

VT420

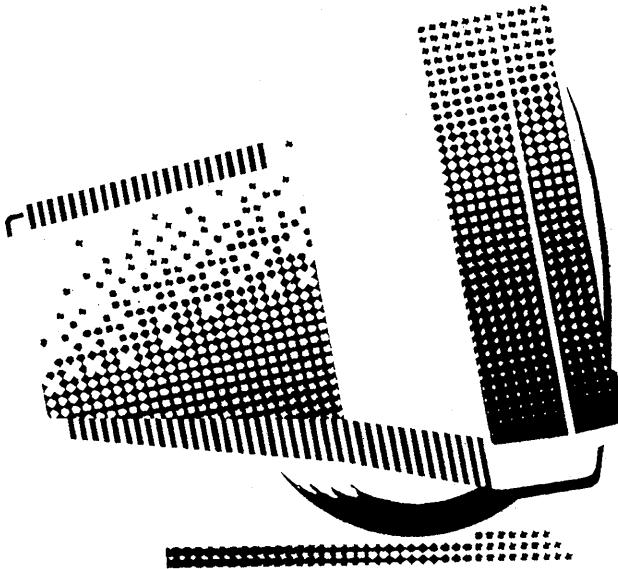
digital

Installing and Using
The VT420 Video Terminal
(North American Model)

Order Number: EK-VT420-UG-001

Installing and Using The VT420 Video Terminal (North American Model)

Order Number EK-VT420-UG-001



**digital equipment corporation
maynard, massachusetts**

First Edition, November 1989

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This document was prepared and published by Educational Services Development and Publishing, Digital Equipment Corporation.

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About This Guide

This guide provides the information you need to install, operate, and maintain your VT420 video terminal. The guide describes the North American version of the VT420 video terminal. A worldwide version is also available.

The guide also provides a summary of the control functions that programmers can use when writing applications for the VT420 terminal. For more detailed programming information, you can order the *VT420 Programmer Reference Manual* from Digital. See Appendix B for ordering information and a complete list of related documentation.

Organization

This guide has 10 chapters, 4 appendices, and a glossary. If you are already familiar with video terminals, you may want to go immediately to the installation section, Chapters 2 and 3.

NOTE

A handy summary of keyboard functions appears at the back of the manual.

- Chapter 1, "A Look at the Terminal," gives you an overview of the VT420 terminal and its features.

Installing Your VT420 Video Terminal

- Chapter 2, "Installation," shows you how to install your terminal and connect it to a host computer system, terminal server, or modem. Depending on your installation, you can use the terminal with two computer systems at the same time.

- Chapter 3, "Getting Started," describes how to set your terminal's operating features to match your installation.

Using Your VT420 Video Terminal

- Chapter 4, "The Keyboard and Indicators," describes the terminal's keyboard and explains the general function of each key. The chapter also describes the terminal's indicators and status lines.
- Chapter 5, "Using Set-Up," describes how to use the VT420 set-up screens. You use set-up screens to examine and change the settings of operating features from the keyboard.
- Chapter 6, "Typing Additional Characters," describes how to select characters that do not appear as standard characters on your keyboard (such as accented letters).
- Chapter 7, "Using Two Sessions, Windows, and the Copy and Paste Feature," describes how to use two sessions and windows on your VT420. Depending on your installation, you can log into two computer systems and view information from both systems at the same time.
- Chapter 8, "Printers and Modems," describes how to use a printer or modem with your terminal.
- Chapter 9, "VT420 Programming Summary," is a summary of control functions that programmers can use with the VT420 terminal. The chapter shows the character sets that are built into the terminal.
- Chapter 10, "Solving Problems and Getting Service," provides suggested solutions for typical operating problems and tells you where to get more help.

Appendices

- Appendix A lists VT420 specifications.
- Appendix B provides ordering information for supplies and documentation.
- Appendix C provides detailed information on communication with a host computer system, including cables and connector signals.

Conventions

The following conventions are used in this manual:

Cautions Provide information to prevent damage to equipment.

Notes Provide general operating information.

Set-up features The names of features appear in **bold** type.

Example: Use the **save** feature in the Set-Up Directory screen.

Set-up feature settings and fields appear in this type.

Example: The cursor is on the Global field in the Set-Up Directory.

Keyboard keys Appear in a **box**.

Example: Press the **Return** key.

Ctrl **key** For **Ctrl** key sequences, hold down **Ctrl** and press the other key.

Glossary entries Appear in *italics* when first used in text.

Example: The VT420 stores information in its *page memory*.

A Look at the Terminal

This chapter introduces you to the VT420 video display terminal. The VT420 is a general-purpose terminal that you use to communicate with a host computer system. The chapter provides an overview of the terminal and its basic operating features. The chapter also tells you where to look in this guide for more information about each feature.

VT420 Components

The VT420 has two main components, a monitor/terminal unit and a keyboard (Figure 1-1). The monitor/terminal unit is simply called the terminal in the rest of this guide.

Terminal

The VT420 uses a 359 mm (14 inch) monochrome screen. The VT420 screen can display 24, 25, 36, or 48 lines of text in 80 or 132 columns.

There are two connectors on the rear of the terminal, for connecting the VT420 to one or two host computer systems. You can also use one of the connectors to connect to a printer. Chapters 2 and 3 describe the terminal's connectors.

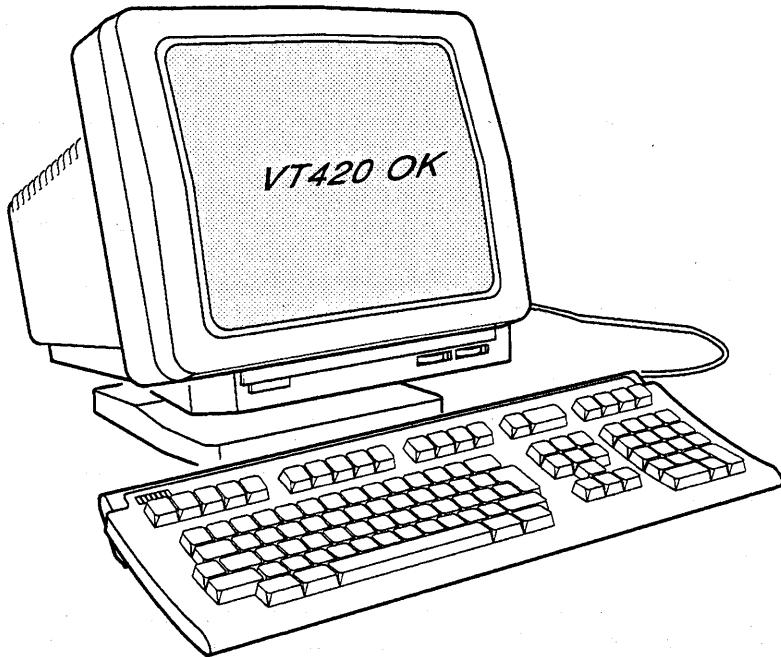
The terminal's tilt and swivel base lets you adjust the screen to the viewing angle you prefer.

2 A Look at the Terminal

Keyboard

The VT420 uses Digital's LK401 keyboard. The keyboard has four groups of keys and two indicator lights. The main keypad looks similar to a typewriter keypad. A cable connects the keyboard to the right side of the terminal.

Chapter 4 describes the LK401 keyboard.



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Figure 1–1 VT420 Video Terminal

Your Computer System

You can use the VT420 with one or more computer systems. You have several options for connecting your terminal to a computer. You can connect the VT420 directly to a computer, or indirectly through a *terminal server* or *modem*. The system you connect to is called the *host*.

Normally, the keys you type on your keyboard send information to the host. The host stores the information and displays it on the terminal's screen. You can print the data by sending it to a printer connected to the terminal.

You can use the VT420 with the *application software* on your host. For example, your host may have applications that let you do word processing, data entry, or programming.

Features

With a VT420, you can

- Select operating features from the keyboard.
- Use two computer *sessions* on one terminal.
- Display information from two sessions at the same time. You can select two *windows* from the keyboard.
- Copy information from one session to another session.
- Display 24, 25, 36, or 48 lines of text in 80 or 132 columns.
- Store data locally in *page memory* for display.
- Store frequently used commands and text in macros.
- Fill the screen with a dark or light background for viewing comfort.
- Align the screen.
- Check the terminal's operating status.

Set-Up

Set-up is a series of display screens that let you examine and change the terminal's operating features from the keyboard. Each screen lists a particular set of operating features for the terminal. For example, one set-up screen lists communication features, while another lists keyboard features.

4 A Look at the Terminal

Some features are for your convenience, and some are required by your host computer system. Each set-up feature has a *factory-default* setting. You can select the settings that are right for your system.

Chapter 5 describes set-up in detail.

Two Sessions

When you use the terminal to communicate with a computer system, you have established a *session* on that system. The VT420 lets you establish two sessions and display data from both sessions at the same time. You can connect the terminal to two different systems, depending on your installation (Chapter 2).

Here are some important tools you use to select and run two sessions:

Terminal comm ports set-up feature
SSU Enable command
Windows
F4 (Session) key

The procedure for selecting and running two sessions is simple. Here are the basic steps:

1. Set the **terminal comm ports** feature to match your cable connections to the host system.
2. Use the **F4** key or the SSU Enable command to initiate two sessions.
3. Press the **Ctrl F4** keys to select two windows.
4. Use **F4** to easily switch back and forth between two sessions.

Chapter 3 provides the detailed procedures for setting up your terminal to run two sessions. Chapter 7 describes how to use two sessions.

Windows

You can divide your screen into two windows. With windows, you can see information from two sessions at the same time. There are two styles of windows, full screen and split screen. The default is a full-screen window.

To change the window style, you simply press the **Ctrl F4** key combination.

When you divide the screen into two windows, you can adjust their relative size by moving the border between them up or down. Chapter 7 describes how to use windows.

Number of Lines on the Screen

The VT420 lets you select a font size to display 24, 36, or 48 lines on the screen. You use the **lines/screen** feature to select the number of display lines. Chapter 7 describes how to select the number of lines/screen.

Page Memory

The VT420 has off-screen memory to store data entered from the keyboard or host system. The VT420 can store 144 lines of text.

The terminal's memory is called *page memory*, because you can divide the 144 lines into a different number of pages. By default, the terminal uses 6 pages of 24 lines each. If you run two sessions, the default format for each session is 3 pages of 24 lines.

Pages create boundaries that affect the way the VT420 displays text. To take advantage of page memory, your applications must be able to recognize these page boundaries.

See the **page arrangement** feature in the "Display Set-Up Screen" section of Chapter 5.

Copy and Paste

The VT420 has a copy and paste feature that lets you copy information displayed on the screen and send it to the host system. You can send the copied text to the same session or to another session.

Chapter 7 describes how to copy and paste text.

Status Line

The VT420 displays a status line at the bottom of the screen. If you are running two sessions, the terminal displays a separate status line at the bottom of each session. The status line has several fields that provide information about the terminal's operating status. For example, one field shows you the current position of the cursor as a set of screen coordinates (row and column number). Applications may also use the status line to send you messages.

Chapter 4 describes the status line.

Keyboard Indicator Line

The VT420 also displays a keyboard indicator line at the bottom of the screen, below the status line. This indicator line has several fields that provide information about the keyboard's operating status. For example, the first field indicates which session you can edit from the keyboard. Other fields indicate if screen data is on hold, if the Caps Lock or Shift Lock setting is in effect, if a compose sequence is in progress, or if you must wait before entering more keyboard data.

Chapter 4 describes the keyboard indicator line.

Screen Alignment

The **screen align** feature on the Set-Up Directory screen lets you adjust the position of the text on your screen for your viewing comfort. If the text is not centered on the screen, you can center it.

Chapter 5 describes the screen alignment feature.

Screen Background

The VT420 lets you select a screen background to improve the readability of text on the screen. The **light/dark screen** feature in the Display Set-Up screen (Chapter 5) uses an overscan method to fill the screen background.

Emulating VT Series Text Terminals

The VT420 can operate like other VT series text terminals. This feature enables software to recognize the terminal and select the correct emulation automatically. The VT420 can emulate the following text terminals:

VT300 series VT200 series VT100 series VT52

To have the VT420 emulate another terminal, you use two features in the General Set-Up screen.

- The **terminal mode** feature chooses an emulation mode to match the software application. The VT420 is compatible with the VT220 and VT320 text terminals, so you should use the VT400 mode setting to emulate these terminals. Other text terminals have their own selections.

- The **terminal ID** feature has settings to match the terminal that uses the software application. This feature makes the VT420 identify itself to the host as the terminal you wish to emulate.

Chapter 5 describes the General Set-Up screen.

Character Sets

The VT420 uses coded character sets to exchange information with a host system. A coded character set is a group of graphic symbols, such as letters and numbers, represented by unique bit combinations or codes.

From the General Set-Up screen, you can choose different character sets to match your computer system or to meet your software application requirements. The VT420 has two 8-bit multinational sets, the DEC Multinational character set and the ISO Latin Alphabet No. 1 character set. The VT420 also has the DEC Technical character set for certain applications.

DEC Multinational Character Set

The VT420 is initially set to use the DEC Multinational character set. This 8-bit character set contains the standard characters for the English language, plus many characters used by major Western European languages.

ISO Latin Alphabet No. 1 Character Set

You can also select the ISO Latin Alphabet No. 1 (ISO Latin-1) character set of the International Organization for Standardization (ISO). The ISO Latin-1 set is similar to the DEC Multinational set, but it is newer and has more characters.

Digital recommends using the ISO Latin-1 set for most applications. However, if you use the DEC Multinational set, many applications will be unaffected by the differences between the two character sets. Refer to the *VT420 Programmer Reference Manual* for detailed information about the two character sets.

Selecting the Character Set

You can select the DEC Multinational or ISO Latin-1 character set from the General Set-Up screen.

Chapter 5 describes the General Set-Up and Keyboard Set-Up screens. Chapter 9 shows the character sets.

Programming the Terminal

The *VT420 Programmer Reference Manual* explains the control functions used to access the terminal's features. Programmers use these functions in their applications. The programmer reference manual is intended for users with programming experience.

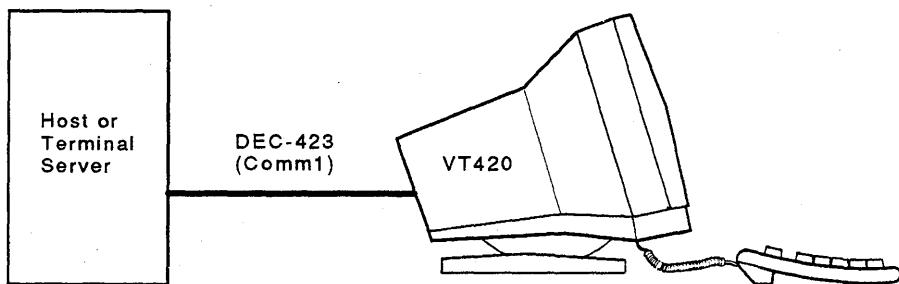
Chapter 9 of this user guide is a summary of the control functions and commands described in the programmer reference manual. See Appendix B for information on how to order the *VT420 Programmer Reference Manual*.

Installing Your VT420 Video Terminal

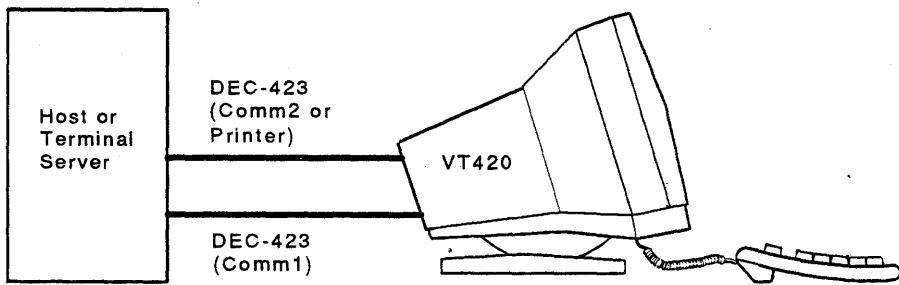
The VT420 Video Terminal is designed to be connected to a standard telephone jack. It can be connected to a telephone line or to a computer system. The VT420 Video Terminal is a high quality video terminal that is designed to be used in a variety of environments. It is a reliable and easy to use device that is perfect for anyone who needs a high quality video terminal.

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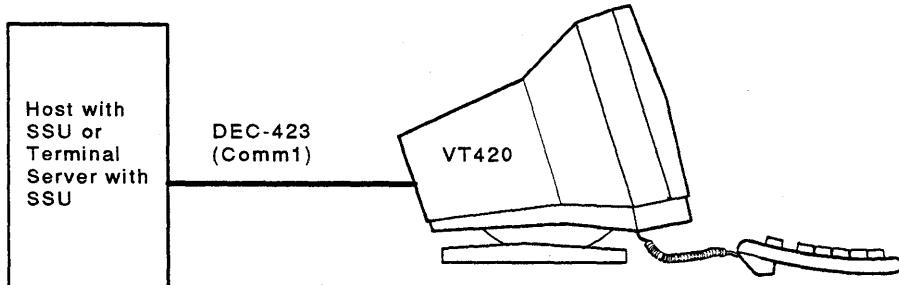
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One Session



Two Sessions (2 Cables)



Two Sessions with SSU (1 Cable)

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2

Installation

This chapter provides step-by-step instructions to install your VT420 terminal.

Complete all the steps in order. Then go to Chapter 3 to set up the terminal for operation.

Site Considerations

The VT420 lets you run one or two sessions on a host computer system. A *session* is an active connection to a computer. For example, when you log into a system, you are running a session. The VT420 lets you run two sessions on the same host system or on separate systems.

Cables

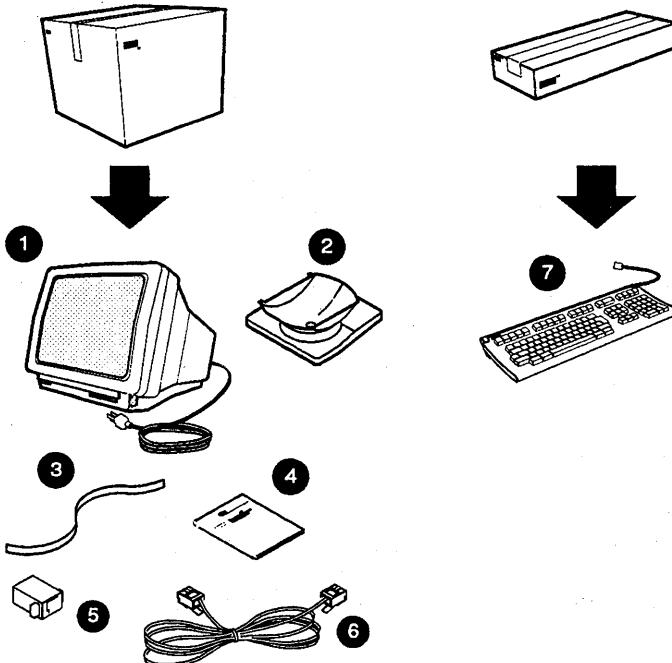
You need a separate communication cable for each session, unless your system has Digital's Session Support Utility software or a DECserver 200 or DECserver 300 terminal server. If you use SSU software or one of the DECservers, you only need one communication cable to run two sessions. Appendix C shows the communication cables you can use. To order cables, see Appendix B.

This chapter shows you how to install communication cables. Chapter 3 describes how to set up the VT420 for one or two sessions. Chapter 7 describes how to use two sessions.

Installation

Unpack and check the contents of each carton.

Make sure you have all the items shown in the following figure. If you have missing or damaged items, contact your sales representative and delivery agent.

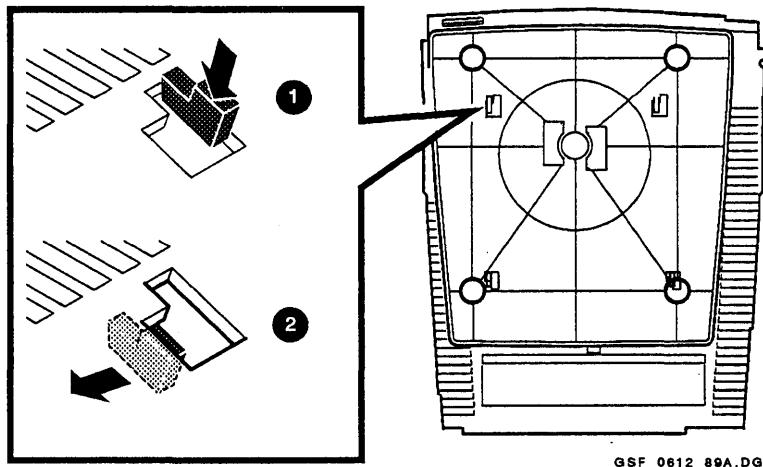


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- ① VT420 video terminal with power cord attached
- ② Tilt-swivel base
- ③ Keyboard legend strip
- ④ *Installing and Using the VT420 Video Terminal (North American Model)*
- ⑤ Cable adapter (6-pin DEC-423 to 25-pin RS-232)
- ⑥ Communication cable
- ⑦ LK401 keyboard

Install the tilt-swivel base on the terminal.

1. Place the terminal upside down on a level surface.
2. Position the tilt ball over the terminal so the four tabs on the ball align with the holes on the bottom of the terminal.
3. Place the tabs in the holes.
4. Slide the tilt-swivel assembly to the left, until the assembly snaps into place.



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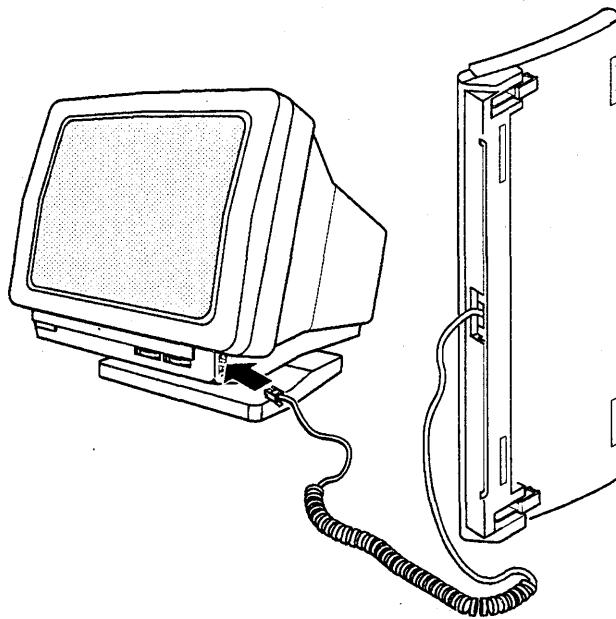
Place the terminal on a level surface.

CAUTION

Do not place objects on top of the terminal. They may block the cooling vents, causing the terminal to overheat.

Connect the keyboard to the terminal.

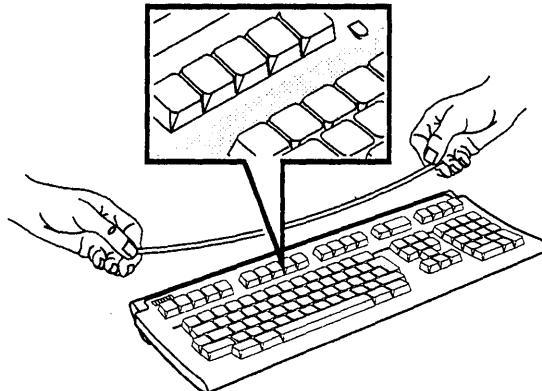
1. The keyboard cable is already connected to the rear of the keyboard.
If you want the keyboard cable routed to the right or left, press the cable into one of the grooves on the bottom of the keyboard.
2. Insert the other end of the cable into the keyboard connector on the side of the terminal.
3. Lower the legs on the bottom of the keyboard.



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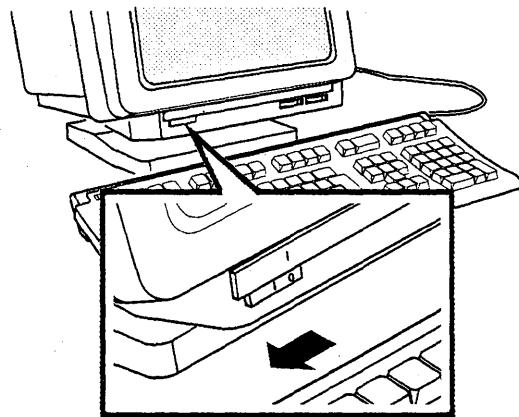
Install the legend strip.

Place the legend strip between the main keypad keys and the top-row function keys. Align the strip with the tabs.



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Make sure the power switch is in the off (0) position.

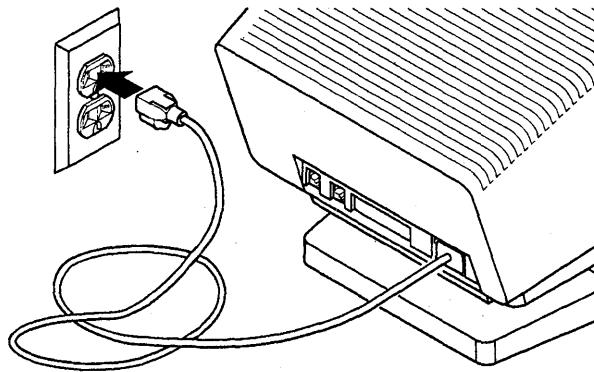


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16 Installation

Plug the power cord into the wall outlet.

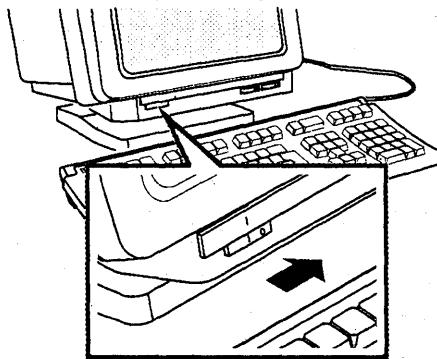
Use a 120 Vac power source.



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Start up your terminal.

1. Turn the power switch on by moving it toward the (|).



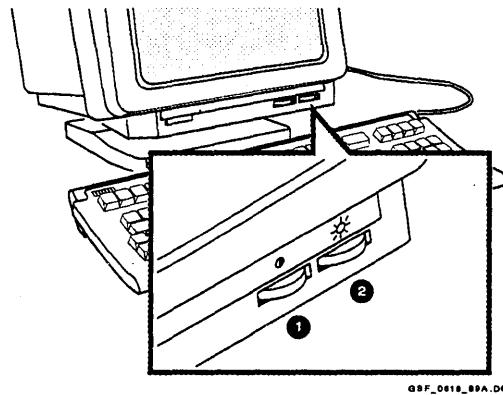
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2. Make sure the keyboard lights turn on and off. The screen displays patterns for 10 seconds. Do not press any keys during this time.
3. Wait for a bell tone from the keyboard and the VT420 OK message to appear on the screen.

NOTE

If you have problems, see the "Problem Solving" section at the end of this chapter.

Adjust the brightness and contrast controls for your viewing preference.



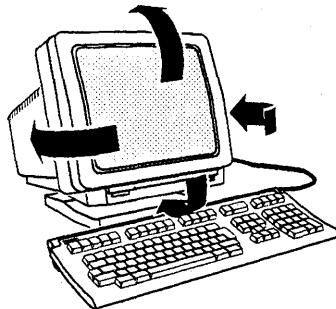
① Contrast control ② Brightness control

Adjust the tilt-swivel base to a comfortable viewing angle.

To set the angle, tilt the terminal forward or backward to the desired position. You can turn the terminal to any viewing position.

CAUTION

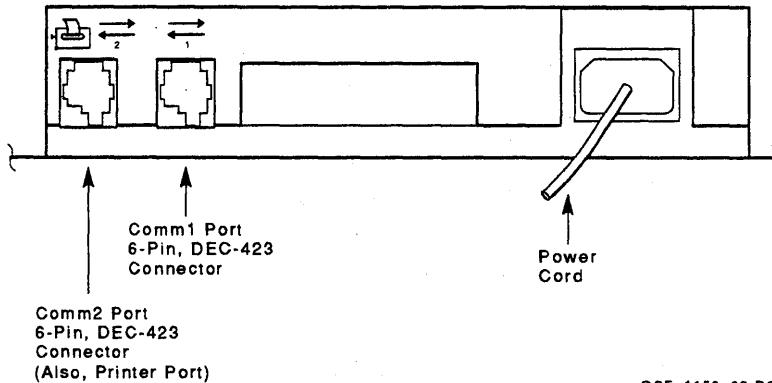
The terminal does not swivel in a complete circle. If you try to swivel the terminal in a complete circle, you may damage the base.



Cable Connections

Identify the cable connectors.

The next four pages show you how to connect the cable(s) from your host system. Use the following figure to identify the cable connectors.



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Port	Connector	Function
Comm1	6-pin, DEC-423	Connects the VT420 to a <i>primary host</i> computer, directly or indirectly (through a terminal server or modem).
Comm2	6-pin, DEC-423	Connects the VT420 to a printer or a <i>secondary host</i> computer, directly or indirectly (through a terminal server).

