WY-350 User's Guide

WYSE

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WYSE

Overview

By reading this guide you'll be able to quickly install and set up the terminal.

The companion guide, the *WY-350 Programmer's Guide*, tells you how to utilize the terminal's features in your computer programs.

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Glossary

alphanumeric characters The letters, numbers, and symbols that appear on a standard typewriter keyboard.

automatic new line The feature that automatically moves the cursor to the next line when it reaches the end of the line. You can turn this feature on and off with the AUTO NL setup parameter (level 3).

baud rate The rate of data transmission, measured in bits per second (bps).

bit The acronym for **bi**nary digi**t**, the smallest unit of computer information; consists of a one or a zero sent to convey a simple message, such as yes/no or on/off.

block mode A communications mode in which data you enter on the keyboard goes to the terminal screen only, allowing you to correct it before sending it to the computer with the SEND key.

byte A unit of seven or eight bits which together represent one character. The number of bits transmitted and accepted by the MODEM and AUX ports is determined by the DATA BITS setup parameter (level 2).

color palette A set of eight colors that can be displayed by the terminal. You can select any of the 16 color palettes predetermined for the terminal, or you can write a program to create your own color palette, choosing from 64 possible colors.

column One of the screen's vertical display positions. Each column is one character wide. You can set the number of columns displayed on the screen to 80 or 132 with the SCREEN setup parameter (level 1).

communication mode One of four possible modes in which the terminal can communicate with a computer: full duplex, half duplex, block, and half-duplex block.

compatibility The ability of a terminal to run programs written for a different terminal with little or no loss of function. You can set the COMPAT MODE setup parameter (level 5) to allow the terminal to run programs written for several different terminals.

configuration The setup parameters that define the terminal's chief operating characteristics.

control code A special character, normally neither displayed nor printed. Control codes are sent from the keyboard by pressing the CTRL key simultaneously with one of the alphanumeric keys.

CRT Acronym for **c**athode **r**ay **t**ube, the tube whose surface is the terminal screen.

CTS Acronym for **C**lear **t**o **S**end line, which signals the terminal that the computer is ready to receive more data.

cursor A position indicator on the screen showing where the next keystroke will appear. By default, the cursor is a blinking rectangle. You can change it to an underline and/or turn off the blinking by resetting the CURSOR and BLINK? setup parameters (setup level 1).

cursor keys The ▲, ▼, ►, ◄ keys that move the cursor up, down, right, and left.

data Characters and commands that can be transmitted and received by the terminal and its attached devices.

data segment One of the two areas of a horizontally split screen. You can display data in one segment while working in the other (*active*) segment.

default The original value of a terminal parameter or function key code when others have not been specified. You can return a parameter to its default value by pressing ESC when the parameter field is highlighted in setup mode.

echo The immediate return to the terminal of data received by the computer.

end-of-block code A code that signals the end of a transmitted block of data. The terminal sends either a CR code or an ETX code, depending on how the BLK END setup parameter (setup level 3) is set.

end-of-line code A code that signals the end of a transmitted line. The terminal sends either a US or a CRLF code, depending on how the BLK END setup parameter (level 3) is set.

error code A code that appears at the bottom right of the screen to indicate a problem uncovered during the terminal's self-test.

escape code A lead-in character that signifies the start of a special sequence sent to or received from the computer. The ESC key sends escape codes from the keyboard.

field A *box* on the setup line containing one of the parameters you can change. The *active* field is the one affected by your changes; it appears brighter than the others. You can change which field is active by pressing the ◄ and ► cursor keys.

full-duplex mode A communication mode in which data entered from the keyboard goes directly to the computer, which relays information back to the terminal, which then displays the data on the screen.

function keys The set of keys (F1 through F16) across the top row of the keyboard. Each can be programmed to transmit multiple characters with just one keystroke.

graphics characters Basic line-drawing elements for drawing pictures on the terminal screen.

half-duplex mode A communication mode in which data entered from the keyboard goes to both the computer and the terminal. The terminal can both transmit and receive data, although not at the same time.

half-duplex block mode A communication mode similar to block mode except that the data flow is controlled by hardware handshake signals between the terminal and the computer.

handshaking A predetermined signal exchanged between communicating devices to ensure orderly flow of data. The terminal and computer each transmit this signal to indicate when they are ready to send or receive information. The handshaking signal sent (if any) is determined by the HANDSHAKE setup parameter (setup level 1).

interface cable A communications cable that connects the terminal with other devices.

keyclick A muted beep that sounds when a key is pressed. You can turn the keyclick feature on and off by pressing the SHIFT and ENTER keys simultaneously. (See Table 3-3 for keyboard command functions.)

mode A state of operation, in which the terminal reacts in a specified way to commands or situations. For example, in setup mode the ▲ and ▼ keys display the different setup levels.

modem Acronym for **mo**dulator/**dem**odulator. An electronic device that enables computers and terminals to communicate over telephone lines.

nonvolatile memory A permanent memory storage area not affected by the terminal's loss of power. For example, setup parameters that you store in nonvolatile memory are still in effect the next time you turn the terminal on.

parameter One of several variables whose values you can set from the terminal. Device-specific parameters, such as baud rate, must be set according to the requirements of attached devices. Optional parameters, such as scrolling speed, can be set according to your needs.

parity The method of checking the data bits received to make sure they are complete and accurate. A redundant bit is added to all odd-numbered bit patterns to make them even (even parity) or to all even-numbered bit patterns to make them odd (odd parity). Thus, it is apparent when a data bit has been dropped. The type of parity the terminal uses (if any) is determined by the PARITY BIT setup parameter (setup level 2).

port The location at which data goes in and out of a device. The terminal has two ports: MODEM (for a computer or modem) and AUX (for a printer).

program A set of instructions written for a computer to follow.

protected characters Characters that a program has designated as unchangeable; they cannot be edited unless the protection is removed. How protected characters are displayed is determined by the PROT setup parameter (setup level 4).

reverse video A terminal display feature that produces the opposite combination of characters and background from the one specified in the SCREEN setup parameter (setup level 1). For example, if normal display is light characters on dark background, reverse video displays dark characters on light background.

RS-232C cable A standard interface cable used to connect the terminal with a computer, modem, or serial printer.

RTS Acronym for **R**equest **t**o **S**end line, which signals the computer that the terminal is ready to send more data.

screen saver The feature that automatically turns off the screen display if you haven't pressed a key within 15 minutes. Although the screen goes blank, no data is lost, and when you press any key on the keyboard (preferably SHIFT), the display returns. This feature prolongs the life of the screen's phosphor. You can turn it on and off with the S.SAVER setup parameter (setup level 4).

scrolling The feature that allows you to scroll up and down through data by pressing the ▲ and ▼ keys (while in block mode). You can set the scrolling speed with the SCRL setup parameter (level 4) or by pressing SHIFT CTRL and the ▲ or ▼ key.

setup level A group of setup parameters appearing on the setup line. You can display each of the five different setup levels by pressing the ▲ and ▼ keys.

setup line The line of boxes that appears across the bottom of the screen in setup mode. Each box, or *field,* contains a changeable setup parameter.

setup mode The mode in which you can change the terminal's operating parameters. Pressing the SHIFT and SETUP keys simultaneously puts the terminal in setup mode.

status line The top line of the screen. Messages concerning the terminal appear on the left end of the line; messages concerning the computer appear on the right end of the line.

status messages Abbreviated messages concerning the status of the computer and/or terminal that appear on the top line of the screen (the status line).

toggle To switch between two operating states, such as on/off.

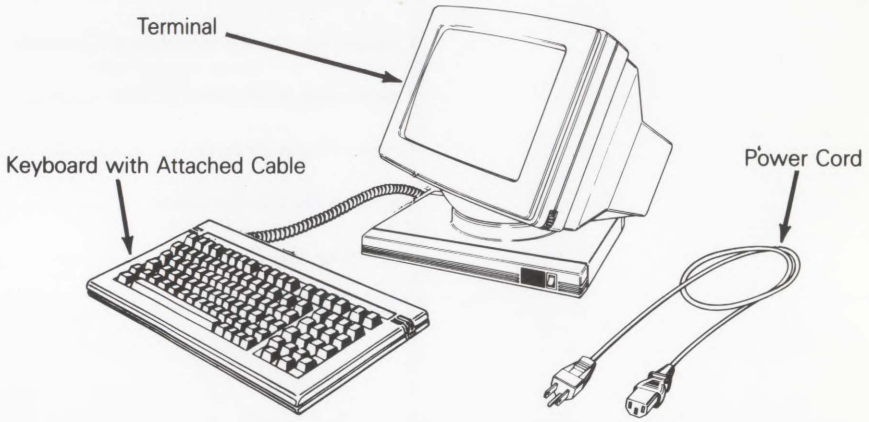
1

Installing the Terminal

In this chapter you'll learn how to connect the terminal to the computer (or modem) and a serial printer.

Getting Ready

As you unpack your terminal, make sure you received everything shown below. If anything is missing or visibly damaged, contact the dealer from whom you purchased the terminal.



The keyboard cable and the power cord come with your terminal. In addition, you'll need an RS-232C interface cable (fitted with a male 25-pin connector on the terminal end) to connect the terminal to your computer. If you plan to connect a serial printer directly to your terminal, you'll need a second RS-232C interface cable. (If these cables weren't supplied with your printer and computer, you can buy them from your dealer.)

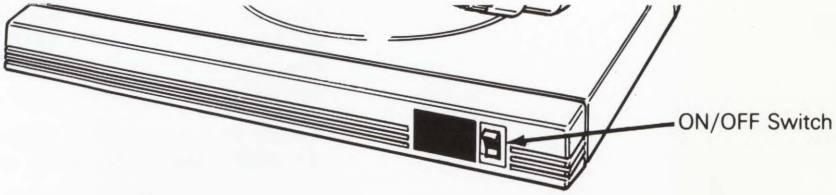
The area where the terminal will be located should be

- Near a grounded, three-pronged power outlet.
- In an area with indirect lighting, away from windows if possible. (Nearby windows should be on either side of the terminal. Control incoming sunlight with drapes or blinds.)
- Large enough to allow three inches of space around the terminal for ventilation.

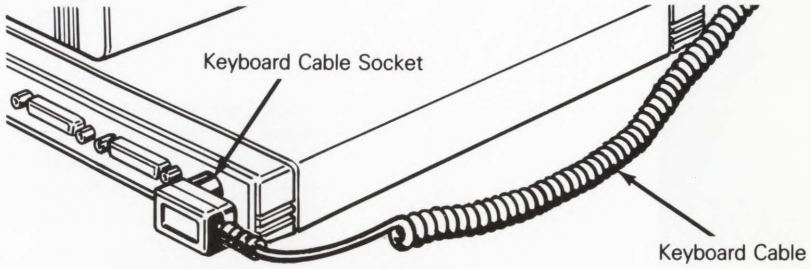
Connecting the Terminal to a Computer

To connect the terminal to your computer

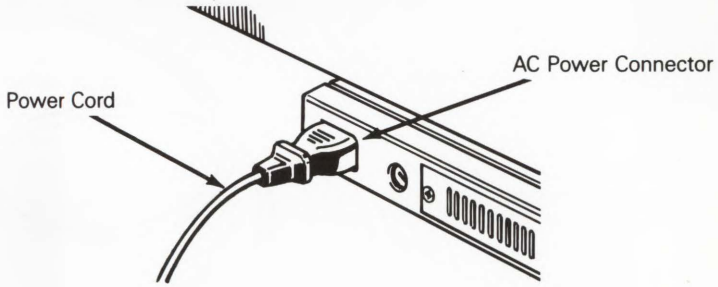
1. Press the bottom half of the power switch on the front of the terminal's base.



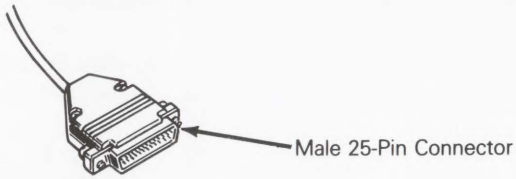
2. Plug the coiled keyboard cable into the socket labeled *KEYBOARD* on the back of the terminal.



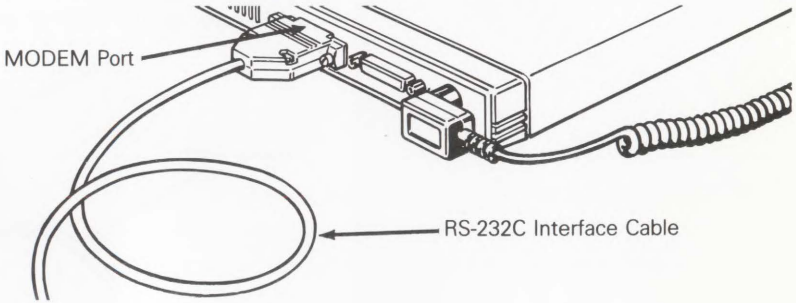
3. Plug the slotted (female) end of the power cord into the three-pronged connector on the back of the terminal.



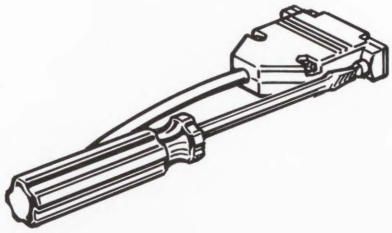
4. Make sure your building's voltage (115 in the U.S.) matches the voltage shown on the back of the terminal. (If it doesn't, contact your dealer about exchanging the terminal for one with the corresponding power configuration.)
5. Plug the pronged end of the power cord into a three-pronged, grounded power outlet. If there's no three-pronged outlet nearby, you can use an adapter. However, be sure to ground the outlet by attaching the adapter's pigtail to the faceplate screw.
6. Locate your computer's interface cable. It should be an EIA-standard RS-232C cable with a male 25-pin connector on at least one end.



7. Check the pin assignments of your computer's connector with those listed in Appendix B. Not every computer has the same configuration on its RS-232C port. If the pins on the RS-232C cable connector aren't configured to meet the requirements of the computer and the terminal, the computer and terminal won't work as expected (or may not work at all).
8. Connect the RS-232C computer interface cable to the terminal's port labeled *MODEM* and to your computer's RS-232C port.



9. With a 1/8-inch, standard flat-blade screwdriver, tighten the screws on both sides of each connector.

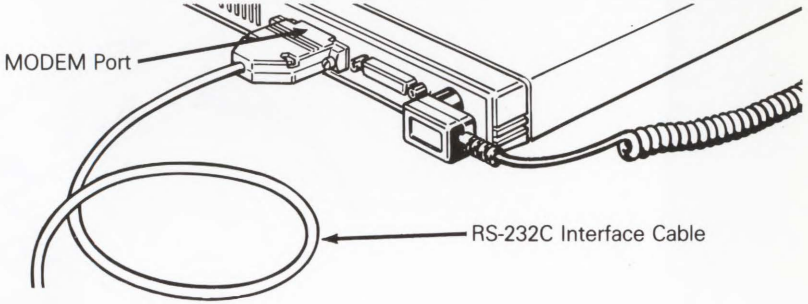


Connecting a Modem

You can connect a modem to the terminal so it can communicate over telephone lines with a distant computer.

■ ***Note*** – If the pin assignments required by your modem differ from those needed by your computer, you'll need an RS-232C interface cable especially configured for your modem. Your modem may have its own cable already. Refer to your modem's reference manual for details.

1. Attach the male, 25-pin end of the RS-232C interface cable to the MODEM port on the back of the terminal.



2. Attach the other end of the cable to your modem's RS-232C connector.
3. Follow the instructions in your modem's manual to connect the modem to your telephone.

4. With a 1/8-inch, standard flat-blade screwdriver, tighten the screws on both sides of each connector to secure the interface.

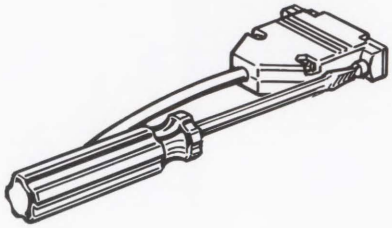
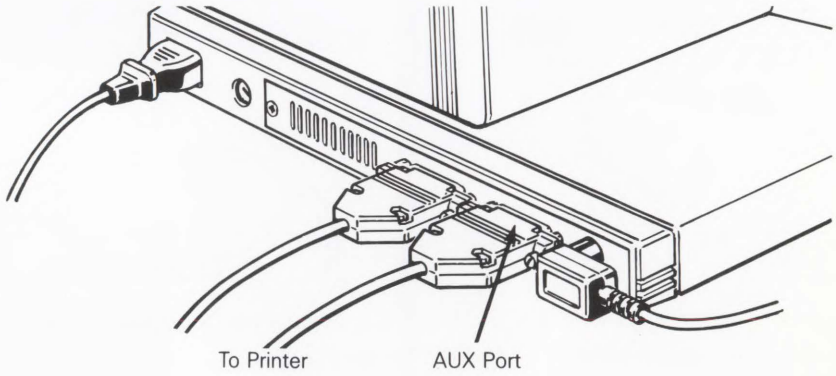


Table B-3 in Appendix B gives typical pin assignments for a modem connector (Hayes Smartmodem).

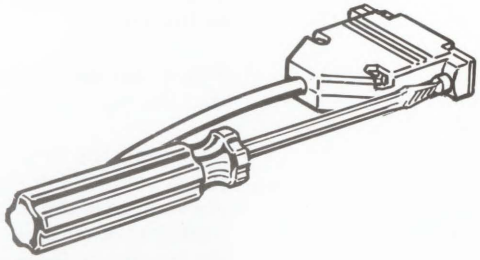
Connecting a Printer

If your software supports a printer connected to a terminal, you can connect a serial printer directly to the terminal. You'll need another RS-232C interface cable with a 25-pin, D-shaped male connector on one end.

1. Plug the printer interface cable into the port labeled *AUX* on the back of the terminal.



2. Attach the other end of the interface cable to the RS-232C port on the printer.



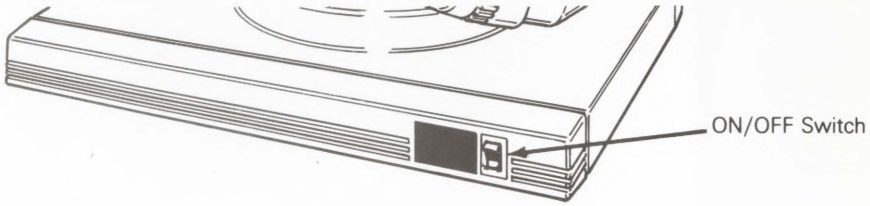
3. With a 1/8-inch, standard flat-blade screwdriver, tighten the screws on both sides of each connector to secure the interface connection.

■ ***Note***–You may need to activate the printer port through the computer before any data can actually be sent to the printer.

Table B-4 in Appendix B lists the pin assignments for an Epson FX80 printer.

Turning On the Terminal

After the terminal's properly installed, turn it on by pressing the top half of the on/off switch on the terminal's front panel. Listen for an immediate beep indicating that the terminal has received power.



Every time you turn the terminal on, it automatically tests itself for about five seconds. If the terminal has recently been on and the cathode ray tube (CRT) is warm, the screen flashes several display patterns as the test runs.

■ ***Note***–If you see an *X* or *Y* in the bottom right corner of the screen, press the SETUP key to stop the self-test and refer to Chapter 4, "Troubleshooting."

If the terminal uncovers a problem during the test, a bell sounds and an error code appears in the bottom right corner of the screen. You can't operate the terminal if an error condition exists; it will need to be serviced by a qualified technician.

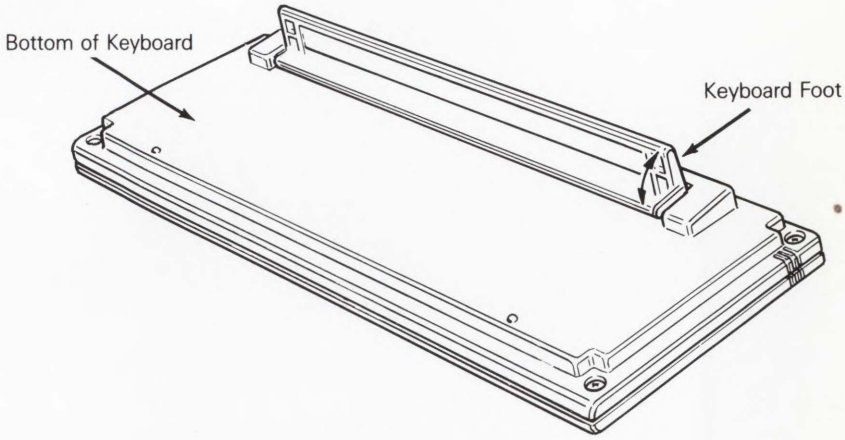
When you see the cursor in the upper left corner of the screen, you know that the terminal has passed all its tests and is ready for operation.

Generally, the next thing to appear on the screen is the status line. At first, it's just a bold rule at the top of the screen with the letters *FDX*, *BLK*, or *HDX* above it near the left end. But later you may see messages about the terminal (called *terminal status messages*) above the left half of the line. Messages about the computer (*computer status messages*) may appear above the right half of the line.

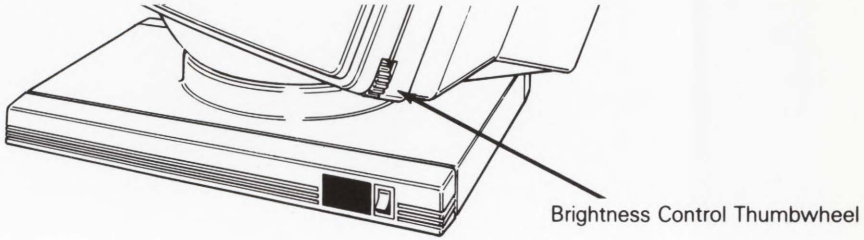
Adjusting the Terminal

Before working on the terminal, take a few minutes to adjust it. The center of the terminal screen should be slightly below your eye level. Swivel the screen sideways and up and down until you find the most comfortable angle.

If you want the keyboard slanted up slightly, turn it over and pull out on the hinged foot until it's perpendicular to the bottom. Typing will be more comfortable if the keyboard is at or below your elbow height.

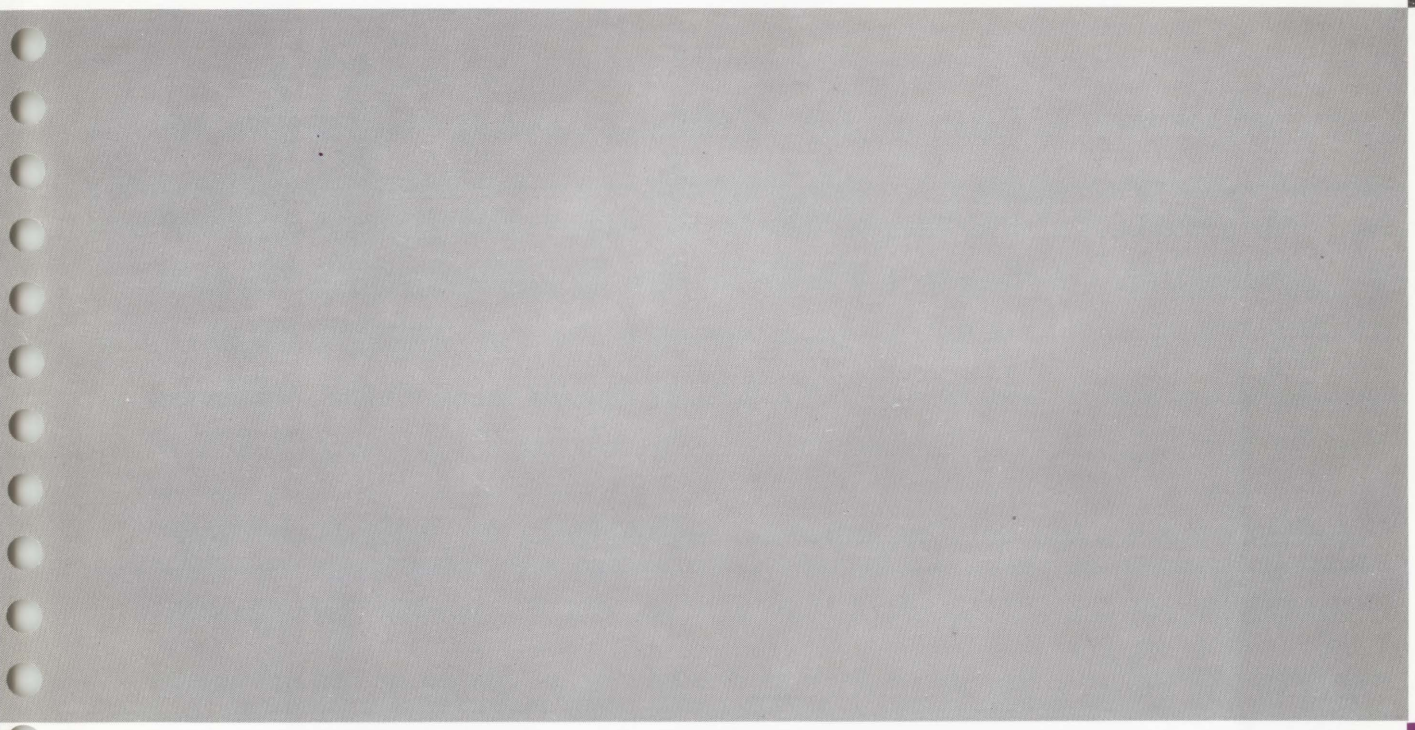


Adjust the intensity of the screen display with the brightness control thumbwheel located at the lower front right corner of the terminal.



Completing Installation

Now you've completed the physical installation of the terminal. Before the terminal and computer can communicate, however, you must check the terminal's setup parameters. This is explained in detail in Chapter 2.



