the **&Z** command. When **&V0** is invoked, the DTE displays the modem configuration, including S registers and the contents of phone cells 0 through 5. Parameters 1 through 5 may be used with **&V** (e.g., **&V3**) to display the contents of additional phone cells. For details, see **&V** in Table 4-1. The **&V** command should be issued as the last command on a line.

&W – Write profile to memory The **&W** command saves the modem’s active configuration by writing the configuration profile to non-volatile memory. By selecting either **&W0** or **&W1**, two different user profiles can be saved (profile 0 or 1). One of these profiles will be automatically restored whenever the modem is powered on or when the Z command is issued. (See **&Y** and **Z** commands.)

The **&W** command cannot be used to write changes to the user profiles if the ALX front panel has been disabled by the Front Panel Control option.

When the **&W** command is used to save a configuration profile, stored phone numbers are *not* saved as part of the profile.

&Z – Store telephone number The **&Z** command is used to store a telephone number that can be subsequently dialed using the **DS** (dial stored number) command. The syntax is **&Zc=n**, where **c** specifies the phone cell where the phone number or dial string will be stored and **n** is the number or dial string to be stored. For example, **AT &Z5=T 1 (301) 555-1212** will store the specified number in phone cell 5.

For pulse dialing, digits 0 through 9 can be stored; for tone dialing, 0 through 9, A through D, # and * can be stored. The dialing modifiers listed in Table 4-2 can also be stored.

Fifty phone cells are available: 0-49. **Each phone cell can hold up to 50 characters, maximum.** For any given cell, this limit may be lower, depending on how other phone cells are loaded relative to total available storage memory. For details, see Chapter 3. You will get an ERROR message if you attempt to save a dial string of more than 50 characters or if the available memory becomes full.

To delete a stored phone number, enter **AT &Zc=**, where **c** is the phone cell number (or use **&Z** to overwrite a new phone number over the old one).

\S – View status of V.42-related configuration The **\S** command displays the active V.42 error correction configuration, stored V.42 profiles, and certain other data not displayed by the **&V** command.

S-REGISTERS

The ALX modem includes S registers that can be used to control specific modem operations. Each register holds a value that serves as a specific operating instruction for the modem. Several of the S registers affect how the previously described commands will be executed.

The functions of the registers intended for user access are explained below and summarized in Table 4-4.

Reading and Setting Registers

An alternate way to change S registers is explained in Appendix C.

Use the **S** command to read the value of a register or to change its value.

To read the current value of a register, use the command **S?**, where the number of the register is specified between the **S** and the **?**, as follows: **S9?**. The decimal value of the register contents will then be displayed. Multiple registers may be read. For example, if you wish to read the current value in registers S0 and S7, enter

AT S0? S7?

A typical response might be

```
001
030
OK
```

meaning that the values in registers S0 and S7 are 1 and 30, respectively.

To set or change a parameter, use the command **S=**, where the number of the register follows **S** and a value between 0 and 255 (the range of values that can be assigned to the registers) follows the equal sign:

```
AT S0=5
```

This command will change the value stored in S0 to 5.

The **S** command can also be used without **?** or **=** to point to a register that will be subsequently read from or written to without being specified. To illustrate this, if you enter

```
AT S7
```

a pointer is set to the address of register S7. As long as no other **S** command is entered, the register value can be requested at any time without specifying the number. If you enter **AT ?** the modem displays the current value in the S7 register. Similarly, if you enter **AT=8** the modem will change the value in the S7 register to 8.

S Register Functions

This section describes the function of the individual S registers. Table 4-4 lists the range of possible parameters and the default value for each S register. *Only S registers that are intended for user access are listed.*

S0 – Ring to answer on The value in this register determines how many rings the ALX will allow before automatically answering a call. For example, if S0 is set to 3 (**AT S0=3**), the ALX will answer when it detects the third ring. Setting S0 to 0 disables auto-answer.

S1 – Ring count Register S1 counts the number of ring signals for each incoming call. If more than 8 seconds pass since the last ring, S1 is cleared to zero. (Register S1 is a read-only register.)

S2 – Escape sequence character The value in register S2 (effective for asynchronous operation only) defines the character used for the escape sequence (to escape from data transfer

mode to command mode). A value greater than 127 will disable escape sequence detection and prevent you from going into Hayes online command mode.

S3 – Carriage return The value in register S3 defines the ASCII character used to terminate a command sequence. The value normally used is 13 (decimal), the standard ASCII carriage return value.

S4 – Line feed Register S4 (effective for asynchronous operation only) defines the line feed character. The line feed character follows the carriage return only if word result codes have been selected (command **V1**). Line feed can be changed to a null but cannot be totally disabled.

S5 – Backspace The value in S5 (effective for asynchronous operation only) defines the backspace character.

S6 – Blind dialing wait time The value in S6 determines how long the ALX will wait after going off-hook before it begins to dial. The minimum wait time is 2 seconds, even if S6 is set to a value less than 2. If the **X2** and **X4** command is in effect, dial tone detection will be enabled and blind dialing will be disabled, meaning that the value in S6 will have no effect. (See also **W** command.)

S7 – Carrier/dial tone wait time This register controls the time the ALX will wait for carrier after a call is established. It also controls the time the ALX will wait for dial tone if the **W** modifier is included in a dial string – or the wait time for silence if the **@** modifier is used.
Note: For V.32bis connections, register S7 should not be set to less than 20 seconds.

S8 – Pause time Register S8 specifies the pause time that results when a comma is included in a dial string or other command line. **Note:** An S8 value of less than 3 (0, 1 or 2) will yield a pause time of 2 seconds.

S9 – Carrier detect response time Register S9 determines how long a carrier tone must be present for the modem to recognize the tone and indicate carrier detect (CD). (The time required for the *absence* of a carrier tone to be recognized is fixed at 0.5 second.)

S10 – Loss of carrier delay The value in register S10 determines how long the delay will be from the occurrence of a loss of carrier until the ALX hangs up the telephone line. A value of 255 disables the modem's carrier disconnect option – and line current disconnect option – meaning that the ALX will *not* hang up in the absence of carrier or line current.

S11 – Tones This register sets the off/on duration of tones used for dialing. The duration and spacing of tones can be extended by increasing the value of S11. This register has no effect on pulse dialing, which is fixed at 10 pulses per second.

S12 – Guard time The value in register S12 (effective for asynchronous operation only) specifies the escape guard time delay. This delay is required immediately before and after entering the escape sequence; therefore, the three escape sequence characters must be entered

with no more time between them than the guard time delay. The unit for this register is 1/50 second (or 20 ms), meaning that the default value of 50 equals 1 second.

If the guard time is zero, timing will not be a factor. The three escape characters can occur with any timing relationship, but they must be consecutive. Be cautious when assigning small guard times – you may not be able to enter three characters fast enough, especially if the guard time is less than the time required to transmit one character at the current transmission rate.

S18 – Diagnostic timer The value in register S18 determines how long a diagnostic test will run. For example, if S18 is set to 120, the test (activated by one of the &T commands) will run for 120 seconds. If S18 is set to zero, the default, the test timer will be disabled and the test will run indefinitely. To terminate a test when the test timer is disabled, use the command **&T0** or reset the modem. Register S18 is set to zero on powerup or by the command **AT Z** or **AT S18=0**.

S25 – Delay to DTR The value stored in register S25 determines how the ALX will respond to a change in DTR. The response depends on the operating mode, as explained below.

Synchronous mode 1 (&Q1 command):

The range for register S25 in this mode is 0-255 *seconds*.

In this mode, the ALX initiates a call using asynchronous methods, but once the connection is fully established, automatically switches to synchronous operation. A delay occurs after a connection has been made before the modem examines the DTR signal. The length of this delay is the value specified in S25 (in seconds). The delay allows the operator time to disconnect the modem from an asynchronous data terminal and attach it to a synchronous terminal without forcing the modem back into the command state.

Asynchronous mode (&Q0) and synchronous mode 2 (&Q2):

The range for register S25 in these modes is 0-255 x *0.01 second*.

Asynchronous mode is the default mode, suitable for most ALX operating modes. In synchronous mode 2, when the ALX detects an OFF-to-ON DTR transition on pin 20, it automatically dials the phone number stored in the phone cell displayed in the front panel AUTO-DIAL screen. In asynchronous mode and synchronous mode 2 (after a connection has been made), a change in DTR (ON or OFF) which lasts for less than the time specified in register S25 (in 1/100ths of a second) is ignored by the modem.

S26 – RTS-to-CTS delay interval This register affects synchronous operation only. With the command **&R0** in effect, CTS is turned on in response to an OFF-to-ON transition of RTS from the local DTE – after the delay specified by the value in register S26 (but only if the modem is on-line and ready to receive synchronous data).

S Registers for Data Rate Control (Speed Limits)

S Registers S43, S44, S64 and S65 are used to set maximum and minimum data rates, as indicated in the following table:

Registers S43, S44, S64 and S65 – Rates Controlled by Each:		
Register	ALX V.34 and V.34M	All other models
S43	Max. TX DCE rate	Max. DCE rate
S44	Min. TX DCE rate	Min. DCE rate
S64	Max. RX DCE rate	<i>Does not apply</i>
S65	Min. RX DCE rate	<i>Does not apply</i>

The four registers listed above are used to specify the maximum and/or minimum data rate the ALX will use in handshaking with another modem. (They are Hayes mode equivalents to the Speed Limit option settings, which are accessible through the front panel LCD.)

The ALX may connect at a rate lower than the specified maximum rate (or higher than the minimum), depending on the remote modem's capabilities and line conditions, but will not be able to connect at a rate higher than the maximum rate or lower than the minimum rate.

For all four registers (S43, S44, S64 and S65), the values that may be stored have the same definitions – i.e., they correspond to the same data rates – as listed in the table below. However, the values in each register are applied differently, as indicated in the table above. For example, a value of 2 in register S43 sets the maximum TX DCE rate to 24.0 Kbps (if the modem is an ALX V.34 or V.34M), while a value of 2 in register S44 sets the *minimum* TX DCE rate to 24.0 Kbps.

Registers S43, S44, S64 and S65 – Parameters:			
S register value	Data rate, bps	S register value	Data rate, bps
0	28.8 K	8	9600
1	26.4 K	9	7200
2	24.0 K	10	4800
3	21.6 K	11	2400
4	19.2 K	12	1200
5	16.8 K	13	600
6	14.4 K	14	0-300
7	12.0 K	15	1200/75

Different TX DCE and RX DCE rates are effective only if the Asymmetric Data Rates option is enabled. If this option is disabled, TX and RX rates are both determined by the TX DCE limits. (The RX DCE setting[s] is ignored.)

The default maximum data rate setting depends on the model:

ALX V.34 and V.34M (TX and RX DCE rate): 0 (28.8 K)
 ALX V.32/19.2 and V.32/19.2M: 4 (19.2 K)
 ALX V.32/14.4 and V.32/14.4M: 6 (14.4 K)
 ALX V.32 and V.32M: 8 (9600 bps)

The default minimum data rate setting for all models is 14 (0-300 bps).

For further information on speed limits and connect rates, see Chapter 2.

S49 – Carrier detect level Register S46 selects the carrier detect (CD) level for dialup and leased line applications, as shown below:

S46 value	CD level, dBm	
	Dial	Leased
0	-26	-26
1	-26	-33
2	-26	-43
16	-33	-26
17	-33	-33
18	-33	-43
32	-43	-26
33	-43	-33
34	-43	-43

Bold face indicates default setting.

S53 – Leased line transmit level Register S53 sets the transmit level for leased line operation. Enter a value of 0 to 15 to select a transmit level of 0 to -15 dBm. Any value higher than 15 will result in a transmit level of -15 dBm. (To select the transmit level type for dial line operation, see the **-L** command in Table 4-1.)

S61 – DTE speed This register controls the DTE speed; however, it is effective only when the ALX is operating in V.42 mode, MNP mode or buffer mode. (If the ALX is not in one of these modes, the DTE speed will be the same as the connect rate.) The values that may be stored in register S61 are identified below:

S61 value	DTE speed, bps	S61 value	DTE speed, bps
0	115.2 K	7	2400
1	57.6 K	8	1800
2	38.4 K	9	1200
3	19.2 K	10	600
4	9600	11	300
5	7200	14	230.4 K
6	4800		

Bold face indicates default setting.

DTE speed refers to the speed of data transfer between the DTE and the local modem – **it is not necessarily the same as the data transmission speed between the connected modems**. If flow control is disabled, the DTE speed must be equal to or less than the modem speed, and the local and remote DTE speeds must be equal.

For Hayes mode operation, register S61 sets the default DTE speed that will be effective after powerup or after a full modem reset. However, the default DTE speed is automatically overridden when the ALX is autobauded (when an **AT** attention code is sent to the ALX).

S64 and S65 – Maximum and minimum DCE rate (V.34 models only): See previous section in this chapter titled *S Registers for Data Rate Control (Speed Limits)*.

SELECTING OPTIONS IN HAYES MODE

In Hayes mode, options may be selected by using –

- AT commands (Table 4-1)
- The front panel option screens *or*
- The Quick Change configuration screens described in Appendix C.

The easiest ways to change options in Hayes mode are to use the AT commands listed in Table 4-1 or the ALX front panel. If an option is changed using an AT command, the change will be effective *for Hayes mode only* unless option changes are saved to memory. If you change an option using an AT command, and then switch to a different mode without saving the change, the front panel display LCD will remain unaffected.

User Profiles

Changes made to option settings will cease to be effective if power is removed from the modem or if a factory reset has occurred – unless the modem configuration (all option settings) is saved to nonvolatile memory. The modem's configuration can be saved to user profile 0 or 1 using the **&W** command (**&W0** or **&W1**).

Upon powerup, the ALX will recall either profile 0 or profile 1, depending on which as been designated as the default profile. (The **&Y** command is used to designate the default profile.) The ALX is shipped from the factory with profile 0 as the default profile.

It is recommended that you use profile 0 for your standard configuration and make it the default profile (**&Y0**). Profile 1 (optional) is intended to be used to store an alternate configuration (e.g., for an alternate application).

To view the contents of the user profile, use the **&V** and **\S** commands.

Active User Profile

At any given time, the active user profile is either profile 0 or profile 1. The **&Y** command (default user profile) determines which profile is active at powerup. However, the **Z** command may be used to change the active profile: **Z0** makes profile 0 active; **Z1** makes profile 1 active.

The active user profile is linked to the modem's front panel (i.e., selections made using the front panel LCD), as explained below:

- When a user profile is made active by default upon powerup (as specified by the **&Y** command) or by recall (using the **Z** command), all options are automatically set according to the stored profile. Therefore, the option settings displayed on the front panel LCD will be the same as those of the active profile.

If profile 0 is the active configuration, the LCD screens will reflect the profile 0 configuration. If profile 1 is the active configuration, the LCD screens will reflect the profile 1 configuration.

- If you make option changes using the front panel (including Summary Setup), the changes for options for which there are associated Hayes commands will be saved to the default profile when you exit the **SETUP** menu.
- If you change the active profile by using Hayes commands or via the **AT PROFILES** screen, the changes are immediately effective and are reflected on the LCD. However, the changes will be permanent only if you save them by exiting the **SETUP** menu. Saved changes are effective for all modes.

If you make option changes from the front panel but have not exited the **SETUP** menu, and then make option changes using Hayes commands and save them to a profile using the **&W** command, the changes made using Hayes commands and saved to the profile will override the front panel selections.

FACSIMILE (FAX) TRANSMISSION

Facsimile (fax) transmission and reception capability is an optional feature (not available on all ALX models). Fax operation is available in Hayes mode only.

ALX models equipped with the facsimile option support fax classes 1 and 2. These ALX models can be used with a fax communication software program to transmit and receive facsimile data. If you are not sure if your modem supports fax operation, use the **AT +FCLASS=?** command (explained in the *Fax Class* section below) to find out.

Fax Software

The fax capabilities of the ALX modem are accessed through an external fax software program only (not by commands sent directly by the user to the modem). To send and receive fax messages, follow the instructions provided with the fax software you are using. A partial list of fax software programs that are compatible with the ALX appears below:

FaxTalk and FaxTalk Plus ...	Thought Communications, Inc.
MTEZ and ExpressFax	MagicSoft, Inc.
WINFAX	Delrina Technology Inc.

Note: During fax communications, the TIA/EIA status screen on the ALX front panel will switch frequently between the “IDLE” message and displays showing various data rates. This is normal. The higher rate displayed is the actual fax transmission rate; the lower rate is the fax protocol rate, which is used for sending signals such as “end-of-page” between the two facsimile devices.

Fax Class

When selecting or installing fax software, you may be required to choose the interface mode (fax class) to be used by the software and the ALX. You must select a fax class (1 or 2) that is supported by both the software program and the modem. If the software and the modem both support both fax classes, you can select either one. The fax class defines the protocol used for communication between the modem and the computer it is connected to. The fax class used is generally transparent to the user.

The Hayes command **AT +FCLASS=?** can be used to find out if a particular modem supports fax communication (and if so, which class or classes). If you enter this command (in Hayes mode only), the modem will respond by sending one or more numbers to the computer’s display, as follows:

Response	Meaning
0	No fax capability (data modes only)
0, 1	Supports fax class 1
0, 1, 2	Supports fax classes 1 and 2

Flow Control

If your fax software manual instructs you to configure the modem for software flow control, enter the command **AT \Q3,3**. If the manual specifies hardware flow control, enter the command **AT \Q1,1**. If received fax messages show incomplete characters or incomplete graphic data across the page (missing scan lines), try the alternate setting (**AT \Q1,1** or **AT \Q3,3**).

HAYES MODE REFERENCE TABLES

Table 4-1 lists the Hayes-compatible commands that can be used with the ALX modem.

Table 4-1. Hayes-Compatible Commands

Command	Function / Explanation
A	ANSWER No parameters.
A/	REPEAT PREVIOUS COMMAND No parameters.
B0 B1	BELL/ITU-T COMPATIBILITY MODE Selects ITU-T V.22 mode (2100 Hz). Selects Bell 212A mode (2225 Hz).
C1	Modem displays OK; command has no other effect. (This response – instead of ERROR – maintains a degree of compatibility with older modems that support this command.)
D	DIAL (ORIGINATE MODE FOR DIALING) Instructs modem to dial the number that follows the D command and attempt to go on-line. For example, AT D3331234 tells the ALX to dial the number 333-1234. Dialing modifiers listed in Table 4-2 may be used with the D command.
E0 E1	ECHO No echo. Echoes all characters back to terminal screen when using a full duplex terminal and in local command mode.
H0 H1 or H2	TELEPHONE SWITCH HOOK On-hook (hang up). Off-hook.
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 F10	SPEED CONTROL Limits data rate to rate specified by the F command parameter (sets minimum and maximum data rate to the specified rate). See also Speed Limit in Chapter 2. 0-300 bps to 28.8 Kbps 300 bps 600 bps 1200/75 bps 1200 bps 2400 bps 4800 bps 7200 bps 9600 bps 12.0 Kbps 14.4 Kbps

F11	16.8 Kbps
F12	19.2 Kbps
F13	21.6 Kbps
F14	24.0 Kbps
F15	26.4 Kbps
F16	28.8 Kbps
Default settings (where applicable) are in bold face .	
PRODUCT CODE OR CHECKSUM	
I0	Requests product code.
I1	Requests checksum for the ALX modem's software. (Only a portion of the checksum displayed via the front panel will be displayed, in decimal format.)
I2	Requests verification of software checksum.
I3	Requests the following for each EPROM (programmable memory unit): chip, part and revision number; checksum.
I4	Reserved.
SPEAKER VOLUME	
L0 or L1	Low speaker volume.
L2	Medium volume.
L3	High volume.
SPEAKER CONTROL	
M0	Speaker always off.
M1	Speaker on until carrier is detected.
M2	Speaker always on.
M3	Speaker off during dialing; otherwise on until carrier is detected.
FORCED ON-LINE	
O0	Forces ALX to on-line state.
O1	Forces ALX to on-line state; then initiates retrain.
PULSE DIAL	
P	No parameters. (Default dialing mode is tone dialing.)
SEND RESULT CODES	
Q0	Send result codes. (Report call progress.)
Q1	Withhold result codes (quiet).
Q2	Withhold result codes for incoming calls only (quiet answer).
MODIFY S REGISTER	
<i>Sn=v</i>	<i>n</i> is the register to be modified; <i>v</i> is the value to be written.
READ S REGISTER	
<i>Sn?</i>	<i>n</i> is the register to be read.
TONE DIAL	
T	No parameters. (Default dialing mode is tone dialing.)
WORD/DIGIT RESULT CODES	
V0	Result codes are transmitted as digits.
V1	Result codes are transmitted as words.