Connect your communication cable(s) to the rear of the terminal.

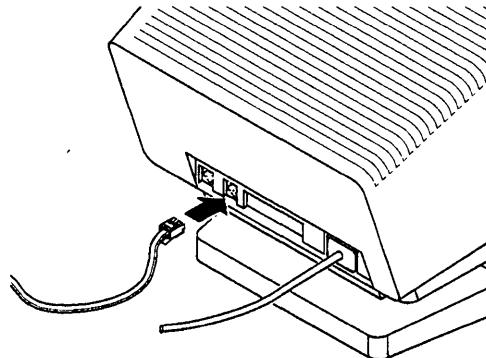
You have three cabling options, based on how many sessions you want to use.

- One session (one cable)
- Two sessions (two cables)
- Two sessions with SSU software or a DECserver 200 or DECserver 300 (one cable)

One Session (One Cable)

To run one session on the VT420:

- Connect a DEC-423 cable to the 6-pin Comm1 connector.



IMPORTANT

After you install the VT420, you must set the terminal's operating features to match this cable connection. Chapter 3 shows you what features to set.

Now, go to Chapter 3.

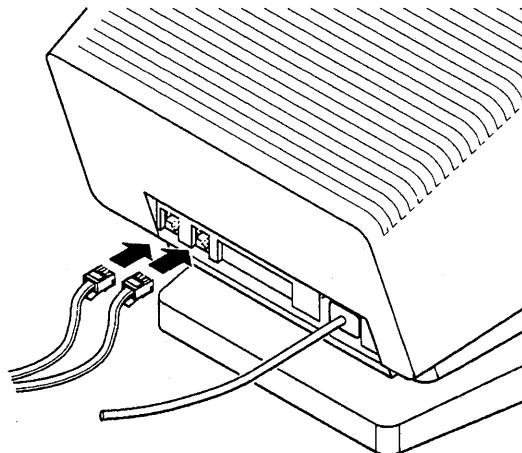
Two Sessions (Two Cables)

To run two sessions over separate communication cables:

1. Connect one DEC-423 cable to the 6-pin Comm1 connector. Use this port to connect to the primary host computer.
and
2. Connect a second DEC-423 cable to the 6-pin Comm2 connector. Use this port to connect to the secondary host computer.

NOTE

You can also use the Comm2 port to connect a printer to the terminal. See Chapter 8.



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IMPORTANT

After you install the VT420, you must set the terminal's operating features to match this cable connection. Chapter 3 shows you what features to set.

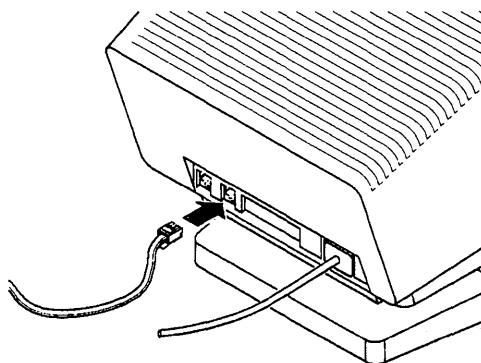
Now, go to Chapter 3.

Two Sessions with SSU Software (One Cable)

Check with your system manager to see if your host system supports SSU software. If your host does not support SSU software or it does not use a DECserver 200 or DECserver 300 terminal server, you need two cables to run two sessions.

To run two SSU sessions over one cable:

- Connect a DEC-423 cable to the 6-pin Comm1 connector.



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IMPORTANT

After you install the VT420, you must set the terminal's operating features to match this cable connection. Chapter 3 shows you what features to set.

You have installed your VT420 successfully. Go to Chapter 3.

If the screen's text is not balanced on the left, right, top, and bottom margins, use the **screen align** feature in the Set-Up Directory screen (Chapter 5).

Problem Solving

Problem	Suggested Solution
The screen is blank.	Turn up the brightness and contrast controls.
The screen is blank and the screen saver indicator is on.	The terminal has a CRT saver that turns off the screen display if you do not use the terminal for 30 minutes. Press any key to reactivate the screen display.
The bell tone does not sound when you turn the terminal on. The keyboard indicator lights do not flash.	Make sure the keyboard is connected to the terminal.
Any message other than VT420 OK appears on the screen.	Call your local Digital Customer Services office for assistance. See Chapter 10.
The screen's text is not balanced on the left and right, or on the top and bottom.	Align the text by using the screen align feature in the Set-Up Directory screen (Chapter 5).
Power to the terminal is lost, and you cannot log into your host system.	When power is restored to the terminal, press the F4 (Session) key first.

3

Getting Started

After you install your VT420, you must set some of the terminal's operating features to

- Run one or two sessions with one or two cables.

This chapter provides step-by-step instructions. All other VT420 operating features are already set to a factory-default setting that works with most Digital systems.

You may have to set some features to match your host system. For example, the VT420 must use the same communication baud rate as your host system.

Also, the terminal ID must match the software running on the VT420. If the message, unknown terminal type appears on the screen, you must set the correct terminal ID. This chapter provides provides the instructions to

- Set the baud rate.
- Set the correct terminal ID.

The VT420 has a series of set-up screens that list the terminal's operating features. You can examine and change feature settings from the keyboard. The procedures in this chapter explain how to use some set-up screens. If you want to know more about set-up, or if you want to set a feature not covered here, see Chapter 5.

Setting Up the VT420 for One or Two Sessions

The VT420 has two communication (Comm) ports that let you run one or two sessions—the Comm1 port and the Comm2 port. These ports provide the cable connections to your host system(s). To set up the terminal correctly, you must know

- How many sessions you want to run—one or two.
- Which port(s) and connectors you are using: Comm1, Comm2, or both.

If you are unsure, see the “Cable Connections” section in Chapter 2. After you identify the port(s) and cables in use, go to the section that matches your installation.

- One session (one cable)
- Two sessions (two cables)
- Two sessions with SSU software (one cable)

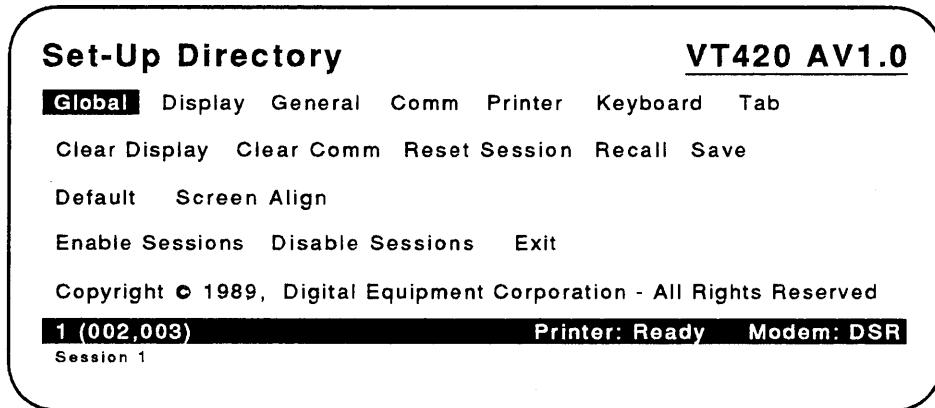
Remember, the terminal must use a separate cable for each session, unless your system has SSU software or a DECserver 200 or DECserver 300 terminal server. SSU lets you run two sessions over one cable, and these terminal servers have SSU software.

Both the primary (Comm1) and secondary (Comm2) port have a 6-pin DEC-423 connector. You can also use the Comm2 port to connect a local printer to the VT420.

Setting Up for One Session (One Cable)

You only need one communication cable to run one session. You can connect the cable to either the Comm1 or Comm2 port. After you connect your cable, you must check the setting of the **terminal comm ports** feature on the Global Set-Up screen. This feature assigns your session to the Comm1 or Comm2 port.

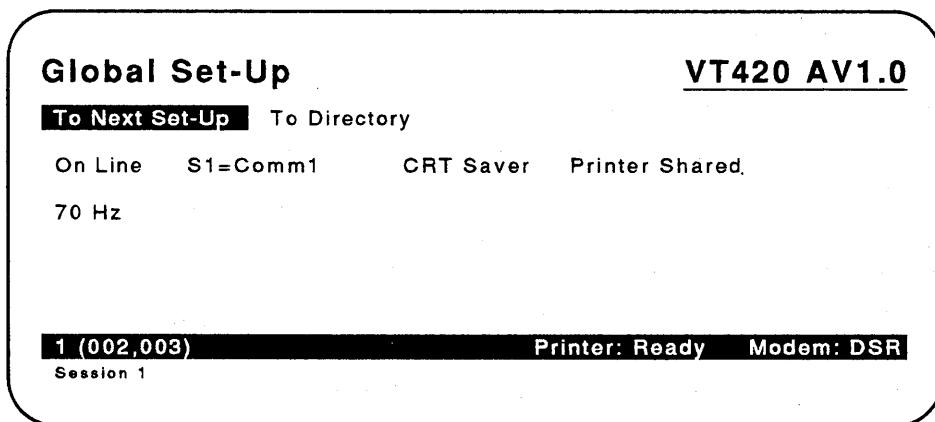
1. Press the **F3** (Set-Up) key to enter set-up. The Set-Up Directory screen appears (Figure 3-1). The cursor is on the **Global** field.



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Figure 3–1 Set-Up Directory

2. Press the **Enter** key. The Global Set-Up screen appears.



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3. The **terminal comm ports** feature is the second field on the second line. There are four possible settings:

26 Getting Started

```
S1=Comm1 (default)
S1=Comm1, S2=Comm2
S1=Comm2, S2=Comm1
Sessions on Comm1
```

The correct setting for your setup is the default setting of S1=Comm1.

If the setting is correct, press **F3** (Set-Up) to leave set-up. You are finished with this procedure.

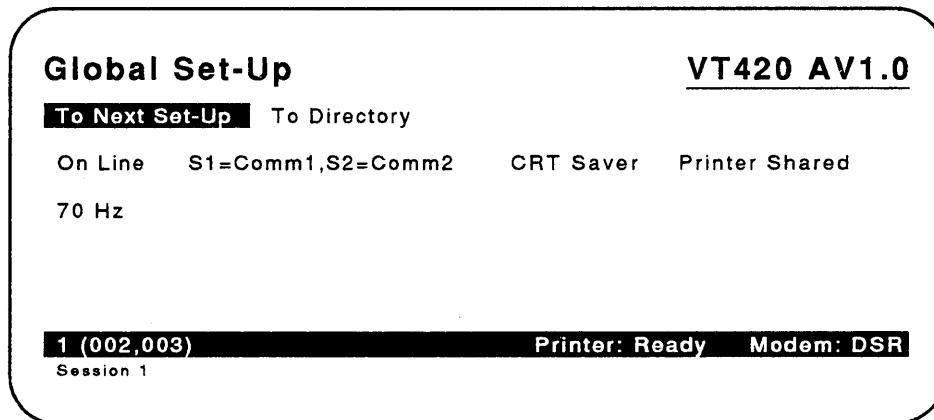
If the setting is incorrect, go on to the next step.

4. Use the arrow keys to move the cursor to the field.
5. Press **Enter** until the S1=Comm1 setting appears.
6. After you select the correct setting, use the arrow keys to move to the To Directory field.
7. Press **Enter** to return to the Set-Up Directory. The cursor is on the Global field.
8. Use the arrow keys to move to the Save field.
9. Press **Enter** to save all the current settings in each set-up screen. A Done message appears at the bottom of the screen.
10. Press **F3** (Set-Up) to leave set-up.

Setting Up for Two Sessions (Two Cables)

When you use two communication cables, you connect one cable to the terminal's Comm1 port and one cable to the Comm2 port. After you connect your cables, you must set the terminal **comm ports** feature on the Global Set-Up screen to match your cable connections. The terminal **comm ports** feature assigns a session to each port.

1. Press the **F3** (Set-Up) key to enter set-up. The Set-Up Directory screen appears (Figure 3-1). The cursor is on the Global field.
2. Press the **Enter** key. The Global Set-Up screen appears.



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- The terminal **comm ports** feature is the second field on the second line. There are four possible settings:

S1=Comm1 (**default**)
 S1=Comm1, S2=Comm2
 S1=Comm2, S2=Comm1
 Sessions on Comm1

To run two sessions over two communication cables, you can use one of two settings:

S1=Comm1, S2=Comm2	Assigns session 1 to the Comm1 port and session 2 to the Comm2 port.
S1=Comm2, S2=Comm1	Assigns session 1 to the Comm2 port and session 2 to the Comm1 port.

NOTE

When you connect your VT420 to two different systems, the VT420 always opens session 1 first. You should match session 1 with the computer you use most often.

If the setting is already correct, press **F3** (Set-Up) to leave set-up. You are finished with this procedure.

If the setting is incorrect, go on to the next step.

- Use the arrow keys to move to the field.

5. Press **[Enter]** until the correct setting appears.

After you select the correct setting, use the arrow keys to move to the **To Directory** field.

6. Press **[Enter]** to return to the Set-Up Directory.
7. Use the arrow keys to move to the **Save** field.
8. Press **[Enter]** to save all the current settings in each set-up screen. A **Done** message appears at the bottom of the screen.
9. Press **[F3] (Set-Up)** to leave set-up.

When you use two cables to run two sessions, you must set the baud rate for each session independently. See "Selecting the Correct Baud Rate" later in this chapter.

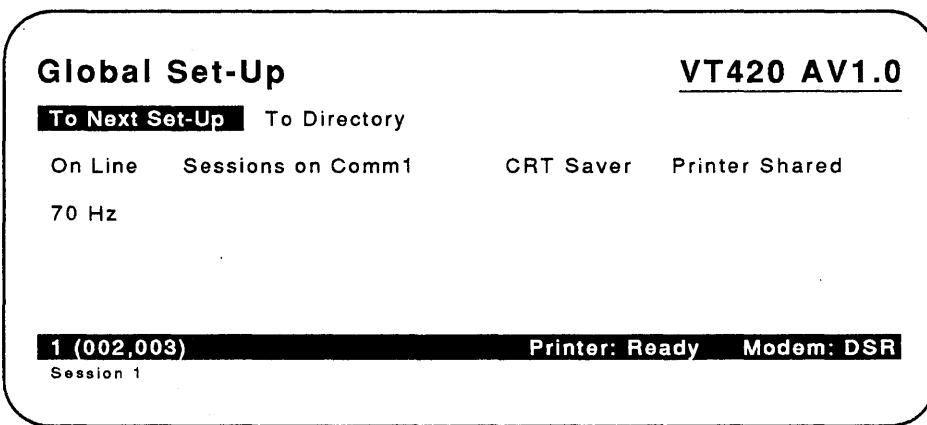
Chapter 7 describes how to use two sessions.

Setting Up for Two Sessions with SSU Software (One Cable)

If your host system has Digital's SSU software, the VT420 can run two sessions over one communication cable. Your system manager can tell you if your system has SSU software.

Connect the communication cable to the Comm1 port. After you connect the cable, set the **terminal comm ports** feature on the Global Set-Up screen to match your cable connection. The **terminal comm ports** feature assigns sessions to the Comm1 port.

1. Press the **[F3] (Set-Up)** key to enter set-up. The Set-Up Directory screen appears (Figure 3-1). The cursor is on the **Global** field.
2. Press the **[Enter]** key. The Global Set-Up screen appears.



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3. The **terminal comm ports** feature is the second field on the second line. There are four possible settings:

S1=Comm1 (**default**)
 S1=Comm1, S2=Comm2
 S1=Comm2, S2=Comm1
 Sessions on Comm1

To assign both sessions to the Comm1 port, use the **Sessions on Comm1** setting.

If the setting is already correct, press **F3** (Set-Up) to leave set-up. You are finished with this procedure.

If the setting is incorrect, go on to the next step.

4. Use the arrow keys to move the cursor to the field.
5. Press **Enter** until the **Sessions on Comm1** setting appears.
 After you select the correct setting, use the arrow keys to move to the **To Directory** field.
6. Press **Enter** to return to the Set-Up Directory.
7. Use the arrow keys to move to the **Save** field.
8. Press **Enter** to save all the current settings in each set-up screen. A **Done** message appears at the bottom of the screen.

9. Press **F3** (Set-Up) to leave set-up.

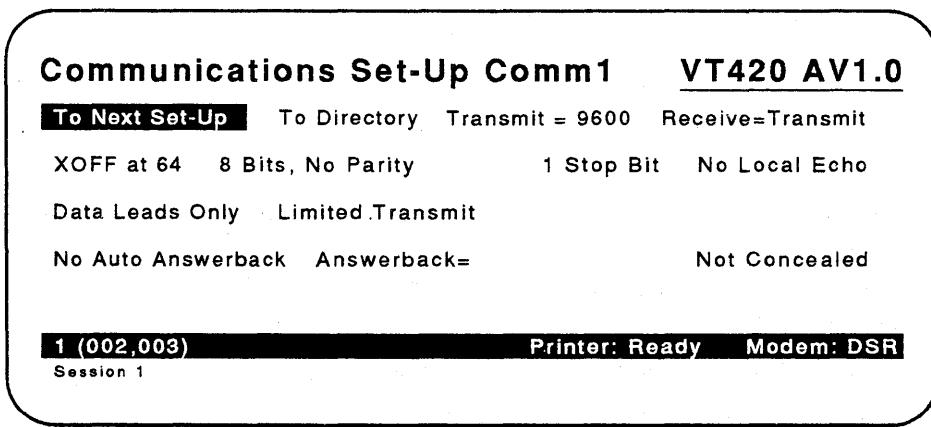
Chapter 7 describes how to use two sessions.

Selecting the Correct Baud Rate

The VT420 is initially set to a *baud rate* of 9600. This setting works with most Digital systems. The baud rate setting must match the baud rate of your host system. If you are unsure what baud rate your host system uses, ask your system operator or system manager.

To set the baud rate, you use the **transmit =** and **receive =** features on the Communications Set-Up screen.

1. Press the **F3** (Set-Up) key to enter set-up. The Set-Up Directory screen appears (Figure 3-1). The cursor is on the **Global** field.
2. Use the arrow keys to move to the **Comm** field.
3. Press the **Enter** key. The Communications Set-Up screen appears.



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4. Use the arrow keys to move to the **Transmit =** field.
5. The **Transmit =** field is initially set to 9600. You should use a setting that matches your host system. There are eight possible settings.

Use the **Enter** key to scroll through the settings.

NOTE

Next to the transmit = feature is the receive = feature. Most systems use the same speed to transmit and receive. The initial setting for receive= is Receive=Transmit, so the receive speed automatically changes to match the transmit speed you select.

6. After you select the correct setting, use the arrow keys to move to the To Directory field.
7. Press **Enter** to return to the Set-Up Directory.
8. Use the arrow keys to move to the Save field.
9. Press **Enter** to save all the current settings in each set-up screen. A Done message appears at the bottom of the screen.
10. Press **F3** (Set-Up) to leave set-up.

If you plan to run two sessions with two communication cables, you must set the baud rate for each session independently. To set the baud rate for the second session, first set up the VT420 for two sessions ("Setting Up for Two Sessions (Two Cables)"). After you complete all the steps in that section, press the **F4** (Session) key and repeat all the steps in this section.

Selecting the Correct Terminal ID

The VT series text terminals are designed to identify themselves to the host software upon request, so the software can automatically recognize the terminals operating features. If your software has not been updated recently, it may not recognize the VT420 ID response. For example, if the message, unknown terminal type, appears on the screen, you should change the **terminal id** feature as follows:

1. Press the **F3** (Set-Up) key to enter set-up. The Set-Up Directory screen appears (Figure 3-1). The cursor is on the **Global** field.
2. Use the arrow keys to move to the **General** field.
3. Press the **Enter** key. The General Set-Up screen appears.

General Set-Up

VT420 AV1.0

To Next Set-Up To Directory VT400 Mode, 7 Bit Controls VT420 ID

User Defined Keys Unlocked User Features Unlocked

Numeric Keypad Normal Cursor Keys No New Line

UPSS DEC Supplemental When Available Update

1 (002,003)

Session 1

Printer: Ready Modem: DSR

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4. Use the arrow keys to move to the VT420 ID field.
Use the **Enter** key to scroll to the VT320 ID settings.
5. After you select the correct setting, use the arrow keys to move to the To Directory field.
6. Press **Enter** to return to the Set-Up Directory.
7. Use the arrow keys to move to the Save field.
8. Press **Enter** to save all the current settings in each set-up screen. A Done message appears at the bottom of the screen.
9. Press **F3** (Set-Up) to leave set-up.

Using Your VT420 Video Terminal

4

The Keyboard and Indicators

This chapter describes the basic function of each keyboard key and indicator. The chapter also describes the terminal status line and keyboard indicator line that you can display on the screen. Later chapters provide more information on keys with special functions.

NOTE

A list of common keyboard functions appears at the end of this guide. You can keep a copy of the list near the terminal, as a quick-reference tool.

LK401 Keyboard

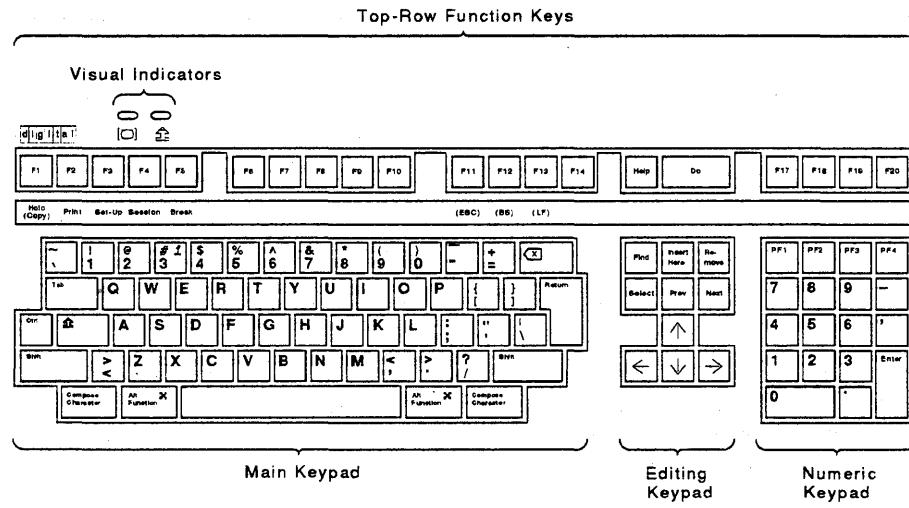
The VT420 uses the LK401 keyboard. This guide describes the standard North American/United Kingdom version of the LK401 keyboard. A word processing system (WPS) version of the keyboard is available for WPS applications.

The LK401 keyboard has four groups of keys and two indicator lights. The keys are grouped by function.

- Main keypad
- Editing keypad
- Numeric keypad
- Top-row function keys

36 The Keyboard and Indicators

The LK401 keyboard also has two audible indicators, a keyclick and bell.



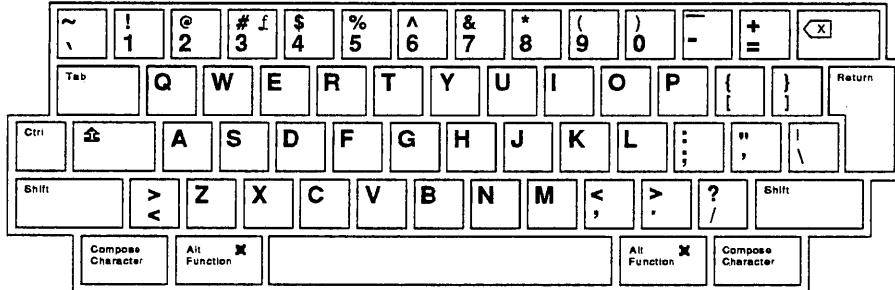
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Main Keypad

The layout of the main keypad is similar to a typewriter keyboard, with alphanumeric characters, punctuation marks, and **Shift** keys. The main keypad also has a number of keys not found on a typewriter, such as the **Ctrl** modifier key and the **Compose Character** prefix keys.

Modifier keys are pressed in combination with another key, to modify the code sent by that key. *Prefix keys* are pressed and released before pressing another key, to change the function of one or more keystrokes.

To use the £ symbol, you select the British Keyboard setting in the Keyboard Set-Up screen. To use the # symbol, you select the North American Keyboard setting.



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Special-Function Keys

The main keypad has the following special-function keys:

Tab Pressing **Tab** sends a horizontal tab, which normally moves the cursor to the next tab stop. You can select the tab stops on the Tab Set-Up screen (Chapter 5). Applications can also change tab stops.

Ctrl Holding down **Ctrl** and pressing another key sends a control code to the host.

For example, **Ctrl Z** means to hold down **Ctrl** and press the **Z** key.

Lock Pressing the lock key down puts the keyboard in caps lock mode or shift lock mode. You can select the mode from Keyboard Set-Up screen (Chapter 5). The default setting is caps lock mode.

- In **caps lock mode**, the alphabetic keys send their uppercase or shifted character when pressed alone. You can use a **Shift** key to send the shifted character on other keys. You turn caps lock mode on and off by pressing and releasing the lock key.
- In **shift lock mode**, all keys on the main keypad send their shifted character. You can turn shift lock mode on by pressing the lock key. You can turn it off by pressing either the lock key or **Shift** key.

When the lock key is down, the lock indicator turns on and the lock symbol (or the word Lock) appears on the keyboard indicator line.

Shift
(left and
right)

Holding down **Shift** and pressing a standard key sends the shifted (top) character on the key.

Holding down **Shift** and pressing a special-function key starts a predefined control function. For example, **Shift F2** (Print) means to hold down **Shift** while pressing the **F2** (Print) key.

Return

Pressing **Return** sends either a carriage return or a carriage return and a line feed (selected in the General Set-Up screen, Chapter 5).

Pressing **Return** normally moves the cursor to the beginning of the next line.

<X
backarrow
key

Pressing the **<X** key normally sends a DEL (delete) character. Many applications use DEL to erase one character to the left of the cursor.

You can make the **<X** key send a BS (backspace) character instead of DEL. You use the **backarrow key** feature in the Keyboard Set-Up screen (Chapter 5).

Space bar

Pressing the space bar sends an SP (space) character. You use spaces to separate words or move the cursor forward.

**Compose
Character**
(left and
right)

These are prefix keys, used to generate characters that do not appear as standard keys on your keyboard. See Chapter 6.

**Alt
Function**
(left and
right)

You use **Alt Function** with other keys, to select alternate functions defined by your application software. The **Alt Function** keys send unique function sequences to the host, when they are pressed or released. For more information, see the *VT420 Programmer Reference Manual*.

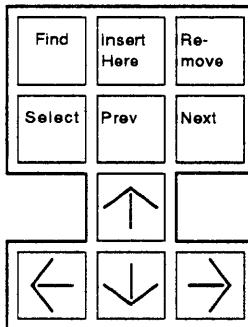
Editing Keypad

The editing keypad has four arrow keys and six editing keys.

Pressing an arrow key normally moves the cursor in the direction of the arrow. For example, pressing the key moves the cursor down one line.

You can use the editing keys in several ways.

- For set-up functions (Chapter 5)
- For copying and pasting text between sessions (Chapter 7)
- For panning up or down on a page, or for changing the size of a window on the screen (Chapter 7)
- For special functions defined by application software

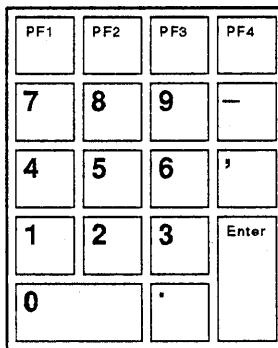


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Numeric Keypad

Numeric keypad keys often have functions assigned by application software, especially [PF1] to [PF4]. See your application software manuals for information about those keys.

You can use the numeric keypad to enter numeric data as you would with a calculator. Programmers can use this keypad to do hexadecimal compose sequences. See "Hexadecimal Compose Sequences" at the end of Chapter 6.



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[Enter]

The [Enter] key on the numeric keypad has several functions.

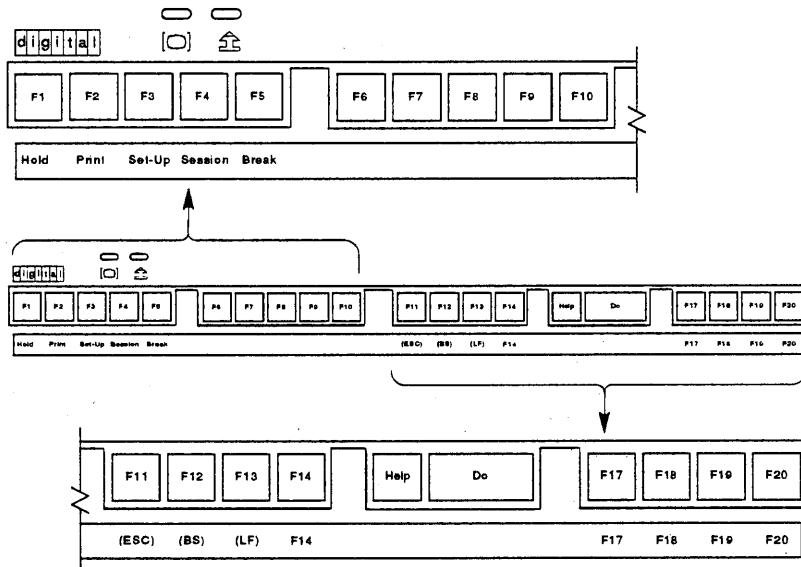
- Normally, [Enter] works like the [Return] key. [Enter] sends a carriage return, or a carriage return and a line feed (Keyboard Set-Up, Chapter 5).
- In set-up, you can use [Enter] to select features in set-up screens (Chapter 5).

