EK-VT220-UG-002

VT 220

Owner's Manual

Digital Equipment Corporation

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This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the booklet How to Identify and Resolve Radio/TV Interference Problems, prepared by the Federal Communications Commission, helpful. This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

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INTRODUCTION

This manual provides the information you need to operate and maintain your VT220 video terminal. The manual is organized into six chapters and three appendices as follows.

- Chapter 1, "A Look at the Terminal," introduces you to the VT220. This chapter provides an overview of what the terminal is and what it does, then briefly describes how it works.

- Chapter 2, "Controls, Indicators, and Connectors," describes the terminal controls, indicators, and connectors, and shows their locations.

- Chapter 3, "Operating Procedures," provides information on specific terminal functions and operating procedures.

- Chapter 4, "Terminal Set-Up," describes each set-up screen feature in detail. It shows you how to select those features to define the terminal operating characteristics.

- Chapter 5, "Communication," describes how the VT220 communicates with a host computer and a peripheral device such as a printer.

- Chapter 6, "Problem Solving," describes the self-test used to find terminal hardware problems. This chapter also contains simple troubleshooting information to correct common operating problems.

- Appendix A, "Specifications," provides all VT220 specifications.

- Appendix B, "Options, Documentation, and Supplies," describes the options, related documentation, and supplies mentioned in this manual and how to order them.

- Appendix C, "Keyboards," shows the various keyboards available with the VT220.

CHAPTER 1
A LOOK AT THE TERMINAL

GENERAL

This chapter introduces you to the VT220 terminal. The chapter provides an overview of what the VT220 is and what it does, then briefly describes how the terminal works.

VT220 COMPONENTS

The two main components of the VT220 are the monitor/system unit and the keyboard (Figure 1-1).

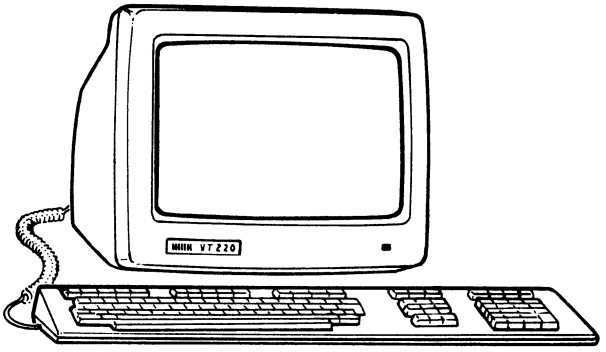

Figure 1-1 VT220 Video Terminal

Monitor/System Unit

The monitor/system unit (referred to as the "terminal" from this point on) consists of a monochrome cathode-ray tube (crt), a terminal controller board, and a power supply/monitor board.

Keyboard

The low-profile keyboard has four groups of keys and four visual indicators. The main keypad operates like a typewriter keyboard. A single coiled cable connects the keyboard to the terminal.

There are 15 basic keyboards available with the VT220. (See Appendix C.) Each keyboard is for a different language.

HOW THE VT220 WORKS

The VT220 is a general-purpose video display terminal that lets you interact with a software application program. You send characters to the application program by typing on the keyboard. Characters sent by the application program appear as text on the terminal screen. You can print the text you create on the screen if the terminal is connected to a printer. The terminal operates by executing standard ANSI functions.

OPERATING STATES

The VT220 has three operating states you can select from the keyboard.

- Set-up
- On-line
- Local

Set-Up

The set-up state lets you select or examine terminal operating features. Chapter 4 describes these set-up features in detail. You also use set-up to select the on-line and local states.

You select set-up from the keyboard by pressing the **Set-Up** key.

On-Line

The on-line state lets the terminal communicate with a host computer. Data entered at the keyboard is sent to the host computer. Data received from the host computer is displayed on the monitor. You can also display data entered from the keyboard on the screen, if you select the local echo feature in set-up (Chapter 4).

You can only select on-line in set-up.

Local

The local state lets you place the host computer on "hold." Data entered at the keyboard is sent to the monitor, but not to the host computer. Data received from the host computer is stored; this data is sent to the monitor after you put the terminal back on-line.

You can only select local in set-up.

OPERATING MODES

The VT220 has four major operating modes. You can select these modes in set-up. The default operating mode is VT200 mode, 7-bit controls.

- VT200 mode, 7-bit controls
- VT200 mode, 8-bit controls
- VT100 mode
- VT52 mode

VT200 Mode, 7-Bit Controls

This mode executes standard ANSI functions and lets you use the full range of VT220 capabilities. You should use this mode with application programs that expect 7-bit control characters, and either DEC multinational characters or national replacement characters (depending on the character set selected in set-up).

> NOTE
> In general, most VT100 application programs will run in VT200 mode, 7-bit controls.

VT200 Mode, 8-Bit Controls

This mode also executes standard ANSI functions and lets you use the full range of VT220 capabilities. You should use this mode with application programs that expect 8-bit control characters and DEC multinational characters.

VT100 Mode

This mode executes standard ANSI functions. You should use VT100 mode with application programs that require strict compatibility with Digital's VT100 terminal.

VT52 Mode

This is a text mode that executes Digital (DEC) private functions (not ANSI). You should use VT52 mode for compatibility with existing application programs designed for Digital's VT52 terminal.

CHARACTER SET MODES

The VT220 has two basic character set modes, multinational and national.

Multinational mode supports the DEC multinational character set (DEC MCS). The DEC MCS is an 8-bit character set that contains most characters used in the major European languages. The ASCII character set is included in the DEC MCS.

National mode supports the national replacement character sets (NRC sets). The NRC sets are a group of eleven 7-bit character sets. The national character set available is determined by the keyboard selected in set-up. Only one national character set is available for use at any one time. National mode restricts compatibility to a 7-bit environment in which the use of the DEC MCS is disabled.

> **NOTE**
> **This manual describes the use of the North American keyboard, unless otherwise specified. When using the North American keyboard, the terminal defaults to multinational mode. (National mode is disabled.)**

CRT SAVER FEATURE

If during normal operation the terminal is inactive for 30 minutes (no keyboard activity or input from a host computer), the monitor screen goes blank (but data is not lost). Keyboard activity or input from the host computer activates the monitor again. The recommended method for reactivating the screen is to press the Ctrl key.

CHAPTER 2
CONTROLS, INDICATORS, AND CONNECTORS

GENERAL

This chapter provides information about the terminal's controls, indicators, and connectors. It also describes the keyboard, including the three keypads and special function keys.

TERMINAL

The terminal controls, indicators, and connectors are shown in Figures 2-1 and 2-2 and described in Tables 2-1 and 2-2.

Monitor

The monitor controls are shown in Figure 2-2 and described in Table 2-2.

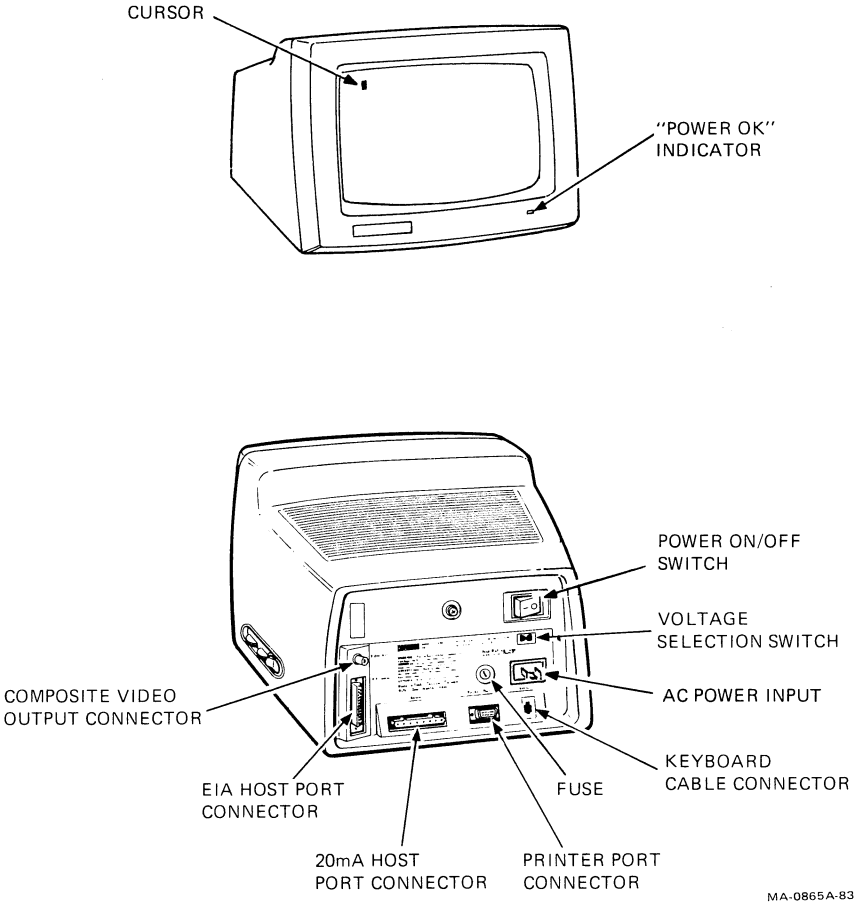

Figure 2-1 Terminal Controls, Indicators, and Connectors

Table 2-1 Terminal Controls, Indicators, and Connectors

Control/Indicator/Connector	Description
Power switch	Turns the terminal on or off. Pressing 1 turns power on. Pressing Ø turns power off.
EIA host port connector	Used to connect the terminal to a host computer either directly or via a modem.
2Ø mA host port connector	Used to connect the terminal to a nearby host computer via a 2Ø mA connection.
Composite video output connector	Provides a complete video output signal to an additional slave monitor.
Power OK indicator	Turns on to indicate power is applied to the terminal.
Printer port connector	Used to connect a printer to the terminal.
Keyboard connector	Used to connect the keyboard cable to the terminal.
AC input connector	Used to connect the power cord to the terminal from the wall outlet.
Fuse	Protects the system from electrical damage.
Voltage select switch	This slide switch lets you match the terminal voltage to the wall outlet voltage. See the VT22Ø Installation Guide for the correct setting. CAUTION An incorrect setting can damage the terminal.
Cursor	Indicates where the next display character will appear on the monitor screen. You can select an underline cursor or block cursor in the Display Set-Up screen (Chapter 4).

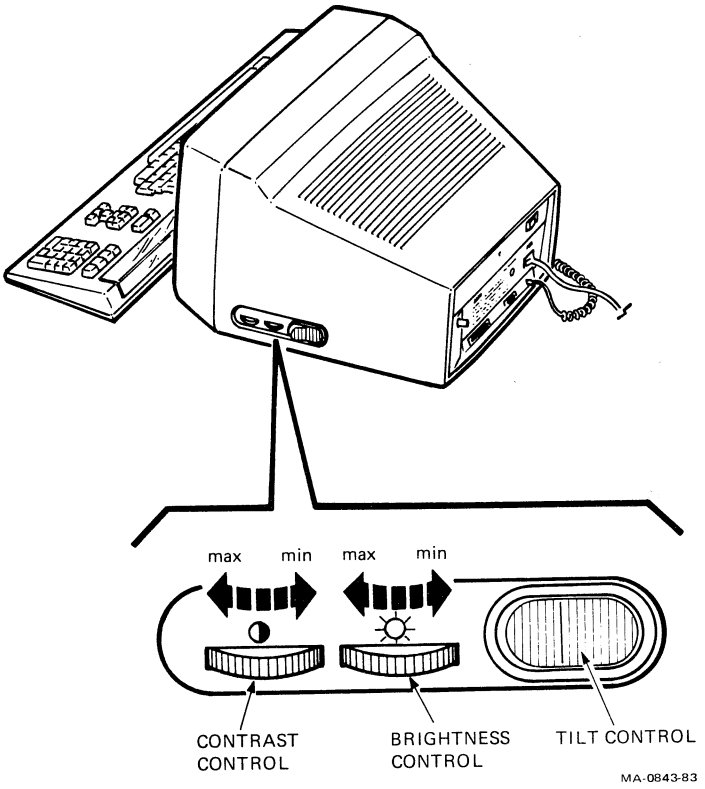

Figure 2-2 Monitor Controls and Tilt Leg Release Button

Table 2-2 Monitor Controls and Tilt Leg Release Button

Control	Description
Contrast control	Adjusts the degree of contrast on the monitor screen.
Brightness control	Adjusts the degree of brightness on the monitor screen.
Tilt leg release button	Adjusts the viewing angle of the monitor. Pressing the button releases a tilt leg that drops to provide a -5 to +15 degree tilt range.

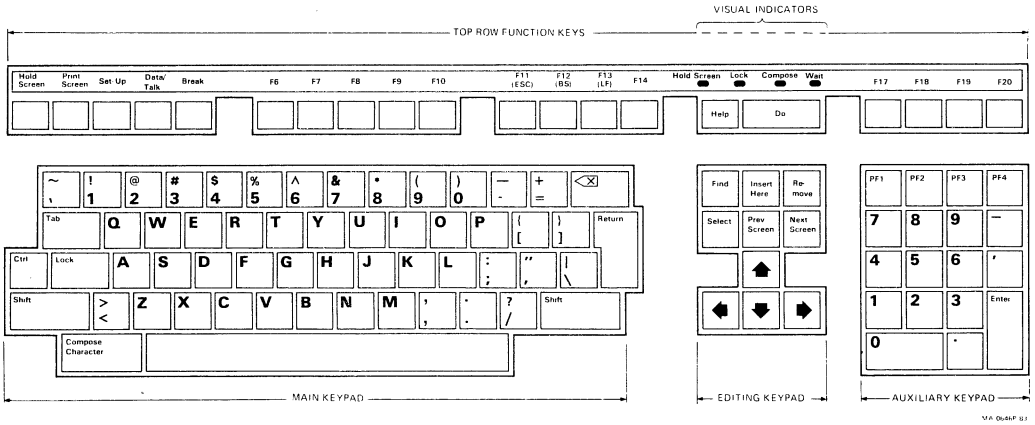

Figure 2-3 Keyboard (North American)

KEYBOARD

The keyboard (Figure 2-3) consists of the following parts.

- Main keypad
- Editing keypad
- Auxiliary keypad
- Top-row function keys
- Four visual indicators
- Two audible indicators

MAIN KEYPAD

This keypad (Figure 2-4) operates like a standard typewriter keyboard.

The main keypad has the following special function keys.

Tab

Pressing the **Tab** key sends a horizontal tab, which normally moves the cursor to the next tab stop.

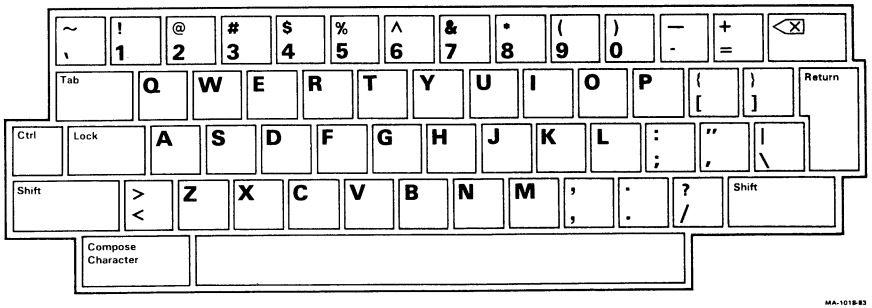

Figure 2-4 Main Keypad

Ctrl

Holding down the **Ctrl** key and pressing another key sends a control code to the system. A control code tells the system to perform a predefined operation.

In this manual, a keyboard control function using **Ctrl** is shown as follows.

Ctrl-(other key)

For example, **Ctrl-Z** means to press and hold **Ctrl** while pressing the **Z** key.

Lock

Pressing the **Lock** key down makes the alphabetic keys send uppercase characters. Pressing **Lock** again makes the alphabetic keys send lowercase characters.

Shift

Holding down the **Shift** key and pressing another key sends uppercase characters, or the top symbol on two-character keys.

In some cases, you use **Shift** with another key to send a predefined control function. In this manual, a keyboard control function using **Shift** is shown as follows.

Shift-(other key)

For example, **Shift-Print Screen** means to press and hold **Shift** while pressing the **Print Screen** key.

Return

Pressing the **Return** key sends either a carriage return or a carriage return and line feed (selected in the General Set-Up screen, Chapter 4). In some cases, **Return** moves the cursor to the next line when editing text. In others, **Return** is a signal to the system that a particular operation is finished.

<X](Delete)

Pressing the <X] (delete) key sends a DEL (delete) character. Normally <X] (delete) erases one character to the left of the cursor. Typing **Shift-**<X](delete) sends a CAN (cancel) character.

Compose
Character

This key lets you create characters that do not exist as standard keys on your keyboard. See "Composing Characters" in Chapter 3 to use this key.

EDITING KEYPAD

Normally, you use the editing keypad (Figure 2-5) to control the cursor and edit data that you already entered.

In a typical editing operation, the four arrow keys move the cursor in the direction indicated by the arrow. The six editing keys have functions corresponding to their legends. See your application software manual for specific information.

AUXILIARY KEYPAD

The auxiliary keypad (Figure 2-6) lets you enter numeric data as you would with a standard calculator. Some keys (**PF1**, **PF2**, **PF3**, and **PF4**) may have functions assigned by the application software. See your application software manual for specific information.

The **Enter** key can cause a carriage return or a carriage return and line feed, depending on the General Set-Up screen selection. You also use **Enter** in set-up, to activate a selected feature.

