WY-35/ES Programmer's Guide

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Preface

ABOUT THIS GUIDE

This guide provides the information you need to take advantage of the terminal's programmable features in your computer programs. These features include

- Compatibility with the WY-30 terminal
- TeleVideo 910+, TeleVideo 925, ADDS Viewpoint A2, Wyse 35, and TeleVideo 905 personalities (compatible modes)
- 41 fully programmable keys and key combinations
- Editing functions programmed into the numeric keypad
- 16 special graphics characters for creating line drawings and diagrams
- Split screen capability

ORGANIZATION AND CONTENT

This guide supplements the *User's Guide*, which tells you how to install and set up the terminal. It provides the following information:

- Chapter 1, "Programming the Terminal," introduces the terminal features and explains how to enter control codes and escape sequences
- Chapter 2, "Communicating with the Computer," describes the commands that control how the terminal communicates with the computer
- Chapter 3, "Controlling the Keyboard," describes commands that control keyboard functions
- Chapter 4, "Controlling the Screen Display," describes commands that control the screen display
- Appendix A, "Escape Sequences," lists the escape sequences supported by the terminal in the native personality mode
- Appendix B, "Control Codes," lists the control codes supported by the terminal in the native personality mode

- Appendix C, "Command Summary," summarizes the commands supported by the terminal in each terminal personality
- Appendix D, "Character Sets," shows the ASCII character set
- Appendix E, "ASCII Code Conversion," provides an ASCII code-conversion table
- Appendix F, "Terminal Status Messages," lists the status messages that can appear on the terminal

An index is included.

SYNTAX NOTATION

In this guide, escape sequences are shown with a space between each character, for example,

ESC ` A

This is done only to make the command easier to read. Do not enter the spaces. For this example, you would enter

ESC`A

ESC (1B in hexadecimal) is immediately followed by the grave accent character ` (60 in hexadecimal) and the uppercase **A** (41 in hexadecimal).

When a space character is part of a command sequence, it's explicitly specified, for example

ESC SPACE

When you enter escape sequences, you must enter uppercase or lowercase characters as shown (uppercase A or lowercase a for example). Also, be sure to distinguish between the characters 1 and l (numeral one and lowercase L), the characters 0 and O (numeral zero and uppercase O), and the characters ' and ` (apostrophe and grave accent).

Variables within an escape sequence are shown in italics. For example, the format for the **ESC G** command sequence is

ESC G *attr*

where

attr represents a character display attribute such as dim or underline.

Hexadecimal values are indicated by the letter H. For example, 63H is 63 hexadecimal (0110 0011 binary).

NOTATION CONVENTIONS

The following notation conventions are used in this guide.

Notation Conventions

Typeface or Symbol	Description	Example
Initial caps	Menu names	Action menu
Italics	Variables	The cursor is on line *lll*, column *ccc*.
`Courier`	Screen display	`Save to Memory`
`Courier bold`	User input and selections in text	Select **`Screen Alignment`** to adjust screen display.
Swiss bold	User input including escape sequences	Enter or send **ESC U** to turn monitor mode on.
[Keyname]	A key on the keyboard	Press [Enter].

1 Programming the Terminal

You can control the terminal with ASCII control codes and escape sequences. This chapter provides a brief overview of using these command sequences to program the terminal.

SETUP PARAMETERS

When you turn on power or perform a hard reset by pressing Ctrl Shift SetUp, the terminal is automatically configured to the setup parameters stored in battery-backed memory.

Refer to Chapter 2 of the *User's Guide* for a complete listing of the setup parameters, and for instructions on how you can change the parameters to select new operating defaults for the terminal.

PROGRAMMING LANGUAGES

Your programming language determines how ASCII control codes and escape sequences are sent to the terminal. Refer to your programming language documentation for information on incorporating terminal command sequences into your programs.

☐ **Note** The command sequences and definitions in Chapters 1 through 4 apply to the terminal's native personality only. Table C-1 lists commands supported by other terminal personalities.

SCREEN AREAS

The screen has three main areas (Figure 1-1): the status line, the 24-line data area, and the label line.

- The status line displays terminal status messages on the left and computer messages on the right.
- The data area can display data in one large format (24 lines by 80 columns) or in two areas of a horizontally split screen (Figure 1-2). Each data area on a split screen is called a data segment.
- The label line displays setup parameter fields in the setup mode. You can also program this line to display function key labels or messages in the normal operating mode.

Figure 1-1 Screen Areas

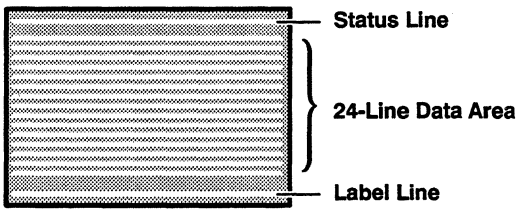
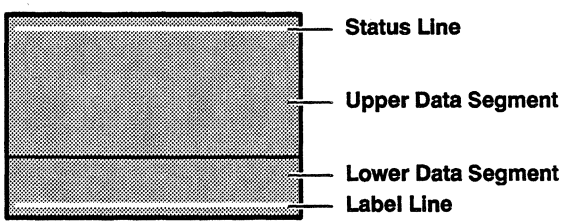


Figure 1-2 Split Screen



ASCII CONTROL CODES

Control codes are single-byte codes received from the computer or generated at the keyboard by pressing Ctrl and an alphanumeric key simultaneously. Some special keys also generate control codes. The control codes recognized by the terminal are listed in Table B-1.

Control codes from the keyboard are executed locally when the terminal is in any communications mode except full-duplex (FDX). In full-duplex mode, the terminal sends keyboard control codes to the computer; it doesn't act on them locally unless the computer echoes them back.

Unless the terminal is in monitor mode (refer to "Monitor Mode" in Chapter 3), control codes are not displayed but are interpreted by the terminal as actions to be performed. For example, the CR control character causes the terminal to execute a carriage return. In monitor mode, the terminal displays symbolic representations of the control codes but does not execute them (see Table B-1).

ESCAPE SEQUENCES

Escape sequences are command sequences that begin with the ASCII ESC character. When the terminal receives an escape code, it initiates an action. Often a multiple code sequence follows the escape code to specify a number of variables for a particular feature.

Depending on the current communication mode of the terminal, escape sequences from the keyboard are executed locally, sent to the computer, or both.

The terminal always executes escape sequences received from the computer unless the terminal is in monitor mode or setup mode. In monitor mode, the terminal displays symbolic representations of received codes without acting on them. In setup mode, the terminal ignores all received codes.

To send an escape sequence from the computer, send 27 (decimal) or lB (hexadecimal) followed by the sequence. To generate an escape sequence from the keyboard, press [Esc] (or [Ctrl][[ ) followed by the sequence.

Some escape sequences change the terminal's operating parameters. These changes remain in effect only until the terminal is reset or turned off unless you save them in battery-backed memory.

To save the changes as new setup parameters,

10 Press [Shift] [SetUp] to display the setup screen.

11 Press [Spacebar] to change the `Save?` parameter to `Yes`.

12 Press [F1] to exit the setup screen and save the changes to battery-backed memory.

Table A-1 lists, in ASCII order, the escape sequences recognized by the terminal in native personality.

Table C-1 lists the escape sequences and control codes under functional categories and includes the commands recognized by other personalities.

2 Communicating with the Computer

This chapter describes the commands that control how the terminal communicates with the computer. It includes information on commands that set the communication mode, handshaking protocol and personality, as well as commands that send data to the MODEM and AUX ports.

COMMUNICATION MODES

The terminal can operate in any of four communication modes,

- Full duplex (FDX)
- Half duplex (HDX)
- Block (BLK)
- Half-duplex block (HBLK)

☐ **Note** A fifth mode, Local (LCL), is available but can only be selected from the setup-mode Kpd4 Comm menu.

The term *conversational mode* is often used generically to refer to the FDX and HDX modes. The term *block mode* is used similarly to refer to the BLK and HBLK modes.

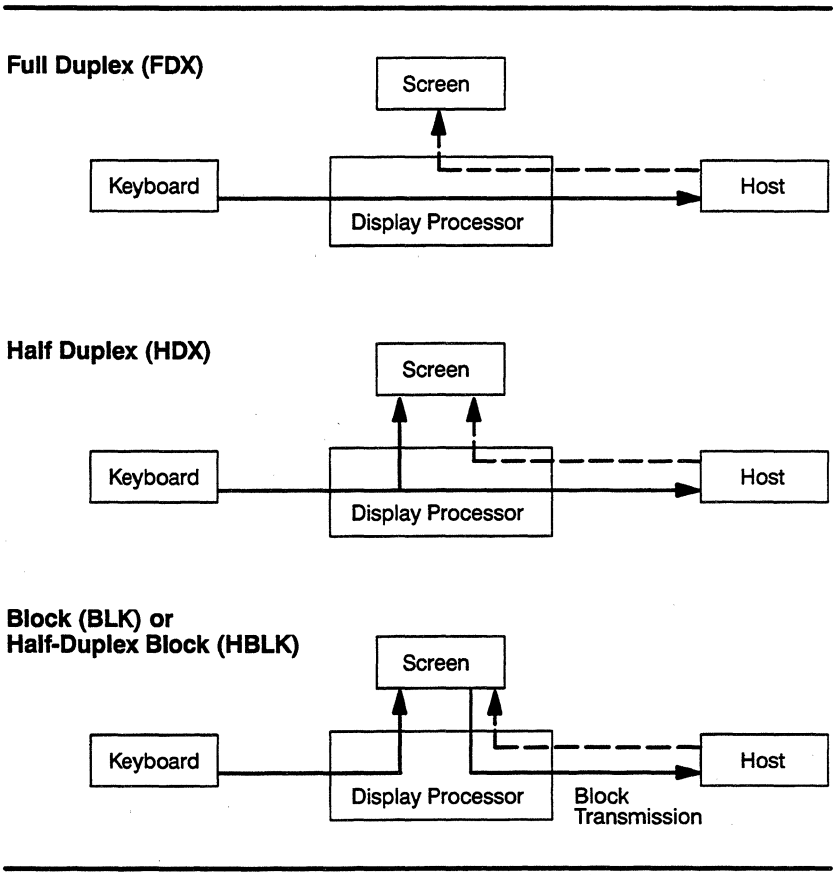
The communication modes control how the terminal handles data and interacts with the computer. Data entered from the keyboard can be sent to the computer, to the terminal and the computer, or to the terminal only (see Figure 2-1).

You select a communication mode by

- Sending one of the escape sequences described in the following sections to the terminal
- Changing the `Comm` parameter (setup-mode Kpd4 Comm menu)

Pressing Ctrl Back Space toggles between the equivalent block and conversational modes, that is, between FDX and BLK or HDX and HBLK.

Figure 2-1 Communication Modes



Assigning the Host Port

Assign MODEM port as host port (default) **ESC e 8**
Assign AUX port as host port **ESC e 9**

These commands determine whether the MODEM port or the AUX port is configured as the host port.

Full-Duplex Mode

Turn on full-duplex (FDX) mode **ESC C ESC D F**

This sequence has two parts. **ESC C** selects the conversational mode and **ESC D F** selects full-duplex communications.

In full-duplex mode,

- The terminal operates as a completely conversational device that can send and receive data simultaneously
- Keyboard data and command sequences are sent to the computer only; they are not displayed or acted on by the terminal unless echoed back by the computer
- The Request-to-Send (RTS) signal line (pin 4 on the MODEM port connector) is always high (ready)
- The message FDX appears on the status line

Half-Duplex Mode

Turn on half-duplex (HDX) mode **ESC C ESC D H**

This sequence has two parts. **ESC C** selects the conversational mode and **ESC D H** selects half-duplex communications.

In half-duplex mode,

- Keyboard data and command sequences are simultaneously sent to the computer and displayed or acted on by the terminal
- The RTS signal line (pin 4 on the MODEM port connector) goes high (ready) with each character
- The message HDX appears on the status line

Block Mode

Turn on block (BLK) mode **ESC D F ESC B**

This sequence has two parts. **ESC D F** selects full-duplex communications and **ESC B** selects the block mode.

Block mode lets the user enter and edit data as though the terminal were a buffered, off-line device. In block mode,

- Keyboard data is displayed on the screen and stored in the terminal's display memory until sent to the computer as a block (see "Sending Data in Block Mode").
- Computer overhead and communication line (e.g., phone line) hookup time is reduced.
- Block transmissions are governed by the following rules:
  - Null characters are not transmitted.
  - Display attributes are sent as space characters.
  - If protect mode is on, graphics characters are sent as spaces.
- The RTS signal line (pin 4 on the MODEM port connector) is always high (ready).
- The message BLK appears on the status line.
- Keyboard command sequences are acted on locally by the terminal. The only key codes transmitted directly to the computer are those generated by
  - [Break]
  - [Funct]
  - any of the function keys [F1] through [F8] that have the `Direction?` parameter (setup-mode Kpd9 Fkeys menu) set to **`Remote`**

  Refer to "Key Codes" and "The Programmable Keys" in Chapter 3 of this guide for detailed information on key codes and and programmable keys.

  Refer to "Redefining the Keys" in Chapter 2 of the *User's Guide* for instructions on setting a key's `Direction?` parameter to `Remote, Local, or Normal.`

Half-Duplex Block Mode

Turn on half-duplex block (HBLK) mode **ESC D H ESC B**

This sequence has two parts. **ESC D H** selects half-duplex communications and **ESC B** selects the block mode.

Half-duplex block mode is the same as block mode except that the terminal requires an RTS/CTS handshake (pins 4 and 5 on the MODEM port connector) before sending data to the computer. In half-duplex block mode,

- The terminal sets the RTS line high when an escape sequence tells it to send data to the computer.
- After setting RTS high, the terminal checks the CTS line. If this line is high, the terminal sends the data immediately. If not, the terminal waits for the computer to set CTS high before sending the data.
- After sending the data, the terminal resets the RTS line low.

The message HBLK appears on the status line when the terminal is in the half-duplex block mode.

SELECTING A PERSONALITY

Select a terminal personality **ESC ~ *pers***

pers	**Personality**
"	Wyse 35
#	TVI 910+
$	TVI 925
%	ADDS A2
b	TVI 905

You can check the current selection by viewing the `Personality` parameter (setup-mode Kpd9 Genrl menu).

ENHANCE MODE

Turn on enhance mode **ESC ~ !**

Turn off enhance mode **ESC ~ SPACE**

In enhance mode, the terminal supports additional features in non-native personalities. Certain native personality commands are also recognized only when enhance mode is on. The command listings in Appendix A, "Escape Sequences," and Appendix C, "Command Summary," identify the commands that require enhance mode on.

EDITING MODES

Turn on local edit mode, duplex edit mode off **ESC k**

Turn on duplex edit mode, local edit mode off **ESC l**

Editing modes modify the way the terminal sends key codes from the editing keys to the computer. The terminal is always in either duplex edit mode (default) or local edit mode.