2

Configuring the Terminal

Before the terminal can communicate with your computer, the two must agree upon a common language. The rules of that language are determined by a set of variables called *parameters,* the values of which you can change from the terminal's keyboard.

This chapter tells you about those parameters and how to change them. You'll also learn how to program the function keys.

Why Configuration is Necessary

The way a terminal's parameters are set make up its *configuration.* To communicate correctly, the configuration of your terminal must match that of your computer, or whatever device you have connected to the terminal. For example, if your computer runs at a baud rate of 1200, you must set up the terminal to send data at 1200 baud.

Your terminal is initially configured with a set of *default* values. Chances are these values won't exactly match the configuration of the device you've attached to the terminal, so you'll have to change some of them.

To change the terminal's configuration, you must put the terminal into a different mode of operation, called *setup mode.* In setup mode, you can also change less vital, optional parameters, such as the number of columns displayed on the screen. And you can program a set of *function keys* to send unique character strings.

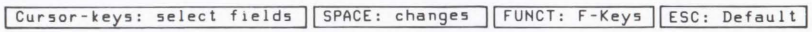
Entering Setup Mode

You can enter setup mode at any time by pressing SHIFT along with the SETUP key.

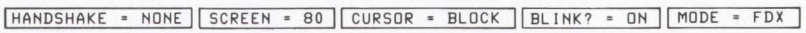
While the terminal's in setup mode, the cursor temporarily disappears from the screen's data area. The information you entered remains frozen on the screen and cannot be altered. When you return the terminal to its normal operating mode, the cursor reappears and you can resume where you left off.

▼ ***Caution*** – Avoid entering setup mode while data is being transmitted between the terminal and the computer. The terminal can't receive data during setup mode, and transmission is interrupted.

When you enter setup mode, a row of boxes (called *fields*) appears across the top of the screen; each box defines the function of a special key or set of keys in setup mode.



The boxes across the bottom of the screen now contain the *setup line,* which displays the parameters you can define for the terminal.



Note that one of the fields on the setup line is brighter than the others. This is the *active* field, or the field whose values you can change. You can rotate which field is active by pressing the ◄ or ► key.

The setup line actually has five levels. You can see one at a time. Each *setup level* displays a different set of changeable parameters. You can move from level to level by pressing the ▲ or ▼ key.

Table 2-1 lists the five setup levels and describes the features you can change in each.

Table 2-1 Setup Levels

Level	Parameters
1	Handshaking protocol, screen display, cursor appearance, and communications mode
2	Data bit, stop bit, parity bit, and MODEM port baud rate
3	End of block terminator, automatic new line, carriage return code, automatic scrolling, and AUX port baud rate
4	Scrolling speed, screen-save feature, and display of protected characters
5	RETURN and ENTER key functions, compatibility mode, enhanced code set, and display of status line

Preparing to Change the Parameters

When you first receive your terminal, it will have been configured with a set of *default* parameter values. These are the values displayed the first time you enter setup mode. Depending on the requirements of your computer, modem, or printer, you'll probably want to change some of these default values.

You can make either device-dependent or optional changes. Device-dependent features are ones you need to set according to the requirements of the attached device(s). Optional features, such as a blinking or steady cursor, are a matter of preference and can be changed according to your needs.

Before you begin, consult the user's manual for your computer, modem, and/or printer to determine these device-dependent requirements. You can use the table below to keep a permanent record of the requirements of several devices.

	Devices			
	_____	_____	_____	_____
Baud rate	_____	_____	_____	_____
Stop bits	_____	_____	_____	_____
Data bits	_____	_____	_____	_____
Parity bit type	_____	_____	_____	_____
Handshaking protocol	_____	_____	_____	_____
End-of-line terminator	_____	_____	_____	_____
Carriage return code	_____	_____	_____	_____

Changing the Setup Parameters

To change the value of a parameter, press the appropriate cursor keys to highlight the parameter; press the spacebar to cycle through all of the parameter's possible values. Leave the desired value displayed and go on to the next parameter you want to change. To return a parameter to its default value, press the ESC key while that parameter's highlighted.

The following sections describe each of the setup levels, the parameters you can access through them, and the selections available for each parameter.

Setup Level One

The first setup level contains both device-dependent and optional parameters. Set the device-dependent parameters, *HANDSHAKE* and *MODE,* to match the requirements of the attached computer. The other parameters are a matter of personal preference.

Table 2-2 describes the parameters you can set in this first setup level and the possible settings. The default settings are listed first.

Table 2-2 Level One Setup Parameters

Parameter	Settings	Explanation
HANDSHAKE	NONE	Terminal doesn't send or receive any handshaking signals through the MODEM port. (Don't select this value if the terminal is set for smooth scroll or if you want to use transparent print or auxiliary print.)
	XONXOFF	Handshaking protocol for MODEM port is X-on/X-off.
	DTR	Handshaking protocol for MODEM port consists of raising and lowering the Data Terminal Ready (DTR) line's voltage (pin 20). (High is +3 to +12 volts; low is −3 to −12 volts.)
	BOTH	Terminal controls the receipt of data through the MODEM port by both sending X-on/X-off signals and raising and lowering the Data Terminal Ready (DTR) line's voltage.
SCREEN	80	Screen displays 80 columns on a dark (normal) background.
	132	Screen displays 132 columns on a dark background.
	80 REV	Screen displays 80 columns on a light (reverse) background.
	132 REV	Screen displays 132 columns on a light (reverse) background.

Table 2-2 Continued

Parameter	Settings	Explanation
CURSOR	BLOCK	Cursor is rectangular.
	LINE	Cursor is an underline.
BLINK?	ON	Cursor blinks.
	OFF	Cursor is steady.
MODE	FDX	Communication mode is full duplex; terminal can send and receive information simultaneously. Keyboard entries go only to the computer. Data can be seen on the screen only if the computer echoes it back to the terminal.
	BLOCK	Communication mode is block; terminal displays data entered on the keyboard but doesn't automatically send it to the computer. The terminal also displays data received from the computer.
	HDX	Communication mode is half duplex; terminal sends keyboard entries to the computer and to the screen.
	H-BLK	Communication mode is half-duplex block; the same as block mode except the terminal can control the receipt and transmission of data (as it does in half-duplex mode) with its Request to Send and Clear to Send lines. Select this value if you've connected a modem to the terminal.

Setup Level Two

Parameters on the second setup level control communication. If the terminal is to communicate correctly, you must set these values according to the requirements of the device(s) you've attached to it.

Table 2-3 describes the second-level parameters and their possible values. Default values are listed first.

DATA BIT = 8 | STOP BIT = 1 | PARITY BIT = NONE | MODEM PORT BAUD RATE = 9600

Table 2-3 Level Two Setup Parameters

Parameter	Settings	Explanation
DATA BIT	8	Both ports (MODEM and AUX) send and receive only 8-bit data words.
	7	Both ports (MODEM and AUX) send and receive only 7-bit data words.
STOP BIT	1	After terminal sends a character to the computer, it sends one stop bit (with a value of one).
	2	After terminal sends a character to the computer, it sends two stop bits (both ones).
PARITY BIT	NONE	Terminal doesn't add or check for a parity bit during communication. Equivalent to space parity.
	ODD	Terminal sends data with odd parity but ignores any incoming parity bits.
	EVEN	Terminal sends data with even parity but ignores any incoming parity bits.
	MARK	Terminal sends data with mark parity but ignores any incoming parity bits.

Table 2-3 Continued

Parameter	Settings	Explanation
MODEM PORT BAUD RATE	9600 19200 38400 50 75 110 134.5 150 300 600 1200 1800 2000 2400 4800	Sets baud rate (speed, expressed as bps) at which the terminal sends data out the MODEM port. Match your computer's receive rate.

Setup Level Three

Parameters on the third setup level include display characteristics and communication variables. Set the *BLK END* parameter to the value sent by your computer at an end-of-line or end-of-block message. Set the AUX port baud rate to the fastest rate your printer will accept. (See the manual for your printer.) You can set the parameters concerning display to suit your needs.

Table 2-4 describes the third-level parameters and their available settings.

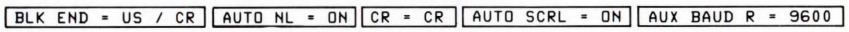


Table 2-4 Level Three Setup Parameters

Parameter	Settings	Explanation
BLK END	US / CR	When you send a block of data to the computer (by pressing the SEND key while the terminal's in block mode), the terminal sends a US character at the end of each line and a CR character at the end of the block.
	CRLF/ETX	When the terminal sends a block of data to the computer, it also sends CRLF characters at the end of each line and an ETX character at the and of the block.
AUTO NL	ON	Turns on automatic new line mode. When the cursor reaches the end of a line, it advances to the beginning of the next line.
	OFF	When the cursor reaches the end of a line, it does not automatically advance to the beginning of the next line.
CR	CR	When the terminal receives a carriage return (CR) code, the cursor returns to the beginning of the line (without advancing to the next line).
	CR,LF	The terminal interprets a CR code as a carriage return and a line feed (in that order). The cursor moves to the beginning of the next line.
AUTO SCRL	ON	Turns automatic scrolling on so that when the cursor tries to go past the last line, the data scrolls up on the screen. (Data that scrolls off the screen cannot be scrolled back onto the screen later.)
	OFF	Turns automatic scrolling off so the cursor returns to the top left position when it reaches the last line on the screen.

Table 2-4 Continued

Parameter	Settings	Explanation
AUX BAUD R	9600 19200 110 134.5 150 300 600 1200 1800 2000 2400 3600 4800 7200	Sets the baud rate (speed, expressed as bps) at which the terminal sends data through the AUX port. Select the fastest rate your printer can accept. The AUX port sends the data bit, stop bit, and parity values you selected for the MODEM port. Handshaking is always *DTR*.

Setup Level Four

The fourth-level parameters are optional display variables. Set them to suit your needs.

■ ***Note*** – If you choose smooth scrolling (*SCRL* parameter), you must select some type of handshaking for the MODEM port (first setup level).

Table 2-5 describes the fourth-level parameters and their possible settings.

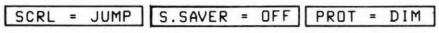


Table 2-5 Level Four Setup Parameters

Parameter	Settings	Explanation
SCRL	JUMP	The screen displays data at the rate it's received.
	SM-1	The screen scrolls smoothly, one line per second.
	SM-2	The screen scrolls smoothly, two lines/second.
	SM-4	The screen scrolls smoothly, four lines/second.
	SM-8	The screen scrolls smoothly, eight lines/second.
S.SAVER	OFF	Disables screen saver feature, so any data on the screen is always displayed, regardless of the lapsed time since the receipt of data.
	ON	The screen saver feature is on, prolonging the life of the screen's phosphor. If the terminal doesn't receive any data for 15 minutes, the screen blanks (but data is not lost) until you press any key.
PROT	DIM	Characters defined by a program as protected are dim.
	REV	Characters defined as protected appear with the reverse display attributes of the normal display (light/dark).
	NORM	Characters defined as protected have normal display attributes (the same as unprotected characters).
	UL	Protected characters are underlined.
	RV/DIM	Protected characters are both dim and reverse.
	REV/UL	Protected characters are underlined and reverse.
	DIM/UL	Protected characters are dim and underlined.
	ALL	Protected characters appear dim, underlined, and reverse.
	EX SET	Extended character set (see ***WY-350 Programmer's Guide***).

Setup Level Five

The fifth-level parameters determine program compatibility, message display, code recognition, and the effect of the ENTER and RETURN keys. The *TEST* parameter should always be set to *OFF*.

Table 2-6 describes these parameters and their possible settings.

RET/ENTER = CR / CR | COMPAT MODE = WY50 | ENHANCE = OFF | STATUS = ON | TEST = OFF

Table 2-6 Level Five Setup Parameters

Parameter	Settings	Explanation
RET/ENTER	CR / CR	You can send a carriage return code by pressing either the RETURN or the ENTER key.
	CRLF/TAB	The RETURN key sends a carriage return and a line feed code. Both the ENTER and TAB keys send a horizontal tab code.
COMPAT MODE	WY50	Turns on compatible mode so terminal can run programs written for WY-50, WY-100, or Lear Siegler ADM-31 terminals.
	TVI910	Terminal can run programs written for a TeleVideo 910 terminal.
	TVI920	Terminal can run programs written for a TeleVideo 912/920 terminal.
	TVI925	Terminal can run programs written for a TeleVideo 925 terminal.
	ADDSVP	Terminal can run programs written for an ADDS Viewpoint A2 terminal.
	HZ1500	Terminal can run programs written for a Hazeltine 1500 terminal.

Table 2-6 Continued

Parameter	Settings	Explanation
ENHANCE	OFF	Terminal ignores an enhanced set of codes.
	ON	Terminal recognizes additional WY-350 codes if you selected HZ1500 or ADDSVP for the *COMPAT MODE* parameter. Select this value if you chose the WY-50-compatible mode and your program uses CTRL X to turn on transparent print.
STATUS	ON	Messages from the terminal and the computer can be displayed on the top line of the screen (the status line).
	OFF	The screen's status line displays only the status of the caps lock mode. (Displays *CAPS* when the CAPS LOCK key has been pressed once.) It doesn't display any messages from the terminal or the computer.
TEST	OFF	Terminal is ready for normal use.
	ON	Do not select this value. It prepares the terminal for a manufacturing test.

Programming the Function Keys

Each *function key* on the top row of the keyboard can transmit several characters with just one keystroke. You can program these keys (F1 through F16, shifted and unshifted) to send a unique character string.

If the function keys have never been programmed, they transmit a set of default codes. The *WY-350 Programmer's Guide* (bound together with this guide) lists those codes.

▼ ***Caution*** – Applications that require normal values for the function keys may not run properly if you redefine these keys.

To program one or more of the function keys

1. Press the SHIFT and SETUP keys to put the terminal in setup mode.
2. Press the FUNCT key. A new field containing

   ```
   F1 =
   ```

   replaces the normal setup line. The message field at the top of the screen defines the functions of special keys in this mode.

   ```
   F1-F16: load current sequence | RETURN: enter new sequence | FUNCT: exit
   ```

3. If you want to program a different function key, press that key (or press RETURN until the number of that function key appears).

■ ***Note***—A shifted function key is indicated by a lowercase *s* as the first character. For example, *sF1* refers to the shifted F1 key.

4. To program the key that's displayed, type the characters you want transmitted. You can enter up to eight characters per key, but only the first four can be stored in the terminal's nonvolatile memory; the rest are erased when you turn the terminal off.

   To enter a carriage return code (CR) in the sequence, hold down the CTRL key while pressing the M key (instead of pressing RETURN). A carriage return counts as one character.

   If you make a mistake, press the function key again and type the command again from the beginning.

■ ***Note***—To restore this function key's default value, press the CTRL and @ keys.

5. To load the program into the key, press the RETURN key.
6. To display other function key numbers, press the RETURN key again or press the desired function key.
7. To stop programming function keys and redisplay the setup lines, press the FUNCT key again. The first setup line reappears.

Example

You want to program the shifted F2 key to send a DIR (CR) code sequence.

1. Press SHIFT and the SETUP key to enter setup mode.
2. Press the FUNCT key.
3. Press RETURN once or press the F2 key.
4. Type

   ```
   DIR
   ```

5. While holding down the CTRL key, press the M key.
6. Press the RETURN key.
7. To return to the first setup line, press FUNCT again.

Instead of typing in the command DIR and pressing the RETURN key to display the disk's directory, now you can just press the F2 key.

■ ***Note***–Your computer's response to a transmitted code depends on the program you're running at the time. Different programs may interpret the same code differently.

Leaving Setup Mode

When you exit setup mode, you'll have the choice of saving or not saving the changes you made. You can save only the parameter changes (including caps lock, current premixed color palette, and keyclick status), or you can save both parameter changes and function key definitions. Changes you make but don't save still take effect after you leave setup mode but only stay in effect until you turn the terminal off.

To leave setup mode, press the shifted SETUP key. A blinking question appears in the screen's status line:

```
Save changes for power-on?
```

The next three fields display the three possible answers:

```
Y: yes (no F-keys)      A: F-keys also      others: no
```

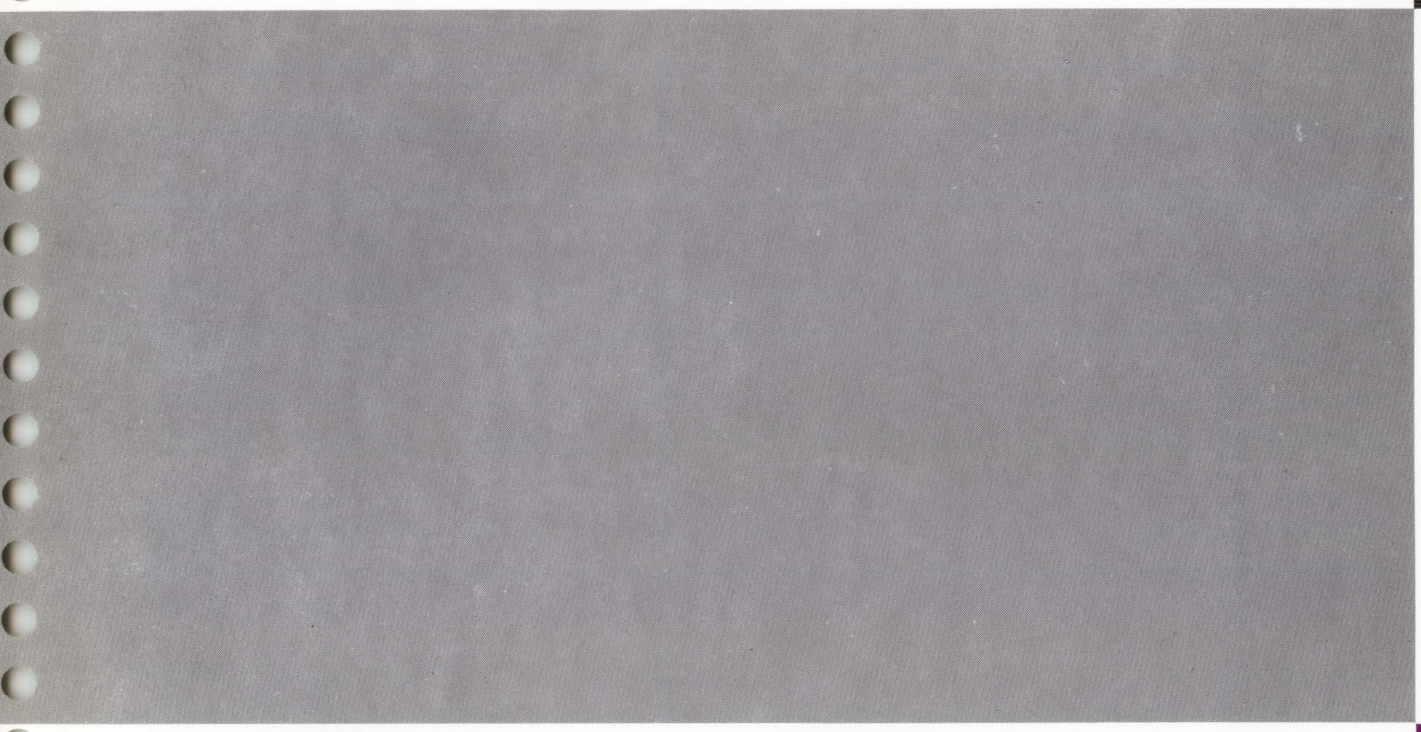
- Pressing Y saves all changes except those made to the function key definitions; they will be in effect the next time you turn on the terminal.
- Pressing A saves all changes (including the first four characters of any new function key definitions).
- Pressing any alphanumeric key other than Y or A lets you temporarily operate the terminal with the new parameters. However, the next time you turn on the terminal, the setup lines will be as they were before you made these changes.

Summary of Setup Mode Controls

Table 2-7 summarizes the functions of special keys in setup mode.

Table 2-7 Key Controls in Setup Mode

Key	Function
SHIFT SETUP	Enters setup mode.
FUNCT	Enables function key programming.
CTRL M	Enters a carriage return in a function key definition.
Same function key	Deletes the characters entered for the key; allows you to correct mistakes by retyping the character string.
RETURN and a function key	Displays the field of that function key, allowing you to redefine it.
RETURN	Programs the displayed function key with the character sequence you typed in the redefinition field.
FUNCT	Exits the function key programming mode and displays the first setup level.



3

Terminal Capabilities

This chapter describes the basic capabilities of the terminal: its keyboard, multikey commands, communication modes, and color palettes.

Selecting a Color Palette

The feature that sets this terminal apart from other Wyse terminals is its color display. The screen can display up to eight of 64 different colors at a time. You can choose from 15 palettes of eight premixed colors. Or, if you're writing a program for the terminal, you can select each color individually to make up your own palette. (See the *WY-350 Programmer's Guide.*)

The color palettes assign a color to normal characters (such as text) and a different color to each of the seven combinations of display attributes (such as dim, underline, etc.). Table 3-1 lists the normal character colors for each palette.

■ ***Note*** – Because each program controls the appearance of the display, you may not see all of the palette's colors on the screen at the same time.

Table 3-1 Premixed Color Palettes

Key[1]	**Normal Character Color**
0	Amber (default)
1	Green
2	White
3	Cyan
4	Light purple
5	Yellow
6	Sky blue
7	Light gray
8	Dull chartreuse
9	Cream
TAB	White[2]
ESC	White[3]
,	Monochrome green
–	Monochrome white
.	Monochrome amber

1. All of the numbers and symbols in this column must be entered from the numeric keypad, on the right-hand side of the keyboard.
2. The rest of the palette consists of reverse tertiary colors.
3. The rest of the palette consists of reverse primary/secondary colors.

To select any premixed color palette from Table 3-1, find the key there that corresponds to the color you want for normal characters. While holding down the SHIFT and CTRL keys, press that palette's key on the numeric keypad at the right-hand side of the keyboard.

For example, to select green as the normal character color, press SHIFT, CTRL, and 1 on the numeric keypad all at the same time.

If you want to save the parameter change, enter and exit setup mode and press Y to save the values. The new color palette will be in effect the next time you turn on the terminal.

■ ***Note***—The additional colors on each palette are listed in the *WY-350 Programmer's Guide.*

Keyboard Description

The alphanumeric keys are identical to those on a standard typewriter. Keys that perform terminal functions (such as RETURN and TAB) are dark grey (highlighted in the figure).

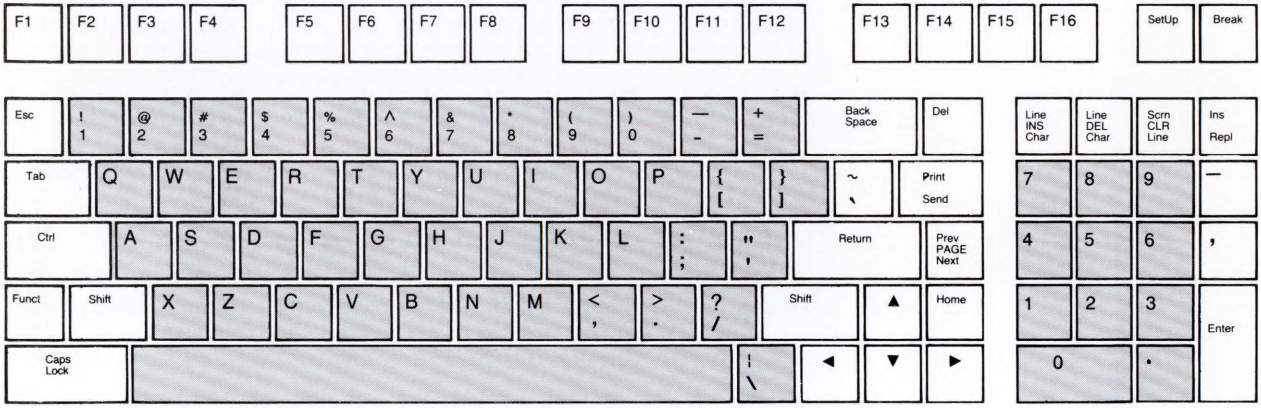


Table 3-2 describes the function of these keys when the terminal's not in setup mode. They're listed alphabetically for easy reference. (Almost all keys repeat if you hold them down for more than a second. This includes the DEL and editing keys.)

- ***Note*** – Keep in mind that unless your program recognizes the codes sent by these keys, pressing them will not produce the described effect.

Table 3-2 Keyboard Functions in Normal Mode

Key	Description
BACK SPACE	Moves the cursor left one position without erasing a character. Same as ◄ key.
BREAK	Sends a BREAK signal for a period of 250 milliseconds. The effect produced by this depends on your computer.
CAPS LOCK	Capitalizes alphabetic keys. You must still press the SHIFT key to enter shifted symbols (!, @, #, etc.). This key has a toggle effect: Press it once to capitalize keys; press it again to enter lowercase letters. When caps lock is in effect, *CAPS* appears in the terminal message field.
CLR SCRN/ LINE	Shifted, it clears the screen by replacing all data from the cursor to the end of the screen with space characters. Unshifted, it replaces all data from the cursor to the end of the line with space characters.
CTRL	When pressed with another key, CTRL generates a control code. (Pressing CTRL by itself has no effect.) Normally undisplayed, control codes cause the terminal and/or program to take special action.
CURSOR KEYS	Move the cursor in the direction of the arrow.
DEL	Sends a DEL (delete) code to the computer. Different programs interpret the DEL code differently. Usually it deletes the character to the left of the cursor.
DEL LINE/ CHAR	Shifted, it deletes the entire line containing the cursor, moving the lines below it up one line. Unshifted, it deletes the cursor character, moving the next character back into that postion.