Application software may use [Enter] as a special-function key.

Top-Row Function Keys

Predefined Keys

The first five top-row keys, **F1** to **F5**, are predefined to perform the following functions. Normally, you do not change these functions. If needed, you can change the functions from the Keyboard Set-Up screen (Chapter 5).



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- F1 (Hold)** Pressing **F1** (Hold) puts the screen display on hold. This stops the scrolling of text on the screen, for easy reading. The hold indicator turns on and **Hold** appears on the keyboard indicator line. Pressing **F1** (Hold) again releases the screen display and allows scrolling to resume.

With Two Sessions

When you run two sessions (Chapter 7), **F1** (Hold) only affects the active session.

Ctrl F1 Pressing **Ctrl F1** (Hold) puts the screen display for the inactive session on hold. Pressing **Ctrl F1** again releases the screen display for the inactive session.

NOTE

The hold function does not work if you set the XOFF feature to No XOFF in the Communications Set-Up screen (Chapter 5).

F1 and editing keys Pressing **F1** (Hold) with specific keys on the editing keypad performs the copy and paste operation. See "Copying and Pasting Text" in Chapter 7.

F2 (Print) Pressing **F2** (Print) sends a page of text from the current session to the printer connected to rear of the VT420. The terminal sends the page that contains the cursor.

A page may or may not correspond to the screen display.

This depends on the set-up settings for page size, font size, and page coupling features, as well as the size of the screen window for the current session. You can change the page size and other features from the Display Set-Up screen (Chapter 5).

Ctrl F2 (Print) Pressing **Ctrl F2** (Print) turns auto print mode on or off. In auto print mode, you can automatically print each line of text as it is received from the host system. See "Selecting a Print Mode" in Chapter 8.

F3 (Set-Up) You press **F3** (Set-Up) to enter or leave set-up. When you enter set-up, the terminal displays the Set-Up Directory screen. You can leave set-up from any set-up screen. Chapter 5 describes set-up.

Pressing **Ctrl F3** (Set-Up) while in set-up causes the terminal to perform a power-up reset. This resets many set-up features for **both** sessions to their saved settings.

For more information, see the reset to initial state (RIS) function in the *VT420 Programmer Reference Manual*.

F4
(Session) Pressing **F4** (Session) changes the active session when you use two sessions. You can switch from session 1 to session 2, or from session 2 to session 1.

F4 (Session) does not work when

- You are using set-up.
- The **F4** = feature (Keyboard Set-Up screen) is set to **F4** = **Ignore**.
- The use of two sessions has not been enabled in Global Set-Up, by using the **S1=Comm1** setting.

Ctrl F4 Pressing **Ctrl F4** (Session) lets you divide the screen into two windows. Windows let you display two sessions at one time.

Pressing **Ctrl F4** (Session):

- One time gives you two windows.
- A second time returns you to a full-screen display. The terminal only displays the active session.

See "Windows" in Chapter 7.

F5
(Break) Pressing **F5** (Break) generates a break signal on the communication port associated with the current session. Some communication equipment recognizes break as a special attention signal. See your communication equipment manual for details.

Shift F5 Pressing **Shift F5** (Break) performs a disconnect on the serial communication port associated with the current session. A disconnect normally ends communication with a modem to prepare for another call.

Ctrl F5 Pressing **Ctrl F5** (Break) sends the answerback message to the active session. See the Keyboard Set-Up screen in Chapter 5.

NOTE

Ctrl F5 (Break) sends the answerback message even if you set the conceal answerback message feature in the Communications Set-Up screen (Chapter 5).

User-Defined Keys and Application-Specific Keys

The function of the remaining top-row keys (**F6** to **F20**) often depends on your application software. Refer to your application software manuals for a description of key functions. You can also define the function of these keys yourself.

- [F6] to [F20]** When pressed alone, these keys send predefined programming sequences to the host system (Chapter 9). Applications that recognize these sequences can use the keys to perform various functions.

In VT100 and VT52 modes

Keys **[F11]**, **[F12]**, and **[F13]** send control characters ESC, BS, and LF respectively. Keys **[F6]** to **[F10]** and **[F14]** to **[F20]** do not function.

NOTE

In VT400 mode, you can use the **[~]** key to send the ESC character. See the Keyboard Set-Up screen in Chapter 5.

- [Shift] [F6] to [Shift] [20]** User-defined keys (UDKs)
Pressing **[Shift]** and one of these keys sends the user-defined function for that key. You can define keys **[F6]** to **[F20]** by using programming sequences. You can use any sequence of characters in your definitions. Definitions are loaded from the host system. See the *VT420 Programmer Reference Manual* for details.

Compose Characters

You can type compose sequences to display many more characters than those shown on the keycaps. For example, you can display accented letters. Chapter 6 describes how to use compose sequences.

Indicator Lights

The keyboard has two indicator lights, Hold and Lock. When they are activated, Hold and Lock appear on the keyboard indicator line.

-  Turns on or off when you press the **[F1]** (Hold) key.

-  Turns on or off when you press the lock key.

Audible Indicators

The keyboard has two audible indicators, a keyclick and a bell. You can use a margin bell, warning bell, or both. You select the keyclick and bell setting from the Keyboard Set-Up screen (Chapter 5).

Keyclick

You hear the keyclick sound each time you press a key that sends a code or causes the terminal to take some immediate action. If a key is autorepeating, the keyclick will repeat once for each character or key sequence sent. Keys do not click under the following conditions:

- You press **Shift** or **Ctrl**. These keys never click except when **Shift** is leaving the shift-lock state.
- You select **Keyclick Off** in the Keyboard Set-Up screen.
- You press a key or key combination that does not have a function under the current operating conditions. Examples: **F6** to **F10** in VT100 mode; invalid control combinations; and keys that generate 8-bit codes, when you use 7-bit national replacements character sets.
- The keyboard **Wait** indicator is on. The terminal is not accepting keystrokes because the host has reset keyboard action mode, or sent XOFF to the terminal and the keyboard input silo is full. You can manually clear the wait condition by selecting **Clear Comm** in the Set-Up Directory screen.

Bell

The bell tone is a beeping sound. You can use the bell as a margin bell, warning bell, or both.

Margin Bell

This bell sounds when the cursor is eight characters from the right margin.

Warning Bell

This bell sounds for any of the following conditions:

- During the power-up self-test
- When the terminal receives a bell (BEL) character from the host system

- After a compose character error
- When SSU errors occur (The bell rings twice.)
- If an NVR error message appears at the bottom of the screen
(See Table 4-2.)

Keyboard Indicator Line

The keyboard indicator line appears at the bottom of the screen, below the status line. When you use two sessions, there is only one keyboard indicator line for both sessions.

The keyboard indicator line displays text in the smaller, 132-column font and appears in the same video background as the main display.

Keyboard Indicator Line Fields

The keyboard indicator line has six fields that show you:

- Which session the keyboard is connected to (the active session)
- Whether or not the inactive session has been updated
- When the screen is on hold or in a wait state
- When the **F1** (Hold), **Compose Character**, or lock keys are active

Table 4-1 describes each field.



Table 4-1 Keyboard Indicator Line Fields

Field	Value	Indicates
1		Active session
	Session 1	Session 1 is active.
	Session 2	Session 2 is active.
		Inactive session activity*
	Session 1	Session 1 is active. Session 2's page memory is being updated since it was last active.

*This field appears in reverse video of the keyboard indicator line.

Table 4-1 (Cont.) Keyboard Indicator Line Fields

Field	Value	Indicates
	Session 2	Session 2 is active. Session 1's page memory is being updated since it was last active.
②	Copy	A copy and paste operation is in progress.
③	Hold	The screen is on hold.
④	Lock	Caps-Lock or Shift-Lock in the Keyboard Set-Up screen is in effect.
⑤	Compose	A compose sequence is in progress.
⑥	Wait	The keyboard is in a wait state and unable to accept typed keystrokes.

Status Line

The VT420 screen normally displays a status line that provides information about the terminal's current operations. If you are running one session, the status line appears at the bottom of the screen. If you run two sessions, a separate status line appears at the bottom of each session. By default, the status line appears in reverse video.

You can select when to display the status line. You can also let host applications write messages on the status line. To make these selections, you use the **status display** feature in the Display Set-Up screen (Chapter 5).

The **status display** feature has three settings.

Indicator status display (default)	The status line appears at all times, providing information on the session (Table 4-2).
No status display	The status line appears when <ul style="list-style-type: none"> • You select a set-up screen, or • The host system selects the status line.
Host-writable status display	Applications can write messages on the status line.

NOTE

The VT420 uses separate set-up settings for each session. Any changes you make only apply to the session you are in. If you

want to change a set-up setting for two sessions, you must make the change in each session.

Status Line Fields

The default status line has four fields that show you:

- The page number of the page displayed
- Cursor position
- Printer status
- Modem status

Table 4-2 describes each field. When you select a *host-writable status line*, applications on your host system can use the status line to send you messages.

You can display the status line in English, French, or German. Use the **set-up language** feature in the Set-Up Directory screen to select the dialect.



Table 4-2 Status Line Fields

Field	Value	Indicates
①		Page displayed on screen (from page memory)
1		Page 1
2		Page 2
3		Page 3
4		Page 4*
5		Page 5*
6		Page 6*
②		Cursor position
(x,y)		Text cursor position

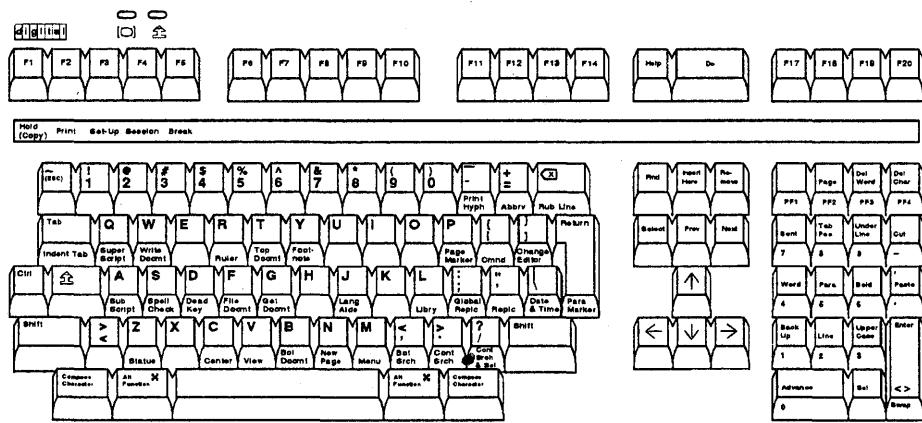
*These page numbers never appear when you use two sessions. Each session can only use three pages.

Table 4-2 (Cont.) Status Line Fields

Field	Value	Indicates
		x = row (1 to 144). y = column (1 to 132).
		You can use the 80/132 column mode feature in the Display Set-Up screen to select 80 or 132 columns.
③		Printer status
	Printer: Ready	The printer can receive data for printing (on-line).
	Printer: Not Ready	The printer is not ready to receive data for printing (off-line).
	Printer: None	The printer is off or not connected to the VT420.
	Printer: Auto Print	The VT420 is in auto print mode. The terminal sends the current display line to the printer when the cursor moves to the next line. To select auto print mode, press Ctrl F2 (Print). See Chapter 8.
	Printer: Controller	The VT420 is in printer controller mode. You cannot select this mode from the terminal. The host system selects printer controller mode.
	Printer: Busy	The printer is busy printing data from the other session.
	Printer: Assigned to 1 (or 2)	The printer is assigned to the other session.
NOTE		
Use the printer assignment feature in the Global Set-Up screen to assign the printer.		
④		Modem status
	Modem: DSR	There is a call connected on the modem.
	Modem: No DSR	The terminal can send commands to the modem, but there is no call connected.

Word Processing Keyboard

The VT420 is also available in a word processing model. The keys are labeled with word processing functions. Remember that the actual function of the key depends on the software you use.



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5

Using Set-Up

Overview

The VT420 has nine set-up screens that list the settings for the terminal's operating features.

Set-Up Directory	General	Keyboard
Global	Communications	Tab
Display	Printer	Screen

You can display these screens and change the settings from the keyboard. This chapter describes set-up and how to use it.

Most set-up features are initially set to a factory-default setting that works with many Digital systems. The VT420 has the factory-default settings permanently stored. If you change settings, you can use the Set-Up Directory to reset the terminal to the factory-default settings.

You can also select and save settings to match your host system. The VT420 saves your selections in nonvolatile memory, along with the factory-default settings. When you shut power off, you do not lose your saved settings.

You can make all changes to set-up features from your keyboard. Also, your host system can change some settings, as described in the *VT420 Programmer Reference Manual*. See Appendix B to order VT420 manuals.

Independent Setups for Two Sessions

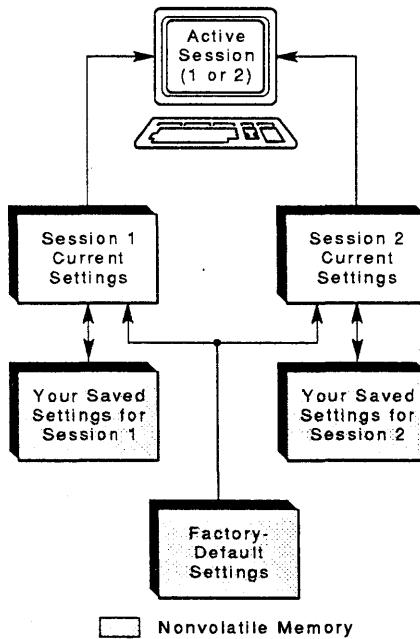
The VT420 can run two sessions with the host system at the same time. Chapters 2 and 3 explain how to set up the terminal to run two sessions.

When you use two sessions, the terminal stores a separate group of features for each session. Only one session is active at a time. The terminal uses the settings for the active session.

If you forget which session is active, you can check the keyboard indicator line at the bottom of the screen. See the "Keyboard Indicator Line" section in Chapter 4.

NOTE

You cannot switch sessions in set-up. To switch sessions, you must leave set-up and press the **F4** (Session) key.



Entering and Leaving Set-Up

To enter set-up: You press the [F3] (Set-Up) key. When you press [F3] (Set-Up), information on the screen disappears. (This information reappears when you leave set-up.) Then the terminal displays the Set-Up Directory screen.

The Set-Up Directory lists all other set-up screens. You can select any other set-up screen from the Set-Up Directory.

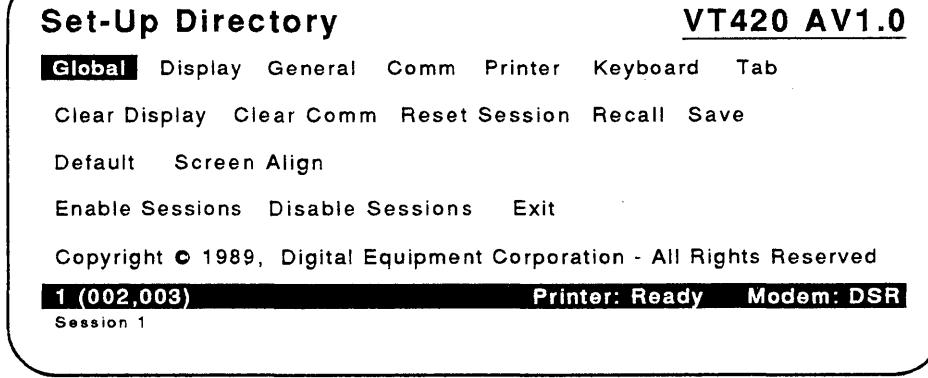
To leave set-up: You press [F3] (Set-Up) again. You can leave set-up from any set-up screen.

NOTE

Most settings that you change take effect when you leave set-up.

Set-Up Directory

When you enter set-up, the Set-Up Directory is always the first screen to appear. You can select any set-up screen from the Set-Up Directory. You can also perform such functions as saving and recalling feature settings.



Status Line and Keyboard Indicator Line

In set-up, the VT420 always displays the status line and the keyboard indicator line for the active session. Both lines appear at the bottom of the screen. The keyboard indicator line is in the smaller, 132-column font and appears below the status line. The keyboard indicator line is in the same video background as the session at the bottom of the screen. For more information, see the "Keyboard Indicator Line" and "Status Line" sections in Chapter 4.

Set-Up Cursor

Set-Up uses a field cursor that highlights a screen entry, or *field*, in reverse video. When you enter set-up, the field cursor highlights the Global field in the Set-Up Directory.

You use the arrow keys to move the field cursor to different features.

Action Fields

Most features in the Set-Up Directory are *action fields*. When you select an *action field*, the terminal immediately performs that action. You press the [Enter] key to select the action field highlighted by the cursor. Most set-up screens have some action fields.

Some actions do not affect the screen, so the VT420 displays a message to let you know if the action was successful. This message appears in place of the keyboard indicator line at the bottom of the screen.

- A Done message indicates the action is complete. The message disappears when you press another key.
- An error message indicates the terminal could not perform the action. See Table 10-2.

The VT420 displays messages for the following action fields on the Set-Up Directory screen:

Clear Display	Save (settings)
Clear Comm	Default (recall factory settings)
Reset Session	Enable Sessions
Recall (saved settings)	Disable Sessions

Set-Up Directory Fields

Table 5-1 describes the Set-Up Directory features.

Table 5-1 Set-Up Directory Features

Feature	Description
Global	These fields select the set-up screen. For example, Global selects the Global Set-Up screen.
Display	
General	
Comm	
Printer	
Keyboard	
Tab	
Clear Display	Clears the screen when you leave set-up.
Clear Comm	Clears communications for the active session. Clear Comm does not affect the on-line/local state, but does the following: <ul style="list-style-type: none"> • Stops any print operation. • Stops any escape sequence, control sequence, control string, or character string processing (ESC, CSI, DCS, APC, OSC, PM, SOS). • Clears the keyboard buffers. • Clears the receive buffer. • Clears the transmit buffer. • Stops printer controller mode and returns to normal print mode. • Sends an XON signal to the host. • Sends an XON signal to the printer if the printer to host and XOFF features are enabled in the Printer Set-Up screen (Chapter 8). • Resets the XOFF received flags at the printer and host ports.

Table 5-1 (Cont.) Set-Up Directory Features

Feature	Description
	<ul style="list-style-type: none"> • Does not clear the screen. • Clears a keyboard wait condition. • Clears the “printer port has seen DSR since power up” flag.
Reset Session	<p>Resets many VT420 operating features for the active session to their initial state.</p> <p>The screen, communication, character set modes, and user-defined keys are not affected. See the <i>VT420 Programmer Reference Manual</i>.</p>
Recall	<p>Sets all set-up features for the active session to their saved values. Clears the screen.</p>
NOTE	
If you are using a modem,	Recall disconnects communication with the host system.
Save	<p>Saves all current feature settings in all set-up screens for the active session.</p>
Default	<p>Replaces all current settings in all set-up screens with the factory-default settings. This feature may affect both sessions, because the default session configuration is one session.</p> <p>The default feature also:</p> <ul style="list-style-type: none"> • Clears the screen and returns the cursor to the upper-left corner. • Stops any print operation. • Stops any escape sequence, control sequence, control string, or character string processing (ESC, CSI, DCS, APC, OSC, PM, SOS).

NOTE

If you are using a modem, **Default disconnects communication with the host system.**

Table 5-1 (Cont.) Set-Up Directory Features

Feature	Description
Screen Align	Lets you center or rotate the image on the screen. This feature clears the screen and creates a black border around the screen's perimeter. The text area of the screen appears in reverse video from the border. After you select this feature, follow the directions on the screen to align the image correctly.
Enable Sessions	Lets you resume an interrupted session. A session can be interrupted by a power failure to the terminal or host. To use this feature, your system must have SSU software. Also, you must set the terminal comm ports feature in the Global Set-Up screen to Sessions on Comm1 . When you select this feature, one of the following messages on the status line: <ul style="list-style-type: none"> • Done • Sessions restored • Sessions not selected See Chapter 7 for more information.
Disable Sessions	Disables the current SSU sessions.
Exit	Lets you leave set-up. You can also press [F3] (Set-Up) to leave set-up.

Selecting Set-Up Screens

There are two ways to select set-up screens. You can move from one screen to the next, in the same order listed on the Set-Up Directory. You can also select any screen directly from the Set-Up Directory.

Moving from Screen to Screen

Each set-up screen has a **To Next Set-Up** field. To move from one screen to the next:

1. Use the arrow keys to move the cursor to **To Next Set-Up**.

2. Press **[Enter]**.

Selecting a Screen from the Set-Up Directory

The Set-Up Directory lists all the set-up screens. To display a selected screen:

1. Use the arrow keys to move the cursor to the name of the desired screen.
2. Press **[Enter]**.

Changing and Recalling Settings

This section describes how to change, save, and recall set-up settings.

How to Change Settings

Use the arrow keys to move the set-up cursor to a particular feature on a set-up screen. Most features have two or more possible settings. Use the **[Enter]** key to change the setting of the feature highlighted by the cursor. Each time you press **[Enter]**, the setting changes. Depending on the feature, the change takes effect immediately or when you leave set-up.

Example

This example shows you how to change the screen display setting from 80 to 132 columns.

1. Press **[F3]** (Set-Up) to enter set-up. The Set-Up Directory appears. The field cursor is on the Global field.
2. Use the arrow keys to move to the Display field.
3. Press **[Enter]**. The Display Set-Up screen appears.
4. Use the arrow keys to move to the 80 Columns field. Press **[Enter]** to change the setting to 132 Columns.

When you change a feature setting, the VT420 uses that setting until you turn the terminal off or change the setting again. To save a new setting, read the next section.

How to Save Your Settings

If you make changes to current settings, you can save your changes with the **save** feature in the Set-Up Directory. This feature saves all current settings (in most set-up screens) for the active session. Even after you turn off the terminal, it retains the saved settings. The VT420 automatically uses these settings each time you turn the terminal on.

Example

This example shows how to save the 132 columns setting selected in the previous example.

1. After you select the 132 columns setting, use the arrow keys to move to the **To Directory** field.
2. Press **Enter** to return to the Set-Up Directory screen.
3. Use the arrow keys to move to the **Save** field.
4. Press **Enter** to save all current settings.
5. Press **F3** (Set-Up) to leave set-up.

If you change settings again, you can recall your saved settings. Read the next section.

How to Recall Saved Settings

For some applications, you may want to make temporary changes to current settings. When you are finished using the temporary settings, you can recall your saved settings with the **recall** feature in the Set-Up Directory.

To recall saved settings:

1. Press **F3** (Set-Up). The terminal displays the Set-Up Directory.
2. Use the arrow keys to move the cursor to the **Recall** field.
3. Press **Enter**. The VT420 replaces all existing settings with the previously saved settings. A **Done** message on the status line indicates the action is complete.
4. Press **F3** (Set-Up) to leave set-up.

NOTE

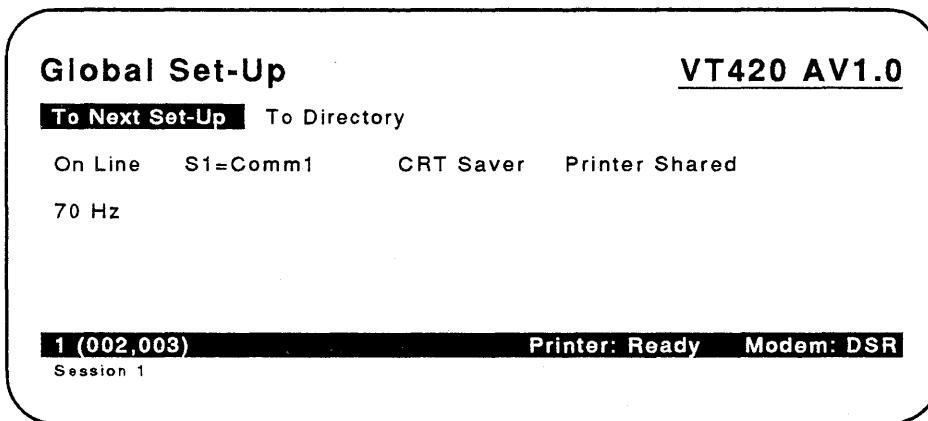
If you are using a modem, Recall disconnects communication with the host system.

Global Set-Up Screen

This screen has features that affect **both** sessions when you use two sessions. Table 5-2 describes each feature on the Global Set-Up screen.

Two Sessions

You use the **terminal comm ports** feature in Global Set-Up to set up the VT420 for two sessions. The setting must match the system cable connections you are using on the rear of the terminal. Chapter 3 describes how to set up the terminal for two sessions. Chapter 7 describes how to use two sessions.



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Table 5-2 Global Set-Up Features

Feature and Settings	Description
On-line/local	Selects whether or not the VT420 can communicate with a host system.
On Line	Lets the VT420 communicate with a host.
Local	Puts the host on hold. The characters you type go directly to the screen.

Default settings are in **bold** type.

Table 5-2 (Cont.) Global Set-Up Features

Feature and Settings	Description
Terminal comm ports	Assigns the communication connectors on the rear of the terminal to session 1 or 2.
S1=Comm1	Assigns only one session to the Comm1 connector. The Session indicator does not appear on the keyboard indicator line.
S1=Comm1,S2=Comm2	Assigns session 1 to the Comm1 connector, and session 2 to the Comm2 connector.
S1=Comm2,S2=Comm1	Assigns session 1 to the Comm2 connector, and session 2 to the Comm1 connector.
Sessions on Comm1	Assigns both SSU sessions to the Comm1 connector. Both sessions use the same communication cable.
CRT saver	Increases screen life.
CRT Saver	If the terminal is left on but inactive for 30 minutes, the screen goes blank. You can press any key to reactivate the screen. The host can also reactivate the screen by sending any character.
No CRT Saver	CRT saver feature is disabled.
Printer assignment	Selects which session can use the printer port.
Printer Shared	Both sessions can use the printer port, but not at the same time.
Printer Session 1	Only session 1 can use the printer port.
Printer Session 2	Only session 2 can use the printer port.
Screen refresh rate	Sets the video refresh rate.
70 Hz	This screen refresh rate is recommended in most environments, to minimize flicker.
60 Hz	Used in environments with electrical noise interference.

Default settings are in **bold** type.

Display Set-Up Screen

This screen has features that affect the way data appears on the screen. Table 5-3 describes the Display Set-Up features.

Selecting a Page Size

The VT420 has *page memory* that can store up to 144 lines of text entered from the keyboard or host system. You can divide the 144 lines into a different number of pages, by using the **page arrangement** feature on the Display Set-Up screen.

There are many page sizes available (Table 5-3). The default page size is the same size as the default screen display area.

- If you use one session, all 144 lines of page memory are available. The default setting is 6 pages of 24 lines each.
- If you use two sessions, each session has 72 lines available. The default setting for each session is 3 pages of 24 lines each.

Pages create boundaries. Before you change the standard page size of 24 lines, you may want to check your application's documentation to make sure the application can recognize the new page boundaries. To display a new page, use the **Ctrl** **Next** and **Ctrl** **Prev** keys.

Selecting the Number of Lines/Screen

You use the **lines/screen** feature on the Display Set-Up screen to select the number of text lines you see on the screen. The ability for the VT420 to display the selected number of lines depends on the following factors:

If ...

The page size is less than the number of Lines/Screen displayed

The page size is greater than the number of Lines/Screen displayed

Then ...

The VT420 displays only the number of lines on the page.

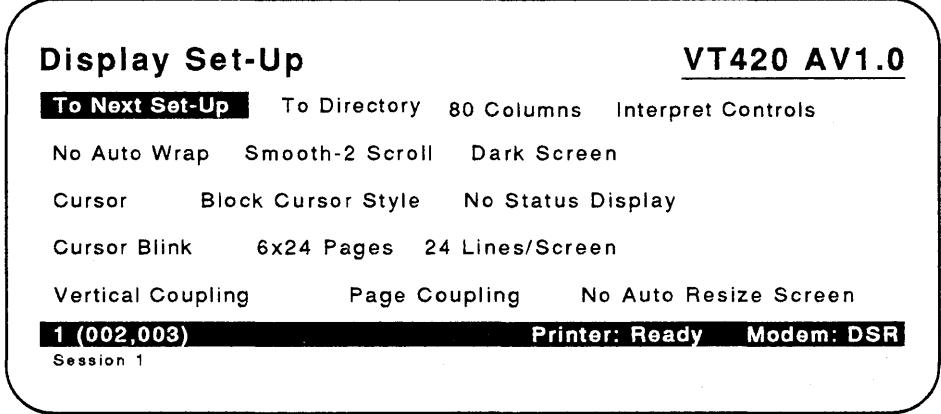
The VT420 may display additional lines on the screen. For example, when the **status display** feature is disabled, an additional line of data is put in place of the missing status line.