- In the duplex edit mode, key codes from the editing keys are processed according to the communications mode that the terminal is in.
  - When the terminal is in the full-duplex mode, key codes are sent only to the computer ; they are not acted on locally unless the computer echoes them back
  - When the terminal is in the half-duplex mode, key codes are both sent to the computer and acted on locally
- In local edit mode, key codes from the editing keys are not sent to the computer but are acted on only by the terminal.

When the `Keypad` parameter is set to **`Application`** (setup-mode Kpd 3 Keybd menu), the numeric keypad accounting keys ([0] through [9], [,], [-], [.], and [Enter])perform the editing functions shown on the legend above the keypad (unless the keys have been redefined). When the `Keypad` parameter is set to **`Numeric`**, (default) these keys perform the same editing functions when pressed with [Ctrl].

MODEM PORT HANDSHAKING PROTOCOL

The handshaking protocol for the MODEM port can be selected from the setup-mode Kpd4 Comm menu. The protocol chosen should ensure against loss of data by enabling data transfers only when the computer or terminal is ready to accept the data.

The choices for the receive mode are

- `Mdm Rcv Hsk=XON/XOFF, DTR, Both,` or `None` (default)
- `Mdm Rcv Hsk Level=64, 128,` or `192` (default)

The receive mode buffer in the terminal can hold a maximum of 256 characters (bytes). When receive handshaking is enabled, the handshake-level parameter specifies both high and low limits for the buffer (64/16, 128/32, and 192/64 characters). When the buffer fills to the high limit, the terminal signals that it cannot accept any more data. When the buffer empties to the low limit, the terminal signals that is ready to accept more data.

The choices for the transmit mode are

- `Mdm Xmt Hsk=XON/XOFF` or `None` (default)
- `Xmt Limit=35 cps, 60 cps, 150 cps,` or `None` (default)

The transmit limit parameter sets the maximum transmit baud rate of the terminal. Refer to the following sections for specific descriptions of the handshaking protocols.

☐ **Note** MODEM port connector pin assignments are shown in Appendix A of the *User's Guide*.

Modem XON/XOFF Receive Handshaking

To enable XON/XOFF receive handshaking, set the `Mdm Rcv Hsk` parameter (setup-mode Kpd4 Comm menu) to `XON/XOFF` or `Both`.

To disable XON/XOFF receive handshaking, set the `Mdm Rcv Hsk` parameter to `DTR` or `None`.

This function provides a software protocol to indicate terminal data-ready status.

- When the terminal is ready to accept data (receive buffer at low limit), it sends an XON character (DC1) to the computer.
- When the terminal cannot accept any more data (receive buffer at high limit), it sends an XOFF character (DC3) to the computer.

Modem Data Terminal Ready (DTR) Receive Handshaking

To enable DTR receive handshaking, set the `Mdm Rcv Hsk` parameter (setup-mode Kpd4 Comm menu) to `DTR` or `Both`.

To disable DTR receive handshaking, set `Mdm Rcv Hsk` parameter to `XON/XOFF` or `None`.

This function provides a hardware protocol to indicate terminal data-ready status. The DTR line (pin 20 on the MODEM port connector) goes low (−3 to −12 volts) for busy, and high (+3 to +12 volts) for ready.

- When the terminal is ready to accept data (receive buffer at low limit), it sets the DTR line high.
- When the terminal cannot accept any more data (receive buffer at high limit), it resets the DTR line low.

Modem Transmit Handshaking

To specify software and hardware handshaking, set the `Mdm Xmt Hsk` parameter (setup-mode Kpd4 Comm menu) to `XON/XOFF`.

To specify hardware handshaking only, set the `Mdm Xmt Hsk` parameter to `None`.

When `Mdm Xmt Hsk` is set to **`XON/XOFF`**, the terminal uses both software and hardware protocols to detect computer data-ready status.

- The computer informs the terminal that it is ready to receive data by setting the DSR line (pin 6 on the MODEM port connector) high and sending an XON character (DC1) to the terminal.
- The computer informs the terminal that it is not ready to receive data by setting the DSR line (pin 6 on the MODEM port connector) low, or by sending an XOFF character (DC3) to the terminal.

When `Mdm Xmt Hsk` is set to **`None`**, the terminal uses a hardware protocol only to detect computer data-ready status.

- The computer informs the terminal that it is ready to receive data by setting the DSR line (pin 6 on the MODEM port connector) high.
- The computer informs the terminal that it is not ready to receive data by setting the DSR line (pin 6 on the MODEM port connector) low.

AUX (PRINTER) PORT HANDSHAKING PROTOCOL

The AUX port handshaking protocols are similar to the MODEM port protocols described previously. The one exception is that receive handshaking uses the DSR line instead of the DTR line.

You can use the setup-mode Kpd4 Comm menu to specify transmit and receive handshaking protocols for the AUX port. The default values are `Aux Xmt Hsk=None` and `Aux Rcv Hsk=None`.

☐ **Note** AUX port connector pin assignments are given in Appendix B of the *User's Guide*.

SENDING DATA IN BLOCK MODE

In full-duplex or half-duplex mode, keyboard data is sent to the computer immediately. In either of the block modes, you must explicitly send data to the computer. The computer can request data by sending one of the escape sequences described in the following sections. The user can send all characters from home through the cursor by pressing [Send] or by entering the required escape sequence.

With escape sequences, you can send a character, line, screen of data, or block of data marked by STX (Start-of-Text) and ETX (End-of-Text) characters that you place at the start and end of the text. (See "Sending a Marked Block of Data" for information on using STX and ETX codes.)

The terminal automatically includes delimiters after each line or block of data. You specify which line/block delimiter pair is used (US/CR or CRLF/ETX) by setting the `Blk End` parameter (setup-mode Kpd6 Misc menu) to the desired value. The default value is `US/CR`.

☐ **Note** Many of the send commands affect protected and unprotected characters differently. To protect characters, see "Creating Protected Forms" in Chapter 4.

Sending One Character

Send one character **ESC M**

Sends the character at the cursor position (one byte) to the computer.

Sending a Line

Send line **ESC 6**

Sends all characters (including protected characters) to the computer, from the start of the line up to and including the character at the cursor location.

Send unprotected line **ESC 4**

Sends all unprotected characters to the computer, from the start of the line up to and including the cursor character.

Sending a Page

Send page **ESC 7**

Sends all characters (including protected characters) to the computer, from the home position up to and including the cursor character. If you've split the screen horizontally, only characters from the active data segment are sent. (To define a horizontally split screen, see "Split Screen" in Chapter 4.)

Send unprotected page **ESC 5**

Sends all unprotected characters to the computer, from the home position up to and including the cursor character. If you've split the screen horizontally, characters are sent only from the active data segment.

Sending a Marked Block of Data

To send a block of data,

1 Mark the beginning and end of the block with STX and ETX characters.

2 Send the block to the computer

Mark block beginning with STX character **ESC 8**

Mark block end with ETX character **ESC 9**

These sequences place a visible STX or ETX character at the cursor location.

☐ **Note** STX is the ASCII CTRL B character, while ETX is an ASCII CTRL C. Each occupies a character position.

Send a block **ESC s**

Send unprotected characters in block **ESC S**

These commands send data between the first STX character left of the cursor and the first ETX character. (The STX and ETX characters added with the **ESC 8** or **ESC 9** sequence are visible and are not sent; the ETX character that can be selected as the transmission terminator in setup mode is an invisible character, however, and is always sent if selected.

When both unprotected and protected characters are sent, protected fields are bracketed with the **ESC)** code (write-protect on) and the **ESC (** code (write-protect off).

When only unprotected characters are sent each protected field is replaced by the field separator code FS (CTRL \).

INTERRUPTING A TRANSMISSION

Pressing [Break] sends a break signal of 250 milliseconds to the computer. The break signal is repeated continuously as long as [Break] is held down.

☐ **Note** The break signal brings the transmit line to a space condition. Space is a positive voltage (binary 0). Mark, the normal condition, is a negative voltage (binary 1).

IDENTIFYING THE TERMINAL

Send terminal identifier **ESC SPACE**

When the terminal receives this sequence, it identifies itself by transmitting the following three-byte string to the computer:

35 CR

or, in hexadecimal,

33H 35H 0DH

PAGE PRINT FUNCTIONS

You can send displayed data directly to a serial printer or other output device through the terminal's AUX port.

☐ **Note** The terminal must be in block mode if print codes are entered from the keyboard.

The printed copy can duplicate the format seen on the screen (formatted page) or the page can be unformatted, i.e., a string of data.

Nulls Suppression

Turn on nulls suppress **ESC e R**
Turn off nulls suppress **ESC e S**

When receiving data from the host to be passed to the printer port, the terminal

- Strips incoming null characters when nulls suppress is on
- Processes null characters as valid data when nulls suppress is off

Printing a Formatted Page

Print formatted page **ESC P**

This command sends all characters (protected and unprotected) from the home position through the cursor position to the AUX port. Every line is terminated with CR, LF, and a null character.

Print formatted unprotected page **ESC @**

This command sends all unprotected characters from the home position through the cursor position to the AUX port.

If protect mode is on (see "Protecting Data" in Chapter 4), protected characters, graphics characters, and display attributes are sent as space characters.

If protect mode is off, graphics characters are sent as their corresponding control codes, and display attributes are sent as space characters. Each line is terminated with CR, LF, and a null character.

Printing an Unformatted Page

Print unformatted page **ESC p or ESC L**

Either of these sequences sends all characters from the home position through the cursor position to the AUX port. Display attributes are sent as space characters (the status of protect mode is ignored). Line terminators are not sent.

PRINT MODES

The terminal recognizes two print modes: copy print (sometimes called auxiliary print or extension print) and transparent print. Data bits, stop bits, parity, and baud rate for the AUX port are the same as those selected for the MODEM port. Refer to Table 2-5 in the *User's Guide*.

The terminal must be in block mode if these codes are entered from the keyboard.

Copy print mode on **CTRL R**

Copy print mode off **CTRL T**

Transparent print mode on **CTRL X**

Transparent print mode off **CTRL T**

While copy print mode is on, all data received from the computer is displayed on the screen and sent to the AUX port.

When transparent print mode is on, all data received from the computer is sent directly to the AUX port without being displayed on the screen.

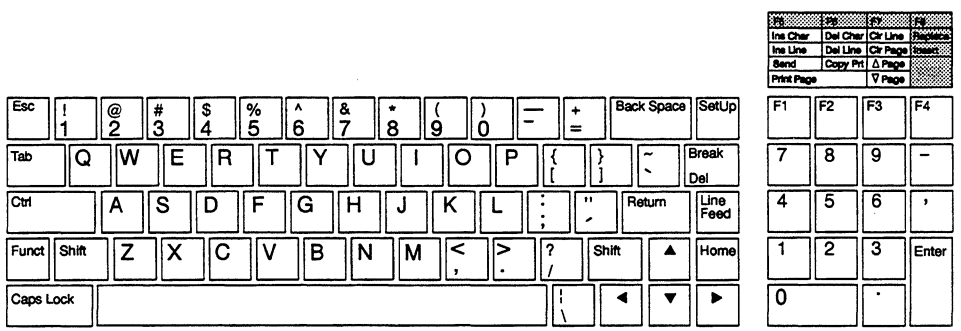
☐ **Note** Transparent print mode can be enabled only if enhance mode is on.

3 Controlling the Keyboard

This chapter describes commands that control keyboard functions, including key codes, escape sequences that redefine the programmable keys, and local keyboard commands. It also covers keyboard lock, bell and keyclick features, the terminal's character set, and line-drawing graphics characters.

Figure 3-1 shows the keyboard layout.

Figure 3-1 Keyboard Layout



KEY CODES

All alphanumeric keys generate the standard ASCII character codes listed in Table E-1. The special keys listed in Table 3-1 generate control or escape codes that are transmitted to the computer in the full-duplex and half-duplex conversational modes.

Table 3-1 Editing and Special Key Codes

Key[1]	Native Code[2]	Hex Value	ADDS VP Code
Back Space	CTRL H	08	CTRL H
Clr Line	ESC T	1B 54	ESC K
Shift Clr Line	ESC t	1B 74	ESC K
Clr Page	ESC Y	1B 59	ESC k
Shift Clr Page	ESC y	1B 79	ESC k
▲	CTRL K	0B	CTRL Z
▼	CTRL J[3]	0A	CTRL J
▶	CTRL L	0C	CTRL F
◀	CTRL H	08	CTRL U
Del Char	ESC W	1B 57	ESC W
Del Line	ESC R	1B 52	ESC l
Enter[4]	CTRL M	0D	CTRL M
Esc	CTRL [	1B	CTRL [
Home	CTRL ^	1E	CTRL A
Shift Home	ESC {	1B 7B	CTRL A
Insert	ESC q	1B 71	ESC q
Ins Char	ESC Q	1B 51	ESC Q
Ins Line	ESC E	1B 45	ESC M
▲ Page	ESC K	1B 4B	ESC J
▼ Page	ESC J	1B 4A	ESC J
Replace	ESC r	1B 72	ESC r
Return	CTRL M	0D	CTRL M
Tab	CTRL I	09	CTRL I
Shift Tab	ESC I	1B 49	ESC I

1. Unless otherwise noted, the shifted key sends the same code as the unshifted key.
2. These codes also recognized in TVI 905, TVI 910+, and TVI 925 personalities.
3. CTRL V in TVI 925 personality. CTRL J or CTRL V in TVI 905 personality, depending on the setting of the `Down Key` parameter (setup-mode Kpd3 Keybd menu).
4. Key pressed with Ctrl, Shift, or Ctrl Shift toggles keyclick if the `Keypad` parameter is set to **`Application`** (setup-mode Kpd3 Keybd menu); key pressed with Ctrl or Ctrl Shift toggles keyclick if the `Keypad` parameter is set to **`Numeric`**.

THE FUNCT KEY

[Funct] Transmits a three-byte sequence to the computer when it's pressed simultaneously with an alphanumeric key. The sequence sent is

SOH *key* CR

where
key is the alphanumeric key's ASCII code.

For example, pressing [Funct] [A] transmits the sequence

SOH A CR

or, in hexadecimal,

0l 41 0D

THE PROGRAMMABLE KEYS

The terminal contains 41 keys and key combinations that can be redefined to send several characters with a single keystroke. You can program these keys from the computer or, in setup mode, from the keyboard (refer to Chapter 2 of the *User's Guide*). The programmable keys include,

- Most of the terminal control keys (Table 3-2)
- The accounting keys (Table 3-2) when the `Keypad` parameter (setup-mode Kpd3 Keybd menu) is set to **`Application`**
- The function keys (Table 3-3)

Default Codes

Tables 3-2 and 3-3 list the default values sent by the terminal control, accounting, and function keys.

Table 3-2 Default Key Codes for Programmable Terminal Control and Accounting Keys

Key	ASCII Code	Key	ASCII Code
Esc	ESC	- *kpd*	- (hyphen)
Tab	HT	Enter	CR
Back Space	BS	0 *kpd*	0
Del	DEL	1 *kpd*	1
Return	CR	2 *kpd*	2
Line Feed	LF	3 *kpd*	3
▲	VT or SUB[1]	4 *kpd*	4
▼	LF[2] or SYN[2,3]	5 *kpd*	5
◀	BS or NAK[1]	6 *kpd*	6
▶	FF or ACK[1]	7 *kpd*	7
Home	RS or SOH[1]	8 *kpd*	8
, *kpd*	, (comma)	9 *kpd*	9
. *kpd*	. (period)		

1. In ADDS VP personality.
2. In TVI 905 personality, LF when `Down Key` parameter (setup-mode Kpd3 Keybd menu) is set to `CTRL J` and SYN when `Down Key` parameter is set to `CTRL V`.
3. In TVI 925 personality.