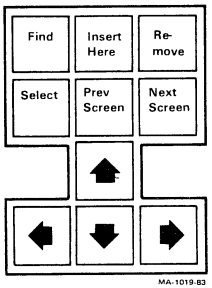

Figure 2-5 Editing Keypad

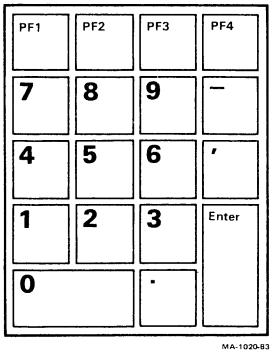

Figure 2-6 Auxiliary Keypad

TOP-ROW FUNCTION KEYS

Most of the top-row function keys (Figure 2-7) have functions assigned by the application software. Your application software manual should describe the function of these keys. The following paragraphs describe the predefined top-row keys.

Hold Screen

Pressing the **Hold Screen** key freezes the screen display and stops any new characters from being displayed. Pressing **Hold Screen** again returns the terminal to normal operation.

Print Screen

Pressing the **Print Screen** key sends the text on the screen to the printer.

Typing **Ctrl-Print Screen** sets or resets auto print mode. See "Auto Print Mode" in Chapter 3.

Set-Up

Pressing the **Set-Up** key causes the terminal to enter or exit the set-up state. (See Chapter 4.)

Data/Talk

The **Data/Talk** key only operates if EIA modem controls are enabled (See Chapter 3.)

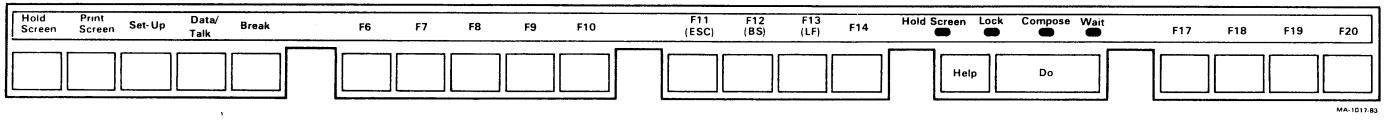

Figure 2-7 Top Row of Function Keys and Visual Indicators

Break

The **Break** key is used alone or with other keys to perform an operation.

- Pressing **Break** alone sends a break if break is enabled in set-up. (See "Keyboard Set-Up Screen" in Chapter 4.)
- Typing **Shift-Break** initiates a disconnect. (See "Connect/Disconnect" in Chapter 5.)
- Typing **Ctrl-Break** sends the answerback message to the host computer. (See "Keyboard Set-Up Screen" in Chapter 4.)

F11
(ESC)

F11 is normally a function key used by application programs. In VT100 and VT52 modes, it sends an ESC (escape) character.

F12
(BS)

F12 is normally a function key used by application programs. In VT100 and VT52 modes, it sends a BS (backspace) character.

F13
(LF)

F13 is normally a function key used by application programs. In VT100 and VT52 modes, it sends an LF (line feed) character.

Function Key Summary

The following keys are function keys used by application programs. Each key takes on a meaning defined by the particular application program. The meaning of a key may or may not correspond to the legend on the key. The following list shows typical uses for each key. Actual use depends on the application.

Application-Defined Keys

F6
F7
F8
F9
F10
F11 (ESC)
F12 (BS)
F13 (LF)
F14
Help
Do
F17
F18
F19
F20

PF1
PF2
PF3
PF4

Cursor Positioning Keys

(←)
(→)
(↑)
(↓)

Editing Keys

Find
Insert Here
Remove
Select
Prev Screen
Next Screen

VISUAL INDICATORS

The keyboard has four visual indicators showing the present terminal status or operation in progress.

Hold Screen Indicator

The Hold Screen indicator is on when the video monitor screen is frozen. See the "Hold Screen" key description.

Lock Indicator

The Lock indicator comes on to indicate that the terminal will generate uppercase characters only. See the "Lock" key description.

Compose Indicator

The Compose indicator comes on to indicate you are performing a compose sequence. (See "Composing Characters" in Chapter 3.)

Wait Indicator

The Wait indicator is on when the keyboard is prevented (locked) from sending information. You can clear this locked condition by invoking the clear comm feature from the Set-Up Directory screen (Chapter 4). See Chapter 5 for the causes of the keyboard lock condition.

AUDIBLE INDICATORS

The keyboard can generate two sounds you select from the Keyboard Set-Up screen (Chapter 4), a keyclick and a bell. You can use the bell as a margin bell, warning bell, or both.

Keyclick

The keyclick sound occurs each time you press a key, with the following exceptions.

- You press **Shift** or **Ctrl**. These keys do not generate a keyclick because they do not send a character. They modify characters sent by other keys.
- When the Wait indicator is on; characters from the keyboard are lost.
- The keyclick set-up feature is off.

Bell

The bell tone sounds in each of the following cases.

- As part of the power-up self-test
- When the terminal receives a bell (BEL) character from the computer
- When a compose error is made
- When the right margin is approached

CHAPTER 3
OPERATING PROCEDURES

GENERAL

This chapter helps you to become familiar with some specific terminal functions and operating procedures. However, your main reference source is the documentation for your application software.

PRINTING

The VT220 has a built-in serial printer interface that supports the following optional Digital printers.

LA34/38
LA35/LA36
LA12
LA100
LA120
LA50
LQP02

The VT220 printing functions operate in one of four modes selected from set-up screens (Chapter 4).

Mode	Set-Up Screen
Normal	Printer Set-Up
Auto print	Printer Set-Up
Printer controller	Printer Set-Up
Local controller	Set-Up Directory and Printer Set-Up

These modes allow the terminal to perform several print operations selected from the keyboard and/or the computer.

Normal Mode

Normal print mode (default) lets you select all local printing functions (such as Print Full Page) from the keyboard.

Auto Print Mode

Auto print mode prints the current display line when the cursor moves to the next line. The cursor moves to the next line when the terminal (1) receives a line feed, form feed, or vertical tab code, or (2) automatically wraps the line. When invoked, "Auto Print Mode" appears on the status line in set-up. All keyboard printing functions (such as Print Full Page) are allowed in auto print mode.

To invoke auto print mode from the keyboard, type **Ctrl-Print Screen.** To exit auto print mode, type Ctrl-Print Screen again.

Printer Controller Mode

In printer controller mode, the host computer has direct control of the printer. Characters received from the host computer go directly to the printer, and are not displayed on the screen. (See "Printer Port Operating Modes" in Chapter 5.) When invoked, "Printer Controller Mode" appears on the status line in set-up. This mode cannot be invoked from the keyboard (except by entering set-up).

Printer controller mode does not allow the use of local printing functions. For example, "Print Full Page" does not work.

Local Controller Mode

Local controller mode is a special mode selected by invoking two separate and distinct set-up features.

1. Local - invoked in the Set-Up Directory screen.
2. Printer controller mode - invoked in the Printer Set-Up screen.

When these two set-up features are selected, the terminal is in local controller mode. Local controller mode lets you send information directly from the keyboard to the printer. This may be useful in setting up certain printers for operation, without involving the host computer.

OPTIONAL MODEM

An optional modem enables the VT220 to communicate over a telephone line with a remote host computer. The VT220 accepts compatible modems such as the Bell 103, 113, and 212 types, in addition to Digital's DF02 and DF03. (See Appendix B, "Options, Documentation, and Supplies.") See Chapter 5 for more information on communications.

COMPOSING CHARACTERS

You can use compose sequences to create characters that do not exist as standard keys on your keyboard. To use a compose sequence, you press a series of keys. There are two types of compose sequences: three-stroke sequences and two-stroke sequences.

> NOTE
> The validity of each compose sequence depends on the terminal's present character set mode (multinational or national). Table 3-1 lists the valid compose sequences for multinational mode. Table 3-2 lists the valid compose sequences for each keyboard in national mode. In national mode the validity of each compose sequence depends on the national keyboard in use.

You can use three-stroke sequences on all VT220 keyboards. First you press the **Compose Character** key, then you press two standard keys whose characters form a valid compose sequence.

You can use two-stroke sequences on all keyboards except the North American keyboard. Two-stroke sequences are faster than three-stroke sequences, but are limited to sequences starting with the following nonspacing diacritical marks: grave accent, acute accent, circumflex accent, tilde mark, diaeresis mark (umlaut) and ring mark. Two-stroke sequences do not use the **Compose Character** key. Instead, you enter a nonspacing diacritical mark first. Then enter a standard character that forms a valid compose sequence with the diacritical mark.

Diacritical marks are available on all but the North American keyboard. The diacritical marks vary among the keyboards, depending on relative usage. Also, some keyboards have keys that contain both a standard character and a diacritical mark.

As with standard keys, you select the character you want with the **Shift** and **Lock** keys.

If you use a diacritical mark within a three-stroke sequence, the diacritical mark is treated as its equivalent character.

Diacritical Mark	Equivalent Character
Diaresis (umlaut) mark	Double quote "
Acute accent	Apostrophe '
Grave accent	Single quote `
Circumflex accent	Circumflex character ^
Tilde mark	Tilde character ~
Ring mark	Asterisk * or degree°

Tables 3-1 and 3-2 list all valid compose sequences for multinational and national modes respectively. Due to keyboard differences, characters in column 1 may be created in one or more ways.

- With a standard key (if available on that keyboard)
- With a three-stroke compose sequence (always)
- With a two-stroke compose sequence (if the diacritical mark is available on the keyboard)

Using a Three-Stroke Compose Sequence

Create a three-stroke compose sequence as follows.

1. Locate the character you want to create in column 1 of Table 3-1 or 3-2.
2. Press the **Compose Character** key. (The Compose indicator comes on, indicating the terminal is in compose mode.)
3. Type the two characters in column 2 for the character you want to create.

For example, to create e with acute accent, press **Compose Character**, and then type e and apostrophe; or press **Compose Character**, and then type apostrophe and e.

When you complete a valid sequence, the Compose indicator turns off and the composite character is sent to the application. If you use an invalid sequence, the sequence is aborted and the bell sounds (if the warning bell is enabled in the Keyboard Set-Up screen, Chapter 4).

> NOTE
> Function keys abort a compose sequence without sounding the bell.

Using a Two-Stroke Sequence

Create a two-stroke compose sequence as follows.

> NOTE
> You can use two-stroke compose sequences on all keyboards except the North American keyboard.

1. Locate the character you want to create in column 1 of Table 3-1 or 3-2. Verify in column 3 that the character can be created.

2. Press the key with the diacritical mark shown in column 3. (The Compose indicator comes on, indicating the terminal is in compose mode.)

3. Type the second character shown in column 3.

For example, to create e with a grave accent on a Danish keyboard, press the key that has the grave accent and then type e.

When you complete a valid sequence, the Compose indicator turns off and the composite character is sent to the application. If you use an invalid sequence, the sequence is aborted and the bell sounds (if the warning bell is enabled in the Keyboard Set-Up screen, Chapter 4).

> NOTE
> Function keys abort a compose sequence without sounding the bell.

Aborting or Restarting a Compose Sequence

If you accidently enter compose mode (by pressing the **Compose Character** key or a diacritical mark key), press the <X (delete) key to immediately terminate the compose sequence and exit compose mode. No character is sent to the application.

If you press **Compose Character** during a compose sequence, a new three-stroke sequence starts from that point. The previous sequence is aborted, with no effect on the application.

Table 3-1 Valid Compose Sequences: Multinational Mode

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
"	(quotation mark)	" (sp)	" (sp)
#	(number sign)	++	
'	(apostrophe)	' (sp)	' (sp)
@	(commercial at)	a a or A A	
[	(opening bracket)	((	
\	(backslash)	// or /<	
]	(closing bracket)	))	
^	(circumflex accent)	^ (sp)	^ (sp)
`	(single quote)	` (sp)	` (sp)
{	(opening brace)	(-	
|	(vertical line)	/^	
}	(closing brace)	)-	
~	(tilde)	~ (sp)	~ (sp)
¡	(inverted !)	!!	
¢	(cent sign)	c/ or C/ or c| or C|	
£	(pound sign)	l- or L- or l= or L=	
¥	(yen sign)	y- or Y- or y= or Y=	
§	(section sign)	so or SO or S! or s! or sØ or SØ	
¤	(currency sign)	xo or XO or xØ or XØ	

Table 3-1 Valid Compose Sequences: Multinational Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
©	(copyright sign)	co or CO or cØ or CØ	
a	(feminine ordinal indicator)	a- or A-	
«	(angle quotation mark left)	<<	
o	(degree sign)	Øˆ or (sp)# or (sp) o	° (sp)
±	(plus/minus sign)	±	
²	(superscript 2)	2ˆ	
³	(superscript 3)	3ˆ	
µ	(micro sign)	/u or /U (order sensitive)	
¶	(paragraph sign)	p! or P!	
·	(middle dot)	.ˆ	
¹	(superscript 1)	1ˆ	
º	(masculine ordinal indicator)	o- or O-	
»	(angle quotation mark right)	>>	
¼	(fraction one-quarter)	1 4 (order sensitive)	
½	(fraction one-half)	1 2 (order sensitive)	
¿	(inverted ?)	??	
À	(A grave)	A`	`A
Á	(A acute)	A'	'A
Â	(A circumflex)	Aˆ	ˆA

Table 3-1 Valid Compose Sequences: Multinational Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
Ã	(A tilde)	A~	~A
Ä	(A umlaut)	"A or A··	··A
Å	(A ring)	A* or A° (degree sign)	A
Æ	(A E ligature)	AE (order sensitive)	
Ç	(C cedilla)	C,	
È	(E grave)	E`	`E
É	(E acute)	E'	'E
Ê	(E circumflex)	E^	^E
Ë	(E umlaut)	E" or 'E··	··E
Ì	(I grave)	I`	`I
Í	(I acute)	I'	'I
Î	(I circumflex)	I^	^I
Ï	(I umlaut)	I" or I··	··I
Ñ	(N tilde)	N~	~N
Ò	(O grave)	O`	`O
Ó	(O acute)	O'	'O
Ô	(O circumflex)	O^	^O
Õ	(O tilde)	O~	~O
Ö	(O umlaut)	O" or O··	··O
Œ	(O E ligature)	O E (order sensitive)	

Table 3-1 Valid Compose Sequences: Multinational Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
Ù	(U grave)	U`	`U
Ú	(U acute)	U'	'U
Û	(U circumflex)	U^	^U
Ü	(U umlaut)	U" or U••	U••
Ÿ	(Y umlaut)	Y" or Y••	Y••
ß	(German small sharp s)	ss	
à	(a grave)	a`	`a
á	(a acute)	a'	'a
â	(a circumflex)	a^	^a
ã	(a tilde)	a~	~a
ä	(a umlaut)	a" or a••	••a
å	(a ring)	a* or a° (degree sign)	°a
æ	(a e ligature)	a e (order sensitive)	
ç	(c cedilla)	c , (comma)	
è	(e grave)	e`	`e
é	(e acute)	e'	'e
ê	(e circumflex)	e^	^e
ë	(e umlaut)	e" or e••	••e
ì	(i grave)	i`	`i
í	(i acute)	i'	'i

Table 3-1 Valid Compose Sequences: Multinational Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
î	(i circumflex)	i^	^i
ï	(i umlaut	i" or i••	••i
ñ	(n tilde)	n~	~n
ò	(o grave)	o`	`o
ó	(o acute)	o'	'o
ô	(o circumflex)	o^	^o
õ	(o tilde)	o~	~o
ö	(o umlaut)	o" or O••	••o
œ	(o e ligature)	o e (order sensitive)	
ø	(o slash)	o/	
ù	(u grave)	u`	`u
ú	(u acute)	u'	'u
ü	(u circumflex)	u^	^u
ü	(u umlaut)	u" or u••	••u
ÿ	(y umlaut)	y" or y••	••y

Table 3-2 Valid Compose Sequences: National Mode

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

		Required Characters	
	(1) Composite Character	(2) Three-Stroke Sequence	(3) Two-Stroke Sequence
British Keyboard			
£	pound sign	1- or L- or 1= or L=	
/	backslash	/<	
Flemish Keyboard			
£	(pound sign)	-L or -1 or =L or =1	
§	(section)	!s or !S or os or oS or Os or OS or øs or øS or	
ù	(u grave)	`u	
è	(e grave)	`e	
French Canadian Keyboard			
à	(a grave)	`a	`a
â	(a circumflex)	^a	^a
ç	(c cedilla)	,c	
ê	(e circumflex)	^e	^e
è	(e grave)	`e	`e
î	(i circumflex)	^i	^i
ô	(o circumflex)	^o	^o
ù	(u grave)	`u	`u
û	(u circumflex)	^u	^u

Table 3-2 Valid Compose Sequences: National Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

	(1) Composite Character	Required Characters (2) Three-Stroke Sequence	(3) Two-Stroke Sequence
Danish Keyboard			
#	(number sign)	++	
Ä	(A umlaut)	··A	··A
Å	(A ring)	* A	
Ø	(O slash)	O/	
Ü	(U umlaut)	··U	··U
ä	(a umlaut)	··a	··a
å	(a ring)	*a	
ø	(o slash)	o/	
ü	(u umlaut)	··u	··u
Finnish Keyboard			
#	(number sign)	++	
@	(commercial at)	aa or AA or aA	
Å	(A ring)	*A	
Ü	(U umlaut)	"U	
é	(e acute)	'e	
å	(a ring)	*a	
ü	(u umlaut)	"u	

Table 3-2 Valid Compose Sequences: National Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

(1) Composite Character	Required Characters (2) Three-Stroke Sequence	(3) Two-Stroke Sequence
German Keyboard		
Ä (A umlaut)	··A	
Ü (U umlaut)	··U	
ä (a umlaut)	··a	
ü (u umlaut)	··u	
Dutch Keyboard		
£ (pound sign)	-L or -l or =L or =l	
¾ (three quarters)	3 4 (order sensitive)	
ij (i j sign)	i j (order sensitive)	
½ (one half)	1 2 (order sensitive)	
Florin	f- (order sensitive)	
Italian Keyboard		
£ (pound sign)	-L or -l or =L or =l	
§ (section)	!s or !S or os or oS or Os or OS or Øs or ØS	
à (a grave)	`a	`a
ç (c cedilla)	,c	
é (e acute)	'e	

Table 3-2 Valid Compose Sequences: National Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

	(1) Composite Character	Required Characters (2) Three-Stroke Sequence	(3) Two-Stroke Sequence
Swiss (French) Keyboard			
ä	(a umlaut)	••a	
ç	(c cedilla)	,c	
ê	(e circumflex)	^e	^e
î	(i circumflex)	^i	^i
ô	(o circumflex)	^o	^o
ö	(o umlaut)	••o	
û	(u circumflex)	^u	^u
ü	(u umlaut)	••u	
ù	(u grave)	`u	`u
Swiss (German) Keyboard			
à	(a grave)	`a	`a
ç	(c cedilla)	,c	
ê	(e circumflex)	^e	^e
é	(e acute)	'e	
è	(e grave)	`e	`e
î	(i circumflex)	^i	^i
ô	(o circumflex)	^o	^o
û	(u circumflex)	^u	^u
ù	(u grave)	`u	`u

Table 3-2 Valid Compose Sequences: National Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

(1) Composite Character		Required Characters (2) Three-Stroke Sequence	(3) Two-Stroke Sequence
Swedish Keyboard			
#	(number sign)	++	
Å	(A ring)	*A	
É	(E acute)	'E	
Ü	(U umlaut)	"U	
å	(a ring)	*a	
é	(e acute)	'e	
ü	(u umlaut)	"u	
Norwegian Keyboard			
#	(number sign)	++	
Å	(A ring)	*A	
Ä	(A umlaut)	··A	··A
Æ	(A E diphthong)	A E (order sensitive)	
Ü	(U umlaut)	··U	··U
ä	(a umlaut)	··a	··a
æ	(a e diphthong)	a e (order sensitive)	
å	(a ring)	*a	
ü	(u umlaut)	··u	··u

Table 3-2 Valid Compose Sequences: National Mode (Cont)

In three-stroke sequences, you can enter required characters in any order unless the table says "order sensitive." You must enter all two-stroke sequences in the order shown.