Table 3-2 Continued

Key	Description
ENTER	If the *RET/ENTER* setup parameter (see Chapter 2) is set to *CR/CR*, this key sends a carriage return code. (See *RETURN.*) If the *RET/ENTER* parameter is set to *CRLF/TAB*, this key is the same as the TAB key.
ESC	Sends an ESC (escape) code to the computer, causing the terminal to temporarily leave the program. The ESC key introduces an escape sequence. The *WY-350 Programmer's Guide* discusses escape sequences recognized by the terminal.
F1 – F16	Shifted and unshifted, these keys send a sequence of codes or characters to the computer. See "Programming the Function Keys" in Chapter 2 to program the message each key sends.
FUNCT	In setup mode, this key allows you to program the function keys (F1 – F16). See "Programming the Function Keys" in Chapter 2. When pressed with another key, sends SOH, the other key's code, and CR.
HOME	Moves the cursor to the top left corner of the screen.
INS LINE/ CHAR	Shifted, it inserts a line below the cursor, pushing data below the inserted line down one line. Unshifted, it inserts a space at the character position, moving all succeeding characters one position to the right.
INS REPL	Toggles between insert and replace mode (jumps from one to the other). In insert mode, characters to the right of the cursor move right as you type. In replace mode, you can type over existing characters.

Table 3-2 Continued

Key	Description
PREV/ NEXT PAGE	Shifted, it moves the cursor to the home position of the lower screen area if the program has divided the screen into two areas (upper and lower). Unshifted, it returns the cursor to the position it last occupied in the upper screen area (if the program has divided the screen into upper and lower areas and the cursor has moved to the lower area).
PRINT SEND	Shifted, it sends the screen's contents to the printer attached to the AUX port. The printed data is formatted exactly as it was on the screen, except that protected areas are omitted. Unshifted, it sends a block of data to the computer; the terminal must be in block mode.
RETURN	Sends the computer a carriage return code.
SETUP	Shifted, it puts the terminal in setup mode, displays the first-level setup line and the setup prompts (see Chapter 2). Unshifted SETUP unlocks the keyboard if the computer program locks it.
SHIFT	Selects upper character shown on key, changes operation of some special keys (e.g., ENTER, HOME), and capitalizes alphabetic characters. Unless pressed simultaneously with another key, SHIFT has no effect.
TAB	Unshifted, moves the cursor to the next horizontal tab stop. If the cursor reaches the end of the line, it jumps to the next. Shifted, moves the cursor to the last tab stop (backtab).

Other Keyboard Commands

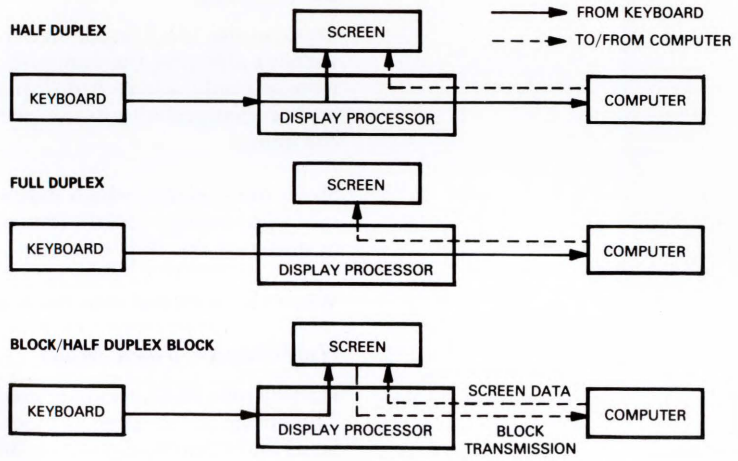
By pressing a combination of keys you can control some additional terminal features. These key combinations are described in Table 3-3. The codes from these keys are never sent to the computer or printer.

Table 3-3 Keyboard Commands

Key Sequence	Effect
SHIFT ENTER	Turns keyclick on or off.
CTRL SHIFT HOME	Turns monitor mode on or off.
SHIFT BREAK	Toggles between block and full-duplex modes.
CTRL SHIFT PRINT	Toggles between auxiliary print on and any print mode off.
CTRL SHIFT ▲	Speeds up scrolling rate.
CTRL SHIFT ▼	Slows down scrolling rate.
SETUP (unshifted)	Partially resets terminal (clears receive buffer and resets UART); unlocks keyboard, and turns all print modes off.

Communication Modes

There are four modes of communication possible between the terminal and an attached computer: full duplex, half duplex, block, and half-duplex block. The figure shown here illustrates how the terminal handles data in each of these communication modes.



You can select the communication mode by setting the *MODE* parameter on the first setup level. You can also switch between full-duplex and block modes by pressing the SHIFT and BREAK keys simultaneously.

The following sections describe each of the communication modes.

Full-Duplex Mode

Full duplex, the terminal's default mode, is one of the most commonly used communication modes. In it, data you enter at the keyboard goes to the computer only. Depending on the program you're running, the computer may send the keyboard codes back to the terminal, where they are displayed on the screen.

In this mode, the terminal can send and receive data at the same time.

Half-Duplex Mode

In half-duplex mode, data you enter on the keyboard goes to the computer and to the terminal at the same time.

Although half duplex is considered a communication mode (because two-way communication occurs), the terminal can't send and receive data at the same time.

Block Mode

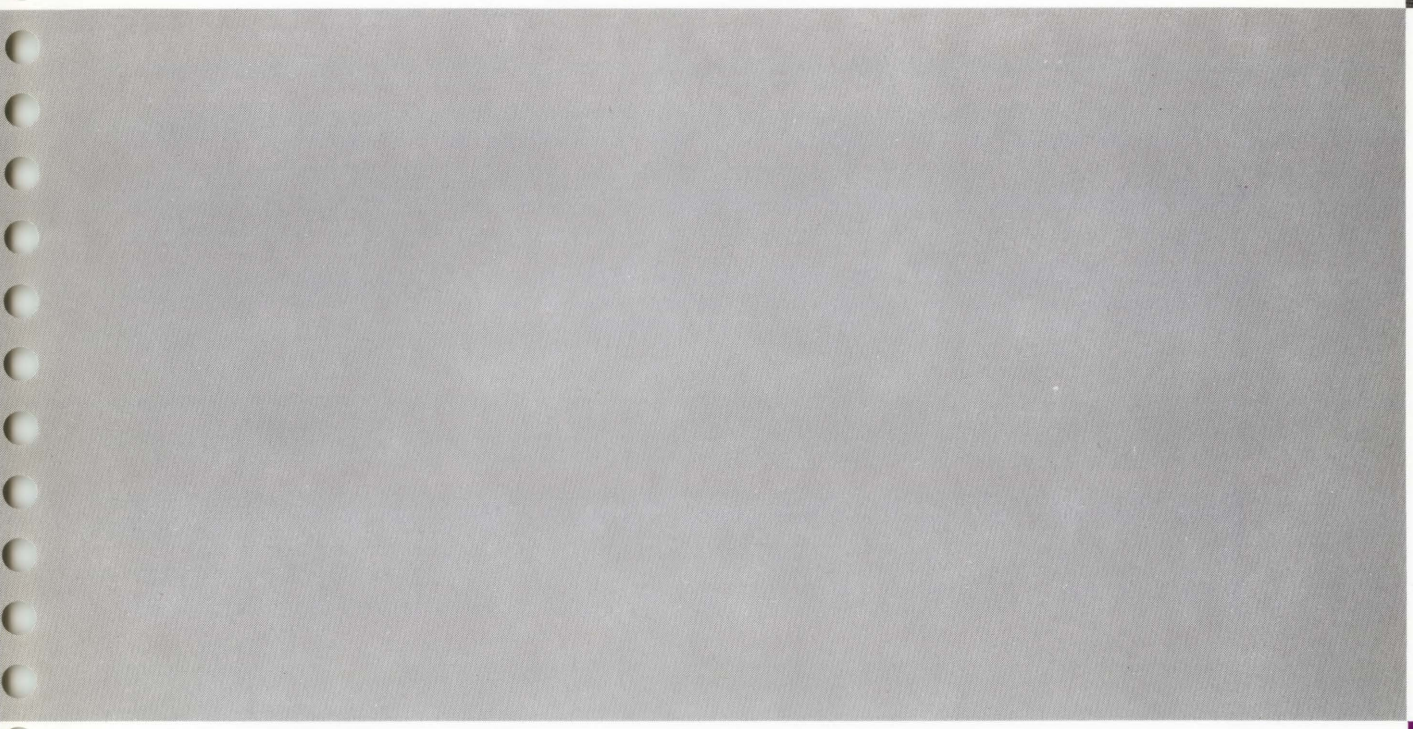
You can use block mode to experiment with the various terminal controls without affecting the computer. In this mode, what you type goes to the terminal only, where it is displayed on the screen. After you've reviewed and/or changed it, you can press the SEND key to send the data to the computer.

Since the speed at which data is sent is determined by the baud rate in effect (not your typing speed), the computer can receive your data much faster than in either of the duplex modes.

While the terminal is in block mode, *BLK* appears in the status line.

Half-Duplex Block Mode

Half-duplex block mode is used when a modem is connected to the terminal. This mode is the same as block mode except that the terminal uses Request to Send and Clear to Send lines to control the receipt and transmission of data.



4

Troubleshooting

Often a suspected terminal malfunction is actually something you can easily fix yourself. Perhaps you've selected the wrong setup value, a cable connection is loose, or the pin assignments on the interface cable need to be changed. Before you place a service call, refer to the solutions suggested in this chapter.

● ***Warning*** **–We are *not* suggested that you open the terminal or try to fix internal terminal problems. *DO NOT* open the terminal case unless you are a qualified service technician. While the case is open, dangerous voltages are exposed (even after the power has been turned off).**

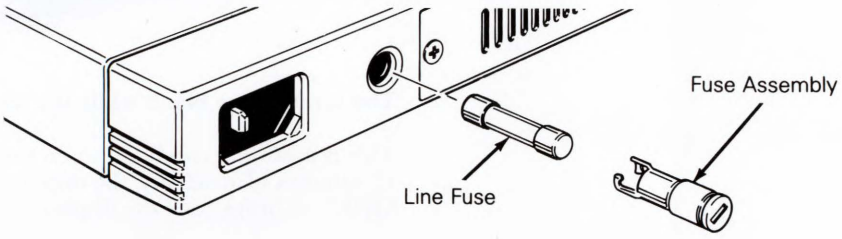
Symptoms and Solutions

The terminal doesn't beep or display a cursor when you turn it on.

1. Turn off the power switch and unplug the power cable.

▼ ***Caution*** –The following procedure exposes you to potentially hazardous shock if you fail to unplug the power cable.

2. Find the line fuse, located on the rear panel next to the power connector.

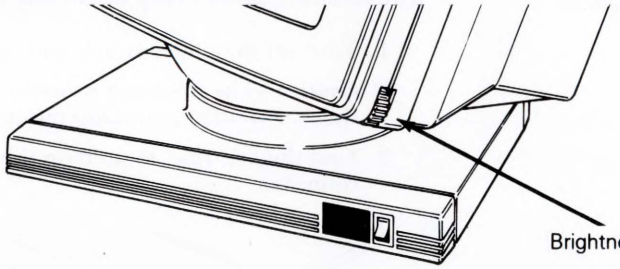


3. Remove the fuse by inserting a small flathead screwdriver in the fuse's slot and turning it counterclockwise.
4. Examine the fuse. If the wire inside the tube is no longer in one piece or if the glass is blackened, the fuse may be blown. If so, pull it out of the spring assembly and insert a new fuse in its place. (You'll need a 3-ampere, 250-volt standard type fuse, available at most hardware and electronics stores.)

5. Reinsert the fuse assembly in the rear panel. While pushing on the fuse assembly with the screwdriver, turn it clockwise about half a revolution. Don't force it.
6. Plug in the power cable and turn on the terminal.

Terminal beeps after you turn it on, but you can't see the cursor.

Turn the brightness control thumbwheel all the way down.



The screen goes blank while the terminal is on.

This is a normal condition when the *SCREEN SAVER* parameter is on. After 15 minutes of inactivity, the display disappears but the data isn't lost. Press SHIFT to bring back the display.

The display doesn't respond when you press a key.

- Look to see if *LOCK* appears in the status line. If it does, your program has inadvertently locked the keyboard. To unlock it, press the SETUP key.
- Check the keyboard cable connection.
- If your computer or applications program recognizes only capital letters, check to see that *CAPS* appears in the status line. If not, press CAPS LOCK.
- Check the computer communications setup (see the next symptom).

The computer doesn't respond when you type on the keyboard.

Check the interface cable connections. Is the computer interface cable connected to the MODEM port? Does it have the right connector pin assignments? (See Appendix B.)

Check the setup selection for *MODE* (choose *FDX*) and *HANDSHAKE* (match your computer). Also check the *MODEM PORT BAUD RATE, DATA BIT,* and *PARITY BIT* selections; they should all match your computer's requirements.

When the terminal is turned on, an *X* or *Y* displays in the bottom right-hand corner of the screen.

Hold down SETUP to exit the self-test.

If the error code continues to display, turn off the terminal and turn it on again. If the error code reappears, it indicates a failure on the MODEM (*X*) or AUX (*Y*) port, and the terminal will need to be serviced by a qualified technician.

When the terminal is turned on, *0, 1, 9, P, R,* or *Z* appears in the bottom right-hand corner of the screen.

These error codes indicate a hard failure on the logic board. The terminal needs to be serviced by a qualified technician.

Nonsense characters (garbage) appear on the screen.

Match the *MODEM PORT BAUD RATE* in the setup line with your computer's baud rate.

Check the pin connections of the computer interface cable (see Appendix B).

Characters become garbled as they appear on the screen.

Make sure the selections for the *STOP BIT* and *PARITY* setup parameters match the stop bit and parity configuration requirements of your computer.

All characters display double when they should be single.

If the computer echoes characters, select *FDX* (full duplex) for the *MODE* setup parameter.

All characters display single when they should be double.

If the computer does not echo characters, select *HDX* (half duplex) for the *MODE* setup parameter.

Terminal powers up but screen contains only a blank status line (i.e., no *FDX*) and a blinking block cursor. You can't enter setup mode and get no response from the computer.

Turn off the terminal. While holding down the D key, turn on the terminal. Keep the D key depressed until the display stops flashing. If *FDX* appears on the status line, enter setup mode and check the configuration. If *FDX* doesn't appear, the terminal needs to be serviced by a qualified technician.

Appendix A–Specifications

Screen	Size: 14 inches measured diagonally Attributes: P22 phosphor 0.31mm dot pitch color CRT
Display Format	26 rows (one status line, 24 data display, one label/setup); 80 or 132 columns (user selectable); horizontally-split screen
Character Formation	80-column: 7 × 13 matrix, 10 × 13 cell 132-column: 7 × 13 matrix, 9 × 13 cell
Character Set	US ASCII
Displayed Character Sets	128 characters (96 displayable ASCII characters, 16 control code symbols, and 16 special graphics characters)
Cursor Control	Home, up, down, left, right, tab, carriage return, previous/next data segment
Cursor Attributes	Block/line; blinking/nonblinking
Communications Interfaces	Two independent EIA RS-232C interfaces
Communications Modes	Block, half duplex, full duplex, and half-duplex block
Word Structure	7 or 8 data bits; 1 or 2 stop bits
Parity	Odd, even, mark, or none
Communications Protocol	X-On/X-Off, DTR, both, or none
Baud Rates	MODEM port: 15 (50 to 38.4K) AUX port: 13 (110 to 19.2K)
Video Attributes	Normal, dim, blink, blank, underline, and reverse (combinable)
Editing	Insert character/line, delete character/line; clear line/screen; insert/replace
Keyboard	Low-profile detached with 6-foot (1.83m) coiled cable; two-position tilt (low position meets DIN specification); 101 keys, including 16 programmable function keys (shiftable to 32), and numeric keypad; N-key rollover with ghost key lockout
Fields	Protected and unprotected

Power Requirements

115 volts ac 50 Hertz; 230 V ac 60 Hertz

Weight

Net: 30 pounds (13.5kg)

Dimensions

	Height		*Width*		*Depth*	
	(in)	*(cm)*	*(in)*	*(cm)*	*(in)*	*(cm)*
Video module	12.00	30.48	12.30	31.24	13.00	33.02
Video module base	1.25	3.20	12.25	31.12	10.25	26.04
Keyboard	2.25	5.72	17.25	43.82	7.60	19.3

Appendix B–Connector Pin Assignments

Tables B-1 and B-2 give the pin assignments for the terminal's MODEM and AUX ports. The pin numbers for both ports are

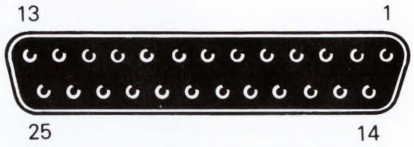


Table B-1 MODEM Port Connector Pin Assignments (DTE - Data Terminal Equipment)

Pin	Signal	Mnemonic	Direction
1	Shield Ground	PGND	
2*	Transmit Data	TXD	Out
3*	Receive Data	RXD	In
4	Request to Send	RTS	Out
5†	Clear to Send	CTS	In
6†	Data Set Ready	DSR	In
7*	Signal Ground	SGND	
8†	Data Carrier Detect		In
20*	Data Terminal Ready	DTR	Out

* Typical requirement.

† Modem protocol. We recommend you leave it disconnected. If pin 5 is low, the terminal will not transmit any data. If pin 8 is low, the terminal will not receive any data but will transmit data.

Table B-2 AUX Port Connector Pin Assignments (DCE - Data Communications Equipment)

Pin	Signal	Mnemonic	Direction
1	Shield Ground	PGND	
2	Not used		
3*	Receive Data	RXD	Out
4	Not used		
5	Not used		
6	Data Set Ready	DSR	Out
7*	Signal Ground	SGND	
8	Not used		
20*	Data Terminal Ready	DTR	In

* Typical configuration

■ ***Note***–The terminal recognizes the printer as busy only when AUX port's pin 20 (DTR) is low.

Table B-3 gives typical pin assignments for a modem (Hayes Smartmodem).

Table B-3 Typical Modem Pin Assignments

WY-350 (DTE)	Hayes Smartmodem 1200 (DCE)
1	1
2	2
3	3
7	7
20	20

We recommend that pins 6 and 8 be disconnected, as they are modem protocols that may lock up the terminal.

■ ***Note***–Hayes Smartmodem 1200 switch settings (front panel) are DUDUDDUD.

A sample printer connection (with the Epson FX80 printer) is shown in Table B-4. The three connections shown (Receive Data, Signal Ground, Data Terminal Ready) are the minimum necessary configuration.

Table B-4 Sample Printer Connection

WY-350		Printer	Signal Name
3	→	3	Receive Data
		4	*RTS
		5	*CTS
7	—	7	Signal Ground
20	←	11	DTR (or Busy/Ready Line)
		6	*DSR
		8	*DCD
		20	*DTR

* Optional for terminal; some printers may need this signal.

Index

WY-350 Programmer's Guide

WYSE

WY-350 Programmer's Guide

WYSE

Overview

This guide tells you how to take full advantage of the terminal's programmable features in your computer programs. These features include

- 64 colors (available in 16 premixed palettes of 8 colors)
- 16 programmable function keys, shiftable to 32
- Split screen capability
- Advanced editing, display, and communications features compatible with the WY-50 and other terminals

This guide is a companion to the *WY-350 User's Guide,* which tells you how to install and set up the terminal.

■ ***Note*** –If you're already familiar with the WY-50 terminal or only want to adapt programs already written for that terminal to display color on this terminal, you don't need to read most of this manual. Turn to the section on "Working with Color" in Chapter 4.

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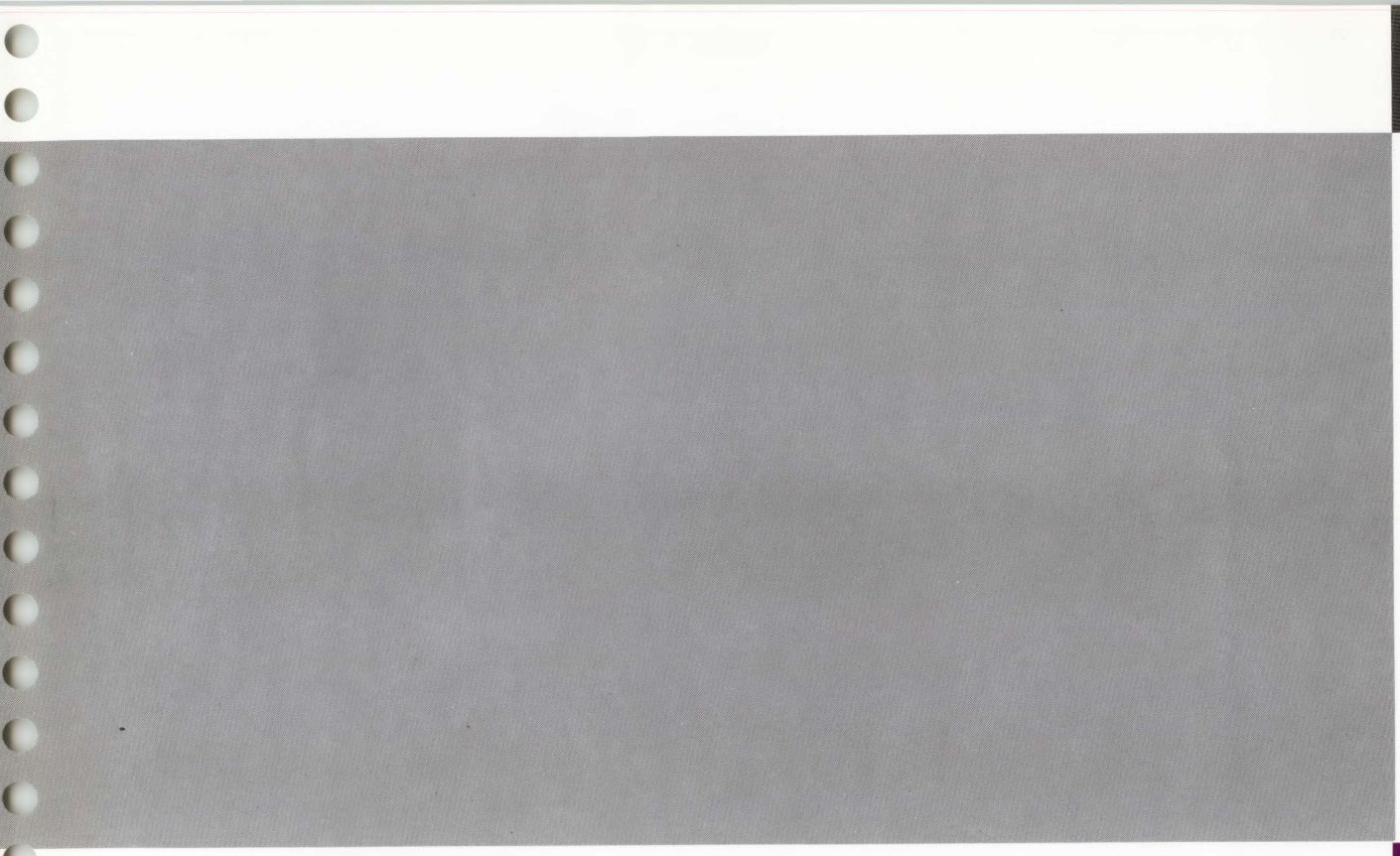


1

Programming the Terminal

You can control the terminal with ASCII control codes and escape sequences. This chapter is a general description of those controls.

Programming Languages

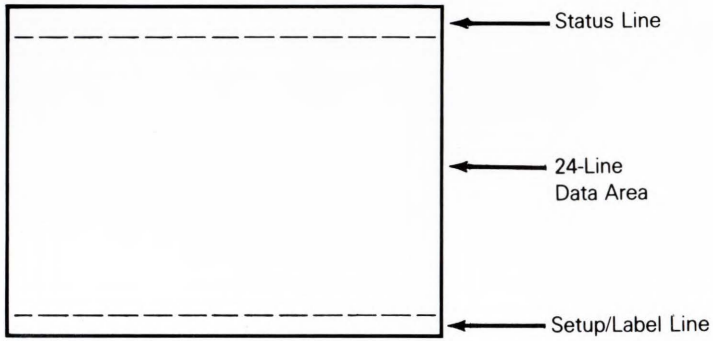
This guide discusses the command sequences recognized by this terminal. How you send he commands described here to the terminal depends on the particular language you're programming in. For information on incorporating these sequences into your programs, refer to your programming language's documentation.

■ ***Note***—All command sequences and definitions in this manual describe the terminal's native operating mode only. The native mode is compatible with the Wyse WY-50, Wyse WY-100, and Lear Siegler ADM-31 terminals. Appendix A discusses the terminal's compatibility with other brands of terminals.

Screen Areas

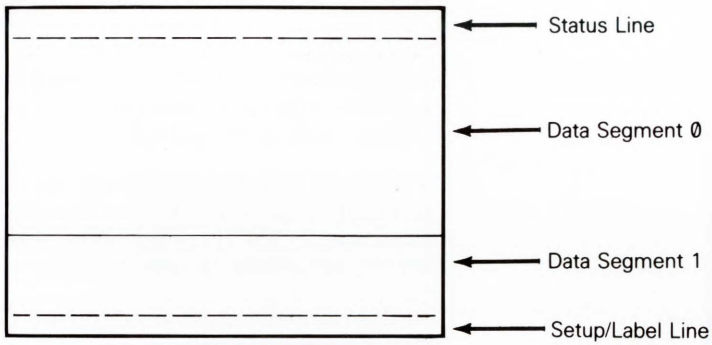
As you read this guide you'll encounter references to the screen's three main areas. As shown in Figure 1-1, they are the status line, the 24-line data area, and the setup/label line.