Command	Function / Explanation
<p>X0</p> <p>X1</p> <p>X2</p> <p>X3</p> <p>X4</p>	<p>SELECT RESULT CODES Selects basic result codes, 0-4. Modem will blind dial (without dial tone).</p> <p>No speed indication; no busy or dial tone detect. Selects result codes 0 – 5, 10 – 15 and 18. Connection speed (up to 28.8 Kbps) indicated; no busy or dial tone detect. Selects result codes 0-6, 10-15 and 18. Same as X1 except dial tone detect is enabled.</p> <p>Selects result codes 0-5, 7, 10-15 and 18. Same as X1 except busy signal detect is enabled.</p> <p>Selects all result codes. Connection speed (up to 28.8 Kbps) indicated; busy signal and dial tone detect enabled.</p> <p>Note: Result code 8 is independent of the X command; it is only displayed when the @ dialing modifier is used.</p>
<p>Y0</p> <p>Y1</p> <p>Y2</p> <p>Y3</p>	<p>RX/TX SPACE DISCONNECT Disables RX space connect and TX space disconnect. Enables RX space connect and TX space disconnect. Enables TX space disconnect; disables RX space disconnect. Enables RX space disconnect; disables TX space disconnect.</p>
<p>Z0</p> <p>Z1</p>	<p>RECALL STORED USER PROFILE Resets modem and makes stored user profile 0 active. Resets modem and makes stored user profile 1 active.</p>
<p>&C0</p> <p>&C1</p> <p>&C2</p>	<p>DATA CARRIER DETECT CONTROL DCD always on when DTR is present (true). DCE on only in the presence of suitable data (normal). DCD on when DTR is present; then toggles off for 500 ms upon disconnect (toggle).</p>
<p>&D0</p> <p>&D1</p> <p>&D2</p> <p>&D3</p>	<p>DATA TERMINAL READY CONTROL Ignore DTR (true). Go on-hook, assume command state and disable auto-answer upon DTR loss. Disconnect upon DTR loss (normal). Reset modem, load default profile upon DTR loss.</p>
<p>&E0</p> <p>&E1</p>	<p>KEYBOARD ABORT Disables Keyboard Abort option. Enables Keyboard Abort option. (If enabled, pressing any key on the DTE keyboard will abort handshaking.)</p>
<p>&F</p>	<p>RECALL FACTORY CONFIGURATION No parameters.</p>
<p>&G0</p> <p>&G1</p> <p>&G2</p>	<p>GUARD TONE CONTROL Guard tone disabled. Enables 550 Hz guard tone. Enables 1800 Hz guard tone.</p>

Command	Function / Explanation
&J	Modem displays OK result code; command has no other effect. (The ALX modem is configured for A/A1 control or MI/MIC control via jumpers JP5 and JP6, as detailed in Appendix D.)
&L	Modem displays OK result code; command has no other effect. (The ALX modem is configured for leased line or dialup line operation via the front panel QUICK SETUP and/or LINE TYPE screens.)
&M	Can be substituted for &Q.
&P	Modem displays OK result code; command has no other effect. (The pulse dialing ratio is factory set, depending on whether the modem is a U.S. or international model.)
&Q0 &Q1 &Q2 &Q3	ASYNCHRONOUS / SYNCHRONOUS MODE Asynchronous mode. Synchronous mode 1 – Synchronous/asynchronous mode Synchronous mode 2 – OFF-to-ON DTR causes ALX to automatically dial the phone numbers stored in the phone cell displayed in the front panel AUTO-DIAL screen. <i>See also S25 in the S Registers section of this chapter.</i>
&R0 &R1 &R2 &R3	RTS AND CTS OPTIONS CTS follows RTS. CTS follows DTR from the DTE (true). CTS is on while the modem is on-line (normal). CTS is always on.
&S0 &S1 &S2	DATA SET READY CONTROL DSR follows DTR supplied from the DTE (true). DSR is on when the modem is on-line (normal). DSR is on regardless of DTR and toggles upon disconnect.
&T0 &T1 &T3 &T4 &T5 &T6 &T7 &T8	TEST COMMANDS Terminates a test in progress. &T0 must be the last command in a command line. &T1 Initiates a local analog loopback test (ALB). &T3 Initiates a local digital loopback test (DLB). &T4 Allows the local modem to accept a request from the remote modem for a remote digital loopback test. &T5 Prevents the ALX from accepting a request from the remote modem for a remote digital loopback test. &T6 Initiates a remote digital loopback test (RDL). &T7 Initiates a remote digital loopback test self-test (RDLST). &T8 Initiates a local analog loopback self-test (ALBST).

Command	Function / Explanation
&V0	VIEW ACTIVE CONFIGURATION, ETC. Displays modem configuration, user profiles and phone numbers stored in phone cells 0-5.
&V1	Displays contents of phone cells 0-9. (Consecutively entering &V1 displays the contents of the next 10 phone cells: cells 10-19, then cells 20-29, etc.)
&V2	Displays contents of phone cells 10-19.
&V3	Displays contents of phone cells 20-29.
&V4	Displays contents of phone cells 30-39.
&V5	Displays contents of phone cells 40-49.
&W0	WRITE PROFILE TO MEMORY Saves storable configuration parameters as user profile 0.
&W1	Saves storable configuration parameters as user profile 1.
&X0	TRANSMITTER CLOCKING Selects internal clocking.
&X1	Selects external clocking.
&X2	Selects receive mode (slaved) clocking.
&Y0	DEFAULT USER PROFILE Stored user profile 0 will be recalled on powerup.
&Y1	Stored user profile 1 will be recalled on powerup.
&Z	STORE TELEPHONE NUMBER Parameters are 0-49 (phone cells 0-49).
\A0	MNP BLOCK SIZE ¹ Selects maximum MNP block size: 64 bytes
\A1	128 bytes
\A2	192 bytes
\A3	256 bytes
\B0	BUFFER MODE/SPEED CONVERSION ¹ Disables speed conversion.
\B1	Enables speed conversion.
\C1	MNP CLASS (LIMIT) ¹ Limits operation to MNP class 1.
\C2	Limits operation to MNP classes 1 and 2.
\C3	Limits operation to MNP classes 1 through 3.
\C4	Limits operation to MNP classes 1 through 4.
\C5	Limits operation to MNP classes 1 through 5.
\D0	DIALING MESSAGE Disables "DIALING" message (result code 72).
\D1	Enables "DIALING" message
\E0	V.42 DETECTION (in answer mode only) ¹ Disables V.42 detection.
\E1	Enables V.42 detection.

Command	Function / Explanation
\Hn	V.42bis STRING LENGTH ¹ Sets maximum V.42bis string length to n characters (where n is a value from 6 to 250). Default string length = 16.
\K0 \K1 \K2 \K3	V.42 BREAK HANDLING ¹ Selects normal break handling. Selects destructive/expedited break handling. Selects non-destructive/expedited break handling. Selects non-destructive/non-expedited break handling.
\M0 \M1	V.42bis OPERATION ¹ Enables V.42bis operation (error correction with data compression). Disables V.42bis operation (for V.42 without compression).
\N0 \N1 \N2 \N3	V.42 MODE ¹ Disables error correction. Enables mandatory mode for error correction. Enables V.42 error correction only. Enables automatic mode for error correction.
\P0 \P1 \P2	V.42 PROTOCOL ¹ Selects LAPM protocol only. Selects MNP protocol only. Selects LAPM/MNP protocol (MNP as alternate).
\Q 0 1 2 3	V.42 FLOW CONTROL ¹ Two parameters may be used (e.g., \Q0,1; \Q3,2, etc.). First parameter specifies DCE-DTE flow; second (optional) specifies DTE-DCE flow control. None (no flow control). CTS on/off or RTS on/off (CTS for DCE-DTE flow control, RTS for DTE-DCE). DC1/DC2 flow control. DC1/DC3 flow control (default for DCE-DTE and DTE-DCE).
\S	VIEW STATUS OF V.42-RELATED CONFIGURATION No parameters.
\T0 \Tn	LOAD INACTIVITY TIMER Disables inactivity timer. Sets inactivity timer to n minutes (where n = 0 to 90).
\V0 \V1	V.42 RESULT CODES ¹ Activates regular V.42 result codes. Activates extended V.42 result codes.

Command	Function / Explanation
\X0,0 or \X0 \X1,1 or \X1 \X1,0 \X0,1	V.42 PASS-THROUGH FLOW CONTROL ¹ (First parameter controls DTE pass-through flow control; second parameter controls DCE pass-through flow control.) Disables DTE and DCE pass-through flow control. Enables DTE and DCE pass-through flow control. Enables DTE pass-through flow control; disables DCE pass-through flow control. Disables DTE pass-through flow control; enables DCE pass-through flow control.
%E0 %E1	AUTO-RETRAIN Disables auto-retrain. (ALX cannot request retrain.) Enables auto-retrain.
%V0 %V1 %V2	V.25bis MODE Switches from Hayes mode to V.25bis mode, asynchronous. Switches to V.25bis mode, sync bit oriented (HDLC). Switches to V.25bis mode, synchronous character oriented.
-L0 -L1	TRANSMIT LEVEL, DIAL Selects permissive transmit level. Selects programmable transmit level.
-F0 -F1 -F2 -F3 -F4 -F5 -F6 -F7 -F8	COMMUNICATION STANDARD For explanation, see <i>Communication Standard</i> in Chapter 2. AUTO V34 V34 AUTO V32 V33 Bell208 V3x/Bell208 V29 V27 V26
-N1	ALTERNATE FUNCTION FOR DTE CONNECTOR Switches function of DTE connector from normal (data transfer) to diagnostic port function. (See Chapter 3.)
-P0 -P1 -P2 -P3 -P4	DIAGNOSTIC PORT DATA RATE Selects rate of 9600 bps. Selects rate of 19.2 Kbps. Selects rate of 38.4 Kbps. Selects rate of 57.6 Kbps. Selects rate of 115.2 Kbps.
¹ Option change will be effective only if the ALX is not on-line.	
Note: DTE speed and parity are set automatically. Auto-answer is enabled or disabled by S register S0.	

Table 4-2. Dialing Modifiers

(These modifiers may be used in any dial mode unless specifically stated otherwise.)

Modifier	Function / Explanation
A B C (or) D	Used in some private branch exchange (PBX) applications (tone dialing only).
L	Links a phone number to another number to be dialed as an alternate. See L – LINK in Chapter 4.
P	Enables pulse dialing mode.
S=c	Dial number stored in phone cell <i>c</i> . This command may be used in Hayes mode only and must be entered from the DTE keyboard. Syntax is AT DS= <i>c</i> , where <i>c</i> = phone cell (0-49) where phone number to be dialed is stored.
T	Enables tone dialing (the default dialing mode).
W or : (colon)	Wait for dial tone before proceeding. (Colon is available only from the DTE keyboard.)
/R	Configures modem for Dial Line Auto-Recovery. See Dial Line Auto-Recovery section in Chapter 3.
, (comma) or <	Pause for 2 seconds (or other period specified in register S8)
; (semicolon)	Return to command state after dialing.
! or &	Flash hook.
@	Wait for silence.
*	Dial * . (This character is sometimes used for access to remote computer systems – tone dialing only.)
#	Dial #. (This character is sometimes used for access to remote computer systems – tone dialing only.)
Separators: A space between characters or a dash (-) may be used for clarity. Neither has any effect on dialing.	

Table 4-3. Hayes Mode Result Codes

Digit Code	Work code	Meaning
0	OK	Command line executed without errors.
1	CONNECT	Carrier detected.
2	RING	Ringing signal detected (in answer mode). (When the ALX detects a ring, it sends a RING result code unless it is in the process of accepting a command. However, the ALX will answer the call only if it is set for automatic answer or is given an A command.)
3	NO CARRIER	Carrier lost or never detected.

4	ERROR	Error in command line, invalid command, command line exceeds 64 characters, or invalid character format.
5	CONNECT 1200	Carrier detected at 1200 bps.
6	NO DIALTONE	No dial tone detected.
7	BUSY	Busy signal detected.
8	NO ANSWER	No period of silence detected. This code will appear only if @ (“wait for silence before dialing”) has been included in the dial string.
9	CONNECT 0600	Carrier detected at 600 bps.
10	CONNECT 2400	Carrier detected at 2400 bps.
11	CONNECT 1275	Modem is on-line in V.23 mode (1200/75 bps).
12	CONNECT 7200	Carrier detected at 7200 bps.
13	CONNECT 12.0	Carrier detected at 12.0 Kbps.
14	CONNECT 14.4	Carrier detected at 14.4 Kbps.
15	CONNECT 4800	Carrier detected at 4800 bps.
18	CONNECT 9600	Carrier detected at 9600 bps.
20	LINKING	ALX is dialing an alternate number (as specified by the L [link] dialing modifier).
21	CONNECT 16.8	Carrier detected at 16.8 Kbps.
22	CONNECT 19.2	Carrier detected at 19.2 Kbps.
72	DIALING	ALX is dialing.
73	CONNECT 21.6	Carrier detected at 21.6 Kbps.
74	CONNECT 24.0	Carrier detected at 24.0 Kbps.
75	CONNECT 26.4	Carrier detected at 26.4 Kbps.
76	CONNECT 28.8	Carrier detected at 28.8 Kbps.

Extended V.42 result codes (use \V1 to enable): Word codes are “BUFFER,” “MNP,” “V42” and “V42bis” followed by the DTE interface speed. These codes indicate if the ALX is in buffer, MNP or LAPM (V.42/V.42bis) mode. The corresponding digit codes and speeds they indicate are listed below (with all speeds in bits per seconds):

<u>BUFFER</u>	<u>MNP</u>	<u>V42</u>	<u>V42bis</u>
28 – 19.2 K	36 – 19.2 K	44 – 19.2 K	55 – 38.4 K
29 – 9600	37 – 9600	45 – 9600	56 – 19.2 K
30 – 4800	38 – 4800	46 – 4800	57 – 9600
31 – 2400	39 – 2400	47 – 2400	58 – 4800
32 – 1200	40 – 1200	48 – 1200	59 – 2400
33 – 600	41 – 600	49 – 600	60 – 1200
34 – 300	42 – 300	50 – 300	61 – 600
35 – 110	43 – 110	51 – 110	62 – 300
53 – 38.4 K	54 – 38.4 K	52 – 38.4 K	63 – 110
64 – 57.6 K	65 – 57.6 K	66 – 57.6 K	67 – 57.6 K
68 – 1800	69 – 1800	70 – 1800	71 – 1800
77 – 115.2 K	78 – 115.2 K	79 – 115.2 K	80 – 115.2 K
82 – 230.4 K	83 – 230.4 K	84 – 230.4 K	85 – 230.4 K

Table 4-4. S Register Functions
(Only registers intended for user access are listed.)

Register	Description	Range	Units	Default
S0	Ring to answer on	0 – 255	rings	1
S1	Counts the number of rings	0 – 255	rings	0
S2	Escape sequence character	0 – 127	ASCII	43
S3	Carriage return character	0 – 127	ASCII	13
S4	Line feed character	0 – 127	ASCII	10
S5	Backspace character	0 – 32, 127	ASCII	8
S6	Wait time before blind dialing	2 – 255	sec	2
S7	Wait time for carrier or dial tone	1 – 255	sec	30
S8	Pause time for comma	0 – 255	sec	2
S9	Carrier detect response time	1 – 255	1/10 sec	6
S10	Delay time between loss of carrier and “hang-up”	1 – 255	1/10 sec	14
S11	Tone spacing	70 – 255	ms	70
S12	Escape sequence guard time	0 – 255	1/50 sec	50
S18	Test timer	0 – 255	sec	0
S25	Delay to DTR	0 – 255	sec or 1/100 sec ¹	5
¹ Depends on mode; see previous section, <i>S25 – Delay to DTR</i> .				
S26	RTS-to-CTS delay (half duplex)	0 – 255	1/100 sec	0
S43	Speed limit, maximum	<i>See Chapter 4.</i>		
S44	Speed limit, minimum	<i>See Chapter 4.</i>		
S46	CD level	<i>See Chapter 4.</i>		
S53	Leased line transmit level	0 – 15	-dBm	0
S61	DTE speed	<i>See Chapter 4.</i>		
¹ Depends on mode; see previous section, <i>S25 – Delay to DTR</i> .				

CHAPTER FIVE – V.25bis AUTODIALER

In V.25bis mode, the ALX complies with ITU-T Recommendation V.25bis, an internationally recognized standard for serial automatic call origination and answering.

The V.25bis autodialer uses the dialing command set defined by the V.25bis Recommendation. It allows you to store and dial phone numbers from the DTE in both synchronous and asynchronous applications. You can dial numbers directly or you can instruct the ALX to automatically dial a previously stored number.

The main topics covered in this chapter are –

- Enabling the V.25bis autodialer
- V.25bis commands (listed in Table 5-1)
- V.25bis result codes (listed in Table 5-2)
- V.25bis message format

ENABLING THE V.25bis AUTODIALER

The V.25bis autodialer can be enabled in either of two ways – by using the Quick Setup feature or by selecting one of the Dialer Mode options.

Quick Setup

Three Quick Setup configurations are available for 2-wire dial V.25bis operation. Selecting any of the three V.25bis Quick Setups (via QUICK on SETUP screen 1) enables the V.25bis autodialer and causes all modem options to be automatically set to a preset configuration. Each V.25bis Quick Setup is suitable for a typical V.25bis application, depending on the DTE to be used.

To select a 2-wire dial V.25bis Quick Setup, access QUICK SETUP screen 2, 3 or 4 (for asynchronous, synchronous character oriented or synchronous bit oriented operation, respectively) on the LCD, and then press pushbutton 2.

After selecting the desired V.25bis Quick Setup configuration, you can reset individual options to suit your application, if desired, as explained in Chapter 2.

Dialer Mode (DIAL V25bis Screen)

If you enable the V.25bis autodialer using the Dialer Mode option, no other options will be changed. To enable the autodialer this way, select DIALER from SETUP screen 2. Then select the V.25bis data protocol that is appropriate for the DTE to be used: asynchronous (V25 Async selection), synchronous character oriented (V25 Syn_c) or synchronous bit oriented (V25 Syn_b). All three protocol selections enable the V.25bis autodialer and select the indicated protocol at the same time.

DTR Dialing in V.25bis Mode

An alternative to using the V.25bis **CRS** command to dial a stored number is to use the DTR dialing option. With DTR dialing enabled, the autodialer will dial the number stored in the phone cell displayed in the front panel AUTO-DIAL screen when DTR goes high for at least 50 ms.

To enable V.25bis DTR dialing, use the Summary Setup feature (as described in Appendix C) to change the parameter for V25bis DTR dialing to 1. Do not select DTR dialing via the front panel DIALER screen; this will not enable DTR dialing for V25bis mode. V.25bis DTR dialing will function only if the V25bis DTR dialing parameter is enabled (set to 1) and the V.25bis autodialer is enabled.

V.25bis AUTODIALER COMMANDS

In asynchronous applications, V.25bis commands are issued directly from the DTE keyboard or through communications software. In synchronous applications, the V.25bis commands can be used to facilitate computer-controlled communications.

Punctuation and spaces may be used with V.25bis commands for clarity, but they are not required. If used, they will be ignored by the modem. One exception is the colon (:), which instructs the autodialer to wait for a dial tone.