You use two windows

The number of lines displayed is limited by the screen area allocated to each session.

Coupling the Cursor to the Display

The VT420 lets you pan through the information stored on one page or move to another page. The Display Set-Up screen has two features that determine whether or not the display automatically pans to keep the cursor visible: **vertical coupling** and **page coupling**. See Chapter 7 for a description of panning.



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Table 5-3 Display Set-Up Features

Feature and Settings	Description
80/132 column mode 80 Columns 132 Columns	Selects an 80- or 132-column page width for text. The screen display width is the same as the page width. If you change the current setting, page memory clears.

Default settings are in **bold** type.

Table 5-3 (Cont.) Display Set-Up Features

Feature and Settings	Description
Control representation mode Interpret Controls Display Controls	Selects whether the terminal processes (interprets) or displays <i>control characters</i> . You can use this feature as an aid for debugging programs. See "Display Controls Mode" in the <i>VT420 Programmer Reference Manual</i> .
Auto wrap No Auto Wrap	Selects whether or not text automatically wraps to the next line when you reach the right margin.
Auto Wrap	When you reach the margin, the VT420 displays each new character in the last column of the line. Each new character overwrites the previous character at that position.
Smooth/jump scroll Smooth-2 Scroll Smooth-4 Scroll Jump Scroll	When you select Smooth-2 Scroll or Smooth-4 Scroll, text on the screen scrolls smoothly. Smooth-4 Scroll is twice as fast as Smooth-2 Scroll. When you select Jump Scroll, text on the screen scrolls as fast as the terminal processes it.
Light/dark screen Dark Screen Light Screen	Selects light text on dark background, or dark text on light background. Takes effect in set-up.
Cursor Cursor No Cursor	Selects whether or not to display the cursor.
Cursor style Block Cursor Style Underline Cursor	Selects a block or underline cursor.
Style	
Status display No Status Display	Selects how and when to use the status line. This session does not display a status line outside of set-up.
Indicator Status Display	The VT420 displays a status line for the current session.

Default settings are in **bold** type.

Table 5-3 (Cont.) Display Set-Up Features

Feature and Settings	Description
Host Writable Status Display	The host can display information on the status line for this session.
NOTE	
In set-up, the terminal always displays the status line for the current session.	
Cursor blink	Selects whether or not the cursor blinks (flashes).
Cursor Blink	
Cursor Steady	
Page arrangement	Selects the the number of lines/page. The effect of this feature depends on whether you are running one session or two sessions.
For Two Sessions	
3x24	Selects 3 pages, with 24 lines/page.
2x25	Selects 2 pages, with 25 lines/page.
2x36	Selects 2 pages, with 36 lines/page.
1x48	Selects 1 page of 48 lines.
1x72	Selects 1 page of 72 lines.
For One Session	
6x24	Selects 6 pages, with 24 lines/page.
5x25	Selects 5 pages, with 25 lines/page.
4x36	Selects 4 pages, with 36 lines/page.
3x48	Selects 3 pages, with 48 lines/page.
2x72	Selects 2 pages, with 72 lines/page.
1x144	Selects 1 page of 144 lines.
Number of lines/screen*	Selects the number of lines displayed on the screen at one time.
24 Lines/Screen	Selects the 24 lines/screen font.

*The **number of lines/screen** is a user preference feature. If you select the **user features locked** feature in the General Set-Up screen and enable **auto resize screen** in the Display Set-Up screen, then the number of lines/screen changes when the page size changes. For more information, see "Selecting the Number of Lines/Screen" at the beginning of this section.

Default settings are in **bold** type.

Table 5–3 (Cont.) Display Set-Up Features

Feature and Settings	Description
36 Lines/Screen	Selects the 36 lines/screen font.
48 Lines/Screen	Selects the 48 lines/screen font.
Vertical coupling	Selects whether or not to automatically pan when the cursor moves beyond the top or bottom border of a window. Automatic panning keeps the cursor visible.
Vertical Coupling	
No Vertical Coupling	
Page coupling	Selects whether or not to automatically display a new page when the cursor moves to a new page in page memory. For more information, see "Windows" in Chapter 7.
Page Coupling	
No Page Coupling	If the cursor moves to a new page, you cannot see the page or the cursor.

NOTE

The page coupling feature is only useful when the page arrangement feature is set to two or more pages.

Auto resize screen*	Selects whether or not to automatically change the number of lines/screen when the page arrangement changes.
No Auto Resize Screen	
Auto Resize Screen	Resizes the screen when the page size changes.
	Page size Screen size
	24 lines 24 lines
	25 24
	36 36
	48 48
	72 48
	144 48

*The number of lines/screen is a user preference feature. If you select the **user features locked** feature in the General Set-Up screen and enable **auto resize screen** in the Display Set-Up screen, then the number of lines/screen changes when the page size changes. For more information, see "Selecting the Number of Lines/Screen" at the beginning of this section.

Default settings are in **bold** type.

General Set-Up Screen

This screen lets you set general features, such as the character set used to display characters on the screen. The **terminal mode** feature lets the VT420 emulate other VT series terminal for software compatibility. Table 5-4 describes the General Set-Up features.

Character Sets

The General Set-Up screen lets you select from two multinational character sets:

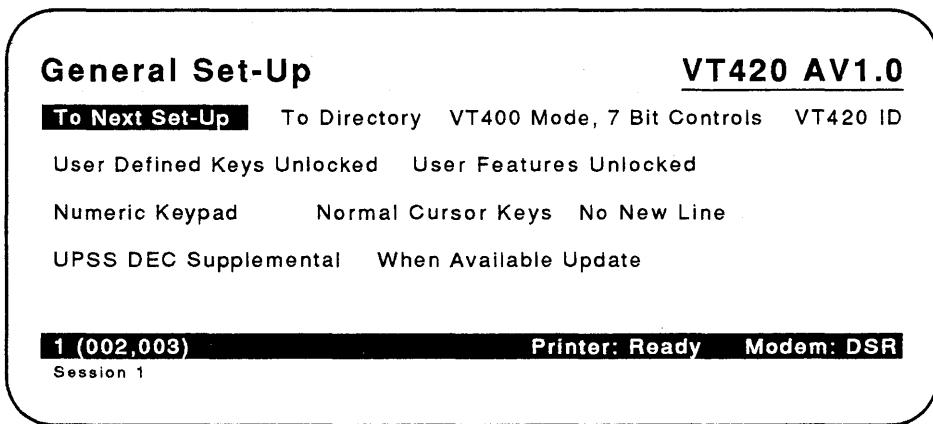
- DEC multinational character set
- ISO Latin Alphabet No. 1 character set (International Organization for Standardization).

Both character sets have two parts—the U.S. ASCII character set and a supplemental set.

- The U.S. ASCII character set (United States American Standard Code for Information Interchange) contains the letters and numbers for English-speaking countries.
- The supplemental character set contains additional symbols and most characters used in the major European languages. There are two supplemental character sets to select from—DEC Supplemental character set and ISO Latin-1 supplemental character set.

Use the **UPSS** (user-preferred supplemental set) feature to select the supplemental set you prefer, DEC Supplemental or ISO Latin-1. You can enter many of the characters in a supplemental set by using compose sequences (Chapter 6).

By default, the VT420 uses the DEC Multinational character set.



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Table 5-4 General Set-Up Features

Feature and Settings	Description
Terminal mode	Selects the terminal's operating mode. The VT420 can emulate any VT series text terminal.
VT400 Mode, 7-Bit Controls	Lets the terminal use all VT420 features. The terminal normally uses 8-bit graphic characters and 7-bit control characters. Select this mode for VT200 and VT300 applications. Digital recommends this mode for most applications.
VT400 Mode, 8-Bit Controls	Lets the terminal use all VT420 features. The terminal uses 8-bit control characters. See Chapter 9 for details. Select this mode for all VT200 and VT300 applications that use 8-bit control characters. This mode is the most efficient, but not yet supported by all applications.
VT100 Mode	Use this mode for applications that require VT100 compatibility.
VT52 Mode	Lets the terminal run VT52 applications.

Default settings are in bold type.

Table 5-4 (Cont.) General Set-Up Features

Feature and Settings	Description
Terminal ID	Selects the device attributes response (terminal ID). Some applications require specific responses.
VT420 ID	This response lets the host system know specific operating attributes of the terminal.
VT100 ID	
VT101 ID	
VT102 ID	
VT220 ID	
VT320 ID	
NOTE	
If your operating system does not recognize the VT420 ID setting, select the VT320 ID setting (Chapter 3).	
User defined keys lock	Selects whether or not the host system can change user-defined key (UDK) definitions.
User Defined Keys	
Unlocked	
User Defined Keys	
Locked	
User features locked	Selects whether or not the host system can change the settings of the user preference features: auto repeat, smooth/jump scroll, light/dark screen, tab, keyboard lock, and number of lines/screen . User preference features are intended to be controlled by the user or terminal management software, rather than by application software.
User Features	
Unlocked	
User Features Locked	
Keypad mode	Selects the type of characters sent by the numeric keypad.
Numeric Keypad	The keypad sends the numbers shown on the keycaps (using ASCII code).†
Application Keypad	The keypad sends control sequences (used with some applications).†
Cursor key mode	Selects whether the arrow keys send ANSI cursor control sequences or application-specific control functions.*
Normal Cursor Keys	
Application Cursor Keys	
New line	Selects how the Return key works.

*Chapter 9 shows the VT420 character sets.

†The setting is not saved in nonvolatile memory.

Default settings are in **bold** type.

Table 5-4 (Cont.) General Set-Up Features

Feature and Settings	Description
No New Line	Pressing [Return] sends a carriage return character. The VT420 does not automatically move the cursor to a new line.
New Line	Pressing [Return] sends a carriage return and a line feed. Used for some non-Digital applications.
User-preferred supplemental set (UPSS)	When the character set mode feature is set to 8-bit Characters, this feature selects the 8-bit supplemental character set.
UPSS DEC Supplemental	Selects the DEC Supplemental character set, which is part of the 8-bit DEC Multinational set. See Chapter 9.
UPSS ISO Latin-1 Supplemental	Selects the ISO Latin-1 supplemental character set, which is part of the ISO Latin-1 multinational character set.
Update method	Selects how and when to update page memory for the inactive session.
When Available Update	Updates page memory for the other session whenever the terminal is not busy with the active session for one second.
Shared Update	Updates page memory for a session whenever the terminal is not busy with the other session. Neither session has priority.
Never Update	Prevents updates to page memory for the inactive session.

Default settings are in **bold** type.

Communications Set-Up Screen

This screen lets you set up the terminal to communicate with your host system. The default settings are those commonly used on Digital systems. Make sure the settings you use match the communication settings of your system.

This screen also includes features for use with modems. Chapter 8 has more information on modems.

If you use the printer connector to connect a second host system to the terminal, the Communications Set-Up screen indicates which port is in use for the current session. The term **Comm** or **Prnt** appears on the top line of the set-up screen.

Table 5-5 describes the Communications Set-Up features. For more information, see *VT420 Programmer Reference Manual*.

Communications Set-Up Comm1		VT420 AV1.0
To Next Set-Up	To Directory	Transmit = 9600 Receive=Transmit
XOFF at 64	8 Bits, No Parity	1 Stop Bit No Local Echo
Data Leads Only	Limited Transmit	
No Auto Answerback	Answerback=	Not Concealed
1 (002,003)		Printer: Ready Modem: DSR
Session 1		

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Table 5-5 Communications Set-Up Features

Feature and Settings	Description
Transmit speed Transmit=9600	Selects the baud rate the VT420 uses to send data to the host system. The transmit baud rates range from 300 to 38400 bits/second. The default setting of Transmit=9600 works with most Digital systems.

Default settings are in **bold** type.

Table 5-5 (Cont.) Communications Set-Up Features

Feature and Settings	Description
NOTE	
The terminal's transmit speed must match the host's receive speed. However, the VT420 can transmit at one speed and receive at another.	
Receive speed Receive=Transmit	Selects the baud rate the VT420 uses to receive data from the host system. Receive baud rates range from 300 to 38,400 bits/second. The default setting is Receive=Transmit .
NOTE	
The terminal's receive speed must match the host's transmit speed. However, the VT420 can receive at one speed and transmit at another.	
XOFF XOFF at 64	Selects the number of characters the VT420 stores in its input buffer before sending the XOFF flow control signal. If you use one session, you can select an XOFF point of 64 or 128. If you use two SSU sessions, you can select an XOFF point of 64, 256, or 1792 (Appendix C).
No XOFF	Will not send an XOFF signal.
Data bits/parity 8 Bits, No Parity	Specifies the character format for communicating with the host system, including: <ul style="list-style-type: none"> • Bits used to send each character (7 or 8) • Parity setting: even, odd, or none • Whether or not to check parity on received characters at the host port If you select a 7-bit environment for the host port, you cannot use 8-bit character sets.
Stop bits 1 Stop Bit 2 Stop Bits	Selects the number of stop bits used by the host port.
Local echo	Selects whether or not to send the characters you type directly to page memory.

Default settings are in **bold** type.

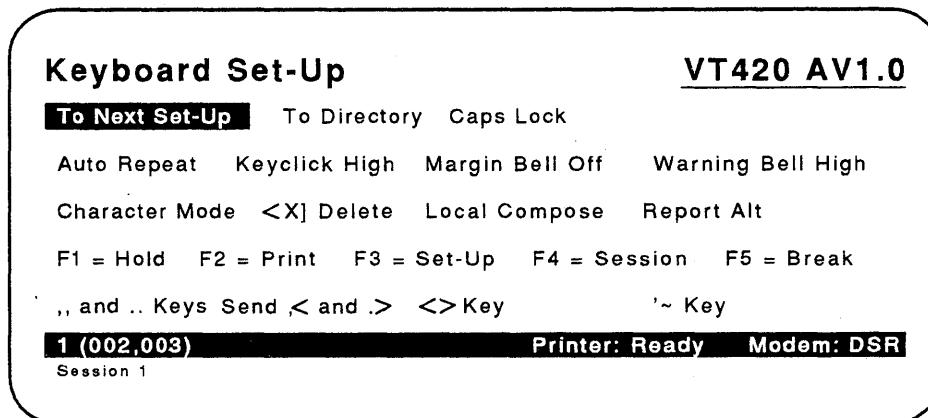
Table 5-5 (Cont.) Communications Set-Up Features

Feature and Settings	Description
No Local Echo	Sends keyboard data to the host system. The host decides whether or not to send the data back to the terminal.
Local Echo	Sends keyboard data both to the host and back to the terminal.
Modem control	Configures the terminal to work with various modem features. See Chapter 8.
Data Leads Only	Modem control pins on the DEC-423 connector are not used.
Modem Control	Uses DSR (pin 6) and DTR (pin 1) of the DEC-423 connector.
Transmit rate limit	Selects whether or not to limit the terminal to sending 150 to 180 characters/second. A limited rate reduces the interrupt burden on the host system.
Limited Transmit	
Unlimited Transmit	
Auto answerback	Selects whether or not to send the answerback message to the host system when establishing a connection.
No Auto Answerback	
Auto Answerback	
Answerback =	Lets you type an answerback message. You can use up to 30 characters. This prompt appears on the status line, indicating the start of the message. If you press the F3 (Set-Up) key while entering an answerback message, the VT420 deletes the new message and saves the old message.
Conceal answerback	Selects whether or not the VT420 will display the answerback message.
Not Concealed	
Concealed	
NOTE	
If the conceal answerback feature is set to Concealed, you must enter a new answerback message before you can set it back to Not Concealed.	
Default settings are in bold type.	

Keyboard Set-Up Screen

This screen lets you control the operation of the keyboard. This includes the function of various keys and the keyboard's keyclick, warning bell, and margin bell.

Table 5–6 describes the Keyboard Set-Up features.



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Table 5–6 Keyboard Set-Up Features

Feature and Settings	Description
Caps/shift lock	Selects the function of the lock key in the down position.
Caps Lock	When the lock key is down, the alphabetic keys send their uppercase character. Other keys still send the bottom character on their keycap.
Shift Lock	When the lock key is down, all keys send the shifted or top character on their keycap.
Auto repeat	Selects whether or not a key sends its character repeatedly when you hold the key down.*
Auto Repeat	
No Auto Repeat	

*The following keys never repeat: **F1**, **F2**, **F3**, **F4**, **F5**, **Return**, **Ctrl**, **Alt Function**, **Compose Character**, and lock.

Default settings are in **bold** type.

Table 5-6 (Cont.) Keyboard Set-Up Features

Feature and Settings	Description
Keyclick Keyclick High Keyclick Low Keyclick Off	Selects whether or not keys click when you press them. You can select a high or low volume.
Margin bell Margin Bell Off Margin Bell High Margin Bell Low	Selects whether or not the VT420 bell sounds when the text cursor approaches the right margin. You can select a high or low volume.
Warning bell Warning Bell High Warning Bell Low Warning Bell Off	Selects whether or not the VT420 bell rings when (1) operating errors occur or (2) the terminal receives Ctrl G . You can select a high or low volume.
Character mode Character Mode	Selects whether the keys send their normal characters or report their key position.
Position Mode	Selects ANSI/ISO character encoding for the keyboard.
Backarrow key <X Delete <X Backspace	The keyboard sends control strings that indicate the position of the key pressed. Selects the function of the <X key. <X sends the DEL (delete) character. <X sends the BS (backspace) character.
Compose key Local Compose	Selects the function of the Compose Character keys. Compose Character starts a compose sequence (Chapter 6).
Report Compose	Compose Character sends a control sequence to the host to report each down or up key transition.
Ignore Compose	Compose Character keys are ignored.
Alt Function key Report Alt	Selects the function of the Alt Function keys. Alt Function sends a control string to the host to report each up or down key transition.
Ignore Alt	Alt Function keys are ignored.

Default settings are in **bold** type.

Table 5-6 (Cont.) Keyboard Set-Up Features

Feature and Settings	Description
F1 =	Selects the function of the F1 (Hold) key.
F1 = Hold	F1 stops the scrolling of text for the active session (Chapter 4).
F1 = Fkey	F1 (unshifted) sends a function key sequence to the host.
F1 = Ignore	F1 is ignored. This setting does not disable F1 for a copy and paste operation.
F2 =	Selects the function of the F2 (Print) key.
F2 = Print	F2 performs the local print functions described in Chapter 8.
F2 = Fkey	F2 (unshifted) sends a function key sequence to the host.
F2 = Ignore	F2 is ignored.
F3 =	Selects the function of the F3 (Set-Up) key.
F3 = Set-Up	F3 is used to enter or leave set-up.
F3 = Fkey	F3 (unshifted) sends a function key sequence to the host. To enter set-up after you disable this key: log out, turn off the terminal, wait 10 seconds, then turn on the terminal and make F3 the first key you press.
F3 = Ignore	F3 is ignored.
F4 =	Selects the function of the F4 (Session) key.
F4 = Session	Pressing F4 switches the active session when you use two sessions (Chapter 8).
F4 = Fkey	F4 (unshifted) sends a function key sequence to the host.
F4 = Ignore	F4 is ignored.
F5 =	Selects the function of the F5 (Break) key.
F5 = Break	F5 (unshifted) sends a break signal.
F5 = No Break	<ul style="list-style-type: none"> • F5 (unshifted) is ignored. • F5 (shifted) performs a disconnect.

Default settings are in **bold** type.

Table 5-6 (Cont.) Keyboard Set-Up Features

Feature and Settings	Description
F5 = Fkey	[F5] (unshifted) sends a function key sequence to the host.
F5 = Ignore	[F5] is ignored.
,, and .. keys	Selects the function of the shifted comma and period keys.
,, and .. Keys Send , < and .>	The comma key sends a comma when unshifted and a < character when shifted. The period key sends a period when unshifted and a > character when shifted.
,, and .. Keys	The shifted comma key sends a comma. The shifted period key sends a period.
<> key	Selects the function of the [<>] angle bracket key.
<> Key	[<>] sends a < when unshifted and a > when shifted.
<> Key Sends ‘~	[<>] sends a ‘ when unshifted and a ~ when shifted.
‘~ key	Selects the function of the [‘~] key.
‘~ Key	[‘~] sends a ‘ when unshifted and a ~ when shifted.
‘~ Key Sends ESC	[‘~] sends an escape (ESC) character.

Default settings are in **bold** type.

Tab Set-Up Screen

This screen lets you set the number of tab stops on a line. Tab stops on the screen are similar to tab stops on a typewriter. When you press the [Tab] key outside of set-up, the cursor advances to the next tab stop. Table 5-7 describes the Tab Set-Up features.

There is one tab stop field for each column on the screen. You can use a screen display of 80 or 132 columns wide. See the **80/132 column mode** feature in the Display Set-Up screen.

You can use the arrow keys or the [Tab] key to move the cursor to any tab stop field. Press the [Enter] key to place a T in a blank field or erase a T from that field. The following figure shows the default tab stop settings.

NOTE

You cannot put a tab in column 1.

Tab Set-Up

VT420 AV1.0

To Next Set-Up To Directory Clear all tabs

Set 8 column tabs

T T T T T T T T
12345678901234567890123456789012345678901234567890123456789012345678901234567890

1 (002,003)

Session 1

Printer: Ready Modem: DSR

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Table 5-7 Tab Set-Up Features

Feature	Description
Clear all tabs	Removes all current tab settings shown on the Tab Set-Up screen.
Set 8 column tabs	Automatically sets one tab every eight columns, starting at column 9.

6

Typing Additional Characters

The VT420 lets you type more characters than appear on your LK401 keyboard. For example, you can type accented characters or a © symbol. This chapter lists the available characters and shows you how to select them.

To enter one of these characters, you type a sequence of two or three keys. You start each sequence by pressing the **Compose Character** key. There are two types of compose key sequences:

- Three-stroke key sequences
- Hexadecimal key sequences (for programmers)

What Characters Can I Type?

You can type any of the characters from the character set the terminal is currently using. You can select from two multinational sets—DEC Multinational or ISO Latin Alphabet No. 1. By default, the VT420 uses the DEC Multinational set. Chapter 1 describes the two character sets, and Chapter 9 shows each character set.

The **character set mode** feature in the General Set-Up screen sets the terminal to work with 8-bit multinational sets.

How to Type a Character Using the Compose Character Key

To enter a compose key sequence:

1. Find the character you want to type in Table 6-1.
2. Press the **Compose Character** key. Compose appears on the keyboard indicator line, indicating the terminal is in the compose mode.

NOTE

If the **Compose Character** key does not work, check the setting of the compose key feature in the Keyboard Set-Up screen (Chapter 5).

3. Type the sequence in Table 6-1 for the character you want.

Example

To type an é:

1. Find the é character in Table 6-1.
2. Press **Compose Character**.
3. Type **e** and **'** (apostrophe).

NOTE

If you try to enter a character that is not available in the current character set, a warning bell sounds. See "Invalid Sequences" in this chapter.

Invalid Sequences

When you complete a valid compose sequence, the selected character appears on the screen and the Compose indicator turns off. If you use an invalid sequence, the VT420 cancels the sequence and sounds the warning bell.

Some characters require that you type the key sequence in the order shown in Table 6-1. If you do not follow the order, the sequence is invalid and the warning bell sounds. If the terminal does not display the character, repeat the sequence exactly as shown in Table 6-1.

NOTES

Pressing a function key cancels a compose sequence without sounding the bell.

You can turn the warning bell on or off in the Keyboard Set-Up screen (Chapter 5).

Canceling or Restarting a Compose Sequence

If you accidentally start a compose sequence by pressing the **Compose Character** key, press the **~~X~~** key. This immediately cancels the compose sequence.

If you press **Compose Character** during a compose sequence, a new three-stroke sequence starts from that point. The first sequence is canceled.

If you press any of the following keys during a compose sequence, they cancel the sequence and perform their usual function:

- **Tab** • Any top-row key
- **Enter** • Any **Ctrl** **other key** combination

Hexadecimal Compose Sequences

This feature is primarily for programmers who are familiar with character coding and hexadecimal representation.

The VT420 uses coded character sets to exchange data with a host computer. These codes can be represented by a pair of hexadecimal digits. With the VT420, you can enter any 8-bit code by pressing the **Compose Character** key followed by two hexadecimal digits typed on the numeric keypad.

When you press **Compose Character**, the terminal assigns hexadecimal values to the numeric keypad keys (Figure 6-1). The character set tables in Chapter 9 show you the hexadecimal values for each character in the standard character sets.

NOTE

The character set mode and UPSS features in the General Set-Up screen do not affect hexadecimal compose sequences.

Examples

- You can use a hexadecimal compose sequence to send the US (unit separator) control character. The hexadecimal value for US is 1F. Figure 6-1 shows the numeric keypad.

1. Press **Compose Character**.

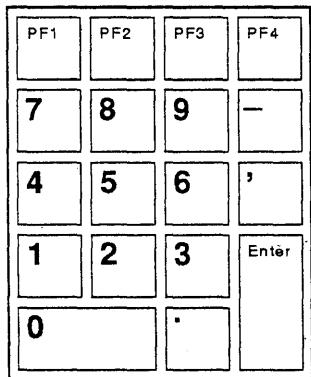
2. Press **1** on the numeric keypad.
 3. Press **,** on the numeric keypad.
- You can use a hexadecimal compose sequence to send the DCS (device control string) character. The hexadecimal value for DCS is 90. Figure 6-1 shows the numeric keypad.
1. Press **Compose Character**.
 2. Press **9** on the numeric keypad.
 3. Press **0** on the numeric keypad.

NOTE

If the terminal mode feature in the General Set-Up screen is set to VT400 Mode, 7 Bit Controls, the 7-bit representation of DCS (ESC P) will be sent.

Invalid Hexadecimal Sequences

Pressing the **Enter** key, the **.** (period) key, or any key other than the numeric keypad keys cancels the sequence and sounds the warning bell. You can turn the warning bell on or off in the Keyboard Set-Up screen (Chapter 5).



<u>Key Name</u>	<u>Hexadecimal Digit</u>
PF1	A
PF2	B
PF3	C
PF4	D
Minus	E
Comma	F

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Figure 6-1 Hexadecimal Compose Keys

Table 6-1 Key Sequences

Character	Sequence	Character	Sequence
"	quotation mark	" (sp)	² superscript 2
#	number sign	++	³ superscript 3
'	apostrophe	' (sp)	µ micro sign
@	commercial at	A A	¶ paragraph sign
[opening bracket	((· middle dot
\	backslash	// or <	¹ superscript 1
]	closing bracket))	º masculine ordinal
^	circumflex accent	^ (sp)	» closed angle brackets
`	grave accent	` (sp)	¼ fraction one-quarter
{	opening brace	(-	½ fraction one-half
	vertical line	/ ^	¾ inverted ?
}	closing brace) -	À A grave
~	tilde	~ (sp)	Á A acute
¡	inverted !	!!	Â A circumflex
¢	cent sign	C / or C	Ã A tilde
£	pound sign	L- or L=	Ä A umlaut
¥	yen sign	Y- or Y=	Å A ring
§	section sign	SO or S! or S0	°A or A*
¤	currency sign	XO or X0	(degree sign)
©	copyright sign	CO or C0	Æ A E diphthong
ª	feminine ordinal	A_-	Ç C cedilla
«	open angle brackets	< <	È E grave
°	degree sign	0 ^	É E acute
±	plus or minus sign	+ -	Ê E circumflex
			Ë E umlaut
			“E or E”

Character	Sequence	Character	Sequence
Í	I grave	Í	'I
Í	I acute	Í	' I
Í	I circumflex	Í	^I
Í	I umlaut	Í	"I or "I
Ñ	N tilde	Ñ	~ N
Ó	O grave	Ó	`O
Ó	O acute	Ó	' O
Ó	O circumflex	Ó	^O
Ó	O tilde	Ó	~O
Ö	O umlaut	Ö	"O or "O
Œ	O E diphthong*	Œ	O E
Ø	O slash	Ø	o /
Ù	U grave	Ù	'U
Ú	U acute	Ú	' U
Û	U circumflex	Û	^U
Ü	U umlaut	Ü	"U or "U
Ý	Y umlaut*	Ý	'Y or "Y
ß	German small sharp s	ß	ss
à	a grave	à	`a
á	a acute	á	' a
â	a circumflex	â	^a
ã	a tilde	ã	~a
ä	a umlaut	ä	"a or "a
å	a ring	å	°a or a*
			(degree sign)
æ	a e diphthong	æ	a e
ç	c cedilla	ç	c , (comma)
è	e grave	è	'e
é	e acute	é	' e
ê	e circumflex	ê	^e
ë	e umlaut	ë	"e or "e
ì	i grave	ì	'i
í	i acute	í	' i
î	i circumflex	î	^i
ï	i umlaut	ï	"i or "i
ñ	n tilde	ñ	~n
ò	o grave	ò	`o
ó	o acute	ó	' o
ô	o circumflex	ô	^o
ö	o tilde	ö	~o
ø	o umlaut	ø	"o or "o
œ	o e diphthong*	œ	o e
ø	o slash	ø	o /
ù	u grave	ù	'u
ú	u acute	ú	' u
û	u circumflex	û	^u
ü	u umlaut	ü	"u or "u
ÿ	y umlaut*	ÿ	"y or "y

Character	Sequence	Character	Sequence
ISO Characters†			
no break space	sp sp	Ý	Y acute
! broken vertical bar	! ! or ! ^	ý	y acute
- logical not	- ,	Þ	capital Icelandic thorn
- soft (syllable) hyphen	--	þ	small Icelandic thorn
® registered trademark	R O	Ð	capital Icelandic Eth
- macron	- ^	ð	small Icelandic Eth
¾ three quarters	3 4	*This character is only available when you use the DEC Multinational Character Set. See the UPSS feature in the General Set-Up screen (Chapter 5).	
÷ division sign	- :	†These characters are only available when you use the ISO Latin Alphabet No. 1 character set. See the UPSS feature in the General Set-Up screen (Chapter 5).	
× multiplication sign	x x		
' acute accent	',		
, cedilla	,,		
“ diaeresis	” (sp) or " "		

7

Using Two Sessions, Windows, And the Copy and Paste Feature

This chapter describes how to:

- Run two computer sessions on your terminal at the same time.
- Select and use windows.
- Copy and paste text between sessions.