Table 3-3 Default Codes for Function Keys

Key	*code* Unshifted	*code* Shifted
F1	SOH @ CR	SOH ` CR
F2	SOH A CR	SOH a CR
F3	SOH B CR	SOH b CR
F4	SOH C CR	SOH c CR
F5 [1]	SOH D CR	SOH d CR
F6 [2]	SOH E CR	SOH e CR
F7 [3]	SOH F CR	SOH f CR
F8 [4]	SOH G CR	SOH g CR

1. F5 is equivalent to Ctrl F1; Shift F5 is equivalent to Ctrl Shift F1.
2. F6 is equivalent to Ctrl F2; Shift F6 is equivalent to Ctrl Shift F2.
3. F7 is equivalent to Ctrl F3; Shift F7 is equivalent to Ctrl Shift F3.
4. F8 is equivalent to Ctrl F4; Shift F8 is equivalent to Ctrl Shift F4.

Redefining a Key from the Computer

Program a programmable key **ESC z** *key sequence* **DEL**

Clear a programmable key **ESC z** *key* **DEL**

where

- *key* is a value from Table 3-4.
- *sequence* is up to 64 bytes of data to be loaded in that key. This data can be any combination of alphanumeric characters, escape sequences, and control codes.

For example, to program the shifted F4 key to set a tab stop whenever the key is pressed, send

ESC z c ESC 1 DEL

where

- **c** is the value of the shifted F4 key from Table 3-4.
- **ESC 1** is the sequence that sets a tab stop at the cursor position (see "Setting a Tab Stop" in Chapter 4).

or, in hexadecimal,

1B 7A 63 1B 31 7F

Table 3-4 Programmable Key Values

Key	*Key* Unshifted	*Key* Shifted	Key	*Key* Unshifted	*Key* Shifted
Esc	SPACE		2 *kpd*	v	
Tab	!		3 *kpd*	w	
Back Space	”		4 *kpd*	x	
Del	#		5 *kpd*	y	
Return	$		6 *kpd*	z	
Line Feed	%		7 *kpd*	{	
▲	+		8 *kpd*	¦	
▼	,		9 *kpd*	}	
◀	–				
▶	.		F1	@	`
Home	/		F2	A	a
, *kpd*	p		F3	B	b
- *kpd*	q		F4	C	c
. *kpd*	r		F5	D	d
Enter	s		F6	E	e
0 *kpd*	t		F7	F	f
1 *kpd*	u		F8	G	g

Redefining a Key from the Keyboard

You can use the setup-mode Kpd9 Fkeys menu options to enter definitions for the programmable keys and specify how the keys function (i.e., local, remote, or normal). Refer to Chapter 2 of the User's Guide for detailed information on redefining the programmable keys.

Saving the Key Definitions

In TVI 910, TVI 925, ADDS A2, and native personalities, key definitions are stored in temporary memory. To save them in battery-backed memory, select `Yes` for the `Save` option when you exit setup mode. In TVI 905 personality, key definitions are automatically saved in battery-backed memory.

Each key can be programmed to send up to 64 characters. Temporary and non-volatile memory both hold up to 1024 characters total for all programmable keys.

LOCKING THE KEYBOARD

Lock keyboard	**ESC #** **or CTRL O** **or CTRL D**
Unlock keyboard	**ESC "** or **CTRL N** or **CTRL B**

☐ **Note** **CTRL D** and **CTRL B** are recognized only if enhance mode is on (refer to "Enhance Mode" in Chapter 2).

The keyboard lock feature prevents input from the keyboard. When the keyboard is locked,

- The message `LOCK` appears on the status line
- All keys are ignored except
  - [SetUp], which unlocks the keyboard
  - [Shift] [SetUp], which puts the terminal in setup mode
  - [Ctrl] [SetUp], which resets the terminal modes

LOCAL KEYBOARD COMMANDS

You can use the key sequences listed in Table 3-5 to control some terminal functions locally. The codes from these keys are never sent to the computer or printer.

Table 3-5 Local Key Commands

Feature	Key Sequence
Put terminal in setup mode	Shift SetUp
Perform soft terminal reset (unlock keyboard; turn off all print modes; turn off graphics, insert, protect, and write-protect modes; turn on display if off; turn off monitor mode if on)	Ctrl SetUp
Perform hard terminal reset[1]	Ctrl Shift SetUp
Clear screen	Ctrl Home
Increase scrolling rate	Ctrl ▲
Decrease scrolling rate	Ctrl ▼
Turn keyclick on and off	Ctrl Enter
Turn monitor mode on and off[2]	Ctrl ◀
Change status line display (editing, standard, off)	Ctrl ▶
Turn block mode on and off	Ctrl Back Space
Turn copy print mode on and off	Ctrl 2 *kpd*
Turn transparent print mode on and off	Ctrl Shift 2 *kpd*
Print unformatted page	Ctrl 0 *kpd*
Print formatted page	Ctrl Shift 0 *kpd*

1. A hard reset is equivalent to turning the terminal off and on again.
2. In monitor mode, the terminal displays ASCII control characters instead of acting on them.

CONTROLLING BELL AND KEYCLICK

Sound bell	**CTRL G**
Turn off keyclick	**ESC e $ or ESC <**
Turn on keyclick	**ESC e % or ESC >**

These commands control the terminal's bell and keyclick feature. When keyclick is on, the keys make a muted beeping sound when pressed.

☐ **Note** The **ESC <** and **ESC >** commands are recognized only when enhance mode is on (refer to "Enhance Mode" in Chapter 2).

You can also toggle keyclick on and off from the keyboard.

- When the `Keypad` parameter is set to `Numeric` (setup mode Kpd3 Keybd menu), pressing Ctrl Enter or Ctrl Shift Enter toggles keyclick on and off.
- When the `Keypad` parameter is set to `Application` pressing Shift Enter, Ctrl Enter, or Ctrl Shift Enter toggles keyclick on and off.

CONTROLLING KEY REPEAT

Turn off key repeat	**ESC e ,**
Turn on key repeat (default)	**ESC e –**

When key repeat is off, the keys do not repeat when held down.

CONTROLLING CAPS LOCK

Turn on CAPS LOCK	**ESC e &**
Turn off CAPS LOCK (default)	**ESC e '**
Define Caps Lock key as caps (default)	**ESC e T**
Define CAPS LOCK as reverse	**ESC e U**
Define CAPS LOCK as shift	**ESC e V**

When CAPS LOCK is on, the word `CAPS` is displayed on the status line and, by default (the CapsLock key defined as *caps*), alphabetical keys are shifted to uppercase; numerical keys and their shifted mathematical and punctuation symbols are not affected.

When CAPS LOCK is defined as *reverse*, the action of Shift is reversed—shifted alphabetic keys generate lowercase characters, and the unshifted keys generate uppercase characters. Number and symbol keys are not affected. When CAPS LOCK is defined as *shift*, all keys generate shifted characters only; pressing Shift turns CAPS LOCK off.

CHARACTER SET

The terminal's character set, illustrated in Figure D-1, contains

- Thirty-two ASCII control characters (0 through 31 decimal, 0 through 1F hexadecimal). The control characters recognized by the terminal are listed in Table B-1.
- Sixteen line-drawing graphics characters (16 through 31 decimal, 10 through 1F hexadecimal) available when graphics mode is on (see the next section).
- Eighty ASCII alphanumeric characters (32 through 127 decimal, 20 through 7F hexadecimal).

Graphics Mode

Turn on graphics mode **ESC H CTRL B**

Turn off graphics mode **ESC H CTRL C**

Display one graphics character **ESC H** *ldraw*

where
ldraw is a value from Table 3-6 (or the corresponding numeric or punctuation key).

The terminal's character set contains 16 line-drawing graphics characters. You can control these characters as a group in graphics mode, or individually with an escape sequence that sends the characters one at a time in the normal operating mode.

When graphics mode is on, sending an *ldraw* value listed in Table 3-6 displays the corresponding graphics character. You can't send normal alphanumeric text in graphics mode, but you can execute control codes and other commands. When protect mode is on, graphics characters are automatically protected (refer to "Protecting Data" in Chapter 4).

When graphics mode is off, you can display a single graphics character from Table 3-6 by entering **ESC H** and the *ldraw* value.

☐ **Note** You cannot send graphics characters to a printer.

Table 3-6 Graphics Character Codes

ldraw	Graphics Character	*ldraw*	Graphics Character	*ldraw*	Graphics Character	*ldraw*	Graphics Character
0	┬	4	├	8	┼	<	═
1	└	5	┘	9	┤	=	┴
2	┌	6	│	:	─	>	╫
3	┐	7	▮	;	▒	?	▒

MONITOR MODE

Turn on monitor mode **ESC U**

Turn off monitor mode **ESC u** or **ESC X**

Monitor mode helps you debug programs. When monitor mode is on, the terminal displays symbolic representations of received codes (including control codes) without acting on them. For example, a carriage return control code is displayed as CR, and no carriage return is executed. Table B-1 lists the symbols for the control codes.

When monitor mode is on, * (asterisk) appears on the status line.

☐ **Note** You can turn monitor mode on and off from the keyboard by pressing Ctrl ◀.

4 Controlling the Screen Display

This chapter describes the commands that control the terminal's screen display, cursor movement, and editing functions.

DISPLAYING THE MESSAGE FIELDS

The screen has three main areas (Figure 4-1): the status line, the 24-line data area, and the label line.

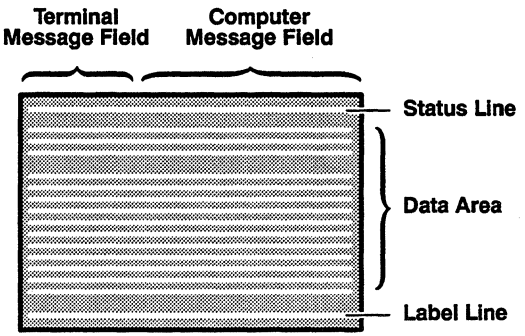
- The status line displays terminal status messages on the left and computer messages on the right.
- The data area can display data in one large format (24 lines by 80 columns) or in two areas of a horizontally split screen (Figure 4-2). Each data area on a split screen is called a data segment.
- You can program the label line to display function key labels or messages in the normal operating mode.

The status line can display computer messages, terminal status messages, or both.

- The computer message field can display a message, such as a warning or a prompt, from the computer. The escape sequence for displaying a computer message is explained in the following section.
- The terminal message field displays the current communication mode as well as any editing or keyboard modes in effect. These terminal status messages appear automatically.

To turn off status line messages, press Ctrl ▶.

Figure 4-1 Display Areas



PROGRAMMING THE MESSAGE FIELDS

Use the commands in this section to define and display computer messages and function key labels.

Programming a Computer Message

Program and display computer message on status line **ESC F** *message* **CR**

where
message is a character string of up to 46 characters that is displayed in the computer message field on the status line.

☐ **Note** You cannot assign display attributes individually to characters in the computer message field, but you can assign an attribute to the entire field (see "Display Attributes" later in this chapter).

Programming the Label Line

In any mode but setup,

- The bottom line can display several labels that correspond to the contents of the function keys, or it can display a single longer label (i.e., a message)
- You can program both the unshifted and shifted label lines for a possible total of 16 function key labels or, alternatively, two different messages

☐ **Note** You cannot assign display attributes individually to characters in the label line, but you can assign an attribute to the entire line (see "Display Attributes" later in this chapter).

Programming a Message

When you program a label line message, the entire bottom line becomes one field. The following commands apply:

Program and display computer message on label line	**ESC f** *text* **CR**
Program and display computer message on unshifted label line	**ESC z (** *text* **CR**
Program and display computer message on shifted label line	**ESC z)** *text* **CR**

where
text is a character string of up to 78 characters.

The **ESC f** command programs and displays the message on both the shifted and unshifted label line. With the **ESC z** command you can program separate messages on the unshifted and shifted label lines; the shifted label line message is displayed when [Shift] is pressed.

The following commands control the display of the label line:

Turn off shifted label line display	**ESC z DEL**
Turn on shifted and unshifted label line display	**ESC g**
Turn off shifted and unshifted label line display	**ESC h**

☐ **Note** The **ESC g** and **ESC h** commands are recognized only when enhance mode is on (see "Enhance Mode" in Chapter 2).

The following commands clear the label line message:

Clear unshifted label line	**ESC z (CR**
Clear shifted label line	**ESC z) CR**

Programming a Function Key Label

Program and display a function key label — **ESC z** *field label* **CR**

Clear function key label — **ESC z** *field* **CR**

where

- *field* is a field code from Table 4-1. You can label up to eight fields (shiftable to 16)
- *label* is a character string of up to eight characters

You can label each field (one field at a time) to correspond to a function key's contents. The unshifted function key label is displayed automatically. The shifted function key label is displayed when Shift is pressed.

Table 4-1 Function Key Field Codes

Key	*field* Unshifted	*field* Shifted	Key	*field* Unshifted	*field* Shifted
F1	0 or 8	P or X	F5	4 or <	T or \
F2	1 or 9	Q or Y	F6	5 or =	U or]
F3	2 or :	R or Z	F7	6 or >	V or ^
F4	3 or ;	S or [	F8	7 or ?	W or_

Defining the Data Area

You can change the line and column display either in setup mode or from the computer. (Refer to Chapter 2 of the *User's Guide* for information about using setup mode.) The display that you select also determines the maximum number of pages that the terminal's memory can hold (see the next section, "Displaying a Page").

Changing the Number of Displayed Columns

Before you change the number of displayed columns, clear the function key labels (see the previous section). You can program them again for the new display width.

Select 80-column display (default)	**ESC ` :**
Select 132-column display	**ESC ` ;**

Allow for a delay of 150 milliseconds before sending data to the terminal.

Unless width-change-clear mode is on, the screen isn't cleared when the terminal executes these commands. The commands are ignored when economy 80-column mode is on.

80/132 Width-Change-Clear Mode

Turn off 80/132 width-change-clear mode (default)	**ESC e .**
Turn on 80/132 width-change-clear mode	**ESC e /**

■ **Caution** When width-change-clear mode is on, the terminal clears the screen when executing a command to change the number of columns.

When entering or leaving economy 80-column mode, the terminal clears the screen regardless of the status of width-change-clear mode.

Economy 80-Column Mode

Turn off economy 80-column mode (default)	**ESC e F**
Turn on economy 80-column mode	**ESC e G**

■ **Caution** When executing these commands, the terminal clears the entire display memory, including the status line.

Economy 80-column mode makes additional pages of display memory available. Turn this mode off if you want to select the standard 80-column or the 132-column display.