The V.25bis commands are described below and are summarized in Table 5-1. See Table 5-2 for explanation of the codes that may be displayed in response to commands.

CIC – Connect next incoming call The **CIC** command instructs the modem autodialer to answer the next incoming call. After the modem goes off hook, the modem will answer the next call only if auto-answer is enabled from the front panel.

CRN – Call request, number provided (Syntax: **CRN 5557979**) By using the **CRN** command, you can dial a number directly from the DTE keyboard. Numbers from 0 through 49 can be dialed, and if tone dialing is enabled, the characters A, B, C, D # and * can also be dialed.

The dialing modifiers listed in Table 4-2 can be used with the **CRN** command to specify how or when a number should be dialed. For example, the command line **CRN :T3331234** instructs the autodialer to wait for a dial tone (:) and then tone dial (**T**) the number 333-1234.

CRS – Call request, storage location provided (Syntax: **CRS 29**) The **CRS** command allows you to dial a stored number simply by specifying the 1- or 2-digit number of the phone cell (memory location) where it is stored. In the example given above, the autodialer will dial the number stored in phone cell 29. The number must first be stored in the specified phone cell using the **PRN** command (Table 5-1).

DIC – Disregard incoming calls The **DIC** command instructs the autodialer not to answer incoming calls. The **DIC** command is canceled when the **CIC** command is issued or the modem is reset. In the event of a reset, the modem will answer if auto-answer is enabled from the front panel.

PRN – Program normal (store phone number) (Syntax: **PRN 17; 5551212**) The **PRN** command is used to store a telephone number or dial string in a phone cell so it can be dialed later by specifying only the phone cell number. As shown above, **PRN** is followed by the phone cell number, a semicolon and the phone number to be stored. After a phone number is stored, it can be dialed using the **CRS** command. Any of the characters listed in Table 4-2 may be stored.

Fifty phone cells are available: 0-49. **Each phone cell can hold up to 50 characters, maximum.** For any given cell, this limit may be lower, depending on how other phone cells are loaded relative to total available storage memory. For details, see Chapter 3. You will get an **ERROR** or **INV** message if you attempt to save a dial string of more than 50 characters or if the available memory becomes full.

To clear a phone cell, enter **PRN** and the cell number, without a phone number. Alternately, you can use the **PRN** command to overwrite a new phone number in place of a previously stored number.

RLN – Request stored number(s) **RLN** can be used to request a list of all stored numbers or to show the number stored in a specific phone cell. **RLN**, used alone, requests a list of all stored numbers. The DTE display will show the stored numbers as follows:

LSN 00; 301 555 1234
 LSN 01; 301 123 4567
 LSN 02; 301 555 5555
 (and so on through phone cell 49)

If a phone cell is specified after **RLN**, e.g., **RLN 5**, the DTE display will show only the number stored in the specified phone cell.

How to Disconnect a Call

To disconnect a call locally, use your communication software to force DTR to go low, or select HANGUP from the ALX front panel AUTO-DIAL screen.

Table 5-1. V.25bis Autodialer Commands

Command	Functions
CIC	Connect next incoming call.
CRN <i>n</i>	Call request – dial number (<i>n</i>) entered on DTE keyboard.
CRS <i>c</i>	Call request – dial number stored in specified phone cell (<i>c</i>).
DIC	Disregard incoming calls.
PRN <i>c; n</i>	Program normal – store number or dial string <i>n</i> in phone cell (<i>c</i>).
RHA	Switch to Hayes dialing mode.
RLN	Request list of all stored numbers.
RLN <i>c</i>	Request to see number stored in phone cell (<i>c</i>).
<p><i>n</i> represents a number to be dialed or stored (e.g., 5557979); <i>c</i> represents the number of a phone cell (0-49) where a telephone number is stored.</p> <p>A comma (,) can be included in a dial string to effect a pause.</p> <p>A colon (:) can be included to instruct the autodialer to wait for a dial tone before proceeding.</p>	

V.25bis RESULT CODES

Table 5-2 explains the result codes, or responses that may be displayed on the DTE monitor in response to V.25bis commands.

Table 5-2. V.25bis Result Codes

Code	Meaning	Sent by – ¹
CFI AB	Call failure – call <u>ab</u> orted because of loss of DTR or because HANGUP was selected from front panel AUTO-DIAL screen.	ORG
CFI CB	Call failure because D <u>C</u> E is <u>b</u> usy.	ORG
CFI ET	Call failure because of busy signal. (<u>E</u> ngaged <u>t</u> one.)	ORG
CFI ND	Call failure – <u>n</u> o <u>d</u> ial tone. Modem did not detect dial tone, line current or both; or loss of dial tone or line current during dialing or handshaking.	ORG
CFI NS	Call failure – call request specified a phone cell that does not contain a stored number. (<u>N</u> o <u>s</u> tored number.)	ORG
CFI NT	Call failure – <u>n</u> o answer <u>t</u> one. Remote unit answered but did not issue answer tone.	ORG
CFI RT	Call failure – <u>r</u> ing <u>t</u> one. Ringback detected, but no answer.	ORG
¹ Column 3 indicates which modem sends the result code. (ANS/ORG indicates answer and/or originate modem.) Underlines in column 2 indicate derivation of the result code (i.e., relation of the code to its meaning). A semicolon (;) is used to separate parameters, e.g., LSN 4;5559797.		
CNX	Call <u>c</u> onnecting.	ANS/ORG
INC	<u>I</u> ncoming call.	ANS
INV CU	Invalid – <u>c</u> ommand <u>u</u> nknown.	ANS/ORG
INV MS	Invalid <u>m</u> essage (command) <u>s</u> yntax.	ANS/ORG
INV PS	Invalid parameter <u>s</u> yntax. Specified parameters are not valid for command used.	ANS/ORG
INV PV	Invalid parameter <u>v</u> alue. Specified parameters are out of range for command used.	ANS/ORG
LSN	<u>L</u> ist of <u>s</u> tored phone <u>n</u> umbers. LSN is followed by phone cell number, stored number; next phone cell number, next stored number, etc.	ANS/ORG
VAL	<u>V</u> alid – command accepted; waiting for next command.	ANS/ORG

MESSAGE FORMAT

The message format for V.25bis DTE to DCE communications is summarized below:

Asynchronous

MARK MESSAGE CR LF MARK
--

This format uses one start bit, 8-bit data units and a 1-unit stop bit. The 8-bit data units are formed by a 7-bit IA5 character and an even parity bit.

Synchronous Character Oriented

SYN SYN STX MESSAGE ETX

This format uses consecutive 8-bit data units formed by a 7-bit IA5 character and an odd parity bit.

Synchronous Bit Oriented

FLAG ADDR CTRL MESSAGE FCS FLAG
(FF) (13)

Consecutive 8-bit data units are used within the message and submitted to the HDLC framing (zero insertion). The 8-bit data units are formed by a 7-bit IA5 character and an odd parity bit.

CHAPTER SIX – DIAGNOSTICS

The troubleshooting information in this chapter applies to all ALX applications (all dialup and leased line modes), unless specifically stated otherwise.

The major topics included in this chapter are –

- Troubleshooting strategy
- Overview of ALX diagnostics
- Test procedures
- Status screens
- Rate change screen

Specific test procedures are listed later in this chapter.

TROUBLESHOOTING STRATEGY

If you experience communications difficulties, your objective in correcting the problem should be to specifically isolate the defective component in your communications system. This typically involves three steps:

1. Assess the problem.

Carefully consider each of the following questions:

- When did the problem begin?
- What is malfunctioning?

Try to isolate the component (or components) of your system that is malfunctioning. The tests described in this chapter may help you in making this determination.

- Has there been a recent change in the system?
- Has the modem been reconfigured?

2. Physically inspect the system.

If you have been able to trace the problem to a specific site, examine that site. Check the installation of the modem and DTE.

- Are all cables in good condition and fully connected?
- Are all components in the system receiving power?

Inspect the system as thoroughly as possible.

3. Conduct diagnostic tests.

Diagnostic tests are often the most valuable tool in further isolating the cause of a problem. If steps 1 and 2 above have not revealed the source of the problem, perform appropriate diagnostic tests as described in the following sections. The sequence in which diagnostic tests should be conducted depends upon the symptoms that have been identified and the availability of personnel at the remote site.

If You Need Assistance ...

If after testing you cannot correct the problem, contact Raymar-Telenetics' Technical Support Team for assistance.

OVERVIEW OF ALX DIAGNOSTICS

Once you identify the symptoms and conduct a physical inspection of the sites in question, you can conduct diagnostic monitoring and testing to further isolate the problem. The ALX modem has diagnostic capabilities that will help locate faults quickly and easily. The diagnostic features of the ALX modem fall into two categories – local and remote.

There are six types of **local** modem diagnostics:

- Analog loopback (ALB)
- Analog loopback self test (ALBST)
- Analog loopback self test with errors (ST/E)
- External analog loopback (ALBX)
- External analog loopback self test (ALXST)
- Digital loopback (DLB)

There are two types of **remote** diagnostics:

- Remote digital loopback (RDL)
- Remote digital loopback self test (RDLST)

Test Objectives

Each test sends data through some or all components of the communication system. The objective is to see if the data (1) reaches its destination and (2) is correctly transmitted and received.

Test Data

Except for the self tests, the test data is generated by the user through the DTE or may be generated by an external bit rate error test (BERT). For self tests, and internal pattern generator in the ALX produces the test data.

HOW TO SELECT AND ACTIVATE TESTS

All tests can be initiated from the modem's front panel LCD and pushbuttons, and most tests can also be initiated by AT commands when the ALX is in Hayes mode. To find the LCD screen for a specific test, refer to the LCD flow chart in the back of this manual.

For specific instructions for each type of test, see the sections below titled *Prerequisite Steps – All Tests and Specific Test Procedures*. These sections include instructions for preparing for and running tests from the front panel and (where applicable) using AT commands.

Prerequisite Steps

For valid results from any of the digital loopback tests (DLB, RDL, and RDLST) or external analog loopback tests (ALBX and ALXST), error correction must be disabled before diagnostic tests are run. There are two ways you can disable error correction:

Using the front panel LCD: Set the V.42 Mode option to OFF.

Using AT commands (Hayes mode only): Enter the command **&F** to restore the Hayes mode factory configuration; then enter **AT \N0**.

Test Duration and Termination

With the ALX in Hayes mode, you can set the duration of a test by assigning a value to register S18. For example, **AT S18=30** sets the test time to 30 seconds. Alternately, you can use the command **AT &TO** to terminate a test.

Remote Test Control

You can configure the ALX modem to ignore or accept requests from remote modems to initiate tests on your ALX. To access the remote test control option, select TEST from SETUP screen 4. Then select RMT from the TEST OPTIONS screen. From the REMOTE TEST screen, select ENABLE to allow remote test initiation or DISABLE to refuse remote test requests.

SPECIFIC TEST PROCEDURES

Local Modem Diagnostics

Local modem diagnostics are for testing the ALX modem and its adjoining system. These tests are accessed from the main menu and are easily performed if the ALX is attached to DTE or an external BERT.

Analog Loopback (ALB) Test

Analog loopback testing allows you to test the local modem and its associated terminal independently from the telephone interface and the remote modem. Figure 6-1 shows the connections automatically made during the test.

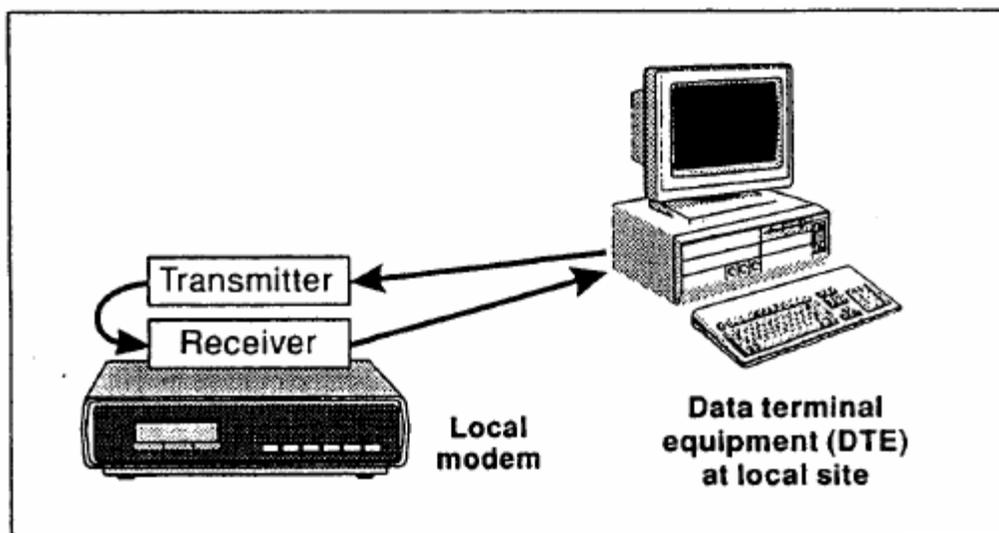


Figure 6-1. Analog loopback test

Before initiating the test, make sure the modem is idle, that the data rate is the same as that of the DTE and that the DTR circuit is on. If TR is present on the TIA/EIA status screen, the DTR circuit is on.

Hayes mode (&T1)

Initiate the analog loopback test by entering **AT &T1** on the DTE keyboard. Then, check for proper operation of the DTE and modem by transmitting test data and comparing it with the received test data.

Front Panel Control

From screen 2 of the LCD MAIN MENU, select TEST. This will take you to screen 1 of the LOCAL TEST menu, where ALB will be displayed as one of the test selections. Select ALB.

The ANALOG LOOPBACK screen will be displayed, with ON and OFF as the possible selections.

Select ON to activate the test. (In general, the DSR during ALB test option discussed in Chapter 2 should be left ON – the default selection – to avoid disrupting the DTE and DTE software operations.)

The TIA/EIA status screen will be displayed while the test is being conducted. Ensure that test data is being generated. Watch for data errors. By transmitting test data and comparing it with received copy, the DTE and modem are checked for proper operation.

To end the test, press the ENT pushbutton to return to the ANALOG LOOPBACK screen, and then select OFF.

Pin 18 Control

The ALB test can also be activated by positive voltage on TIA/EIA pin 18 if the ALB-DTE Ctrl'd option is enabled.

Analog Loopback Self Test (ALBST)

In the analog loopback self test, the modem is placed in analog loopback and data is sent and received by an internal 511-bit pattern generator and receiver; therefore, no DTE or external BERT is necessary. Figure 6-2 shows the data flow for this test.

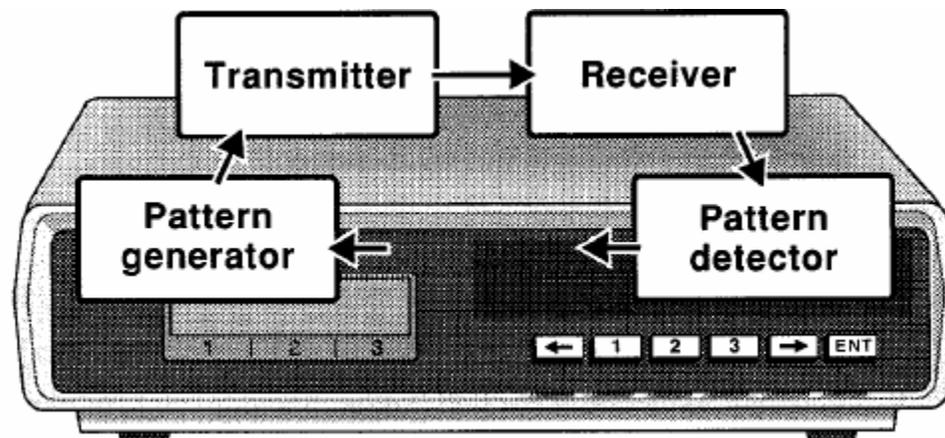


Figure 6-2. Analog loopback self test (ALBST)

Hayes Mode (&T8)

Initiate the analog loopback self test by entering the command **AT &T8**.

When the test is complete, the ALX will send a three-digit error code to the terminal (in Hayes mode only). If there are no errors, the error code will be 000. If there are errors, the code will range from 001 (1 error) to 255. (The error code will not exceed 255, even if there are more than 255 errors.)

Front Panel Control

From screen 2 of the LCD MAIN MENU, select TEST. This will take you to screen 1 of the LOCAL TEST menu, where ALBST will be visible as one of the selections. Select ALBST.

The SELFTEST screen will be displayed, with ON and OFF as the possible selections. Select ON to activate the test. The TIA/EIA status screen will be displayed while the test is being conducted. If “ER” is present on the LCD, data errors have occurred. The ER indicator may flash on when the test is first turned on, but it should quickly go out and remain off until the end of the test.

To end the test, press the ENT pushbutton to return to the SELFTEST screen, and then select OFF.

Analog Loopback Self Test with Errors (ST/E)

This test can only be initiated through the front panel LCD; there is no AT command for it.

In the analog loopback self test with errors, data is sent and received by an internal 511-bit pattern generator and receiver; therefore, no DTE or external BERT is necessary. This test differs from the ALBST in that errors are injected into the data flow every few seconds. The data flow is the same as that shown in Figure 6-2 (the ALBST).

To run this test, follow these steps:

From screen 2 of the LCD MAIN MENU, select TEST. This will take you to screen 1 of the LOCAL TEST menu, where ST/E will be visible as one of the selections. Select ST/E.

The SELFTEST W/ERROR screen will be displayed, with ON and OFF as the possible selections. Select ON to activate the test. The TIA/EIA status screen will be displayed. The ER indicator should flash every few seconds, indicating that the pattern generator and detector are working. Errors are injected every few seconds. To end the test, press the ENT pushbutton to return to the SELFTEST W/ERROR screen, and then select OFF.

External Analog Loopback (ALBX) Test

The external analog loopback test is available for **4-wire leased line mode only**.

The ALBX test checks the local modem and its associated terminal and verifies the availability of the leased line circuit. The test circuit does not include the remote modem. Figure 6-3 shows the connections automatically made during the ALBX test.

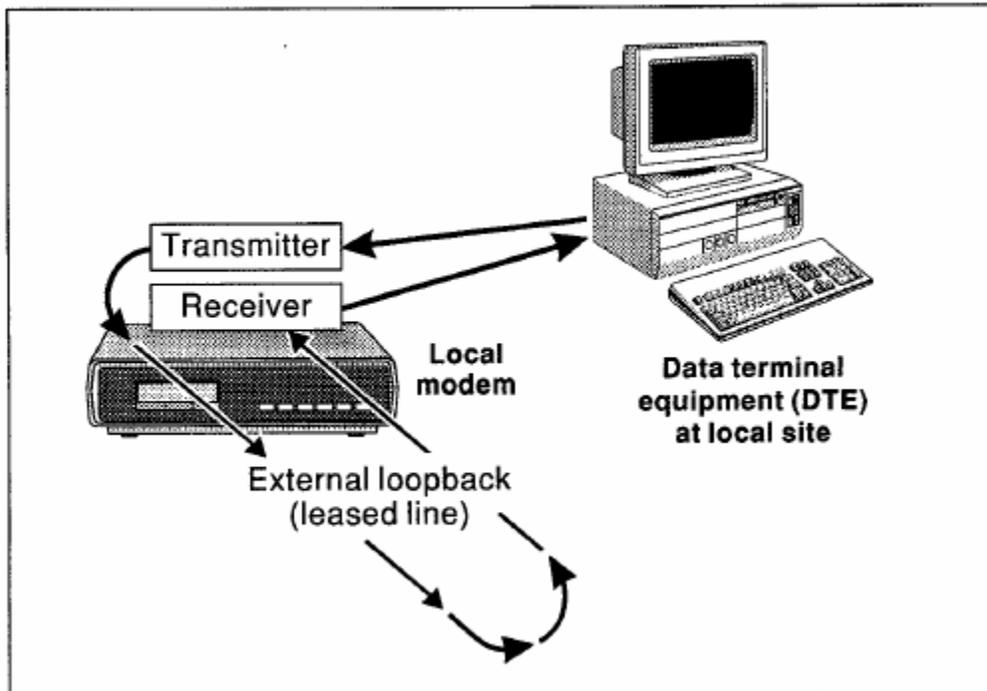


Figure 6-3. External analog loopback (ALBX) test

IMPORTANT: The ALBX test may result in errors or may fail altogether even where conditions are satisfactory for normal operation. This is because the test channel presented to the modem during the ALBX test includes all impairments of both the inbound and outbound channels (amplitude distortion, delay distortion, noise, etc.). The main purpose of the ALBX test is to verify that the modem is connected to the leased line and that the leased line circuit is complete. The test is not meant to assess the suitability of the leased line.