With two sessions, your VT420 becomes two terminals in one. You can also use the VT420 as a conventional one-session terminal.

Running two sessions offers many advantages. For example, you can easily display and compare data from two different jobs at the same time. To display data from two sessions, you divide the screen into two *windows*. You can also copy and paste text from one session to another.

What Are Sessions?

A video terminal lets you exchange information with a computer system. In order to communicate with the host system, you must open a session from your terminal. A *session* is an active connection between the terminal and a host system. On many systems, you open a session by logging in to the system.

Two Sessions

The VT420 lets you run two sessions at the same time. Opening two sessions is easy. After you set up the VT420 for two sessions, you can use the **F4** (Session) key to move back and forth between two sessions. The session you are using is called the *active session*. The next section describes how to open two sessions.

You can connect the VT420 to a host computer, a *terminal server*, or a *modem*. This means you can run two sessions on the same host system or on two different systems.

Opening Two Sessions

The VT420 uses a communication cable to exchange information with a computer. You can use one or two communication cables for two sessions. To use one cable, your system must have Digital's Session Support Utility software or a terminal server that supports multiple sessions.

Chapters 2 and 3 describe how to install communication cables and set up the terminal for two sessions. This section describes how to use two sessions after you set up the terminal correctly.

The way you open two sessions depends on how many communication cables you use. The following sections describe how to open two sessions if you use

- Two cables
- One cable and SSU software
- One cable and a terminal server that supports multiple sessions

If You Use Two Cables

This section describes how to open two sessions if you use two communication cables.

IMPORTANT

Make sure your VT420 is set up correctly before you try to open two sessions. Chapter 3 describes how to set up the terminal for two sessions using two cables.

Session 1

You open session 1 the way you normally do on your host system. The VT420 always connects you to the system assigned to session 1. This assignment is based on the cable connections at the rear of the terminal. To assign a system to a session, you use the **terminal comm ports** feature in the Global Set-Up screen.

Session 2

After you open session 1, you press the **F4** (Session) key and open session 2 the same way you opened session 1. When you press **F4** (Session), the VT420 maintains session 1. The session can still receive information from the host system. No information is lost.

If the terminal does not respond correctly when you press **F4** (Session), repeat the set-up procedure for two sessions in Chapter 3.

Example

The following example shows you how to open (log in to) two sessions on one of Digital's VAX/VMS systems:

NOTE

The *Guide to Using VMS* provides detailed information on how to log in to the VMS operating system.

To open session 1:

1. Turn on the VT420 and wait for the screen to display VT420 OK.
2. Press the **Return** key to tell the system you want to log in.
3. The system prompts you for your user name. Enter your *user name* and press **Return**.
4. The system prompts you for your password. Enter your *password* and press **Return**.

The system does not display your password. When you correctly type your name and password, the system displays a VAX/VMS version number and a \$ (dollar sign) prompt. The \$ indicates you have logged into session 1 successfully.

The login sequence looks like this:

Return
Username: Smith **Return**
Password: (not displayed) **Return**

To open session 2: Press the **F4** (Session) key and repeat the login sequence.

If You Use One Cable

If your system has Digital's SSU software or a Digital terminal server that supports multiple sessions, you can run two sessions over one communication cable. Your system manager can tell you if your system has either one.

If Your System has SSU Software

If your system has Digital's SSU software, use the following procedure to run two sessions over one communication cable:

IMPORTANT

Make sure your VT420 is set up correctly before you try to open two sessions. Chapter 3 describes how to set up the terminal for two sessions, using one cable and SSU software.

Session 1

To open SSU session 1:

1. Log into your host system the way you normally do.
2. Enable SSU with two sessions on your terminal line.

On a VAX/VMS system, enter the following command at the \$ prompt:

\$ SSU ENABLE **Return**

The terminal should display the following response on the status line at the bottom of the screen:

Done

The first session is now open.

NOTE

If you type information before the Done message appears on the status line, the terminal displays the Service name = prompt.

Session 2

To open a second session:

1. Press the **F4** (Session) key.

NOTE

If you did not enable SSU in step 2 above, the host system will not respond when the terminal tries to open the second session. After 10 seconds, the warning bell rings twice and a message appears on the status line, indicating that the host did not respond.

2. The system prompts you for the service name.

Service name = _____

VAX/VMS systems ignore the service name. Go to the next step.

3. Press **Return**. The system responds with

Session Open Request Pending

immediately followed by

Session Opened

Session 2 is now open. On a VAX/VMS system, you should see a login prompt on the screen. On other systems, the system is ready for the login procedure.

4. Type your login procedure before the terminal sends a timeout message. If you get a timeout message, go to the previous step and repeat the procedure.

If Your Terminal Server Supports Multiple Sessions

The DECserver 200 and DECserver 300 terminal servers support multiple sessions. If your system has one of these terminal servers, you can use the following procedures to run two sessions over one communication cable. First, you must define your terminal server port for multiple-session use.

Defining Your Terminal Port for Multiple Sessions

1. Turn on the VT420 and wait for the screen to display VT420 OK.
2. Press the **Return** key twice and log in to your terminal server the way you normally do. The Local> prompt appears.
3. At the Local> prompt, enter the following command:

```
Local> DEFINE PORT MULTISESSIONS ENABLED Return
```

The terminal displays the following response on the status line at the bottom of the screen:

Done

The terminal server port is now defined for multiple sessions. This setting remains in effect after you log out. You do not have to repeat this command each time you log in to the terminal server.

Now, you can open two sessions.

Session 1 from the Terminal Server

To open session 1:

1. Press the **F4** (Session) key. The terminal server prompts you for the service name at the bottom of the screen.
2. At the service name prompt, enter the node name. Your system manager can tell you the node name.

```
Service name = {Node name} Return
```

The following response appears on the status line at the bottom of the screen:

Session Opened

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Session 1 is now open on the terminal server. Now, you should log in to your system.

3. Type your login procedure before the terminal server sends a timeout message. If you get a timeout message from the terminal server, go to the previous step and repeat the procedure.

Session 2 from the Terminal Server

To open session 2, repeat the three steps used to open session 1.

Disabling Multiple Sessions from the Terminal Server

1. Log out from one session the way you normally do.

The terminal displays a response indicating that you logged out.

Then the terminal server displays a response that indicates which session (1 or 2) you closed:

```
Local -nnn- Session n disconnected from (Node name)  
Local -nnn- 1 other session(s) active
```

2. Press the **F4** (Session) key.
3. Repeat step 1 for the second session.
4. At the Local> prompt, enter the following command:

```
Local> DEFINE PORT MULTISESSIONS DISABLED [Return]
```

The terminal displays the following response on the status line at the bottom of the screen:

Done

The following response appears after the logout response:

```
Local -XXX- Session Management terminated
```

Multiple sessions are now disabled from your terminal's port on the terminal server.

Restoring an Interrupted SSU Session

You can restore sessions that are interrupted by one of the following events:

- Turning the terminal off when it is still connected to the terminal server
- A power failure or similar problem

When a session is interrupted, the VT420 or the host system may lose the context of the current session. After the terminal and system regain communication, you can restore the context of the interrupted session without canceling the session and starting over again.

To restore a session: Press the **F4** (Session) key.

SSU Screen and Error Messages

The VT420 displays SSU screen and error messages on the line at the bottom of your screen. The messages disappear when you press any keyboard key.

The following paragraphs describe each SSU message. If the message is an error message, the keyboard's warning bell rings twice before the message appears.

- Sessions not enabled - Unable to run with host Session Management version

The terminal's version of SSU firmware does not match the system's version. Check with your system manager.

- Sessions not enabled - No Session Management response from host

The system's SSU software is not working or is not installed. Also, you may have lost your connection with the system. Check with your system manager.

- Sessions enabled - Restoring previous sessions

The host system is servicing an SSU request. Wait briefly for the message to disappear.

- Session open request pending

The host system is servicing an SSU request. Wait briefly for the message to disappear. If the message is followed by No response from the host for SSU Session Management, check your connection to the host. If your terminal has been disconnected from the host, you must log in and start your SSU sessions over again.

- Insufficient host resources to open session

There is an error at the host system's end of the SSU session. Contact your system manager for help.

- Data overrun occurred on Session (1 or 2)

A communication error has occurred between the terminal and the host system. If this message disappears and does not reappear, the host has corrected the error on its own. If the message continues to appear, contact your system manager for help.

- Session (number) terminated abnormally

The host system has ended the session. Try opening the session again. If you cannot reopen the session, there is a problem with the host system. Check with your system manager.

Which Session is Active?

You can display information from two sessions at the same time, by using windows. However, you can only enter information in one session at a time. There are two ways you can tell which session is active.

- Look at the keyboard indicator line. The active session number appears in the first field at the left of the line.
- Look at the cursors. The active session usually has a blinking cursor. The inactive session has a steady cursor.

NOTE

The cursor blink feature in the Display Set-Up screen lets you select a blinking or steady cursor for the current session.

- Type a keyboard character. The software application will display the character in the active session.

Number of Lines/Screen

You can display 24, 25, 36, or 48 lines of information at one time on the screen. By default, 24 lines are visible at one time (excluding the status line at the bottom of the screen). If you display 36 or 48 lines on the screen, the size of the characters will be smaller. The **lines/screen** feature in the Display Set-Up screen controls how many lines you can see on the screen at one time.

The number of lines on the screen also depends on the number of lines on a page in page memory. For example, if you select 48 lines/screen but the page size is 24 lines, then you will only see 24 lines of information from that session. This is the case even if there is room for more lines on the screen. If you are running two sessions, you can select 48 lines/screen to display 24 lines in each session.

How to Change the Number of Lines/Screen

The number of lines on the screen is a user preference feature. You may have terminal management software that automatically selects the appropriate number of lines on the screen. However, if you want to change the setting manually, use the following procedure:

NOTE

If you are running two sessions and you want to change the number of lines/screen setting for each session, you must make the change for each session individually.

The Display Set-Up screen contains the **lines/screen** feature.

1. Press **F3** (Set-Up). The terminal displays the Set-Up Directory.
2. Use the arrow key to move to the **Display Set-Up** field.
3. Press **Enter**. The terminal displays the Display Set-Up screen.
4. Use the arrow keys to move to the **24 Lines/Screen** field.
5. Press **Enter** to change the setting to 36 or 48 lines/screen.
6. Press **F3** (Set-Up) to leave set-up.

Windows

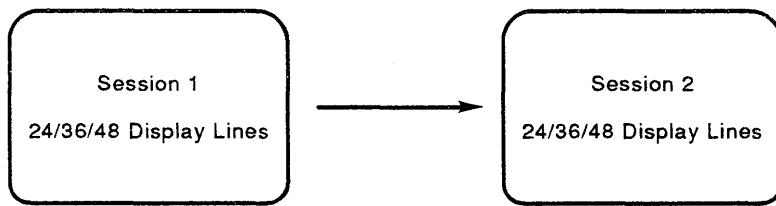
A *window* is an area of the screen that displays information from one session. You can divide the VT420 screen into two windows by opening two sessions.

The amount of information you can display is determined by:

- The number of windows you are using (1 or 2)
- The page size you are using. Pages in page memory may be larger than the number of lines available on the screen.
- The number of lines/screen you choose in the Display Set-Up screen.

One Window

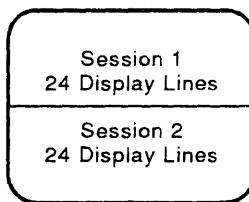
Normally, the VT420 uses a full-screen window. In this window, you can only display one session at a time. A full-screen window lets you display 24, 25, 36, or 48 lines of text in 80 or 132 columns. If you use two sessions, you can switch between sessions with the **F4** (Session) key.



Press **F4** (Session).

Two Windows

The VT420 lets you divide the screen into two windows. When you divide the screen into windows, each window can display 12, 18, or 24 lines of text in 80 or 132 columns. The default is one-half the number of the lines/screen setting you selected.



48 Lines/Screen

How to Select One or Two Windows

Before you use two windows, make sure the **terminal comm ports** feature in the Global Set-Up screen is set correctly. See Global Set-Up screen in Chapter 5.

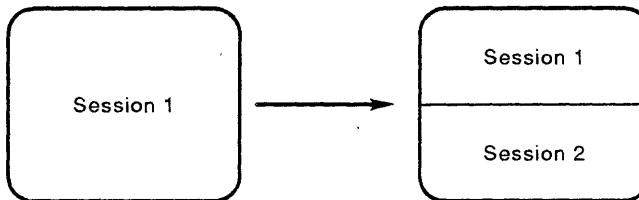
To select a new window style, press **Ctrl F4** (Session). Each time you press **Ctrl F4** (Session), the style of window on the screen changes.

Pressing Ctrl F4 (Session)	Gives You ...
One time	Two windows
Again	A full-screen window again

IMPORTANT

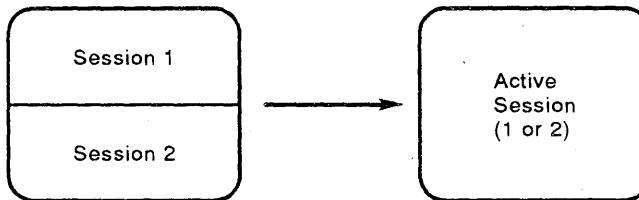
Before you use windows, read the next section on keeping the cursor visible.

To select two windows:



Press **Ctrl F4** (Session) once

To select one full-screen window again:



Press **Ctrl F4** (Session) again.

Keeping the Cursor Visible

When you divide the screen into windows, half of the area for the active session may disappear. If the cursor for the active session is in the area that disappears, the cursor may also disappear.

For example, if the screen has 24 lines and you divide the screen horizontally, the top window displays only the top 12 lines of that session. If the cursor is between lines 13 and 24, you cannot see the cursor.

To make sure the cursor stays visible, you can use the coupling features in the Display Set-Up screen (Chapter 5).

If you use one or two windows

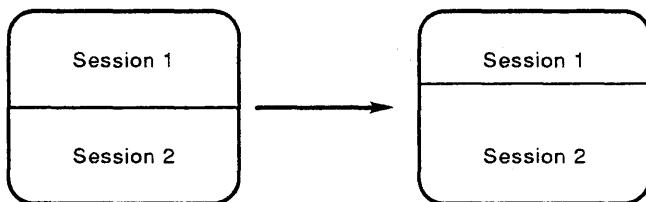
Make sure the **vertical coupling** feature is set to Vertical Coupling.

If your application uses
multiple pages and you move
from page to page in page
memory

Make sure the **page coupling** feature is set to
Page Coupling.

How to Change Window Sizes

When you use two windows, you can change the relative size of the windows. The VT420 displays a border between the two windows. You can move the border up or down:



Press **Shift** **Ctrl** **↑** to move the border up
(or **Shift** **Ctrl** **↓** to move the border down).

To move the
border ...

Press ...

Up

Shift **Ctrl** **↑**

Down

Shift **Ctrl** **↓**

Tips on Using Windows

If the **vertical coupling** feature is enabled, data on the screen may appear to skip up and down when you move the cursor beyond the top and bottom border of a window. The skipping occurs because the VT420 must update the screen to keep the cursor visible.

This problem occurs most often with applications that involve frequent cursor action (for example, word processors). Here are a few suggested solutions.

- Disable the **vertical coupling** feature in the Display Set-Up screen. This step will stop the skipping motion on the screen. However, the cursor will disappear if it moves to an area of the terminal's memory that is not on the screen.

For example, if you split the screen so that each session displays 12 lines of text, the cursor will disappear if it moves to line 13 in either session.

- Set the application to use only the number of lines actually displayed. When you split the screen horizontally, the terminal displays 12 lines in each session by default. Many applications have commands to limit the number of lines available for editing. Here are two examples.
 - Digital's EDT editor has a SET LINES command that lets you specify the number of lines available for editing. If you set the number of lines to match the **lines/screen** feature in the Display Set-Up screen when you use two windows, the skipping motion on the screen stops.
 - Digital's VMS operating system has a SET TERMINAL/PAGE=nn command. This command lets you specify the number of lines used on the screen. Several VMS utilities and applications use this information to limit the number of lines used. If you set the PAGE to one less than the number of displayed lines, applications such as HELP, NOTES, MAIL and the TPU editor (EVE and EDT sections) perform well when you use two windows.

Panning

You can pan the window for the active session, to view more data in page memory. *Panning* a window is similar to panning a camera. When you pan a camera over a subject, you can see different parts of the subject while standing in the same position. When you pan a window, you can see another part of page memory without moving the window on the screen.

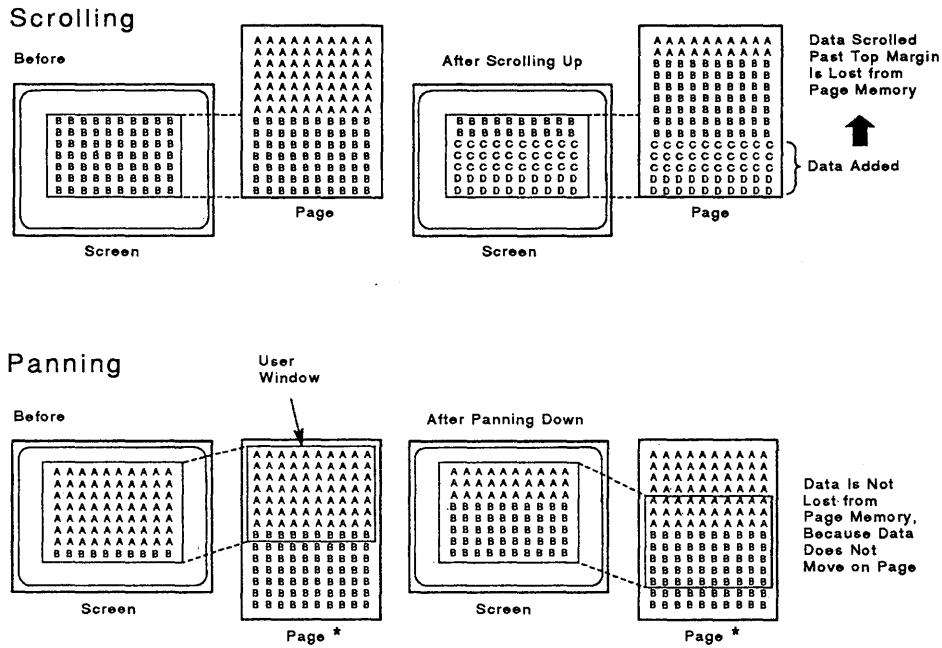
How to Pan

You can pan a window up or down. You can also pan to another page in page memory. To pan a window, you use the following keystrokes:

To pan...	Press...
Up	Ctrl
Down	Ctrl
Back one page	Ctrl Prev
Forward one page	Ctrl Next

The Difference Between Panning and Scrolling

Panning directions are the opposite of scrolling directions. For example, when you pan up, data appears to scroll down on the screen. The following figure shows the difference between scrolling and panning.



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Notes About Panning

- You can only move to another page if memory is divided into more than one page.
- In order to pan on a page, the page size must be larger than the window. The **page arrangement** feature in the Display Set-Up screen (Chapter 5) determines the page size.
- Your cursor may disappear from the screen when you use panning functions. There are two ways you can bring the cursor back on the screen.
 - Look at the status line. It shows you the cursor location. Then use the **Ctrl** and arrow keys to pan the cursor back onto the screen.

- Make sure the two cursor-coupling features—**vertical coupling** and **page coupling**—are enabled in the Display Set-Up screen.

Copying and Pasting Text

The VT420 provides a simple procedure for copying and pasting data within an active session or between two active sessions. The VT420 stores the copied data in a buffer before sending the data to the host. The paste buffer can hold one 24-line page of text data.

Copying Text into the Paste Buffer

To copy text into the paste buffer:

1. Press and hold the **[F1]** (Copy) key down for the rest of the copy operation. If the cursor was not visible, it appears when you press **[F1]** (Copy).

NOTE

Releasing [F1] (Copy) before completing the copy operation cancels the operation.

2. Use the arrow keys to position the cursor at the beginning of the text you want to copy.
3. With the cursor at the beginning of the text you want to copy, press the **[Select]** key.
4. Use the arrow keys to position the cursor one character beyond the end of the text you want to copy. As you move the cursor, the terminal underlines the text you are copying.
5. Press the **[Remove]** key, then release **[F1]** (Copy).

After you complete the copy operation, the terminal places the copied text in the paste buffer and erases the underline from the text on the screen. state.

Pasting Text

After you copy text to the terminal's paste buffer, you can paste the text into an active session. When you paste the text, it appears on the screen as if it were typed from the keyboard. You can paste text into a file. To paste text:

1. If you are editing a file, use the arrow keys to position the cursor where you want to paste the text.

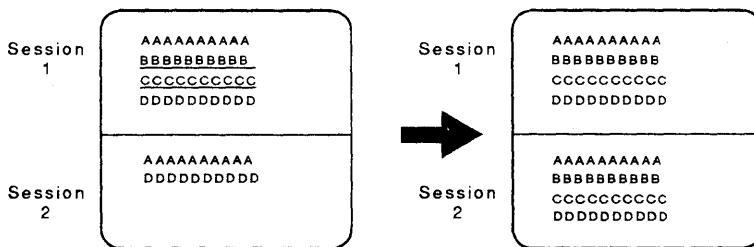
If you are at the command level, text will appear on the command line when you paste it.

2. Press and hold the **F1** (Copy) key down while you press the **Insert** key.
3. Release **F1** (Copy).

The terminal sends a copy of the text in the paste buffer to the active session. The text also remains in the paste buffer until you:

- Copy additional text, or
- Turn the terminal off.

The following figure shows an example of copying and pasting text from one active session to another:



Notes About Copying and Pasting Text

- You can copy up to 24 lines of 132 characters at one time.
- If you try to copy non-ASCII characters, such as graphics information, the VT420 sends blank spaces in place of those characters.
- You cannot copy the visual character attributes of text, such as bolding, underlining, and blinking.
- If you release the **F1** (Copy) key before completing the copy or paste operation, the terminal cancels the operation.
- If you set the transmit baud rate to **Transmit=19200** or higher in the Communications Set-Up screen, a copy and paste operation may send data to the host computer faster than the host can receive the data. When you are using the VMS operating system, type the **SET TERM/HOSTSYNC** command to control data flow and prevent the loss of data.

8

Printers and Modems

You can connect a printer directly to your VT420. This chapter describes the Printer Set-Up screen and the types of printers you can use. The chapter also describes how to use a modem with the terminal.

Printers

The VT420 has a built-in serial printer interface that supports many draft, letter-quality, and laser printers, as well as plotters. Here are some of the Digital printers and plotters you can use with your terminal:

LA Series		Letter-Quality	Laser	Plotter
LA12	LA38	LQP02	LN01	LJ250
LA34	LA50	LQP03	LN03	LJ251
LA35	LA75			
LA36	LA100/LA210			

Connecting a Printer

The VT420 uses the Comm2 port to connect a printer.

1. Connect a DEC-423 cable from the printer to the 6-pin Comm2 connector.
2. Make sure the installation is correct. Check the appropriate cabling section in Chapter 2.

One session (one cable) and a printer

Two sessions with SSU software (one cable) and a printer

NOTE

You cannot connect a printer to the Comm2 port if the VT420 is set up for two sessions using two cables.

Selecting a Print Mode

The VT420 lets you select from three different print modes, using the **print mode** feature in the Printer Set-Up screen (Chapter 5):

- Normal mode (**default**)
- Auto print mode
- Controller mode

The status line (Chapter 4) displays the current print mode setting.

Normal Mode: Printing Pages of Text

This mode lets you print displayed text by using the **F2** (Print) key. *Page* refers to the current page in the terminal's page memory. This page may be larger than the screen. The size of the page depends on two other set-up features.

Feature	Set-Up Screen	Function
Page arrangement	Display Set-Up	Selects the page size. By default the page size is 24 lines, which matches the default screen size.
Printer extent	Printer Set-Up	Lets you print a page or the <i>scrolling region</i> . The scrolling region is the area within the scrolling margins.

Auto Print Mode: Printing Text from the Host System

In this mode, the VT420 sends the current display line to the printer when the cursor moves to the next line after a line feed, form feed, vertical tab, or autowrap. Auto print mode lets you print each line as it is received from the host.

While selected, Auto Print Mode appears on the status line. You can still perform printing functions with the **F2** (Print) key in auto print mode.

You can also turn auto print mode on and off by pressing **Ctrl F2** (Print). When you leave auto print mode, you return to normal print mode.

Printer Controller Mode: Letting the Host Control Printing

In this mode, the host system can send text directly to the printer, without displaying the text on the terminal's screen.

While selected, Printer: Controller appears on the status line.

You cannot use the **F2** (Print) key in printer controller mode.

Local Controller Mode: Setting Up the Printer

This mode lets you send information directly from the keyboard to the printer, without displaying the information on the screen. You may find this feature useful in setting up certain printers for operation, without involving the host system. To select local controller mode, you must set two different set-up features (Chapter 5).

1. Set the **on-line/local** feature in the Global Set-Up screen to Local.
2. Set the **print mode** feature in the Printer Set-Up screen to Controller Mode.

Assigning a Printer in Two Sessions

The VT420 lets you assign a printer exclusively to one session or share the printer with both sessions. To assign the printer, you use the **printer assignment** feature in the Global Set-Up screen. There are three possible settings:

Printer shared (**default**)

Printer session 1

Printer session 2

NOTE

The printer assignment feature is not enabled if the printer port is assigned as a normal communication port for one of the sessions (in the Global Set-Up screen).

Printer Set-Up Screen

This screen lets you select features to match those of your printer. Table 8-1 describes the features on the Printer Set-Up screen.

Notes About Printing

- If you enter set-up while printing, the VT420 temporarily suspends print operations. When you leave set-up, the printer resumes print operations.
- For two sessions: the VT420 can save only one version of printer communication set-up features (**printer to host comm**, **print speed**, **flow control**, **character format**, and **stop bits**), because both sessions share one printer line.
- Make sure the **printer assignment** feature on the Global Set-Up screen (Chapter 5) is set to **Printer Shared** or to the session number you want to print from (1 or 2).

NOTE

The Printer Set-Up screen only appears if the terminal comm ports feature on the Global Set-Up screen is set to Sessions on Comm1 or S1=Comm1.

Printer Set-Up**VT420 AV1.0**

To Next Set-Up To Directory Speed=4800 No Printer To Host
 Normal Print Mode XOFF 8 Bits, No Parity 1 Stop Bit
 Print Full Page Print National Only No Terminator

1 (002,003)

Session 1

Printer: Ready Modem: DSR

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Table 8-1 Printer Set-Up Features

Feature and Settings	Description
Transmit speed/ receive speed Speed=4800	Selects the baud rate the VT420 uses to send data to a printer. The baud rates range from 300 to 38,400 bits per second.
Printer to host comm No Printer to Host	Selects whether or not the printer can send data to the host system. Data can only move from host to printer.
Printer to Host	Data can move from host to printer and from printer to host.
Print mode Normal Print Mode	Determines when and how printing takes place. Lets you start print functions from the keyboard.
Auto Print Mode	Prints the current line of text when the VT420 receives a line feed, form feed, or vertical tab from the host.
Controller Mode	Lets the host send data directly to the printer without displaying the data on the screen.

Default settings are in bold type.

Table 8-1 (Cont.) Printer Set-Up Features

Feature and Settings	Description
XOFF	Selects whether or not to use XON/XOFF flow control with the printer.
XOFF	
No XOFF	
NOTE	XON/XOFF flow control operates independently between the terminal and printer, and between the terminal and host.
Data bits/parity	Selects a character format to match the printer's.
8 Bits, No Parity	You can select 7 bits (no, even, odd, mark, or space parity) or 8 bits (no, even, or odd parity).
Stop bits	Selects the number of stop bits (one or two) used by the printer port UART.
1 Stop Bit	
2 Stop Bits	
Print Extent	Selects how much of the screen to print when you press the F2 (Print) key.
Print Full Page	
Print Scroll Region	
Printed data type	Lets you restrict the character sets used for printing, so they match the capabilities of the attached printer.
Print National Only	Use with a printer that supports the ASCII set (in 8-bit multinational mode) or the current national set (in 7-bit national mode). Examples: LA34, LA36, and LA120 printers.
National and Line Drawing	Use with a printer that supports the VT100 line drawing set and (1) the ASCII set (in 8-bit multinational mode), or (2) the current national set (in 7-bit national mode). Example: LA100.
Print All Characters	Use with a printer that supports the multinational and line drawing sets. Example: LA50.
Print Terminator	Selects whether or not the VT420 sends a form feed (FF) at the end of a print operation.
No Terminator	
Terminator = FF	

Default settings are in bold type.