Displaying a Page

Commands to display pages take effect only when multiple page mode is on. The terminal's memory can hold

- Three pages when the normal 80-column or 132-column display is selected
- Six pages when the economy 80-column mode is selected

Turn off multiple-page mode (default) **ESC e x**
Turn on multiple-page mode **ESC e y**

When multiple page mode is off, the terminal ignores commands to display the pages. If multiple page mode is turned on by an escape sequence or in setup mode (Kpd1 Disp menu), the terminal executes commands to display pages.

Display previous page **ESC w B** or **ESC J**

Display next page **ESC w C** or **ESC K**

☐ **Note** If the screen is split, the **ESC J** and **ESC K** commands activate the page in the alternate window.

Display specific page **ESC w** *page*

where
page is a single digit value that specifies the page number (0–2 for normal 80/132-column display or 0–5 for 80-column economy mode).

CONTROLLING GENERAL DISPLAY FEATURES

General display features include the appearance of the screen and the configuration of the three screen areas: the status line, the label line, and the data area. (Figure 4-1 shows the screen areas.)

Controlling Screen and Cursor Display

Turn off screen display **ESC ` 8** or **ESC o**

Turn on screen display (default) **ESC ` 9** or **ESC n**

These commands control the visibility of the screen display.

☐ **Note** The **ESC o** and **ESC n** commands are recognized only when enhance mode is on (see "Enhance Mode" in Chapter 2).

Turn off screen saver **ESC e P**
Turn on screen saver or **ESC e Q**

When screen saver is on, the screen goes temporarily blank after the terminal is inactive for 15 minutes. Press Shift to redisplay the data.

Reverse screen **ESC ^ 1**

Restore normal screen (default) **ESC ^ 0**

A normal screen displays light characters on a dark background. A reversed screen displays dark characters on a light background.

Set cursor display features **ESC ` *cursor***

where

cursor defines whether or not the cursor is displayed, or in what form it is displayed.

cursor	**Cursor Display**
0	Off
1	On (default)
2	Steady block
3	Blinking line
4	Steady line
5	Blinking block (default)

Turn cursor display off **CTRL W**

When enhance mode is on, this command turns off the cursor display.

Displaying the Status Line

Turn on editing status line **ESC ` a**
Turn on standard status line (default) **ESC ` b**
Turn off status line display **ESC ` c**

The standard status line displays the cursor line and column indicators. The editing status line displays editing status messages (see Table F-1). Computer messages can be displayed on either the standard or editing status line.

☐ **Note** From the keyboard, press Ctrl ▶ to change the status line display from standard to off to editing.

Selecting Character Cell Size

Select 10x13 character cell (80 Hz) **ESC e ?**
Select 10x15 character cell (70 Hz, default) **ESC e z**

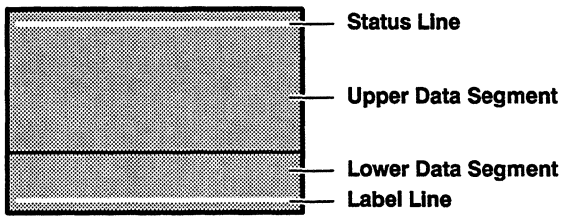
The 80 Hz refresh rate (10x13 character cell) minimizes background flicker when the screen is reversed (light background).

When the character cell size is changed, the terminal clears the display memory and homes the cursor.

SPLIT SCREEN

By dividing the screen's data area into two horizontal segments as shown in Figure 4-2, you can display data in one data segment while working in the other data segment.

Figure 4-2 Split Screen Format



Splitting the Screen

Split screen horizontally and clear screen **ESC x 1** *line*
or **ESC ¦ 1** *line*

where
line is an ASCII character from Table 4-2 corresponding to the number of the line that you want to become the top line in the lower data segment (data segment 1).

☐ **Note** The **ESC ¦ 1** command is recognized only when enhance mode is on.

For example, if you want line 16 to be line 1 of the lower data segment, send

ESC x 1 /

where
/ is the code for line 16 from Table 4-2.

Executing this command

- Clears all data from the screen
- Turns off write-protect and protect modes and clears the screen to spaces
- Moves the cursor to the home position of the upper data segment
- Makes the upper data segment the active segment

If this escape sequence originates from the computer, the terminal returns an ACK character to the computer.

Table 4-2 ASCII Line Codes

Line	*line* Native[1]	*line* ADDS A2[2]	Line	*line* Native[1]	*line* ADDS A2[2]
1	SP	CTRL @	13	,	CTRL L
2	!	CTRL A	14	–	CTRL M
3	”	CTRL B	15	.	CTRL N
4	#	CTRL C	16	/	CTRL O
5	$	CTRL D	17	0	CTRL P
6	%	CTRL E	18	1	CTRL Q
7	&	CTRL F	19	2	CTRL R
8	’	CTRL G	20	3	CTRL S
9	(	CTRL H	21	4	CTRL T
10	)	CTRL I	22	5	CTRL U
11	*	CTRL J	23	6	CTRL V
12	+	CTRL K	24	7	CTRL W

1. These codes are also recognized in TVI 910+ and TVI 925 personalities and in ADDS A2 personality absolute cursor addressing.
2. Vertical addressing (CTRL K).

Activating a Data Segment

Activate other data segment — **ESC J** or **ESC K**

Activate upper data segment — **ESC]** or **ESC c**

Activate lower data segment — **ESC }**

Executing any of these commands returns the cursor to its previous position within the active data segment.

☐ **Note** When the terminal is in block mode or half-duplex block mode, pressing Ctrl ▼ Page *kpd* or Ctrl ▲ Page *kpd* also activates the other data segment.

Restoring a Full Screen Format

Redefine screen as one data segment and clear screen **ESC x 0** or **ESC ¦ 0**

☐ **Note** The **ESC ¦ 0** command is recognized only when enhance mode is on (refer to "Enhance Mode" in Chapter 2).

Executing this command returns a split screen to a full screen format and

- Clears all data from the screen
- Resets the display, turning off write-protect and protect modes and clearing the screen to spaces
- Homes the cursor

If this escape sequence originates from the computer, the terminal returns an ACK character to the computer.

SCROLLING

Set scrolling speed and type **ESC ` *scroll***

where
scroll is the scrolling type and speed in lines per second (lps).

scroll	**Scrolling Type**	**Speed (lps)**
@	Jump scroll (default)	
<	Smooth scroll	1
=	Smooth scroll	2
>	Smooth scroll	4
?	Smooth scroll	8
H	Smooth scroll	15
I	Smooth scroll	20

Jump scrolling means that the terminal displays characters as fast as it receives them. Smooth scrolling permits you to control the scrolling speed.

Autoscrolling must be on for this function to operate (see next section). Smooth scrolling won't work properly unless you've selected some type of handshaking protocol for the MODEM port (see "Modem Port Handshaking Protocol" in Chapter 2).

Autoscrolling Mode

Turn off autoscrolling mode **ESC N**

Turn on autoscrolling mode (default) **ESC O**

When autoscrolling mode is on, entering a linefeed command while the cursor is on the bottom line or entering a character on the bottom line at the last column position

- Scrolls the data up one line
- Inserts a line of space characters
- Moves the cursor to the first position of that line

The line that scrolls off the top of the screen is lost. A reverse linefeed command (Esc J) while the cursor is on the top line scrolls the data down one line and inserts a new line of space characters. The line that scrolls off the bottom of the screen is lost.

When autoscrolling mode is off,

- Entering a character on the bottom line at the last column position wraps the cursor to the home position (or the first unprotected position)
- Entering a linefeed on the last line wraps the cursor to the same column in the first line

☐ **Note** Turning protect mode on (see "Protecting Data" later in this chapter) causes the terminal to ignore autoscrolling mode so that data cannot scroll off the screen.

Cursor Modes

Received CR mode = CR (default) **ESC e 4**
Received CR mode = CRLF **ESC e 5**

These commands determine how the terminal responds to a received ASCII CR character—by executing a carriage return (CR) that moves the cursor to the start of the current line, or by executing a linefeed and a carriage return (CRLF) that moves the cursor to the start of the next line.

Turn on autopage mode **ESC v**

Autopage mode controls whether or not a new page is displayed when the terminal receives a command to move the cursor beyond the top or bottom of the current page. The default state is `Autopage=Off` (setup-mode Kpd1 Disp menu).

When autopage mode is on, a command to move the cursor beyond the top line of the page moves the cursor to the bottom line of the previous page and displays the new page. A command to move the cursor past the bottom line of the page moves the cursor to the top line of the next page and displays the new page.

☐ **Note** If autopage mode is on when only one page is defined, the cursor wraps to the top or bottom of the page and the display adjusts accordingly.

DISPLAY ATTRIBUTES

Display attributes are visual properties that change the way data appears on the screen. The terminal has five display attributes that can be assigned either individually or in combination to characters or to areas of the screen. You can also assign attributes specifically to protected characters. The display attributes are

- Dim
- Reverse
- Underline
- Blink
- Blank (invisible)

Assigning Display Attributes to a Message Field

Assign display attribute to a message field — **ESC A** *mf attr* or **ESC ** *mf attr*

where

– *mf* defines what area of the screen is assigned the display attribute

mf	**Screen Area**
0	Data area
1	Label line
2	Terminal message field on status line
3	Computer message field on status line

– *attr* is a display attribute value from Table 4-3.

Table 4-3 Display Attribute Values

attr	Display Attribute	*attr*	Display Attribute
SP	Space character	p	Dim
0	Normal	q	Dim and blank
1	Blank (no display)	r	Dim and blink
2	Blink	s	Dim, blink, blank
3	Blink, blank	t	Dim and reverse
4	Reverse	u	Dim, reverse, blank
5	Reverse and blank	v	Dim, reverse, blink
6	Reverse and blink	w	Dim, reverse, blink, blank
7	Reverse, blink, blank	x	Dim and underline
8	Underline	y	Dim, underline, blank
9	Underline and blank	z	Dim, underline, blink
:	Underline and blink	{	Dim, underline, blink, blank
;	Underline, blink, blank	¦	Dim, underline, reverse
<	Underline and reverse	}	Dim, underline, reverse, blank
=	Underline, reverse, blank	~	Dim, underline, reverse, blink
>	Underline, reverse, blink	DEL	Dim, underline, reverse, blink, blank
?	Underline, reverse, blink, blank		

Assigning Character Display Attributes

Assign character display attribute **ESC G *attr***

where
attr is a display attribute value from Table 4-3.

The attribute is not hidden, i.e., it occupies the current cursor location, appearing on the screen as a space character.

This sequence assigns display attributes to characters within the data area. The attribute extends to all positions to the right and below the cursor to the end of the screen or line (depending on the attribute mode) or until another attribute is encountered.

The following sequences set the attribute mode:

Set attribute active to end of screen (default) **ESC ^ 2**

Set attribute active to end of line **ESC ^ 3**

The following sequence clears unprotected characters to a display attribute (Table 4-3).

Clear unprotected characters to display attribute **ESC ! *attr***

The same attribute is assigned to every unprotected character position. This makes it easy to create forms that display primarily one kind of attribute for all fields. You can also clear the entire screen to the normal attribute (**Esc ! 0**) to eliminate flashing when generating a form (that is, the attribute will not flash onto the screen to the right of the cursor but will display only where data is entered).

☐ **Note** If you have cleared unprotected characters to any attribute except the normal attribute, avoid entering data in the first screen position (line 1, column 1) or the attribute won't take effect in the top line.

ADDRESSING AND READING THE CURSOR

The following rules apply to cursor movement commands:

- If the screen is split, the cursor can move only within the active data segment unless you include a specific command to move it outside that area
- The cursor can move to a protected position but it cannot write anything there

Addressing the Cursor

Address cursor in current 80/132- column page **ESC a** *ll* **R** *ccc* **C**
or **ESC d** *ll* **R** *ccc* **C**

where

- *ll* is the one- or two-digit decimal value of the line relative to home
- *ccc* is the one-, two- or three-digit decimal value of the column relative to home

This sequence moves the cursor relative to the home position. If the screen is split horizontally, the cursor is positioned relative to the first line of the active data segment.

For example, the sequence

ESC a 10 R 12 C

positions the cursor at line 10, column 12 of a full screen. If the screen is split, the sequence positions the cursor at column 12 on the tenth line of the active data segment.

When the screen is not split, the sequence

ESC a 1 R 1 C

positions the cursor at the home position (line 1, column 1). When the screen is split, the sequence positions the cursor at column 1 on the top line of the active data segment.

Address cursor to line in current 80-column page **ESC [** *line*

Address cursor to column in current 80-column page **ESC _** *col*
or **CTRL P** *col*

Address cursor to line and column in current 80-column page **ESC =** *line col*

where

- *line* is a line code from Table 4-4 that corresponds to the line where you want the cursor to be positioned
- *col* is a column code from Table 4-5 that corresponds to the column where you want the cursor to be positioned

☐ **Note** **CTRL P** is recognized only when enhance mode is on (see "Enhance Mode" in Chapter 2).

Address cursor in specific 80-column page or data segment **ESC –** *seg/page line col*

where

– *seg* defines the data segment where the cursor will be moved

seg/page	**Page or Data Segment**	*seg/page*	**Page or Data Segment**
0	Page 0 or upper segment	3	Page 3
1	Page 1 or lower segment	4	Page 4
2	Page 2	5	Page 5

– *line* is the line code from Table 4-4 that corresponds to the line where you want the cursor to be positioned

– *col* is a column code from Table 4-5 that corresponds to the column where you want the cursor to be positioned

Home cursor **ESC {**
or CTRL ^

These commands home the cursor, either on a full screen or within the active data segment of a split screen.

Table 4-4 ASCII Line Codes

Line	*line* Native[1]	*line* ADDS A2[2]	Line	*line* Native[1]	*line* ADDS A2[2]
1	SP	CTRL @	13	,	CTRL L
2	!	CTRL A	14	–	CTRL M
3	"	CTRL B	15	.	CTRL N
4	#	CTRL C	16	/	CTRL O
5	$	CTRL D	17	0	CTRL P
6	%	CTRL E	18	1	CTRL Q
7	&	CTRL F	19	2	CTRL R
8	'	CTRL G	20	3	CTRL S
9	(	CTRL H	21	4	CTRL T
10	)	CTRL I	22	5	CTRL U
11	*	CTRL J	23	6	CTRL V
12	+	CTRL K	24	7	CTRL W

1. These codes are also recognized in TVI 910+ and TVI 925 personalities and in ADDS A2 personality absolute cursor addressing.
2. Vertical addressing (CTRL K).