(1) Composite Character	Required Characters (2) Three-Stroke Sequence	(3) Two-Stroke Sequence
French/Belgian Keyboard		
£ (pound sign)	-L or -l or =L or =l	
§ (section)	!s or !S or os or oS or Os or OS or Øs or Øs	
è (e grave)	`e	
ù (u grave)	'u	
Spanish Keyboard		
£ (pound sign)	-L or -l or =L or =l	
§ (section)	!s or !S or os or oS or Os or OS or Øs or ØS	
¡ (inverted !)	! !	
¿ (inverted ?)	? ?	
º (degree sign)	^ O	

CHAPTER 4
TERMINAL SET-UP

GENERAL

This chapter describes the VT220 set-up screens, and how to use them. These screens let you examine or change terminal operating features such as transmit/receive speeds, type of cursor, and so on.

The VT220 stores many of its operating features in an NVR (nonvolatile RAM) memory. NVR memory retains theses features even when power is shut off. In addition to storing operator-selected features, the terminal retains the factory-default settings. You can recall these default settings in set-up.

You can change all available set-up features from the keyboard. Some features can be changed by the host computer as described in the VT220 Programmer Reference Manual. (See Appendix B to order other documents).

USING SET-UP

The set-up state is based on selectable displays called set-up screens. You can select any set-up screen from the Set-Up Directory screen displayed when you enter set-up (Figure 4-1). Each set-up screen displays the features for that set-up function and lets you change or keep those features. Only one set-up screen can be displayed at a time. You can enter the Set-Up Directory screen from any other set-up screen.

SET-UP SCREENS

Each set-up screen occupies the bottom third of the monitor screen. (Current screen data is temporarily invisible.) Incoming data is not lost if the host supports XOFF and that feature is enabled. (See "Communications Set-Up Screen.") Each screen contains the following information (Figure 4-2).

Screen title
Terminal identifier
Firmware version number
Status line
Fields (action, parameter, text parameter)

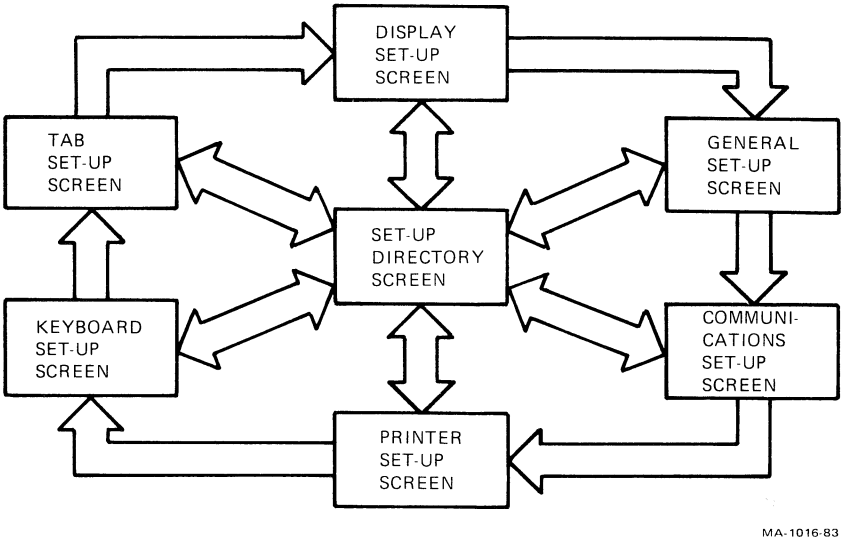

Figure 4-1 Set-Up Screens

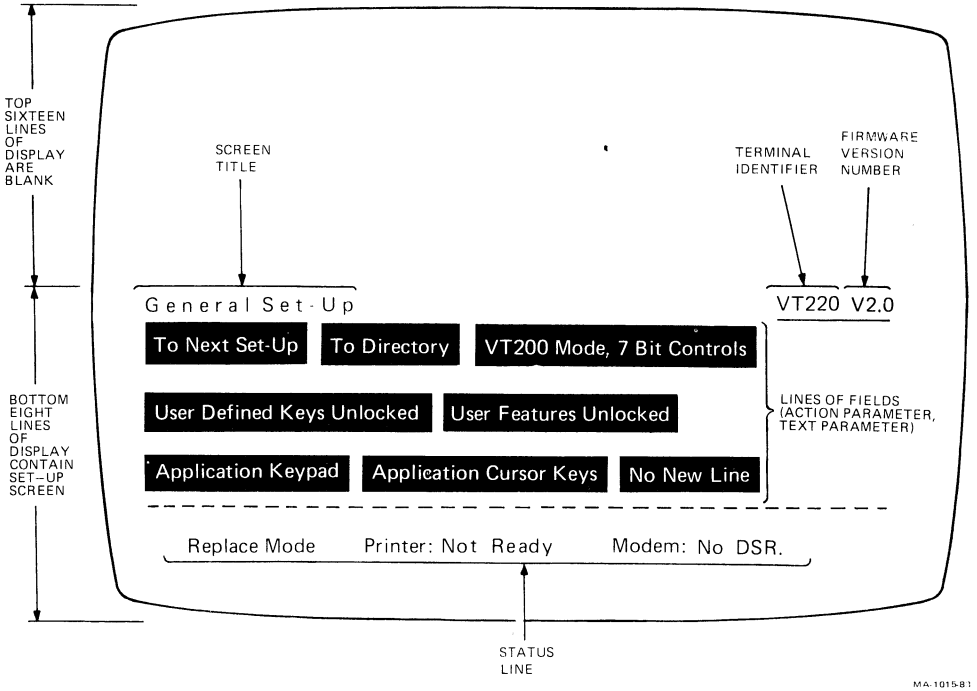

Figure 4-2 Sample Set-Up Screen

Screen Title

The screen title identifies the current set-up screen. There are seven set-up screens.

1. Set-Up Directory
2. Display Set-Up
3. General Set-Up
4. Communications Set-Up
5. Printer Set-Up
6. Keyboard Set-Up
7. Tab Set-Up

Terminal Identifier

The terminal identifier identifies the type of terminal you are using, in this case a VT220.

Firmware Version Number

The firmware version number identifies the level of firmware the terminal is using.

Status Line

The status line appears at the bottom of each set-up screen. It shows you the current status of the modem (if EIA modem control is selected), the printer, and the terminal insert/replace mode. The status line is a reporting line only; you cannot change the status line from the keyboard. Table 4-1 describes the status line messages.

Table 4-1 Status Line Messages

Report	Values	Meaning
Insert/ Replace:	Insert	The terminal is in insert mode. During normal text operation, all new display characters move old characters to the right; old characters moved past the right margin are lost.
	Replace	The terminal is in replace mode. During normal text operation, all new display characters replace old characters at the cursor position. Replace is the normal mode of operation.
Printer:	Ready	The printer is ready.
	Not Ready	The printer is not ready.
	None	No printer is available.
	Auto	The terminal is in auto print mode.
	Controller	The terminal is in printer controller mode.
Modem:	DSR,Data DSR,Talk	The modem is ready to send or receive data.
	No DSR,Data No DSR,Talk	The modem is not ready to send or receive data.

Fields

The fields on each screen are blocks of text describing current operating characteristics. There are three types of fields.

1. Action Field

   An action field has only one value, so it always reads the same. When you select an action field and press the **Enter** key, the terminal performs the action.

   For example, each screen has an action field that reads "To Directory." When you select this field and press **Enter**, the Set-Up Directory screen replaces the current screen.

2. Parameter Field

A parameter field contains a feature that has two or more values. When you select a parameter field and press **Enter**, the next value replaces the current value.

For example, if you select the keyclick parameter field, it may have a value of "Keyclick." Pressing **Enter** changes the field to "No Keyclick."

3. Text Parameter Field

A text parameter field lets you enter a value from the keyboard. You can select a text parameter field as follows.

1. Use the arrow keys to move the field cursor to the text parameter field. (See "Set-Up Controls and Cursor.")

2. Press **Enter**. The terminal prompts you to enter text on the "status line" at the bottom of the screen, temporarily overwriting the status line.

3. Type the text you want entered as the new value. The value appears next to the prompt.

4. Press **Enter** to enter the new value.

If you make a mistake, press the ⟨X⟩(delete) key to erase the last character entered. If you want to abort the entry without changing the original value, press an arrow key to change the field selection. (See "Set-Up Controls and Cursor.")

Set-Up Controls and Cursor

The VT220 uses a field cursor while in set-up. The field cursor appears as a highlighted field that you can move from field to field with the arrow keys.

Table 4-2 describes the keys used to enter and exit set-up, move the field cursor, and change operating characteristics.

Table 4-2 Set-Up Controls and Cursor Functions

Control Key	Function
Set-Up	Pressing the **Set-Up** key one time places the terminal in set-up. Pressing **Set-Up** again returns the terminal to the operating state (on-line or local).
Arrow keys	Pressing the arrow keys moves the field cursor in the direction of the arrow.
Enter	The **Enter** key lets you perform the function displayed at the field cursor position. If the cursor is on an action field, pressing **Enter** immediately performs the action. If the cursor is on a parameter field, pressing **Enter** changes the value of the field. You can use the **Enter** key to see the range of available field values. The value displayed is the current value invoked.

SET-UP EXAMPLE: CHANGING FEATURES

This section provides an example of changing the terminal operating characteristics in set-up.

Suppose the terminal is currently set to display its text in 80 columns, and the keyboard keys click each time you press them.

You decide to change these two operating characteristics so the terminal displays 132 columns, and the keys do not click when pressed.

Use the following procedure to change these two operating characteristics in set-up.

1. Press the **Set-Up** key. The terminal enters set-up and displays the Set-Up Directory screen (Figure 4-3).

2. Note that the cursor is on the field that reads "Display."

3. Press the **Enter** key. The terminal replaces the Set-Up Directory screen with the Display Set-Up screen (Figure 4-4).

4. Use the arrow keys to move the field cursor to the field that reads "80 columns."

5. Press **Enter**. The field changes from "80 columns" to "132 columns", indicating that the feature changed.

   NOTE
   Although many parameter changes are immediate (such as the column feature), some changes do not take effect until you exit set-up.

6. Use the arrow keys to move the field cursor to the field that reads "Directory." (You want to change another feature).

7. Press **Enter**. The terminal replaces the Display Set-Up screen with the Set-Up Directory screen.

8. Use the arrow keys to move the field cursor to the field that reads "Keyboard."

9. Press **Enter**. The terminal replaces the Set-Up Directory screen with the Keyboard Set-Up screen (Figure 4-8).

10. Use the arrow keys to move the field cursor to the field that reads "Keyclick."

11. Press **Enter**. The field changes from "Keyclick" to "No Keyclick", indicating that the feature changed.

12. Press **Set-Up** to exit set-up and return to the operating mode (on-line or local).

SET-UP SCREEN SUMMARIES

The following sections describe the set-up screens and their features. When you select the various set-up features you want to use, make sure to check off the box beside the parameter value selected for that feature. This gives you a record of the values selected, in case the settings are accidently changed or lost. If repairs to the terminal are necessary, the technician needs this information to reset the set-up feature values.

Table 4-3 summarizes the set-up screens. It lists the features available on each screen.

Table 4-3 Set-Up Display Summary

Set-Up Directory	Display Set-Up	General Set-Up
Display Set-Up	To Next Set-Up	To Next Set-Up
General Set-Up	To Directory	To Directory
Communications Set-Up	80/132 Columns	Terminal Mode
Printer Set-Up	Control Representation Mode	UDK Lock
Keyboard Set-Up	Auto Wrap	User Features Lock
Tab Set-Up	Smooth/Jump Scroll	Character Set Mode
On-Line/Local	Light/Dark Screen	Keypad Mode
Clear Display	Cursor	Cursor Key Mode
Clear Communications	Cursor Style	New Line
Reset Terminal		
Recall Saved Parameters		
Save Parameters		
Set-Up Language		
Keyboard Language		
Factory Defaults		
Exit Set-Up		

Communications Set-Up	Printer Set-Up	Keyboard Set-Up
To Next Set-Up	To Next Set-Up	To Next Set-Up
To Directory	To Directory	To Directory
Transmit Speed	Transmit/Receive Speed	Typewriter/D.P.
Receive Speed	Print Mode	Caps/Shift-Lock
XOFF	Data-Bits Parity	Auto Repeat
Data-Bits/Parity	Stop Bits	Keyclick
Stop Bits	Print Page/Region	Margin Bell
Local Echo	Printed Data Type	Warning Bell
Host Port Selection	Print Terminator	Break
Disconnect		Auto Answerback
Transmit Rate Limit		Conceal Answerback

Tab Set-Up
To Next Set-Up
To Directory
Clear All Tabs
Set 8 Column Tabs
Tab Fields and Ruler

SET-UP DIRECTORY SCREEN

The Set-Up Directory screen (Figure 4-3) appears immediately when you enter set-up. This screen lets you access any other set-up screen. It also contains fields you can use to select terminal operating features.

Table 4-4 describes all fields on this screen.

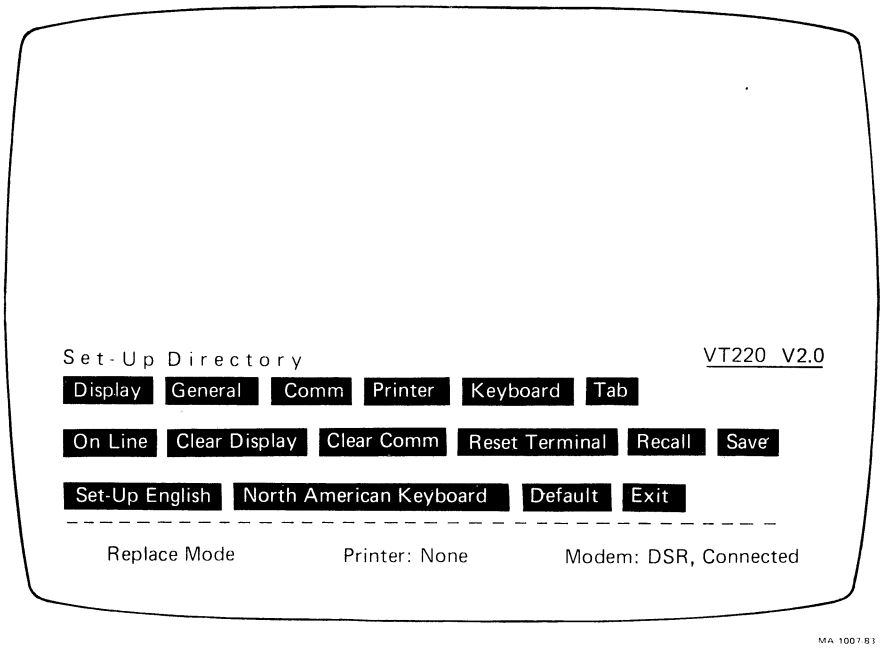

Figure 4-3 Set-Up Directory

Table 4-4 Set-Up Directory Screen

Field	Function
Display Action field Value: Display	Replaces the Set-Up Directory screen with the Display Set-Up screen.
General Action field Value: General	Replaces the Set-Up Directory screen with the General Set-Up screen.