Modems

You need a modem if you want to connect your VT420 to a computer system through a telephone line. The modem converts the serial characters sent between the terminal and computer into signals that can travel over telephone lines.

The VT420 can operate with full-duplex, asynchronous modems that meet the following national and international standards. The modem you use with your VT420 must be compatible with the modem used by the host system.

EIA 232-D
CCITT V.24
CCITT V.28
CCITT V.10
ISO 2110.2

Connecting to a Modem

You can use Digital's DF124, DF212, DF224, and DF242 modems with the VT420. You can also use compatible modems and acoustic couplers, such as the AT&T's 103, 113, and 212 types. See Appendix B for information on ordering modems.

To connect one of these standard modems to the VT420:

1. Connect the modem cable to the 6-pin DEC-423 connector on the rear of the terminal, or use a cable and adapter.
2. Go to the Communication Set-Up screen (Chapter 5).
3. Set the **modem control** feature to the appropriate setting:

Modem Control	If you plan to use modem features that require additional signals beyond data leads only. Examples: call origination and dialing from the keyboard, automatic speed select, and disconnect on loss of carrier or when Shift F5 (Break) is pressed.
---------------	---

Data Leads Only	If you do not plan to use modem control features or your modem (or modem cable) is not configured for modem control.
-----------------	--

4. While in the Communications Set-Up screen, set the **transmit speed** and **receive speed** features to match your modem's settings.

VT420 Programming Summary

This chapter is a summary of the control functions and commands described in the *VT420 Programmer Reference Manual*. Programmers can use this chapter as a quick-reference tool.

NOTE

The application of the control functions and commands on the VT420 effects each session independently.

The chapter is divided into sections that correspond to the chapters of the *VT420 Programmer Reference Manual*. For example, to find out more about

2 Character Encoding

you would go to Chapter 2 of the *VT420 Programmer Reference Manual*.

Section	Section
2 Character Encoding	9 Rectangular Area Operations
3 Keyboard Codes	10 Cursor Movement and Panning
4 Emulating VT Terminals	11 Keyboard, Printing, and Display Commands
5 Using Character Sets	12 VT420 Reports
6 Page Memory	13 Resetting and Testing the Terminal
7 Setting Visual Character and Line Attributes	14 Session Management
8 Editing	A VT52 Mode Control Codes

2 Character Encoding

DEC Multinational Character Set

		Column b6 b7 b6 b5 b4 b3 b2 b1 Row b4 b3 b2 b1	0	1	2	3	4	5	6	7	
Left Half—U.S. ASCII Character Set										Right Half—DEC Supplemental Character Set	
		DLE	SP	0	0	@	P	0	P		
0	• • • •	NUL	•	•	•	•	•	•	•	Column b6 b7 b6 b5 b4 b3 b2 b1 Row b4 b3 b2 b1	
1	• • • •	SOH	DC1	1	1	A	Q	1	a	1	
2	• • • •	STX	DC2	2	2	B	R	b	r	162	
3	• • • •	ETX	DC3	3	3	C	S	c	s	163	
4	• • • •	EOT	DC4	4	4	D	T	d	t	164	
5	• • • •	ENQ	NAK	%	5	E	U	e	u	165	
6	• • • •	ACK	SYN	&	6	F	V	f	v	166	
7	• • • •	BEL	ETB	*	7	G	W	g	w	167	
8	• • • •	BS	CAN	(8	H	X	h	x	168	
9	• • • •	HT	EM)	9	I	Y	i	y	169	
10	• • • •	LF	SUB	*	10	J	Z	j	z	170	
11	• • • •	VT	ESC	+	11	K	[k	[171	
12	• • • •	FF	FS	,	12	L	\	l	\	172	
13	• • • •	CR	GS	=	13	M]	m]	173	
14	• • • •	SO	RS	>	14	N	A	n	~	174	
15	• • • •	SI	US	?	15	O	E	o	DEL	175	

← C0 Codes → ← GL Codes (ASCII Graphic) → →

Key

Character	ESC	33 Octal	33 Decimal
		19 Hex	

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		8	9	10	11	12	13	14	15	
Right Half—DEC Supplemental Character Set										Column b6 b7 b6 b5 b4 b3 b2 b1 Row b4 b3 b2 b1
		DCS	•	•	•	•	•	•	•	0
0	• • • •	PU1	221	241	261	281	301	321	341	361
1	• • • •	PU2	222	242	262	282	302	322	342	362
2	• • • •	STS	223	243	263	283	303	323	343	363
3	• • • •	IND	224	244	264	284	304	324	344	364
4	• • • •	CCH	225	245	265	285	305	325	345	365
5	• • • •	NEL	226	246	266	286	306	326	346	366
6	• • • •	SSA	227	247	267	287	307	327	347	367
7	• • • •	ESA	228	248	268	288	308	328	348	368
8	• • • •	HTS	229	249	269	289	309	329	349	369
9	• • • •	HTJ	230	250	270	290	310	330	350	370
10	• • • •	VTS	231	251	271	291	311	331	351	371
11	• • • •	PLD	232	252	272	292	312	332	352	372
12	• • • •	PLU	233	253	273	293	313	333	353	373
13	• • • •	RI	234	254	274	294	314	334	354	374
14	• • • •	SS2	235	255	275	295	315	335	355	375
15	• • • •	SS3	236	256	276	296	316	336	356	376

← C1 Codes → ← GR Codes (DEC Supplemental Graphic) → →

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DEC Special Graphics Character Set

Column	0	1	2	3	4	5	6	7
Row	b7 b6 b5 b4 b3 b2 b1 b0							
0	NUL	DLE	SP	@	P	DEL		
1	SOH	DC1	I	A	Q	ECAN 3		
2	STX	DC2	^	B	H	ECAN 5		
3	ETX	DC3	#	C	S	F	ECAN 9	
4	EOT	DC4	\$	D	T	ECAN 13		
5	ENQ	NAK	%	E	U	ECAN 17		
6	ACK	SYN	&	F	V	ECAN 21		
7	BEL	ETB	*	G	W	ECAN 25		
8	BS	CAN	(H	X	ECAN 29		
9	HT	EM)	Y	Z	ECAN 33		
10	LF	SUB	*	J	Z	ECAN 37		
11	VT	ESC	+	K	^	ECAN 41		
12	FF	FS	-	L	_	ECAN 45		
13	CR	GS	=	M		ECAN 49		
14	SO	RS	>	N	~	ECAN 53		
15	SI	US	?	O	DEL	ECAN 57		

← C0 Codes → ← GL Codes (DEC Special Graphic) →

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Key
Character: [ESC] [27] Octal
[IB] Decimal
[Hex]

ISO Latin-1 Supplemental Character Set

Column	8	9	10	11	12	13	14	15	Row
b7 b6 b5 b4 b3 b2 b1 b0	DCS	NBSP	A	A	A	A	A	A	0
1	PU1	i	+	A	N	O	O	O	1
2	PU2	¢	2	A	l	o	o	o	2
3	STS	£	3	A	á	é	í	ó	3
IND	CCH	¤	4	A	â	ê	î	ô	4
NEL	MW	¥	5	A	ä	ë	ï	ö	5
SSA	SPA	‰	6	A	æ	œ	œ	œ	6
ESA	EPA	§	7	A	ç	ç	ç	ç	7
HTS	n	8	A	E	ø	ø	ø	ø	8
HTJ	©	9	A	E	ú	ú	ú	ú	9
VTS	a	10	A	E	û	û	û	û	10
PLD	CSI	11	A	E	û	û	û	û	11
PLU	ST	12	A	E	û	û	û	û	12
R1	OSC	13	A	E	û	û	û	û	13
SS2	PM	14	A	E	û	û	û	û	14
SS3	APC	15	A	E	û	û	û	û	15

← C1 Codes → ← GR Codes (ISO Latin-1-Supplemental Graphic) →

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DEC Technical Character Set

b7	b6	b5	b4	b3	b2	b1	b0	b7	b6	b5	b4	b3	b2	b1	b0	b7	b6	b5	b4	b3	b2	b1	b0	
Bits				GL GR		GL GR		GL GR		GL GR		GL GR		GL GR		GL GR		GL GR		GL GR		GL GR		
				Column		Row																		
Row	Column																							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key Group
Character: **GL** Octal Decimal Hex

* Note:
When Set to Mapped into GR
Bit B0 is 1

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Control Characters

C0 (7-Bit) Control Characters Recognized

Name	Mnemonic	Column/Row	Function
Null	NUL		NUL has no function 0/0 (ignored by the terminal).
Enquiry	ENQ	0/5	Sends the answerback message. (Communications Set-Up)
Bell	BEL	0/7	Sounds the bell tone if the bell is enabled in the Keyboard Set-Up.
BS	BS	0/8	Moves the cursor one character position to the left. If the cursor is at the left margin, no action occurs.

Name	Mnemonic	Column/Row	Function
Horizontal tab	HT	0/9	Moves the cursor to the next tab stop. If there are no more tab stops, the cursor moves to the right margin. HT does not cause text to auto wrap.
Line feed	LF	0/10	Causes a line feed or a new line operation, depending on the setting of line feed/new line mode.
Vertical tab	VT	0/11	Treated as LF.
Form feed	FF	0/12	Treated as LF.

Name	Mnemonic Column/Row	Function	Name	Mnemonic Column/Row	Function
Carriage return	CR 0/13	Moves the cursor to the left margin on the current line.	Substitute	SUB 1/10	Immediately cancels an escape sequence, control sequence, or device control string in progress. The VT420 displays a reverse question mark for an error character.
Shift out Locking (shift 0)	SO (LS1) 0/14	Maps the G1 character set into GL. You designate G1 by using a select character set (SCS) sequence.	Escape	ESC 1/11	Introduces an escape sequence. ESC also cancels any escape sequence, control sequence, or device control string in progress.
Shift in Locking (shift 0)	SI (LS0) 0/15	Maps the G0 character set into GL. You designate G0 by using a select character set (SCS) sequence.	Delete	DEL 7/15	Ignored when received, unless a 96-character set is mapped into GL. DEL is not used as a fill character. Digital does not recommend using DEL as a fill character. Use NUL instead.
Device control 1 XON)	DC1 1/1	Also known as XON. If XON/XOFF flow control is enabled in the Communications Set-Up, DC1 clears DC3 (XOFF). This action causes the VT420 to continue sending characters.			
Device control 3 XOFF)	DC3 1/3	Also known as XOFF. If XON/XOFF flow control is enabled in the Communications Set-Up, DC3 causes the VT420 to stop sending characters. The terminal cannot resume sending characters until it receives a DC1 control character.			
Device control 4	DC4 1/4	Introduces an SSU session management command. The VT420 and host use this control to separate SSU commands from ANSI text and control functions.			
Cancel	CAN 1/8	Immediately cancels an escape sequence, control sequence, or device control string in progress. The VT420 does not display any error characters.			

C1 (8-Bit) Control Characters Recognized

Name	Mnemonic Column/Row	Function
Index	IND 8/4	Moves the cursor down one line in the same column. If the cursor is at the bottom margin, the page scrolls up.
Next line	NEL 8/5	Moves the cursor to the first position on the next line. If the cursor is at the bottom margin, the page scrolls up.
Horizontal tab set	HTS 8/8	Sets a horizontal tab stop at the column where the cursor is.

Name	Mnemonic Column/Row	Function
Reverse index	RI 8/13	Moves the cursor up one line in the same column. If the cursor is at the top margin, the page scrolls down.
Single shift 2	SS2 8/14	Temporarily maps the G2 character set into GL, for the next graphic character. You designate the G2 set by using a select character set (SCS) sequence.
Single shift 3	SS3 8/15	Temporarily maps the G3 character set into GL, for the next graphic character. You designate the G3 set by using a select character set (SCS) sequence.
Device control string	DCS 9/0	Introduces a device control string. Used for loading function keys or a soft character set.
Start of string	SOS 9/8	Ignored.
DEC private identification	DECID 9/10	Makes the terminal send its device attributes response to the host (same as an ANSI device attributes (DA) sequence). Programs should use the ANSI DA sequence instead.
NOTE		
If the printer is in controller mode, the terminal sends the sequence to the printer.		
Control sequence introducer	CSI 9/11	Introduces a control sequence.
String terminator	ST 9/12	Ends a device control string. You use ST in combination with DCS.

Name	Mnemonic Column/Row	Function
Operating system command	OSC 9/13	Introduces an operating system command.*
Privacy message	PM 9/14	Introduces a privacy message string.*
Application program command	APC 9/15	Introduces an application program command.*

*The VT420 ignores all following characters until it receives a SUB, ST, or any other C1 control character.

8-Bit Control Characters and Their 7-Bit Equivalents

Name	8-Bit Character	7-Bit Sequence
Index	IND	ESC D
Next line	NEL	ESC E
Horizontal tab set	HTS	ESC H
Reverse index	RI	ESC M
Single shift 2	SS2	ESC N
Single shift 3	SS3	ESC O
Device control string	DCS	ESC P
Start of string	SOS	ESC X
DEC private identification	DECID	ESC Z
Control sequence introducer	CSI	ESC [
String terminator	ST	ESC \
Operating system command	OSC	ESC]
Privacy message	PM	ESC ^
Application program	APC	ESC _

18 VT420 Programming Summary

Using Macros

The VT420 lets you define and invoke macros to suit the needs of your application. A *macro* is a string of ANSI text and commands downloaded into the terminal. By invoking the macro, you can execute a group of control functions with one operation.

Name	Mnemonic	Sequence
Define macro	DECDMAC	DCS Pid ; Pdt ; Pen ! z D...D ST
		Pid = macro ID number (0-63). Pdt = macros to delete first. 0 = delete all current macros. 1 = delete all current macros. Other = terminal ignores the macro. Pen = encoding format for macro text. 0 = standard ASCII characters. 1 = hex pairs for each ASCII character. Other = terminal ignores the macro. D..D = control string data. ! = repeat sequence introducer.

Display Controls Mode

Display Controls Font (Left Half)

Column	0	1	2	3	4	5	6	7
Row	b4 b5 b2 b1	b6	b7	b8	b9	b10	b11	b12
0	+	*	^	°	°	°	°	°
1	S	O	H	I	D	L	O	P
2	T	X	E	T	D	C	G	R
3	E	T	X	S	D	C	S	T
4	E	O	T	S	D	C	T	D
5	E	N	Q	N	A	K	U	U
6	A	C	K	S	Y	N	F	V
7	B	E	L	E	T	B	G	W
8	B	S	C	A	N	(H	X
9	H	T	E	M)	9	I	Y
10	L	F	?	?	?	J	Z	j
11	V	T	E	S	C	+	K	{
12	F	F	F	S	S	<	L	
13	C	R	G	S	S	;	J	m
14	S	O	R	S	S	;	N	n
15	S	I	U	U	S	?	O	D

← C0 Codes → ← GL Codes (ASCII Graphic) →

Key

Character	[ESC]	Octal Decimal Hex
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Display Controls Font (Right Half)

Column	8	9	10	11	12	13	14	15	Column
Row	b4 b5 b2 b1	b6	b7	b8	b9	b10	b11	b12	b4 b5 b2 b1
0	+	*	^	°	°	°	°	°	+
1	S	O	H	I	D	L	O	P	S
2	T	X	E	T	D	C	G	R	T
3	E	T	X	S	D	C	S	T	E
4	E	O	T	S	D	C	T	D	O
5	E	N	Q	N	A	K	U	U	N
6	A	C	K	S	Y	N	F	V	A
7	B	E	L	E	T	B	G	W	E
8	B	S	C	A	N	(H	X	S
9	H	T	E	M)	9	I	Y	T
10	L	F	?	?	?	J	Z	j	F
11	V	T	E	S	C	+	K	{	T
12	F	F	F	S	S	<	L		F
13	C	R	G	S	S	;	J	m	R
14	S	O	R	S	S	;	N	n	O
15	S	I	U	U	S	?	O	D	I

← C1 Codes → ← GR Codes (ISO Latin-1 Supplemental Graphic) →

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Codes Sent by Numeric Keypad Keys

Keyboard Codes

Codes Sent by Editing Keys

Code Sent		
Key	VT400 Mode	VT100, VT52 Modes
Find	CSI 1 ~	The editing keys do not send codes in these two modes.
Insert Here	CSI 2 ~	
Remove	CSI 3 ~	
Select	CSI 4 ~	
Prev	CSI 5 ~	
Next	CSI 6 ~	

Codes Sent by Arrow Keys

Cursor Key Mode Setting (DECCCKM)			
ANSI Mode*		VT52 Mode*	
Key	Cursor	Application	Cursor or Application
↑	CSI A	SS3 A	ESC A
↓	CSI B	SS3 B	ESC B
→	CSI C	SS3 C	ESC C
←	CSI D	SS3 D	ESC D

*ANSI mode applies to VT400 and VT100 modes. VT52 mode is not compatible with ANSI standards.

Numeric Keypad Mode Setting (DECNKM)

ANSI Mode* VT52 Mode*

Key	Numeric	Application	Numeric	Application
0	0	SS3 p	0	ESC ? p
1	1	SS3 q	1	ESC ? q
2	2	SS3 r	2	ESC ? r
3	3	SS3 s	3	ESC ? s
4	4	SS3 t	4	ESC ? t
5	5	SS3 u	5	ESC ? u
6	6	SS3 v	6	ESC ? v
7	7	SS3 w	7	ESC ? w
8	8	SS3 x	8	ESC ? x
9	9	SS3 y	9	ESC ? y
-	(minus)	SS3 m	-	ESC ? m
,	(comma)	SS3 l	,	ESC ? l †
.	(period)	SS3 n	.	ESC ? n
Enter	CR or CR LF‡	SS3 M	CR or CR LF‡	ESC ? M
PF1	SS3 P	SS3 P	ESC P	ESC P
PF2	SS3 Q	SS3 Q	ESC Q	ESC Q
PF3	SS3 R	SS3 R	ESC R	ESC R
PF4	SS3 S	SS3 S	ESC S	ESC S

*ANSI mode applies to VT400 and VT100 modes. VT52 mode is not compatible with ANSI standards.

†You cannot use these sequences on a VT52 terminal.

‡Keypad numeric mode. [Enter] sends the same codes as [Return]. You can use line feed/new line mode (LNM) to change the code sent by [Return]. When LNM is reset, pressing [Return] sends one control character (CR). When LNM is set, pressing [Return] sends two control characters (CR, LF).

Codes Sent by the Top-Row Function Keys

Code Sent			
Legend	Key Number	VT400 mode	VT100, VT52 modes
Hold	F1*	—	—
Print	F2*	—	—
Set-Up	F3*	—	—
Session	F4*	—	—
Break	F5*	—	—
F6	F6	CSI 1 7 ~	—
F7	F7	CSI 1 8 ~	—
F8	F8	CSI 1 9 ~	—
F9	F9	CSI 2 0 ~	—
F10	F10	CSI 2 1 ~	—
F11 (ESC)	F11	CSI 2 3 ~	ESC
F12 (BS)	F12	CSI 2 4 ~	BS
F13 (LF)	F13	CSI 2 5 ~	LF
F14	F14	CSI 2 6 ~	—
Help	F15	CSI 2 8 ~	—
Do	F16	CSI 2 9 ~	—
F17	F17	CSI 3 1 ~	—
F18	F18	CSI 3 2 ~	—
F19	F19	CSI 3 3 ~	—
F20	F20	CSI 3 4 ~	—

*F1 through F5 are local function keys that do not send codes.

Keys Used to Send 7-Bit Control Characters

Control Character Mnemonic	Code Table Position	Key Pressed With Ctrl (All Modes)	Dedicated Function Key
NUL	0/00	2 or space bar	—
SOH	0/01	A	—

Control Character Mnemonic	Code Table Position	Key Pressed With Ctrl (All Modes)	Dedicated Function Key
STX	0/02	B	—
ETX	0/03	C	—
EOT	0/04	D	—
ENQ	0/05	E	—
ACK	0/06	F	—
BEL	0/07	G	—
BS	0/08	H	F12 (BS)*
HT	0/09	I	Tab
LF	0/10	J	F13 (LF)*
VT	0/11	K	—
FF	0/12	L	—
CR	0/13	M	Return
SO	0/14	N	—
SI	0/15	O	—
DLE	1/00	P	—
DC1	1/01	Q†	—
DC2	1/02	R	—
DC3	1/03	S†	—
DC4	1/04	T	—
NAK	1/05	U	—
SYN	1/06	V	—
ETB	1/07	W	—
CAN	1/08	X	—
EM	1/09	Y	—
SUB	1/10	Z	—
ESC	1/11	3 or [F11 (ESC)*
FS	1/12	4 or /	—
GS	1/13	5 or]	—
RS	1/14	6 or ~	—
US	1/15	7 or ?	—
DEL	7/15	8	Delete

*7-bit control characters sent in VT100 or VT52 modes only.

†7-bit control codes sent only when XON/XOFF support is off.

Emulating VT Series Terminals

Selecting an Operating Level (DECSCL)

Sequence	Level Selected
	<i>Level 1</i>
CSI 6 1 " p	VT100 mode
	<i>Level 4*</i>
CSI 6 n " p	VT400 mode, 8-bit controls
CSI 6 n ; 0 " p	VT400 mode, 8-bit controls
CSI 6 n ; 1 " p	VT400 mode, 7-bit controls (D)
CSI 6 n ; 2 " p	VT400 mode, 8-bit controls

Level 4 includes levels 2 and 3. In these sequences, *n* can be 2 or 3, or 4
D) = default

Sending C1 Controls to the Host

Sequence	Mode Before	Mode After
<i>7-Bit Controls (S7C1T)</i>		
ESC sp F	VT400 mode, 8-bit controls	VT400 mode, 7-bit controls
	VT400 mode, 7-bit controls	Same. Terminal ignores sequence.
	VT100 or VT52 mode	Same. Terminal ignores sequence.
<i>8-Bit Controls (S8C1T)</i>		
ESC sp G	VT400 mode, 8-bit controls	Same. Terminal ignores sequence.
	VT400 mode, 7-bit controls	VT400 mode, 8 bit controls
	VT100 or VT52 mode	Same. Terminal ignores sequence.

Using Character Sets

Selecting Graphic Character Sets

1. Designate the set as G0, G1, G2, or G3.
2. Map the designated set into the in-use table.

Designating Character Sets (SCS Sequences)

You designate a hard character set as G0 through G3 by using a select character set (SCS) escape sequence. You cannot designate a 96-character set as G0.

Format:

ESC I₁ I₂ ... I_n F

I₁, intermediate character

Designates the character set as G0, G1, G2, or G3.

I ₁ Character	Code	Set Selection
94-Character Sets		
(2/8	G0 (initial setting for GL)
)	2/9	G1
*	2/10	G2 (initial setting for GR)
+	2/11	G3
96-Character Sets*		
-	2/13	G1
.	2/14	G2
/	2/15	G3

*You cannot designate a 96-character set into G0.

I₂...I_n F, intermediate and final characters
Selects one of the following standard character sets:

Character Set	I ₂ ...I _n F Characters	Code
94-Character Sets		
ASCII (initial G1 and G0 setting)	B	4/2
DEC Supplemental Graphic (initial G2 and G3 setting)	%5	2/5, 3/5
DEC Special Graphics	0	3/0
DEC Technical	>	3/14
User-preferred supplemental	<	3/12
96-Character Sets		
ISO Latin-1 Supplemental	A	4/1

Mapping Character Sets

After you designate a character set as G0, G1, G2, or G3, you must map the set into the in-use table as GL or GR. To map a set, you use *locking-shift* or *single-shift* control functions.

Locking Shifts (LS)

When you use a locking shift, the character set remains in GL or GR until you use another locking shift.

Name	Mnemonic	Code	Maps ...
Locking shift G0	LS0	SI	G0 into GL. (default)
Locking shift G1	LS1	SO	G1 into GL.
The following locking shift functions are available only in VT400 mode.			
Locking shift G1 right	LS1R	ESC ~	G1 into GR.
Locking shift G2	LS2	ESC n	G2 into GL.
Locking shift G2 right	LS2R	ESC }	G2 into GR.

Locking shift G3	LS3	ESC o	G3 into GL.
Locking shift G3 right	LS3R	ESC	G3 into GR.

Single Shifts (SS)

You use a single shift when you want to display the next character from a different character set. A single shift maps the G2 or G3 set into GL. The character set is active for only one character. Then the terminal returns to the previous character set in GL.

Name	8-Bit Code	7-Bit Code	Function
Single shift 2	SS2	ESC N	Maps G2 into GL for the next character.
Single shift 3	SS3	ESC O	Maps G3 into GL for the next character.

Assigning User-Preferred Supplemental Sets (DECAUPSS)

Default: DEC Supplemental Graphic

Sequence	Set Selected
DCS 0 ! u % 5 ST	DEC Supplemental Graphic
DCS 1 ! u A ST	ISO Latin-1 supplemental

ANSI Conformance Levels

ESC sp Final

Final ANSI Conformance Level

L	Level 1
M	Level 2
N	Level 3

Soft Character Sets

You can only load soft character sets in VT400 mode.

Character Cell Sizes

Cell Size	80 Columns	132 Columns
<i>4 lines/screen</i>		
Width	10 pixels	6 pixels
Height	16	16
<i>3 lines/screen</i>		
Width	10	6
Height	10	10
<i>3 lines/screen</i>		
Width	10	6
Height	8	8

Binary Value	Hex Value	Hex Value + 3F Offset	Character Equivalent
001111	F	4E	N
010000	10	4F	O
010001	11	50	P
010010	12	51	Q
010011	13	52	R
010100	14	53	S
010101	15	54	T
010110	16	55	U
010111	17	56	V
011000	18	57	W

Converting Binary Code to an ASCII Character

Binary Value	Hex Value	Hex Value + 3F Offset	Character Equivalent
00000	00	3F	?
00001	01	40	@
00010	02	41	A
00011	03	42	B
00100	04	43	C
00101	05	44	D
00110	06	45	E
00111	07	46	F
01000	08	47	G
01001	09	48	H
01010	A	49	I
01011	B	4A	J
01100	C	4B	K
01101	D	4C	L
01110	E	4D	M
101000	28	67	g
101001	29	68	h
101010	2A	69	i
101011	2B	6A	j
101100	2C	6B	k

Binary Value	Hex Value	Hex Value + 3F Offset	Character Equivalent
101101	2D	6C	l
101110	2E	6D	m
101111	2F	6E	n
110000	30	6F	o
110001	31	70	p
110010	32	71	q
110011	33	72	r
100100	34	73	s
110101	35	74	t
110110	36	75	u
110111	37	76	v
111000	38	77	w
111001	39	78	x
111010	3A	79	y
111011	3B	7A	z
111100	3C	7B	{
111101	3D	7C	
111110	3E	7D	}
111111	3F	7E	~

Downloading Soft Characters

Use the following sequence format:

**DCS Pfn ; Pcn; Pe; Pcmw; Pss; Pt; Pcmh; Pcss { Dscs
Sxbp1 ; Sxbp2 ;...; Sxbpn ST**

DECSDL Parameter Characters

Parameter	Name	Description
Pfn	Font number	Selects the DRCS font buffer to load. Each session has only one font buffer. Pfn has two valid values, 0 and 1. Both values refer to DRCS buffer 1 for each session.
Pcn	Starting character	Selects where to load the first character in the DRCS font buffer. The location corresponds to a location in the ASCII code table. For example, a Pcn value of 0 means that the first soft character is loaded into position 2/0 of the character table. A Pcn value of 1 means position 2/1 in the table, and so on up to Pcn = 95 (position 7/15).
		Pcn is affected by the character set size. See Pcss below.
Pe	Erase control	Selects which characters to erase from the DRCS buffer before loading the new font.
0	=	erase all characters in the DRCS buffer with this number, width and rendition.
1	=	erase only characters in locations being reloaded.
2	=	erase all renditions of the soft character set (normal, bold, 80-column, 132-column).

NOTE

Erased characters are undefined (not blank). The terminal displays these characters as the error character (reverse question mark).