Table 4-5 ASCII Column Codes

Column	*col* Native[1]	*col* ADDS A2[2]	Column	*col* Native[1]	*col* ADDS A2[2]	Column	*col* Native[1]	*col* ADDS A2[2]
1	SP	CTRL @	28	;	’	55	V	T
2	!	CTRL A	29	<	(	56	W	U
3	”	CTRL B	30	=	)	57	X	V
4	#	CTRL C	31	>	0	58	Y	W
5	$	CTRL D	32	?	1	59	Z	X
6	%	CTRL E	33	@	2	60	[	Y
7	&	CTRL F	34	A	3	61	\	/
8	’	CTRL G	35	B	4	62	]	a
9	(	CTRL H	36	C	5	63	^	b
10	)	CTRL I	37	D	6	64	_	c
11	*	CTRL P	38	E	7	65	`	d
12	+	CTRL Q	39	F	8	66	a	e
13	,	CTRL R	40	G	9	67	b	f
14	–	CTRL S	41	H	@	68	c	g
15	.	CTRL T	42	I	A	69	d	h
16	/	CTRL U	43	J	B	70	e	i
17	0	CTRL V	44	K	C	71	f	p
18	1	CTRL W	45	L	D	72	g	q
19	2	CTRL X	46	M	E	73	h	r
20	3	CTRL Y	47	N	F	74	i	s
21	4	SP	48	O	G	75	j	t
22	5	!	49	P	H	76	k	u
23	6	”	50	Q	I	77	l	v
24	7	#	51	R	P	78	m	w
25	8	$	52	S	Q	79	n	x
26	9	%	53	T	R	80	o	y
27	:	&	54	U	S			

1. These codes are also recognized in TVI 910+ and TVI 925 personalities and in ADDS A2 personality absolute cursor addressing.
2. Horizontal addressing (CTRL P).

Reading the Cursor Address

The terminal responds to the following escape sequences by sending the screen coordinates of the cursor position to the computer. The response to the **ESC ?** command is in the form of line and column codes; the response to the **ESC b** command is in decimal values relative to home.

Read cursor address in current 80-column page **ESC ?**

The terminal returns a three-byte address in the format

line col **CR**

where
line is the line code (Table 4-4) and *col* is the column code (Table 4-5).

For example, if the cursor is at line 10, column 8, the terminal sends **) ' CR** or, in hexadecimal, **29H 27H 0DH.**

Read cursor address in current 80/132-column page **ESC b**

The terminal returns a seven-byte address in the format

ll **R** *ccc* **C**

where

- *ll* is the one- or two-digit decimal value of the line relative to home
- *ccc* is the one-, two, or three-digit decimal value (with a leading zero) of the column relative to home.

For example, if the cursor is on line 10, column 8, the terminal sends **10 R 008 C**

☐ **Note** A CR character is not sent after the coordinates.

Read 80-column data segment/page number and cursor address **ESC /**

The terminal returns the number of the active data segment and the cursor address in the format

seg/page line col **CR**

where

- *seg/page* is the data segment or page number (0 = page 0 or upper segment; 1 = page 1 or lower segment; 2–5=pages 2–5)
- *line* is the line code (Table 4-4)
- *col* is the column code (Table 4-5).

MOVING THE CURSOR

Move cursor to start of line	**CTRL M**
Move cursor to start of next line; scroll	**CTRL _**
Move cursor right one column	**CTRL L**
Move cursor right one column (enhance mode on)	**CTRL F**
Move cursor left one column (backspace)	**CTRL H**
Move cursor left one column (backspace) (enhance mode on)	**CTRL U**
Move cursor down one line in current column; scroll (linefeed)	**CTRL J**
Move cursor down one line in current column; no scroll	**CTRL V**
Move cursor up one line in current column; wrap	**CTRL K**
Move cursor up one line in current column; scroll (reverse linefeed)	**ESC j**

These commands move the cursor within the data area. What happens when the cursor moves past the last character position on the bottom line, or the first character position on the top line, depends on whether the command calls for the cursor to scroll or wrap or neither.

- Scroll—A new line is inserted, the cursor moves onto it, and a line at the opposite end of the screen (top or bottom) scrolls off the screen. Data on the scrolled-off line is lost.

☐ **Note** Protected data cannot be scrolled off the screen.

- Wrap—The cursor simply wraps from top to bottom (or bottom to top) of the screen (or active data segment). No new line is added and no data is lost.
- No Scroll or Wrap—The cursor does not move beyond the top or bottom line; characters in the last position on the line are overwritten.

TAB STOPS

These commands let you set tab stops, move the cursor to those stops, and clear the tab stops either individually or as a group.

Setting a Tab Stop

Set tab stop at cursor position	**ESC 1**
Clear tab stop at cursor position	**ESC 2**
Clear all tab stops	**ESC 0** or **ESC 3**

Tabulating

Tabulate cursor **ESC i** or **CTRL I**

This sequence moves the cursor to the next tab stop. If the current line doesn't contain any more tab stops, the cursor wraps around to the next line to find another tab stop. If the tab stop is on a protected position, the cursor moves to the next unprotected position.

Backtab **ESC I**

This sequence moves the cursor to the previous tab stop. If the current line doesn't contain any more tab stops, the cursor wraps back to the previous line to find another tab stop. If the tab stop is on a protected position, the cursor moves to the previous unprotected position.

CREATING PROTECTED FORMS

Protect mode lets you build forms on the screen. Protected areas of a form cannot be overwritten or deleted. In protect mode you can

- Create permanent headings and labels
- Reserve areas of the screen
- Protect data that has been entered
- Control what data is transmitted to the computer or printer

When protect mode is on,

- Data cannot be written in a protected area. If the cursor is addressed there, it will jump to the first unprotected position as soon as you attempt to enter data.
- Tabulating commands move the cursor to the first unprotected character position beyond a protected tab stop.
- Protected data can't scroll off the screen.
- Lines cannot be deleted or inserted.

Writing Data to be Protected

Turn on write-protect mode **ESC)**

Turn off write-protect mode **ESC (**

When write-protect mode is on, all subsequently received characters are defined as write-protected and displayed with the display attribute selected for write-protected characters. If protect mode is also on, the message `PROT WRPT` is displayed on the status line.

Protecting Data

Turn on protect mode **ESC &**

Turn off protect mode **ESC '**

When protect mode is on, you can't write over write-protected data. Autoscroll is prevented. The message `PROT` is displayed in the terminal message field. When protect mode is off, the data is not protected.

Protecting a Column

Protect column **ESC V**

This sequence clears a single column, replacing the existing characters with write-protected space characters. The column extends from the cursor line to the bottom of the active data segment.

Creating a Protected Form

Protecting data on the screen involves two basic steps:

1 Turn on write-protect mode and enter the data to be protected.

- **a** Position the cursor where you will enter the first write-protected character.
- **b** Turn off protect mode if it is on, or you won't be able to enter data.
- **c** Send **ESC)** to turn on write-protect mode.
- **d** Enter the data to be protected.

2 Turn on protect mode to protect the areas defined in write-protect mode.

- **a** Send **ESC (** to turn off write-protect mode.
- **b** Send **ESC &** to turn on protect mode. This protects all write-protected areas on the screen.

If the cursor is still in a write-protected field when you turn on protect mode, it moves to the next unprotected character position.

Working with Protected Characters

Several commands let you treat protected characters differently from unprotected characters. The functions covered by these commands include

- Assigning display attributes to write-protected characters (see the following section)
- Clearing protected or unprotected characters (see "Clearing Unprotected Data")
- Sending protected or unprotected characters to the computer or the printer (see "Sending Data in Block Mode" in Chapter 2)

Assigning Display Attributes to Write-Protected Characters

Assign write-protected character display attribute **ESC ` *wpca***

where

wpca is a display attribute to be assigned to write-protected characters.

wpca	**Display Attribute**
6	Reverse
7	Dim (default)
A	Normal
B	Reverse and dim
C	Double-wide and normal
D	Double-wide and reverse
E	Double-wide and dim
F	Double-wide, reverse, and dim
J	Underline
K	Underline and dim
L	Underline and double-wide

When the double-wide attribute is selected,

- All write-protected characters are displayed as double-wide, even on lines containing single-wide (unprotected) characters.
- Each double-wide character occupies two character positions on the screen and also requires two positions in the screen buffer. In the buffer, the first position contains the character to be displayed; the second position must be occupied by a place-holding character.

The two character positions occupied by a double-wide character must be taken into account when editing the character.

- Position the cursor on the first of the two double-wide character positions. (The cursor won't be visible if it is in the second position.)
- When overwriting or inserting a double-wide character, enter the character twice. For example, to display the word *what* in double-wide characters, enter **wwhhaatt.**
- When deleting a double-wide character, be sure to delete both character positions—the first (displayed) position and the second (place-holding) position.

EDITING THE CURSOR LINE

The commands described in this section affect only the cursor line (not the entire screen).

Controlling Insert Mode

Turn on insert mode, replace mode off **ESC q**

Turn off insert mode, replace mode on **ESC r**

When insert mode is on, `INS` appears on the status line. The character at the cursor position and any characters to the right on the same line move right for each character entered. Data that moves beyond the right margin or beyond a protected field is lost.

When insert mode is off, each character entered overwrites the existing character.

Inserting Space Characters

Insert one space character **ESC Q**

This command inserts a space character at the cursor location. All characters from the cursor to the end of the line are moved one position to the right. The last character in the line is lost. If protect mode is on and the moving data encounters a protected field before the end of the line, the last unprotected character before the protected field is lost.

Insert line of space characters **ESC E**

This command inserts a line of space characters, moving all lines from the current cursor line to the end of the active data segment down one line. The cursor moves to the first position of the new line. If protect mode is on, the command is ignored.

Deleting Characters

Delete cursor character **ESC W**

This command deletes the character at the cursor position. All characters from the cursor to the end of the line are pulled to the left one position and a space character is added to the end of the line. If protect mode is on and a protected field is encountered before the end of the line, all characters up to the protected field are pulled to the left one position, and a space character is added at the last position before the protected field.

Delete line **ESC R**

This command deletes the entire cursor line. All following lines in the active data segment are moved up one line, and the cursor moves to the start of the line. The bottom line is filled with space characters. If protect mode is on, the command is ignored.

EDITING THE SCREEN

This section tells how to clear (replace) individual characters, all data on the screen, or designated sections of the screen.

Clearing a character position is different from deleting the character. When you delete a character, all following characters are pulled to the left one position. When you clear characters, they are replaced with other characters.

Clearing the Screen

Clear screen to nulls **ESC ***

Clear screen to spaces **ESC +**

These commands

- Replace all data on the screen (or in the active data segment) with null or space characters
- Turn off protect and write-protect modes
- Return the cursor to the home position

☐ **Note** The difference between null and space characters is that null characters are not sent in block transmissions (see "Block Mode" in Chapter 2).

Clear screen to write-protected spaces **ESC ,**

This command

- Replaces all data on the screen with write-protected space characters
- Turns off protect and write-protect modes
- Returns the cursor to the home position

Clearing Unprotected Data

Clear unprotected characters to spaces **ESC ;** or **CTRL Z**

Clear unprotected characters to nulls **ESC :**

These commands clear all unprotected characters on the screen to either space or null characters, and return the cursor to the home position.

Clear unprotected characters to a specified character **ESC . *char***

where
char is the character that replaces all unprotected characters on the screen.

For example, to fill the screen with uppercase Es (used by service technicians to align the screen), send **ESC . E** or, in hexadecimal, **IBH 2EH 45H**

☐ **Note** The **ESC ! *attr*** sequence, which clears unprotected characters to a display attribute, is discussed earlier in this chapter (see "Assigning Character Display Attributes").

Clear unprotected characters to spaces from cursor **ESC Y**

Clear unprotected characters to nulls from cursor **ESC y**

These commands replace all characters from the current cursor location to the end of the screen (or active data segment) with either space or null characters. If protect mode is on, only unprotected characters are cleared.

Clear unprotected line to spaces from cursor **ESC T**

Clear unprotected line to nulls from cursor **ESC t**

These commands replace all unprotected characters from the cursor position to the end of the line (or to the start of a protected field) with either space or null characters.

☐ **Note** The **ESC V** command to clear a column is discussed earlier in this chapter (see "Protecting a Column").

A Escape Sequences

Table A-1 lists in ASCII order the escape sequences supported by the terminal in the native personality and references the page where you'll find the main discussion of the command. (Control codes are listed separately in Appendix B.)

☐ **Note** Values for the variables (shown in italics) are not included here. You can find them with the command descriptions on the referenced page, or listed in alphabetical order at the end of Table C-1. Table C-1 lists, under functional categories, all the commands recognized by the terminal in all personalities.

Table A-1 Escape Sequences

Sequence	Command	Page
ESC SPACE	Send terminal identifier Response: 35 CR	2-11
ESC ! *attr*	Clear unprotected characters to display attribute	4-14
ESC "	Unlock keyboard	3-7
ESC #	Lock keyboard	3-7
ESC &	Turn on protect mode	4-21
ESC '	Turn off protect mode	4-21
ESC (	Turn off write-protect mode	4-20
ESC)	Turn on write-protect mode	4-20
ESC *	Clear screen to nulls	4-24
ESC +	Clear screen to spaces	4-24
ESC ,	Clear screen to write-protected spaces	4-24
ESC – *seg/page line col*	Address cursor in specific 80-column page or data segment	4-15
ESC . *char*	Clear unprotected characters to a specified character[2]	4-25
ESC /	Read 80-column data segment/page number and cursor address Response: *seg/page line col* CR	4-18

Table A-1 Escape Sequences, Continued

Sequence	Command	Page
ESC 0	Clear all tab stops	4-19
ESC 1	Set tab stop at cursor position	4-19
ESC 2	Clear tab stop at cursor position	4-19
ESC 3	Clear all tab stops	4-19
ESC 4	Send unprotected line	2-9
ESC 5	Send unprotected page	2-10
ESC 6	Send line	2-9
ESC 7	Send page	2-10
ESC 8	Mark block beginning with STX character	2-10
ESC 9	Mark block end with ETX character	2-10
ESC :	Clear unprotected characters to nulls	4-25
ESC ;	Clear unprotected characters to spaces	4-25
ESC <	Turn off keyclick[1]	3-9
ESC = *line col*	Address cursor to line and column in current 80-column page	4-15
ESC >	Turn on keyclick[1]	3-9
ESC ?	Read cursor address in current 80-column page Response: *line col* CR	4-18
ESC @	Print formatted unprotected page	2-12
ESC A 0 *attr*	Assign display attribute to data area	4-13
ESC A 1 *attr*	Assign display attribute to label line	4-13
ESC A 2 *attr*	Assign display attribute to terminal message field on status line	4-13
ESC A 3 *attr*	Assign display attribute to computer message field on status line	4-13
ESC B	Turn off conversation mode (block mode on)	2-4, 2-5
ESC C	Turn on conversation mode (block mode off)	2-3
ESC C ESC DF	Turn on full-duplex (FDX) mode	2-3
ESC C ESC DH	Turn on half-duplex (HDX) mode	2-3
ESC D F	Turn on full-duplex conversation or block mode	2-3, 2-4
ESC D F ESC B	Turn on block (BLK) mode	2-4
ESC D H	Turn on half-duplex conversation or block mode	2-3, 2-5
ESC D H ESC B	Turn on half-duplex block (HBLK) mode	2-5
ESC E	Insert line of space characters[3]	4-23