Figure 1-1 Screen Areas



The data area can display data in one large format (24 lines by either 80 or 132 columns) or in two areas of a horizontally split screen (shown in Figure 1-2). Each of these areas is called a *data segment.*

Figure 1-2 Split Screen



ASCII Control Codes

Control codes are single-byte codes generated from the keyboard when the CTRL key is pressed simultaneously with other alphanumeric keys. Some special keys also generate control codes. The terminal's control codes are given in Table E-1 in Appendix E.

Control codes sent from the keyboard are executed by the terminal locally if the terminal is in block or half-duplex conversational mode. In full-duplex mode, the terminal generates control codes that are sent to the computer; the terminal doesn't act on them locally unless the computer echoes them back.

Escape Sequences

Escape sequences are command sequences that begin with the ASCII ESC character. When the terminal receives an escape code from the computer, it initiates an action. Often a multiple code sequence follows the escape code to specify one of 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's in monitor mode). (In setup mode, all received codes are ignored.)

To send an escape sequence from the computer, send 27 (decimal) or 1B (hexadecimal) followed by the sequence. You can generate an escape sequence from the keyboard by pressing the ESC key followed by the specific sequence.

Some escape sequences change the terminal's operating parameters. These commands aren't saved in nonvolatile memory; they remain in effect only until the terminal is powered off. If you want to save parameter changes, change them in setup mode.

The Quick Reference Guide lists the escape sequences recognized by the terminal in the order they are described. Appendix F lists the escape sequences in ASCII sorting order. Appendix A compares the escape codes for the compatible terminal modes.

Syntax Notation

In this manual, 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; don't enter the spaces. In this example, you would enter

ESC

immediately followed by a grave (`) character and an uppercase *A* (i.e., 1BH 60H 41H).

When a space character is part of a command sequence, it's explicitly shown as

ESC SPACE

When you enter escape sequences, notice whether the command requires upper- or lowercase characters. Also, be sure to distinguish between the characters *1* and *l*, *0* and *O*, ' and `.

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

ESC ` *code*

where *code* represents the screen feature code, such as *A*, *1*, or @.

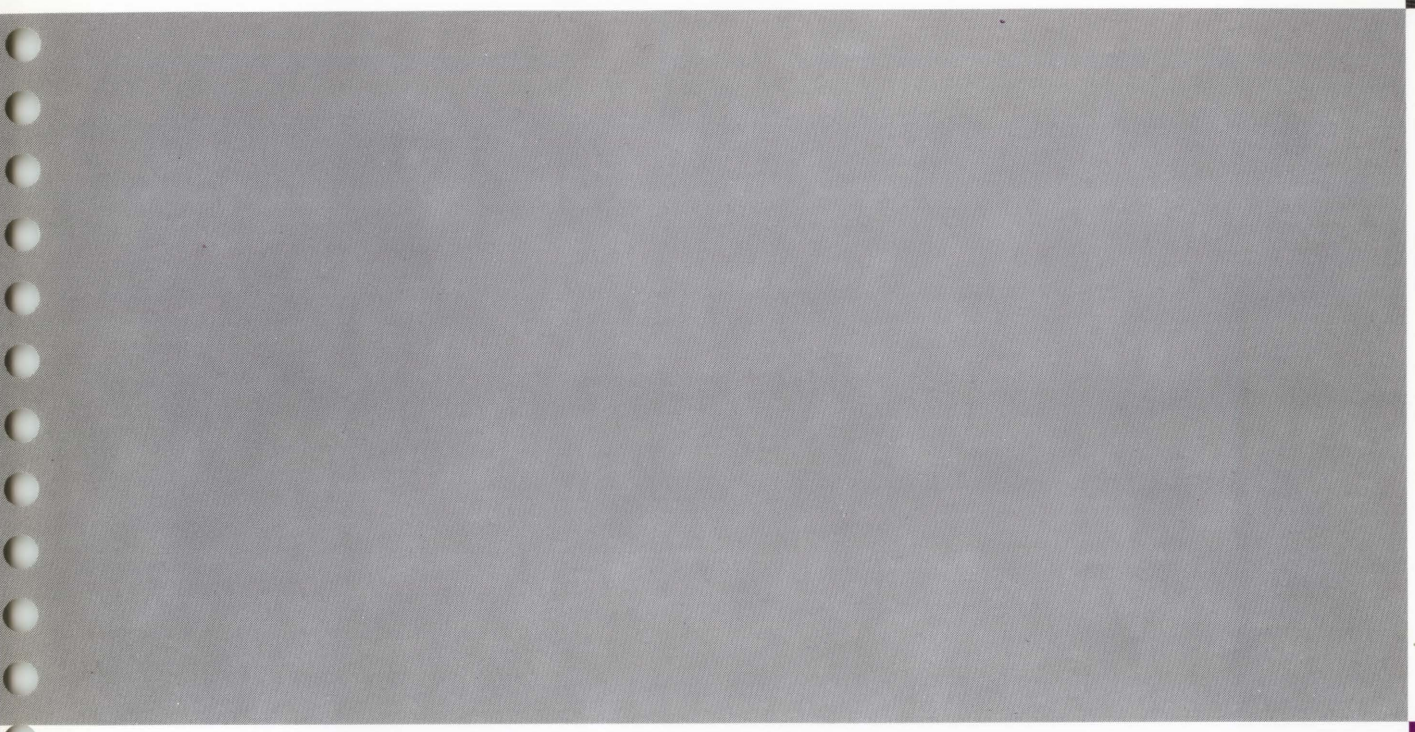
■ ***Note***—Don't enter the italicized characters.

Setup Parameters

When the terminal is first turned on, default parameters control its mode of operation. These parameters (which include the baud rate, the parity, and the mode of communication with the computer) can be changed in setup mode. Other programmable features such as the display format and function key definitions can also be configured through the setup mode.

Chapter 2 of the companion *WY-350 User's Guide* describes how to put the terminal in setup mode and change the parameter values.

■ ***Note***–Going into setup mode is nondestructive; the data area of the screen isn't cleared. However, any data sent from the computer while the terminal's in setup mode is lost.



2

Communicating with the Computer

This chapter describes how the terminal communicates with the computer. You'll learn about the commands that send data in block mode, as well as commands that send data to the AUX (printer) port.

Communication Modes

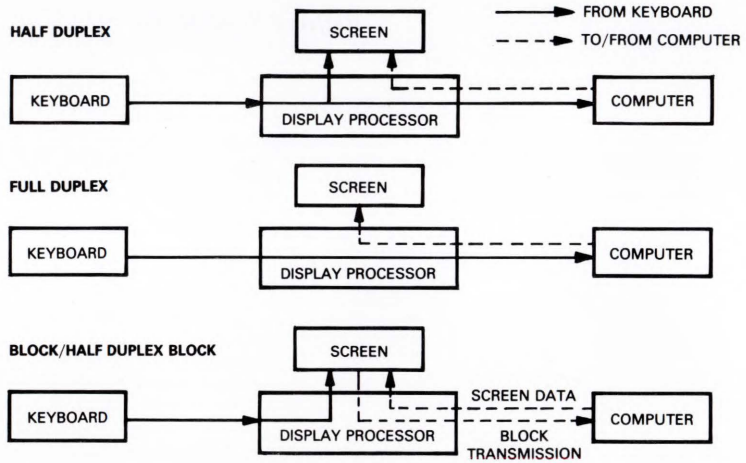
The terminal's communication mode controls how the terminal interacts with the computer. Keyboard input can be sent to the computer, to the terminal and the computer, or to the terminal only. You select the communication mode by sending an escape sequence to the terminal or by changing the setup lines (see Chapter 2 of the *WY-350 User's Guide*).

The terminal can operate in any of four communication modes:

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

Figure 2-1 compares the transmission sequences for each of the four communication modes.

Figure 2-1 Communication Modes



Full-Duplex Mode

Full-duplex mode on	ESC C ESC D F

This sequence has two parts: ESC C puts the terminal in conversational mode; ESC D F puts it into full-duplex mode.

In full-duplex mode, the terminal operates as a completely conversational device. All terminal functions are controlled by the computer. Keystrokes send character codes or control codes to the computer—keyboard input is not acted on locally. Depending on how the computer is programmed, it may or may not echo the result back to the terminal. The terminal can send and receive simultaneously. Operation changes when local edit mode is also selected—see "Local Edit Mode."

In full-duplex mode, RTS (pin 4 on the MODEM connector) is always high (ready).

When you select full-duplex mode, *FDX* appears in the terminal message field.

Half-Duplex Mode

Half-duplex mode on	ESC C ESC D H

In half-duplex mode, each character input from the keyboard is simultaneously sent to the screen and to the computer. Control keys are simultaneously acted on and sent to the computer. Local editing keys (such as INS CHAR) are executed and transmitted. The codes for keys that generate escape codes are acted upon and transmitted.

RTS, normally low, goes high when the terminal is ready to transmit. When CTS from the computer goes high, the terminal sends data to the computer, then lowers RTS.

When you enable half-duplex mode, *HDX* appears in the terminal message field.

Block Mode

Block mode on	ESC B

Block mode lets the user enter and edit data as though the terminal were a buffered, off-line device. Keystrokes are stored in the terminal's display memory; they're sent to the computer as a block only when the user presses the SEND key.

To define how much data is sent during block mode, you can insert markers (delimiters) in the text. Add a start-of-text (STX) character where you want data transmission to start and an end-of-text (ETX) character where you want it to stop. STX and ETX occupy a character position.

The terminal automatically includes delimiters after each line or block of data. Here you determine which delimiter is sent by the value selected for the *BLK END* parameter in the setup mode.

The only key codes automatically transmitted to the computer are those generated by the BREAK key, FUNCT key sequences, and function keys F1 through F16.

Block mode reduces computer overhead and communication line (e.g., phone line) hook-up time.

Block transmissions are governed by the following rules:

- Null characters are not transmitted.
- Attributes are sent as space characters.
- If protect mode is on, graphics character codes are sent as spaces.

In block mode, RTS (pin 4 on the MODEM connector) is always high. The message *BLK* appears in the terminal message field.

Half-Duplex Block Mode

Half-duplex block mode on	ESC C ESC D H ESC B

Half-duplex block is the same as block mode except the terminal uses RTS and CTS handshaking protocol.

RTS, normally low, goes high when the terminal is ready to transmit. When CTS from the computer goes high, the terminal sends a block of data to the computer, then lowers RTS.

When half-duplex block mode is on, *BLK* appears in the terminal message field.

Editing Modes

Editing modes modify the way the terminal sends special key codes to the computer.

The terminal is always in either duplex or local edit mode.

Duplex Edit Mode

Duplex edit mode on	ESC l

When the terminal is in either full- or half-duplex mode and in duplex edit mode, key codes from keys that generate escape codes are sent to the computer.

■ ***Note***–This sequence includes a *lowercase L*, not the number one.

Local Edit Mode

Local edit mode on	ESC k

In local edit mode, key codes from keys (except function keys) that generate escape codes are not sent to the computer but are acted upon only by the terminal.

MODEM Port Handshaking Protocol

The handshaking protocol exchanged between the terminal and the computer (through the MODEM port) is selected in the setup mode. You can select *XON/XOFF, DTR,* or *BOTH.* The handshaking protocol prevents the loss of data when the terminal's receive buffer becomes full.

■ ***Note***–The pin assignments of the MODEM port connector are given in the *WY-350 User's Guide.*

X-On/X-Off Handshaking

When the terminal's receive buffer is almost full, the terminal sends an X-off character to the computer. This tells the computer to stop sending data until it receives an X-on character. When the terminal is ready to receive more data, it sends the X-on character.

Data Terminal Ready (DTR)

When the terminal's receive buffer is almost full, the DTR line (pin 20 on the MODEM connector) goes low (busy) (−3 to −12 volts). When the terminal is ready to receive again, the DTR line goes high (ready) (+3 to +12 volts).

AUX (Printer) Port Handshaking Protocol

The terminal supports DTR handshaking protocol on pin 20 of the AUX port. The handshaking protocol selected for the MODEM port doesn't affect the AUX port's handshaking protocol.

When the printer is ready, the printer's DTR line should go high (ready) (+3 to +12 volts). When the printer's busy, its DTR line should go low (busy) (−3 to −12 volts).

■ ***Note***—The AUX port pin assignments are given in the *WY-350 User's Guide.*

Sending Data in Block Mode

In full- or half-duplex mode, data entered from the keyboard goes immediately to the computer. In block mode, you must explicitly send data to the computer. The computer can request data by sending one of the escape sequences described below, or the user can press the SEND key or type in the escape sequence.

If you don't want to send a character, line, or screen of data, you can define the block to be sent by adding STX and ETX delimiters.

■ ***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 (one byte) at the cursor position to the computer. No CR character is sent after the character.

Sending One Line

Send entire line	ESC 6

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

Sending An Unprotected Line

Send unprotected line	ESC 4

Sends all unprotected characters in the cursor's line to the computer, beginning with the first character position up to and including the cursor character.

Sending a Page

Send page	ESC 7

Sends all characters (including protected) 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 horizontal split screen, see "Split Screen" in Chapter 4.)

Sending an Unprotected Page

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

Sending a marked block of data involves two steps:

1. Mark the beginning and end of the block by adding the STX and ETX characters to the data with the escape sequences listed below.
2. Send the block to the computer with the ESC s or ESC S sequence. (The STX and ETX characters are not sent.)

Defining a Block

Add Start-of-Text (STX) character	ESC 8
Add End-of-Text (ETX) character	ESC 9

These sequences insert a visible STX or ETX character at the cursor location to define the block of text that will be sent to the computer in block mode.

- ***Note***–STX is the ASCII CTRL B character, while ETX is an ASCII CTRL C. Each occupies a single character position, and they are visible.

Sending a Block of Data

Send block of data	ESC s

When protect mode is off, this sequence sends all characters from the first STX character left of the cursor to the next ETX character. An end-of-line sequence (US or CR/LF) is sent at the end of each line. An end-of-transmission sequence (CR or ETX) is sent as the transmission terminator.

- ***Note***–The ETX character which can be selected as the transmission terminator in setup mode is an invisible character and is always sent (if selected). However, any ETX and STX characters added with the ESC 8 or ESC 9 sequence are visible and are not sent.

When protect mode is on, each protected field is sent, bracketed with the ESC) code (write-protect on) and the ESC (code (write-protect off).

Sending an Unprotected Block of Data

Send unprotected characters in block	ESC S

Sends unprotected characters only.

When protect mode is off, the terminal sends all characters from the first STX character left of the cursor to the next ETX character. The end-of-line sequence (US or CR/LF) is sent at the end of each line. The end-of-transmission sequence (CR or ETX) is sent as the transmission terminator.

When protect mode is on, each protected field is replaced by the field separator code, FS (CTRL \). STX and ETX characters that have been added to the data are not sent.

Interrupting a Transmission

Pressing the BREAK key sends a break signal of 250 milliseconds to the computer. The break signal continues as long as BREAK is held down.

■ ***Note***–The BREAK key 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

Sending Terminal Identifier

Send terminal identifier	ESC SPACE

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

3 5 0 CR

or, in Hex,

33H 35H 30H 0DH

Page Print Functions

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

■ ***Note***–The terminal must be in block mode if these codes are typed in from the keyboard.

The printed copy can duplicate the format seen on the screen *(formatted page)* if the terminal sends the end-of-line delimiters; or the page can be unformatted, i.e., a string of data.

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 (printer) port. Every line is terminated with CR LF NULL characters.

Print formatted unprotected page	ESC @

This command sends all unprotected characters from home to and including the cursor location to the AUX port.

If protect mode is on, 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 NULL characters.

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 irrelevant.) End-of-line delimiters are not sent.

Buffered Print Modes

The terminal recognizes two buffered print modes: auxiliary (sometimes called *extension* or *copy*) and transparent. Because both modes are buffered, the AUX port can run at a different baud rate than the MODEM port. Data bits and stop bits are the same as selected for the MODEM port.

- ***Note***—The terminal must be in block mode if these codes are typed in from the keyboard.

Controlling Auxiliary Print Mode

Auxiliary print mode on	CTRL R
Auxiliary print mode off	CTRL T

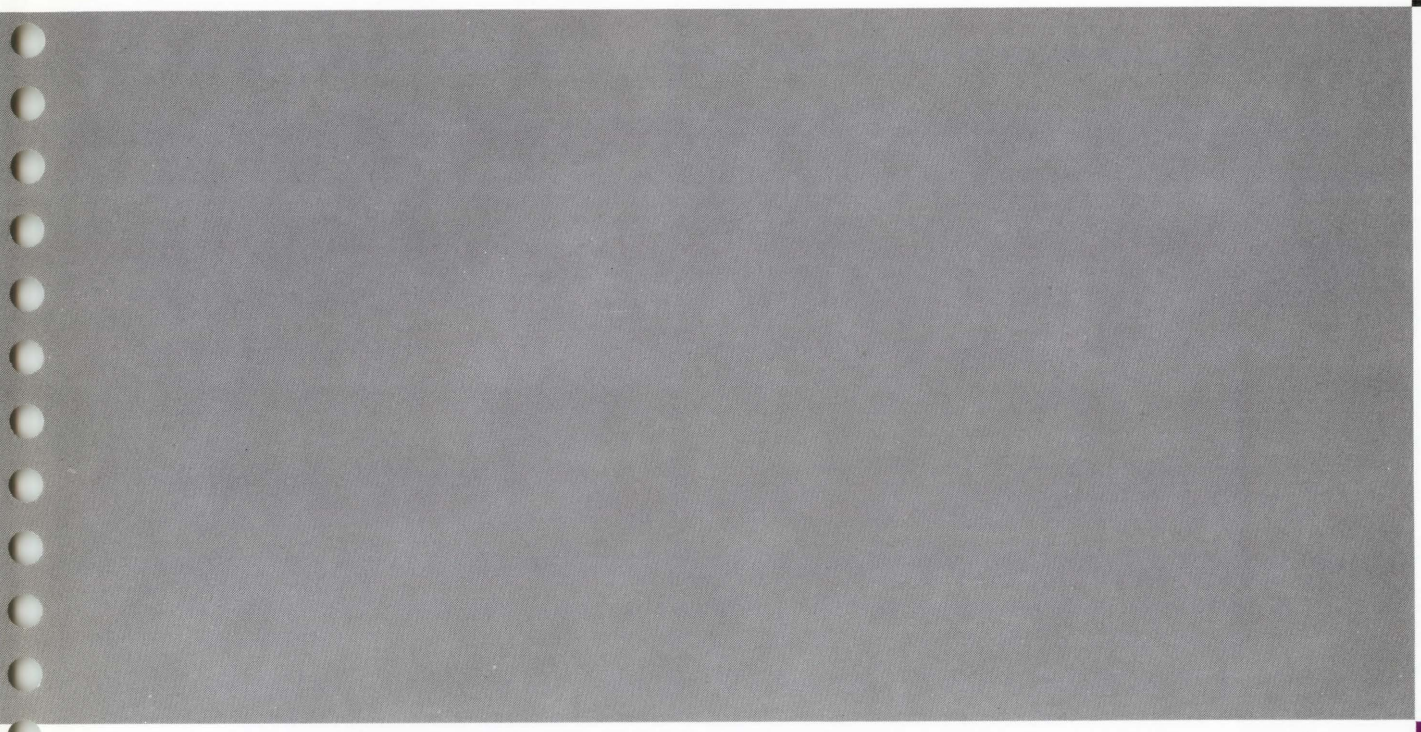
While auxiliary print mode is on, all data received from the computer is displayed on the screen and sent to the AUX (printer) port.

Controlling Transparent Print Mode

Transparent print mode on	CTRL X
Transparent print mode off	CTRL T

When transparent print mode is on, all data received from the computer goes to the AUX port but it's not displayed on the screen.

- ***Note***—Transparent print mode can be enabled only if the enhance mode is on.



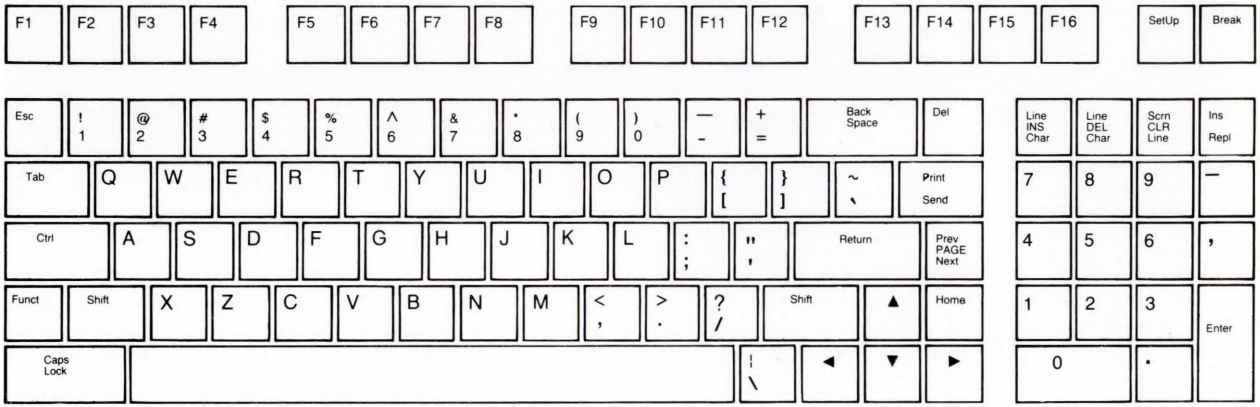
3

The Keyboard

This chapter describes the keyboard and lists the key codes sent by each nonalphanumeric key. You'll learn how to program the function keys, as well as local keyboard commands.

The Keyboard

Figure 3-1 Keyboard Layout



Key Codes

All alphanumeric keys generate the standard ASCII character codes, given in Appendix C. The keys listed in Table 3-1 generate control or escape codes that are transmitted to the computer in conversational mode. The action of these codes is determined by the setup parameters, particularly the communication mode.

- ***Note*** – Unless noted, shifted keys generate the same codes as unshifted. ADDS-VP and HZ-1500 key codes are the same as WY-350 codes unless noted. If the terminal is in a duplex communication mode, the edit key codes go directly to the computer unless local edit mode is also on.

Table 3-1 Key Codes

Key		WY-350 Code[1]	Hex. Value	ADDS-VP Code	HZ-1500 Code
ENTER		CTRL M	0D		
	or	CTRL I	09		
ESC		CTRL [	1B		
RETURN		CTRL M	0D		
	or	CTRL M CTRL J	0D 0A		
TAB		CTRL I	09		
SHIFT TAB		ESC I	1B 49		~CTRL I
▼		CTRL J	0A		~CTRL K
	or	CTRL V[2]	16		
◄		CTRL H	08	CTRL U	
►		CTRL L	0C	CTRL F	CTRL P
▲		CTRL K	0B	CTRL Z	~CTRL L
BACKSPACE		CTRL H	08		
HOME		CTRL ^	1E	CTRL A	~CTRL R
SHIFT HOME		ESC {	1B 78	CTRL A	~CTRL R
PAGE NEXT		ESC K	1B 4B	ESC J	CTRL A
PAGE PREV		ESC J	1B 4A		CTRL E
PRINT		ESC P	1B 50		CTRL F
SEND		ESC 7	1B 37		~7

1. These codes are also recognized by the WY-50 and when the terminal is in TeleVideo 910/920/925 modes.
2. CTRL V if the terminal is in TeleVideo 925 mode.

Table 3-1 Continued

Key	WY-350 Code	Hex. Value	ADDS-VP Code	HZ-1500 Code
CLR LINE	ESC T	1B 54	ESC K	~CTRL O
CLR SCRN	ESC Y	1B 59	ESC k	~CTRL \
DEL CHAR	ESC W	1B 57		CTRL C
DEL LINE	ESC R	1B 52	ESC l	~CTRL S
INS	ESC q	1B 71		CTRL U
INS CHAR	ESC Q	1B 51		CTRL B
INS LINE	ESC E	1B 45	ESC M	~CTRL Z
REPL	ESC r	1B 72		CTRL D

The default function key codes are given in the next section.

The Function Keys

Programming a Function Key from the Computer

Program function key	ESC z *key sequence* DEL
Clear function key	ESC z *key* DEL

key is the default value for that function key from Table 3-2.

sequence is up to eight bytes of data to be loaded in that key. This data can be any combination of alphanumeric characters, escape sequences, and control codes.

The first four bytes of data in each are stored in nonvolatile memory if you immediately enter setup mode and save it there.

Table 3-2 Default Function Key Values

Key	Unshifted	Shifted
F 1	@	`
F 2	A	a
F 3	B	b
F 4	C	c
F 5	D	d
F 6	E	e
F 7	F	f
F 8	G	g
F 9	H	h
F10	I	i
F11	J	j
F12	K	k
F13	L	l
F14	M	m
F15	N	n
F16	O	o

Each unprogrammed function key sends

SOH *default code* CR

Examples

For example, the unshifted F1 key sends the sequence

SOH @ CR

CTRL A @ CTRL M

or, in Hex,

01H 40H 0DH

In a second example, you want to change the color palette to the premixed green palette whenever the shifted F4 key is pressed.

■ ***Note*** –This example assumes the computer echoes codes back to the terminal.

1. Send the escape sequence to start the programming:

   ESC z

2. Find the value of the shifted F4 key in Table 3-2 and send

   c

3. Send the value for the premixed palette:

   ESC % 1

4. Send

   DEL

   to end the programming sequence.

The entire sequence would be

ESC z c ESC % 1 DEL

or, in Hex,

1B 7A 63 1B 25 31 7F

Programming a Function Key from the Keyboard

Each function key on the top row of the keyboard can transmit several characters with just one keystroke. You can program these keys (F1 through F16, shifted and unshifted) from the keyboard to send a unique character string.

To program one or more of the function keys:

1. Press the SHIFT and SETUP keys to put the terminal in setup mode.
2. Press the FUNCT key. A new field containing

   F1 =

   replaces the normal setup line. The terminal message field in the status line at the top of the screen defines the functions of special keys in this mode.