Parameter Name		Description	Parameter Name		Description
'cmw	Character matrix width	Selects the maximum character cell width. <i>VT400 mode</i>	Pss	Font set size	Defines the screen width and screen height for this font.
0	=	10 pixels wide for 80 columns, 6 pixels wide for 132 columns. (default)		0,1 =	80 columns, 24 lines. (default)
1	=	illegal.		2 =	132 columns, 24 lines
2	=	5 × 10 pixel cell (VT220 compatible).		11 =	80 columns, 36 lines
3	=	6 × 10 pixel cell (VT220 compatible).		12 =	132 columns, 36 lines
4	=	7 × 10 pixel cell (VT220 compatible).		21 =	80 columns, 48 lines
5	=	5 pixels wide.		22 =	132 columns, 48 lines
6	=	6 pixels wide.			
10	=	10 pixels wide.			If the number of columns or lines per screen changes, the terminal uses the appropriate variation of the soft set. If you try to display a DRCS character when there is no soft set defined for the current number of lines and columns, the terminal displays the error character (reverse question mark).
Pt		Text or full cell		Defines the font as a text font or <i>full-cell font</i> .	
0	=	text. (default)		0 =	text. (default)
1	=	text.		1 =	text.
2	=	full cell.		2 =	full cell.
					Full-cell fonts can individually address all pixels in a cell.
					Text fonts cannot individually address all pixels. If you specify a text cell, the terminal automatically performs spacing and centering of the characters.

Parameter Name	Description												
Pcmh	<p>Character matrix height</p> <p>0 or omitted = 16 pixels high. (default)</p> <table> <tr><td>1</td><td>=</td><td>1 pixel high.</td></tr> <tr><td>2</td><td>=</td><td>2 pixels high.</td></tr> <tr><td>3</td><td>=</td><td>3 pixels high.</td></tr> <tr><td>16</td><td>=</td><td>16 pixels high.</td></tr> </table> <p>Pcmh values over 16 are illegal. If the value of Pcmw is 2, 3, or 4, Pcmh is ignored.</p>	1	=	1 pixel high.	2	=	2 pixels high.	3	=	3 pixels high.	16	=	16 pixels high.
1	=	1 pixel high.											
2	=	2 pixels high.											
3	=	3 pixels high.											
16	=	16 pixels high.											
Pcss	<p>Character set size</p> <p>0 = 94-character set. (default)</p> <p>1 = 96-character set.</p> <p>The value of Pcss changes the meaning of the Pcn (starting character) parameter above.</p>												

Examples

- If Pcss = 0 (94-character set)**
The terminal ignores any attempt to load characters into the 2/0 or 7/15 table positions.
Pcn Specifies
1 column 2/row 1

94 column 7/row 14
- If Pcss = 1 (96-character set)**
Pcn Specifies
0 column 2/row 0

95 column 7/row 15

Dscs

defines the name for the soft character set. You use this name in the select character set (SCS) escape sequence. You use the following format for the Dscs name:

I F

- I** is 0, 1 or 2 intermediate characters from the range 2/0 to 2/15 in the ASCII character set.
F is a final character in the range 3/0 to 7/14.

Sxbp1 ; Sxbp2 ; ... ; Sxbpn

are the sixel bit patterns for individual characters, separated by semicolons (3/11). Your character set can have 1 to 94 patterns or 1 to 96 patterns, depending on the setting of the character set size parameter (Pcss). Each sixel bit pattern is in the following format:

S...S/S...S

the first **S...S**
represents the upper columns of the soft character.

/ (2/5)

advances the sixel pattern to the lower columns of the soft character.

the second S...S

represents the sixels in the lower columns of the soft character.

ST

is the *string terminator*. ST is an 8-bit C1 character. You can use the equivalent 7-bit sequence ESC \ (1/11, 5/12) when coding for a 7-bit environment.

Valid DECDLD Parameter Combinations

Pt	Pcmw	Pcmh	Pss*
<i>80-Column, 24 lines</i>			
0 or 1	0 to 8	0 to 16	0 or 1
2	0 to 10	0 to 16	0, 1

Pt	Pcmw	Pcmh	Pss*
132-column, 24 lines			
) or 1	0 to 5	0 to 16	2
2	0 to 6	1 to 16	2
90-column, 36 lines			
) or 1	0 to 8	0 to 10	11
2	0 to 10	0 to 10	11
132-column, 36 lines			
) or 1	0 to 5	0 to 10	12
2	0 to 6	0 to 10	12
90-column, 48 lines			
) or 1	0 to 8	0 to 8	21
2	0 to 10	0 to 8	21
132-column, 48 lines			
) or 1	0 to 5	0 to 8	22
2	0 to 6	0 to 8	22

*The default values are the maximum legal values in each case.

Clearing a Soft Character Set

You can clear a soft character set that you loaded into the terminal by using the following DECDLD control string:

DCS 1;1;2 { sp @ ST

Any of the following actions also clear the soft character set:

- Performing the power-up self-test.
- Selecting Recall or Default in the Set-Up Directory.
- Using a reset to initial state (RIS) sequence.

6 Page Memory

Setting the Page Format

Name	Mnemonic	Sequence
Set columns per page	DECSCPP	CSI Pn \$ Pn columns (80 or 132).
Column mode	DECCOLM	Set: CSI ? 3 h 132 columns. Reset: CSI ? 3 l 80 columns. (D)
Set lines per page	DECSLPP	CSI Pn t Pn lines per page. The number of pages depend on how many sessions you use.
Pn	Dual Sessions	Single Session
24	3 pages	6 pages
25	2	5
36	2	4
48	1	3
72	1	2
144	—	1

Set left and right margins DECSLRM **CSI Pl ; Pr s**
 Pl = left column.
 Pr = right column.

Name	Mnemonic	Sequence
Set top and bottom margins	DECSTBM	CSI Pt ; Pb r Pt = top line. Pb = bottom line.
Origin mode	DECOM	Set: CSI ? 6 h Move within margins. Reset: CSI ? 6 l Move outside margins. (D)
Vertical split screen mode	DECVSSM	Set: CSI ? 69 h Left and right margins can be changed. Reset: CSI ? 6 9 l Left and right margins cannot be changed. (D)

(D) = default.

7 Visual Character and Line Attributes

Character and Line Attribute Sequences

Name	Mnemonic	Sequence
Select graphic rendition	SGR	CSI Ps...Ps m Ps = character attribute value(s). (See the list below.)
Single-width, single-height line	DECSWL	ESC # 5
Double-width, single-height line	DECDWL	ESC # 6
Double-width, double-height line	DECDHL	ESC # 3 (top half) ESC # 4 (bottom half)

Moving Through Page Memory

Name	Mnemonic	Sequence*
Next page	NP	CSI Pn U Move Pn pages forward. C = home.
Preceding page	PP	CSI Pn V Move Pn pages backward. C = home.
Page position absolute	PPA	CSI Pn sp P Move to page Pn. C = same as old page.
Page position backward	PPB	CSI Pn sp R Move Pn pages backward. C = same as old page.
Page position relative	PPR	CSI Pn sp Q Move Pn pages forward. C = same as old page.

*C= new cursor position.

Visual Character Attribute Values

Ps	Attribute
VT100 or VT400 Mode	
0	All attributes off
1	Bold
4	Underline
5	Blinking
7	Reverse video
VT400 Mode Only	
22	Bold off
24	Underline off
25	Blinking off
27	Reverse video off

> Editing

Editing Sequences

Name	Mnemonic	Sequence
Insert/replace node	IRM	Set: CSI 4 h Insert characters.
		Reset: CSI 4 I Replace characters.
Delete column	DECDC	CSI Pn ' ~ Pn columns.
Insert column	DECIC	CSI Pn ' } Pn columns.
Delete line	DL	CSI Pn M Pn lines.
Insert line	IL	CSI Pn n
Delete character	DCH	CSI Pn P Pn characters.
Insert character	ICH	CSI Pn @ Pn characters.
Erase in display	ED	CSI Ps J
	Ps =	0, cursor to end. (D)
	Ps =	1, beginning to cursor.
	Ps =	2, complete display.
Erase in line	EL	CSI Ps K
	Ps =	0, cursor to end. (D)
	Ps =	1, beginning to cursor.
	Ps =	2, complete line.
Erase character*	ECH	CSI Pn X Pn characters.

Name	Mnemonic	Sequence
Select character protection attribute*	DECSCA	CSI Ps " q
	Ps =	0, DECSED and DECSEL can erase. (D)
	Ps =	1, DECSED and DECSEL cannot erase.
	Ps =	2, DECSED and DECSEL can erase.
Selective erase in display*	DECSED	CSI ? Ps J
	Ps =	0, cursor to end. (D)
	Ps =	1, beginning to cursor.
	Ps =	2, complete display.
Selective erase in line*	DECSEL	CSI ? Ps K
	Ps =	0, cursor to end. (D)
	Ps =	1, beginning to cursor.
	Ps =	2, complete line.

*Available in VT400 mode only.
(D) = default.

9 Rectangular Area Operations

Rectangular Area Control Functions

Name	Mnemonic	Sequence*
Copy rectangular area	DECCRA	CSI <i>Pts; Pl; Pbs; Prs; Pps; Ptd; Pld; Ppd \$ v</i>
		Pts = top-line border. Pl = left-column border. Pbs = bottom-line border. Prs = right-column border. Pps = source page number. Ptd = destination top-line border. Pld = destination left-column border. Ppd = destination page number.
Erase rectangular area	DECERA	CSI <i>Pt; Pl; Pb; Pr \$ z</i>
		Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border.
Fill rectangular area	DECFR A	CSI <i>Pch; Pt; Pl; Pb; Pr \$ x</i>
		Pch = decimal code of fill character. Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border.

Name	Mnemonic	Sequence*
Selective erase rectangular area	DECSERA	CSI <i>Pt; Pl; Pb; Pr \$ {</i>
		Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border.
Select attribute change extent	DECSACE	CSI <i>Ps * x</i>
		Ps = character positions affected. 0 or 1 = stream of character positions. 2 = rectangular area of character positions.
Change attributes in rectangular area	DECCARA	CSI <i>Pt; Pl; Pb; Pr; Ps1..Psn \$ r</i>
		Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border. Psn = visual character attributes
Reverse attributes in rectangular area	DEC RARA	CSI <i>Pt; Pl; Pb; Pr; Ps1..Psn \$ t</i>
		Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border. Psn = visual character attributes.

*These sequences work in VT400 mode only.

Cursor Movement and Panning

Cursor Movement and Panning Sequences

Name	Mnemonic	Sequence
Enabling the Cursor		
Visible cursor	DECTCEM	Set: CSI ? 25 h Visible cursor. (D)
Invisible cursor.		Reset: CSI ? 25 I Invisible cursor.
Moving the Cursor*		
Backward text	DECBI	ESC 6
Forward text	DECFI	ESC 9
Horizontal position	CUP	CSI Pl ; Pc H Line Pl, column Pc.
Vertical position	HVP	CSI Pl ; Pc f Line Pl, column Pc. (Digital recommend using CUP instead.)
Forward cursor	CUF	CSI Pn C Pn columns right.
Backward cursor	CUB	CSI Pn D Pn columns left.
Upward cursor	CUU	CSI Pn A Pn lines up.
Downward cursor	CUD	CSI Pn B Pn lines down.

Name	Mnemonic	Sequence
Panning*		
Pan down	SU	CSI Pn S Pn lines down.
Pan up	SD	CSI Pn T Pn lines up.
Vertical cursor coupling mode	DECVCCM	Set: CSI ? 61 h Coupled. (D) Reset: CSI ? 61 I Uncoupled.
Page cursor coupling mode	DECPCCM	Set: CSI ? 64 h Coupled. (D) Reset: CSI ? 64 I Uncoupled.

*In these sequences, the default value for Pn, Pl, and Pc is 1.

†Available in VT400 mode only.

(D) = default.

11 Keyboard, Printing, and Display Commands

Keyboard Control Sequences

Sequence			
Mode	Mnemonic	Set	Reset
Keyboard action	AM	CSI 2 h Locked.	CSI 2 I Unlocked. (D)
Backarrow key	DECBKM	CSI ? 67 h Backspace.	CSI ? 67 I Delete. (D)
Line feed/ new line	LNM	CSI 20 h New Line.	CSI 20 I Line feed. (D)
Autorepeat	DECARM	CSI ? 8 h Repeat. (D)	CSI ? 8 I No repeat.
Autowrap	DECAWM	CSI ? 7 h Autowrap.	CSI ? 7 I No autowrap. (D)
Cursor keys	DECCKM	CSI ? 1 h Application.	CSI ? 1 I Cursor. (D)
Keypad application/ numeric	DECKPAM	ESC = Application.	ESC > Numeric. (D)
Numeric keypad	DECNKM	CSI ? 66 h Application.	CSI ? 66 I Numeric. (D)
Keyboard usage	DECKBUM	CSI ? 68 h Data processing.	CSI ? 68 I Typewriter. (D)
Key position	DECKPM	CSI 81 h Position reports.	CSI 81 I Character codes. (D)

Sequence			
Mode	Mnemonic	Set	Reset
Enable local functions	DECELF	CSI Pf1; Pcl; ... Pfn; Pcn + q	
	Pfn	= function number.	
	0	= all local functions.	
	1	= local copy and paste.	
	2	= local panning	
	3	= local window resize.	
	Pcn	= control performed.	
	0	= factory default.	
	1	= enable local function.	
	2	= disable local function.	
Local function key control	DECLFKC	CSI Pk1; Pf1; ... Pkn; Pfn = }	
	Pkn	= function key number.	
	0	= all local function keys.	
	1	= F1 or Hold.	
	2	= F2 or Print.	
	3	= F3 or Set-Up.	
	4	= F4 or Session.	
	Pfn	= function performed.	
	0	= factory default.	
	1	= local function.	
	2	= send key sequence.	
	3	= disable key.	
Select modifier key reporting	DECSMKR	CSI Pm1; Pf1; ... Pmn; Pfn + r	

Sequence			
Code	Mnemonic	Set	Reset
Pmn	=	key number.	
0	=	all keys.	
1	=	left Shift.	
2	=	right Shift.	
3	=	lock key.	
4	=	Ctrl.	
5	=	left Alt Function.	
6	=	right Alt Function.	
7	=	left Compose Character.	
8	=	right Compose Character.	
Pcn	=	control performed.	
0	=	factory default.	
1	=	modifier function.	
2	=	extended keyboard report.	
3	=	key disabled.	
xtended eyboard port	DECEKBD	APC : ppp mm ST	
	ppp	= key position number.	
	mm	= modifier key state.	
	0	= not pressed.	
	1	= pressed.	
() = default.			

Programming UDKs

Definable Keys

6 through F14 Help
 o F17 through F20

ECUDK Device Control String Format

CS Pc ; PI | Ky1/St1;...Kyn/Stn ST

c is the clear parameter.

or none = clear all keys before loading new values (default)
 = clear one key at a time, before loading a new value.

PI is the lock parameter.

0 or none = lock the keys.

1 = do not lock the keys.

Ky1/St1;...Kyn/Stn are the key definition strings.

The key selector number (Kyn) indicates which key you are defining.

Key	Value	Key	Value	Key	Value
F6	17	F11	23	Do	29
F7	18	F12	24	F17	31
F8	19	F13	25	F18	32
F9	20	F14	26	F19	33
F10	21	Help	28	F20	34

The string parameters (Stn) are the key definitions, encoded as pairs of hex codes.

3/0 through 3/9 (0 through 9)

4/1 through 4/6 (A through F)

6/1 through 6/6 (a through f)

Printing Control Sequences

Name	Mnemonic	Sequence
Printer extent mode	DECPEX	Set: CSI ? 19 h Page. (D) Reset: CSI ? 19 l Scrolling region.
Print form feed mode	DECPFF	Set: CSI ? 18 h Form feed. Reset: CSI ? 18 l No form feed. (D)

Name	Mnemonic	Sequence
Auto print mode	MC	On: CSI ? 5 i Off: CSI ? 4 i
Printer controller mode	MC	On: CSI 5 i Off: CSI 4 i
Print page	MC	CSI 1 or CSI 0 i
Print composed main display	MC	CSI ? 10 i
Print all pages	MC	CSI ? 11 i
Print cursor line	MC	CSI ? 1 i
Start printer-to-host session	MC	CSI ? 9 i
Stop printer-to-host session	MC	CSI ? 8 i
Assign printer to active session	MC	CSI ? 18 i
Release printer	MC	CSI ? 19 i
Send line attributes	—	
Single-width		ESC # 5
Double-width		ESC # 6
Double-width/double-height		
Top half		ESC # 3
Bottom half		ESC # 4
Send visual character attributes	—	
Clear all attributes		ESC [0 m
Set attributes		ESC [0; Ps; Ps; ... Ps m Ps = attribute. See text.

(D) = default.

Screen Display Control Sequences

Name	Mnemonic	Sequence
Send/receive mode	SRM	Set: CSI 12 h Local echo off. (D) Reset: CSI 12 l Local echo on.
Screen mode	DECSCNM	Set: CSI ? 5 h Light background. Reset: CSI ? 5 l Dark background. (D)
Scrolling mode	DECSCLM	Set: CSI ? 4 h Smooth scroll. (D) Reset: CSI ? 4 l Jump scroll.
Select number of lines per screen	DECSNLS	CSI Pn * Pn = number of lines.
Select active status display*	DECSASD	CSI Ps \$ } Ps = 0, main display. Ps = 1, status line.
Select status line type*	DECSSDT	CSI Ps \$ ~ Ps = 0, none. Ps = 1, indicator. (D) Ps = 2, host-writable.

*Available in VT400 mode only.

(D) = default.

12 VT420 Reports

Sequences for VT420 Reports

Name	Mnemonic	Sequence
Primary Device Attributes		
Primary DA request (Host to VT420)	DA	CSI c or CSI 0 c
Primary DA response (VT420 to host)	DA	CSI ? Psc; Ps1; ... Psn c
Psc = operating level.		
61 = level 1 (VT100 family).		
62,63,64 = level 4 (VT400 family).		
Ps1...Psn= extensions.		
1 = 132 columns.		
2 = printer port.		
6 = selective erase.		
7 = soft character set.		
8 = user-defined keys.		
15 = DEC technical set.		
18 = user windows.		
19 = two sessions.		
21 = horizontal scrolling.		
See Table 9-1 for alias responses.		
Secondary Device Attributes		
Secondary DA request (Host to VT420)	DA	CSI > c or CSI > 0 c
Secondary DA response (VT420 to host)	DA	CSI > 41; Pv ; 0 c
Pv = firmware version.		

Primary DA request (Host to VT420)	DA	CSI c or CSI 0 c
Primary DA response (VT420 to host)	DA	CSI ? Psc; Ps1; ... Psn c
		Psc = operating level.
		61 = level 1 (VT100 family).
		62,63,64 = level 4 (VT400 family).
		Ps1...Psn= extensions.
		1 = 132 columns.
		2 = printer port.
		6 = selective erase.
		7 = soft character set.
		8 = user-defined keys.
		15 = DEC technical set.
		18 = user windows.
		19 = two sessions.
		21 = horizontal scrolling.
See Table 9-1 for alias responses.		

Secondary DA request (Host to VT420)	DA	CSI > c or CSI > 0 c
Secondary DA response (VT420 to host)	DA	CSI > 41; Pv ; 0 c

Pv = firmware version.

Name	Mnemonic	Sequence
Tertiary Device Attributes (VT400 Mode Only)		
Tertiary DA request (Host to VT420)	DA	CSI = c or CSI = 0 c
DECRPTUI response (VT420 to host)	DA	DCS ! D..D ST
Device Status Reports		
VT420 Operating Status		
Request (Host to VT420)	DSR	CSI 5 n
Report (VT420 to host)	DSR	CSI 0 n No malfunction. CSI 3 n Malfunction.
Cursor Position Report		
Request (Host to VT420)	DSR	CSI 6 n
Report (VT420 to host)	CPR	CSI P; Pc R
	Pl	= line number.
	Pc	= column number.
Extended Cursor Position Report		
Request (Host to VT420)	DSR	CSI ? 6 n
Report (VT420 to host)	DECXCPR	CSI ? Pl; Pc; Pp R
	Pl	= line number.
	Pc	= column number.
	Pp	= page number.

Name	Mnemonic	Sequence	Name	Mnemonic	Sequence
Device Status Reports			Device Status Reports		
Printer Status					
Request (Host to VT420)	DSR	CSI ? 15 n	Pla	=	keyboard dialect. 1 = North American.
Report (VT420 to host)	DSR	CSI ? 13 n No printer. CSI ? 10 n Printer ready. CSI ? 11 n Printer not ready. CSI ? 18 n Printer busy. CSI ? 19 n Printer assigned to other session.	Pst	=	keyboard status. 0 = keyboard ready. 3 = no keyboard. 8 = keyboard busy.
			Ptyp	=	keyboard type. 0 = LK201. 1 = LK401.
UDK Status (VT400 Mode Only)					
Request (Host to VT420)	DSR	CSI ? 25 n	Macro Space		
Report (VT420 to host)	DSR	CSI ? 20 n UDKs unlocked. CSI ? 21 n UDKs locked.	Request (Host to VT420)	DSR	CSI ? 62 n
			Report(VT420 to host)	DECMSR	CSI Pn * { Pn = number of bytes/16.
Keyboard Status					
Request (Host to VT420)	DSR	CSI ? 26 n	Memory Checksum		
Report (VT420 to host)	DSR	CSI ? 27; Pla; Pst; Ptyp n	Request (Host to VT420)	DSR	CSI ? 63; Pid n Pid = request label.
			Report (VT420 to host)	DECCKSR	DCS Pid ! ~ D..D ST
					Pid = request label. D..D = checksum.
Data Integrity					
Request (Host to VT420)	DSR		Request (Host to VT420)	DSR	CSI ? 75 n
Report (VT420 to host)	DSR		Report (VT420 to host)	DSR	CSI ? 70 n No communication errors. CSI ? 71 n Communication errors. CSI ? 73 n Not reported since last power-up or RIS.

Name	Mnemonic	Sequence
Device Status Reports		
Multiple Session Status		
Request (Host to VT420)	DSR	CSI ? 85 n
Report (VT420 to host)	DSR	CSI ? 80; Ps2 n SSU sessions enabled. Ps2 = Maximum number of sessions.
		CSI ? 81; Ps2 n SSU sessions available but pending. Ps2 = Maximum number of sessions.
		CSI ? 83 n SSU sessions not ready.
		CSI ? 87 n Sessions on separate lines.
Requesting Checksum of Rectangular Area (VT400 Mode Only)		
Request (Host to VT420)	DECREQ-CRA	CSI Pid; Pp; Pt; Pl; Pb; Pr* y
		Pid = request label. Pp = page number. Pt = top-line border. Pl = left-column border. Pb = bottom-line border. Pr = right-column border.
Checksum Report (VT420 to host)	DECCKSR	DCS Pid ! ~ D..D ST D..D = checksum.
Terminal State Reports (VT400 Mode Only)		
Request (Host to VT420)	DECRQTSRCI	Ps \$ u
	Ps	= report requested.
	0	= ignored.
	1	= terminal state report.

Name	Mnemonic	Sequence
Terminal State Reports (VT400 Mode Only)		
Terminal state report (VT420 to host)	DECTSR	DCS 1 \$ s D..D ST D..D = report data.
Restore	DECRSTS	DCS Ps \$ p D..D ST
	Ps	= data string format.
	0	= error.
	1	= terminal state report.
	D..D	= restored data.
Presentation State Reports (VT400 Mode Only)		
Request (Host to VT420)	DECRQPSRCI	Ps \$ w
	Ps	= report requested.
	0	= error.
	1	= cursor information report.
	2	= tab stop report.
Cursor information report (VT420 to host)	DECCIR	DCS 1 \$ u D..D ST D..D = data string.
Tab stop report (VT420 to host)	DECTABSR	DCS 2 \$ u D..D ST D..D = tab stops.
Restore	DECRSPS	DCS Ps \$ t D..D ST
	Ps	= data string format.
	0	= error.
	1	= cursor information report.
	2	= tab stop report.
	D..D	= data string.

Name	Mnemonic	Sequence
Mode Settings (VT400 Mode Only)		
Request mode (Host to VT420)	DECROM	CSI Pa \$ p
	Pa =	ANSI mode. (Table 9-2) CSI ? Pd \$ p
	Pd =	DEC private mode. (Table 9-3)
Report mode (VT420 to host)	DECRPM	CSI Pa; Ps \$ y
	Pa =	ANSI mode. (Table 9-2)
	Ps =	mode state.
	0 =	unknown mode.
	1 =	set.
	2 =	reset.
	3 =	permanently set.
	4 =	permanently reset.
Set mode	SM	CSI Pa; ... Pa h
	Pa =	ANSI mode(s). (Table 9-2) CSI ? Pd; ... Pd h
	Pd =	DEC private mode(s). (Table 9-3)
Reset mode	RM	CSI Pa; ... Pa I
	Pa =	ANSI mode(s). (Table 9-2) CSI ? Pd; ... Pd I
	Pd =	DEC private mode(s). (Table 9-3)

Name	Mnemonic	Sequence
Control Function Settings (VT400 Mode Only)		
Request (Host to VT420)	DECROSS	DCS \$ q D...D ST
	D..D =	intermediate and/or final characters of function. (Table 9-4)
Report (VT420 to host)	DECRPSS	DCS Ps \$ r D...D ST
	Ps =	0, valid request.
	Ps =	1, invalid request.
	D..D =	intermediate and/or final characters of function. (Table 9-4)
Saving and Restoring the Cursor State		
Save cursor state	DECSC	ESC 7
Restore cursor state	DECRC	ESC 8
Window Report (VT400 Mode Only)		
Request (Host to VT420)	DECQRDE	CSI " v
Report (VT420 to host)	DECRPDE	CSI Ph; Pw; Pml; Pmt; Pmp " w
	Ph =	number of lines.
	Pw =	number of columns.
	Pml =	first column at left.
	Pmt =	top line.
	Pmp =	page number.

Name	Mnemonic	Sequence
User-Preferred Supplemental Set (VT400 Mode)		
Request (Host to VT420)	DECREQ- UPSS	CSI & u
Report (VT420 to host)	DECA- UPSS	DCS 0 ! u % 5 ST DEC Supplemental Graphic DCS 1 ! u A ST ISO Latin-1 supplemental

Table 9-1 Alias Primary DA Responses From the VT420

Terminal	Identification Sequence	Meaning
VT100 DA	ESC [? 1; 2 c	VT100 terminal
VT101 DA	ESC [? 1; 0 c	VT101 terminal
VT102 DA	ESC [? 6 c	VT102 terminal
VT220 DA*	CSI ? 62; 1; 2; 6; 7; 8; 9 c	VT220 terminal
VT320 DA*	CSI ? 63; 1; 2; 6; 7; 8; 9 c	VT320 terminal
VT420 DA*	CSI ? 64; 1; 2; 6; 7; 8; 9; 15; 18; 19; 21 c	VT420 terminal

NOTE

To change an alias response, you must use the General Set-Up screen. See Chapter 5, "Using Set-Up".

*These responses correspond to the worldwide model of the terminal. The North American model does not support NRC sets (9).

Table 9-2 ANSI Modes for DECRQM, DECRPM, SM, and RM

Mode	Mnemonic	Sequence
Guarded area transfer	GATM*	1
Keyboard action	AM	2
Control representation	CRM†	3
Insert/replace	IRM	4
Status reporting transfer	SRTM*	5
Vertical editing	VEM*	7
Horizontal editing	HEM*	10
Positioning unit	PUM*	11
Send/receive	SRM	12
Format effector action	FEAM*	13
Format effector transfer	FETM*	14
Multiple area transfer	MATM*	15
Transfer termination	TTM*	16
Selected area transfer	SATM*	17
Tabulation stop	TSM*	18
Editing boundary	EBM*	19
Line feed/new line	LNM	20

*This control function is permanently reset.

†The host cannot change the setting of CRM. You can only change CRM from set-up. If CRM is set, the terminal ignores DECRQM and most other control functions.

Table 9-3 DEC Private Modes for DECRQM, DECRPM, SM, and RM

Mode	Mnemonic	Pd
Cursor keys	DECCKM	1
ANSI	DECANM	2
Column	DECCOLM	3
Scrolling	DECSCLM	4
Screen	DECSCNM	5
Origin	DECOM	6
Autowrap	DECAWM	7
Autorepeat	DECARM	8
Print form feed	DECPFF	18
Printer extent	DECPEX	19
Text cursor enable	DECTCEM	25
National replacement character set	DECNRCM	42
Horizontal cursor coupling	DECHCCM†	60
Vertical cursor coupling	DECVCCM	61
Page cursor coupling	DECPCCM	64
Numeric keypad	DECNKM	66
Backarrow key	DECBKM	67
Keyboard usage	DECKBUM	68
Vertical split screen	DECVSSM	69
Transmit rate limiting	DECXRLM	73
Keyboard position	DECKPM	81

†This control function is permanently reset.