Table A-1 Escape Sequences, Continued

Sequence	Command	Page
ESC F *message* CR	Program and display computer message on status line	4-2
ESC G *attr*	Assign character display attribute	4-14
ESC H CTRL B	Turn on graphics mode	3-10
ESC H CTRL C	Turn off graphics mode	3-10
ESC H *ldraw*	Display one graphics character	3-10
ESC I	Backtab	4-20
ESC J	Display previous page (or activate other data segment)	4-6, 4-9
ESC K	Display next page (or activate other data segment)	4-6, 4-9
ESC L	Print unformatted page	2-12
ESC M	Send one character	2-9
ESC N	Turn off autoscrolling mode	4-11
ESC O	Turn on autoscrolling mode (default)	4-11
ESC P	Print formatted page	2-11
ESC Q	Insert one space character	4-23
ESC R	Delete line[3]	4-24
ESC S	Send unprotected characters in block	2-10
ESC T	Clear unprotected line to spaces from cursor	4-25
ESC U	Turn on monitor mode	3-11
ESC V	Protect column	4-21
ESC W	Delete cursor character	4-24
ESC X	Turn off monitor mode	3-11
ESC Y	Clear unprotected characters to spaces from cursor	4-25
ESC [*line*	Address cursor to line in current 80-column page	4-15
ESC \ 0 *attr*	Assign display attribute to data area	4-13
ESC \ 1 *attr*	Assign display attribute to label line	4-13
ESC \ 2 *attr*	Assign display attribute to terminal message field on status line	4-13
ESC \ 3 *attr*	Assign display attributes to computer message field on status line	4-13
ESC]	Activate upper data segment	4-9
ESC ^ 0	Restore normal screen (default)	4-7
ESC ^ 1	Reverse screen	4-7
ESC ^ 2	Set attribute active to end of screen (default)	4-14

Table A-1 Escape Sequences, Continued

Sequence	Command	Page
ESC ^ 3	Set attribute active to end of line	4-14
ESC _ *col*	Address cursor to column in current 80-column page	4-15
ESC ` *cursor*	Set cursor display features	4-7
ESC ` *scroll*	Set scrolling speed and type	4-10
ESC ` *wpca*	Assign write-protected character display attribute	4-22
ESC ` 8	Turn off screen display	4-6
ESC ` 9	Turn on screen display (default)	4-6
ESC ` :	Select 80-column display (default)	4-5
ESC ` ;	Select 132-column display	4-5
ESC ` a	Turn on editing status line	4-7
ESC ` b	Turn on standard status line (default)	4-7
ESC ` c	Turn off status line display	4-7
ESC a *ll* R *ccc* C	Address cursor in current 80/132-column page	4-15
ESC b	Read cursor address in current 80/132-column page Response: *ll* R *ccc* C	4-18
ESC c	Activate upper data segment	4-9
ESC d *ll* R *ccc* C	Address cursor in current 80/132-column page	4-15
ESC e $	Turn off keyclick	3-9
ESC e %	Turn on keyclick	3-9
ESC e &	Turn on CAPS LOCK	3-9
ESC e '	Turn off CAPS LOCK (default)	3-9
ESC e –	Turn on key repeat (default)	3-9
ESC e ,	Turn off key repeat	3-9
ESC e .	Turn off 80/132 width-change-clear mode (default)	4-5
ESC e /	Turn on 80/132 width-change-clear mode	4-5
ESC e 4	Receive CR mode = CR (default)	4-12
ESC e 5	Receive CR mode = CRLF	4-12
ESC e 8	Assign MODEM port as host port (default)	2-3
ESC e 9	Assign AUX port as host port	2-3
ESC e ?	Select 10x13 character cell (80 Hz)	4-7
ESC e F	Turn off economy 80-column mode (default)	4-5

Table A-1 Escape Sequences, Continued

Sequence	Command	Page
ESC e G	Turn on economy 80-column mode	4-5
ESC e P	Turn off screen saver	4-6
ESC e Q	Turn on screen saver	4-6
ESC e R	Turn on nulls suppress	2-11
ESC e S	Turn off nulls suppress	2-11
ESC e T	Define CAPS LOCK key as caps (default)	3-9
ESC e U	Define CAPS LOCK as reverse	3-9
ESC e V	Define CAPS LOCK as shift	3-9
ESC e x	Turn off multiple-page mode (default)	4-6
ESC e y	Turn on multiple-page mode	4-6
ESC e z	Select 10x15 character cell (70 Hz, default)	4-7
ESC f *text* CR	Program and display computer message on label line	4-3
ESC g	Turn on shifted and unshifted label line display[1]	4-3
ESC h	Turn off shifted and unshifted label line display[1]	4-3
ESC i	Tabulate cursor	4-20
ESC j	Move cursor up one line in current column; scroll (reverse linefeed)	4-19
ESC k	Turn on local edit mode, duplex edit mode off	2-6
ESC l	Turn on duplex edit mode, local edit mode off	2-6
ESC n	Turn on screen display[1] (default)	4-6
ESC o	Turn off screen display[1]	4-6
ESC p	Print unformatted page	2-12
ESC q	Turn on insert mode, replace mode off	4-23
ESC r	Turn off insert mode, replace mode on	4-23
ESC s	Send a block	2-10
ESC t	Clear unprotected line to nulls from cursor	4-25
ESC u	Turn off monitor mode	3-11
ESC v	Turn on autopage mode	4-12
ESC w *page*	Display specific page	4-6
ESC w B	Display previous page	4-6
ESC w C	Display next page	4-6
ESC x 0	Redefine screen as one data segment and clear screen	4-10
ESC x 1 *line*	Split screen horizontally and clear screen[4]	4-8

Table A-1 Escape Sequences, Continued

Sequence	Command	Page
ESC y	Clear unprotected page to nulls from cursor	4-25
ESC z *field* CR	Clear function key label	4-4
ESC z *field label* CR	Program and display a function key label	4-4
ESC z) *text* CR	Program and display computer message on shifted label line	4-3
ESC z (*text* CR	Program and display computer message on unshifted label line	4-3
ESC z) CR	Clear shifted label line	4-3
ESC z (CR	Clear unshifted label line	4-3
ESC z DEL	Turn off shifted label line display	4-3
ESC z *key* DEL	Clear a programmable key	3-5
ESC z *key sequence* DEL	Program a programmable key	3-5
ESC {	Home cursor	4-16
ESC ¦ 0	Redefine screen as one data segment and clear screen[1]	4-10
ESC ¦ 1 *line*	Split screen horizontally and clear screen [1, 4]	4-8
ESC }	Activate lower data segment	4-9
ESC ~ SPACE	Turn off enhance mode	2-5
ESC ~ !	Turn on enhance mode	2-5
ESC ~ "	Select Wyse 35 personality	2-5
ESC ~ #	Select TVI 910+ personality	2-5
ESC ~ $	Select TV 925 personality	2-5
ESC ~ %	Select ADDS A2 personality	2-5
ESC ~ b	Select TVI 905 personality	2-5

1. With enhance mode on.
2. Character is write-protected if write-protect mode is on.
3. Command is ignored if protect mode is on.
4. If command is sent by host, the terminal returns an ACK character (06H) to the host after executing the command.

B Control Codes

Table B-1 lists the control codes recognized by the terminal in the native personality.

Table B-1 Control Codes

ASCII Character	Hex Value	Decimal Value	Display Symbol[1]	Control Key	Action[2]
NUL	00	000	(blank)	@ or \	
SOH	01	001	S_H	A	
STX	02	002	S_X	B	Unlock keyboard[3]
ETX	03	003	E_X	C	
EOT	04	004	E_T	D	Lock keyboard[3]
ENQ	05	005	E_Q	E	Send ACK if not busy
ACK	06	006	A_K	F	Cursor right[3]
BEL	07	007	B_L	G	Sound bell
BS	08	008	B_S	H	Cursor left (backspace)
HT	09	009	H_T	I	Tab cursor
LF	0A	010	L_F	J	Cursor down (linefeed), scroll
VT	0B	011	V_T	K	Cursor up, no scroll
FF	0C	012	F_F	L	Cursor right
CR	0D	013	C_R	M	Cursor to start of line
SO	0E	014	S_O	N	Unlock keyboard
SI	0F	015	S_I	O	Lock keyboard
DLE	10	016	T	P	Cursor to specific column[3]
DC1 (XON)	11	017	ι	Q	Resume transmission (XON)[4]
DC2	12	018	r	R	Copy print mode on
DC3 (XOFF)	13	019	٦	S	Suspend transmission (XOFF)[4]
DC4	14	020	⊦	T	All print modes off
NAK	15	021	⅃	U	Cursor left[3]

Table B-1 Control Codes, Continued

ASCII Character	Hex Value	Decimal Value	Display Symbol[1]	Control Key	Action[2]
SYN	16	022	▏	[V]	Cursor down, no scroll
ETB	17	023	▉	[W]	Cursor off[3]
CAN	18	024	▕	[X]	Transparent print mode on[3]
EM	19	025	▏	[Y]	
SUB	1A	026	–	[Z]	Home cursor, clear unprotected characters
ESC	1B	027	▒	[{] or [[]	Initiate escape sequence
FS	1C	028	=	[¦] or [\]	
GS	1D	029	⊥	[}] or [ ]]	
RS	1E	030	‖	[~] or [^]	Home cursor
US	1F	031	▒	[_] or [Del]	Cursor to start of next line

1. Characters displayed when monitor mode is on.
2. A blank in this column means the code is ignored.
3. With enhance mode on.
4. If handshaking is XON/XOFF.

C Command Summary

INTRODUCTION

Table C-1 summarizes the commands supported by the terminal in each terminal personality. The commands are listed under the following functional categories:

The native personality command sequence is listed immediately after the command description. Variables are shown in italics and listed alphabetically at the end of the table.

The remaining columns show the support for the command in other personalities according to the following notations:

- Same = Native personality command sequence is supported.
- ENH = Native personality command sequence is supported when enhance mode is on.

- A different command sequence in any column means that the related terminal's native command is supported. Refer to the other terminal's documentation for the complete command sequence and variable values.
- A blank in any column means that the command function is not supported in that personality.

Table C-1 Summary of Supported Commands

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Selecting Personalities					
Turn off enhance mode	ESC ~ SPACE	Same	Same	Same	Same
Turn on enhance mode	ESC ~ !	Same	Same	Same	Same
Select Wyse 35 personality	ESC ~ "	Same	Same	Same	Same
Select TVI 910+ personality	ESC ~ #	Same	Same	Same	Same
Select TVI 925 personality	ESC ~ $	Same	Same	Same	Same
Select ADDS A2 personality	ESC ~ %	Same	Same	Same	Same
Select TVI 905 personality	ESC ~ b	Same	Same	Same	Same
Communicating with the Computer					
Assign MODEM port as host port (default)	ESC e 8	ENH	ENH	ENH	ENH
Assign AUX port as host port	ESC e 9	ENH	ENH	ENH	ENH
Enable transmission (XON)[1]	CTRL Q	Same	Same	Same	
Stop transmission (XOFF)[1]	CTRL S	Same	Same	Same	
Enable DTR handshaking			CTRL N	CTRL N	CTRL N
Enable XON/XOFF handshaking			CTRL O	CTRL O	CTRL O
Send ACK if not busy	CTRL E	ENH	ENH	ENH	
Turn on full-duplex (FDX) mode	ESC C ESC D F	ENH	ENH	Same	
Turn on half-duplex (HDX) mode	ESC C ESC D H	ENH	ENH	Same	
Turn off conversation mode (block mode on)	ESC B	ENH	ENH	Same	Same
Turn on conversation mode (Block mode off)	ESC C	ENH	ENH	Same	Same
Turn on block (BLK) mode	ESC D F ESC B	ENH	ENH	ENH	
Turn on half-duplex block (HBLK) mode	ESC D H ESC B	ENH	ENH	ENH	
Send terminal identifier (Response: 35 CR)	ESC SPACE	ENH	ENH	ESC M	ESC M
Send answerback message (of up to 20 bytes)					CTRL E

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Controlling the Terminal and Keyboard					
Turn on monitor mode	ESC U	ENH	Same	Same	Same
Turn off monitor mode	ESC u or ESC X	ENH ENH	Same Same	Same Same	Same Same
Turn on local edit mode, duplex edit mode off	ESC k		Same	Same	Same
Turn on duplex edit mode, local edit mode off	ESC l		Same	Same	Same
Sound bell	CTRL G	Same	Same	Same	Same
Unlock keyboard	ESC " or CTRL N or CTRL B[2]	ENH or CTRL B or ESC 6	Same ENH	Same ENH	Same
Lock keyboard	ESC # or CTRL O or CTRL D[2]	ENH or CTRL D or ESC 5	Same ENH	Same ENH	Same
Turn off keyclick	ESC e $ or ESC <[2]	ENH or ENH	ENH or ENH	ENH or ESC <	ENH or ESC <
Turn on keyclick	ESC e % or ESC >[2]	ENH or ENH	ENH or ENH	ENH or ESC >	ENH or ESC >
Turn on key repeat (default)	ESC e –	ENH	ENH	ENH	ENH
Turn off key repeat	ESC e ,	ENH	ENH	ENH	ENH
Turn on CAPS LOCK	ESC e &	ENH	ENH	ENH	ENH
Turn off CAPS LOCK (default)	ESC e '	ENH	ENH	ENH	ENH
Define CAPS LOCK key as caps (default)	ESC e T	ENH	ENH	ENH	ENH
Define CAPS LOCK as reverse	ESC e U	ENH	ENH	ENH	ENH
Define CAPS LOCK as shift	ESC e V	ENH	ENH	ENH	ENH
Set/return time				ESC SPACE	
Redefining the Keys					
Program a programmable key	ESC z *key sequence* DEL	ENH	ENH	ENH	ENH or ESC | *p1 p2 message* CTRL Y
Clear a programmable key	ESC z *key* DEL	ENH	ENH	ENH	ENH

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Screen and Cursor Display					
Turn off screen display	ESC ` 8 or ESC o[2]	ENH ENH	ENH	ESC o	ESC o
Turn on screen display (default)	ESC ` 9 or ESC n[2]	ENH ENH	ENH	ESC n	ESC n
Reverse screen	ESC ^ 1	ENH	ENH	ESC b	ESC b
Restore normal screen (default)	ESC ^ 0	ENH	ENH	ESC d	ESC d
Set scrolling speed and type	ESC ` *scroll*	ENH			ENH
Set cursor display features	ESC ` *cursor*	ENH	ESC . *cursor*	ESC . *cursor*	ESC . *cursor*
Cursor display off	ESC ` 0 or CTRL W[2]	ENH or CTRL W	ENH	ENH	
Cursor display on	ESC ` 1	CTRL X			
Turn on editing status line	ESC ` a	ENH	ESC . a	ESC . a	ESC . a
Turn on standard status line (default)	ESC ` b	ENH	ESC . b	ESC . b	ESC . b
Turn off status line display	ESC ` c	ENH	ESC . c	ESC . c	ESC . c
Turn off screen saver	ESC e P	ENH	ENH	ENH	ENH
Turn on screen saver	ESC e Q	ENH	ENH	ENH	ENH
Select 10x13 character cell (80 Hz)	ESC e ?	ENH	ENH	ENH	ENH
Select 10x15 character cell (70 Hz, default)	ESC e z	ENH	ENH	ENH	ENH
Displaying the Message Fields					
Select 80-column display (default)	ESC ` :	ENH	ESC ‘ :	ESC ‘ :	ESC ‘ :
Select 132-column display	ESC ` ;	ENH	ESC ‘ ;	ESC ‘ ;	ESC ‘ ;
Turn off 80/132 width-change-clear mode (default)	ESC e .	ENH	ENH	ENH	ENH
Turn on 80/132 width-change-clear mode	ESC e /	ENH	ENH	ENH	ENH
Turn off economy 80-column mode (default)	ESC e F	ENH	ENH	ENH	ENH
Turn on economy 80-column mode	ESC e G	ENH	ENH	ENH	ENH
Turn off multiple-page mode (default)	ESC e x	ENH	ENH	ENH	ENH
Turn on multiple-page mode	ESC e y	ENH	ENH	ENH	ENH
Display specific page	ESC w *page*	ENH			