3. If you want to program a different function key, press that function key (or press RETURN until the number of that function key appears).

■ ***Note***–A shifted function key is indicated by a lowercase *s* as the first character. For example, *sF1* refers to the shifted F1 key.

4. To program the key that's displayed, type the characters you want transmitted. You can enter up to eight characters per key, but only the first four can be stored in the terminal's nonvolatile memory; the rest are erased when you turn the terminal off.

   To enter a carriage return code (CR) in the sequence, hold down the CTRL key while pressing the M key (instead of pressing RETURN). A carriage return counts as one character.

   If you make a mistake, press the function key again and type the command again from the beginning.

■ ***Note***–To restore the function key's default value, press the CTRL and @ keys.

5. To load the program into the key, press the RETURN key.
6. To display other function key levels, press RETURN again or press the desired function key.
7. To stop programming function keys and redisplay the setup lines, press the FUNCT key again. The first setup line reappears.

Example–You want to program the shifted F2 key to send a DIR (CR) code sequence.

1. Press the SHIFT and SETUP keys to enter setup mode.
2. Press the FUNCT key.
3. Press the RETURN key once or press the F2 function key.
4. Type

   DIR
5. While holding down the CTRL key, press the M key.
6. Press the RETURN key.
7. To return to the first setup line, press FUNCT again.

Instead of having to type in the command DIR and press the RETURN key to display the disk's directory, now you can just press the F2 key.

■ ***Note***—If the program sequence includes a null character, the default value for that function key is restored.

The FUNCT Key

The FUNCT key transmits a three-byte sequence when it's pressed before an alphanumeric key. The sequence sent is

SOH *key* CR

where *key* is the key's ASCII code.

Example

FUNCT A transmits the sequence SOH A CR to the computer. (It isn't displayed unless echoed by the computer.)

■ ***Note***—Unlike the CTRL and SHIFT keys, which are pressed at the same time as another key, the FUNCT key is pressed and released before the next key is pressed.

The FUNCT key does not repeat when held down.

Character Sets

The terminal contains three character sets:

1. Standard alphanumeric characters
2. Sixteen line-drawing graphics characters
3. Extended character set for protected characters

Controlling Graphics Mode

Toggle graphics mode on/off	ESC H *x*

x is the graphics character code. If you enter STX (CTRL B) as *x*, you turn on graphics mode so that each line-drawing character shown in Table 3-3 displays when the corresponding key is pressed. ETX (CTRL C) turns graphics mode off.

x	*Graphics Mode*	*Hex Value*
STX	On	1B 48 02
ETX	Off	1B 48 03

While graphics mode is on, you can execute control codes.

If *x* is a value from Table 3-3, the sequence displays one line-drawing character at a time at the cursor location.

Table 3-3 Line-Drawing Graphics Character Codes

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

This set of 16 graphics characters lets you draw graphs, charts, and other line-drawn figures. You can access one character at a time or the whole group.

Extended Character Set

The character set shown in Table 3-4 is available in write-protect mode (see Chapter 4). However, these characters should be included only in applications programs specifically designed for them.

Table 3-4 Extended Character Set Codes

Char.	Key	Char.	Key	Char.	Key	Char.	Key
┌	!	├	%	└	)	■	-
┐	"	┤	&	┘	*	▞	.
└	#	┌	'	▙	+	▒	/
┘	$	┐	(	■	,	┬	0

Table 3-4 Continued

Char.	Key	Char.	Key	Char.	Key	Char.	Key
╘	1	é	E	Ì	Y	½	m
╒	2	ó	F	Ö	Z	δ	n
╕	3	ú	G	Ü	[	¯	o
╞	4	à	H	Ė	\	¯	p
╛	5	è	I	ï	]	^	q
╽	6	ò	J	ß	^	¯	r
▉	7	ù	K	⊥	_	¯	s
┼	8	ä	L	♦	`	¥	t
┤	9	ë	M	↑	a	¢	u
─	:	ö	N	↓	b	µ	v
▓	;	ü	O	→	c	ß	w
═	<	Ȧ	P	←	d	Δ	x
┴	=	î	Q	@	e	≤	y
╟	>	ø	R	°	f	≥	z
▒	?	ﬀ	S	±	g	π	{
â	@	ȧ	T	Ñ	h	≠	¦
ê	A	Í	U	ñ	i	£	}
ô	B	ø	V	ς	j		~
û	C	æ	W	¿	k		
á	D	Ä	X	¼	l		

Local Commands

From the Keyboard

The user can change the terminal locally with some key sequences, listed in Table 3-5. The codes from these keys are never sent to the computer or printer.

Table 3-5 Keyboard Commands

Key Sequence	Effect
SHIFT ENTER	Turns keyclick on or off
CTRL SHIFT HOME	Turns monitor mode on or off
SHIFT BREAK	Toggles between block and full-duplex modes
CTRL SHIFT PRINT	Toggles between auxiliary print on and any print mode off.
CTRL SHIFT ▲	Speeds up scrolling rate
CTRL SHIFT ▼	Slows down scrolling rate
SETUP (unshifted)	Partially resets terminal (clears receive buffer and resets UART); unlocks keyboard and turns all print modes off.

From the Computer

Lock keyboard	CTRL O or ESC #
Unlock keyboard	CTRL N or ESC "

The keyboard lock feature prevents input from the keyboard. When the keyboard is locked, all keys are ignored except BREAK, the FUNCT key sequence, and the function keys F1 through F16. The message *LOCK* appears in the terminal message field.

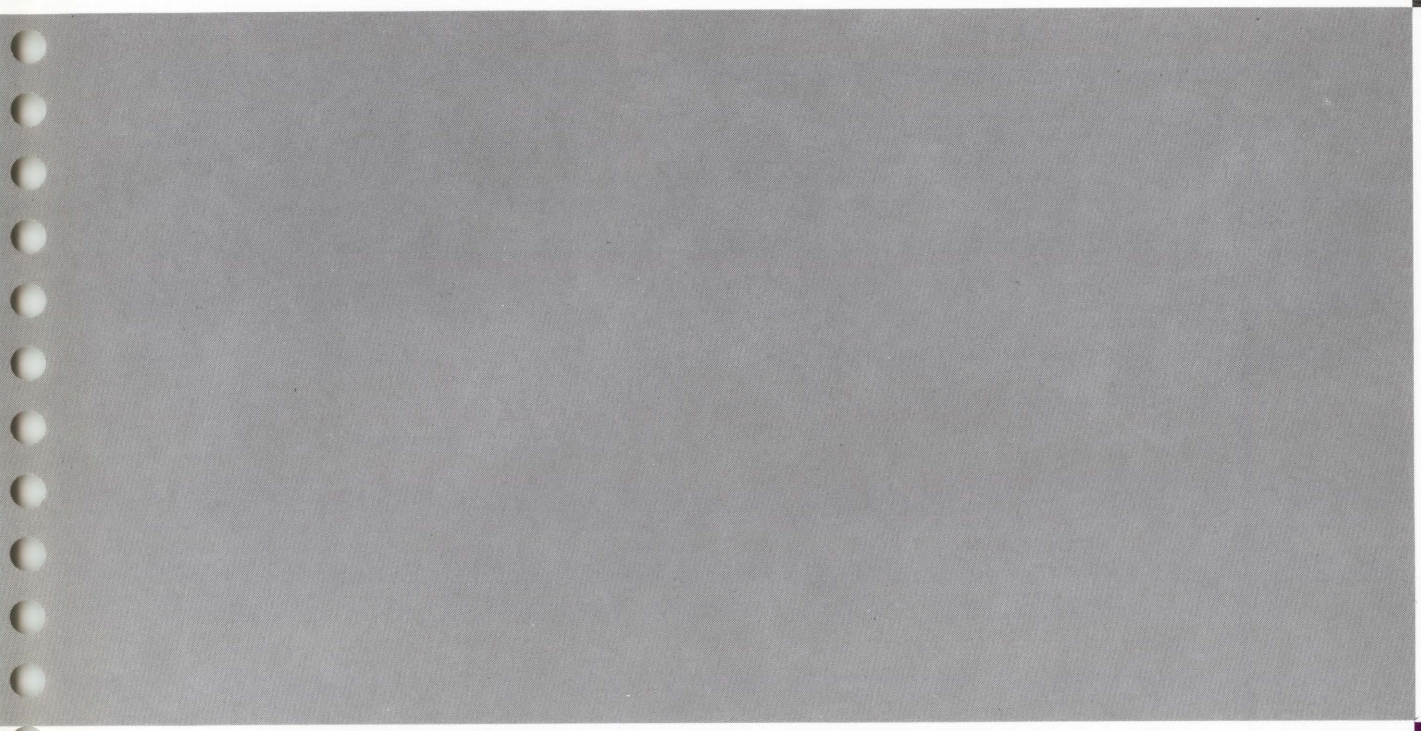
■ ***Note*** – Pressing the unshifted SETUP key unlocks the keyboard, clears the receive buffer, and clears the UART.

Monitor Mode

Turn monitor mode on	ESC U
Turn monitor mode off	ESC u or ESC X

Monitor mode helps you debug programs. Monitor mode causes the terminal to display symbols for all received codes (including control codes) without acting on them. For example, a carriage return linefeed sequence is displayed as *CRLF*. (The first 32 characters in Appendix B illustrate how received control codes appear.) * appears in the terminal message field when monitor mode is on.

■ ***Note***–Press SHIFT CTRL HOME to toggle monitor mode on and off.



4

Controlling the Display

This chapter tells you how to control the terminal's screen and cursor movements.

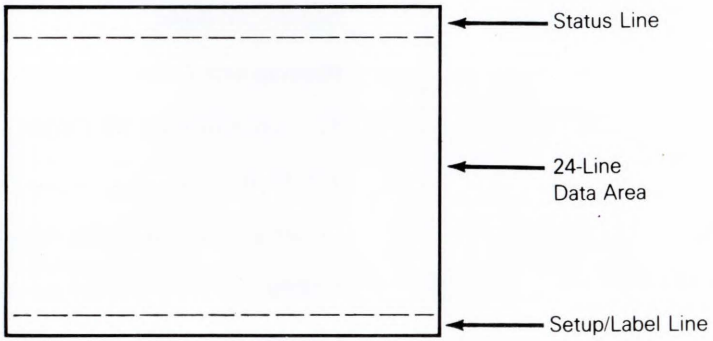
Displaying the Message Fields

Terminal Display Areas

The top line on the screen is the *status line*. The bottom line—the setup/label line—is described later. Between these two lines are 24 lines for data display. Figure 4-1 shows the terminal display areas.

■ ***Note*** –When the terminal's in setup mode, the display in both lines is controlled by that mode.

Figure 4-1 Display Areas



The status line can display computer messages, terminal status messages, or both; or you can turn it off in setup mode.

- 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 below.
- The *terminal status message field* displays the current communication mode as well as any editing or keyboard modes in effect. These appear automatically.

Programming a Computer Message

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

message is a character string of up to 46 characters for an 80-column screen (up to 98 characters for a 132-column screen) that is displayed in the computer message field on the status line.

You cannot insert display attributes (or any escape sequences or control characters) in the computer message field. Set any attributes separately; see the "Display Attributes" section of this chapter.

Programming the Label Line

Unless setup mode is on, 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 32 function key labels or, alternatively, two different messages.

■ ***Note***–Don't confuse the label line message with the computer message that can be programmed to appear in the status line (the top line on the screen).

Program and display entire unshifted label line	ESC z (*label* CR
Program entire shifted label line	ESC z) *label* CR

label is a message containing up to

78 characters for an 80-column screen

130 characters for a 132-column screen

The entire bottom line becomes one field. The unshifted label line message is displayed as soon as the escape sequence is received. The following sequence controls the display of the shifted label line message, which is displayed when the SHIFT key is pressed.

Controlling the Label Line Display

Display entire shifted label line (default)	ESC z P CR
Turn off entire shifted label line	ESC z DEL

These two sequences control whether or not the shifted label line is displayed when the SHIFT key is pressed.

The unshifted label line is displayed automatically; however, it can be hidden by sending

ESC A 1 1

to assign the blank display attribute. See the "Display Attributes" section in this chapter for information on assigning display attributes to the label line. Any attribute assigned will apply to both the unshifted and shifted label lines.

Program and display one function key label	ESC z *field label* CR

field is the field code given in Table 4-1.

You can label up to

Eight fields (shiftable to 16) on an 80-column screen

Sixteen fields (shiftable to 32) on a 132-column screen

label is a character string of up to

Eight characters for an 80-column screen

Seven characters for a 132-column screen

Table 4-1 Function Key Field Codes

	Field Code			Field Code	
Key	**Unshifted**	**Shifted**	**Key**	**Unshifted**	**Shifted**
F1	0	P	F10	9	Y
F2	1	Q	F11	:	Z
F3	2	R	F12	;	[
F4	3	S	F13	<	\
F5	4	T	F14	=	]
F6	5	U	F15	>	^
F7	6	V	F16	?	_
F8	7	W	all	(	)
F9	8	X			

■ ***Note***—Before you change from one screen format (80- or 132-column) to another, clear each function key label with the escape sequence described below. You can then enter new function key labels as desired.

This sequence allows you to 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 by pressing the SHIFT key.

Clearing the Label Line

Clear function key label	ESC z *field* CR

field is the field code given in Table 4-1.

You can clear the contents of any of

Eight fields (shiftable to 16) on an 80-column screen

Sixteen fields (shiftable to 32) on a 132-column screen

This sequence clears the contents of one label field at a time on the label line.

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

These sequences clear the entire label line.

Screen and Cursor Display

Changing the Number of Displayed Columns

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

Allow for a delay of 150 milliseconds before entering data.

If you've programmed labels on the bottom line or want to add them after you change the screen width, follow this procedure *before* changing the number of displayed columns:

1. Send

   ESC z (CR
   ESC z) CR

   or, in Hex,

   1BH 7AH 28H 0DH
   1BH 7AH 29H 0DH

   to clear the line completely.

2. Send

   ESC A 1 *attr*

   or, in Hex,

   1BH 41H 31H *attr*

   where *attr* is the display attribute from Table 4-2 in the "Display Attributes" section of this chapter.

3. Send the new function key label with the proper ESC z sequence.

After changing the number of displayed columns, move the cursor to the location desired.

Controlling the Screen Display

Turn screen display off	ESC ' 8
Turn screen display on (default)	ESC ' 9

This command to turn off the screen display is different from the screen saver feature, which only temporarily blanks the display.

Controlling the Cursor Display

Set cursor display features	ESC ' *n*

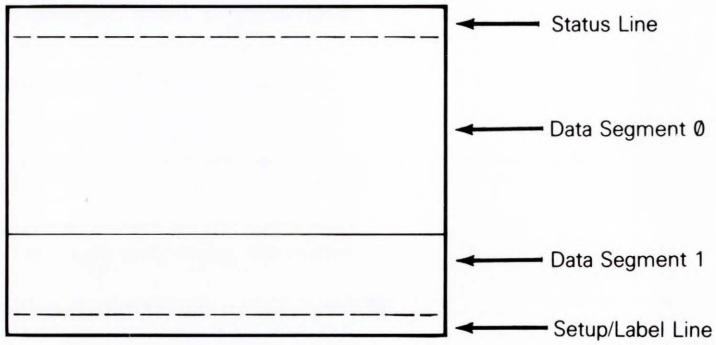
n defines whether or not the cursor is displayed, or in what form it is displayed.

n	*Cursor Display*
0	Cursor display off
1	Cursor display on (default)
2	Block cursor, steady (default)
5	Block cursor, blinking
4	Line cursor, steady
3	Line cursor, blinking

Split Screen

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

Figure 4-2 Split Screen Format



Splitting the Screen Display

Split screen horizontally	ESC x 1 *line*

line is the ASCII character corresponding to the line number of the line that you want to become the top line in the lower data segment. (See Table 4-5, "ASCII Line Codes.")

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 4-5.

Executing this command

- Clears all data from the screen
- Resets the terminal, thus turning off write-protect and protect modes and clearing 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.

Activating a Data Segment

Activate the other data segment	ESC J or ESC K
Activate upper data segment	ESC]
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's in block or half-duplex block mode, pressing SHIFT PAGE NEXT also activates the other data segment.

Reading the Active Segment and Cursor Address

Read active 80-column segment number and cursor address	ESC /

In response to this command, the terminal sends the number of the active data segment (0 = upper, 1 = lower) and the cursor address. The transmission format is

seg line col CR

where *line* is the line code from Table 4-5 and *col* is the column code from Table 4-6.

Setting Full Screen Format

Redefine screen as one segment	ESC x 0

Executing this command

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

If you've split the screen horizontally, this command returns it to a full screen format.

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

Scrolling

Scrolling Speed and Type

Set scrolling speed and type	ESC ' *c*

c	*Scrolling Type*	*Speed (lines per second)*
@	Jump scroll (default)	
<	Smooth scroll	1
=	Smooth scroll	2
>	Smooth scroll	4
?	Smooth scroll	8

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

Smooth scrolling won't work properly unless you've selected some type of handshaking for the MODEM port. (See Chapter 2 of the *WY-350 User's Guide.*)

■ ***Note*** – This command employs the grave accent character, not an apostrophe.

Autoscrolling Mode

Turn autoscrolling mode off	ESC N
Turn autoscrolling mode on (default)	ESC O

When autoscrolling mode is on, entering a character on the last line at the last column position scrolls the data up one line, fills the last line with space characters, and moves the cursor to the first position of that line. The line that scrolled off the top of the screen is lost.

When autoscrolling mode is off, entering a character on the last line at the last column position moves the cursor to the home position (or the first unprotected position).

■ ***Note*** – Turning protect mode on turns off autoscrolling mode. When protect mode is on, protected fields cannot scroll off the screen.

Display Attributes

By executing the commands described in this section, you can choose five display attributes, either individually or in combination, that change the way data and the status and setup/label lines appear on the screen. These display attributes are

- Dim
- Reverse
- Underline
- Blink
- Blank

Each attribute or combination of attributes has its own value. Table 4-2 lists these values.

Table 4-2 Display Attributes

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

Attributes can be assigned to areas of the screen or to individual positions. You can also set display attributes specifically for protected characters. In addition, you can combine the terminal's 64 colors with the display attributes. (See "Working with Color" in this chapter.)

Assigning Display Attributes to a Field

Set field display attribute	ESC A *n attr*

n defines what part of the screen is affected by the display attribute.

n	***Screen Area***
0	Data area
1	Setup/label line
2	Terminal message field on status line
3	Computer message field on status line

attr is the attribute value from Table 4-2.

Selecting Character Display Attributes

Set character display attribute	ESC G *attr*

attr is the attribute value from Table 4-2.

The attribute occupies the current cursor location, appearing on the screen as a space character (i.e., it is nonhidden).

This sequence sets display attributes within the data area. The attribute is assigned to all positions to the right and below the cursor until it reaches another attribute or the end of the screen, whichever is encountered first. The attribute flashes on to fill the assigned positions.

Clear unprotected characters to display attribute	ESC ! *attr*

attr is the attribute code shown in Table 4-2.

This sequence clears the unprotected characters to the attribute, assigning the same attribute 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 the form (i.e., the attribute won't flash onto the screen to the right of the cursor but will display only where data is entered).

■ ***Note***–When you clear the screen to any except the normal attribute, don't enter data in the first position (line 1, column 1) or the attribute won't take effect in that line.

Working with Color

The terminal has 64 colors displayed in any of 16 premixed palettes. Each palette contains eight color associations (colors combined with display attributes) designed to maximize data contrast while minimizing eye strain. You can select from these premixed color palettes or you can define your own color associations individually.

The colors are always foreground colors on a black background unless the reverse attribute is selected, in which case the foreground is black on a colored background.

Changing the Current Color Palette

Change current color palette	ESC % *n*

n is a single-byte variable defining any one of the sixteen premixed palettes listed in Table 4-3. All except the sixteenth palette (n = ?) can be selected from the keyboard. The sixteenth palette can be addressed only by the ESC % ? sequence, not directly from the keyboard.

■ ***Note***–When entering the value for *n* from the keyboard, you must press the number or punctuation mark (comma, hyphen, or period) on the *numeric keypad;* otherwise the command will be ignored.

The displayed colors change as soon as the terminal receives the sequence. The data itself is not changed.

■ ***Note***–Our color names are based on general color tones. As color perception is very personal, feel free to rename the colors.

The first palette (n = 0) in Table 4-3 is the default palette.

Table 4-3 Color Palettes

n	Palette Colors		Key Command
0	Amber, white, red orange, pale yellow		CTRL SHIFT 0
	Normal	Amber	
	Reverse	White	
	Dim	Red orange	
	Underline	Pale yellow	
	Reverse, dim	Red orange	
	Reverse, underline	Pale yellow	
	Dim, underline	Red orange	
	Reverse, dim, underline	Red orange	
1	Green, cyan, light blue green, faded blue green		CTRL SHIFT 1
	Normal	Green	
	Reverse	Cyan	
	Dim	Light blue green	
	Underline	Faded blue green	
	Reverse, dim	Light blue green	
	Reverse, underline	Faded blue green	
	Dim, underline	Light blue green	
	Reverse, dim, underline	Light blue green	
2	White, yellow, red, amber		CTRL SHIFT 2
	Normal	White	
	Reverse	Yellow	
	Dim	Red	
	Underline	Amber	
	Reverse, dim	Red	
	Reverse, underline	Amber	
	Dim, underline	Red	
	Reverse, dim, underline	Red	

Table 4-3 Continued

n	Palette Colors		Key Command
3	Cyan, white, electric blue, green		CTRL SHIFT 3
	Normal	Cyan	
	Reverse	White	
	Dim	Electric blue	
	Underline	Green	
	Reverse, dim	Electric blue	
	Reverse, underline	Green	
	Dim, underline	Electric blue	
	Reverse, dim, underline	Electric blue	
4	Light purple, hot pink, faded rose, bright blue		CTRL SHIFT 4
	Normal	Light purple	
	Reverse	Hot pink	
	Dim	Faded rose	
	Underline	Bright blue	
	Reverse, dim	Faded rose	
	Reverse, underline	Bright blue	
	Dim, underline	Faded rose	
	Reverse, dim, underline	Faded rose	
5	Yellow, red orange, deep red, orange brown		CTRL SHIFT 5
	Normal	Yellow	
	Reverse	Red orange	
	Dim	Deep red	
	Underline	Orange brown	
	Reverse, dim	Deep red	
	Reverse, underline	Orange brown	
	Dim, underline	Deep red	
	Reverse, dim, underline	Deep red	

Table 4-3 Color Palettes

n	Palette Colors		Key Command
6	Sky blue, blue green, bright green, chartreuse		CTRL SHIFT 6
	Normal	Sky blue	
	Reverse	Blue green	
	Dim	Bright green	
	Underline	Chartreuse	
	Reverse, dim	Bright green	
	Reverse, underline	Chartreuse	
	Dim, underline	Bright green	
	Reverse, dim, underline	Bright green	
7	Light gray, blue purple, charcoal gray, medium blue		CTRL SHIFT 7
	Normal	Light gray	
	Reverse	Blue purple	
	Dim	Charcoal gray	
	Underline	Medium blue	
	Reverse, dim	Charcoal gray	
	Reverse, underline	Medium blue	
	Dim, underline	Charcoal gray	
	Reverse, dim, underline	Charcoal gray	
8	Dull chartreuse, chartreuse, bright green, khaki green		CTRL SHIFT 8
	Normal	Dull chartreuse	
	Reverse	Chartreuse	
	Dim	Khaki green	
	Underline	Bright green	
	Reverse, dim	Khaki green	
	Reverse, underline	Bright green	
	Dim, underline	Khaki green	
	Reverse, dim, underline	Khaki green	

Table 4-3 Continued

n	Palette Colors		Key Command
9	Cream, orange brown, tan, sage green		CTRL SHIFT 9
	Normal	Cream	
	Reverse	Orange brown	
	Dim	Tan	
	Underline	Sage green	
	Reverse, dim	Tan	
	Reverse, underline	Sage green	
	Dim, underline	Tan	
	Reverse, dim, underline	Tan	
:	Reverse tertiary colors (for CRT adjustment)		CTRL SHIFT TAB
	Normal	White	
	Reverse	Sky blue	
	Dim	Blue green	
	Underline	Chartreuse	
	Reverse, dim	Purple	
	Reverse, underline	Magenta	
	Dim, underline	Amber	
	Reverse, dim, underline	White	
;	Reverse primary/secondary colors (for CRT adjustment)		CTRL SHIFT ESC
	Normal	White	
	Reverse	Red orange	
	Dim	Blue	
	Underline	Green	
	Reverse, dim	Light purple	
	Reverse, underline	Yellow	
	Dim, underline	Cyan	
	Reverse, dim, underline	White	

Table 4-3 Continued

n	Palette Colors		Key Command
<	Simulated monochrome green screen		CTRL SHIFT ,
	Normal	Green	
	Reverse	Green	
	Dim	Bright green	
	Underline	Green	
	Reverse, dim	Bright green	
	Reverse, underline	Green	
	Dim, underline	Bright green	
	Reverse, dim, underline	Bright green	
=	Simulated monochrome white screen		CTRL SHIFT -
	Normal	White	
	Reverse	White	
	Dim	Light gray	
	Underline	White	
	Reverse, dim	Light gray	
	Reverse, underline	White	
	Dim, underline	Light gray	
	Reverse, dim, underline	Light gray	
>	Simulated monochrome amber screen		CTRL SHIFT .
	Normal	Amber	
	Reverse	Amber	
	Dim	Orange brown	
	Underline	Amber	
	Reverse, dim	Orange brown	
	Reverse, underline	Amber	
	Dim, underline	Orange brown	
	Reverse, dim, underline	Orange brown	

Table 4-3 Continued

n	Palette Colors		Key Command
?	Normal primary/secondary (not accessible from keyboard—send ESC % ?)		
	Normal	White	
	Reverse	Red	
	Dim	Blue	
	Underline	Green	
	Reverse, dim	Light purple	
	Reverse, underline	Yellow	
	Dim, underline	Cyan	
	Reverse, dim, underline	Amber	

The first palette is the default palette, but you can select another palette to be displayed when the terminal is turned on.