Table 4-4 Set-Up Directory Screen (Cont)

Field	Function
Comm Action field Value: Comm	Replaces the Set-Up Directory screen with the Communications Set-Up screen.
Printer Action field Value: Printer	Replaces the Set-Up Directory screen with the Printer Set-Up screen.
Keyboard Action field Value: Keyboard	Replaces the Set-Up Directory screen with the Keyboard Set-Up screen.
Tab Action field Value: Tab	Replaces the Set-Up Directory screen with the Tab Set-Up screen.
On-Line or **Local** Parameter field Values:	Lets you select the mode of operation.
☐ On-Line (default)	Lets the terminal communicate with the host computer.
☐ Local	Effectively puts the host computer on hold. Data entered at the keyboard is sent directly to the monitor screen only.
Clear Display Action field Value: Clear Display	Clears the monitor screen when you exit set-up.

Table 4-4 Set-Up Directory Screen (Cont)

Field	Function
Clear Comm Action field Value: Clear Comm	Clears communication as follows. • Aborts any print operation in progress. • Aborts any escape sequence, control sequence, or device control string (DCS) processing. • Clears the keyboard buffers. • Clears the receive buffer. • Clears the transmit buffer. • Takes the terminal out of printer controller mode. • Sends XON to the host port. • Resets XOFF received flags on the printer and host ports.
Reset Terminal Action field Value: Reset Terminal	Resets many terminal operating features to a default setting used by most application programs. The screen, communication, national and multinational modes, and user-defined keys are not affected.
Recall Action field Value: Recall	Replaces all existing set-up features with saved values. The monitor screen is cleared. NOTE Recall causes a disconnect to occur.
Save Action field Value: Save	Saves all set-up features in all set-up screens.

Table 4-4 Set-Up Directory Screen (Cont)

Field	Function
Set-Up=_____ Parameter field Values: ☐ Set-Up= English ☐ Set-Up= Francais ☐ Set-Up= Deutsch	Lets you select the language used to display set-up screens.
_____Keyboard Parameter field Values: ☐ North American ☐ British ☐ Flemish ☐ Canadian (French) ☐ Danish ☐ Finnish ☐ German ☐ Dutch ☐ Italian ☐ Swiss (French) ☐ Swiss (German) ☐ Swedish ☐ Norwegian ☐ French/Belgian ☐ Spanish	This field lets you select correct terminal operation for the national keyboard you are using.
Default Action field Value: Default	Replaces all current set-up features with factory-default settings. The monitor screen is cleared, and the cursor returns to the upper-left corner of the screen. NOTE Default causes a disconnect to occur.
Exit Action field Value: Exit	Exits set-up and returns the terminal to on-line or local.

DISPLAY SET-UP SCREEN

The Display Set-Up screen (Figure 4-4) lets you define monitor display characteristics.

Table 4-5 describes all fields on this screen.

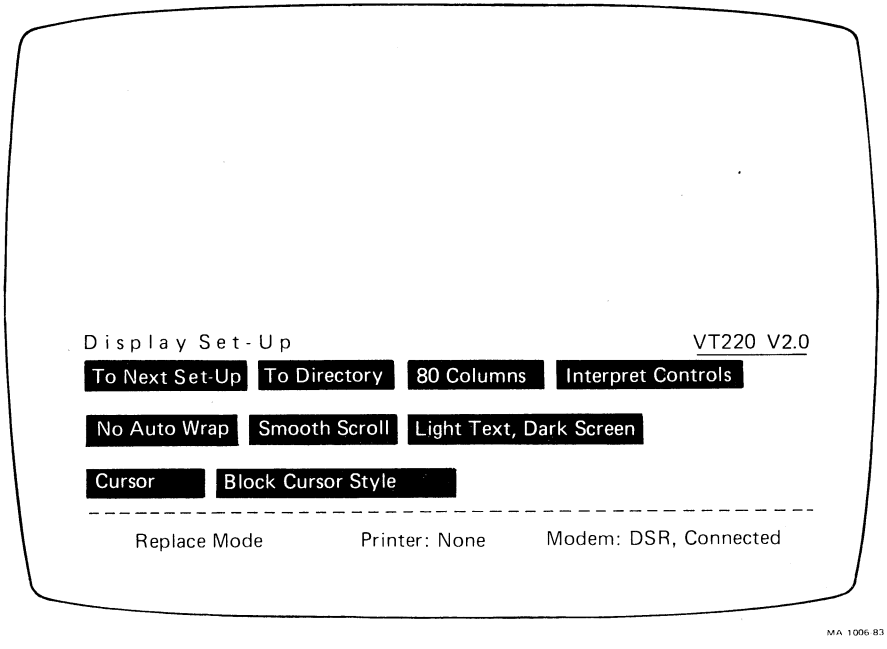

Figure 4-4 Display Set-Up

Table 4-5 Display Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the Display Set-Up screen with the General Set-Up screen.
To Directory Action field Value: To Directory	Replaces the Display Set-Up screen with the Set-Up Directory screen.

Table 4-5 Display Set-Up Screen (Cont)

Field	Function
_____ Columns Parameter field Values:	Selects an 80 or 132-column screen display for text. A change to this field takes effect immediately and clears the display.
☐ 80 Columns (default)	Selects 80-column screen.
☐ 132 Columns	Selects 132-column screen.
_____ Controls Parameter field Values:	Selects how the terminal handles control codes from the host computer.
☐ Interpret Controls (default)	Interprets control codes, but does not display them.
☐ Display Controls	Displays the control codes as characters, but does not act on them.
Auto Wrap Parameter field Values:	Selects whether display text automatically wraps on screen.
☐ Auto Wrap	Causes a character received after the right margin to automatically appear in the first character position of the next line.
☐ No Auto Wrap (default)	Causes characters received after the right margin to be overwritten into the last character position of the current line.

Table 4-5 Display Set-Up Screen (Cont)

Field	Function
_____ Scroll Parameter field Values:	Selects how fast lines appear on the screen.
☐ Smooth Scroll (default)	Limits the speed at which new lines appear on the screen, causing a smooth steady scroll.
☐ Jump Scroll	Displays new lines as fast as they are received, causing a jump scroll.
____ Text, ____ Screen Parameter field Values:	Selects the screen display type.
☐ Light Text, Dark Screen (default)	Selects a normal screen display (light text on a dark background).
☐ Dark Text, Light Screen	Selects reverse video screen display (dark text on a light background).
Text Cursor Parameter field Values:	Selects whether or not the text cursor is displayed.
☐ Cursor (default)	Displays the cursor.
☐ No Cursor	Does not display the cursor.
_____ Cursor Style Parameter field Values:	Selects the text cursor style displayed.
☐ Block Cursor default)	Displays block cursor.
☐ Underline Cursor	Displays underline cursor.

GENERAL SET-UP SCREEN

The General Set-Up screen (Figure 4-5) lets you define a group of commonly used general operating features.

Table 4-6 describes all fields on this screen.

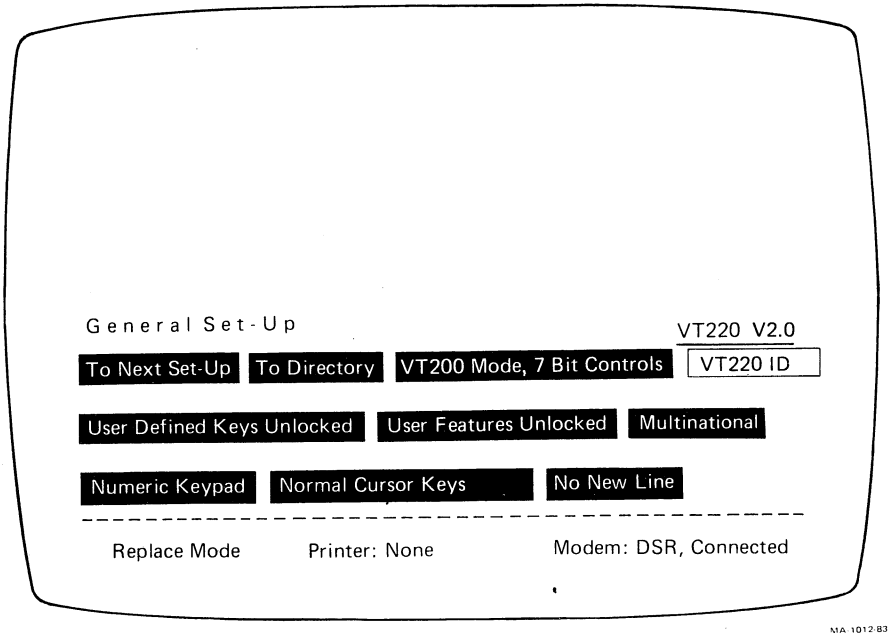

Figure 4-5 General Set-Up

Table 4-6 General Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the General Set-Up screen with the Communications Set-Up screen.
To Directory Action field Value: To Directory	Replaces the General Set-Up screen with the Set-Up Directory screen.

Table 4-6 General Set-Up Screen (Cont)

Field	Function
_____ Mode _____	Selects the basic text operating mode.
Parameter field	
Values:	
☐ VT200 Mode, 7-Bit Controls (default)	Sets the terminal to operate with a full range of capabilities, using 8-bit graphic characters and 7-bit controls. This is the recommended mode for most applications.
☐ VT200 Mode, 8-Bit Controls	Sets the terminal to operate with a full range of capabilities in an 8-bit environment with 8-bit controls. Many applications designed for the VT100 terminal will run in this mode.
☐ VT52 Mode	Sets the terminal for use with application programs designed for the VT52 terminal.
☐ VT100 Mode	Sets the terminal for use with application programs designed for a VT100 terminal and requiring strict VT100 compatibility. In general, use VT200 mode, 7-bit controls if possible.

Table 4-6 General Set-Up Screen (Cont)

Field	Function
VT100 Mode Terminal ID Parameter field	Selects the device attributes of the terminal in VT100 mode. NOTE This field is unique. It is visible only when the terminal is in VT100 mode.
Values:	
☐ VT220 ID (default)	Causes the terminal to send the device attributes of a VT220 terminal to the host computer.
☐ VT100 ID	Causes the terminal to send the device attributes of a VT100 terminal to the host computer.
☐ VT101 ID	Causes the terminal to send the device attributes of a VT101 terminal to the host computer.
☐ VT102 ID	Causes the terminal to send the device attributes of a VT102 terminal to the host computer.
User Defined Keys ____ Parameter field	Selects whether or not the host can change user defined key (UDK) definitions.
Values:	
☐ User Defined Keys Locked	Prevents UDKs from being loaded.
☐ User Defined Keys Unlocked (default)	Allows UDKs to be loaded.

Table 4-6 General Set-Up Screen (Cont)

Field	Function
User Features _____ Parameter field	Selects whether or not the host can change user preference features you have set.
Values: ☐ User Features Unlocked (default)	Lets the host change user features.
☐ User Features Locked	Prevents the host from changing features. The following user preference features are affected by this feature. - Auto Repeat - Smooth/Jump Scroll - Light/Dark Screen - Tab Stops - Keyboard Lock NOTE Some software applications expect to control these user features. If this applies to your particular software, set the value to "User Features Unlocked" to ensure predictable behavior.
Character Set Mode Parameter field	Selects either the national or multinational character set mode. NOTE If the North American keyboard has been selected, only multinational mode is available for use. National mode is disabled.
Values: ☐ Multinational	Enables the terminal to generate 8-bit multinational characters, including 7-bit ASCII characters.
☐ National (default)	Causes the terminal to use one of eleven 7-bit national replacement character sets. The NRC set depends on the keyboard field selected in the Set-Up Directory screen.

Table 4-6 General Set-Up Screen (Cont)

Field	Function
_____ Keypad Parameter field	Selects whether or not the keypad sends ASCII character codes or escape sequences.
Values:	
☐ Numeric Keypad (default)	Causes the auxiliary keypad to send ASCII character codes corresponding to the numeric characters on the keys.
☐ Application Keypad	Causes the auxiliary keypad to send escape sequences used by an application program.
_____ Cursor Keys Parameter field	Selects whether or not the cursor keys send ANSI cursor control sequences or application control functions.
Values:	
☐ Normal Cursor Keys (default)	Cursor keys send ANSI cursor control sequences (up, down, left, and right).
☐ Application Cursor Keys	Cursor keys send application program control functions.
_____ New Line Parameter field	Selects whether or not the Return key sends a carriage return only, or a carriage return and a line feed.
Values:	
☐ No New Line (default)	The Return key sends a carriage return only.
☐ New Line	The Return key sends a carriage return and a line feed. NOTE When the terminal is in numeric keypad mode, this feature affects the Enter key in the same way it does the Return key.

COMMUNICATIONS SET-UP SCREEN

The Communications Set-Up screen (Figure 4-6) lets you define the communications environment between the terminal and host.

Table 4-7 describes all fields on this screen.

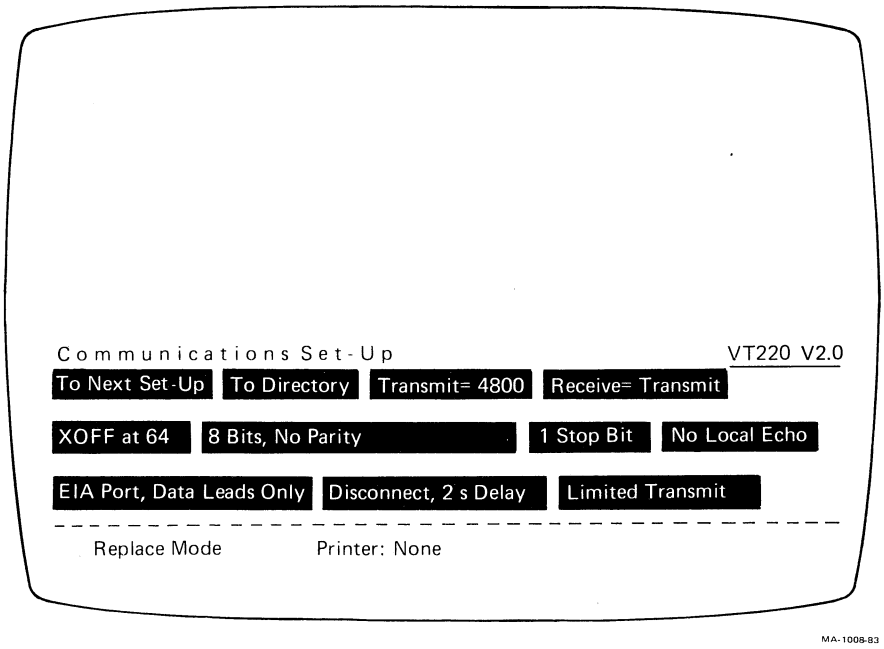

Figure 4-6 Communications Set-Up

Table 4-7 Communications Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the Communications Set-Up screen with the Printer Set-Up screen.
To Directory Action field Value: To Directory	Replaces the Communications Set-Up screen with the Set-Up Directory screen.

Table 4-7 Communications Set-Up Screen (Cont)

Field	Function
Transmit= _____ Parameter field Values: ☐ Transmit= 75 ☐ Transmit= 110 ☐ Transmit= 150 ☐ Transmit= 300 ☐ Transmit= 600 ☐ Transmit= 1200 ☐ Transmit= 2400 ☐ Transmit= 4800 (default) ☐ Transmit= 9600 ☐ Transmit=19200	Selects the rate at which the terminal sends data to the host computer. The terminal transmit speed must be set to match the computer receive speed. However, the terminal can transmit at one speed and receive at another. NOTE **This feature does not set the format for the printer port.**
Receive= _____ Parameter field Values: ☐ Receive= 75 ☐ Receive= 110 ☐ Receive= 150 ☐ Receive= 300 ☐ Receive= 600 ☐ Receive= 1200 ☐ Receive= 2400 ☐ Receive= 4800 ☐ Receive= 9600 ☐ Receive=19200 ☐ Receive=Transmit (default)	Selects the rate at which the terminal receives data from the host computer. The terminal receive speed must be set to match the computer transmit speed. However, the terminal can receive at one speed and transmit at another.
_____ XOFF _____ Parameter field Values: ☐ XOFF at 64 (default) ☐ XOFF at 128 ☐ No XOFF	Selects the XOFF point or disables the automatic XON/XOFF flow control. (See "Terminal/Host Data Flow Control" in Chapter 5.) For most applications you should set XOFF at 64 or 128. Selects an XOFF of 64 characters. Selects an XOFF of 128 characters. Disables automatic XON/XOFF.

Table 4-7 Communications Set-Up Screen (Cont)

Field	Function
__ Bits,___ Parity ___ Parameter field Values: ☐ 8 Bits, No Parity (default) ☐ 8 Bits, Even Parity ☐ 8 Bits, Odd Parity ☐ 7 Bits, No Parity ☐ 7 Bits, Even Parity ☐ 7 Bits, Odd Parity ☐ 7 Bits, Mark Parity ☐ 7 Bits, Space Parity ☐ 7 Bits, Even Parity, No Check ☐ 7 Bits, Odd Parity, No Check ☐ 8 Bits, Even Parity No Check ☐ 8 Bits, Odd Parity No Check	Selects the character format used for communication with the host computer. (See "Character Format" in Chapter 5.) NOTE This feature does not set the format for the printer port. Select the correct character format to match the printer. For example, if you are using a 7-bit compatible printer, then you should select one of the five 7-bit parameter field options.
__ Stop Bit__ Parameter field Values: ☐ 1 Stop Bit (default) ☐ 2 Stop Bits	Sets the number (1 or 2) of stop bits used by the host port (See "Character Format" in Chapter 5.) NOTE This feature does not set the format for the printer port.
Local Echo Parameter field Values: ☐ No Local Echo (default) ☐ Local Echo	Enables or disables the local echo feature. Sends data from the keyboard to the host computer only; the host may or may not send the data back to the monitor screen. Sends data from the keyboard to monitor screen as well as the host computer.