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Displaying the Message Fields, Continued					
Display previous page (or activate other segment)	ESC w B or ESC J	ENH	ENH	ENH	Same
Display next page (or activate other segment)	ESC w C or ESC K	ENH or ENH	Same	Same	Same
Program and display computer message on status line	ESC F *message* CR	ENH	ENH	ENH	Same
Program and display computer message on shifted label line	ESC z) *text* CR	ENH	ENH	ENH	ENH
Program and display computer message on unshifted label line	ESC z (*text* CR	ENH	ENH	ENH	ENH
Turn on shifted and unshifted label line display	ESC g[2]	ENH	ENH	ESC g	ESC g
Turn off shifted and unshifted label line display	ESC h[2]	ENH	ENH	ESC h	ESC h
Program and display computer message on label line	ESC f *text* CR	ENH	ENH	Same	ESC f *text* CTRL M
Turn off shifted label line display	ESC z DEL	ENH	ENH	ENH	ENH
Clear unshifted label line	ESC z (CR	ENH	ENH	ENH	ENH
Clear shifted label line	ESC z) CR	ENH	ENH	ENH	ENH
Program and display function key label[3]	ESC z *field label* CR	ENH	ENH	ENH	ENH
Clear function key label	ESC z *field* CR	ENH	ENH	ENH	ENH
Splitting the Screen					
Split screen horizontally and clear screen[4]	ESC x 1 *line* or ESC ¦ 1 *line*[2]	ENH ENH	ENH	ENH	
Activate upper data segment	ESC] or ESC c	ENH ENH	ENH	ENH	
Activate lower data segment	ESC }	ENH	ENH	ENH	
Redefine screen as one data segment and clear screen	ESC x 0 or ESC ¦ 0[2]	ENH ENH	ENH	ENH	

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Display Attributes					
Assign display attribute to a message field	ESC A *mf attr* or ESC \ *mf attr*	ENH ENH	ENH	ENH	
Assign character display attribute	ESC G *attr*	ENH	Same	Same	
Set attribute active to end of screen (default)	ESC ^ 2	ENH	ENH	ENH	
Set attribute active to end of line	ESC ^ 3	ENH	ENH	ENH	
Assign write-protected character display attribute	ESC ` *wpca*	ESC 0			
Clear unprotected characters to display attribute	ESC ! *attr*	ENH	ENH	ENH	
Protecting Data					
Turn off write-protect mode	ESC (	ENH or CTRL O	Same	Same	Same
Turn on write-protect mode	ESC)	ENH or CTRL N	Same	Same	Same
Protect column	ESC V	ENH	ENH	ENH	
Turn off protect mode	ESC '	ENH	Same	Same	Same
Turn on protect mode	ESC &	ENH	Same	Same	Same
Graphics Characters					
Turn on graphics mode	ESC H CTRL B	ENH	ENH	ENH	
Turn off graphics mode	ESC H CTRL C	ENH	ENH	ENH	
Display one graphics character	ESC H *ldraw*	ENH	ENH	ENH	
Special graphics mode on					ESC $[5]
Special graphics mode off					ESC %
Controlling the Cursor					
Turn on autopage mode	ESC v	ENH	Same	Same	ESC w
Turn off autopage mode			ESC w	ESC w	ESC v
Receive CR mode = CR (default)	ESC e 4	ENH	ENH	ENH	ENH
Receive CR mode = CRLF	ESC e 5	ENH	ENH	ENH	ENH
Cursor left (backspace)	CTRL H or CTRL U[2]	Same or CTRL U	Same ENH	Same ENH	Same
Cursor right	CTRL L or CTRL F[2]	CTRL F	Same	Same	Same

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Controlling the Cursor, Continued					
Cursor up; no scroll	CTRL K	CTRL Z	Same	Same	Same
Move cursor up one line in current column; scroll (reverse linefeed)	ESC j	ENH	ENH	Same	Same
Cursor down; no scroll	CTRL V	ENH	ENH	Same	Same
Cursor down; scroll (linefeed)	CTRL J	Same	Same	Same	Same
Cursor to start of line	CTRL M	Same	Same	Same	Same
Cursor to start of next line	CTRL _	ENH	Same	Same	Same
Home cursor	ESC { or CTRL ^	ENH or CTRL A	ENH Same	ENH Same	Same
Address cursor to column in current 80-column page	ESC _ *col* or CTRL P *col*[2]	ENH or CTRL P *col*	ENH ENH or ESC][2]	ENH ENH or ESC][2]	
Address cursor to line in current 80-column page	ESC [*line*	ENH or CTRL K	ENH	ENH	
Turn off autoscrolling mode	ESC N	ENH	ENH	ENH	ESC v
Turn on autoscrolling mode (default)	ESC O	ENH	ENH	ENH	ESC w
Address cursor to line and column in current 80-column page	ESC = *line col*	ENH or ESC Y	Same	Same	Same
Address cursor in current 80/132-column page	ESC a *ll* R *ccc* C or ESC d *ll* R *ccc* C[2]	ENH Same	ENH		
Address cursor in specific 80-column or data segment	ESC – *seg/page line col*	ENH	Same	Same	ENH
Read cursor address in current 80-column page (Response: *line col* CR)	ESC ?	ENH	Same	Same	Same
Read 80-column data segment/page number and cursor address (Response: *seg/page line col* CR)	ESC /	ENH	ENH	Same	ENH
Read cursor address in current 80/132-column page (Response: *ll* R *ccc* C)	ESC b	ENH	ENH		ESC ?

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Editing					
Clear all tab stops	ESC 0 or ESC 3		ENH Same	ENH Same	Same
Set tab stop at cursor position	ESC 1	ENH	Same	Same[6]	Same[6]
Clear tab stop at cursor position	ESC 2	ENH	Same	Same	Same
Tabulate cursor	ESC i or CTRL I	ENH ENH	Same	Same	Same
Backtab	ESC I	ENH	Same	Same	Same
Field tab			ESC i	ESC i	ESC i[7]
Turn on insert mode, replace mode off	ESC q	ENH	ENH	ENH	ENH
Turn off insert mode, replace mode on	ESC r	ENH	ENH	ENH	ENH
Insert one space character	ESC Q	ENH	Same	Same	Same
Insert line of spaces characters[3]	ESC E	ENH or ESC M	Same	Same	Same
Delete cursor character	ESC W	ENH	Same	Same	Same
Delete line[3]	ESC R	ENH or ESC l[2]	Same	Same	Same
Clearing Data					
Clear screen to nulls	ESC *	ENH	Same	Same	Same
Clear screen to spaces	ESC +	ENH or CTRL L			
Clear screen to write-protected spaces	ESC ,	ENH			Same
Clear cursor column to write-protected spaces	ESC V	ENH	ENH	ENH	
Clear unprotected characters to spaces	ESC ; or CTRL Z	ENH	Same Same or ESC +	Same Same or ESC +	Same Same or ESC +
Clear unprotected characters to nulls	ESC :	ENH	Same	Same	Same[9]
Clear unprotected characters to specified character[8]	ESC . *char*	ENH			
Clear unprotected characters to protected spaces			ESC ,	ESC ,	ESC ,
Clear unprotected tab field to spaces					CTRL X

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Clearing Data, Continued					
Clear unprotected characters to display attribute	ESC ! *attr*	ENH	ENH	ENH	Same
Clear unprotected characters to spaces from cursor	ESC Y		Same	Same	Same
Clear unprotected characters to nulls from cursor	ESC y	ENH or ESC k	Same	Same	Same[9]
Clear unprotected line to spaces from cursor	ESC T	ENH	Same	Same	Same
Clear unprotected line to nulls from cursor	ESC t	ENH or ESC K	Same	Same	Same[9]
Sending Data					
Send one character	ESC M		ENH		
Send line	ESC 6		Same	Same	Same
Send unprotected line	ESC 4		Same	Same	Same
Send page	ESC 7	ENH	Same	Same	Same
Send unprotected page	ESC 5		Same	Same	Same
Mark block beginning with STX character	ESC 8	ENH	ENH	ENH	ESC CTRL B
Mark block end with ETX character	ESC 9	ENH	ENH	ENH	ESC CTRL C
Send a block	ESC s	ENH	Same	Same	Same
Send unprotected characters in block	ESC S	ENH	Same	Same	Same
Define delimiters			ESC x *delim d1 d2*	ESC x *delim d1 d2*	ESC x *delim d1 d2*
Print Functions					
Turn on nulls suppress	ESC e R	ENH	ENH	ENH	ENH
Turn off nulls suppress	ESC e S	ENH	ENH	ENH	ENH
Print formatted page	ESC P	ENH	ENH	Same	
Print formatted unprotected page	ESC @	ENH			ESC P
Print unformatted page	ESC p or ESC L	ENH ENH	ENH ENH		ESC L
Print formatted page with time				ESC L	

Table C-1 Summary of Supported Commands, Continued

Function	Native Personality	ADDS A2	TeleVideo 910+	TeleVideo 925	TeleVideo 905
Print Functions, Continued					
Copy print mode off	CTRL T	Same	Same or ESC A	Same or ESC A	ESC A
Copy print mode on	CTRL R	Same	ENH or ESC @	Same or ESC @	ESC @
Transparent print mode off	CTRL T	Same or ESC 4	ESC a	ESC a	ESC a
Transparent print mode on	CTRL X[2]	ESC 3	ENH or ESC `	ENH or ESC `	ESC `
Buffered bidirectional print mode on					CTRL R
Buffered bidirectional print mode off					CTRL T
Set print terminator			ESC p *trm*	ESC p *trm*	ESC p *trm*
Resetting the Terminal					
Reset terminal to factory default values.[10]					ESC ~ 0
Reset terminal to values stored in battery-backed memory.[11]					ESC ~ 1
Reset function keys (including editing keys) to factory default values.					ESC ~ 2

1. If XON/XOFF handshaking is enabled.
2. With enhance mode on.
3. Command ignored with protect mode on.
4. If command is sent by host, the terminal returns an ACK character (06H) to the host after executing the command.
5. When monitor mode is off, 10H through 7FH all display write-protected graphics characters.
6. If protect mode is off.
7. When protect mode is on.
8. Write-protected if write-protect mode is on.
9. When protect and write-protect modes are on.
10. Sound bell, clear display, and remain in TeleVideo 905 personality.
11. Sound bell, clear display, and unlock keyboard.

Variable Values for Table C-1

attr	**Display Attributes**
SP	Space character
0	Normal
1	Blank (no display)
2	Blink
3	Blink, blank
4	Reverse
5	Reverse and blank
6	Reverse and blink
7	Reverse, blink, blank
8	Underline
9	Underline and blank
:	Underline and blink
;	Underline, blink, blank
<	Underline and reverse
=	Underline, reverse, blank
>	Underline, reverse, blink
?	Underline, reverse, blink, blank

*attr**	**Display Attributes***
p	Dim
q	Dim and blank
r	Dim and blink
s	Dim, blink, blank
t	Dim and reverse
u	Dim, reverse, blank
v	Dim, reverse, blink
w	Dim, reverse, blink, blank
x	Dim and underline
y	Dim, underline, blank
z	Dim, underline, blink
{	Dim, underline, blink, blank
!	Dim, underline, reverse
}	Dim, underline, reverse, blank
~	Dim, underline, reverse, blink
DEL	Dim, underline, reverse, blink, blank

ccc	One-, two-, or three-digit decimal value of column relative to home
char	Character that replaces unprotected characters

* The values and display attributes in this column are not recognized in TVI 905 personality.

Variable Values for Table C-1, Continued

Column	*col* Native[1]	*col* ADDS A2[2]	Column	*col* Native[1]	*col* ADDS A2[2]	Column	*col* Native[1]	*col* ADDS A2[2]
1	SP	CTRL @	28	;	'	55	V	T
2	!	CTRL A	29	<	(	56	W	U
3	"	CTRL B	30	=	)	57	X	V
4	#	CTRL C	31	>	0	58	Y	W
5	$	CTRL D	32	?	1	59	Z	X
6	%	CTRL E	33	@	2	60	[	Y
7	&	CTRL F	34	A	3	61	\	/
8	'	CTRL G	35	B	4	62	]	a
9	(	CTRL H	36	C	5	63	^	b
10	)	CTRL I	37	D	6	64	_	c
11	*	CTRL P	38	E	7	65	`	d
12	+	CTRL Q	39	F	8	66	a	e
13	,	CTRL R	40	G	9	67	b	f
14	–	CTRL S	41	H	@	68	c	g
15	.	CTRL T	42	I	A	69	d	h
16	/	CTRL U	43	J	B	70	e	i
17	0	CTRL V	44	K	C	71	f	p
18	1	CTRL W	45	L	D	72	g	q
19	2	CTRL X	46	M	E	73	h	r
20	3	CTRL Y	47	N	F	74	i	s
21	4	SP	48	O	G	75	j	t
22	5	!	49	P	H	76	k	u
23	6	"	50	Q	I	77	l	v
24	7	#	51	R	P	78	m	w
25	8	$	52	S	Q	79	n	x
26	9	%	53	T	R	80	o	y
27	:	&	54	U	S			

1. These codes are also recognized in TVI 910+ and TVI 925 personalities and in ADDS A2 personality absolute cursor addressing.
2. Horizontal addressing (CTRL P).

Variable Values for Table C-1, Continued

cursor	**Cursor Display**	*cursor*	**Cursor Display**
0	Cursor display off	3	Blinking line cursor
1	Cursor display on (default)	4	Steady line cursor
2	Steady block cursor	5	Blinking block cursor (default)

d1 7-bit character (see delim)

d2 7-bit character (see delim)

delim	**Delimiter**	**d1 (default)**	**d2 (default)**
0	field code	FS (1CH)	NULL* (00H)
1	line code	US (1FH)	NULL* (00H)
2	start protected field	ESC (1BH)	)
3	end protected text	ESC (1BH)	(
4	end of text	CR (0DH)	NULL* (00H)

* Using Null (00H) specifies no delimiter

Key	***field*** **Unshifted**	***field*** **Shifted**	**Key**	***field*** **Unshifted**	***field*** **Shifted**
F1	0 or 8	P or X	F5 [1]	4 or <	T or \
F2	1 or 9	Q or Y	F6 [2]	5 or =	U or]
F3	2 or :	R or Z	F7 [3]	6 or >	V or ^
F4	3 or ;	S or [	F8 [4]	7 or ?	W or_

1. F5 is equivalent to Ctrl F1; Shift F5 is equivalent to Ctrl Shift F1.
2. F6 is equivalent to Ctrl F2; Shift F6 is equivalent to Ctrl Shift F2.
3. F7 is equivalent to Ctrl F3; Shift F7 is equivalent to Ctrl Shift F3.
4. F8 is equivalent to Ctrl F4; Shift F8 is equivalent to Ctrl Shift F4.