1. Select the new palette as the current palette by executing one of the commands given above.
2. Enter setup mode.
3. Exit setup mode and press the Y or A key.

■ ***Note***–You cannot select a palette in setup mode.

Redefining an Attribute's Color and/or Attribute

Assign a new color and/or new attribute to an existing attribute	ESC m *n color rd*

n is the display attribute to be assigned the value of *color* and/or redefined to the attribute *rd*

n	*Display Attribute*
0	Normal
1	Reverse
2	Dim
3	Underline
4	Reverse and dim
5	Reverse and underline
6	Dim and underline
7	Reverse, dim, and underline
8	Protect (The attribute can't be redefined by this escape sequence, i.e., *rd* must be entered but will be ignored.)

color is the foreground color (from Table 4-4) to be assigned to all data with the attribute *n*.

rd redefines *n* as

rd	*New Attribute*
0	Normal (no reverse or underline)
–	Reverse
.	Underline
/	Reverse and underline

■ ***Note***–This command is not available on our other terminals.

Table 4-4 lists the colors available, along with the foreground parameter that selects that color.

Each of the three color guns of the terminal (red, green, and blue) has four possible intensities: off, one-third on, two-thirds on, and completely on. This makes possible a total of 64 colors. (See Appendix D for the color gun intensities for each color.)

For convenience of reference, we have given each color a name. The names are not based on any scientific or artistic criteria and are intended only as guidelines within a range of colors. As color perception is very personal, feel free to rename the colors.

Table 4-4 Foreground Colors

Color	Foreground Parameter	Color	Foreground Parameter
Black (normal)	1	Medium green	_
Black	)	Khaki green	'
Black	!	Sage green	m
Indigo	?	Pale green	p
Violet	&	Chartreuse	o
Light violet	x	Dull chartreuse	/
Dark blue	"	Yellow	7
Deep blue	*	Pale yellow	}
Blue	2	Amber	y
Powder blue	]	Cream	~
Medium blue	^	White	8
Blue gray	a	Tan	z
Light blue	b	Orange brown	i
Electric blue	9	Red orange	u
Bright blue	:	Red	5
Sky blue	<	Deep red	-
Blue purple	\	Brick red	%
Light blue purple	n	Hot pink	s
Teal blue	$	Magenta	t
Turquoise	,	Pale pink	v
Blue green	>	Purple pink	w
Light blue green	;	Purple	h
Pale blue green	e	Medium purple	.
Faded blue green	q	Light purple	6
Cyan	4	Pale purple	¦
Light cyan	f	Faded purple	{
Pale cyan	r	Rose	g
Sea green	=	Faded rose	j
Sea foam green	d	Purple blue	l
Green blue	`	Purple gray	k
Grass green	#	Light gray	0
Green	3	Charcoal gray	(
Bright green	+		
Lime green	c		

You can assign a color to

- Any combination of the reverse, dim, and underline nonhidden attributes (i.e., $n = 1$ through 7)
- Normal data ($n = 0$)
- Protected data ($n = 8$)

Colors cannot be assigned to the blink and blank attributes or the combination of blink and blank, all of which continue to function normally.

■ ***Note*** – When assigning a new color to protected data, you must send the whole sequence even though *rd* has no effect. Choose any one of the values given for *rd*.

You can assign normal, reverse, underline, or reverse and underline status to any combination of the nonhidden attributes. (The protect attribute cannot be redefined by this sequence.) Thus, what used to be reversed in your program can be changed to normal, or what used to be normal can be made to appear underlined, and so on.

Two examples follow to illustrate changing colors and redefining attributes. In summary, the procedure is

1. Send ESC G *attr* (from the attribute values in Table 4-2) to enter the attribute you want to change. The attribute will apply to all positions to the right and below the cursor. (See "Selecting Character Display Attributes.")
2. Send ESC m *n color rd*

   If you want only to change an attribute's color, specify the attribute (*n*) to be recolored, the new *color* from Table 4-4, and the same *rd* attribute. (In the case of the dim attribute, specify $rd = 0$.) All data on the screen assigned that attribute will change to the new color; data entered to the right of the cursor will have that attribute in that color.

   If you want only to redefine an attribute, specify the attribute (*n*) to be redefined, its existing *color* from Table 4-4, and the new attribute *rd*. All the data previously assigned the *n* attribute will display the new attribute, as will subsequent data entered.

If you want to both redefine the attribute and change the color, specify the attribute (*n*), the new *color* from Table 4-4, and the new *rd* attribute. All data on the screen previously assigned the *n* attribute will change to the new attribute and color. Subsequent data will display the new attribute and color.

■ ***Note***–The first (starting) position of a nonhidden attribute is displayed as a normal space character; therefore, redefining or changing the color of the normal attribute ($n = 0$) causes the start location to be displayed with the new attribute or color.

Examples–Follow the steps in the two examples below to see some of the effects of changing colors and redefining attributes.

The first example illustrates changing colors while entering and redefining various display attributes.

1. Press SHIFT BREAK to enter block mode.

   ■ ***Note***–This is a local keyboard function; the equivalent codeis ESC B.

2. If you are not already displaying the default color palette, press CTRL SHIFT 0 (numeric keypad).
3. Type

   test colors

   The text is amber (the default color for the normal attribute) on a black background.
4. Send

   ESC m 0 7 0

   to change the color of the normal attribute to yellow. The text becomes yellow.
5. Send

   ESC G 4

   to reverse the screen to the right and below the cursor to the default reverse color (white). Type

   more colors

   The text *more colors* is black on white.

6. Send

   ESC m 1 5 –

   to change the color of the reverse attribute to red. The text *more colors* becomes black on red.

7. Now send

   ESC m 1 2 0

   The text *more colors* becomes blue on a black background.

8. Send

   ESC G <

   to enter the reverse and underline attribute at the cursor position. The rest of the screen becomes underlined and pale yellow, the default color. Type

   test colors again

9. Send

   ESC m 5 3 0

   to redefine the reverse and underline attribute as normal green. The text *test colors again* becomes green on a black background.

10. Send

    ESC m 5 3 /

    The green color is now in the background as the screen becomes reversed and underlined again, starting with the words *test colors again* where you entered the reverse and underline attribute (Step 8).

11. Send

    ESC G 0

    to enter the normal attribute at the cursor position.

12. Send

    ESC m 0 r 0

    to assign the color pale cyan to the normal attribute. The text *test colors*, which was yellow (Step 4), becomes pale cyan. Data entered to the right and below the cursor will be pale cyan.

The following example shows the effect of changing the color associated with a display attribute after clearing unprotected characters to the attribute (ESC ! *attr*).

1. Send

   ESC *

   to clear the screen.

2. Press

   CTRL SHIFT 0

   (the numeric keypad zero) to return to the default color palette.

3. Send

   ESC ! 4

   to clear all unprotected data to the reverse attribute.

4. Move the cursor to column 2 with the ► key and type

   new color test

5. Now send

   ESC m 1 5 –

   to change the reverse attribute to red. Notice that in this case the screen does not flash red as it did in Step 6 of the previous example. Instead, the attribute displays only at the positions where data is entered.

6. Experiment by moving to various screen positions and entering data.

Controlling the Screen Background

Reverse screen	ESC ^ 1
Restore normal (nonreverse) screen	ESC ^ 0

ESC ^ 1 reverses the colors of the entire screen, exchanging the foreground and background colors. (The reverse effect does not stop at the first nonhidden attribute as it does on the WY-50 monochrome terminal.)

■ ***Note***–This command is not available on the WY-50 terminal.

Addressing/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 can't write anything there.

Addressing the Cursor

Address cursor (80-column mode)	ESC = *line col*

line is the line code from Table 4-5 that corresponds to the line where you want the cursor to be positioned.

col is the column code from Table 4-6 that corresponds to the column where you want the cursor to be positioned.

Table 4-5 lists the ASCII line codes; Table 4-6 lists the column codes.

Table 4-5 ASCII Line Codes

	Line Codes			Line Codes	
Line	**WY-350[1]**	**HZ-1500/ ADDS-VP**	**Line**	**WY-350[1]**	**HZ-1500/ ADDS-VP**
1	SPACE	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 recognized by the WY-50 and also when the terminal is in TeleVideo 910/920/925 modes.

Table 4-6 ASCII Column Codes

	Column Codes		
Column	**WY-350[1]**	**HZ-1500**	**ADDS-VP**
1	SPACE	CTRL @	CTRL @
2	!	CTRL A	CTRL A
3	"	CTRL B	CTRL B
4	#	CTRL C	CTRL C
5	$	CTRL D	CTRL D
6	%	CTRL E	CTRL E
7	&	CTRL F	CTRL F
8	'	CTRL G	CTRL G
9	(	CTRL H	CTRL H
10	)	CTRL I	CTRL I
11	*	CTRL J	CTRL P
12	+	CTRL K	CTRL Q
13	,	CTRL L	CTRL R
14	-	CTRL M	CTRL S
15	.	CTRL N	CTRL T
16	/	CTRL O	CTRL U
17	0	CTRL P	CTRL V
18	1	CTRL Q	CTRL W
19	2	CTRL R	CTRL X
20	3	CTRL S	CTRL Y
21	4	CTRL T	SPACE
22	5	CTRL U	!
23	6	CTRL V	"
24	7	CTRL W	#
25	8	CTRL X	$
26	9	CTRL Y	%
27	:	SPACE	&
28	;	!	'
29	<	"	(
30	=	#	)
31	>	$	0
32	?	%	1
33	@	&	2

1. These codes are recognized by the WY-50 and also when the terminal is in TeleVideo 910/920/925 modes.

Table 4-6 Continued

	Column Codes		
Column	**WY-350[1]**	**HZ-1500**	**ADDS-VP**
34	A	'	3
35	B	(	4
36	C	)	5
37	D	*	6
38	E	+	7
39	F	,	8
40	G	-	9
41	H	.	@
42	I	/	A
43	J	0	B
44	K	1	C
45	L	2	D
46	M	3	E
47	N	4	F
48	O	5	G
49	P	6	H
50	Q	7	I
51	R	8	P
52	S	9	Q
53	T	:	R
54	U	;	S
55	V	<	T
56	W	=	U
57	X	>	V
58	Y	?	W
59	Z	@	X
60	[	A	Y
61	\	B	/
62	]	C	a
63	^	D	b
64	_	E	c
65	`	F	d
66	a	G	e
67	b	H	f

1. These codes are recognized by the WY-50 and also when the terminal is in TeleVideo 910/920/925 modes.

Table 4-6 Continued

Column	Column Codes WY-350[1]	HZ-1500	ADDS-VP
68	c	I	g
69	d	J	h
70	e	K	i
71	f	L	p
72	g	M	q
73	h	N	r
74	i	O	s
75	j	P	t
76	k	Q	u
77	l	R	v
78	m	S	w
79	n	T	x
80	o	U	y

1. These codes are recognized by the WY-50 and also when the terminal is in TeleVideo 910/920/925 modes.

Address cursor (80/132-column mode) ESC a *ll* R *ccc* C

ll is a one- or two-digit decimal value of the line relative to home.

ccc is a one- to three-digit decimal value of the column relative to home.

This sequence moves the cursor relative to the home position (line 1, column 1) regardless of the screen width in effect (80 or 132 columns). If the screen is split horizontally, the cursor is positioned relative to the first line of the active data segment.

Examples– When the screen is not split horizontally, ESC a 1 R 1 C positions the cursor at the home position.

When the screen is split horizontally, ESC a 10 R 12 C positions the cursor at line 10, column 12 of the active data segment.

Homing the Cursor

Home cursor	ESC { or CTRL ^

This command homes the cursor within the active data segment.

Moving the Cursor to the Other Data Segment

Move cursor to other data segment	ESC - *seg line col*

seg defines the data segment where the cursor will be moved.

seg	*Data Segment*
0	Upper segment
1	Lower segment

line is the line code from Table 4-5 that corresponds to the line where you want the cursor to be positioned.

col is the column code from Table 4-6 that corresponds to the column where you want the cursor to be positioned.

Reading the Cursor's Location

The sequences described here send the coordinates of the cursor's location to the computer.

Read cursor address (80-column mode)	ESC ?

The terminal returns a three-byte address:

line col CR

line is the line code from Table 4-5.

col is the column code from Table 4-6.

Example–If the cursor were at line 10, column 8, the ESC ? sequence would cause the terminal to transmit

) ' CR

or, in Hex,

29H 27H 0DH

Read cursor address (80/132-column mode)	ESC b

In response to this command, the terminal sends the cursor's address from the active data segment. The terminal returns a seven-byte address:

ll R *ccc* C

ll is a one- or two-digit decimal value of the line.

R is the ASCII character *R*.

ccc is a one- to three-digit decimal value of the column relative to home.

C is the ASCII character *C*.

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

Example–If the cursor's on line 10, column 8, ESC b transmits

10 R 8 C

Reading the Segment Number and Cursor's Address

Read segment number and cursor address (80-column)	ESC /

If the terminal is in 80-column mode when it receives this command, it returns the number of the active data segment and reads the cursor's address. The format is

seg line col CR

seg corresponds to the data segment

seg	*Data Segment*
0	Upper segment
1	Lower segment

line is the line code from Table 4-5 that corresponds to the line where the cursor is positioned.

col is the column code from Table 4-6 that corresponds to the column where the cursor is positioned.

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	ESC 1

The tab stop is set at the cursor position.

Clearing the Current Tab Stop

Clear current tab stop	ESC 2

The tab stop at the current cursor position is cleared.

Clearing All Tab Stops

Clear all tab stops	ESC 0

All tab stops are cleared, regardless of the cursor's position.

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 can wrap 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 can wrap back up to the previous line to find another tab stop. If the tab stop is on a protected position, the cursor moves to the next unprotected position.

Creating Protected Forms

Protect mode allows you to 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

- The cursor can enter a protected area (i.e., when addressing the cursor), but it can't write anything there
- Protected data can't scroll off the screen
- The TAB key and tabulate commands move the cursor to the next unprotected character field
- A protected line cannot be deleted, nor can a line be inserted at a protected line

Writing Data to be Protected

Turn write-protect mode on	ESC)
Turn write-protect mode off	ESC (

When write-protect mode is on, all subsequently received characters are defined as write-protected and displayed with the protect attribute. All characters entered are displayed and stored with the protect attribute.

Protecting Data

Turn protect mode on	ESC &
Turn protect mode off	ESC '

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

Protecting a Column of Data

Protect column	ESC V

This sequence protects a single column 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 so you can enter the data to be protected.
2. Turn on protect mode to protect the areas defined during write-protect mode.

The exact procedure is

1. Position the cursor where you will enter the first protected character.
2. Turn off protect mode if it's on, or you won't be able to edit the data being entered.
3. Send

   ESC)

   to turn on write-protect mode.
4. Enter the information to be protected.
5. Send

   ESC (

   to turn off write-protect mode.
6. 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

- Setting display attributes for protected characters—see the following section.
- Clearing protected or unprotected characters—see "Clearing Data" in this chapter.
- Sending protected or unprotected characters to the computer—see Chapter 2.
- Sending protected or unprotected data to the AUX (printer) port—see Chapter 2.

You can also select a number of display options by changing the *PROT* parameter in setup mode. The options available are listed in Chapter 2 of the *WY-350 User's Guide*.

Defining a Protected Attribute

Set protected character attribute (WY-50 mode only)	ESC ' *c*

c is one of the following protect attribute values:

c	*Attribute*
7	Dim (default)
6	Reverse
A	Normal
B	Reverse and dim
C	Underline
D	Dim and underline
E	Reverse and underline
F	Reverse, dim, and underline
G	Normal extended character set

This command sets one or more display attributes for protected characters in WY-50 mode.

A special character set (*c* = G) is available for protected characters. However, these characters should be included only in applications programs specifically designed for them. Table 3-4 gives the key codes for the extended character set. The characters are illustrated in Appendix B.

■ ***Note***—Dim, reverse, and normal (alone, not in combination) are the display attributes available for the WY-50 terminal.

Set protected character attribute (ADDS-VP mode only)	ESC O *c*

c is the protect attribute:

c	*Attribute*
A	Dim
P	Reverse
@	Normal
Q	Reverse and dim
a	Dim and underline

■ ***Note***–The combinations reverse and dim and dim and underline are not available for the WY-50 terminal.

Editing

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

Controlling Insert Mode

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

When insert mode is on, *INS* appears in the terminal message field. 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 replaces 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 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. A space character is added to the line's last position. 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 stored in the last position before the protected field.

Delete line	ESC R

This deletes the entire cursor line. All following lines in the active data segment are moved up one line, and the cursor moves to the first position of the line. If protect mode is on, the command is ignored.

Clearing Data

This section tells how to clear (erase) individual characters, all data on the screen, or designated sections of the screen. (The ESC ! *attr* sequence, which clears unprotected characters to a display attribute, is discussed in the "Display Attributes" section of this chapter.)

Note that 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 space or null characters (data does not move).

Clearing the Entire 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 mode, and return the cursor to the home position of the active data segment.

Clearing the Screen to Protected Spaces

Clear screen to protected spaces	ESC ,

This turns off protect mode, replaces all data with write-protected space characters, and returns the cursor to the home position.

Clearing Unprotected Data

Clear unprotected data to spaces	CTRL Z or ESC ;
Clear unprotected data to nulls	ESC :

This clears all unprotected characters to either space or null characters, and returns the cursor to the home position (of the active data segment).

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

char is the character that replaces all unprotected characters.

Example – To fill the screen with uppercase E's (used by service technicians to align the screen), send

ESC . E

or, in Hex,

1BH 2EH 45H

Clearing a Line

Clear line to spaces	ESC T
Clear line to nulls	ESC t

These commands replace all characters from the cursor location to the end of the line with either space or null characters. If protect mode is on, cleared data ends at the start of a protected field or at the end of the line, whichever is first encountered.

Clearing the Active Data Segment

Clear segment to spaces	ESC Y
Clear segment to nulls	ESC y

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

Appendix A—Compatible Terminal Modes

Compatibility with the WY-50

The WY-350 is fully compatible with the WY-50. The terminal can be used without modification for any system or application for which the WY-50 is used. The terminal has all the compatibility modes present on the WY-50: TeleVideo 910/920/925, ADDS Viewpoint, and Hazeltine 1500.

The most prominent added feature is the color mapper, which allows the protect attribute and the nonhidden enhancement attributes to be mapped to any of 64 colors.

Also note the following differences:

- The WY-350 does not have the foreign keyboard options in the U.S. keyboard ROM.
- The PROT selection in setup mode has several added options not present on the WY-50. These are

UL	Underline
RV DIM	Reverse dim
REV/UL	Reverse and underline
DIM/UL	Dim and underline
ALL	Dim, reverse, and underline
EX SET	Extended character set

- The STATUS and TEST selections are on the fifth setup level rather than the fourth level as on the WY-50.
- The WY-350 keyboard command for entering monitor mode is CTRL SHIFT HOME. (The WY-50 command is CTRL SHIFT 1 on the numeric keypad.)

Compatibility with the WY-300

The WY-350 is compatible with the WY-300, with the following exceptions:

- The WY-350 does not have the foreign keyboard options in the U.S. keyboard ROM.
- The WY-350 does not have a nonhidden color attribute mode. Therefore, except for the hidden protect attribute color, hidden (nonembedded) color attributes cannot be assigned or selected. The background color for all color assignments is black, unless reverse is selected (in which case the foreground color is black).

- The WY-350 does not have the soft character font and programmable keyboard present on the WY-300.
- The following WY-300 keys are not present on the WY-350:

SEND LINE	SEND MSG	SCRN EDIT	SET TAB	NEW LINE
PAGE	SCRL UP	SCRL DOWN	SOM/EOM	LINE FEED

Compatibility with Other Manufacturers' Terminals

Tables A-1 and A-2 compare the functions of WY-350 control codes and escape sequences with those of other manufacturers' terminals. When a code response is given for the other terminals, it indicates that the code is a native terminal code supported by the WY-350. The notation *Wyse* indicates the implementation of a Wyse code; *same* indicates that the response is exactly the same as the WY-350's.

The complete formats for escape sequences are not given here—see Chapter 4 or the "Quick Reference Guide" for the exact escape sequences.

Enhanced Codes for Hazeltine 1500 and ADDS Viewpoint

When the ENHANCE setup parameter is set to ON, the codes generated by the Hazeltine 1500 and the ADDS Viewpoint terminals are supplemented by most of the WY-350 commands normally unavailable for those terminals. (*HZ1500* or *ADDSVP* must also be selected in the *COMPATIBLE MODE* parameter.) These commands appear in Tables A-1 and A-2 with the code *ENH* to indicate their availability. For example, page print is not normally available on the ADDS Viewpoint terminal, but with ENHANCE on, ESC P will print a formatted page.

Code Comparison Tables

The following tables compare the effects of control codes and escape sequences in all of the terminal compatibility modes. (A blank indicates no effect.)

Table A-1 Supported Control Codes for Compatible Modes

ASCII	CTRL Character	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
NUL	@						
SOH	A					Home cursor	
STX	B					Unlock keyboard	
ETX	C						
EOT	D					Lock keyboard	
ENQ	E	Send ACK	Wyse	Wyse	Wyse	ENH	Read cursor ~ CTRL E
ACK	F					Cursor right	Unlock keyboard ~ CTRL F
BEL	G	Sound bell	Same	Same	Same	Same	Same
BS	H	Backspace	Same	Same	Same	Same	Same
HT	I	Tab	Same	Same	Same	Wyse	Same
LF	J	Linefeed	Same	Same	Same	Same	Same
VT	K	Cursor up	Same	Same	Same	Line address	Cursor down ~ CTRL K
FF	L	Cursor right	Same	Same	Same	Clear screen to spaces	Cursor up ~ CTRL L
CR	M	Carriage return	Same	Same	Same	Same	Same
SO	N	Unlock keyboard	Enable DTR	Wyse		Set tag attribute	ENH
SI	O	Lock keyboard	Enable X-on/ X-off	Wyse		Reset tag attribute	ENH Erase to end of line ~ CTRL O

Legend
Wyse: Wyse code interpretation/implementation
Same: Exactly the same as Wyse code
ENH: Wyse code implementation when ENHANCE setup parameter is on

Table A-1 Continued

ASCII	CTRL Character	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
DLE	P					Column address	Cursor right
DC1	Q						Address cursor ~ DC1 *l c*
DC2	R	Auxiliary print on	Bidirec-tional print on	Wyse	Wyse	Same	Home cursor ~ DC2
DC3	S						Delete line ~ DC3
DC4	T	All print modes off	Bidirec-tional print off	Wyse	Wyse	Same	ENH
NAK	U					Cursor left	Lock keyboard ~ NAK
SYN	V	Cursor down	Same	Wyse	Wyse	ENH	ENH
ETB	W					Cursor suppress	Clear background to protect ~ ETB
CAN	X	Transparent print on	Wyse	Wyse	Wyse	Cursor enable	ENH Erase page ~ CAN
EM	Y						Background protect on ~ EM
SUB	Z	Clear unprotected to spaces	Same	Same	Same	Cursor up	ENH Insert line ~ SUB
ESC	[	Escape sequence introducer	Same	Same	Same	Same	ENH
FS	\						Clear all ~ FS

Table A-1 Continued

ASCII	CTRL Character	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
GS	]						Clear foreground ~ GS
RS	^	Home cursor	Same	Same	Same	ENH	ENH
US	_	New line	Same	Same	Same	ENH	ENH Foreground on ~ US

Table A-2 Supported Escape Sequences for Compatible Modes

ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC SP	Send terminal ID	Wyse	Wyse	Wyse	ENH	ENH
ESC ! *attr*	Clear unprotected to attribute	Wyse	Wyse	Wyse	ENH	ENH
ESC "	Unlock keyboard	Same	Same	Same	ENH	ENH
ESC #	Lock keyboard	Same	Same	Same	ENH	ENH
ESC $						
ESC % *n*	Change color palette					
ESC &	Protect on	Same	Same	Wyse	ENH	ENH
ESC '	Protect off	Same	Same	Wyse	ENH	ENH
ESC (	Write-protect off	Same	Same	Same	ENH	
ESC)	Write-protect on	Same	Same	Same	ENH	
ESC *	Clear screen to nulls	Same	Same	Same	ENH	ENH

Legend
Wyse: Wyse code interpretation/implementation
Same: Exactly the same as Wyse code
ENH: Wyse code implementation when ENHANCE setup parameter is on

Table A-2 Continued

ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC +	Clear screen to spaces	Clear unprotected to spaces	Same	Same	ENH	ENH
ESC ,	Clear screen to protected spaces	Clear unprotected to protected spaces	Wyse	Wyse	ENH	ENH
ESC - *seg line col*	Address cursor	Same	Same	Wyse	ENH	ENH
ESC .	Clear unprotected data to specific character	Cursor display	Cursor display	Cursor on/off	ENH	ENH
ESC / *seg line col*	Read cursor	Same	Same	Wyse	ENH	ENH
ESC 0	Clear all tabs	Wyse	Wyse	Wyse	Set protected character attribute	
ESC 1	Set tab	Same	Same	Same	ENH	
ESC 2	Clear column tab	Same	Same	Same	ENH	
ESC 3		Clear tabs	Clear tabs	Clear tabs	Transparent print on	
ESC 4	Send unprotected line	Same	Same	Wyse	Transparent print off	ENH
ESC 5	Send unprotected page	Same	Same	Wyse	Lock keyboard	ENH
ESC 6	Send entire line	Same	Same	Wyse	Unlock keyboard	ENH
ESC 7	Send page	Same	Same	Wyse	ENH	ENH
ESC 8	STX at cursor	Wyse	Wyse	Wyse	ENH	ENH
ESC 9	ETX at cursor	Wyse	Wyse	Wyse	ENH	ENH
ESC :	Clear unprotected to nulls	Same	Same	Wyse	ENH	ENH
ESC ;	Clear unprotected to spaces	Same	Same	Wyse	ENH	ENH