Table 4-7 Communications Set-Up Screen (Cont)

Field	Function
_____ Port _____ Parameter field	Selects the type of port used for communication with the host computer. (See "Host and Printer Port Interfaces" in Chapter 5.)
Values:	
☐ 20 mA Port	Selects the 20 mA port if the terminal connects to the host computer via the 20 mA port.
☐ EIA Port, Data Leads Only (default)	Selects EIA port, data leads only if the terminal connects to the host computer via the COMM port.
☐ EIA Port, Modem Control	Selects EIA port, modem control if the terminal connects to the host via the COMM port and an external modem requiring EIA modem control is used.
Disconnect, ___ Delay Parameter field	When modem control is used, the disconnect delay feature determines the time allowed before the terminal disconnects from the communications line when the received line signal detection (RLSD) is lost.
Values:	
☐ Disconnect, 2s Delay (default)	All countries except the United Kingdom should use the 2 s delay.
☐ Disconnect, 60ms Delay	The 60 ms delay is for use in the United Kingdom.
_____ Transmit Parameter field	Selects a limited or unlimited terminal transmit speed.
Values:	
☐ Limited Transmit (default)	Limits the terminal transmit speed to 150 to 180 characters per second, regardless of the baud rate. This places a minimal interrupt burden on the operating system.
☐ Unlimited Transmit	Selects an unlimited terminal transmit speed.

PRINTER SET-UP SCREEN

The Printer Set-Up screen (Figure 4-7) lets you define printer operations with the VT220.

Table 4-8 describes all fields on this screen.

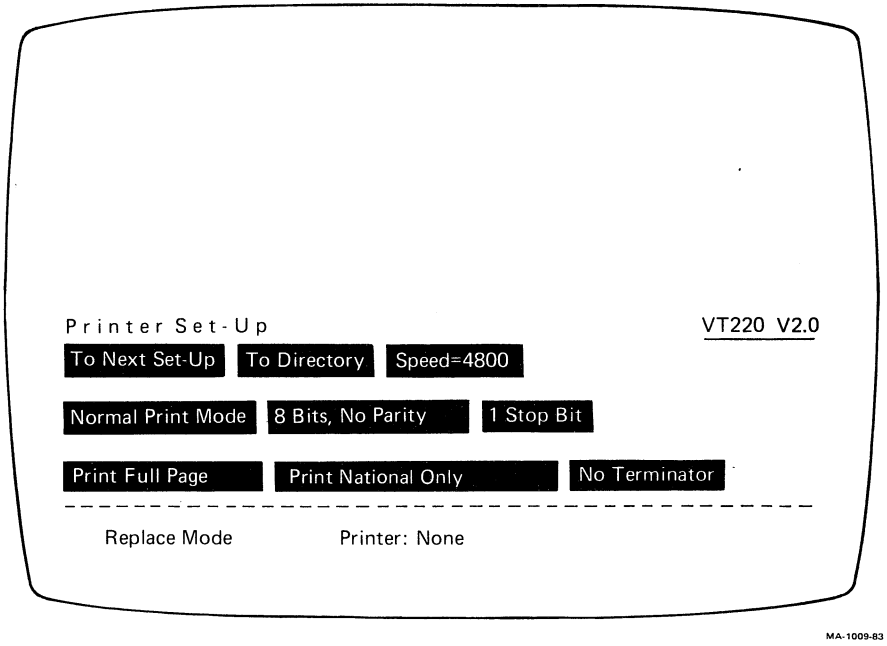

Figure 4-7 Printer Set-Up

Table 4-8 Printer Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the Printer Set-Up screen with the Keyboard Set-Up screen.
To Directory Action field Value: To Directory	Replaces the Printer Set-Up screen with the Set-Up Directory screen.

Table 4-8 Printer Set-Up Screen (Cont)

Field	Function
Speed= ____ Parameter field Values: ☐ Speed= 75 ☐ Speed= 110 ☐ Speed= 150 ☐ Speed= 300 ☐ Speed= 600 ☐ Speed= 1200 ☐ Speed= 2400 ☐ Speed= 4800 (default) ☐ Speed= 9600 ☐ Speed=19200	Selects the rate at which the terminal sends data to a printer.
_____ Mode Parameter field Values:	Selects the operating mode for the printer.
☐ Normal Print Mode (default)	Lets you invoke print functions from the keyboard.
☐ Auto Print Mode	Prints the current line of text when the terminal receives a line feed, form feed, or vertical tab code from the host computer.
☐ Controller Mode	Causes the printer port to treat the printer as a terminal, while the VT220 monitors traffic. (The host computer transfers data to the printer, but the data is not displayed on the monitor screen.)

Table 4-8 Printer Set-Up Screen (Cont)

Field	Function
___ Bits, ___ Parity Parameter field Values: ☐ 7 Bits, No Parity ☐ 7 Bits, Mark Parity ☐ 7 Bits, Space Parity ☐ 7 Bits, Even Parity ☐ 7 Bits, Odd Parity ☐ 8 Bits, No Parity (default) ☐ 8 Bits, Even Parity ☐ 8 Bits, Odd Parity	Selects the character format used by the printer port. (See "Character Format" in Chapter 5.) **NOTE** **Choose the character format to match the printer. For example, if you are using a 7-bit compatible printer, then you should select one of the five 7-bit parameter field options.**
___ Stop Bit ____ Parameter field Values: ☐ 1 Stop Bit (default) ☐ 2 Stop Bits	Sets the number of stop bits to match the printer. Selects 1 stop bit. Selects 2 stop bits.
Print _____ Parameter field Values: ☐ Print Full Page (default) ☐ Print Scroll Region	Selects how much of the screen is printed during a print page operation. Print the full screen. Print only the scrolling region.

Table 4-8 Printer Set-Up Screen (Cont)

Field	Function
Printed Data Type Parameter field	Selects the type of characters (from the terminal's character sets) to send to the printer.
Values:	
☐ Print National Only (default)	Use with a printer that supports ASCII (multinational mode) or the current national set (national mode). (Examples: LA34, LA36, LA12Ø, non-Digital printers.)
☐ Print National and Line Drawing	Use with a printer that supports ASCII and the line drawing sets (multinational mode), or the current national set and the line drawing set (national mode). (Example: LA1ØØ.)
☐ Print Multinational	Use with a printer that supports the multinational and line drawing sets. (Example: LA5Ø.)
Print Terminator Parameter field	Selects whether or not a terminator (form feed) is sent at the end of a print page operation.
Values:	
☐ Terminator = FF	Selects the form feed (FF) terminator.
☐ No Terminator (default)	Selects no terminator.

KEYBOARD SET-UP SCREEN

The Keyboard Set-Up screen (Figure 4-8) lets you define keyboard operating features.

Table 4-9 describes all fields on this screen.

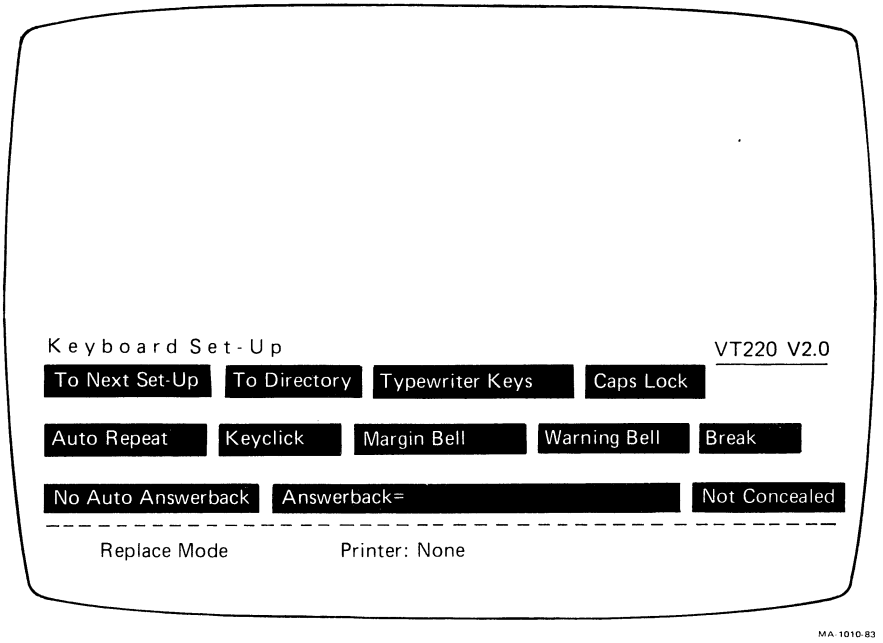

Figure 4-8 Keyboard Set-Up

Table 4-9 Keyboard Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the Keyboard Set-Up screen with the Tab Set-Up screen.
To Directory Action field Value: To Directory	Replaces the Keyboard Set-Up screen with the Set-Up Directory screen.

Table 4-9 Keyboard Set-Up Screen (Cont)

Field	Function
_____ Keys Parameter field Values: ☐ Typewriter Keys (default) ☐ Data Processing Keys	Sets the terminal keyboard map for the type of keyboard you are using. If your keyboard is North American, select "Typewriter Keys." For all other keyboards, select either "Typewriter Keys" or "Data Processing Keys." "Typewriter Keys" selects the characters on the left half of the keycaps; "Data Processing Keys" selects the characters on the right half of the keycaps. **Example** The French Canadian keyboard uses a key that has a C cedilla (on the left side), and a "[ ]" (on the right side). Selecting "Typewriter Keys" makes the key respond as uppercase and lowercase C cedilla. Selecting "Data Processing Keys" makes the key respond as "[ ]".
_____ Lock Parameter field Values: ☐ Caps Lock (default) ☐ Shift Lock	Selects the function of the **Lock** key. Pressing **Lock** key turns on the Lock indicator on the keyboard. To clear the lock function, simply press **Lock** again. (The Lock indicator turns off.) The alphabetic keys send uppercase characters only. The alphabetic keys send uppercase characters, and the numeric/symbol keys send the top characters only. Shift Lock can also be cleared by pressing the **Shift** key.

Table 4-9 Keyboard Set-Up Screen (Cont)

Field	Function
Auto Repeat Parameter field	Selects whether or not keystrokes automatically repeat when you hold down a key.
Values:	
☐ Auto Repeat (default)	Pressing a key generates the character repeatedly until the key is released.
☐ No Auto Repeat	Pressing a key generates only one character.
Keyclick Parameter field	Selects whether or not the keyboard generates a clicking sound each time a key is pressed.
Values:	
☐ Keyclick (default)	Selects the keyclick feature.
☐ No Keyclick	Turns off the keyclick feature.
Margin Bell Parameter field	Selects whether or not the terminal generates a bell tone when the text cursor approaches the right margin.
Values:	
☐ Margin Bell (default)	Selects the margin bell feature.
☐ No Margin Bell	Turns off the margin bell feature.
Warning Bell Parameter field	Selects whether or not the terminal generates a bell tone for operating errors, and for **Ctrl-G**.
Values:	
☐ Warning Bell (default)	Selects the warning bell feature.
☐ No Warning Bell	Turns off the warning bell feature.

Table 4-9 Keyboard Set-Up Screen (Cont)

Field	Function
Break Parameter field Values:	Enables or disables the **Break** key function (See "Break" in Chapter 3.)
☐ Break (default)	Selects the **Break** key function.
☐ No Break	Turns off the **Break** key function. Terminal disconnect (**Shift-Break**) is not affected by this feature. (See "Connect/Disconnect" in Chapter 5.)
Auto Answerback Parameter field Values:	Selects whether or not the answerback message is automatically sent to the host computer after a communication line connection.
☐ Auto Answerback (default)	Selects the answerback message feature.
☐ No Auto Answerback	Turns off the answerback message feature.
Answerback= Text Parameter field	Allows an answerback message entry.
Value: text entry	The terminal sends an answerback message when it receives ENQ or you type **Ctrl-Break**. In the case of ENQ, the message you enter is sent to the host without affecting screen data or requiring further operator action. When you select this field, the set-up status line displays the prompt "Enter Answerback = " (temporarily overwriting the status line). You can enter any keyboard character, up to a 30-character limit. Your message can be concealed using the "Concealed" feature in this set-up screen.

Table 4-9 Keyboard Set-Up Screen (Cont)

Field	Function
Concealed Parameter field	Selects whether or not your answerback message entry is displayed on the screen.
Value:	
☐ Concealed	Your answerback message is not displayed on the screen, so it will not be revealed. You cannot reset this feature to "Not Concealed", except by entering a new answerback message.
☐ Not Concealed (default)	The terminal can display the answerback message as entered.

TAB SET-UP SCREEN

The Tab Set-Up screen (Figure 4-9) lets you set the terminal's tab stop settings.

Table 4-10 describes all fields on this screen.

The tab stop fields are one character wide. A ruler appears below the tab stop fields on the screen. Refer to the ruler when setting tabs.

There is one tab stop field for each column on the screen display. The display can be 80 or 132 columns wide, depending on the number of columns set. (See "Columns" in the Display Set-Up screen.)

There are two possible settings for each tab stop field: the letter T (tab stop set) or blank (no tab stop set).

You can move the field cursor to a tab stop field with the arrow keys or the **Tab** key. After you select a field, press the **Enter** key to place a T in a blank field or erase a T from that field.

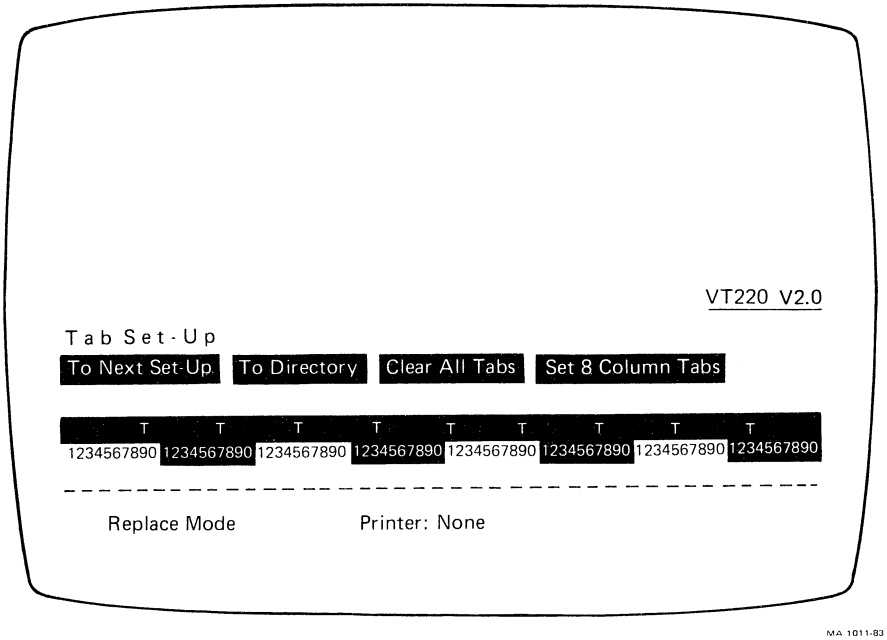

Figure 4-9 Tab Set-Up

Table 4-10 Tab Set-Up Screen

Field	Function
To Next Set-Up Action field Value: To Next Set-Up	Replaces the Tab Set-Up screen with the Display Set-Up screen.
To Directory Action field Value: To Directory	Replaces the Tab Set-Up screen with the Set-Up Directory screen.
Clear All Tabs Action field Value: Clear All Tabs	Clears all tabs previously set.
Set 8 Column Tabs Action field Value: Set 8 Column Tabs	Automatically sets tabs every 8 columns, starting with column 9.

CHAPTER 5
COMMUNICATION

GENERAL

This chapter describes how the VT220 communicates with a host computer and a printer.

The terminal operates on full-duplex asynchronous lines only, and has ten possible transmit/receive speeds. You select the transmit/receive speeds in set-up for both the terminal (Communications Set-Up screen) and the printer (Printer Set-Up screen).

The VT220 operates in accordance with the following national and international communications standards.

EIA Standard RS232C/RS423
CCITT V.24
CCITT V.26 (V.10)
CCITT X.20 (V.21)

You can connect the terminal directly to a local host computer via cable. You can also connect the terminal indirectly to a remote host computer via public-switched or dedicated telephone lines, using a modem or acoustic coupler.

HOST AND PRINTER PORT INTERFACES

The VT220 has two asynchronous serial ports. One is for communication with a host computer, and the other is for communication with a printer.

There are two host port connectors.

- A 25-pin subminiature D-type (EIA RS232C/RS423) connector used to connect the terminal to a local or remote host computer
- An 8-pin Mate-N-Lok (20 mA) connector used to connect the terminal to a local host computer

The printer port has one connector.

- A 9-pin subminiature D-type (EIA RS232C/RS423) connector used to connect the terminal to a local printer.

Tables 5-1 through 5-3 describe the interface signals for the three connectors.

> NOTE
> Connector pins not listed in Tables 5-1 through 5-3 are not connected.

Table 5-1 Comm Port EIA Interface Signals

Pin	Signal	Mnemonic	EIA/CCITT/DIN	Description
2	Transmit data	TXD	BA/103/D1	From VT220: Transmits serial characters. Held in mark state when no characters are transmitted. In modem control modes, transmits data only when RTS, CTS, DSR, and DTR are on.
3	Received data	RXD	BB/104/D2	To VT220: Receives serial characters. In modem control modes, ignores characters if RLSD is off.
4	Request to send	RTS	CA/105/S2	From VT220: When on, places the modem in transmit mode.
5	Clear to send	CTS	CB/106/M2	To VT220: When on, tells the terminal that the modem is ready to transmit.