To run this test, follow these steps:

Make sure the local modem is not in communication with the remote modem, that the data rate is the same as that of the DTE and that the DTR circuit is on. (If TR is present on the TIA/EIA status screen, the DTR circuit is on.)

From screen 2 of the LCD MAIN MENU, select TEST. Go to screen 2 of the LOCAL TEST menu and select ALBX.

The ANALOG LOOP (EXT) screen will be displayed, with ON and OFF as the possible selections.

Select ON to activate the test. (In general, the DSR during ALB test option discussed in Chapter 2 should be left ON – the default selection – to avoid disrupting the DTE and DTE software operations.)

The TIA/EIA status screen will be displayed while the test is being conducted. If no external loopback is present, the status screen will display an “IDLE” message. If a loopback is present, handshake sequence codes will appear (H-01, etc.), followed by the modem speed. Ensure that test data is being generated. Watch for data errors. By transmitting test data and comparing it with the received copy, the DTE and modem are checked for proper operation. During the ALBX test, RD (receive data) may appear on the status screen even though no data is being received – this is normal.

During the ALBX test, the modem will attempt to retrain upon loss of carrier. In switched carrier mode, the modem will attempt to retrain upon loss of RTS.

To end the test, press the ENT pushbutton to return to the ANALOG LOOP (EXT) screen, and then select OFF.

External Analog Loopback Self Test (ALXST)

The external analog loopback self test is available for **4-wire leased line mode only**.

The ALXST places the modem in analog loopback and causes data to be sent and received by an internal 511-bit pattern generator and receiver; therefore, no DTE or external BERT is necessary. As shown in Figure 6-4, the test circuit includes the leased lines (the external loopback).

IMPORTANT: The ALXST may result in errors or may fail altogether even where conditions are satisfactory for normal operation. This is because the test channel presented to the modem during the ALXST includes all impairments of both the inbound and outbound channels (amplitude distortion, delay distortion, noise, etc.). The main purpose of the ALXST is to verify that the modem is connected to the leased line and that the leased line circuit is complete. The test is not meant to assess the suitability of the leased line.

To run this test, follow these steps:

From screen 2 of the LCD MAIN MENU, select TEST. Go to screen 2 of the LOCAL TEST menu and select ALXST.

The ANALOG ST (EXT) screen will be displayed, with ON and OFF as the possible selections. Select ON to activate the test.

The TIA/EIA status screen will be displayed while the test is being conducted. If no external loopback is present, the status screen will display an “IDLE” message. If a loopback is present, handshake sequence codes will appear, followed by the modem speed. If “ER” is present on the front panel, data errors have occurred.

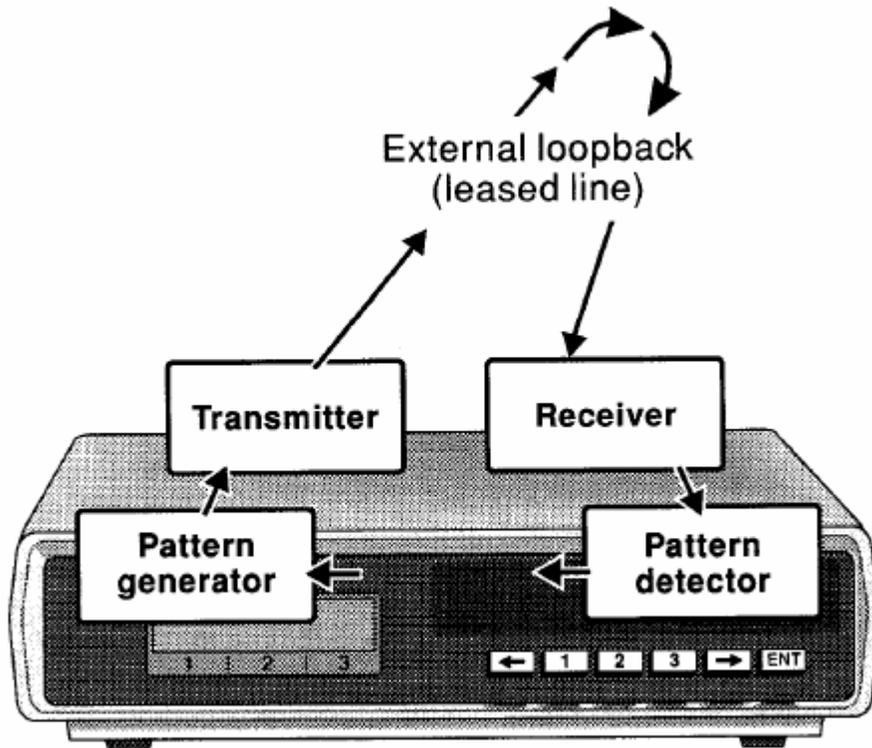


Figure 6-4. External analog loopback self test (ALXST)

The ER indicator may flash on when the test is first turned on, but it should quickly go out and remain off until the end of the test.

The information at the end of the previous section (for the ALBX test) concerning signal loss, loss of carrier and loss of RTS also apply to the ALXST.

To end the test, press the ENT pushbutton to return to the ANALOG ST (EXT) screen, and then select OFF.

Digital Loopback Test (DLB)

Digital loopback testing determines the operational performance of the local modem, the remote modem and the telephone line as a composite system. Test data is sent from the DTE or external BERT to the remote modem and then to the local modem, where it is regenerated and looped back to the remote modem and then back to the DTE. The test data is originated and checked by the DTE or BERT. The DLB test results can indicate whether or not the DTE is performing satisfactorily, and comparison of the DLB and ALB test results can help determine if either modem or the telephone lines are defective.

In the DLB test, the data to be sent and received is originated and checked by the DTE or external BERT. Figure 6-5 shows the data flow for this test.

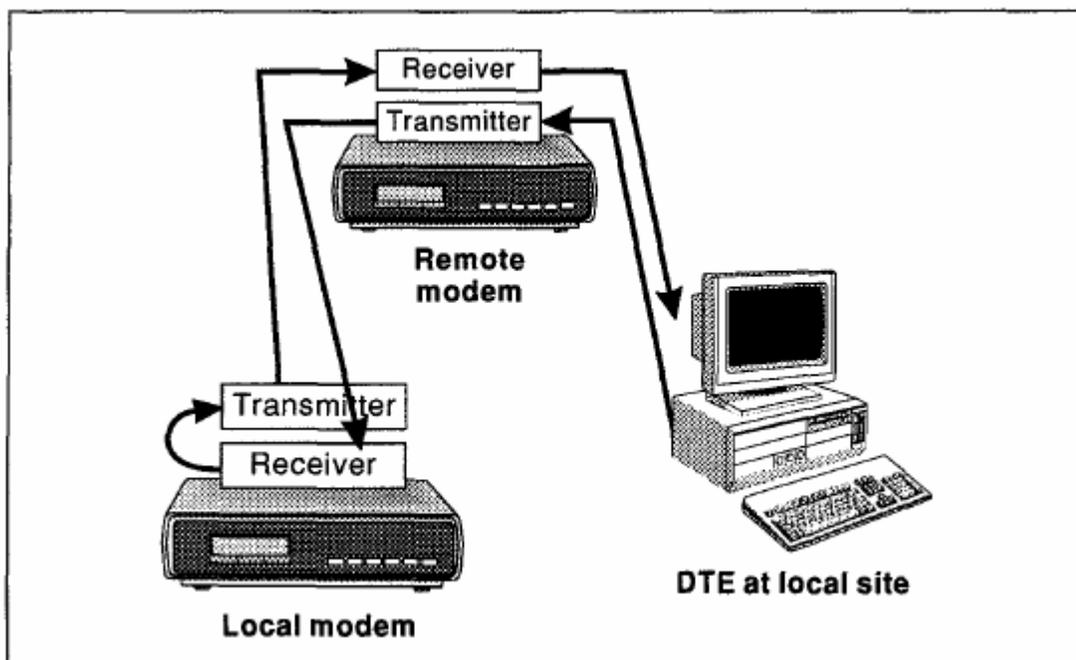


Figure 6-5. Digital loopback (DLB) test

Note (V.34 models only): When the Asymmetric Data Rates option is enabled, the DLB test is disabled.

Hayes Mode (&T3)

Initiate the digital loopback test from the local modem by entering **AT &T3**. Then, check for proper operation of the modems and phone lines by transmitting test data and comparing it (at the remote site) with the received test data.

Front Panel Control

From screen 2 of the LCD MAIN MENU, select TEST. Go to screen 2 of the LOCAL TEST menu and select DLB.

The DIGITAL LOOPBACK screen will be displayed. Select ON to activate the test. The TIA/EIA status screen will be displayed while the test is being conducted. Ensure that test data is being generated. Watch for data errors. By transmitting test data and comparing it with the received copy, the DTE is checked for proper operation. To end the test, press the ENT pushbutton to return to the DIGITAL LOOPBACK screen, and then select OFF.

Remote Modem Diagnostics

The ALX is capable of performing two sets on compatible remote modems: remote digital loopback (RDL) and remote digital loopback self test (RDLST). If a problem is encountered and the local ALX passes all diagnostic tests, the local ALX can test the remote modem.

There are two (noncontiguous) REMOTE TEST screens on the ALX LCD:

- (1) The remote tests are *initiated* from the REMOTE TEST *menu*. (Select RMT from MAIN MENU screen 2, and then select TEST. Then select the test type.)
- (2) **A remote test cannot be initiated unless the Remote Test option is enabled on the remote modem.** This option (also REMOTE TEST on the LCD) is accessed via SETUP screen 4.

Remote Digital Loopback (RDL) Test

The RDL test (Figure 6-6) tests the local modem, remote modem and telephone line from the local site.

For this test, both modems should be on-line. Ensure that the DTR circuit is on. (If TR is present on the TIA/EIA status screen, the DTR circuit is on.)

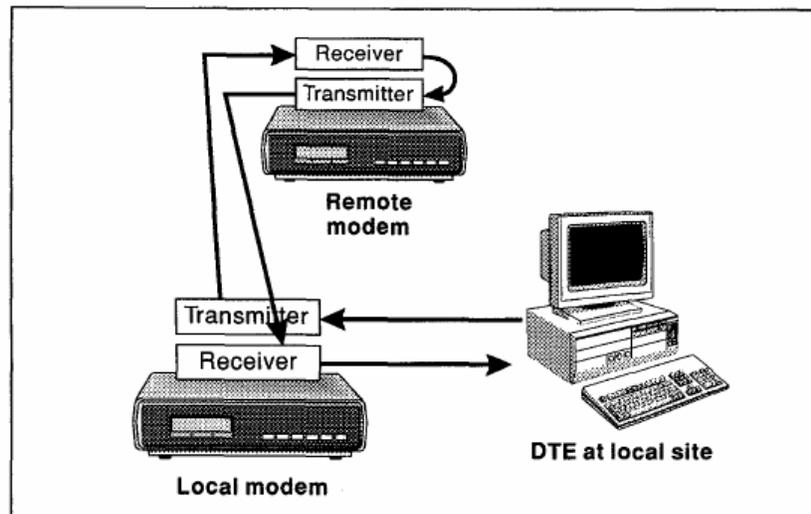


Figure 6-6. Remote digital loopback (RDL) test

Note (V.34 models only): When the Asymmetric Data Rates option is enabled, the RDL test is disabled.

Hayes Mode (&T6)

Initiate the remote digital loopback test by entering the command **AT &T6**. Then, check for proper operation of the modems and phone lines by transmitting test data and comparing it with the received test data.

Front Panel Control

From screen 2 of the MAIN MENU, select RMT, and then select TEST. From the REMOTE TEST menu, select RDL.

From the REMOT DIGIT LOOP screen, select ON to activate the test. The status screen will be displayed as the test is being conducted. Ensure that test data is being generated. Watch for data errors. By transmitting test data and comparing it with the received copy, the modems as well as the telephone line can be checked for proper operation.

To end the test, press the ENT pushbutton to return to the REMOT DIGIT LOOP screen, and then select OFF.

Pin 21 Control

The RDL test can also be activated by positive voltage on TIA/EIA pin 21 if the RDL-DTE Ctrl'd option is enabled.

Remote Digital Loopback Self Test (RDLST)

The RDLST tests the local modem, remote modem and telephone line from the local site as did the previous test, except that the test data is generated by internal modem circuitry as opposed to a DTE or external BERT. Figure 6-7 shows the connections automatically made during the test.

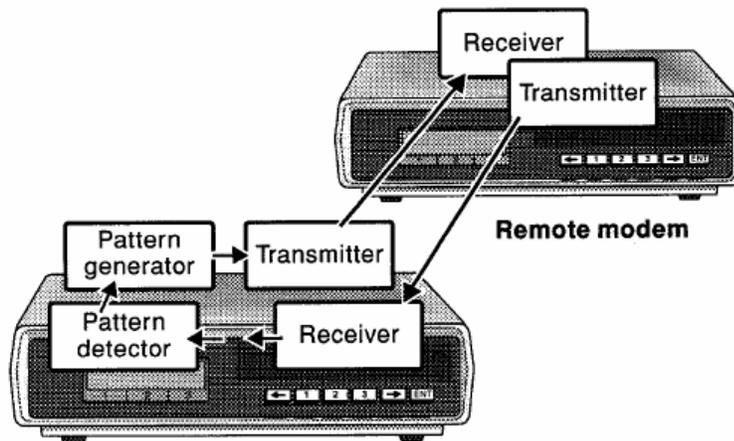


Figure 6-7. Remote digital loopback self test (RDLST)

Before initiating the test, make sure both modems are on-line.

Note (V.34 models only): When the Asymmetric Data Rates option is enabled, the RDLST test is disabled.

Hayes Mode (&T7)

Initiate the remote digital loopback self test by entering the command **AT &T7**.

When the test is complete, the ALX will send a three-digit error result code to the terminal (in Hayes mode only). If there are no errors, this result code will be 000. If there are errors, the code will range from 001 (1 error) to 255. (The result code will not go higher than 255, even if there are more than 255 errors.)

Front Panel Control

From screen 2 of the MAIN MENU, select RMT, and then select TEST. From the REMOTE TEST menu, select RDLST.

From the RDL SELFTEST screen, select ON to activate the test. The status screen will be displayed as the test is being conducted. If “ER” is present on the status screen, the modem is detecting errors. If numerous errors are detected, steps should be taken to try to identify their source.

STATUS SCREEN

Numerous status screens are available for monitoring modem activity.

TIA/EIA Status Screen

The primary status screen, the TIA/EIA status screen, is illustrated and explained in Chapter 1.

Handshake Display

When two modems establish a connection, they engage in an exchange known as a handshake. While a handshake is taking place, the ALX displays several codes on the TIA/EIA status screen in the form H-*nn* (where *nn* = a 2-digit number). A handshake typically lasts for up to 12 seconds and is accompanied by various audible tones.

Other Status Screens

Several other status screens can be viewed through the front panel LCD. To see these screens, press the ENT pushbutton until the TIA/EIA status screen is displayed; then use the arrow pushbuttons to move between the additional status screens. The additional status screens, described below, are illustrated on the LCD flow chart.

Checksum Screens

By pressing pushbutton 1 while the TIA/EIA status screen is displayed, you can access a CHECKSUM menu that leads to several checksum screens. These screens are intended for use by servicing personnel. They show revision levels and checksums for the main processor and data pump software.

TX and RX Data Rates Screen

This screen (TX RATE and RX RATE) is present on the ALX V.34 and ALX V.34M only. It shows the transmitter (TX) and receiver (RX) data rates, after connection, in bits per second or thousand bits per second (as indicated by K). The TX RATE and RX RATE are always equal if the Asymmetric Data Rate option is disabled; if this option is enabled, the two rates may be the same or different.

Quality Screen

The quality screen displays the quality of the received signal carrier as a numeric value and as a horizontal bar graph. A low numeric value indicates good signal quality. The best possible signal quality is indicated when the bar graph extends all the way to the right edge of the LCD.

Line Levels Screen

This screen shows the selected (configured) transmit signal level (TX) and the actual (measured) receive signal level (RX).

The RX value is the approximate local receive level of the incoming signal. The range of measurement for RX is from 0 to -43 dBm in 1-dBm increments. If the signal level is less than the carrier detect threshold, <CD will be displayed.

Echo Characteristics Screen

This screen displays the characteristics of the echo portion of the receive signal (for 2-wire operation only). Specifically, it shows round trip delay, in milliseconds, and the far end echo frequency offset, in Hertz.

Channel Frequency Offset

This screen displays the frequency offset of the receive signal in Hertz (for 2-wire operation only).

Throughput Screen

This screen functions only if an error correction has been established. It shows the approximate rate (in bits per second) at which characters are being accepted by the modem from the DTE.

Packet Screen

The packet screen (PKT: SIZE TX ER) functions only when error correction is enabled. It has three components, as explained below.

- **SIZE** Shows size of data packets (MNP) or blocks (V.42/V.42bis) currently being transmitted. MNP uses “shorter” packets to transmit through noisy lines and “longer” packets (which allow greater throughput) when line conditions are good. The maximum MNP packet size is 256 characters (MNP classes 4 and 5) or 64 (MNP classes 1-3). The block size for V.42/V.42bis is fixed at 128 characters.
- **Transmitted (TX)** Number of packets or blocks transmitted since the connection was established (or since counter reset).
- **Errors (ER)** Number of retransmissions (retransmitted because of data errors) since the connection was established (or since counter reset). (**Note:** Some errors are “normal” when flow control is used.)

To reset the TX and ER counters, press button 2 while the packet screen is displayed. These counters reset automatically when a dial call disconnects, but in leased line modes (including dial backup auto-recovery), they reset only if you press pushbutton 2 with the packet screen displayed or reset the modem by selecting RESET.

Mode and Rate Screen

This screen shows the following data:

- **MODE** Below **MODE**, this screen indicates the error correction status:

Display	Error correction status
NORMAL	Error correction and buffer mode are both inactive.
V42	V.42 error correction (LAPM) is active.
V42bis	V.42bis error correction (LAPM with data compression) is active.
MNP 01 – MNP 05	MNP error correction is active.
BUFFER	Buffer mode is active.
OFFLINE	Modem is off-line.

- **RATE** This screen shows the data rate of the DTE.

RATE CHANGE SCREEN

In V.34 or V.32bis mode, if the Rate Renegotiation Procedure (RRP) option is enabled, the modem will automatically adjust during data transmission to a higher or lower data rate, depending on the receive signal quality. For diagnostic purposes, the RATE screen (accessed from screen 3 of the MAIN MENU) may be used to *manually* initiate speed renegotiation from the front panel.

If you select DOWN from the RATE screen, the ALX will fall back to the next lower speed. If you select UP, the modem will fall forward to the next higher speed – if the signal quality is good enough. **The range within which the ALX can fall forward or fall back is limited by the Speed Limit option minimum and maximum data rate and symbol rate settings.** After you select UP or DOWN, the LCD will automatically switch to the TIA/EIA status screen so you can see the result of the rate change request (i.e., the current data rate, which is displayed in the lower left corner of the TIA/EIA status screen). However, if the local ALX has reached the minimum or maximum speed, it will *not* switch to the TIA/EIA status screen. **Note:** A request to increase the data rate may result in no change in the data rate if the signal quality is poor.

If you manually initiate speed renegotiation with RRP enabled, the modem will automatically renegotiate the speed when it receives good signal quality. If the originate modem attempts to negotiate a rate that is lower than the minimum rate setting of the answer modem, the answer modem will disconnect.