Table A-2 Continued

ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC <						
ESC = *line col*	Address cursor	Same	Same	Same	ENH	ENH
ESC >						
ESC ?	Read cursor address	Same	Same	Same	ENH	ENH
ESC @	Print formatted unprotected page		Extension print on		ENH	ENH
ESC A *n attr*	Set field attribute		Extension print off		ENH	ENH
ESC B	Block mode on	Same	Same	Wyse	ENH	ENH
ESC C	FDX mode on	Same	Same	Wyse	ENH	ENH
ESC D *n*	Set communication mode	Wyse	Wyse	Wyse	ENH	ENH
ESC E	Insert line of spaces	Same	Same	Wyse	ENH	ENH
ESC F *message* CR	Program computer message field	Wyse	Wyse	Wyse	ENH	ENH
ESC G *attr*	Set display attribute	Same	Wyse	Same	ENH	ENH
ESC H *x*	Graphics on/off	Wyse	Wyse	Wyse	ENH	ENH
ESC I	Backtab	Same	Same	Same	ENH	ENH
ESC J	Upper data segment	Same	Same	Wyse	ENH	ENH
ESC K	Lower data segment	Same	Same	Wyse	Clear line to spaces	ENH
ESC L	Print unformatted page	Wyse	Wyse	Wyse	ENH	ENH
ESC M	Send cursor character	Wyse	Wyse	Wyse	Insert line	ENH
ESC N	Autoscroll off				ENH	ENH
ESC O	Autoscroll on				ENH	ENH

Table A-2 Continued

ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC P	Print formatted page	Same	Same	Wyse	ENH	ENH
ESC Q	Insert a space character	Same	Same	Wyse	ENH	ENH
ESC R	Delete line	Same	Same	Wyse	ENH	ENH
ESC S	Send all unprotected	Same	Same	Wyse	ENH	ENH
ESC T	Clear line to spaces	Same	Same	Same	ENH	ENH
ESC U	Monitor mode on	Same	Wyse	Same	ENH	ENH
ESC V	Protect column	Wyse	Wyse	Wyse	ENH	ENH
ESC W	Delete character	Same	Same	Wyse	ENH	ENH
ESC X	Monitor mode off	Same	Wyse	Same	ENH	ENH
ESC Y	Clear segment to spaces	Same	Same	Same	Address cursor	ENH
ESC Z						
ESC [*l*				Address line		
ESC \						
ESC]	Activate upper data segment				ENH	ENH
ESC ^	Reverse screen					
ESC _						
ESC ` *n*	Set screen display features		Transparent print on		ENH	ENH
ESC a *ll* R *ccc* C	Address cursor	Transparent print off	Copy print off	Copy print off	ENH	ENH
ESC b	Read cursor	Wyse	Wyse	Wyse	ENH	ENH
ESC c						

Table A-2 Continued

ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC d *l c*	Address cursor	Wyse	Wyse	Wyse	ENH	ENH
ESC e						
ESC f *message* CR	Program entire label line	Same	Wyse	Wyse	ENH	ENH
ESC g						
ESC h						
ESC i	Tab	Field tab	Field tab	Wyse	ENH	ENH
ESC j	Reverse linefeed	Same	Reverse video	Wyse	ENH	ENH
ESC k	Local edit on	Same	Normal video	Wyse	Erase page to spaces	ENH
ESC l	Duplex edit on	Same	Start underline	Wyse	Delete line	ENH
ESC m *n color rd*	Assign new color/ attribute		End underline			
ESC n						
ESC o						
ESC p	Print unformatted page	Wyse	Wyse	Wyse	ENH	ENH
ESC q	Insert on	Wyse	End blink/ blank	Wyse	ENH	ENH
ESC r	Insert off	Wyse		Wyse	ENH	ENH
ESC s	Send block of data	Same	Same	Wyse	ENH	ENH
ESC t	Clear line to nulls	Same	Same	Wyse	ENH	ENH
ESC u	Monitor mode off	Same	Wyse	Same	ENH	ENH

Table A-2 Continued

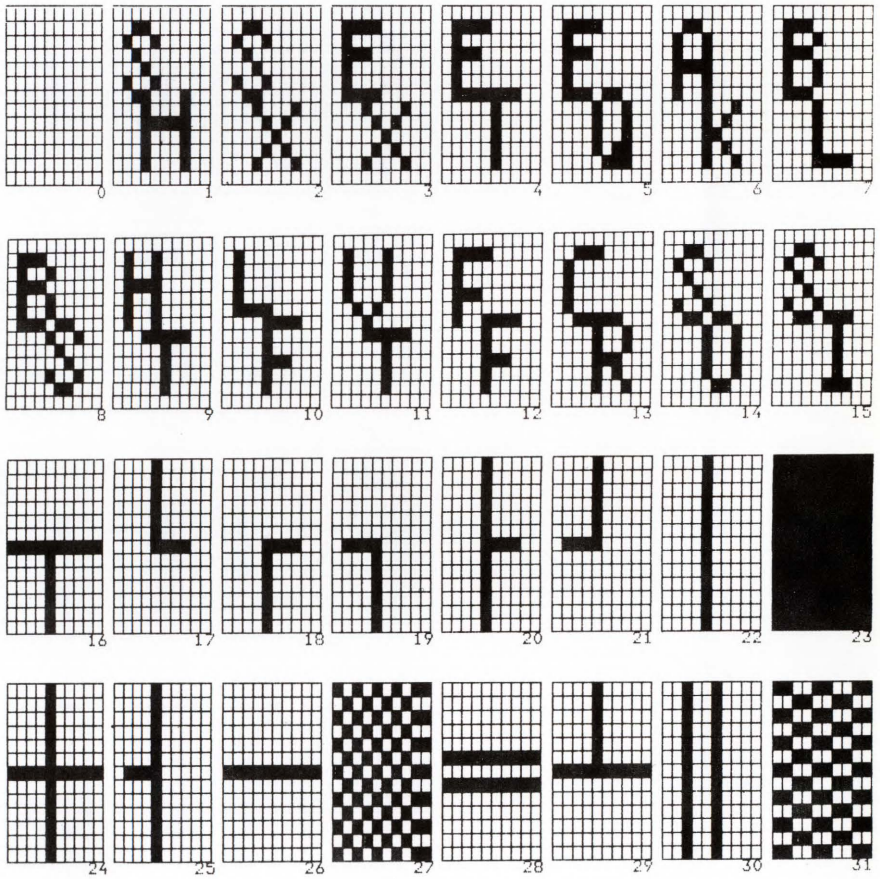
ESC Sequence	WY-350	Tele-Video 925	Tele-Video 920	Tele-Video 910	ADDS Viewpoint	Hazeltine 1500
ESC v						
ESC w						
ESC x *n*	Split screen				ENH	ENH
ESC y	Clear segment to nulls	Same	Same	Wyse	ENH	ENH
ESC z *n* *field /label* CR/DEL	Program label line/ function keys	Wyse	Wyse	Wyse	ENH	ENH
ESC {	Home cursor	Wyse	Wyse	Wyse	ENH	ENH
ESC ¦						
ESC }	Activate lower data segment				ENH	ENH
ESC ~						
ESC DEL						

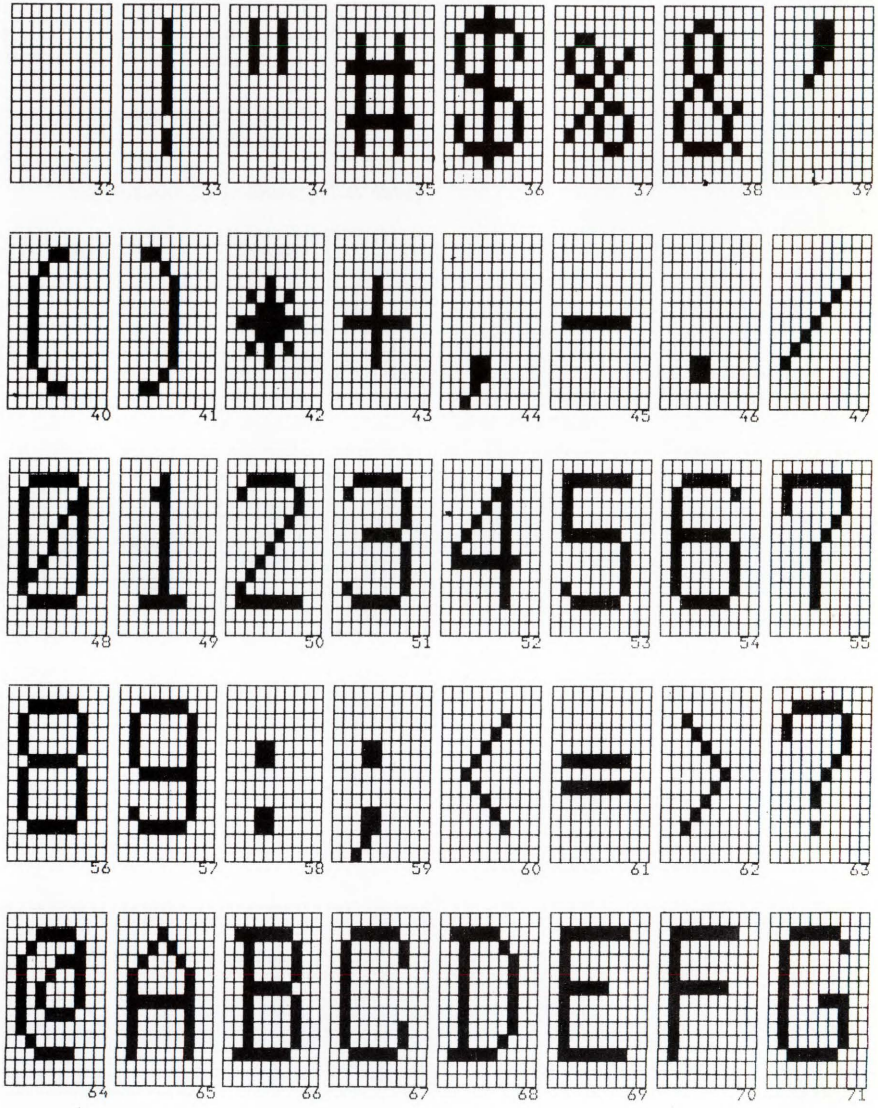
Appendix B– Character Sets

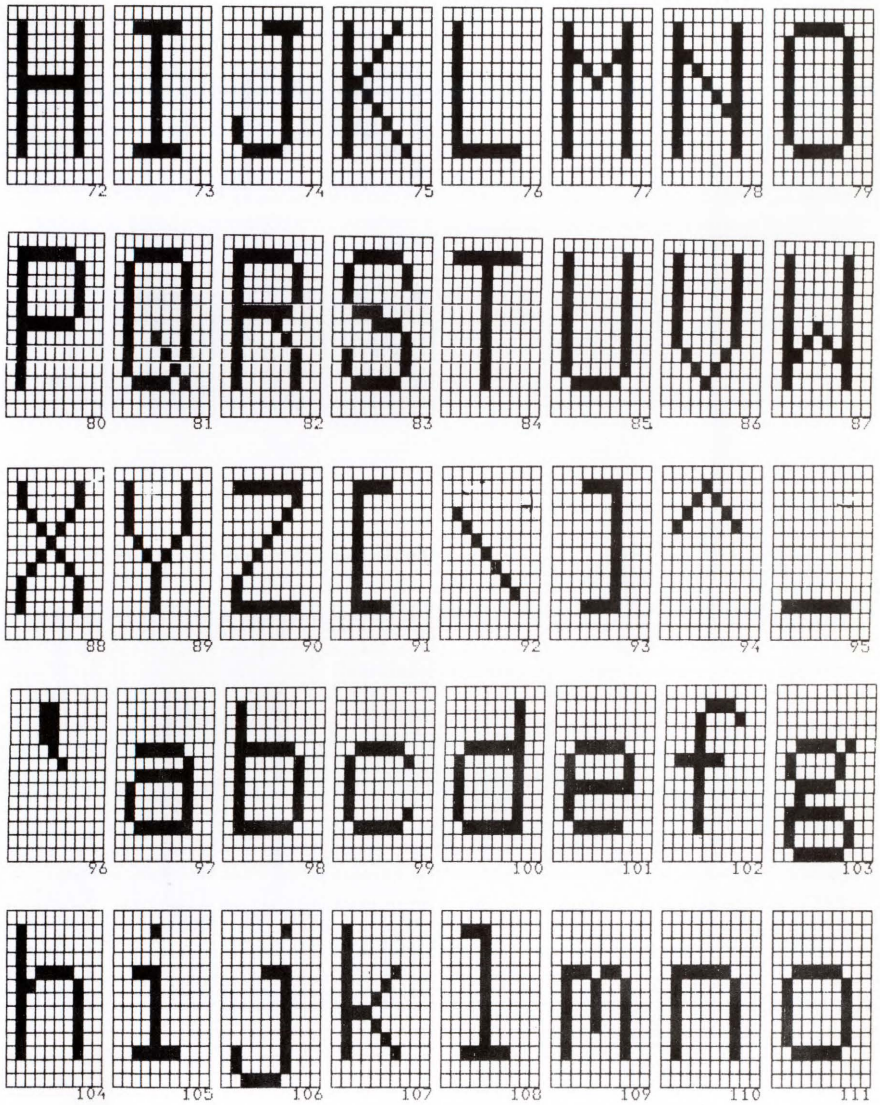
Table B-1 illustrates the standard character set. Each character is made up of a 7 × 13 matrix in a cell that is 10 × 13 pixels for an 80-column display (illustrated here) and 9 × 13 for a 132-column display.

Table B-2 illustrates the extended character set that is available in write-protect mode.

Table B-1 Standard Character Set




32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47
48 49 50 51 52 53 54 55
56 57 58 59 60 61 62 63
64 65 66 67 68 69 70 71


72 73 74 75 76 77 78 79
80 81 82 83 84 85 86 87
88 89 90 91 92 93 94 95
96 97 98 99 100 101 102 103
104 105 106 107 108 109 110 111

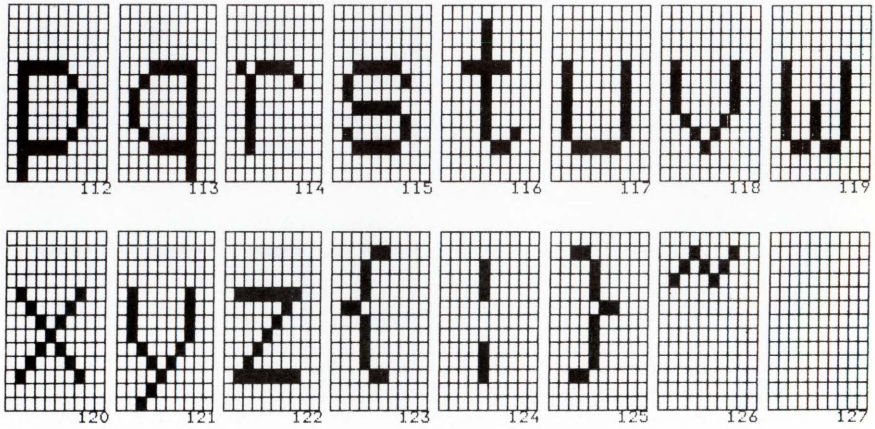
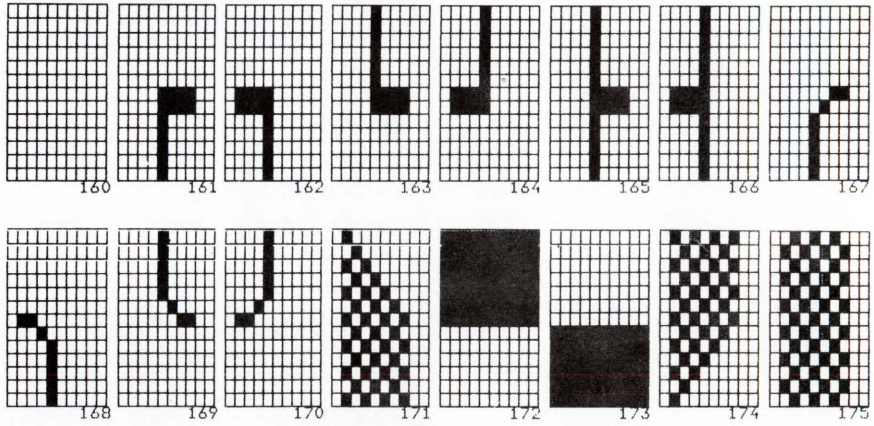
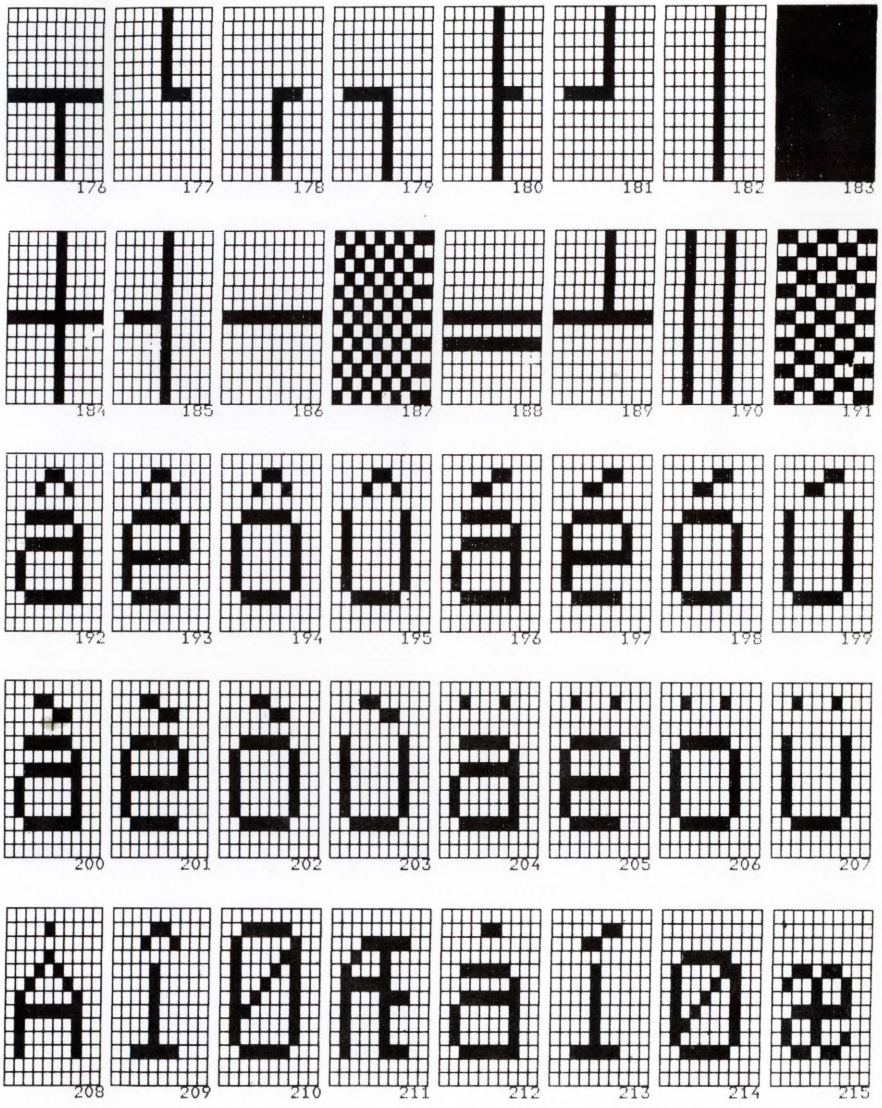


Table B-2 Extended Character Set

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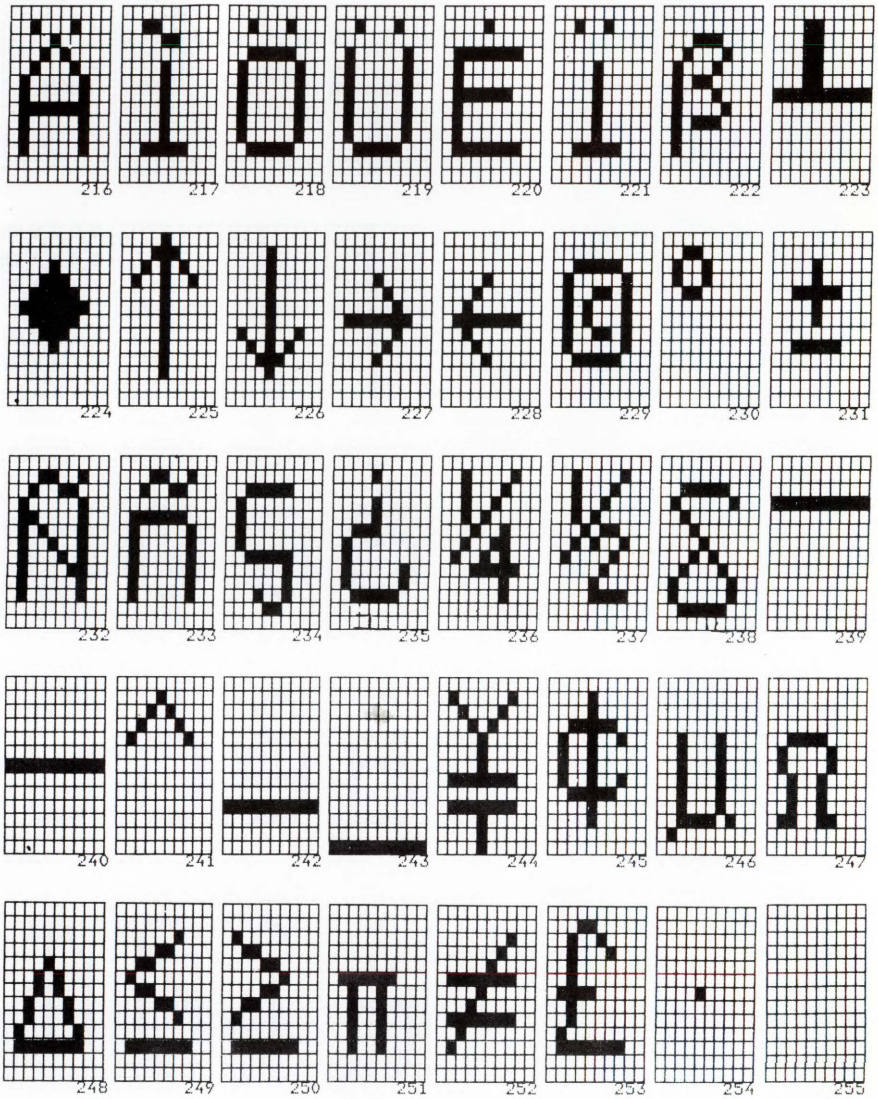
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Appendix C–ASCII Code Conversion Listing

Table C-1 ASCII Code Conversion Listing

		Bit	7	6	5	4	3	2	1	0			
ASCII Character	CTRL Codes	Binary Value	128	64	32	16	8	4	2	1	Octal	Decimal	Hex
NUL	@		0	0	0	0	0	0	0	0	000	000	00
SOH	A		0	0	0	0	0	0	0	1	001	001	01
STX	B		0	0	0	0	0	0	1	0	002	002	02
ETX	C		0	0	0	0	0	0	1	1	003	003	03
EOT	D		0	0	0	0	0	1	0	0	004	004	04
ENQ	E		0	0	0	0	0	1	0	1	005	005	05
ACK	F		0	0	0	0	0	1	1	0	006	006	06
BEL	G		0	0	0	0	0	1	1	1	007	007	07
BS	H		0	0	0	0	1	0	0	0	010	008	08
HT	I		0	0	0	0	1	0	0	1	011	009	09
LF	J		0	0	0	0	1	0	1	0	012	010	0A
VT	K		0	0	0	0	1	0	1	1	013	011	0B
FF	L		0	0	0	0	1	1	0	0	014	012	0C
CR	M		0	0	0	0	1	1	0	1	015	013	0D
SO	N		0	0	0	0	1	1	1	0	016	014	0E
SI	O		0	0	0	0	1	1	1	1	017	015	0F
DLE	P		0	0	0	1	0	0	0	0	020	016	10
DC1	Q		0	0	0	1	0	0	0	1	021	017	11
DC2	R		0	0	0	1	0	0	1	0	022	018	12
DC3	S		0	0	0	1	0	0	1	1	023	019	13
DC4	T		0	0	0	1	0	1	0	0	024	020	14
NAK	U		0	0	0	1	0	1	0	1	025	021	15
SYN	V		0	0	0	1	0	1	1	0	026	022	16
ETB	W		0	0	0	1	0	1	1	1	027	023	17
CAN	X		0	0	0	1	1	0	0	0	030	024	18
EM	Y		0	0	0	1	1	0	0	1	031	025	19
SUB	Z		0	0	0	1	1	0	1	0	032	026	1A
ESC	[		0	0	0	1	1	0	1	1	033	027	1B
FS	\		0	0	0	1	1	1	0	0	034	028	1C
GS	]		0	0	0	1	1	1	0	1	035	029	1D
RS	^		0	0	0	1	1	1	1	0	036	030	1E
US	-		0	0	0	1	1	1	1	1	037	031	1F
SP			0	0	1	0	0	0	0	0	040	032	20
!			0	0	1	0	0	0	0	1	041	033	21