Table 5-1 Comm Port EIA Interface Signals (Cont)

Pin	Signal	Mnemonic	EIA/CCITT/DIN	Description
6	Data set ready	DSR	CC/107/M1	To VT220: When on, tells the terminal that the modem is in the data mode and is ready to exchange RTS, CTS, and RLSD.
7	Signal ground	SGND	AB/102/E2	Serves as common ground reference potential for all connector signals except protective ground.
8	Receive line signal detect (carrier detect)	RLSD	CF/109/M5	To VT220: When on, tells the terminal that the signal received on the communication line is good enough to ensure proper demodulation of received data. When off, indicates no signal received, or signal is unsuitable for demodulation.
12	Speed indicator	SPDI	CI/112/M4	To VT220: When on, enables modem to control terminal transmit and receive speeds. Sets terminal transmit and receive speeds to 1200 bits per second, regardless of set-up selection.

Table 5-1 Comm Port EIA Interface Signals (Cont)

Pin	Signal	Mnemonic	EIA/CCITT/DIN	Description
20	Data terminal ready	DTR	CD/108.2/S1.2	From VT220: When on, tells the modem that the terminal is ready to transmit or receive.
23	Speed select	SPDS	CH/111/S4	From VT220: When on, tells the modem that receive speed selected in set-up is greater than 600 bits per second.

Table 5-2 20 mA Port EIA Interface

Pin	Signal
1	-12 V
2	Transmit -
3	Receive -
5	Transmit +
7	Receive +
8	Ground

Table 5-3 Printer Port EIA Interface Signals

Pin	Signal	Mnemonic	EIA/CCITT/ DIN	Description
1	Protective ground	PGND	AA/101/E1	Connects to terminal chassis. Also connects to external ground through third wire of power cord.
2	Transmitted data	TXD	BA/103/D1	From VT220: Transmits serial characters. Held in mark state when no characters are transmitted.
3	Receive data	RXD	BB/104/D2	To VT220: Receives serial characters for flow control.
4	Request to send	RTS	CA/105/S2	From VT220: On when the terminal is on.
5	Data terminal ready	DTR	CD/108.2/S1.2	From VT220: On when the terminal is on.
6	Data set ready	DSR	CC/107/M1	To VT220: Receives DTR on this line. If DSR is present at power-up, the printer controls print operations. If DSR is not present at power-up, the terminal checks for DSR before each character print operation.
7	Signal ground	SGND	AB/102/E2	Common ground reference for all voltages on interface.

MODEMS

The VT220 can operate with all modems conforming to the national and international standards listed at the beginning of this chapter. However, the modem at the terminal must be compatible with the modem at the host computer.

The VT220 accepts compatible modems and acoustic couplers such as the Bell 103, 113, and 212 types, in addition to Digital's DF02 and DF03.

The terminal must be certified for connection to non-Bell type modems used outside of continental North America. Your local Digital Field Service Office has detailed information on terminal certification and use of non-Bell type modems.

CABLES

Figure 5-1 shows the RS232C/RS423 cables you can use to connect the terminal to a host computer and printer.

PRINTERS

You can connect the terminal to a local asynchronous serial printer by using a null modem cable. Here are some of the Digital printers you can use with the VT220.

LA12	LA50
LA34	LA100
LA35	LA120
LA36	LQP02
LA38	

CHARACTER FORMAT

The terminal sends and receives characters serially formatted. You select the character format (Figure 5-2) in set-up.

> **NOTE**
> **Detailed information on character format is available in ANSI Standard X3.15.**

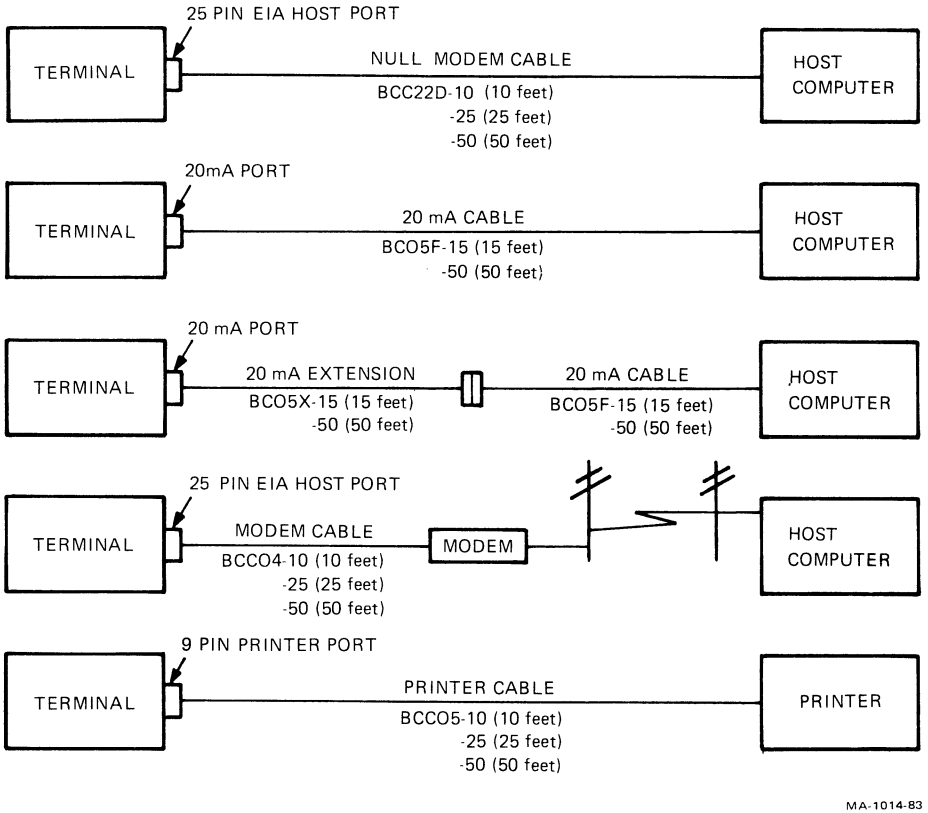

Figure 5-1 Cables

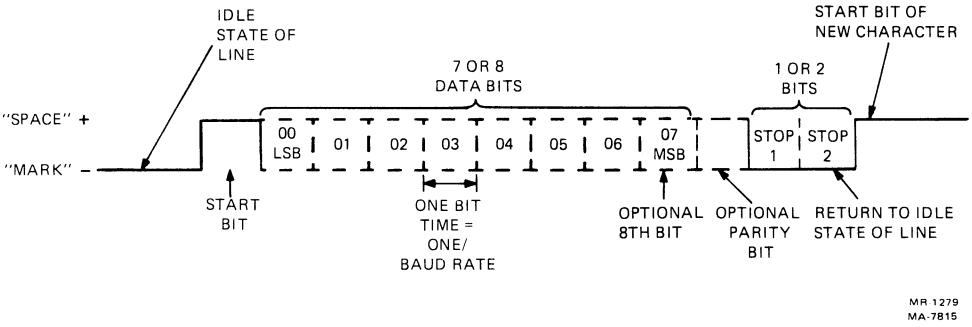

Figure 5-2 Character Format

TERMINAL--HOST DATA FLOW CONTROL

The terminal stores incoming characters in a character input buffer and processes the characters on a first-in/first-out basis. The size of the input buffer is 254 characters. When the input buffer fills to 64 or 128 characters (selected from the Communications Set-Up screen), the terminal sends an XOFF character (if you enabled XOFF from the Communications Set-Up screen) to stop the host computer from sending more characters. If the computer fails to respond to the XOFF character, the terminal sends a second XOFF character when the input buffer fills to 220 characters. The terminal sends a third XOFF character when the buffer is full.

When the input buffer contents falls below 32 characters, the terminal sends an XON character to tell the host computer to start sending characters again.

> **NOTE**
> **If you disable XOFF in set-up, the terminal does not send XOFF to the host computer when the input buffer fills. The Hold Screen key is also disabled. With XOFF disabled, there is no way to ensure that data will not be lost.**

If you enable XON/XOFF, the terminal recognizes received XON and XOFF characters. When the terminal receives XOFF, it stops sending data (except XON/XOFF characters). If the keyboard data buffer overflows, the keyboard locks and the Wait indicator turns on. The terminal resumes transmission when it receives an XON.

Conditions That Send XON

When uou enable the XOFF/XON feature in set-up, the following conditions send XON.

- The number of characters in the input buffer reaches the XON point (32 characters) and the last flow control character sent was XOFF.
- A clear comm operation is performed.
- A recall operation is performed.
- The power self-test is completed (Chapter 6).
- The **Hold Screen** key is pressed to release the screen when the input buffer is at or below the XON point.

Conditions That Send XOFF

When you enable the XOFF/XON feature in set-up, the following conditions send XOFF.

- The number of characters in the input buffer reaches the first XOFF point (64 or 128 characters, selected from the Communications Set-Up screen) for the first time since the last XON was sent.
- The number of characters in the input buffer reaches the second XOFF point (220 characters) for the first time since the last XON was sent.
- The terminal receives a character when the input buffer is full (256 characters).

Buffer Overflow Prevention

If the host computer does not respond to the XOFF from the terminal, the input buffer continues to fill with characters. If the buffer is filled and characters are still coming, the buffer overflows and characters are lost. In place of lost characters, the terminal displays reverse question mark characters (؟).

You can use the following formulas to determine how fast the host computer must respond to the first XOFF character, to prevent loss of characters due to buffer overflow. Calculate the overflow first, then host response time.

> NOTE
> These formulas assume that you set the transmit rate limit feature in the Communications Set-Up screen to "Unlimited."

1. Overflow

   OVFL = (MXBF - XOFF) - [3 x (RCDR/XMDR)] - (RCDR/600)

   where:

   OVFL = the number of characters to overflow

   MXBF = the receive buffer size (254 characters)

   XOFF = the first XOFF point (64 or 128)

   RCDR = the received data rate (receive speed)

   XMDR = the transmitted data rate (transmit speed)

2. Host Response Time

HRST = OVFL x [(DATA + STOP + PRTY + 1)/RCDR]

where:

HRST = the host computer response time (in seconds)

OVFL = the number of characters to overflow

DATA = the number of data bits per character

STOP = the number of stop bits per character

PRTY = the number of parity bits per character

Example - The VT220 sends and receives 8-bit characters with no parity at 4800 bits per second. There is 1 stop bit. XOFF is sent when the buffer has 64 characters in it.

OVFL = (254 - 64) - [3 x (4800/4800)] - (4800/600)
= 179 characters

HRST = 179 x [(8 bits + 1 bit + 0 bits + 1)/4800]
= 0.37 seconds

Therefore, the host computer must stop sending data in 0.37 seconds, or the terminal input buffer will overflow.

Use of Fill Characters

Software that does not support XON/XOFF characters from the terminal can still use all the terminal features by using fill characters. In some applications, you can use the terminal without XON/XOFF support or fill characters. However, the bit rate must be limited to 9600 and the software must not send the ESC (escape code), use slow scrolling, split screen, or the printer port.

Connect/Disconnect

When a connection is made to the host computer via a modem, the terminal performs the following operations to ensure it is ready to send and receive.

- Unlocks the keyboard (if it was locked).
- Clears any transmit in progress.
- Clears the keyboard buffer and all message buffers.
- Clears the input buffer.
- Clears XOFF sent and XOFF received.

The following conditions cause a communications line disconnect.

- Typing **Shift-Break**
- Invoking "Recall" or "Default" values in the Set-Up Directory screen
- Loss of DSR
- Loss of RLSD for a time you defined in set-up
- No RLSD within 30 seconds after DSR
- A self-test command received from the host computer
- Switching from the EIA port to the 20 mA port, or from the 20 mA port to the EIA port

The usual way to disconnect the terminal from the communications line at the end of communications is to type **Shift-Break.** The host computer's response to the disconnect signal depends on the computer and the software.

TERMINAL--PRINTER DATA FLOW CONTROL

The VT220 sends only data characters to the printer; it does not send XON/XOFF. The terminal recognizes only XON/XOFF from the printer (any other characters from the printer are ignored).

When it receives XOFF from the printer, the terminal stops sending data. The terminal starts sending data again when it receives an XON, or a clear comm operation is performed.

Note On Printer Installation

Using an 8-bit setting for the printer port line implies the use of 8-bit C1 control characters. Using a 7-bit setting implies the use of the 7-bit ESC [form of C1 control characters.

> NOTE
> Older printers may not recognize the 8-bit form of C1 control characters. With these printers, the printer line must be set to 7-bits for correct operation.

CHAPTER 6
PROBLEM SOLVING

GENERAL

This chapter describes what to do if there is a problem with the VT220. It provides a problem checklist and describes the power-up self-test.

COMMON OPERATING PROBLEMS

Table 6-1 is a list of common operating problems and their possible solutions. Check this list before calling for service.

Table 6-1 Common Operating Problems

Problem	Possible Solution
The terminal does not power up when the power switch is set to 1 (on).	Make sure the terminal power cord is plugged into the wall outlet. Check for power at the wall outlet by plugging in a lamp to see if it lights. Make sure the voltage selection switch is in the correct position . (See VT220 Installation Guide for the correct setting.) Check the fuse and replace if necessary. (If the fuse blows again, there is a possible shorting problem. Contact Digital Field Service.)
The printer does not print.	Make sure the printer is plugged in and its power switch is in the on position. Make sure the cable connection between the printer and terminal is tight. Make sure all communication features on the terminal and printer (such as baud rate and parity) match.

Table 6-1 Common Operating Problems (Cont)

Problem	Possible Solution
The monitor display does not resume scrolling. The Hold Screen indicator is on.	Press the Hold Screen key to resume scrolling.
The terminal seems to be locked and does not respond to data sent from the host.	Clear the terminal by using the Clear Comm field in the Set-Up Directory screen (Chapter 4).
The screen is blank, and the Power OK indicator is on.	The CRT saver feature (Chapter 1) may be invoked. Press any key to reactivate the screen display. Make sure the brightness and contrast controls are properly adjusted.
The bell tone does not sound when the terminal is turned on. Keyboard visual indicators are not on.	Make sure the keyboard is connected to the terminal.

POWER-UP SELF-TEST

The power-up self-test runs automatically each time you power up the terminal. During the test cycle, the power-up self-test has full control of the the terminal. The terminal cannot respond to commands other than those used for the test itself. When the test cycle ends, control returns to the terminal.

In the self-test mode, the monitor screen and the keyboard indicators (Hold Screen, Lock, Compose, and Wait) provide information about the terminal operating status. The monitor screen displays a text message, and the keyboard indicators provide a coded message.

PERFORMING THE POWER-UP SELF-TEST

Start the power-up self-test by setting the terminal power switch to 1 (on).

During the self-test the following events should occur.

- All keyboard indicators turn on and off.
- The bell tone sounds.

A successful power-up self-test ends with all keyboard indicators off and the screen displaying the message shown in Figure 6-1. The message is erased when a character is received from the host computer, or if you press any key.

The terminal displays an error message on the screen (if possible) if the test finds any error. Table 6-2 explains the error messages displayed on the screen.

Figure 6-1 Successful Power-Up Screen Message

Table 6-2 Screen Error Messages

Screen Error Message	Problem
VT220 NVR Error - 1	Terminal controller board. The nonvolatile memory (set-up storage) is not operating.
VT220 EIA Port Data Error - 2	Terminal controller board. The EIA host port is not operating.
VT220 Keyboard Error - 4	Keyboard. Terminal can only receive input from the host computer.
VT220 Printer Port Error - 6	Printer port. Terminal is operating, but cannot perform printing functions.

DIGITAL SERVICE

If the self-test indicates a problem, call your local Digital Field Service number for assistance. Before calling, make sure to note the exact nature of the problem, when it occurred, and any error messages or codes that appeared.

Information about your warranty, Digital services, terminal supplies, and spare parts is provided on the inside of the back cover of this manual.

APPENDIX A
SPECIFICATIONS

GENERAL

This appendix lists the specifications of the VT220 terminal.

VT220 SPECIFICATIONS

Physical

Terminal	
Height	28.3 cm (11-1/8 in)
Width	33.3 cm (13-1/8 in)
Depth	38.7 cm (15-1/4 in)
Weight	11.8 kg (26 lbs)
Adjustable tilt	+5 to -15 degrees
Keyboard	
Height	5.1 cm (2.0 in)
Width	53.3 cm (21.0 in)
Depth	17.1 cm (6.75 in)
Weight	2.0 kg (4.5 lbs)

Environmental

Operating	
Temperature	10° to 40° C (50° to 104° F)
Relative humidity	10% to 90%
Maximum wet bulb	28° C (82° F)
Minimum dew point	2° C(36° F)
Maximum altitude	2.4 km (8000 ft)
Storage	
Temperature	-40° to 66° C -40° to 151° F)
Relative humidity	0% to 95%
Maximum altitude	9.1 km (30,000 ft)

Electrical

Line voltage (switch selectable)	90 to 128 Vac (100 to 120 RMS nominal) single-phase, 3-wire 180 to 268 Vac (220 to 240 RMS nominal) single phase, 3-wire
Line frequency	47 to 63 Hz
Line current	0.48 amps RMS at 120 Vac RMS 0.24 amps RMS at 240 Vac RMS
Input power	60 watts maximum
Power cord	Detachable, 3-conductor, grounded
Power cord receptacle	EIA specified CEE22-6A

Display

CRT	30.5 cm (12.0 in) diagonal measure monochrome
Active display size	
Horizontal	20.3 cm (8.0 in)
Vertical	12.7 cm (5.0 in)
Format	24 lines of 80 or 132 characters
Character	7 X 9 dot matrix with 2 descenders
Character size	
80 column mode	3.35 X 2.0 mm (0.132 X 0.078 in)
132 column mode	3.35 X 1.3 mm (0.132 X 0.051 in)
Character sets	ASCII, national replacement (NRC), DEC special graphic, and DEC supplemental character sets (each 94 characters)
Video attributes	Reverse video, underline, bold, and blinking -- selected individually or in any combination
Cursor type	Blinking block character or blinking underline

Keyboard

General	105-key detachable unit with a 1.8 m (6.0 ft) coiled cord with a 4-pin telephone-type modular connector. Word processing and data processing versions available in 15 languages
Keypad	Sculptured key array. Matte texture finish keys. Home-row key height 30 mm (1.18 in) above desk top
Key size	12.7 mm (0.5 in) square
Key spacing	19 mm (0.75 in) center-to-center (single-width keys)
Numeric keypad	18 keys
Function keys	36 keys, firmware and software driven
Visual indicators	4 LED indicators: Hold, Lock, Wait, and Compose
Audible signals	
Keyclick	Audible feedback for each keystroke
Bell	Sounds when BEL character is received, when 8 characters from right margin, and when compose errors occur.
Multiple bell	Sounds on error in a set-up save or recall operation.