APPENDIX A – TECHNICAL DATA

GENERAL DESCRIPTION

The Alliance Series modems – the ALX V.34M, ALX V.34, ALX V.32/19.2M, ALX V.32/19.2, ALX V.32/14.4M, ALX V.32/14.4, ALX V.32M and ALX V.32 – are intelligent microprocessor-controlled high-speed modems designed for use in a wide variety of applications. All ALX models operate full duplex over the public telephone network or over 2- or 4-wire leased lines.

Speed

The Alliance Series modems operate at data rates of 300 bps to 28.8 Kbps (depending on the specific model, as detailed in Table A-1). All models support automatic fallback, so they will automatically select the highest possible data rate.

At speeds of 600 bps and higher, the Alliance Series modems can operate in either asynchronous or synchronous mode; at lower speeds, the data type is asynchronous.

Features

Standard features include Hayes-compatible or V.25bis automatic call origination, V.42/V.42bis and MNP error correction, automatic dial backup for leased line applications, internal storage of up to 50 telephone numbers, facsimile operation (fax classes 1 and 2) and a full repertoire of ITU-T V.54 diagnostic capabilities.

More than 100 user-selectable options allow you to configure the modem for optimum performance relative to your specific application. A Quick Setup feature allows you to select preset configurations for either dialup or leased line applications by selecting a single option.

Physical Configurations

All Alliance Series modems are available in three configurations: Stand-alone, full-size rack-mount and low-profile rack-mount. The stand-alone and full-size rack-mount units are identical, except that the rack-mount unit has no enclosure, which can accommodate up to eight rack-mount modems. The low-profile rack-mount modems are designed for use in Raymar-Telenetics' 1616 rack enclosure, which can hold up to 16 modems. For further information on the low-profile rack-mount modems, see Appendix E.

SPECIFICATIONS

Table A-1 lists the specifications of the Alliance Series modems.

Table A-1. Specifications

- Operational Specifications -	
Compatibility	<p>V.34 28.8, 26.4, 24.0, 21.6, 19.2, 16.8, 14.4 and 12.0 Kbps, 9600, 7200, 4800 and 2400 bps ¹</p> <p>V.33 14.4 and 12.0 Kbps ²</p> <p>V.32terbo 19.2 and 16.8 Kbps ³</p> <p>V.32bis 14.4 and 12.0 Kbps, 9600, 7200 and 4800 bps ²</p> <p>V.32 9600 and 4800 bps</p> <p>V.29 9600, 7200 and 4800 bps ⁴</p> <p>V.29 (fax) 9600/7200 bps ⁴</p> <p>V.27bis/ter 4800 and 2400 bps ⁴</p> <p>V.27ter (fax) 4800/2400 bps ⁴</p> <p>V.26/V.26bis 2400 and 1200 bps ⁴</p> <p>V.22bis 2400 bps</p> <p>V.22 1200 and 600 bps</p> <p>V.21 300 bps</p> <p>V.17 (fax) 14.4 and 12.0 Kbps, 9600 and 7200 bps ⁴</p> <p>Bell 208A/B 4800 bps ²</p> <p>Bell 212A 1200 bps</p> <p>Bell 103 0-300 bps</p> <p>Proprietary 19.2 and 16.8 Kbps modulation ³</p> <p>Proprietary V.29 fast training ⁵</p> <p>¹ ALX V.34 and V.34M only.</p> <p>² All ALX models except ALX V.32 and V.32M</p> <p>³ ALX V.34, V.34M, V.32/19.2 and V.32/19.2M only.</p> <p>⁴ Optional (available on selected models).</p> <p>⁵ V.29 is available as an option on all models except the ALX V.32 and V.32M</p>
Data rates	<p>ALX V.34 and V.34M:</p> <p style="padding-left: 20px;">Dial modes: 300 bps – 28.8 Kbps</p> <p style="padding-left: 20px;">Leased line modes: 2400 bps – 28.8 Kbps</p> <p>ALX V.32/19.2 and V.32/19.2M:</p> <p style="padding-left: 20px;">Dial modes: 300 bps – 19.2 Kbps</p> <p style="padding-left: 20px;">Leased line modes: 2400 bps – 19.2 Kbps</p>

	<p>ALX V.32/14.4 and V.32/14.4M: Dial modes: 300 bps – 14.4 Kbps Leased line modes: 2400 bps – 14.4 Kbps</p> <p>ALX V.32 and ALX V.32M: Dial modes: 300 – 9600 bps Leased line modes: 2400 bps – 9600 Kbps</p> <p><i>See also Compatibility on previous page.</i></p>
Supported DTE speeds	300 bps – 230.4 Kbps (including 1200/75 and 1800 bps)
Modes	<p>V.34: QAM at 28.8, 26.4, 24.0, 21.6, 19.2, 16.8, 14.4 and 12.0 Kbps, 9600, 7200, 4800 and 2400 bps; full duplex over 2-wire line (Trellis coded)</p> <p>V.33: QAM Trellis coded at 14.4 and 12.0 Kbps</p> <p>V.32terbo: QAM at 19.2 and 16.8 Kbps</p> <p>V.32bis/V.32: QAM at 14.4, 12.0 Kbps, 9600, 7200 and 4800 bps; full duplex over 2-wire line (Trellis coded at 7200 bps and higher; coded or non-coded at 9600 bps)</p> <p>V.29: QAM at 9600, 7200 and 4800 bps V.27: 8-phase DPSK at 4800 and 2400 bps V.26: 4-phase DPSK at 2400 and 1200 bps V.23: FSK at 1200/75 bps, full duplex V.22bis: QAM at 2400 bps; bandsplit, full duplex V.22: DPSK at 1200 and 600 bps; bandsplit, full duplex V.21: FSK at 0-300 bps; bandsplit, full duplex</p>
Operation	<ul style="list-style-type: none"> - Full duplex over 2-wire dial lines or 2- or 4-wire leased lines - Half duplex - Simulated half duplex V.13 operation
Autodialer	<ul style="list-style-type: none"> - Automatic dialing using rotary pulses or tone signaling - Supports Hayes AT commands or V.25bis commands
Facsimile operation	<ul style="list-style-type: none"> - Class 1 - Class 2 (TIA/EIA 578, preliminary EIA 2388) - Group 3 (T.30, T.4)
Answer modes	Automatic and manual answer

Data format	<ul style="list-style-type: none"> - Asynchronous: 9, 10 or 11 bits, serial, binary - Synchronous: Serial, binary 			
Equalization	<p>V.32terbo, V.32bis, V.32 operation: Receiver: Automatic adaptive equalization Transmitter: Selectable compromise equalization (4 types)</p> <p>V.34 operation (V.34 models only): Adaptive pre-emphasis Precoding</p>			
Transmit timing	Internal, external, or slaved to receive clock			
Transmit level	<ul style="list-style-type: none"> - Leased: Selectable, 0 to -15 dBm - Dial: Permissive or programmable 			
Carrier detect threshold	<ul style="list-style-type: none"> - Leased line: -26, -33 or -43 dBm; selectable - Dial line: -26, -33 or -43 dBm; selectable 			
RTS-CTS delays (resulting from training)	<u>Mode</u>	<u>Rate, bps</u>	<u>Training</u>	<u>Delay, ms</u>
	V.33	All rates	--	1393
	V.29	All rates	Short	26
	V.29	All rates	Long	253
	V.27	4800	Short	50
	V.27	4800	Long	708
	V.27	2400	Short	67
	V.27	2400	Long	943
	V.26	2400	Short	35
	V.26	2400	Long	96
	In V.27 mode, if the Echo Protection Tone option is enabled, CTS delay increases by 205 ms.			
Test capabilities	<ul style="list-style-type: none"> - Analog loopback, analog loopback self test, self test with errors, digital loopback, remote digital loopback, remote digital loopback self test, external analog loopback (4-wire), external analog loopback self test (4-wire) - Front panel, TIA/EIA or Hayes control 			
- Physical Specifications -				
Available configurations	<ul style="list-style-type: none"> - Stand-alone - Full-size rack-mount - Low-profile rack-mount 			

Interface	Terminal: RS-232C/D, ITU-T V.24/V.28 Telephone line: - Dialup – 8-pin RJ-45 modular connector with A/A1 and MI/MIC control - Leased line – 6-pin RJ-11 modular connector - Diagnostic port: 8-pin RJ-45 modular connector
Line requirement	Unconditioned
AC power	- Stand-alone: 90 – 132 VAC, 60 Hz +/- 5% or 198 – 242 VAC, 50 Hz (depends on specific model) - Rack-mount: Compatible with 117 or 220 VAC rack enclosure (depends on specific model)
Power consumption	8 Watts
Environment	- Ambient temp: 0 to 50°C (32 to 122°F) - Storage temp: -20 to 70°C (-4 to 158° F) - Relative humidity: 10 to 95%
Dimensions (stand-alone unit)	- Width: 24.6 cm (9.7 inches) - Height: 6.35 cm (2.5 inches) - Depth: 25.7 cm (10.1 inches)
Weight	- Stand-alone: 1.9 kg (4 lb 2 oz) - Full-size rack-mount: 0.9 kg (2 lb) - Low-profile rack-mount: 0.7 kg (1 lb 8 oz)
- Regulatory information - (See also Appendix F)	
U.S. FCC registration no.	ABEUSA-21976-MM-E
FCC class	A
Ringer equivalence	0.7 B
Canadian DOC approval no.	565 6502 AB

APPENDIX B – QUICK SETUP CONFIGURATIONS

Tables B-1 and B-2 show the modem configuration – i.e., the default setting for each option – for each of the Quick Setup modes. When you select a Quick Setup, the modem automatically sets all options as indicated in the table. The options are listed in the same order in which they appear on the LCD flow chart.

Instructions for selecting Quick Setups are included in Chapter 1.

Note: Some options do not apply to all Quick Setup modes; that is, in some Quick Setup modes, some options have no effect. However, Tables B-1 and B-2 list the default settings for all options for each Quick Setup, because each Quick Setup sets the entire modem configuration – all options – to default settings.

Some options can be selected via Summary Setup only. These options are not listed in Tables B-1 and B-2. The factory default settings for these options are shown in Appendix C.

Table B-1. Quick Setup Configurations
(See Table B-2 for additional Quick Setup configurations.)

Option	Default settings listed by Quick Setup mode					
	Hayes	V.25bis async ¹	Dumb	2-wire leased ²	4-wire leased ²	V.33 ³
Communication Standard option						
STD	AUTO V.34 ⁴	AUTO V.34 ⁴	AUTO V.34 ⁴	AUTO V.34 ⁴	AUTO V.34 ⁴	V.33
V.34 options (Available on ALX V.34 and ALX V.34M only.)						
CHANNEL PROBING	Enable	Enable	Enable	Enable	Enable	Enable
TX LVL ADJ BY PROBING	Enable	Enable	Enable	Enable	Enable	Enable
ASYMM SYMBOL RATES	Disable	Disable	Disable	Disable	Disable	Disable
OPTIONAL SYMBOL RATES (all 3 rates)	Enable	Enable	Enable	Enable	Enable	Enable
ASYMM DATA RATES	Enable	Enable	Enable	Enable	Enable	Enable
TRELLIS CODING TYPE	NEG	NEG	NEG	NEG	NEG	NEG
PRE-EMPH FILTER	NEG	NEG	NEG	NEG	NEG	NEG
MANDAT CARRIER	Low	Low	Low	Low	Low	Low
PRECODING	NEG	NEG	NEG	NEG	NEG	NEG
<p>¹ V.25bis synchronous configurations (character- and bit-oriented) are the same as the V.25bis asynchronous configuration except as follows: V.42 MODE is OFF, BUFFER is disabled, DATA TYPE is synchronous, PARITY is ODD; RX SPACE DISCONNECT and TX SPACE DISCONNECT are both disabled; and DIALER MODE (V.25bis) is Sync_c for character-oriented mode, Sync_b for bit-oriented mode.</p> <p>² Leased line originate and answer Quick Setups [(ORG) and (ANS) on the LCD] are the same except that ANS/ORG DEFAULT is set to ORIGINATE for the originate Quick Setups and is set to ANSWER for the answer Quick Setups (2-wire or 4-wire).</p> <p>³ Not available on the ALX V.32 and ALX V.32M.</p> <p>⁴ V.32 models; Setting is AUTO V.32.</p>						

Option	Default settings listed by Quick Setup mode					
	Hayes	V.25bis async ¹	Dumb	2-wire leased ²	4-wire leased ²	V.33 ³
SHAPING	NEG	NEG	NEG	NEG	NEG	NEG
NONLINEAR ENCODING	NEG	NEG	NEG	NEG	NEG	NEG
PH4 CONST	NEG	NEG	NEG	NEG	NEG	NEG
Line Type Option						
LINE TYPE	2W-D	2W-D	2W-D	2W-LL	4W-LL	4W-LL
Speed Limit Option ALX V.34 and ALX V.34M						
MAX TX DCE	28.8 K	28.8 K	28.8 K	28.8 K	28.8 K	14.4 K
MIN TX DCE	300	300	300	2400	2400	12.0 K
MAX RX DCE	28.8 K	28.8 K	28.8 K	28.8 K	28.8 K	14.4 K
MIN RX DCE	300	300	300	2400	2400	12.0 K
MAX TX SYM	3429	3429	3429	3429	3429	3429
MIN TX SYM	2400	2400	2400	2400	2400	2400
MAX RX SYM	3429	3429	3429	3429	3429	3429
MIN RX SYM	2400	2400	2400	2400	2400	2400
Speed Limit Option ALX V.32, V.32M, V.32/14.4, V.32/14.4M, V.32/19.2, V.32/19.2M						
MAX DCE RATE	19.2 K ⁵	19.2 K ⁵	19.2 K ⁵	19.2 K ⁵	19.2 K ⁵	14.4 K
MIN DCE RATE	300	300	300	4800	4800	12.0 K
V.42 error correction options						
V.42 MODE	Auto	Auto ¹	Auto	Auto	Auto	OFF
MNP CLASS (LIMIT)	5	5	5	5	5	5
V.42 BREAK HANDLING	NDT/NEXP	NDT/NEXP	NDT/NEXP	NDT/NEXP	NDT/NEXP	NDT/NEXP
V.42 PROTOCOL	LAPM/MNP	LAPM/MNP	LAPM/MNP	LAPM/MNP	LAPM/MNP	LAPM/MNP
V.42bis	Enable	Enable	Enable	Enable	Enable	Enable
DICTIONARY SIZE	2K	2K	2K	2K	2K	2K
⁵ Maximum speed for the ALX V.32/14.4 and ALX V.32/14.4M is 14.4 Kbps; maximum speed for the ALX V.32 and ALX V.32M is 9600 bps.						

Option	Default settings listed by Quick Setup mode					
	Hayes	V.25bis asyn ¹	Dumb	2-wire leased ²	4-wire leased ²	V.33 ³
BUFFER	Enable	Enable ¹	Enable	Enable	Enable	Disable
DTE SPEED	38.4 K	38.4 K	38.4 K	38.4 K	38.4 K	38.4 K
FLOW CONTROL, DTE-DCE	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3
FLOW CONTROL, DCE-DTE	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3
DTE PASS-THR FLOW CTRL	Disable	Disable	Disable	Disable	Disable	Disable
(Miscellaneous)						
ADDRESS ⁶	999,999	999,999	999,999	999,999	999,999	999,999
DIALER MODE	Hayes	V25bis/Asyn ¹	OFF	OFF	OFF	OFF
AUTO ANSWER	Enable	Enable	Enable	Disable	Disable	Disable
Data format options						
DATA TYPE	Asyn	Asyn ¹	Asyn	Sync	Sync	Sync
CHAR LENGTH	10	10	10	10	10	10
PARITY	None	Even ¹	None	None	None	None
Disconnect options						
RX SPACE DISC'T	Enable	Enable ¹	Enable	Disable	Disable	Disable
TX SPACE DISC'T	Enable	Enable ¹	Enable	Disable	Disable	Disable
CARRIER DISC'T	Enable	Enable	Enable	Enable	Enable	Enable
LINE CURR DISC'T	Enable	Enable	Enable	Enable	Enable	Enable
RTS DISC'T	OFF	OFF	OFF	OFF	OFF	OFF
⁶ Quick Setup does not change the address to the default address, but a factory reset does.						

Option	Default settings listed by Quick Setup mode					
	Hayes	V.25bis async ¹	Dumb	2-wire leased ²	4-wire leased ²	V.33 ³
Test options						
DSR DURING ALB	ON	ON	ON	ON	ON	ON
REMOTE TEST	Enable	Enable	Enable	Enable	Enable	Enable
EIA options						
CTS TO EIA	RTS	True	Normal	Normal	Normal	Normal
CD TO EIA	Normal	Normal	Normal	Normal	Normal	Normal
DSR TO EIA	True	Normal	Normal	True	True	True
DTR FROM EIA	Normal	Normal	Normal	True	True	True
ALB- DTE CTRL'ED	Disable	Disable	Disable	Disable	Disable	Disable
RDL- DTE CTRL'ED	Disable	Disable	Disable	Disable	Disable	Disable
TM TO EIA	Normal	Normal	True	True	True	True
Modem setup options						
CD LEVEL, LEASED	-26 dBm	-26 dBm	-26 dBm	-26 dBm	-26 dBm	-26 dBm
CD LEVEL, DIAL	-43 dBm	-43 dBm	-43 dBm	-43 dBm	-43 dBm	-43 dBm
TX LEVEL, LEASED	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm
SIGNAL QUALITY LEVEL	10 ⁴	10 ⁴	10 ⁴	10 ⁴	10 ⁴	10 ⁴
COMPR EQUAL	T-III	T-III	T-III	T-III	T-III	T-III
TRELLIS CODE	Enable	Enable	Enable	Enable	Enable	Enable
TRANSMIT CLOCKING	Internal	Internal	Internal	Internal	Internal	Internal
T1 TIMER	0.8 sec	0.8 sec	0.8 sec	0.8 sec	0.8 sec	0.8 sec

Option	Default settings listed by Quick Setup mode					
	Hayes	V.25bis async ¹	Dumb	2-wire leased ²	4-wire leased ²	V.33 ³
AUTO-RETRAIN	Enable	Enable	Enable	Enable	Enable	Enable
ANS/ORG DEFAULT	ORIG	ORIG	ORIG	See footnote 2	See footnote 2	ORIG
ANS TONE	2100 Hz	2100 Hz	2100 Hz	2100 Hz	2100 Hz	2100 Hz
FRONT PANEL	Enable	Enable	Enable	Enable	Enable	Enable
SPKR CTRL	Til-CD	Til-CD	Til-CD	Til-CD	Til-CD	Til-CD
SPKR VOL	Medium	Medium	Medium	Medium	Medium	Medium
GUARD TONES	OFF	OFF	OFF	OFF	OFF	OFF
V.8 PROC	Enable	Enable	Enable	Enable	Enable	Enable
V.13 OPERATION	OFF	OFF	OFF	OFF	OFF	OFF
TRAINING LENGTH	Long	Long	Long	Long	Long	Long
CARRIER	Switched	Switched ⁷	Switched	Switched	Switched	Constant
CTS	RTS	RTS ⁷	RTS	RTS	RTS	RTS
RTS-CTS DELAY	0	0 ⁷	0	0	0	0
Auto-Recovery options						
AUTO-RECV SELECT	None	None	None	None	None	None
AUTO-RECV RETURN	OFF	OFF	OFF	OFF	OFF	OFF
AUTO-RECV TEST INT'VL	20 min	20 min	20 min	20 min	20 min	20 min
AUTO-RECV TEST TYPE ⁸	INTER	INTER	INTER	INTER	INTER	INTER
LCD intensity option						
LCD INTENSITY	5	5	5	5	5	5
⁷ Effective for synchronous modes only. ⁸ Available only on special modes.						

Table B-2. Quick Setup Configurations
(See Table B-1 for additional Quick Setup configurations.)