Table 9-4 Control Functions for DECRQSS Requests

Control Function	Mnemonic	Intermediate and Final Characters(s)
Select active status display	DECSASD	\$ }
Select attribute change extent	DECSACE	* x
Set character attribute	DECSCA	" q
Set conformance level	DECSCL	" p
Set columns per page	DECSCPP	\$
Set lines per page	DECSLPP	t
Set number of lines per screen	DECSNLS	*
Set status line type	DECSSDT	\$ ~
Set left and right margins	DECSLRM	s
Set top and bottom margins	DECSTBM	r
Select graphic rendition	SGR	m
Enable local functions	DECelf	+ q
Local function key control	DECLFKC	= }
Select modifier key reporting	DECSMKR	+ r

Soft Terminal Reset (DECSTR) States**3 Resetting and Testing the Terminal****Resetting and Testing Sequences**

Name	Mnemonic	Sequence	Mode	Mnemonic	State After DECSTR
Resetting the Terminal					
Soft terminal reset*	DECSTR	CSI ! p	Text cursor enable	DECTCEM	Cursor enabled.
Hard terminal reset	RIS	ESC c	Insert/replace	IRM	Replace.
Secure reset	DECSR	ESC [Pr + p	Origin	DECOM	Absolute (cursor origin at upper-left of screen).
Secure reset confirmation	DECSRC	ESC [Pr * q	Autowrap	DECAWM	No autowrap.
Tabulation ear	TBC	CSI 0 g CSI 3 g	National replacement character set	DECNRCM	Multinational set.
Testing the Terminal					
Screen alignment display	DECALN	ESC 8	Keyboard action	AM	Unlocked.
Invoke confidence test	DECTST	CSI 4; Ps1;...Psn y	Numeric keypad	DECNKM	Numeric characters.
		Ps = test to run. 0 = all tests. 1 = power-up self-test. 3 = printer port loopback. 7 = DEC-423 port loopback. 9 = repeat tests.	Cursor keys	DECCKM	Normal (arrow keys).
			Other Control Functions		
			Set top and bottom margins	DECSTBM	Top margin = 1. Bottom margin = page length.
			All character sets	G0, G1, G2, G3, GL, GR	VT420 default settings. (DECSTR works only in VT400 mode.)
			Select graphic rendition	SGR	Normal rendition.
			Select character attribute	DECSCA	Normal (erasable by DECSEL and DECSED).
			Save cursor state	DECSC	Home position with VT420 defaults.
			Assign user-preferred supplemental set	DECAUPSS	Set selected in set-up.
			Select active status display	DECSASD	Main display (first 24 lines).
			Keyboard position mode	DECKPM	Character codes.

Available in VT420 mode only.

14 Session Management

Enable Session Command

CSI & x

A VT52 Mode Control Codes

Sequence	Action
ESC A	Cursor up.
ESC B	Cursor down.
ESC C	Cursor right.
ESC D	Cursor left.
ESC F	Enter graphics mode.
ESC G	Exit graphics mode.
ESC H	Move the cursor to the home position.
ESC I	Reverse line feed.
ESC J	Erase from the cursor to the end of the screen.
ESC K	Erase from the cursor to the end of the line.
ESC Y Pn	Move the cursor to column Pn.
ESC Z	Identify. (host to terminal)
ESC / Z	Report. (terminal to host)
ESC =	Enter alternate keypad mode.
ESC >	Exit alternate keypad mode.
ESC <	Exit VT52 mode. (Enter VT100 mode.)
ESC ^	Enter autoprint mode.
ESC _	Exit autoprint mode.
ESC W	Enter printer controller mode.
ESC X	Exit printer controller mode.
ESC]	Print the screen.
ESC V	Print the line with the cursor.

10

Solving Problems And Getting Service

This chapter describes what to do if you have a problem with the VT420. The chapter also describes the terminal's power-up self-test and screen error messages.

Operating Problems

Table 10-1 lists some possible operating problems and their suggested solutions. Check this list before calling for service. If you need service, see the "Digital Service" section in this chapter.

Power-Up Self-Test

Every time you turn the terminal on, the VT420 automatically runs a power-up self-test. This test checks the operating status of many of the terminal's internal parts.

Successful test: If the test is successful, a VT420 OK message appears on the screen. The keyboard bell should ring once.

Error: If the keyboard bell does not ring or it rings similar to a telegraph sound, this indicates a self-test error. The keyclick and bell sound patterns are codes that provide service personnel with information about the terminal's operating condition.

Error Messages

If the VT420 fails the power-up self-test, the terminal may display one of the error messages in Table 10-2. Only qualified service personnel should try to correct these problems. If possible, note the error message that appears, then call for service.

Table 10-1 Common Operating Problems

Problem	Suggested Solution
The VT420 does not turn on when you set the power switch to 1 (on).	Make sure the VT420 power cord is plugged into the wall outlet. Check the power at the wall outlet by plugging in a lamp.
The screen's text is not balanced on the left and right or top and bottom.	Align the text by using the screen align feature in the Set-Up Directory screen (Chapter 5).
The printer does not print.	Make sure the printer is plugged in and its power switch is on. Make sure the cable connection between the printer and VT420 is tight.
	Make sure the printer assignment feature in Global Set-Up is set to the active session (Chapter 5). If the setting is correct, Printer: Ready should appear on the status line at the bottom of the screen.
	Make sure all communication settings on the terminal and printer (such as transmit rate, receive rate, and parity) match.
Data on the screen does not scroll. The Hold indicator is on.	Press the F1 (Hold) key to resume scrolling.
The keyboard seems to be locked (the Wait indicator may be on), and the VT420 cannot receive data from the host.	Clear the terminal by using the Clear Comm field in the Set-Up Directory screen (Chapter 5).

Table 10-1 (Cont.) Common Operating Problems

Problem	Suggested Solution
The screen is blank, except for a blinking cursor at the lower-right corner of the screen.	The CRT saver feature in the Global Set-Up screen (Chapter 5) may be on. Press any key to reactivate the screen display. Make sure the brightness and contrast controls (Chapter 4) are adjusted correctly.
The bell tone does not ring when you turn the VT420 on. The keyboard indicator lights do not flash.	Make sure the keyboard is connected to the terminal.
The host system's software does not recognize the VT420 terminal type.	Change the setting of the terminal ID feature in the General Set-Up screen (Chapter 3).
Power to the terminal is lost, and you cannot log in to your host system.	When power is restored to the terminal, make the F4 (Set-Up) key the first key you press. Refer to Chapter 7 for the procedure to restore an interrupted session.

Table 10-2 Screen Error Messages

Error Message	Problem and Solution
VT420 NVR Error - 1	Nonvolatile memory (set-up storage) is not operating. Turn the terminal off and on. When you turn the terminal on, the set-up features will return to the default state. If the problem continues, call Digital Customer Services.

Table 10-2 (Cont.) Screen Error Messages

Error Message	Problem and Solution
VT420 Keyboard Error - 4	<ol style="list-style-type: none"> 1. Make sure your keyboard is plugged in. If it is, 2. Turn the terminal off and on. If the problem continues, 3. Try another keyboard, if you have one. If the new keyboard works, replace the old keyboard. 4. If the new keyboard does not work, the problem is inside the Call Digital Customer Services.
VT420 DEC-423 Port Error - 5	The problem is inside the terminal. Call Digital Customer Services.
VT420 Printer Port Error - 6	The problem is inside the terminal. Call Digital Customer Services.
The keyboard's keyclick and margin bell make sound patterns similar to a telegraph.	The problem is inside the terminal. Call Digital Customer Services.

Digital Service

Digital provides a wide range of maintenance programs that cover small systems and terminals. These include on-site, carry-in, and mail-in repair services. You can use these programs to select a plan that best meets your service needs.

On-Site Hardware Services

Digital offers fast, low-cost, quality maintenance performed at your site by Digital-trained Service Specialists. There are several on-site services available.

DECservice

DECservice provides preferred on-site service, with a guaranteed response time when equipment is located within a specified distance of the service facility. DECservice guarantees a continuous repair effort until service is restored. You can choose the hours of coverage, up to 24 hours a day, 7 days a week.

Basic

Basic offers priority response during regular business hours, Monday through Friday.

Site SERVICenter

If you have at least 50 terminals and can provide workspace at your site, Digital will provide an on-site technician for a predetermined, periodic time interval. The terminals can include a variety of models (for example, VT200s, VT300s, and VT420s).

Per Call

This noncontractual offering provides on-site repair based on time and materials. Per call service is available during regular business hours, Monday through Friday.

DECall

DECall is similar to per call service, but has an annual retainer fee. DECall gives you on-site service at a fixed fee per repair call.

Off-Site Hardware Services

Carry-In SERVICenters

Digital SERVICenters are located in major cities around the world. They offer convenient, cost-effective repair service with a 48 hour turnaround time. Both contract and per call coverage is offered.

DECmailer

DECmailer is a mail-in service for module and subassembly repairs. DECmailer provides five day turnaround and express 24 hour turnaround.

Software Service

Software service products are available for host resident applications.

How to Get Service

Digital has a central service center in your area to help you keep your system running at peak efficiency. To find out more about Digital's hardware and software service offerings

In the United States

Call 1-800-554-3333 during regular business hours and ask for Customer Assistance.

Outside the United States

Contact your local Digital Customer Services Office.

A

Specifications

This appendix lists the specifications for the North American version of the VT420 video terminal.

Site Planning

VT420 Terminal	(Approximate Size)	
Height	282 mm	(11.1 in)
Width	320 mm	(12.6 in)
Depth	331 mm	(13.1 in)
Weight	8 kg	(17.5 lb)
Tilt-swivel	60 degrees	
Adjustable tilt	+5 to -20 degrees	

LK401 Keyboard	(Approximate Size)	
Height	4 mm	(1.75 in)
Width	48 mm	(18.8 in)
Depth	19 mm	(7.5 in)
Weight	7 kg	(3.1 lb)

Operating Environment

Temperature	10° to 40° C (50° to 104° F)
Relative humidity	10% to 90% relative humidity with a maximum wet bulb of 280° C and a minimum dew point of 2° C
Altitude	2400 m (8000 ft) maximum

Electrical

AC input	No selection required. 125 V nominal, single-phase, 2-wire plus safety earth ground
Line frequency	50 to 60 Hz nominal
Input power	67 watts
Power cord	Rated 125 V, listed, type SJT/SVT, 18 AWG-3 wire

Display

Active video area	(approximate size)
Horizontal	232 mm (9.04 in)
Vertical	168 mm (6.55 in)
Format	24, 36, or 48 lines of 80 or 132 characters
Built-in character sets	DEC Multinational character set U.S. ASCII DEC Supplemental ISO Latin Alphabet No. 1 ISO Latin-1 Supplemental DEC Special Graphics DEC Technical
Video attributes	Normal, bold, underline, blinking, and negative image (reverse video)—selected individually or in combination
Text cursor	Blinking or steady block or underline
Frame rate	70 Hz (60 Hz optimal)
Antiglare	Integral with CRT

LK401 Keyboard

General

General	108 sculptured keys with matte finish Available in a word processing version.
Cord	1.8 m (6 ft) coiled cord with a 4-pin telephone-type modular connector
Indicator lights	2 keyboard indicators:



Hold



Lock

Keys (Approximate Size)

Home row	30 mm (1.18 in) above desktop
Key size	13 mm (0.50 in) square
Key spacing	19 mm (0.75 in) center to center (for single-width keys)
Numeric keypad	18 keys
Function keys	5 predefined keys, 15 user-definable keys

Audible Indicators

Keypress	Sounds after each keystroke.
Margin bell	Rings once when cursor approaches right margin.
Warning bell	Rings once for compose errors. Rings twice for errors in set-up. Rings once upon receipt of Ctrl G .

B

Options and Documentation

You can order the following modems, cables, and manuals from Digital for the North American version of the VT420. See the end of this appendix for ordering information.

Modems

Part Number	Description
DF242 Scholar Plus	300, 1200, and 2400 baud, full-duplex asynchronous
DF224	300, 1200, and 2400 baud, full-duplex, asynchronous
DF124	300, 1200, and 1200 baud, full-duplex, asynchronous

Cables

Part Number	Length	Connector
Printer Cables and Adapter (VT420 to printer)		
BC16E-10	10 ft (3 m)	6-pin M DEC-423 to
BC16E-25	25 ft (7.6 m)	6-pin M DEC-423
H8571-A adapter	-	6-pin F DEC-423 to 25-pin F RS-232
Null Modem Cables		
BC22D-xx	-	25-pin F RS-232 to 25-pin F RS-232
Communication Cables and Adapters		
BC16E-10	10 ft (3 m)	6-pin M DEC-423 to
BC16E-25	25 ft (7.6 m)	6-pin M DEC-423
H8571-C adapter	-	25-pin F RS-232 to
H8571-F adapter	-	6-pin M DEC-423

M = male. F = female.

xx = length in feet (10, 25, 50, 100, 200, 250)

Related Documentation

You can order the following VT420 documents from Digital:

VT420 Programmer Reference Manual **EK-VT420-RM**

This manual provide information on character processing, character codes, and control functions that programmers can use for VT420 applications.

VT420 Service Guide **EK-VT420-PS**

This guide provides service personnel with the information needed to test, troubleshoot, and repair the VT420 monochrome video terminal.

Guide to Using VMS **AA-LA05A-TA**

**Installing and Using the Session Support
Utility**

AA-JB84B-TE

This guide provides system managers with instructions for installing SSU software to support two sessions over a single communication line. The guide is part of an SSU software kit. The kit is available on different media.

Magtape	00-QnZAV-HM*
RX50	00-QnZAV-H3*
TK50	00-QnZAV-H5*

* n = processor number.

Ordering Information

You can order modems, supplies, and documentation by phone 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, and Hawaii

Call 1-603-884-6660.

C

Communication

This appendix provides information on how the VT420 communicates with a host computer, printer, or modem. The appendix shows the cables you can use for different system configurations. It describes how XON and XOFF characters help control data flow. The last section describes the signals carried by the connectors on the rear of the terminal.

The terminal operates on full-duplex asynchronous lines only, with 10 possible transmit and receive speeds. You can use split transmit and receive speeds, but you must use the same speeds as your host system and printer.

To match your host system's speed, use the Communications Set-Up screen (Chapter 5). To match your printer's speed, use the Printer Set-Up screen (Chapter 8).

For more information on communication, see the *VT420 Programmer Reference Manual*.

Cables

You can connect the VT420 directly to a local host system with a cable. You can also connect the terminal indirectly to a remote host system using (1) a terminal server, or (2) a modem or acoustic coupler connected to public-switched or dedicated telephone lines. See "Modems" in Chapter 8.

Figure C-1 shows the DEC-423 cables you can use to connect the VT420 to a host system or printer. To order cables, see Appendix B.

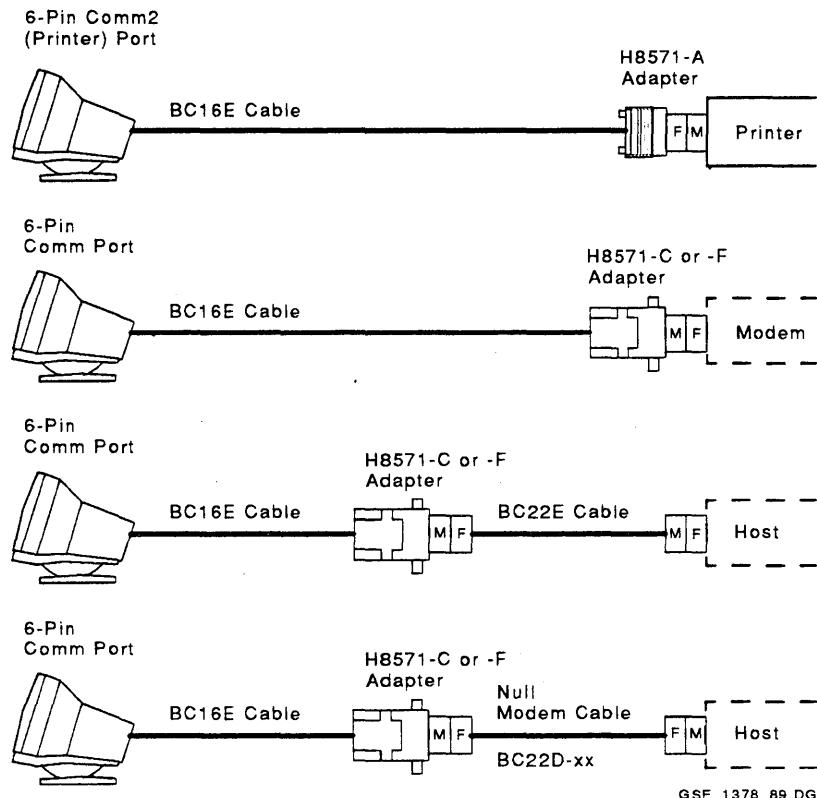


Figure C-1 Cables

XON/XOFF Flow Control

Normally, the VT420 processes and displays characters as fast as it receives them. If the host system sends data faster than the terminal can display it, the terminal can use XON/XOFF flow control to tell the host to wait until the terminal has caught up.

The VT420 stores incoming characters in a 254-character input buffer. When the buffer fills to a predetermined level (XOFF point), the terminal sends an XOFF character to stop the host system from sending more characters. When the buffer empties to an appropriate level (XON point), the terminal sends an XON character to tell the host system to resume sending characters.

If the terminal is set up to run one session, you can select a first XOFF point of 64 or 128 characters (Communications Set-Up screen). The XON point is 32 characters. If the host system fails to respond to the first XOFF character, the terminal sends another XOFF character when the buffer fills to 220, and when the buffer is completely full.

If you use SSU software to run two sessions, you can select a first XOFF point of 64, 256, or 1792. SSU provides its own credit-based flow control, so XOFF is not needed.

For normal interactive use, you should use the default XOFF point of 64 characters. This setting prevents the host system from getting too far ahead of what is displayed on the screen. In some cases, using an XOFF point greater than 64 characters may improve the average speed for processing characters, since the host does not have to wait as often.

Hold Screen Function

If XON/XOFF flow control is enabled:

[Ctrl] [S] (XOFF) Puts the screen display on hold.

[Ctrl] [Q] (XON) Releases the screen display.

If XON/XOFF flow control is disabled, you cannot use **[Ctrl] [S]** and **[Ctrl] [Q]** to hold and release the screen. Instead, the keys will send their corresponding codes to the host system.

Notes on Using the VT420 Without XON/XOFF Flow Control

- If you disable XON/XOFF flow control, the terminal's receive input buffer can overflow if the host system sends data faster than the terminal can process and display it.

- The VT420 can process text (without ESC sequences) at approximately 2000 characters/second. This rate allows the VT420 to communicate at 19,200 baud. Some editing functions, such as inserting or deleting characters in lines, require additional time to process. The 254-character input buffer allows for short bursts.

For extensive editing, the host system should be programmed to insert fill characters (NULs) after editing sequences. If the host system is not programmed, you should reduce the terminal baud rate to 9600 baud or less. See the Communications Set-Up screen in Chapter 5.

- Selecting one of the smooth scroll settings in the Display Set-Up screen slows the screen display for easy reading. In order for the smooth scroll setting to work properly at high speeds, you must have XON/XOFF data flow enabled.

Modem Connections and Disconnections

When the VT420 makes a connection to the host system through 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 transmission in progress.
- Clears the keyboard buffer and all message buffers.
- Clears the input buffer.
- Clears XOFF sent and XOFF received flags.

Any of the following conditions will disconnect the connection to the host system:

- You type **Shift F5** (Break).
- You use the Recall or Default fields in the Set-Up Directory.
- The terminal loses the data set ready (DSR) signal.
- The terminal loses the receive line signal detect (RLSD) signal for the period of time you selected in set-up. See the **disconnect delay** feature in the Communications Set-Up screen.
- The terminal receives a self-test command from the host system.

The usual way to disconnect communications is to type **Shift F5** (Break).

Break Function

A break condition is the occurrence of a continuous space on a communication line for greater than one character time. Some systems and communication equipment recognize break as a special attention signal.

You can generate a break signal (275 ms space) by pressing **[F5]** (Break), unless you have changed the function of the **[F5]** key (Keyboard Set-Up screen).

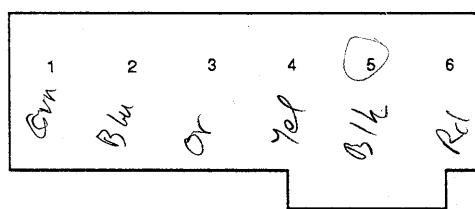
Changing the **terminal comm ports** feature setting from **S1=Comm1** to one of the two-session configurations also generates a break signal. This action alerts the host that the session configuration has been altered.

The **[F5]** (Break) key has three functions when used as a break key.

- | | |
|------------------------------|--|
| [F5] (Break) | Sends a break signal to the host. |
| Shift [F5]
(Break) | Disconnects communications when you use a modem. |
| Ctrl [F5]
(Break) | Sends the answerback message (Communications Set-Up screen) to the host. |

Connector Signals

The VT420 has two 6-pin connectors on the rear of the terminal. Both connectors can be used as host system (Comm1 or Comm2) connectors, and one of the two can be used as a printer connector (Comm2). Both connectors use the same signals. Table C-1 describes the signals. Figure C-2 shows the pin numbers for the 6-pin connectors.



GSF_1383_89.DG

Figure C-2 6-Pin Connector Pinouts

Table C-1 6-Pin DEC-423 Connector Interface Signals (Comm 1 or Comm 2)

Pin	Signal	Mnemonic	Description
1	Data terminal ready	DTR	<i>From VT420</i> When on, tells the modem or printer that the VT420 is ready to send or receive.
2	Transmit- ted data	TXD+	<i>From VT420</i> Sends serial characters. Held in the mark state (-) when characters are not being sent.
3	Transmit signal ground	TXD-	In modem control modes, sends data only when DSR and DTR signals are on.
4	Receive signal ground	RXD-	Provides the common ground reference potential for transmitted signals TXD+ and DTR.
5	Received data	RXD+	<i>From VT420</i> Provides the common ground reference potential for received signals RXD+ and DSR.
6	Data set ready	DSR	<i>To VT420</i> From the modem: When on, tells the VT420 that it has a call connected. From the printer: When on, tells the VT420 that the printer is ready to print. The terminal checks for DTR from the printer before each print operation.

Standards

The VT420 operates in accordance with the following national and international communication standards:

EIA 232-D
 CCITT V.24
 CCITT V.28
 CCITT V.10

ISO 2110.2

Glossary

Action field

Terminal features in *set-up* that make the VT420 perform an immediate action.

Active session

The *session* that you are currently using on the VT420. You use the **F4** (Session) key to change the active session.

Application software

A program that performs a specific function for a particular class of computer users. Examples: spreadsheet applications, word processing applications, text editing applications.

Auto print mode

A method of printing information directly from the host system. The VT420 sends a display line to the printer after a carriage return or form feed character.

Bottom margin

The last line of the *scrolling region*.

CCITT

Comite Consultatif International de Telegraphique et Telephonique (International Telegraph and Telephone Consultative Committee). A standards committee for the communication industry in Europe.

Character set

A group of graphic characters and control characters stored as a unit in the terminal. Graphic characters are characters you can display on the screen. Control characters perform special functions.

Compose character

A character produced when you press two or three keys in a certain sequence. You can use compose sequences to produce characters that do not appear as standard keys on your keyboard.

Current page

The *page* in *page memory* that the cursor is on.

Cursor

An indicator that highlights the active position on the screen. The VT420 uses different cursor characters for text and set-up.

Data processing keys

Keys that have characters on the left half and right half of their keycap. The characters on the right half of the keycap are data processing characters. You must select a special set-up feature to use these characters.

Diacritical marks

Marks or symbols that indicate a change in the standard pronunciation of a letter. Examples of diacritics are the acute accent ('), grave accent (`), and tilde (~).

On the VT420, you can use diacritical marks (if available on your keyboard) to start two-stroke compose sequences.

Display

The information that appears on the screen.

Factory default

A standard setting for a feature. The VT420 uses factory-default settings, unless you select a new setting. Many set-up features have default settings.

Full-duplex modem

A *modem* that can handle simultaneous, two-way communications.

Host system

The computer system(s) you connect to the VT420. If you connect the terminal to two systems, one is the primary host and one is the secondary host.

Inactive session

A *session* that you are not currently using. You can run two sessions at the same time on the VT420, but you can only interact with one session at a time.

Keyboard indicator line

A status line with six fields that provide information about the keyboard's status. The keyboard indicator line appears at the bottom of the screen, in the smaller, 132-column font. See also *status line*.

Modem

Modulator - demodulator. A device that converts data from a computer or terminal into signals that can be sent over a telephone line.

Modifier key

A key pressed in combination with another key, to modify the code sent by that key. **[Ctrl]** is a modifier key.

Nonvolatile memory

Nonvolatile RAM (random access memory). The VT420 uses this memory to store the *saved settings* of set-up features. The settings are not lost when you turn the terminal off.

Page

A section of the terminal's *page memory*. Each page has left, right, top and bottom margins. You can define the size and layout of a page by using the *page arrangement* feature.

Page arrangement

A set-up feature that divides *page memory* into one of four standard page sizes. The default setting of the **page arrangement** feature is 3 pages of 24 lines each (for two sessions) or 6 pages of 24 lines each (for a single session).

Page memory

Memory in the VT420 that can store the information you enter from the keyboard. The total size of page memory is 144 lines. Page memory is divided into pages. You can select from several standard page sizes. The amount of memory available depends on the page size selected and the number of *sessions* used (one or two).

Panning

Pointing a *window* to display different parts of *page memory*. Panning a window is similar to panning a camera. The window does not move on the screen; you point the window at another location in page memory.

Pixel

Picture elements. The smallest displayable unit on a video screen. To display a character, the terminal turns on a series of pixels.

Port

The logical route for data in or out of the controller board on the VT420. Also, another term for connector. One port can support one or more connectors. All the VT420 connectors are on the rear of the terminal.

Prefix key

A key that you press and release before pressing another key, to change the function of one or more keystrokes. Compose Character is a prefix key.

Resynchronize

To restore communication with an interrupted *session*.

Saved settings

The settings of set-up features that the VT420 uses when you turn the terminal on. You can change these settings or use the *factory-default* settings.

Scrolling

Moving data between the margins of the page currently displayed. Data scrolled past the margins is lost from *page memory*, but usually not from the *host system*.

Scrolling region

The area on the current *page* that is between the top, bottom, left, and right page margins. The default scrolling region is the complete page. Only a programmer can change the page margins.

Session

An active connection between the VT420 and a *host system*. When you log in to a computer from the terminal, you open a session.

Set-up

A set of display screens on the VT420 that let you examine and change the settings of the terminal's operating features. You can use the keyboard to change settings.

SSU

Digital's Session Support Utility. This software lets you run two sessions over one communication line.

Status line

A display line that provides information about the session's current operating state. The status line appears at the bottom of the screen or at the bottom of the session (if you are running two sessions). The VT420's **status display** feature has three settings—indicator, none, and host-writable. The VT420 always displays the status line for the current session in set-up.

Terminal server

An intelligent unit that can connect a number of asynchronous devices (terminals and printers) to a host system. For example, Digital's DECserver 200 can link eight VT420 terminals to a system in a local area network (LAN), using a high-speed Ethernet cable.

User-defined keys (UDKs)

Any of the 15 keys, [F6] to [F20], on the top row of the keyboard for which a user has defined special functions. You can use UDKs to store frequently used text and commands.

Visual character attribute

A quality of a display character that highlights the character, such as bolding and underlining.

Window

A specified area of the screen used to display information from *page memory*. You can divide the screen horizontally into two windows, to display information from two sessions at the same time.

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VT420 Common Keyboard Functions

Set-Up Keys (Chapter 5)

Set-Up	Enter and leave set-up.
Arrow keys	Move the set-up cursor to different features in a set-up screen.
Enter or Return	Perform an action or change the setting of the feature that the set-up cursor is on.
Ctrl Set-Up	Reset most set-up features for both sessions to their saved setting. This key sequence only works in set-up.

Printing (Chapter 8)

F2 (Print)	Print the page of text that the cursor is on.
Ctrl F2 (Print)	Turn auto print mode on or off. Print each line of text as it is received from the host system.

Two Sessions (Chapters 3 and 7)

F4 (Session)	Change the active session.
F1 (Hold)	Hold the screen display of the active session. Press again to release.
Ctrl F1 (Hold)	Hold the screen display of the inactive session. Press again to release.

Windows (Chapter 7)

Ctrl F4 (Session)	Select one or two windows on the screen. Press One time: two horizontal windows Two times: one full-screen window
Shift Ctrl ↑ or ↓	Change the relative size of two windows.

Panning (Chapter 7)

Ctrl ↑ or ↓	Pan up and down.
Ctrl Prev	Pan to the previous page.
Ctrl Next	Pan to the next page.

Copying and Pasting Text (Chapter 7)

Press and hold the **F1** (Copy) key. While holding the **F1** (Copy) key, use the following keys to cut and paste text:

arrow keys

Move the cursor to beginning or end of text to be copied.

Select

Select the starting point of text to be copied.

Remove

Remove the selected text and put it in the paste buffer.

Insert

Paste the copied text into the active session, at the cursor's current position.

Typing Additional Characters (Chapter 6)

Compose Character

Lets you enter additional characters (Table 6-1) that do not appear on your keycaps.

Function Keys (Chapter 4)

F6 to **F20**

Perform application-defined functions.

Shift **F6** to **Shift**
F20

Perform user-defined functions. To define keys, see the *VT420 Programmer Reference Manual*.

Communication (Chapters 4, 5, 8, and Appendix C)

F5 (Break)

Usually ends communication with a session.

Shift **F5** (Break)

End communication with a modem.

Ctrl **F5** (Break)

Send the answerback message to the active session.