APPENDIX B
OPTIONS, DOCUMENTATION, AND SUPPLIES

GENERAL

This appendix describes the options, documentation, and supplies offered by Digital for the VT220. Part numbers and ordering information are included.

AVAILABLE OPTIONS

Modems

There are two modem options available for the VT220. These options are described below and can be ordered from Digital.

Part Number	Description
DFO2-AA	Direct-connect, Bell 103J equivalent, 300 baud, full-duplex modem with EIA RS232C interface
DFO3-AA	Direct-connect, Bell 103J/212A equivalent, 300/1200 baud full-duplex modem with EIA RS232C interface.

Cables

See Chapter 5 for information on available modem and printer cables.

RELATED DOCUMENTATION

In addition to this owner's manual, you can order the following VT220 documents from Digital.

Title and Part Number	Description
VT220 Programmer Reference Manual (EK-VT220-RM)	Describes VT220 character processing, character codes, and control sequences needed to generate terminal control programs.
VT220 Installation Guide (EK-VT220-IN)	Describes the installation procedure for the VT220. This document is shipped with the terminal.
VT220 Programmer Pocket Guide (EK-VT220-HR)	Provides a summary of VT220 programming information in a pocket-size guide. This document comes with the terminal.
VT220 Pocket Service Guide (EK-VT220-PS)	Describes the procedures used to troubleshoot and repair the VT220 to the field replaceable unit.
VT220 Video Terminal IPB (EK-VT220-IP)	Provides a detailed parts breakdown of the VT220 field replaceable units. Does not provide part numbers for printed circuit board components.
VT220 Family Field Maintenance Print Set (MP-01732-01)	Provides a complete set of VT220 electrical and mechanical schematic diagrams.

SPECIFICATIONS

ANSI specifications are available from:

Sales Department
American National Standards Institute
1430 Broadway
New York, NY 10018

EIA specifications are available from:

Engineering Department
Electronic Industries Association
2001 Eye Street, NW
Washington, DC 20006

International standards are available from:

CCITT
UN Book Store
United Nations Building
New York, NY 10017

ORDERING INFORMATION

You can order options, supplies, and documentation by phone from 8:30 a.m. to 6:00 p.m. (EST) or by mail.

Continental USA and Puerto Rico

Call 800-258-1710 or mail to:

Digital Equipment Corporation
P.O. Box CS2008
Nashua, NH 03061

New Hampshire, Alaska, Hawaii

Call 1-603-884-6660.

Outside the USA and Puerto Rico

Mail to:

Digital Equipment Corporation
Attn: Accessories and Supplies Business Manager
c/o Local Subsidiary or Digital-approved Distributor

APPENDIX C
KEYBOARDS

GENERAL

This appendix provides illustrations of all national keyboards for the VT220 in the following order.

> NOTE
> Most of the keyboards are available in two versions, standard and word processing. Although the key positions on both types of keyboards are the same, the word processing version has different key legends, appropriate to word processing only.

North American
United Kingdom
Belgium (Flemish)
Canada (French)
Denmark
Finland
France/Belgium
Germany/Austria
Holland
Italy
Norway
Spain
Sweden
Switzerland (French)
Switzerland (German)

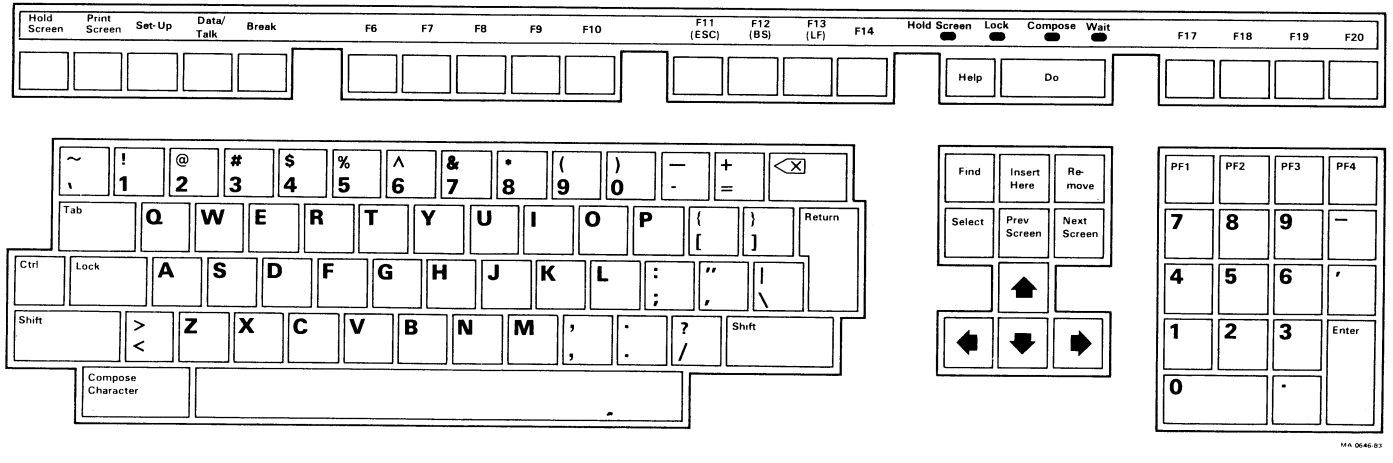

Figure C-1 North American

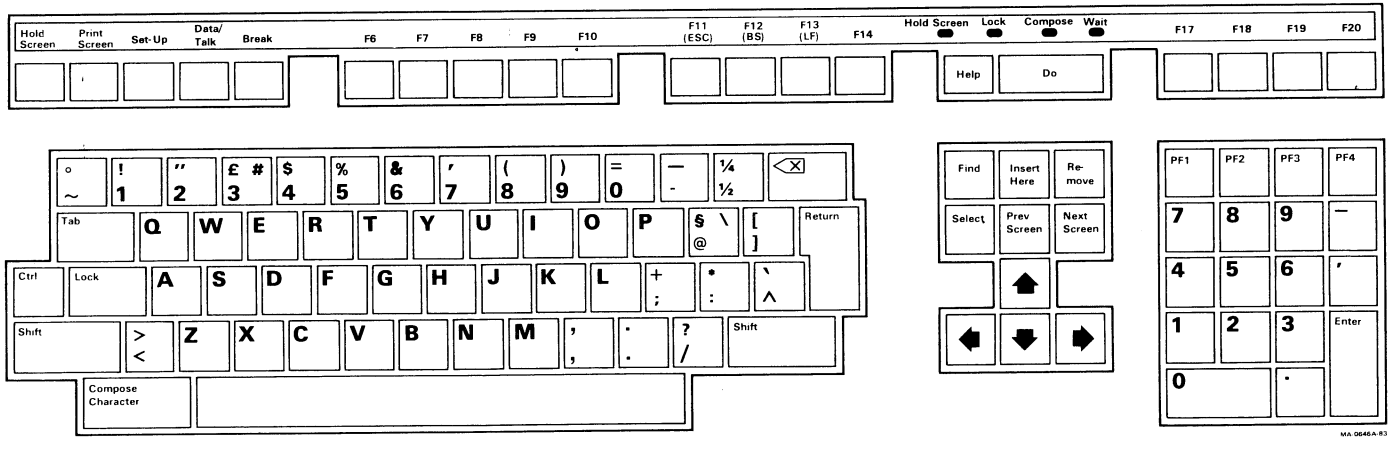

Figure C-2 United Kingdom

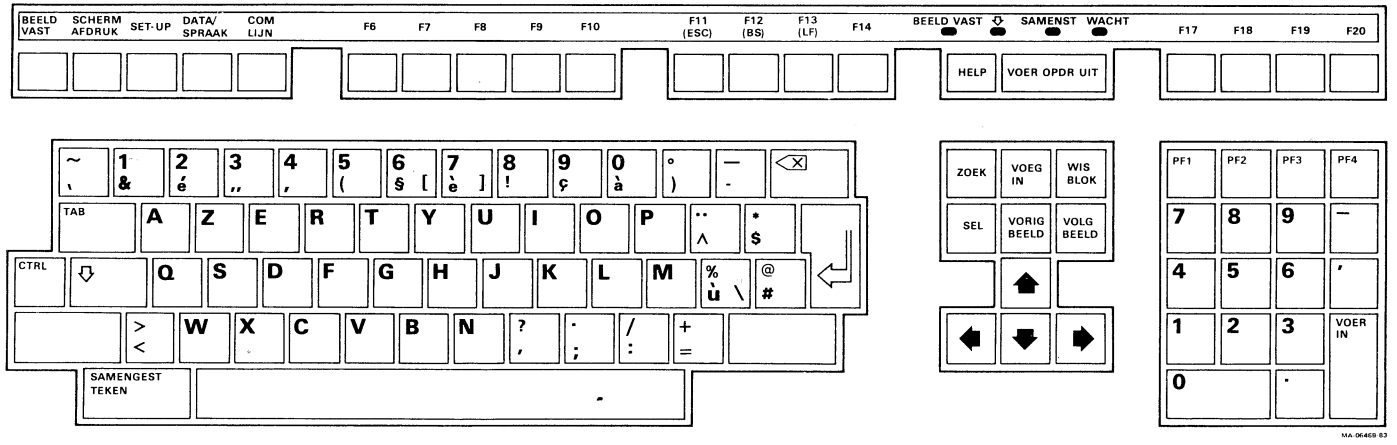

Figure C-3 Belgium (Flemish)

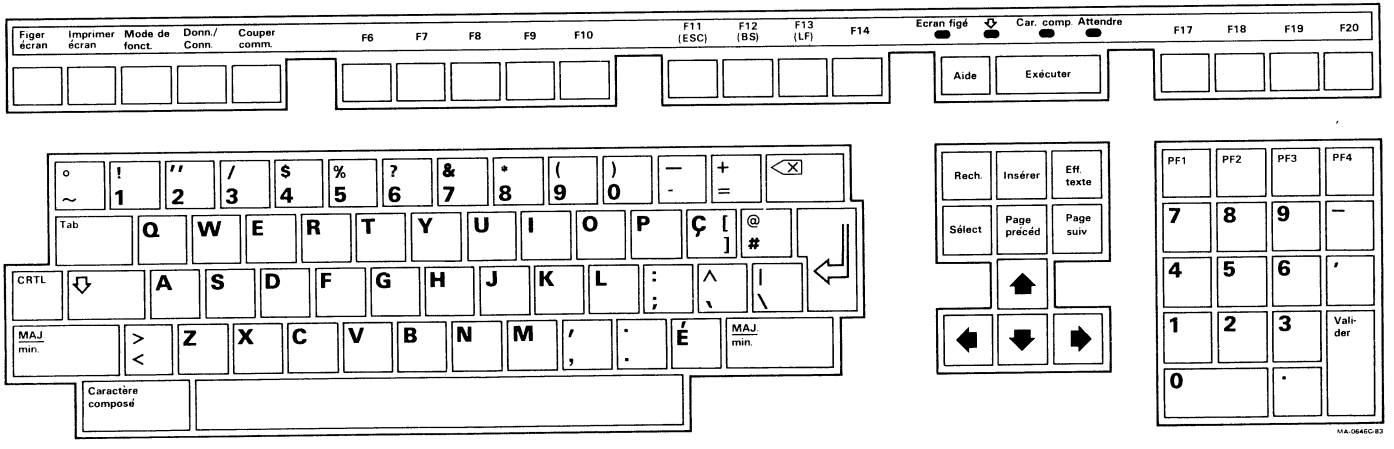

Figure C-4 Canada (French)