Option	Default settings listed by Quick Setup mode				
	Bell 208 ¹	4-wire leased V.29	V.29 fast master	V.29 fast slave	V.27
Communication Standard option					
STD	208	V.29	V.29	V.29	V.27
V.34 options (Available on ALX V.34 and ALX V.34M only.)					
CHANNEL PROBING	Enable	Enable	Enable	Enable	Enable
TX LVL ADJ BY PROBING	Enable	Enable	Enable	Enable	Enable
ASYMM SYMBOL RATES	Disable	Disable	Disable	Disable	Disable
OPTIONAL SYMBOL RATES (all 3 rates)	Enable	Enable	Enable	Enable	Enable
ASYMM DATA RATES	Enable	Enable	Enable	Enable	Enable
TRELLIS CODING TYPE	NEG	NEG	NEG	NEG	NEG
PRE-EMPH FILTER	NEG	NEG	NEG	NEG	NEG
MANDAT CARRIER	Low	Low	Low	Low	Low
PRECODING	NEG	NEG	NEG	NEG	NEG
<p>¹ Not available on the ALX V.32 and ALX V.32M. The V.3x/208 auto-mode Quick Setup configuration is the same as the Dumb mode Quick Setup configuration (Table B-1) except as follows: STD is V3x/Bell208, DATA TYPE is synchronous, V.13 OPERATION is set to TX and RX, CARRIER is constant; Summary Setup V.3x/208 option (data pump options group) is set to 1 (enable).</p>					

Option	Default settings listed by Quick Setup mode				
	Bell 208 ¹	4-wire leased V.29	V.29 fast master	V.29 fast slave	V.27
SHAPING	NEG	NEG	NEG	NEG	NEG
NONLINEAR ENCODING	NEG	NEG	NEG	NEG	NEG
PH4 CONST	NEG	NEG	NEG	NEG	NEG
Line Type option					
LINE TYPE	2W-D	4W-LL	4W-LL	4W-LL	2W-D
Speed Limit option ALX V.34 and ALX V.34M					
MAX TX DCE	4800	9600	9600	9600	4800
MIN TX DCE	4800	4800	4800	4800	2400
MAX RX DCE	28.8 K	28.8 K	28.8 K	28.8 K	28.8 K
MIN RX DCE	300	300	300	2400	2400
MAX TX SYM	3429	3429	3429	3429	3429
MIN TX SYM	2400	2400	2400	2400	2400
MAX RX SYM	3429	3429	3429	3429	3429
MIN RX SYM	2400	2400	2400	2400	2400
Speed Limit option ALX V.32, V.32M, V.32/14.4, V.32/14.4M, V.32/19.2, V.32/19.2M					
MAX DCE RATE	4800	9600	9600	9600	4800
MIN DCE RATE	4800	4800	4800	4800	2400
V.42 error correction options					
V.42 MODE	OFF	OFF	OFF	OFF	OFF
MNP CLASS (LIMIT)	5	5	5	5	5
V.42 BREAK HANDLING	NDT/NEXP	NDT/NEXP	NDT/NEXP	NDT/NEXP	NDT/NEXP
V.42 PROTOCOL	LAPM/MNP	LAPM/MNP	LAPM/MNP	LAPM/MNP	LAPM/MNP
V.42bis	Enable	Enable	Enable	Enable	Enable
DICT SIZE	2K	2K	2K	2K	2K

Option	Default settings listed by Quick Setup mode				
	Bell 208 ¹	4-wire leased V.29	V.29 fast master	V.29 fast slave	V.27
BUFFER	Disable	Disable	Disable	Disable	Disable
DTE SPEED	38.4 K	38.4 K	38.4 K	38.4 K	38.4 K
FLOW CONTROL, DTE-DCE	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3
FLOW CONTROL, DCE-DTE	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3	DC1/DC3
DTE PASS-THR FLOW CTRL	Disable	Disable	Disable	Disable	Disable
(Miscellaneous)					
ADDRESS 2	999,999	999,999	999,999	999,999	999,999
DIALER MODE	OFF	OFF	OFF	OFF	OFF
AUTO ANSWER	Enable	Enable	Disable	Disable	Enable
Data format options					
DATA TYPE	Sync	Sync	Sync	Sync	Sync
CHAR LENGTH	10	10	10	10	10
PARITY	None	None	None	None	None
Disconnect options					
RX SPACE DISC'T	Disable	Disable	Disable	Disable	Disable
TX SPACE DISC'T	Disable	Disable	Disable	Disable	Disable
CARRIER DISC'T	Enable	Enable	Enable	Enable	Enable
LINE CURR DISC'T	Enable	Enable	Enable	Enable	Enable
RTS DISC'T	OFF	OFF	OFF	OFF	OFF
² Quick Setup does not change the address to the default address, but a factory reset does.					

Option	Default settings listed by Quick Setup mode				
	Bell 208 ¹	4-wire leased V.29	V.29 fast master	V.29 fast slave	V.27
Test options					
DSR DURING ALB	ON	ON	ON	ON	ON
REMOTE TEST	Enable	Enable	Enable	Enable	Enable
EIA options					
CTS TO EIA	Normal	Normal	Normal	Normal	Normal
CD TO EIA	Normal	Normal	Normal	Normal	Normal
DSR TO EIA	Normal	True	True	True	Normal
DTR FROM EIA	Normal	True	True	True	Normal
ALBT DTE CTRL'ED	Disable	Disable	Disable	Disable	Disable
RDL DTE CTRL'ED	Disable	Disable	Disable	Disable	Disable
TM TO EIA	True	True	True	True	True
Modem setup options					
CD LEVEL, LEASED	-26 dBm	-26 dBm	-26 dBm	-26 dBm	-26 dBm
CD LEVEL, DIAL	-43 dBm	-43 dBm	-43 dBm	-43 dBm	-43 dBm
TX LEVEL, LEASED	0 dBm	0 dBm	0 dBm	0 dBm	0 dBm
TX LEVEL, DIAL	Permis.	Permis.	Permis.	Permis.	Permis.
SIGNAL QUAL LEVEL	10 ⁴	10 ⁴	10 ⁴	10 ⁴	10 ⁴
COMPR EQUAL	T-III	T-III	T-III	T-III	T-III
TRELLIS CODE	Enable	Enable	Enable	Enable	Enable
TRANSMIT CLOCKING	Internal	Internal	Internal	Internal	Internal
T1 TIMER	0.8 sec	0.8 sec	0.8 sec	0.8 sec	0.8 sec

Option	Default settings listed by Quick Setup mode				
	Bell 208 ¹	4-wire leased V.29	V.29 fast master	V.29 fast slave	V.27
AUTO-RETRAIN	Enable	Enable	Disable	Disable	Enable
ANS/ORG DEFAULT	ORIG	ORIG	ORIG	ANS	ORIG
ANS TONE	2100 Hz	2100 Hz	2100 Hz	2100 Hz	2100 Hz
FRONT PANEL	Enable	Enable	Enable	Enable	Enable
SPKR CTRL	Til-CD	Til-CD	Til-CD	Til-CD	Til-CD
SPKR VOL	Medium	Medium	Medium	Medium	Medium
GUARD TONES	OFF	OFF	OFF	OFF	OFF
V.8 PROC	Enable	Enable	Enable	Enable	Enable
V.13 OPERATION	OFF	OFF	OFF	OFF	OFF
TRAINING LENGTH	Long	Long	Short	Short	Short
CARRIER	Switched	Constant	Constant	Switched	Switched
CTS	RTS	RTS	RTS	RTS	RTS
RTS-CTS DELAY	150 ms	0	0	0	0
Auto-Recovery options					
AUTO-RECV SELECT	None	None	None	None	None
AUTO-RECV RETURN	OFF	OFF	OFF	OFF	OFF
AUTO-RECV TEST INT'VL	20 min	20 min	20 min	20 min	20 min
AUTO-RECV TEST TYPE ³	INTER	INTER	INTER	INTER	INTER
LCD Intensity option					
LCD INTENSITY	5	5	5	5	5
³ Available only on special models.					

APPENDIX C – QUICK-CHANGE CONFIGURATION SCREENS

Three Quick-Change configuration screens accessible through SETUP screen 6 on the front panel LCD allow users to quickly and selectively change multiple option settings or S register values from a single screen. **Use of these screens is recommended for experienced users only because option settings are shown only as numbers and there is very little guidance on the LCD screen to indicate which option is being changed.**

The Quick-Change configuration screens are the Summary Setup screen, AT PROFILES screen and S-REG screen. These screens are briefly identified below. For details, refer to the following pages.

Summary Setup screen

PRI	addr
012120850	999 99

This screen allows you to change all ALX options that can be accessed through the front panel LCD and several options that can only be accessed or changed through Summary Setup.

AT PROFILES screen

AT PROFILES		
0	1	&Y0

The AT PROFILES screen allows you to access and change the Hayes mode user profiles (profile 0 and profile 1).

S-REG screen

S-REG	00:01
DEC	INC

This screen allows you to change S register values.

Accessing the Quick-Change Screens

To access the Quick-Change screens, use pushbutton 1 to select SUMMARY from SETUP screen 6. The ALX will display the SUMMARY menu:

SUMMARY	03F6
SETUPS AT	S-REG

From this screen, select –

- SETUPS to access Summary Setup,
- AT to access the AT PROFILES screen, or
- S-REG to access the S-REG (S register) screen.

(The four-digit hexadecimal value in the upper right corner of the SUMMARY menu screen is a checksum derived from the modem’s current configuration. If the checksum changes, at least one modem option has been changed. After setting up the ALX, record the checksum for possible later reference. The checksum allows you to determine if any of the modem’s option settings have been changed, although you cannot determine from this number which options have been changed. The checksum does not reflect changes in the modem address, stored phone numbers or Hayes mode autobaud settings.)

Note: Changes made through the Quick-Change configuration screens modify the active modem configuration and are saved to memory when you exit the SETUP menu.

SUMMARY SETUP

The ALX Summary Setup feature allows you to change all ALX options that can be accessed through the front panel LCD *and several options that can only be accessed or changed through Summary Setup*. (Options that can only be changed through Summary Setup are listed in Chapter 2.)

Summary Setup makes it possible to view most modem options and selectively change multiple options using a single LCD screen (the Summary Setup screen).

Changing Options via Summary Setup

This section applies to the Summary Setup screen and to the user profile 0 and user profile 1 screens accessible from the AT PROFILES screen.

The appearance of the Summary Setup screen and user profile screens is essentially the same: Brief descriptive information on the top line and a long string of numbers on the bottom line.

The numbers are broken down into groups, with each group representing a category of options

(dial line options, EIA interface options, etc.). Each digit within the number string represents an option, and the specific value of each digit (0, 1, E, etc.) indicates the *current option setting*.

On the following pages are diagrams that show –

- Which options are included in each option group
- Which option is indicated by each digit within the group
- The possible settings for each option

To change an option setting, use the front panel pushbuttons to change the value of the digit that corresponds to the option you want to change, as explained in the following section.

Summary Setup Pushbutton Functions

The LCD can display only a portion of the Summary Setup number strings (options) and user profiles; however, you can scroll across the string of numbers to view the entire display. **For the Summary Setup and user profile screens only, the front panel pushbuttons function as follows:**

- Pushbutton 1 moves the cursor to the left. Pushbutton 3 moves the cursor to the right. If the cursor is at the end of the screen, the screen will scroll one character at a time.
- Pushbutton 2 changes the flashing value (i.e., the current option setting). When you press pushbutton 2, the LCD cycles through the possible values (settings).
- The right arrow button moves the screen to the beginning of the next group of options to the right. The left arrow button moves the screen to the beginning of the next group of options to the left. Groups of options are separated by blank spaces on the LCD.

Note: On the user profile screens (for AT profiles 0 and 1) the cursor location is indicated by a solid black box when the cursor is positioned in a blank cell (one with no characters).

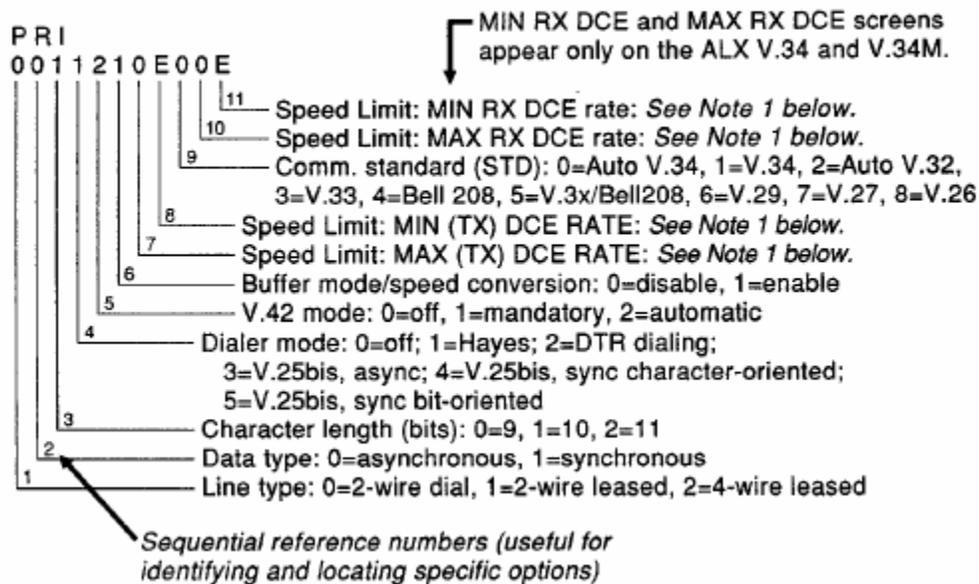
Explanation of Summary Setup Screens

Note that options are identified on the Summary Setup screens only by the relative positions of the digits within the number string, as indicated in the following diagrams. Each digit represents an option, and the value of each digit (0, 1, E, etc.) indicates the current option setting.

The string of numbers in each diagram shows the factory default setting for each option (i.e., the Hayes mode default settings). Each diagram also identifies all possible settings (values) for each option.

Note: Numbers within an option group that are not identified in the following diagrams are reserved for future use or factory use. *Do not change these numbers.*

PRIMARY OPTIONS: ← LCD (Each digit represents an option.)



Note 1: Settings for Speed Limit screens are (in bps):

0=28.8 K, 1=26.4 K, 2=24.0 K, 3=21.6 K, 4=19.2 K, 5=16.8 K, 6=14.4 K, 7=12.0 K, 8=9600, 9=7200, A=4800, B=2400, C=1200, D=600, E=0-300, F=1200/75.

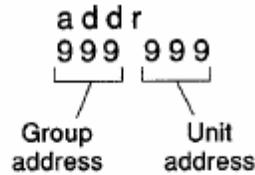
However, Speed Limit settings for each ALX model can only be set within the range shown in the table in Chapter 2.

The default maximum rate (MAX (TX) DCE RATE and MAX RX DCE) for each model is the highest rate shown in the table in Chapter 2. For example, the default MAX DCE RATE setting for the ALX V.32/19.2M is 4 (19.2 Kbps).

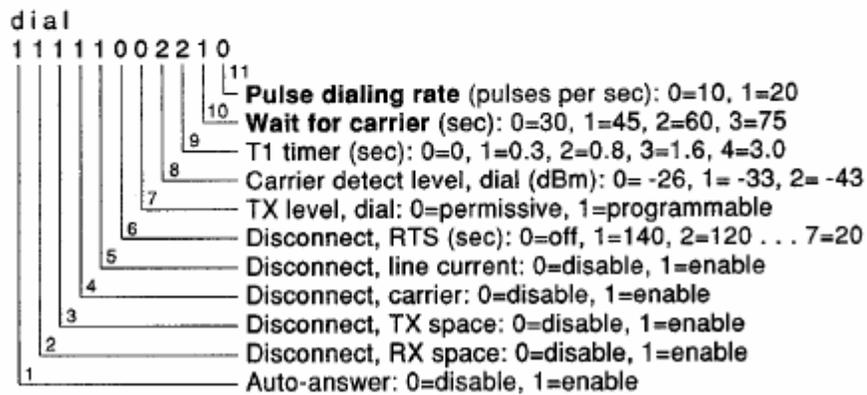
Speed Limit: Symbol (SYM) rates: See V.34-RELATED OPTIONS later in this Appendix.

Communication standard: Not all standards are available on all ALX models. On V.32 models, the default setting is 2 (Auto V.32).

ADDRESS:

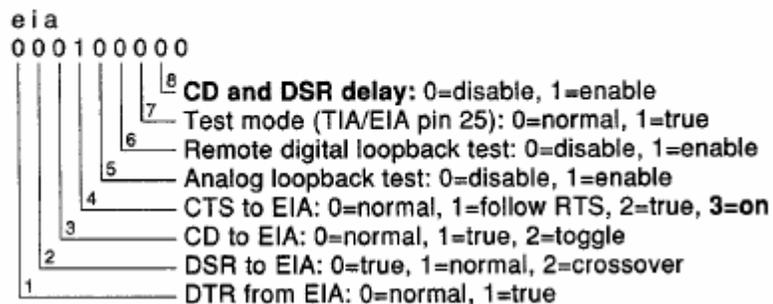


DIAL LINE OPTIONS:

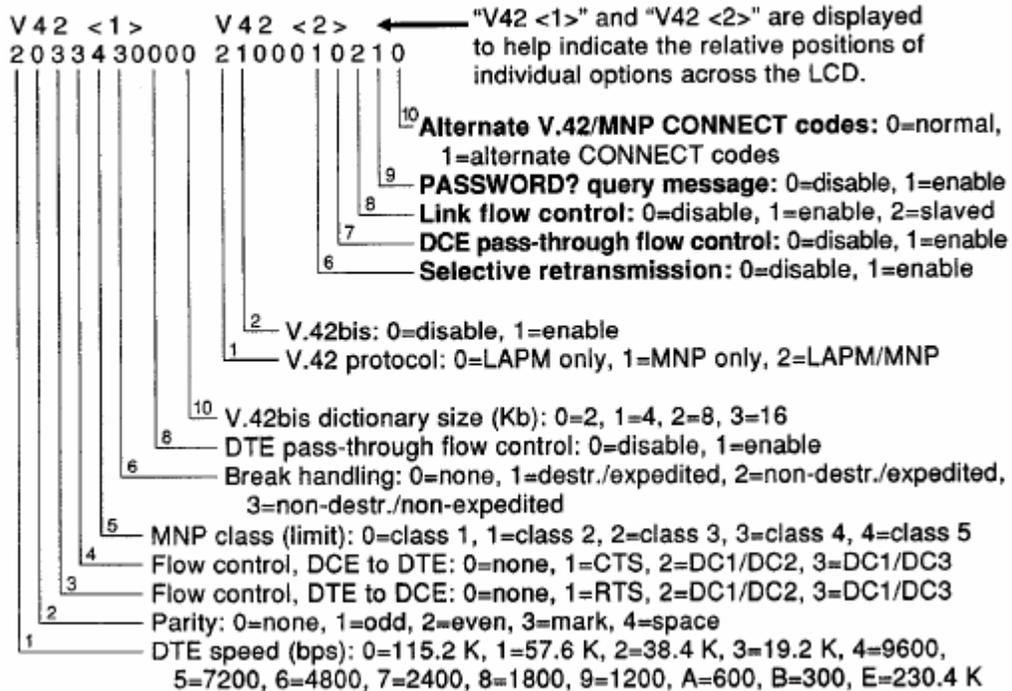


Options shown in bold type are accessible only via Summary Setup screens.
 Options in normal type can also be accessed through additional (individual) LCD screens (e.g., the TX LEVEL screen).