Table C-1 Continued

ASCII Character	CTRL Codes	Bit Binary Value	7 128	6 64	5 32	4 16	3 8	2 4	1 2	0 1	Octal	Decimal	Hex
"			0	0	1	0	0	0	1	0	042	034	22
#			0	0	1	0	0	0	1	1	043	035	23
$			0	0	1	0	0	1	0	0	044	036	24
%			0	0	1	0	0	1	0	1	045	037	25
&			0	0	1	0	0	1	1	0	046	038	26
' (apostrophe)			0	0	1	0	0	1	1	1	047	039	27
(			0	0	1	0	1	0	0	0	050	040	28
)			0	0	1	0	1	0	0	1	051	041	29
*			0	0	1	0	1	0	1	0	052	042	2A
+			0	0	1	0	1	0	1	1	053	043	2B
, (comma)			0	0	1	0	1	1	0	0	054	044	2C
- (hyphen)			0	0	1	0	1	1	0	1	055	045	2D
. (period)			0	0	1	0	1	1	1	0	056	046	2E
/			0	0	1	0	1	1	1	1	057	047	2F
0			0	0	1	1	0	0	0	0	060	048	30
1			0	0	1	1	0	0	0	1	061	049	31
2			0	0	1	1	0	0	1	0	062	050	32
3			0	0	1	1	0	0	1	1	063	051	33
4			0	0	1	1	0	1	0	0	064	052	34
5			0	0	1	1	0	1	0	1	065	053	35
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

Table C-1 Continued

ASCII Character	CTRL Codes	Bit Binary Value	7 128	6 64	5 32	4 16	3 8	2 4	1 2	0 1	Octal	Decimal	Hex
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
U			0	1	0	1	0	1	0	1	125	085	55
V			0	1	0	1	0	1	1	0	126	086	56
W			0	1	0	1	0	1	1	1	127	087	57
X			0	1	0	1	1	0	0	0	130	088	58
Y			0	1	0	1	1	0	0	1	131	089	59
Z			0	1	0	1	1	0	1	0	132	090	5A
[			0	1	0	1	1	0	1	1	133	091	5B
\			0	1	0	1	1	1	0	0	134	092	5C
]			0	1	0	1	1	1	0	1	135	093	5D
^			0	1	0	1	1	1	1	0	136	094	5E
_ (underline)			0	1	0	1	1	1	1	1	137	095	5F
`			0	1	1	0	0	0	0	0	140	096	60
a			0	1	0	0	0	0	0	1	141	097	61
b			0	1	1	0	0	0	1	0	142	098	62
c			0	1	1	0	0	0	1	1	143	099	63
d			0	1	1	0	0	1	0	0	144	100	64
e			0	1	1	0	0	1	0	1	145	101	65

Table C-1 Continued

ASCII Character	CTRL Codes	Bit Binary Value	7 128	6 64	5 32	4 16	3 8	2 4	1 2	0 1	Octal	Decimal	Hex
f			0	1	1	0	0	1	1	0	146	102	66
g			0	1	1	0	0	1	1	1	147	103	67
h			0	1	1	0	1	0	0	0	150	104	68
i			0	1	1	0	1	0	0	1	151	105	69
j			0	1	1	0	1	0	1	0	152	106	6A
k			0	1	1	0	1	0	1	1	153	107	6B
l			0	1	1	0	1	1	0	0	154	108	6C
m			0	1	1	0	1	1	0	1	155	109	6D
n			0	1	1	0	1	1	1	0	156	110	6E
o			0	1	1	0	1	1	1	1	157	111	6F
p			0	1	1	1	0	0	0	0	160	112	70
q			0	1	1	1	0	0	0	1	161	113	71
r			0	1	1	1	0	0	1	0	162	114	72
s			0	1	1	1	0	0	1	1	163	115	73
t			0	1	1	1	0	1	0	0	164	116	74
u			0	1	1	1	0	1	0	1	165	117	75
v			0	1	1	1	0	1	1	0	166	118	76
w			0	1	1	1	0	1	1	1	167	119	77
x			0	1	1	1	1	0	0	0	170	120	78
y			0	1	1	1	1	0	0	1	171	121	79
z			0	1	1	1	1	0	1	0	172	122	7A
{			0	1	1	1	1	0	1	1	173	123	7B
¦			0	1	1	1	1	1	0	0	174	124	7C
}			0	1	1	1	1	1	0	1	175	125	7D
~			0	1	1	1	1	1	1	0	176	126	7E
DEL			0	1	1	1	1	1	1	1	177	127	7F

Appendix D– Color Specifications

The terminal has three *color guns* (red, green, and blue). Each color gun has four possible intensities:

0 Off
1 One-third on
2 Two-thirds on
3 Completely on

Table D-1 gives the color intensities for the 64 possible colors. For convenience of reference, we have given each color a name. The names are not based on any scientific or artistic criteria and are intended only as guidelines within a range of colors. As color perception is very personal, feel free to rename the colors.

Table D-1 Color Gun Intensities

		Intensity (in thirds)		
Color Name	**Foreground Parameter**	**Red Gun**	**Green Gun**	**Blue Gun**
Black (normal)	1	0	0	0
Black	)	0	0	0
Black	!	0	0	0
Indigo	?	1	0	2
Violet	&	1	0	1
Light violet	x	3	1	3
Dark blue	"	0	0	1
Deep blue	*	0	0	2
Blue	2	0	0	3
Powder blue	]	1	1	2
Medium blue	^	1	1	3
Blue gray	a	1	2	2
Light blue	b	1	2	3
Electric blue	9	0	1	2
Bright blue	:	0	1	3
Sky blue	<	0	2	3
Blue purple	\	1	0	3
Light blue purple	n	2	2	3
Teal blue	$	0	1	1
Turquoise	,	0	2	2

Table D-1 Continued

Color Name	Foreground Parameter	Intensity (in thirds) Red Gun	Green Gun	Blue Gun
Blue green	>	0	3	2
Light blue green	;	0	2	1
Pale blue green	e	1	3	2
Faded blue green	q	2	3	2
Cyan	4	0	3	3
Light cyan	f	1	3	3
Pale cyan	r	2	3	3
Sea green	=	0	3	1
Sea foam green	d	1	3	1
Green blue	'	1	2	1
Grass green	#	0	1	0
Green	3	0	3	0
Bright green	+	0	2	0
Lime green	c	1	3	0
Medium green	—	1	2	0
Khaki green	'	1	1	0
Sage green	m	2	2	1
Pale green	p	2	3	1
Chartreuse	o	2	3	0
Dull chartreuse	/	2	2	0
Yellow	7	3	3	0
Pale yellow	}	3	3	1
Amber	y	3	2	0
Cream	~	3	3	2
White	8	3	3	3
Tan	z	3	2	1
Orange brown	i	2	1	0
Red orange	u	3	1	0
Red	5	3	0	0
Deep red	-	2	0	0
Brick red	%	1	0	0

Table D-1 Continued

Color Name	Foreground Parameter	Intensity (in thirds) Red Gun	Green Gun	Blue Gun
Hot pink	s	3	0	1
Magenta	t	3	0	2
Pale pink	v	3	1	1
Purple pink	w	3	1	2
Purple	h	2	0	3
Medium purple	.	2	0	2
Light purple	6	3	0	3
Pale purple	¦	3	2	3
Faded purple	{	3	2	2
Rose	g	2	0	1
Faded rose	j	2	1	1
Purple blue	1	2	1	3
Purple gray	k	2	1	2
Light gray	0	2	2	2
Charcoal gray	(	1	1	1

Appendix E–Control Codes

In full-duplex mode, terminal functions are controlled by code sequences received from the computer. Table E-1 gives these terminal control codes. (If the *Action* column is blank, the code is not recognized.) For a comparison of the control codes generated by the compatible terminal modes, see Appendix A.

Table E-1 Terminal Control Codes

Control Key	Hex. Value	ASCII Character	Symbol	Action
@ or	00	NUL		
A or a	01	SOH	S_H	
B or b	02	STX	S_X	
C or c	03	ETX	E_X	
D or d	04	EOT	E_T	
E or e	05	ENQ	E_Q	Returns ACK to computer, if not busy
F or f	06	ACK	A_K	
G or g	07	BEL	B_L	Sounds bell
H or h	08	BS	B_S	Backspaces cursor
I or i	09	HT	H_T	Tabs cursor
J or j	0A	LF	L_F	Moves cursor down in same column (linefeed)
K or k	0B	VT	V_T	Moves cursor up
L or l	0C	FF	F_F	Moves cursor right
M or m	0D	CR	C_R	Moves cursor to start of line
N or n	0E	SO	S_O	Unlocks keyboard
O or o	0F	SI	S_I	Locks keyboard
P or p	10	DLE	⊤	
Q or q	11	DC1 (XON)	⌊	
R or r	12	DC2	⌈	Turns on auxiliary print

Table E-1 Continued

Control Key	Hex. Value	ASCII Character	Symbol	Action
S or s	13	DC3 (XOFF)	┐	
T or t	14	DC4	┤	Turns off auxiliary or transparent print
U or u	15	NAK	┘	
V or v	16	SYN	│	Moves cursor down
W or w	17	ETB	▮	
X or x	18	CAN	┼	Turns on transparent print (in ENHANCE mode only)
Y or y	19	EM	┤	
Z or z	1A	SUB	─	Clears all unprotected characters to spaces
{ or [	1B	ESC	▒	Modifies action of subsequent characters (escape sequence); displays symbol of subsequent control code
¦ or \	1C	FS	═	
} or]	1D	GS	┴	
^ or ~	1E	RS	‖	Moves cursor home
_ or DEL	1F	US	▒	Moves cursor to start of next line

Appendix F– Escape Sequences

This appendix lists escape sequences in ASCII sorting order and describes their effects. (If the *Action* column is blank, there is no effect.) Appendix A contains a comparison of the escape sequences for the compatible terminal modes. The Quick Reference Guide lists the escape sequences in the order in which they are discussed in Chapters 2, 3, and 4.

■ **Note**–Complete formats are not given here. Refer to the listed page for variable parameters and more complete information.

Table F-1 Escape Sequences

Escape Sequence	Action	Page
ESC SPACE	Send terminal identifier	2-9
ESC ! *attr*	Clear unprotected characters to display attribute	4-12
ESC "	Unlock keyboard	3-11
ESC #	Lock keyboard	3-11
ESC $		
ESC % *n*	Change current color palette	4-13
ESC &	Turn protect mode on	4-34
ESC '	Turn protect mode off	4-34
ESC (	Turn write-protect mode off	4-34
ESC)	Turn write-protect mode on	4-34
ESC *	Clear screen to nulls	4-38
ESC +	Clear screen to spaces	4-38
ESC ,	Clear screen to protected spaces	4-39
ESC - *seg line col*	Move cursor to other segment	4-30
ESC . *char*	Clear unprotected data to a specified character	4-39
ESC /	Read active segment and cursor address (80-column)	4-8, 4-31
ESC 0	Clear all tab stops	4-32

Table F-1 Continued

Escape Sequence	Action	Page
ESC 0 *c*	Set protected character attribute (ADDS-VP mode only)	4-36
ESC 1	Set tab stop	4-32
ESC 2	Clear current tab stop	4-32
ESC 3		
ESC 4	Send unprotected line	2-7
ESC 5	Send unprotected page	2-7
ESC 6	Send entire line	2-6
ESC 7	Send page	2-7
ESC 8	Add Start-of-Text (STX) character	2-7
ESC 9	Add End-of-Text (ETX) character	2-7
ESC :	Clear unprotected characters to nulls	4-39
ESC ;	Clear unprotected characters to spaces	4-39
ESC <		
ESC = *line col*	Address cursor (80-column mode)	4-26
ESC >		
ESC ?	Read cursor address (80-column mode)	4-31
ESC @	Print formatted unprotected page	2-9
ESC A *n attr*	Set display field attributes	4-6, 4-12
ESC B	Turn block mode on	2-3
ESC C ESC D F	Turn full-duplex mode on	2-2
ESC C ESC D H	Turn half-duplex mode on	2-3
ESC C ESC D H ESC B	Turn half-duplex block mode on	2-4
ESC D	Set communication mode	2-3

Table F-1 Continued

Escape Sequence	Action	Page
ESC E	Insert line of space characters	4-37
ESC F *message* CR	Program and display computer message on status line	4-2
ESC G *attr*	Set character display attribute	4-12
ESC H *x*	Toggle graphics mode on/off, or display single graphics character	3-8
ESC I	Backtab	4-33
ESC J or ESC K	Activate other data segment	4-8
ESC L	Print unformatted page	2-10
ESC M	Send one character	2-6
ESC N	Turn autoscrolling mode off	4-10
ESC O	Turn autoscrolling mode on	4-10
ESC P	Print formatted page	2-9
ESC Q	Insert one space character	4-37
ESC R	Delete a line	4-38
ESC S	Send unprotected characters in block	2-8
ESC T	Clear line to spaces	4-39
ESC U	Turn monitor mode on	3-12
ESC V	Protect a column	4-34
ESC W	Delete cursor character	4-38
ESC X	Turn monitor mode off	3-12
ESC Y ESC Z ESC [	Clear segment to spaces	4-40

Table F-1 Continued

Escape Sequence	Action	Page
ESC \		
ESC]	Activate upper data segment	4-8
ESC ^ 1	Reverse screen	4-25
ESC ^ 0	Restore normal (nonreverse) screen	4-25
ESC _		
ESC ` *c*	Set scrolling speed and type	4-9
	Set protected character attribute (WY-50 mode only)	4-37
ESC ` *n*	Set cursor display features	4-6
ESC ` 8	Turn screen display off	4-6
ESC ` 9	Turn screen display on	4-6
ESC ` ;	Select 132-column display	4-5
ESC ` :	Select 80-column display	4-5
ESC a *11* R *ccc* C	Address cursor (80/132-column mode)	4-29
ESC b	Read cursor address (active data segment)	4-30
ESC c		
ESC d	Address cursor	
ESC e		
ESC f		
ESC g		
ESC h		
ESC i	Tabulate cursor	4-33
ESC j	Move cursor up in same column (reverse linefeed)	
ESC k	Turn local edit mode on	2-5

Table F-1 Continued

Escape Sequence	Action	Page
ESC l	Turn duplex edit mode on	2-5
ESC m *n color rd*	Assign new color and/or new attribute to existing attribute	4-19
ESC n		
ESC o		
ESC p	Print unformatted page	2-10
ESC q	Turn insert mode on, replace mode off	4-37
ESC r	Turn insert mode off, replace mode on	4-37
ESC s	Send block of data	2-8
ESC t	Clear line to nulls	4-39
ESC u	Turn monitor mode off	3-12
ESC v		
ESC w		
ESC x 1 *line*	Split screen horizontally	4-7
ESC x 0	Redefine screen as one segment	4-9
ESC y	Clear segment to nulls	4-40
ESC z *key sequence* DEL	Program function key	3-4
ESC z *key* DEL	Clear function key	3-4
ESC z *field label* CR	Program and display one function key label	4-4
ESC z *field* CR	Clear one function key label	4-5
ESC z (*label* CR	Program and display entire unshifted label line	4-3
ESC z (CR	Clear entire unshifted label line	4-3

Table F-1 Continued

Escape Sequence	Action	Page
ESC z) *label* CR	Program entire shifted label line	4-3
ESC z) CR	Clear entire shifted label line	4-6
ESC z P CR	Display entire shifted label line	4-3
ESC z DEL	Turn off entire shifted label line	4-3
ESC {	Home cursor	4-30
ESC |		
ESC }	Activate lower data segment	4-8
ESC ~		
ESC DEL		

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Quick Reference Guide

Command	*Sequence*	*Page*
Communication Modes		
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Turn half-duplex mode on	ESC C ESC D H	2-3
Turn block mode on	ESC B	2-3
Turn half-duplex block mode on	ESC C ESC D H ESC B	2-4
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Turn local edit mode on	ESC k	2-5
Sending Data in Block Mode		
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Send entire line	ESC 6	2-6
Send unprotected line	ESC 4	2-7
Send page	ESC 7	2-7
Send unprotected page	ESC 5	2-7
Add STX character	ESC 8	2-7
Add ETX character	ESC 9	2-7
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Send terminal identifier	ESC SPACE	2-9
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Print formatted page	ESC P	2-9
Print formatted unprotected page	ESC @	2-9
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Auxiliary print mode on	CTRL R	2-10
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Clear function key	ESC z *key* DEL	3-4

Command			*Sequence*			*Page*
	key			*key*		
Key	*Unshifted*	*Shifted*	*Key*	*Unshifted*	*Shifted*	
F 1	@	`	F 9	H	h	
F 2	A	a	F10	I	i	
F 3	B	b	F11	J	j	
F 4	C	c	F12	K	k	
F 5	D	d	F13	L	l	
F 6	E	e	F14	M	m	
F 7	F	f	F15	N	n	
F 8	G	g	F16	O	o	
Character Sets						
Toggle graphics mode on/off				ESC H *x*		3-8
x	***Graphics Mode***		***Hex Value***			
STX	On		1B 48 02			
ETX	Off		1B 48 03			
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Turn monitor mode on				ESC U		3-12
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Display Message Fields						
Program and display computer message on status line				ESC F *message* CR		4-2
Program and display entire unshifted label line				ESC z (*label* CR		4-3
Program entire shifted label line				ESC z) *label* CR		4-3
Turn off entire shifted label line				ESC z DEL		4-3
Display entire shifted label line				ESC z P CR		4-3
Program and display one function key label				ESC z *field label* CR		4-4

Command			*Sequence*		*Page*
	field			*field*	
Key	***Unshifted***	***Shifted***	***Key***	***Unshifted***	***Shifted***
F1	0	P	F10	9	Y
F2	1	Q	F11	:	Z
F3	2	R	F12	;	[
F4	3	S	F13	<	\
F5	4	T	F14	=	]
F6	5	U	F15	>	^
F7	6	V	F16	?	_
F8	7	W	all	(	)
F9	8	X			
Clear function key label				ESC z *field* CR	4-5
Clear entire unshifted label line				ESC z (CR	4-5
Clear entire shifted label line				ESC z) CR	4-5
Screen and Cursor Display					
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Select 80-column display				ESC ' :	4-5
Turn screen display off				ESC ' 8	4-6
Turn screen display on				ESC ' 9	4-6
Set cursor display features				ESC ' *n*	4-6
n	***Cursor Display***				
0	Cursor display off				
1	Cursor display on				
2	Block cursor, steady				
5	Block cursor, blinking				
4	Line cursor, steady				
3	Line cursor, blinking				
Split Screen					
Split screen horizontally				ESC x 1 *line*	4-7
Activate the other data segment				ESC J or ESC K	4-8
Activate upper data segment				ESC]	4-8
Activate lower data segment				ESC }	4-8
Read active 80-column segment number and cursor address				ESC /	4-8
Redefine screen as one segment				ESC x 0	4-9

Command	*Sequence*	*Page*
Scrolling		
Set scrolling speed and type	ESC ' *c*	4-9

c	*Scrolling Type*	*Speed (lps)*
@	Jump scroll	
<	Smooth scroll	1
=	Smooth scroll	2
>	Smooth scroll	4
?	Smooth scroll	8

Turn autoscrolling mode off	ESC N	4-10
Turn autoscrolling mode on	ESC O	4-10
Display Attributes		
Set field display attribute	ESC A *n attr*	4-12

n	*Screen Area*
0	Data area
1	Function key label line
2	Terminal message field
3	Computer message field

Set character display attribute	ESC G *attr*	4-12
Clear unprotected characters to display attribute	ESC ! *attr*	4-12

attr	*Display Attributes*
SPACE	Space character
0	Normal
1	Blank (no display)
2	Blink
3	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 Attribute*
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

Command	*Sequence*	*Page*
Working with Color		
Change current color palette	ESC % *n* or CTRL SHIFT *key*	4-13

n	*Colors*	*Keys*[1]	
0	Amber, white, red orange, pale yellow	CTRL SHIFT 0	4-14
1	Green, cyan, light blue green, faded blue green	CTRL SHIFT 1	4-14
2	White, yellow, red, amber	CTRL SHIFT 2	4-14
3	Cyan, white, electric blue, green	CTRL SHIFT 3	4-15
4	Light purple, hot pink, faded rose, bright blue	CTRL SHIFT 4	4-15
5	Yellow, red orange, deep red, orange brown	CTRL SHIFT 5	4-15
6	Sky blue, blue green, bright green, chartreuse	CTRL SHIFT 6	4-16
7	Light gray, blue purple, charcoal gray, medium blue	CTRL SHIFT 7	4-16
8	Dull chartreuse, chartreuse, bright green, khaki green	CTRL SHIFT 8	4-16
9	Cream, orange brown, sage green, tan	CTRL SHIFT 9	4-17
:	Reverse tertiary colors for CRT adjustment	CTRL SHIFT TAB	4-17
;	Reverse primary/secondary colors for CRT adjustment	CTRL SHIFT ESC	4-17
<	Simulated monochrome green screen	CTRL SHIFT ,	4-18
=	Simulated monochrome white screen	CTRL SHIFT -	4-18
>	Simulated monochrome amber screen	CTRL SHIFT .	4-18
?	Normal primary/secondary		4-19

1. Numeric keypad

Assign new color/attribute to existing attributes	ESC m *n color rd*	4-19

n	*Display Attribute*
0	Normal
1	Reverse
2	Dim
3	Underline
4	Reverse and dim
5	Reverse and underline
6	Dim and underline
7	Reverse, dim, and underline
8	Protect (The attribute can't be redefined by this escape sequence, i.e., *rd* must be entered but will be ignored.)

color	*Foreground Color*	*color*	*Foreground Color*	*color*	*Foreground Color*
1	Black (normal)	e	Pale blue green	8	White
)	Black	q	Faded blue green	z	Tan
!	Black	4	Cyan	i	Orange brown
?	Indigo	f	Light cyan	u	Red orange
&	Violet	r	Pale cyan	5	Red
x	Light violet	=	Sea green	-	Deep red
"	Dark blue	d	Sea foam green	%	Brick red
*	Deep blue	'	Green blue	s	Hot pink
2	Blue	#	Grass green	t	Magenta
]	Powder blue	3	Green	v	Pale pink
^	Medium blue	+	Bright green	w	Purple pink
a	Blue gray	c	Lime green	h	Purple
b	Light blue	'	Khaki green	.	Medium purple
9	Electric blue	_	Medium green	6	Light purple
:	Bright blue	m	Sage green	¦	Pale purple
<	Sky blue	p	Pale green	{	Faded purple
\	Blue purple	o	Chartreuse	g	Rose
n	Light blue purple	/	Dull chartreuse	j	Faded rose
$	Teal blue	7	Yellow	l	Purple blue
,	Turquoise	}	Pale yellow	k	Purple gray
>	Blue green	y	Amber	0	Light gray
;	Light blue green	~	Cream	(	Charcoal gray

Command	*Sequence*	*Page*
rd ***Attribute***		
0 Normal (no reverse or underline)		
- Reverse		
. Underline		
/ Reverse and underline		
Reverse screen	ESC ^ 1	4-25
Restore normal (nonreverse) screen	ESC ^ 0	4-25
Addressing/Reading the Cursor		
Address cursor (80-column)	ESC = *line col*	4-26
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Move cursor to other data segment	ESC - *seg line col*	4-30
Read cursor address (80-column)	ESC ?	4-30
Read cursor address (80/132-column)	ESC b	4-31
Read segment number and cursor address (80-column mode)	ESC /	4-31
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Turn write-protect mode on	ESC)	4-34
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Turn protect mode on	ESC &	4-34
Turn protect mode off	ESC '	4-34
Protect column	ESC V	4-34
Set protected character attribute (WY-50 mode only)	ESC ` *c*	4-36

Command	*Sequence*	*Page*
c ***Attribute***		
7 Dim (default)		
6 Reverse		
A Normal		
B Reverse and dim		
C Underline		
D Dim and underline		
E Reverse and underline		
F Reverse, dim, and underline		
G Normal extended character set		
Set protected character attribute (ADDS-VP mode only)	ESC O *c*	4-36
c ***Protect attribute***		
A Dim		
P Reverse		
@ Normal		
Q Reverse and dim		
a Dim and underline		
Editing		
Turn insert mode on, replace mode off	ESC q	4-37
Turn insert mode off, replace mode on	ESC r	4-37
Insert one space character	ESC Q	4-37
Insert line of space characters	ESC E	4-37
Delete cursor character	ESC W	4-38
Delete line	ESC R	4-38

Command	*Sequence*	*Page*
Clearing Data		
Clear screen to nulls	ESC *	4-38
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Clear screen to protected spaces	ESC ,	4-39
Clear unprotected data to spaces	ESC ; or CTRL Z	4-39
Clear unprotected data to nulls	ESC :	4-39
Clear unprotected data to a specified character	ESC . *char*	4-39
Clear unprotected data to display attribute	ESC ! *attr*	4-12
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Clear segment to nulls	ESC y	4-40

Local Keyboard Commands[1]

Key Sequence	*Effect*	
SHIFT ENTER	Turn keyclick on or off	3-11
CTRL SHIFT HOME	Turn monitor mode on or off	3-11
SHIFT BREAK	Toggle between block and full-duplex modes	3-11
CTRL SHIFT PRINT	Toggle between auxiliary print on and any print mode off	3-11
CTRL SHIFT ▲	Speed up scrolling rate	3-11
CTRL SHIFT ▼	Slow down scrolling rate	3-11
SETUP (unshifted)	Unlock keyboard, turn all print modes off; partially reset terminal (clear receive buffer and reset UART)	3-11
SHIFT SETUP	Toggle between entering and leaving setup mode	3-11

1. See "Working with Color" section for local keyboard commands for changing color palettes.

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