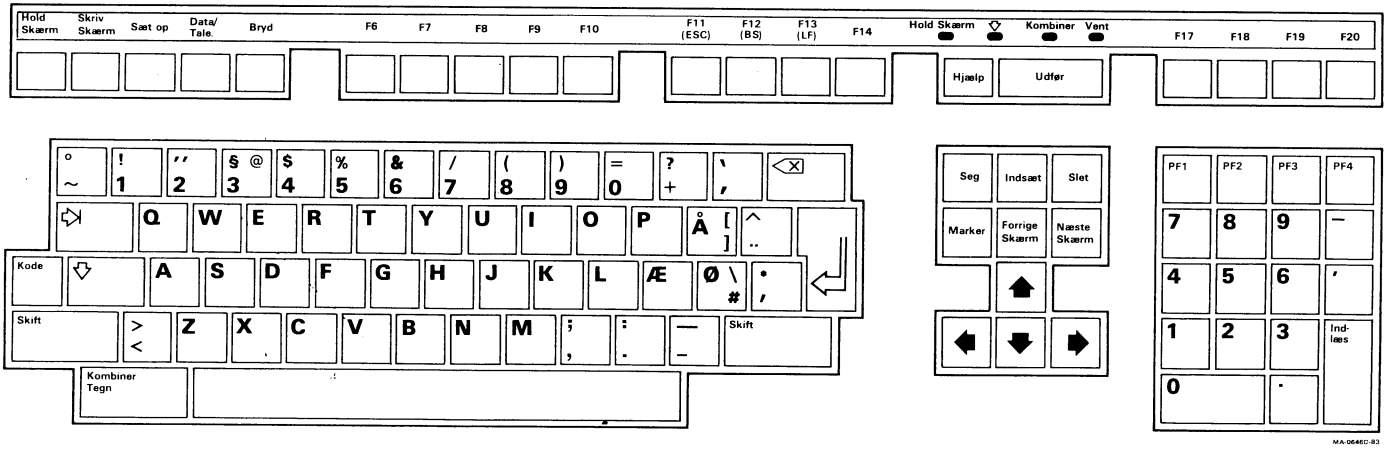

Figure C-5 Denmark

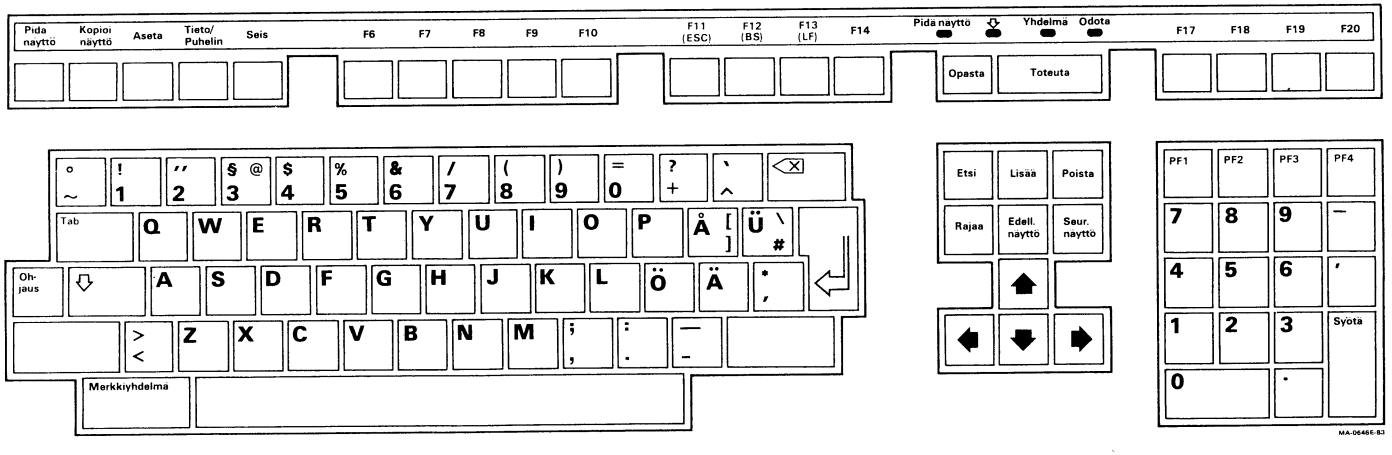

Figure C-6 Finland

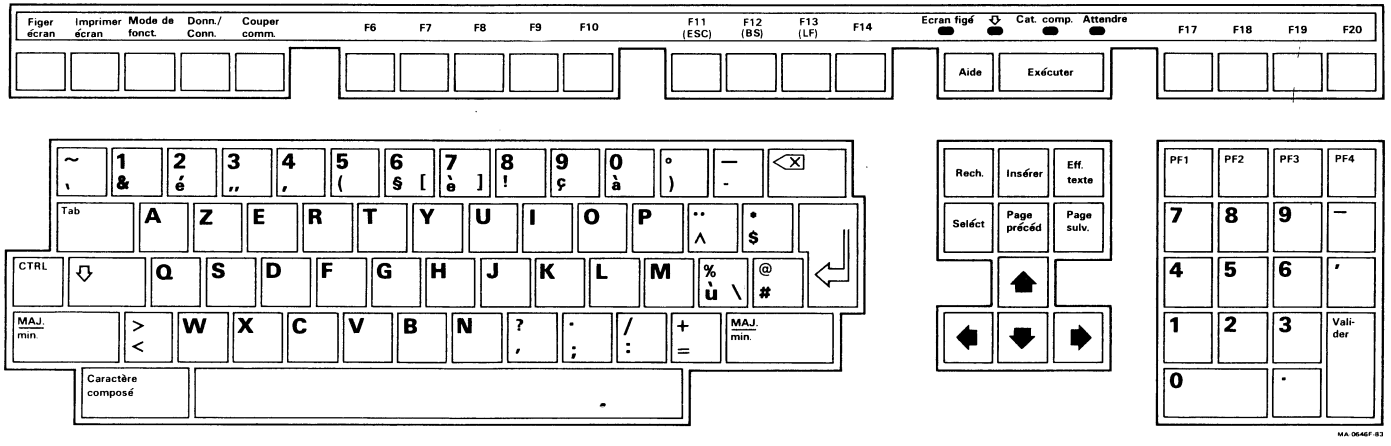

Figure C-7 France/Belgium

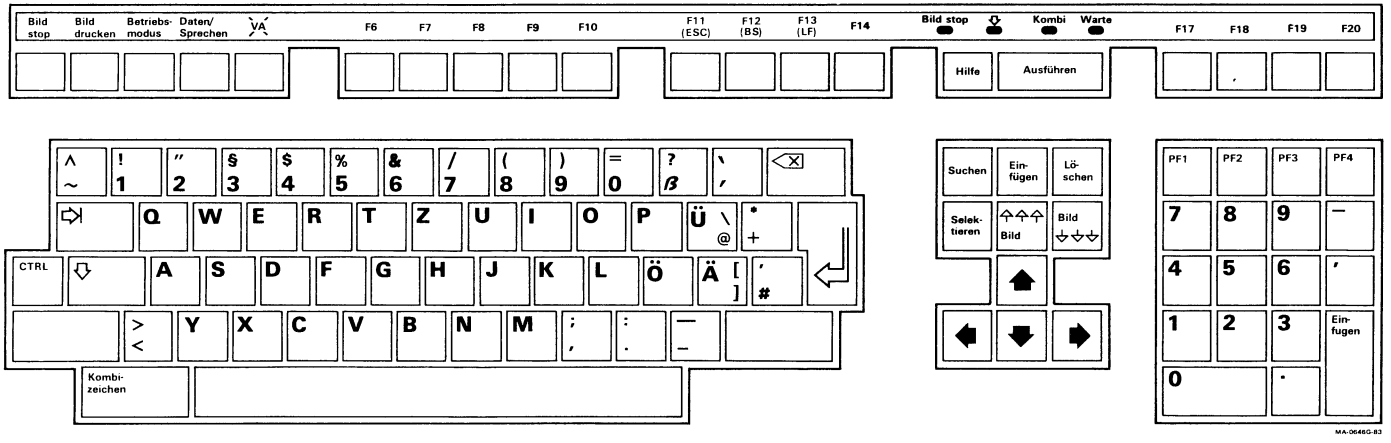

Figure C-8 Germany/Austria

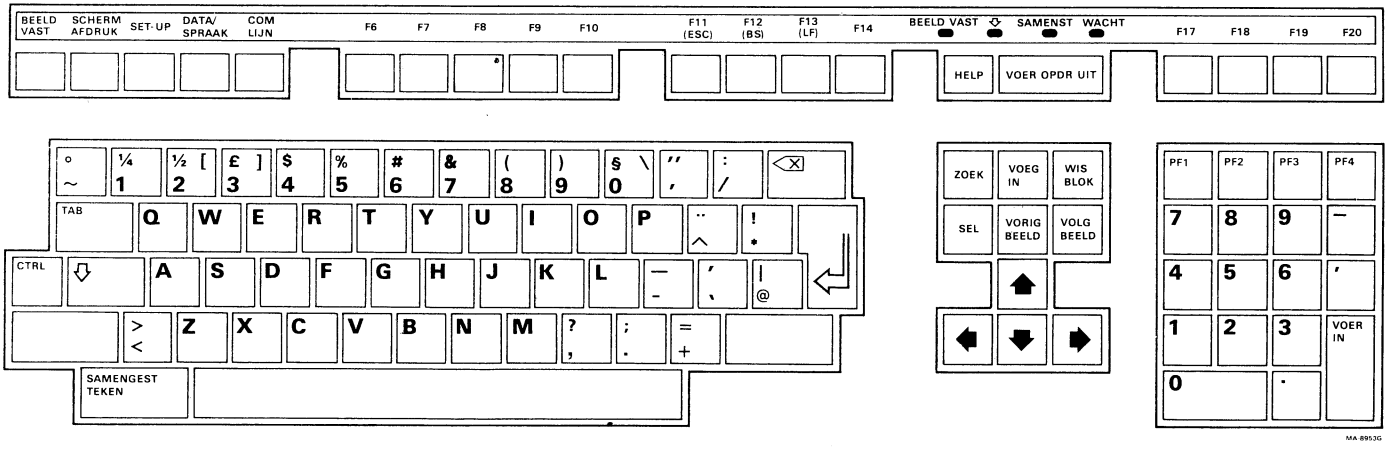

Figure C-9 Holland

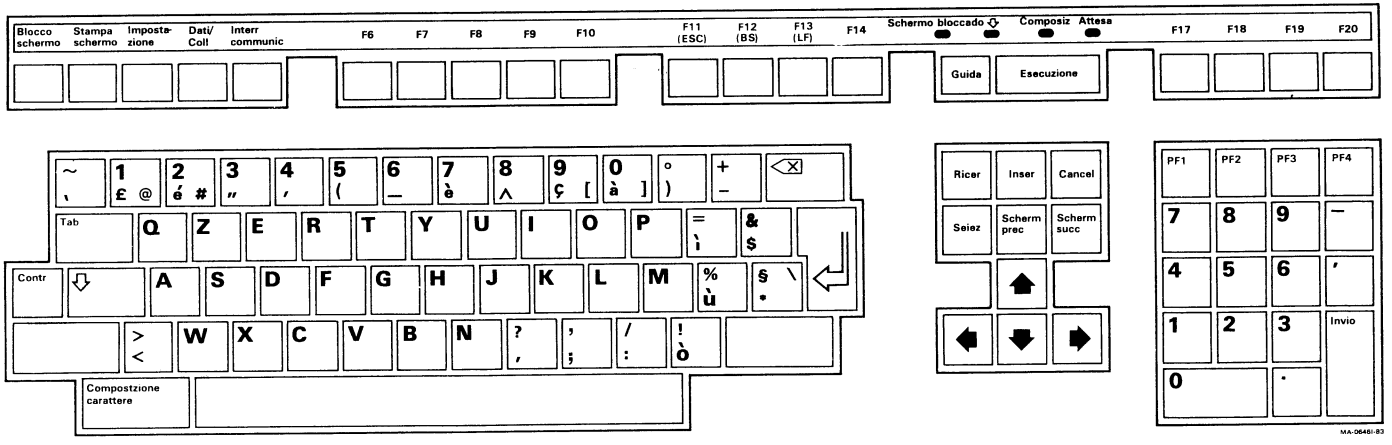

Figure C-1Ø Italy

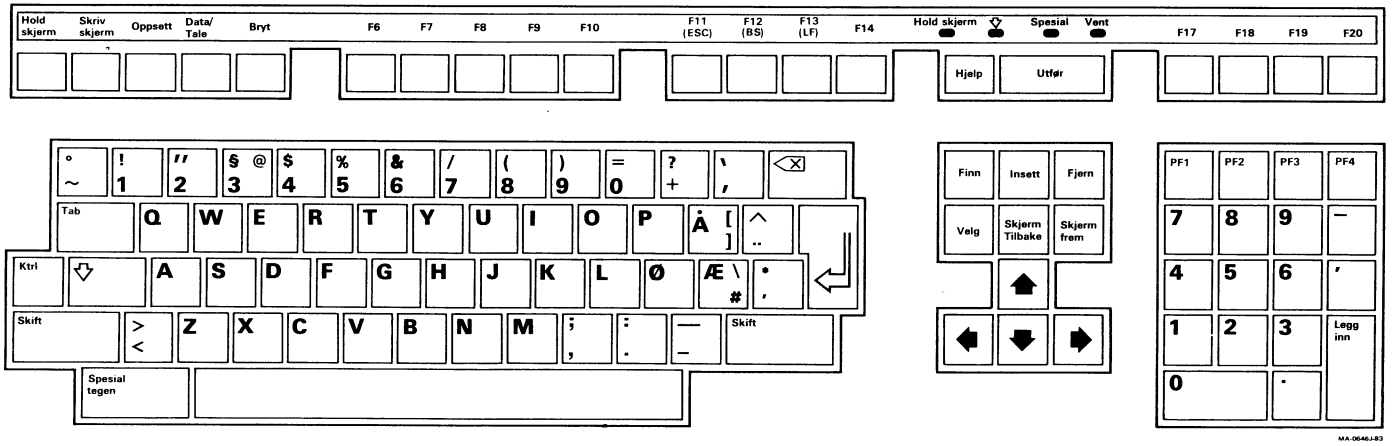

Figure C-11 Norway

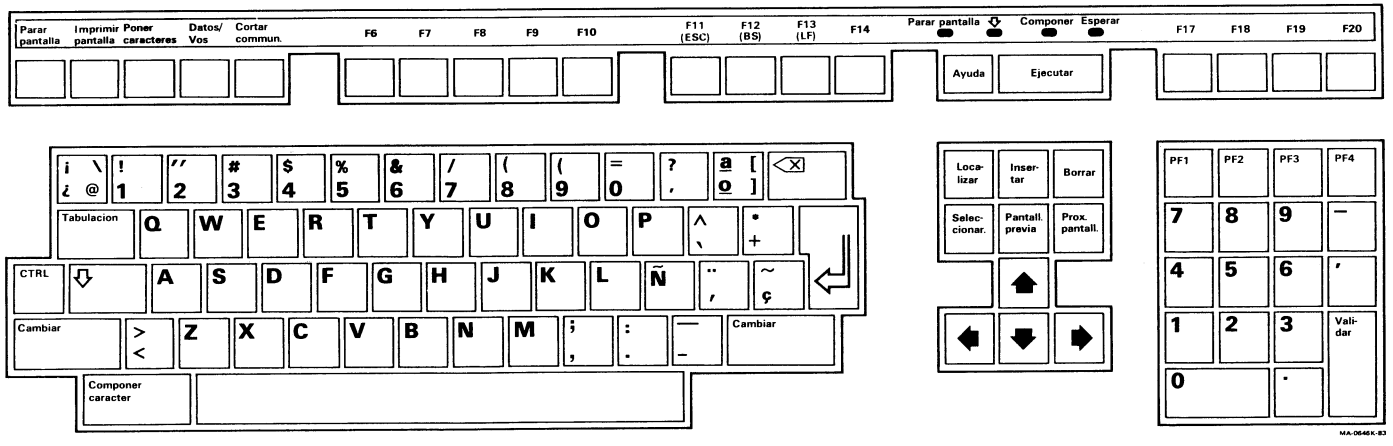

Figure C-12 Spain

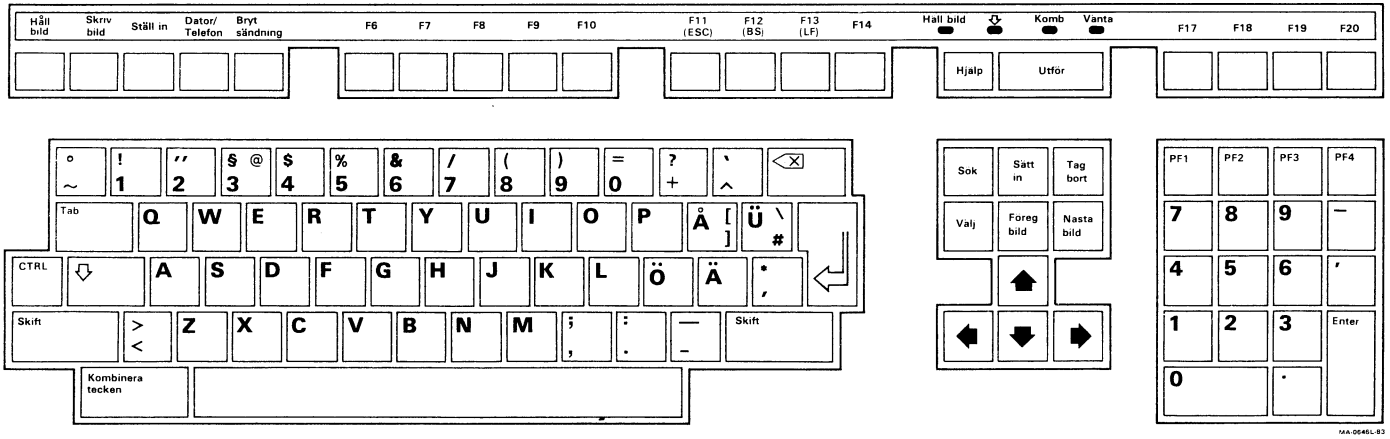

Figure C-13 Sweden

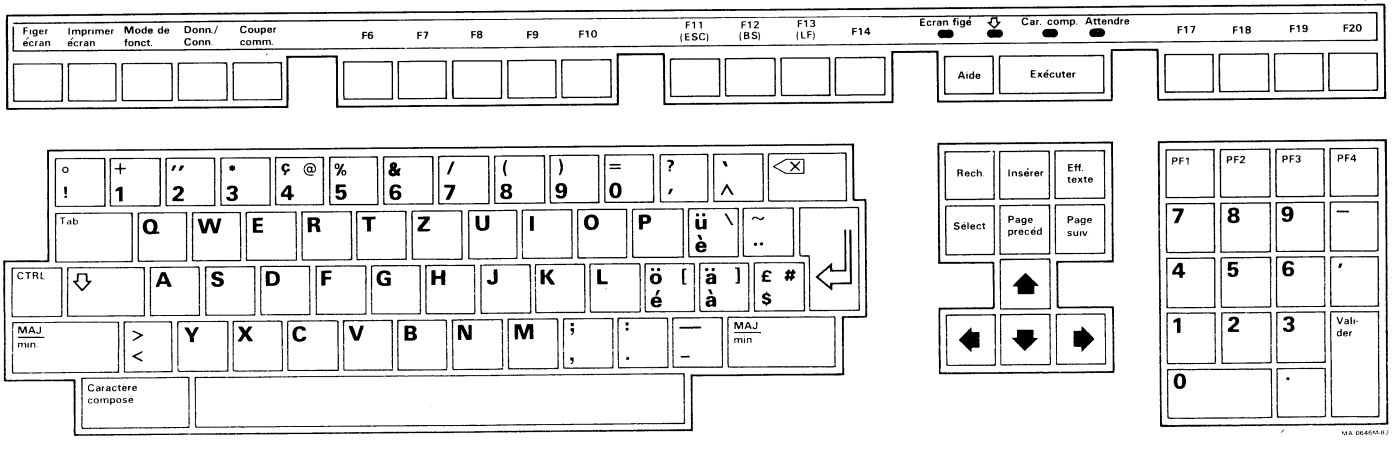

Figure C-14 Switzerland (French)

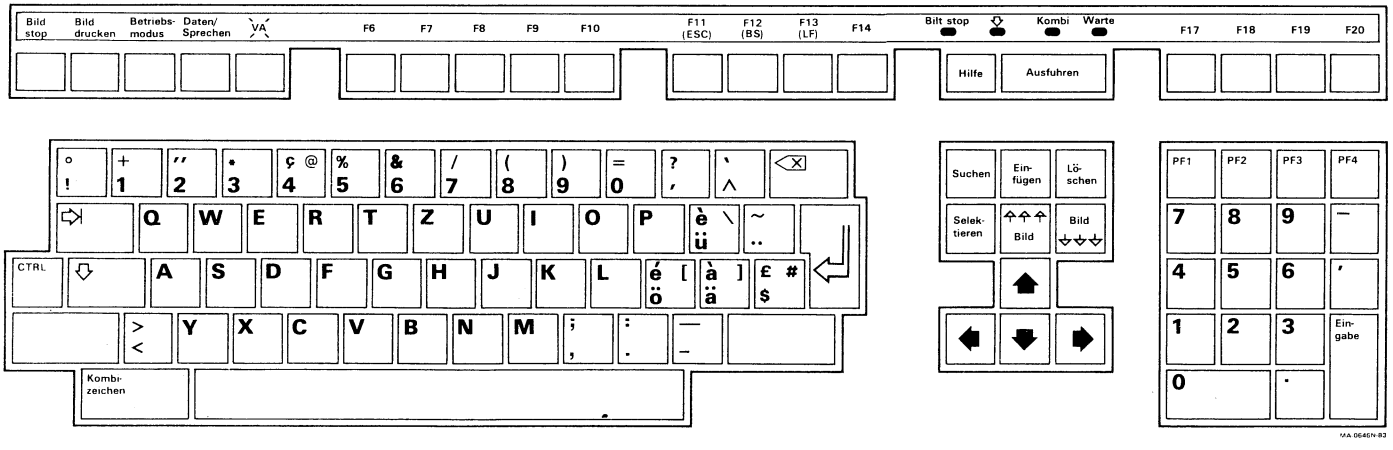

Figure C-15 Switzerland (German)