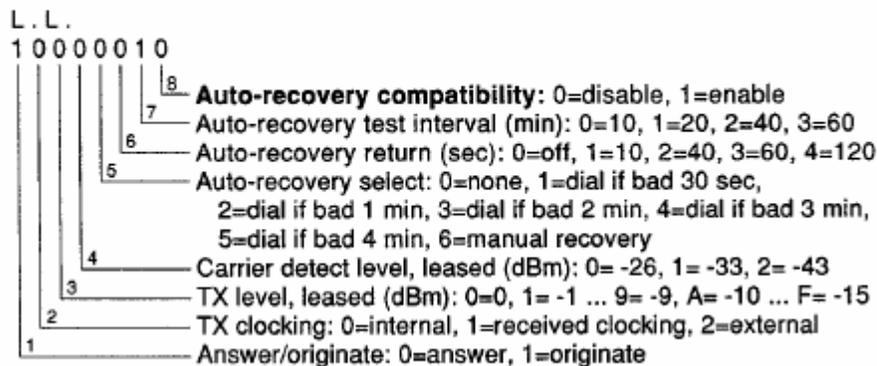
EIA INTERFACE OPTIONS:



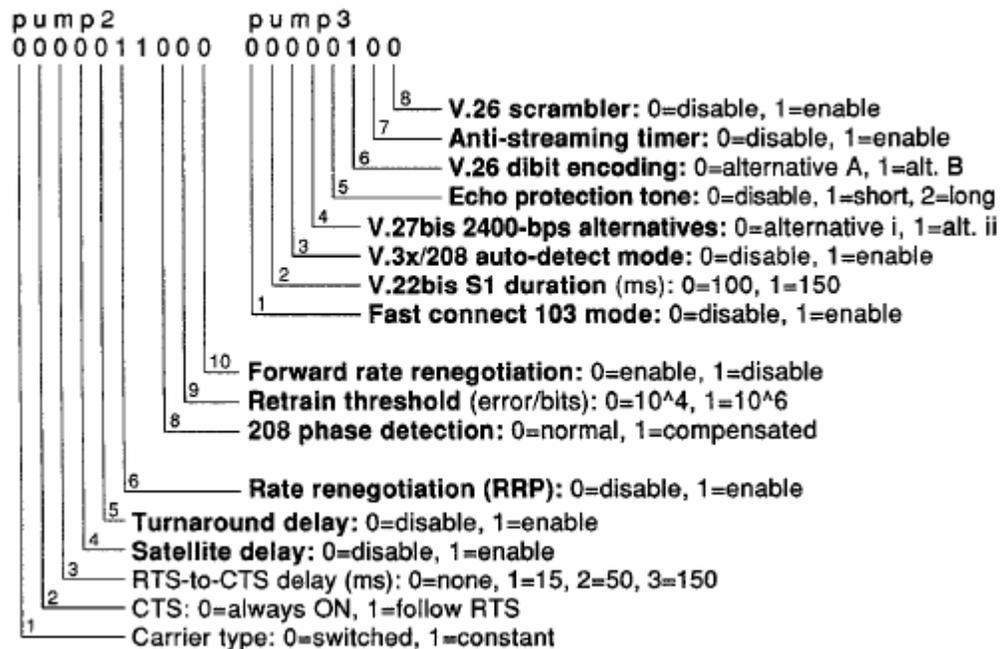
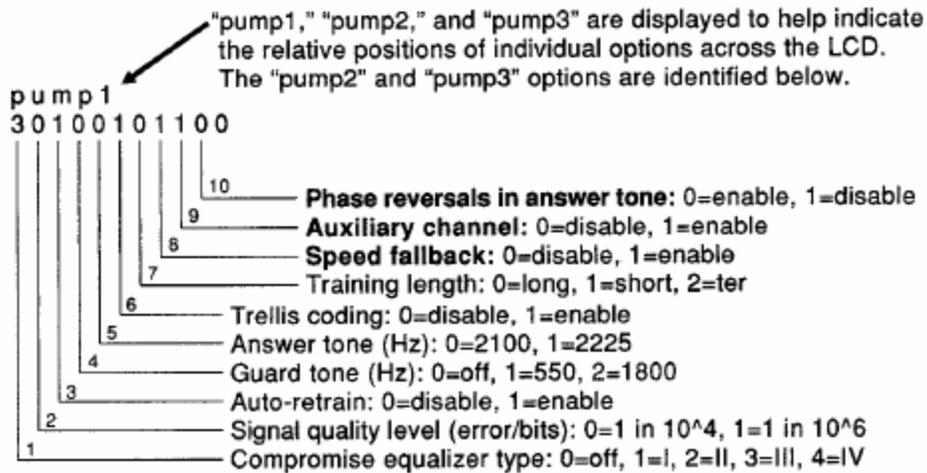
V.42 ERROR CORRECTION OPTIONS:



LEASED LINE OPTIONS:



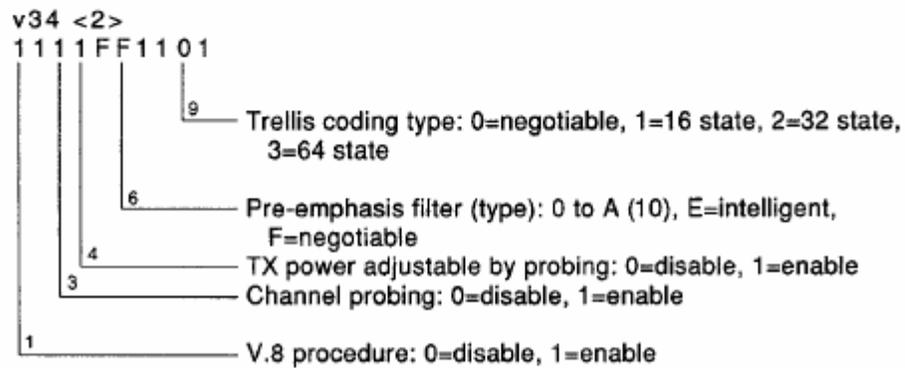
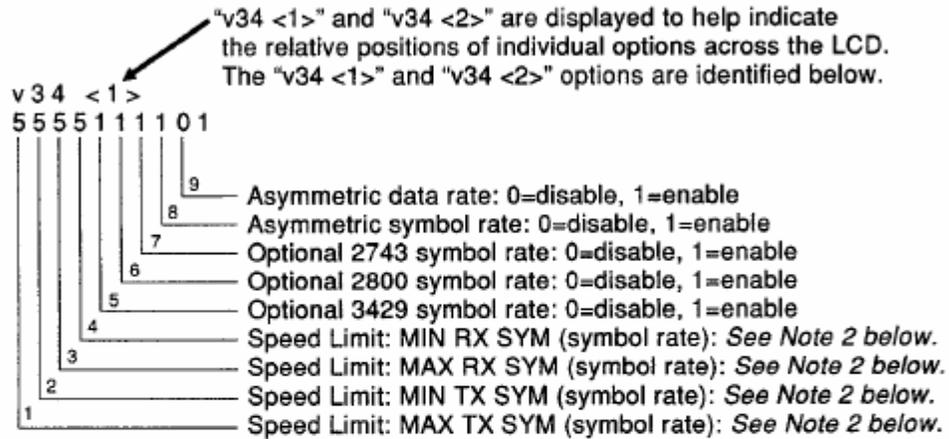
DATA PUMP OPTIONS:



NOTE: ALX V.32, V.32/14.4, V.32/19.2 and V.34 only: Default auxiliary channel setting: 1.

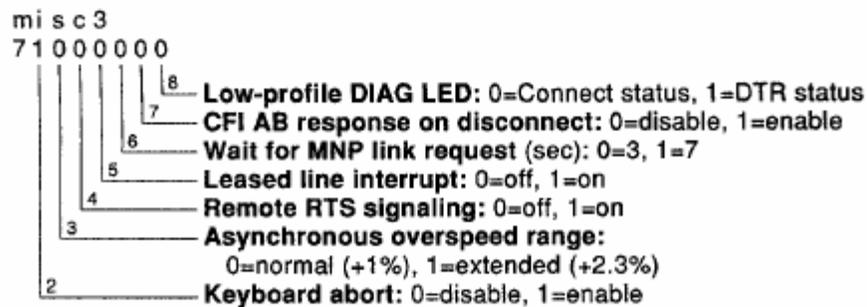
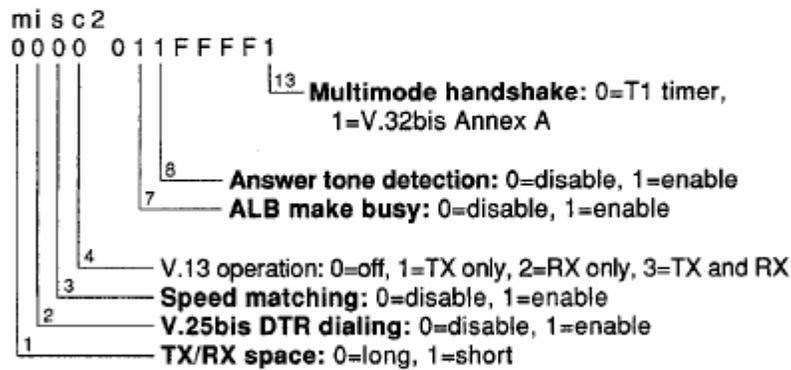
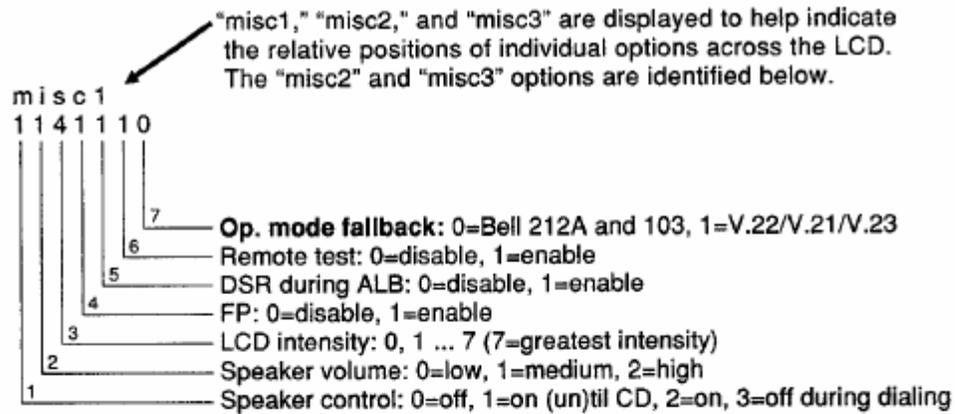
V.34-RELATED OPTIONS:

These options are available on the ALX V.34 and V.34M only.



Note 2: Settings for Speed Limit screens are (in sym/s):
 0=2400, 1=2743, 2=2800, 3=3000, 4=3200, 5=3429.
 Speed Limit: Data rates: See *PRIMARY OPTIONS*.

MISCELLANEOUS OPTIONS:



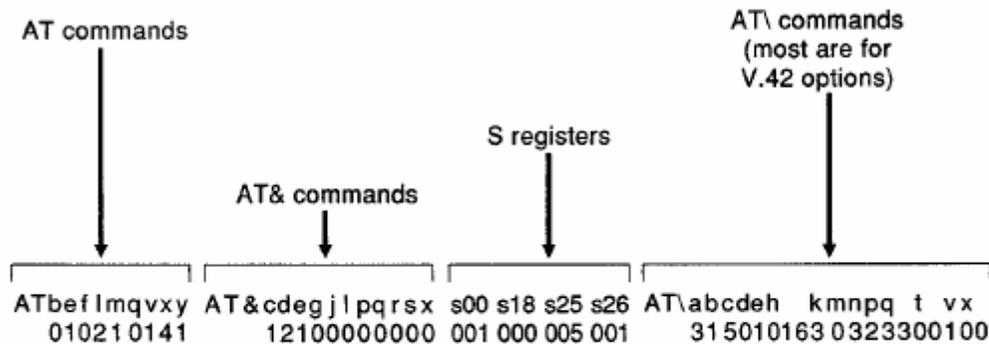
AT PROFILES SCREEN

For Hayes mode operation (only), choose AT from the SUMMARY menu to modify Hayes mode user profiles (0 or 1).

The ALX will display the AT PROFILES screen, which allows you to select user profile 0 (pushbutton 1) or 1 (pushbutton 2) for viewing or modification. The selected profile is used as the active configuration and is also designated as the default user profile. Use pushbutton 3 to change the default configuration profile: Press pushbutton 3 to toggle (switch) between profile 0 or profile 1 as the default – the effect is the same as issuing the **&Y** command (**&Y0** or **&Y1**).

When the configuration screen for profile 0 or profile 1 is displayed (as illustrated below) use the front panel pushbuttons as explained in the previous section, Summary Setup Pushbutton Functions, to scroll through and modify the user profile.

HAYES MODE OPTIONS—FOR EACH AT PROFILE:



Refer to table 4-1 for explanation of the commands represented in this diagram.

Both L0 and L1 = low speaker volume.
If L1 is selected, this display will show L0 if you exit the SETUP menu and then return to this display.

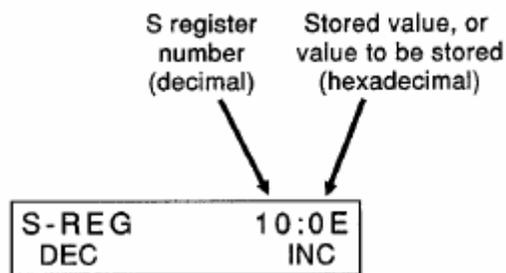
S-REG SCREEN

The S-REG screen may be used to read or change the value stored in an S register. (See Chapter 4 for a complete explanation of S registers.)

Not all S registers are intended for user access. Do not change the value of an S register if you do not know the register's function. Doing so is likely to adversely affect the modem configuration.

How to Change S Register Values

The S-REG screen displays an S register number and the value currently stored in the displayed S register:



Select the desired S register number, then modify its value, as follows: Use the arrow pushbuttons to move the LCD cursor from one digit to the next. Then select DEC or INC to decrease or increase the selected (blinking) value until the desired value is displayed.

S registers can also be changed by using the Hayes mode S command, as explained in Chapter 4.

APPENDIX D – CONNECTORS, ADAPTERS, and JUMPERS

This appendix provides a detailed description of all modem connectors, including pin assignments. It also includes a description of the modem jumper functions and a diagram that shows you where to find the jumpers.

CONNECTORS and ADAPTERS

The ALX includes the following connectors (labeled on the rear panel as indicated below):

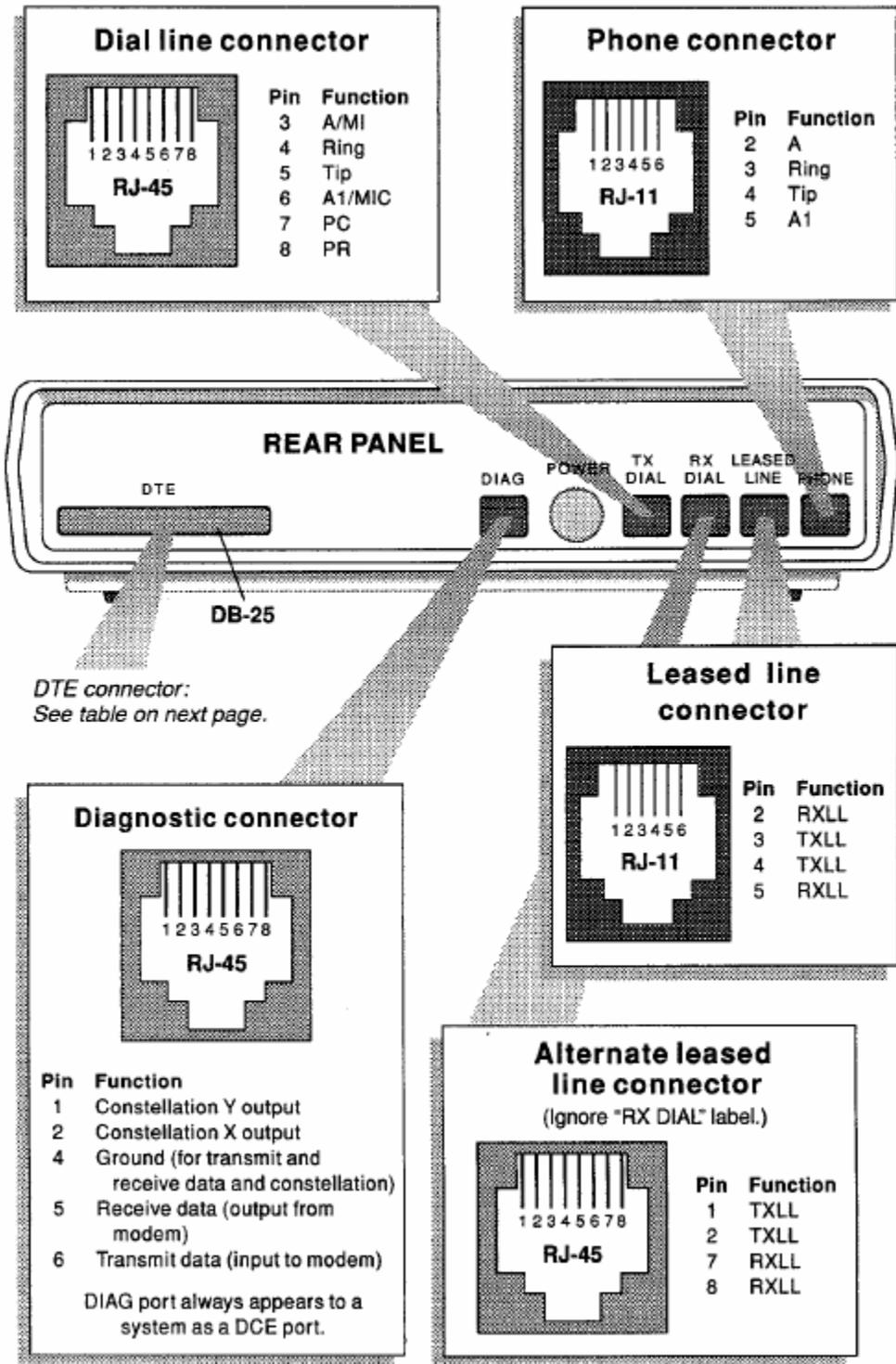
- DTE – 25-pin (DB-25) RS-232C/D female cable connector, for connection to DTE (computer or terminal)
- DIAG – RJ-45 modular jack (diagnostic connector), for diagnostic port control (optional)
- POWER – Five-pin DIN connector for AC power
- TX DIAL – RJ-45 modular jack for connection to a dial line
- RX DIAL – (Ignore “RX DIAL” label.) RJ-45 modular jack for alternate leased line connection (when an 8-pin connector is required)
- LEASED LINE – RJ-11 modular jack, for (6-pin) leased line connection
- PHONE – RJ-11 modular jack, for connection to a telephone handset (optional)

These connectors are illustrated in Chapter 1, which explains how to install the ALX and how to make the connections referred to above.

All ALX models include an edge connector for optional rack mounting. When the ALX is rack mounted, the edge connector performs the functions of all the connectors listed above (and the other connectors are not used).

Connector Pin Assignments

For users who need to know connector pin assignments, this information is provided in Figure D-1 (DIAG, TX DIAL, RX DIAL, LEASED LINE and PHONE connectors) and in Table D-1 (DTE interface connector).



*All connectors are shown as viewed from rear of modem.
Pins not included in the listings above are not used.*

Figure D-1. Connector pin assignments

Table D-1. Pin Assignments - DB-25 TIA/EIA Interface Connector

Pin	Function	Designation			Source
		EIA	ITU-T	LCD	
1	Frame ground – not connected	AA	101		
2	Transmit (send) data (TD)	BA	103	TD	DTE
3	Received data (RD)	BB	104	RD	Modem
4	Request to send (RTS)	CA	105	RS	DTE
5	Clear to send (CTS)	CB	106	CS	Modem
6	Data set (modem) ready (DSR)	CC	107	MR	Modem
7	Signal ground (SG)	AB	102		Ground
8	Carrier detect (CD)	CF	109	CD	Modem
9	Testing voltage, +10V	+P			Modem
10	Testing voltage, -10V	-P			Modem
15	Transmit clock (TC)	DB	114		Modem
17	Receive clock (RC)	DD	115		Modem
18	Analog loopback (ALB) control ¹	CN			DTE
20	Data terminal ready (DTR)	CD	108/2	TR	DTE
21	Remote digital loopback (RDL) control ¹	CN			DTE
22	Ring indicator (RI)	CE	125	R	Modem
24	External transmit clock (XTC)	DA	113		DTE
25	Test mode indicator (TM) ²	CN		TM	Modem

¹ + voltage activates indicated loopback test (but only if ALB-DTE Ctrl'ed or RDL-DTE Ctrl'ed option is enabled); - voltage disables test.