Variable Values for Table C-1, Continued

Key	*key* Unshifted	*key* Shifted
F1	@	`
F2	A	a
F3	B	b
F4	C	c
F5 [1]	D	d
F6 [2]	E	e
F7 [3]	F	f
F8 [4]	G	g
Esc	SPACE	
Tab	!	
Back Space	"	
Del	#	
Return	$	
Line Feed	%	
▲	+	
▼	,	
◀	−	
▶	.	

Key	*key* Unshifted
Home	/
.*kpd*	p
-*kpd*	q
.*kpd*	r
Enter	s
0*kpd*	t
1*kpd*	u
2*kpd*	v
3*kpd*	w
4*kpd*	x
5*kpd*	y
6*kpd*	z
7*kpd*	{
8*kpd*	¦
9*kpd*	}

1. F5 is equivalent to Ctrl F1; Shift F5 is equivalent to Ctrl Shift F1.
2. F6 is equivalent to Ctrl F2; Shift F6 is equivalent to Ctrl Shift F2.
3. F7 is equivalent to Ctrl F3; Shift F7 is equivalent to Ctrl Shift F3.
4. F8 is equivalent to Ctrl F4; Shift F8 is equivalent to Ctrl Shift F4.

Variable Values for Table C-1, Continued

label 8 characters

ldraw	Graphics Character	*ldraw*	Graphics Character	*ldraw*	Graphics Character	*ldraw*	Graphics Character
0	┬	4	├	8	┼	<	═
1	└	5	┘	9	┤	=	┴
2	┌	6	│	:	─	>	╫
3	┐	7	▓	;	▒	?	▒

Line	*line* Native[1]	*line* ADDS A2[2]	Line	*line* Native[1]	*line* ADDS A2[2]
1	SP	CTRL @	13	,	CTRL L
2	!	CTRL A	14	–	CTRL M
3	”	CTRL B	15	.	CTRL N
4	#	CTRL C	16	/	CTRL O
5	$	CTRL D	17	0	CTRL P
6	%	CTRL E	18	1	CTRL Q
7	&	CTRL F	19	2	CTRL R
8	’	CTRL G	20	3	CTRL S
9	(	CTRL H	21	4	CTRL T
10	)	CTRL I	22	5	CTRL U
11	*	CTRL J	23	6	CTRL V
12	+	CTRL K	24	7	CTRL W

1. These codes are also recognized in TVI 910+ and TVI 925 personalities and in ADDS A2 personality absolute cursor addressing.
2. Vertical addressing (CTRL K).

Variable Values for Table C-1, Continued

ll One- or two-digit decimal value of line relative to home

message 46 characters

mf	**Screen Area**
0	Data area
1	Label line
2	Terminal message field on status line
3	Computer message field on status line

p1	**Key**	*p1*	**Key**
1	F1	9	F9
2	F2	:	F10
3	F3	;	F11
4	F4	<	F12
5	F5	=	F13
6	F6	>	F14
7	F7	?	F15
8	F8	@	F16

p2	**Message Destination**
1	Send message to computer
2	Send message to terminal
3	Send message to both computer and terminal

- When a function key is reprogrammed, input bytes (messages) do not display on screen in any mode.
- In local mode, a programmed message cannot be sent to the computer regardless of the destination specified for the function key.
- There are two areas for storing programmable-key data—temporary buffers and battery-backed memory. Each area provides 1024 bytes total.
- Programming a function key in setup mode with TeleVideo 905 personality selected, automatically saves the data to battery-backed memory.
- The ESC | *p1 p2 message* CTRL Y command automatically saves the data to battery-backed memory. The ESC *z key sequence* DEL command loads the data into temporary buffers.

Variable Values for Table C-1, Continued

scroll	**Scrolling Type**	**Speed (lps)**
@	Jump scroll (default)	
<	Smooth scroll	1
=	Smooth scroll	2
>	Smooth scroll	4
?	Smooth scroll	8
H	Smooth scroll	15
I	Smooth scroll	20

seg/page	**Page or Data Segment**	*seg/page*	**Page or Data Segment**
0	Page 0 or upper segment	3	Page 3
1	Page 1 or lower segment	4	Page 4
2	Page 2	5	Page 5

sequence Up to 64 bytes to be loaded in key

text 78 characters

trm Any 7-bit character

wpca	**Write-Protected Display Attribute Native, TVI 910+/925**	*wpca*	**Write-Protected Display Attribute Native, TVI 910+/925**
6	Reverse	E	Double-wide and dim
7	Dim	F	Double-wide, reverse, dim
A	Normal	J	Underline
B	Reverse and dim	K	Underline and dim
C	Double-wide, normal	L	Underline and double-wide
D	Double-wide and reverse		

wpca	**Write-Protected Display Attribute ADDS A2**	*wpca*	**Write-Protected Display Attribute ADDS A2**
@	Normal	R	Reverse and blink
A	Dim	S	Reverse, dim, blink
B	Blink	`	Underline
C	Dim and blink	a	Underline and dim
D	Blank	b	Underline and blink
P	Reverse	c	Underline, dim, blink
Q	Reverse and dim		

D Character Sets

Figure D-1 ASCII Character Set

DEC ➡		0	16[1], 16[2]	32	48	64	80	96	112
⬇	HEX	0	1[1], 1[2]	2	3	4	5	6	7
0	0		┬		0	@	P		p
1	1	S_H	└ ╲	!	1	A	Q	a	q
2	2	S_X	┌ ╱	"	2	B	R	b	r
3	3	E_X	┐ ╲	#	3	C	S	c	s
4	4	E_T	├ ╱	$	4	D	T	d	t
5	5	E_Q	┘ └	%	5	E	U	e	u
6	6	A_K	│ ┌	&	6	F	V	f	v
7	7	B_L	■ ┐	'	7	G	W	g	w
8	8	B_S	┤ ┘	(	8	H	X	h	x
9	9	H_T	┤ ┼	)	9	I	Y	i	y
10	A	L_F	─ │	*	:	J	Z	j	z
11	B	V_T	▒ ─	+	;	K	[	k	{
12	C	F_F	═ ┤	,	<	L	\	l	¦
13	D	C_R	┴ ├	-	=	M	]	m	}
14	E	S_O	‖ ┬	.	>	N	^	n	~
15	F	S_I	▒ ┴	/	?	O	_	o	⌂

1. For Wyse 35, TVI 910+, TVI 925, and ADDS A2 personalities.
2. For TVI 905 personality.

Table D-1 National Replacement Characters*

Keyboard Language / ASCII Hex	# (23H)	< (3CH)	> (3EH)	@ (40H)	[(5BH)	\ (5CH)	] (5DH)	^ (5EH)	_ (5FH)	` (60H)	{ (7BH)	¦ (7CH)	} (7DH)	~ (7EH)
Danish					Æ	Ø	Å				æ	ø	å	
French/Belgian	£			à	°	ç	§				é	ù	è	¨
French Canadian				à	â	ç	ê	î		ô	é	ù	è	û
German				§	Ä	Ö	Ü				ä	ö	ü	ß
Italian	£			§	°	ç	é			ù	à	ò	è	ì
Portuguese					Ã	Ç	Õ				ã	ç	õ	
Spanish					¡	Ñ	¿				°	ñ	ç	¦·
Swedish				É	Ä	Ö	Å	Ü		é	ä	ö	å	ü
Swiss (Fr/Ger)	£	[	]	ç	à	é	è				ä	ö	ü	¨
United Kingdom	£													

* Characters that are different from the ASCII characters shown in Figure D-1 when the Language setup parameter is set to the indicated keyboard language.

E ASCII Code Conversion

Table E-1 ASCII Code Conversion

ASCII Character	Control Code	Bit 7——0	Octal	Decimal	Hex
NUL	@	00000000	000	000	00
SOH	A	00000001	001	001	01
STX	B	00000010	002	002	02
ETX	C	00000011	003	003	03
EOT	D	00000100	004	004	04
ENQ	E	00000101	005	005	05
ACK	F	00000110	006	006	06
BEL	G	00000111	007	007	07
BS	H	00001000	010	008	08
HT	I	00001001	011	009	09
LF	J	00001010	012	010	0A
VT	K	00001011	013	011	0B
FF	L	00001100	014	012	0C
CR	M	00001101	015	013	0D
SO	N	00001110	016	014	0E
SI	O	00001111	017	015	0F
DLE	P	00010000	020	016	10
DC1	Q	00010001	021	017	11
DC2	R	00010010	022	018	12
DC3	S	00010011	023	019	13
DC4	T	00010100	024	020	14
NAK	U	00010101	025	021	15
SYN	V	00010110	026	022	16
ETB	W	00010111	027	023	17

Table E-1 ASCII Code Conversion, Continued

ASCII Character	Control Code	Bit 7————0	Octal	Decimal	Hex
CAN	X	00011000	030	024	18
EM	Y	00011001	031	025	19
SUB	Z	00011010	032	026	1A
ESC	[	00011011	033	027	1B
FS	\	00011100	034	028	1C
GS	]	00011101	035	029	1D
RS	^	00011110	036	030	1E
US	–	00011111	037	031	1F
SP		00100000	040	032	20
!		00100001	041	033	21
”		00100010	042	034	22
#		00100011	043	035	23
$		00100100	044	036	24
%		00100101	045	037	25
&		00100110	046	038	26
’ (apostrophe)		00100111	047	039	27
(		00101000	050	040	28
)		00101001	051	041	29
*		00101010	052	042	2A
+		00101011	053	043	2B
, (comma)		00101100	054	044	2C
– (hyphen)		00101101	055	045	2D
. (period)		00101110	056	046	2E
/		00101111	057	047	2F
0		00110000	060	048	30
1		00110001	061	049	31
2		00110010	062	050	32
3		00110011	063	051	33
4		00110100	064	052	34
5		00110101	065	053	35

Table E-1 ASCII Code Conversion, Continued

ASCII Character	Control Code	Bit 7————0	Octal	Decimal	Hex
6		0 0 1 1 0 1 1 0	066	054	36
7		0 0 1 1 0 1 1 1	067	055	37
8		0 0 1 1 1 0 0 0	070	056	38
9		0 0 1 1 1 0 0 1	071	057	39
:		0 0 1 1 1 0 1 0	072	058	3A
;		0 0 1 1 1 0 1 1	073	059	3B
<		0 0 1 1 1 1 0 0	074	060	3C
=		0 0 1 1 1 1 0 1	075	061	3D
>		0 0 1 1 1 1 1 0	076	062	3E
?		0 0 1 1 1 1 1 1	077	063	3F
@		0 1 0 0 0 0 0 0	100	064	40
A		0 1 0 0 0 0 0 1	101	065	41
B		0 1 0 0 0 0 1 0	102	066	42
C		0 1 0 0 0 0 1 1	103	067	43
D		0 1 0 0 0 1 0 0	104	068	44
E		0 1 0 0 0 1 0 1	105	069	45
F		0 1 0 0 0 1 1 0	106	070	46
G		0 1 0 0 0 1 1 1	107	071	47
H		0 1 0 0 1 0 0 0	110	072	48
I		0 1 0 0 1 0 0 1	111	073	49
J		0 1 0 0 1 0 1 0	112	074	4A
K		0 1 0 0 1 0 1 1	113	075	4B
L		0 1 0 0 1 1 0 0	114	076	4C
M		0 1 0 0 1 1 0 1	115	077	4D
N		0 1 0 0 1 1 1 0	116	078	4E
O		0 1 0 0 1 1 1 1	117	079	4F
P		0 1 0 1 0 0 0 0	120	080	50
Q		0 1 0 1 0 0 0 1	121	081	51
R		0 1 0 1 0 0 1 0	122	082	52
S		0 1 0 1 0 0 1 1	123	083	53
T		0 1 0 1 0 1 0 0	124	084	54

Table E-1 ASCII Code Conversion, Continued

ASCII Character	Control Code	Bit 7————0	Octal	Decimal	Hex
U		01010101	125	085	55
V		01010110	126	086	56
W		01010111	127	087	57
X		01011000	130	088	58
Y		01011001	131	089	59
Z		01011010	132	090	5A
[		01011011	133	091	5B
\		01011100	134	092	5C
]		01011101	135	093	5D
^		01011110	136	094	5E
_ (underline)		01011111	137	095	5F
‘		01100000	140	096	60
a		01100001	141	097	61
b		01100010	142	098	62
c		01100011	143	099	63
d		01100100	144	100	64
e		01100101	145	101	65
f		01100110	146	102	66
g		01100111	147	103	67
h		01101000	150	104	68
i		01101001	151	105	69
j		01101010	152	106	6A
k		01101011	153	107	6B
l		01101100	154	108	6C
m		01101101	155	109	6D
n		01101110	156	110	6E
o		01101111	157	111	6F
p		01110000	160	112	70
q		01110001	161	113	71
r		01110010	162	114	72
s		01110011	163	115	73

Table E-1 ASCII Code Conversion, Continued

ASCII Character	Control Code	Bit 7————0	Octal	Decimal	Hex
t		01110100	164	116	74
u		01110101	165	117	75
v		01110110	166	118	76
w		01110111	167	119	77
x		01111000	170	120	78
y		01111001	171	121	79
z		01111010	172	122	7A
{		01111011	173	123	7B
¦		01111100	174	124	7C
}		01111101	175	125	7D
~		01111110	176	126	7E
DEL		01111111	177	127	7F

F Terminal Status Messages

Table F-1 Terminal Status Messages

Message	Meaning
CAPS	CAPS LOCK is on.
LOCK	The keyboard is locked.
1 . . . 5	The terminal is displaying the indicated page (no message appears when page 0 is displayed).
*	Monitor mode is on.
FDX	The terminal is in full-duplex mode.
HDX	The terminal is in half-duplex mode.
LCL	The terminal is in local mode.
BLK	The terminal is in block mode.
HBLK	The terminal is in half-duplex block mode.
<FDX <HDX <BLK <HBLK	The terminal is sending data to the computer while in the indicated communication mode.
REST	It is time to take a scheduled rest.
AUX	The terminal is in auxiliary print mode.
BDIR	The terminal is in bidirectional print mode.
XPT	The terminal is in transparent print mode.
PBSY	The printer is busy (not ready to receive data) or no printer is connected.

Table F-1 Terminal Status Messages, Continued

Message	Meaning
ll-ccc[1]	The cursor is on line *ll,* column *ccc*.
PROT[2]	Protect mode is on.
WPRT[2]	Write-protect mode is on (displayed only when protect mode is also on).
INS[2]	Insert mode is on.

1. Displayed only when a standard status line has been turned on by your application or by a local key command (refer to Table 3-5).
2. Displayed only when an editing status line has been turned on by your application or by a local key command (refer to Table 3-5).

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