² Alternately, pin 25 may be used for analog loopback (ALB) control. See *Jumpers* section in this Appendix.

RJ-45 to DB-25 Cable Adapters

Three types of cable adapters are available to convert the RJ-45 pinout to a DB-25 pinout if necessary. These adapters are illustrated in Figure D-2.

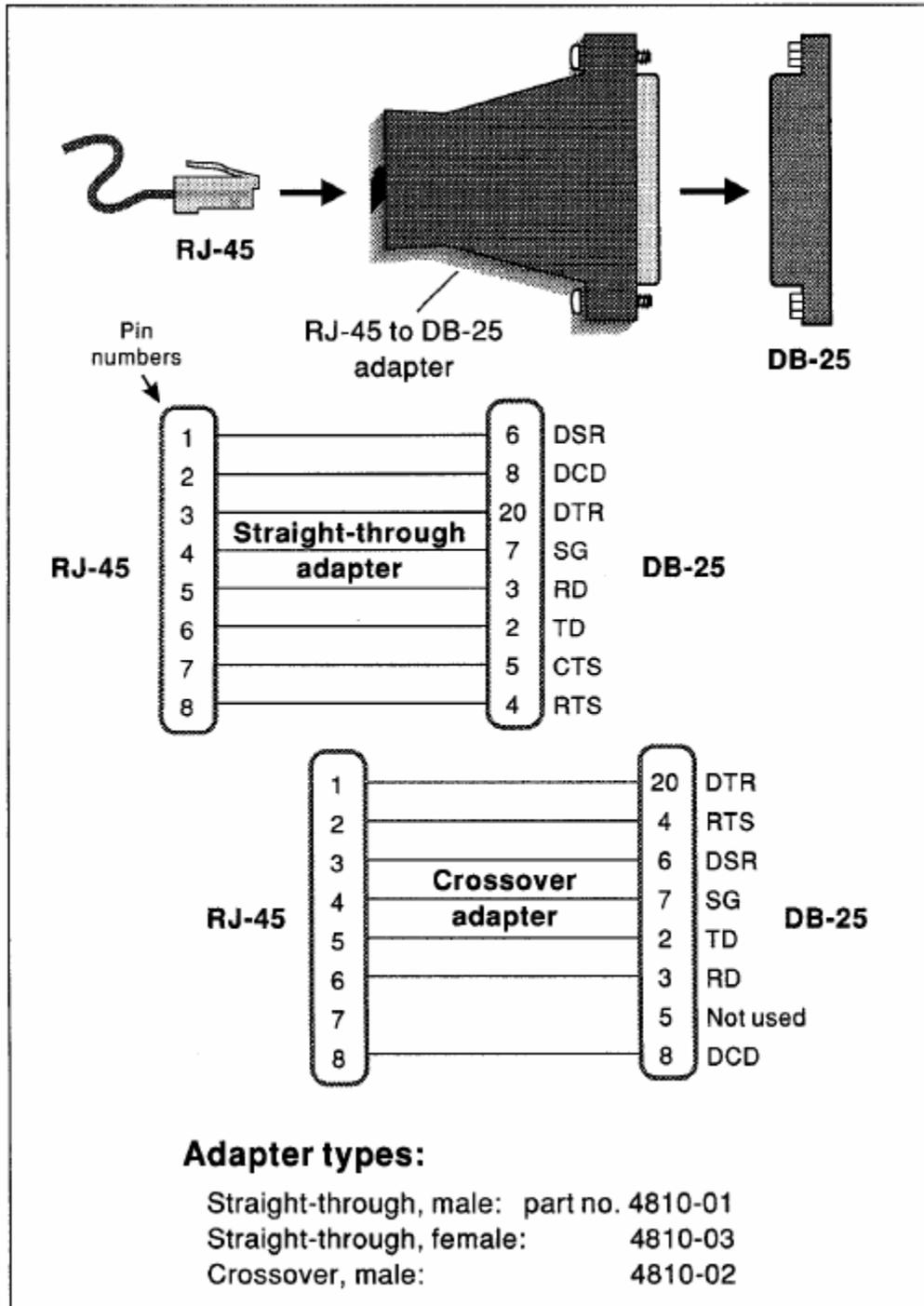


Figure D-2. RJ-45 to DB-25 adapter types

JUMPERS

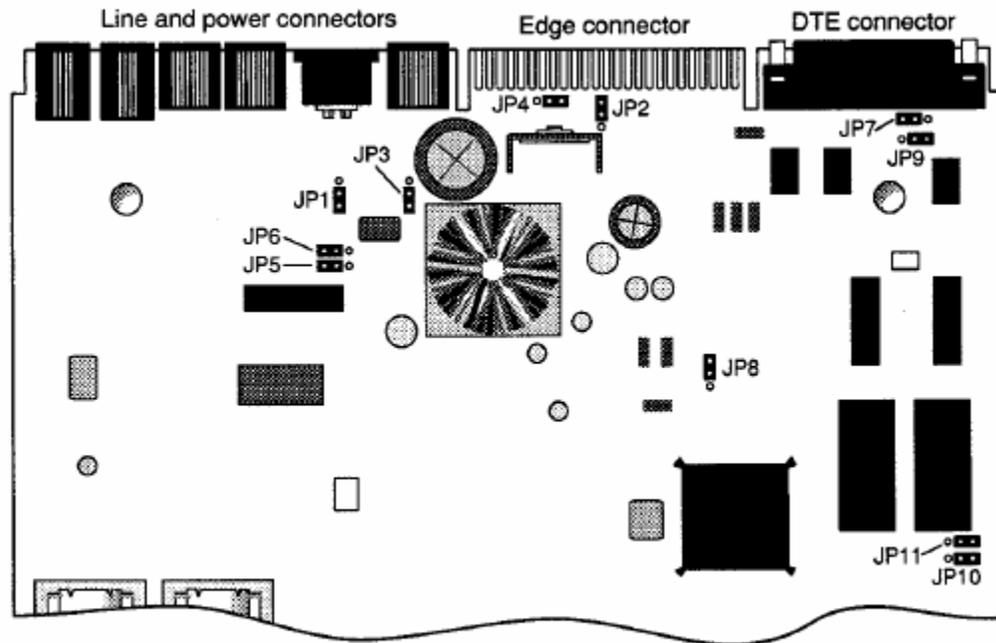
WARNING: Jumpers should be switched only by qualified service personnel.

For most applications, there is no need to reset the modem's internal jumper switches. However, a jumper switch will have to be reset if you need to –

- Connect frame ground to signal ground,
- Switch from A/A1 control to MI/MIC control,
- Strap the modem for use in a DC rack enclosure, or
- Change the function of TIA/EIA interface pin 25.

If you need to reset a jumper switch, refer to the following page to determine the jumper that should be switched, where it is located, and how it should be set. The jumpers are numbered on the circuit board; for example, JP2 is jumper 2. To access the jumpers, unscrew the four screws on the bottom of the modem and carefully lift off the cover.

WARNING: Improper setting of AC and DC power jumpers could result in serious damage to the modem.



TOP VIEW (Only some of the main components are shown for orientation.)

Figure D-3. Partial view of modem circuit board, showing jumper locations

Table D-2. ALX Modem Jumper Settings

Jumper(s)	Pins 1 and 2 connected:	Pins 2 and 3 connected:
JP1	Frame and signal ground connected	Frame and signal ground not connected
JP2, JP3, JP4 (Set to same position.)	AC power	DC power (for Telco 48 VDC battery)
JP5, JP6 (Set to same position.)	A/A1 control	MI/MIC control
JP7	Pin 25 used for analog loopback (input)	Pin 25 used as test mode indicator (output)
JP8, JP9, JP10, JP11	<i>Reserved. Do not change these jumpers.</i>	
<p>Factory settings are shown in bold face. For each jumper, pin 1 is identified by a "1" on the modem circuit board.</p>		

APPENDIX E – LOW-PROFILE RACK-MOUNT MODEM

DESCRIPTION

Low-profile rack-mount versions are available for all Alliance Series models. *This appendix applies only to the low-profile rack-mount versions. (Operating information for **full-size** rack-mount Alliance Series modems is the same as for their stand-alone counterparts; i.e., as detailed in the main body of this manual.)*

The modified front panel of the low-profile rack-mount modem (Figure E-1) allows 16 low-profile modems to be housed in a single high-density rack enclosure. (Stand-alone versions of the Alliance Series modems can be used in a rack enclosure, with the outer shell removed, but the low-profile design allows more modems to be used in a single rack.)

The software and virtually all of the circuitry in the low-profile units are identical to the software and circuitry in their stand-alone counterparts, which are described in the main body of this instruction manual. Except for the absence of the plastic outer shell and interface connectors, the only difference between the low-profile units and the stand-alone units are in the front panel design:

- The low-profile front panel does not have a liquid crystal display (LCD) or control pushbuttons.
- The low-profile front panel includes three status indicators (light-emitting diodes, or LEDs).
- The low-profile front panel is half as high (1 inch) as the front panel of its stand-alone counterpart. (When the modem is in the vertical rack-mount position, the front panel width is 1 inch, as shown in Figure E-1).

The low-profile modem functions exactly the same as its stand-alone counterpart, except that different methods of control have to be used for configuration and testing, since there is no LCD or pushbuttons. *Therefore, this instruction manual applies to the low-profile modem except for information pertaining to the LCD and control pushbuttons.*

INSTALLATION

To install the low-profile ALX modem, follow the installation instructions in the rack enclosure manual.

IMPORTANT: The factory default address is 999,999. **The address must be changed to a unique address** (with respect to the system the modem is a part of) so the unit can be individually addressed. To change the address, use the commands listed in Table 3-2 to access the modem's ADDRESS feature.

STATUS INDICATORS

The front panel of the low-profile modem includes three light-emitting diodes (LEDs) that indicate the operational status of the modem:

- **DIAG (diagnostic port)** – The DIAG indicator is on when the modem's diagnostic port is actively connected. For example, the DIAG indicator will be on when the modem is being polled for diagnostic information through the diagnostic port. (This indicator can be configured to instead show DTR status; see Low-Profile DIAG LED Function in Chapter 2.)
- **ON LINE** – The ON LINE indicator is on when the modem is actively connected to either a dial line or a leased line and is trained (not idle). The ON LINE LED will flash on and off when the modem receives a ring signal or when a dial backup occurs.
- **POWER** – The POWER LED indicates whether or not power is being supplied to the unit. It is on when the modem is receiving power.

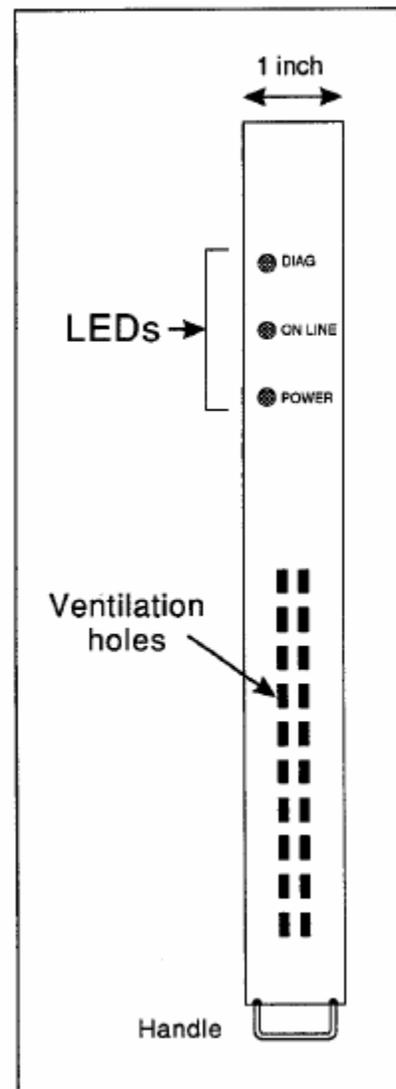


Figure E-1. Low-profile modem – front panel

HOW TO CONTROL the LOW-PROFILE MODEM

As previously stated, the low-profile ALX modem does not have an LCD or control pushbuttons. Therefore it cannot be controlled in the same way as a stand-alone ALX modem.

There are three ways to control the low-profile ALX modem. **All three methods require an intelligent rack controller**, a unit which is connected directly to the rack enclosure. The three control methods are –

- The ALX modem (including the low-profile version) supports special commands that make it possible to control the modem from a dumb terminal or computer (DTE). These commands are described in Chapter 3. See the section titled *Diagnostic Port Control*.
- An alternate method for controlling low-profile ALX modems in a rack enclosure is to control them from an ALX V.32M, ALX V.32/14.4M, ALX V.32/19.2M or V.34M modem equipped with a front panel LCD and pushbuttons mounted in the same rack. This method of control is also described in Chapter 3. See the section titled *Remote Control through a Rack Controller*.
- Low-profile modems in a rack can also be controlled from a computer running network management software. The required software is available from Raymar-Telenetics.

APPENDIX F – REGULATORY NOTICES

USE in the UNITED STATES

WARNING: This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15, Subpart J, of the Federal Communications Commission (FCC) rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

The FCC has established rules which permit this device to be directly connected to the telephone network. Standardized jacks are used for these connections. This equipment should not be used on party lines or lines that require coin payment.

Change or modifications to this device not expressly approved by the manufacturer could void the user's authority to operate it.

If this device is malfunctioning, it may also be causing harm to the telephone network, and should be disconnected until the source of the problem has been determined. If this is not done, the telephone company may temporarily disconnect service.

The telephone company may make changes in its technical operations and procedures; if such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes. You will be advised of your right to file a complaint with the FCC.

If the telephone company requests information on what equipment is connected to its lines, inform the telephone company of –

- a. The telephone number this unit is connected to
- b. The ringer equivalence number (REN)
- c. The USOC jacks required are RJ-11C and RJ-45S; the Facility Interface Code is 02LS2; and the Service Order Code is 9.0Y.
- d. The FCC registration number

The REN, USOC jack types and FCC registration number are indicated on the product label.

The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

In the event of equipment malfunction, all repairs should be performed by Raymar-Telenetics. It is the responsibility of users requiring service to report the need for service to Raymar-Telenetics. Service may be obtained at the address and telephone number listed on the title page of this manual.

Interference Information

If you suspect the ALX is causing interference in nearby radio or television reception (which can be determined by turning the unit off and on), attempt to correct the problem with one or more of the following measures:

- Re-orient the receiving antenna.
- Relocate this device away from the radio or television receiver.
- Plug this device into a different power outlet so that it and the receiver are on different AC branch circuits.

If necessary, consult an experienced radio/television technician for additional suggestions.

USE in CANADA

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications (DOC).

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numérique de la Class A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

The Canadian DOC label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The DOC does not guarantee the equipment will operate to the user's satisfaction. The **DOC approval number** for this unit is 565 6502 AB.

Before installing this equipment, users should ensure that it is permissible for connection to the facilities of the local telecommunications company. The equipment must be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure, for their protection, that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority or electrician, as appropriate.

The load number (LN) assigned to each terminal device denotes the percentage of the total load that can be connected to a telephone loop which is used by the device, in order to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the load numbers of all the devices does not exceed 100. An alphabetic suffix may be used to specify the ringing type (A or B), if applicable. The **load number** for the Alliance Series modem is 6.

Raymar Information Technology, Inc. Limited Warranty

One Year Limited Hardware Warranty

Raymar Information Technology, Inc., dba Raymar-Telenetics, warrants their products against defects in hardware, material and workmanship under normal use for one (1) year from the date of purchase. Raymar will, at no charge, either repair the product (with new or reconditioned parts), or replace it (with a new or reconditioned product). Repaired replacement products are warranted for either 90 days or the remainder of the original warranty period, whichever is longer. This warranty extends to the original end-user only.

What This Warranty Does Not Cover

This warranty does not cover: (a) software; (b) installation or service of the product; (c) conditions resulting from consumer damage such as improper maintenance or misuse, abuse, accident or alteration; (d) all plastic surfaces (including display screens) and all other exposed parts that are scratched or damaged due to normal use; (e) operation of our products with equipment not supplied by Raymar (f) products which have had the serial number removed or made illegible; or (g) products rented to others. This warranty applies only to hardware products manufactured by or for Raymar Information Technology, Inc. and identified by the Raymar-Telenetics trademark, trade name or product identification logo affixed to them. Refer to the Service and Support section of the User's Guide for service after the warranty expires. No warranty is made as to coverage availability or grade of service provided by the carrier.

General Provisions

This warranty sets forth Raymar's entire hardware responsibilities regarding this product. Repair, replacement or refund of the purchase price is at Raymar's discretion. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES, IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. IN NO EVENT SHALL RAYMAR BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS, OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS RAYMAR PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW. WITHOUT LIMITING THE FOREGOING, RAYMAR SHALL HAVE NO LIABILITY FOR ANY DATA STORED IN OR USED WITH THE PRODUCT, INCLUDING THE RECOVERY COSTS OF SUCH DATA OR PROGRAMS.

State Law Rights

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS. THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. This warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

Provincial Law Rights

SOME PROVINCIAL LAWS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF IMPLIED WARRANTIES, THE EXCLUSION OR LIMITATION OF WARRANTY COVERAGE IN CERTAIN SITUATIONS. SOME OF THE ABOVE LIMITATIONS OR EXCLUSIONS CONTAINED IN THIS LIMITED WARRANTY MAY NOT APPLY TO YOU. This warranty gives you specific rights, and you may have other rights which vary from province to province.

How To Use Raymar's Limited Warranty Service

To take advantage of this warranty, you must do the following:

- If you are having trouble with your product, contact Raymar service using the appropriate number from the Service and Support section of the User's Guide. If it is determined that your product requires service, you will be issued a Return Materials Authorization (RMA) form.
- Pack the defective product securely for shipping. Include only the units pre-approved by service on your RMA form.
- This warranty is void if the product is damaged in transit, you must insure your shipment.
- Ship the defective product, proof of date of purchase, and the RMA form to the address specified.
- Display your RMA number prominently on the outside of the shipping box. Customer is responsible for freight in, door to door. Raymar is responsible for return shipping costs.
- To ensure prompt service, please write on the RMA form a brief description of the problem you are experiencing with the product.

Raymar Information Technology, Inc.
7325 Roseville Road
Sacramento, CA 95842
Service Hotline (800) 747-1522
<http://support.telenetics.com> or e-mail to techsupport@raymarinc.com

Raymar Information Technology, Inc. Return Merchandise Authorization (RMA) Procedure

Before returning any Raymar-Telenetics product, an RMA number must be obtained.

The most convenient way to obtain an RMA number for a product purchased from Raymar-Telenetics is to call **1-800-747-1522 (+1-916-783-1951)**. When doing so, please have the following information ready:

- Company name
- Full billing address, as well as the address for the location where the product should be returned once repaired or replaced
- Telephone & Fax numbers
- Email address
- Product model number and serial number

For each item being returned, please include the product model number, the serial number, a description of the problem being encountered, and the cause of the problem (if known).

Please note that prior to authorizing a return, a product support specialist may call to verify that the product is properly installed or may ask you to perform tests to insure that the product has actually failed.

The product must be properly packed and returned to:

**Raymar-Telenetics
7325 Roseville Road
Sacramento, CA 95842**

The RMA number must be legibly displayed on the shipping carton. Raymar-Telenetics will not be responsible for any product returned without an RMA number.

If the product is out of warranty, estimates for repair rates and any applicable shipping costs will be communicated by a customer service representative. Currently, Raymar-Telenetics accepts purchase orders or credit cards as payment methods.

Repairs currently require 5 – 10 business days and are returned via UPS Ground.