

# ***VT220 Terminal Emulation Program Programmer's User Guide***

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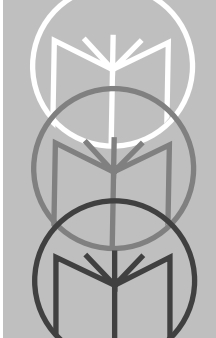
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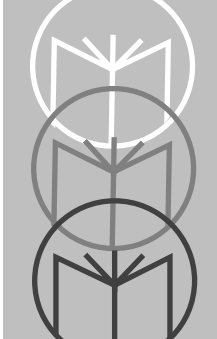
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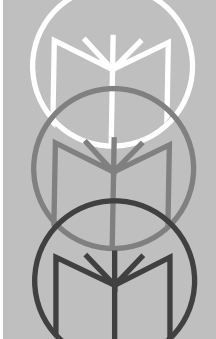


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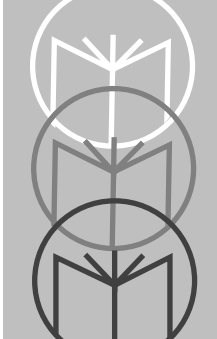
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## *About This Guide*

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This guide describes how to load, modify, and use the Symbol VT220 Terminal Emulation Program with a DEC VT-compliant host application. Users should have a basic familiarity with the following:

- Host application programming
- DEC VT interface
- C language
- Symbol terminals used in the application

This guide does not describe how to configure networks or program terminals. For information about these topics, refer to the following documents:

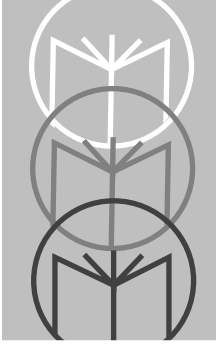
Document	Document Control No.
Spectrum24 Access Point AP-3020 Product Reference Guide	70-20504-01
Series 3000 Application Programmer's Guide	70-16308-02
Series 3000 Application Programmer's Reference Manual	70-16309-02

The documents listed above can be ordered through a Symbol sales representative. You can also refer to the documentation supplied with the network control products, terminals, and cradles.

In this guide, keycap graphics are used to represent individual characters transmitted or received and keys to be pressed, as appropriate in context. The keycap graphic , for example is used to represent the Enter key on the keyboard.







# *Chapter 1*

## *VT220 Overview*

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# The VT220 Terminal Emulation Program

The Symbol VT220 Terminal Emulation Program is a video terminal (VT) emulator for Symbol Series 1000, 3000, and 6000 radio terminals operating over a Spectrum24 network. The VT220 Terminal Emulation Program allows a Symbol mobile terminal to connect to a host computer and behave like a VT220 terminal so that it can interact with VT220-compatible applications on the host. The VT220 program also allows a Symbol terminal to emulate a VT100 or VT52 terminal.

A proprietary version of the command set supplied with the Digital Equipment Corporation (DEC) VT220 terminal is provided by this program. The terminal communicates with the host using the appropriate driver and the VT220 program loaded into the terminal's nonvolatile memory (NVM) or flash memory.

Spectrum24 uses electromagnetic waves to transmit and receive electric signals without wires. Users communicate with the network using radio links between radio-equipped mobile units (MUs) and Access Points (APs).

Spectrum24 uses FM (frequency modulation) to transmit digital data from one device to another. In FM, a radio signal begins with a carrier signal that provides the base or center frequency. The digital data signal superimposes on the carrier signal (modulation). The radio signal propagates into the air as electromagnetic waves. A receiving antenna in the path of the waves absorbs the waves as electrical signals. The receiving device demodulates the signal by removing the carrier signal. This demodulation results in the original digital data.

Spectrum24 features include:

- Bridging architecture to provide communication between radio and wired multiple network segments.
- A design based on the IEEE 802.11 standard.
- Fast operation.
- Seamless roaming for mobile users of devices such as laptop computers, wireless PCs, scanning terminals, and computer devices with PCMCIA slots.

The Ethernet AP provides transparent access between Ethernet wired



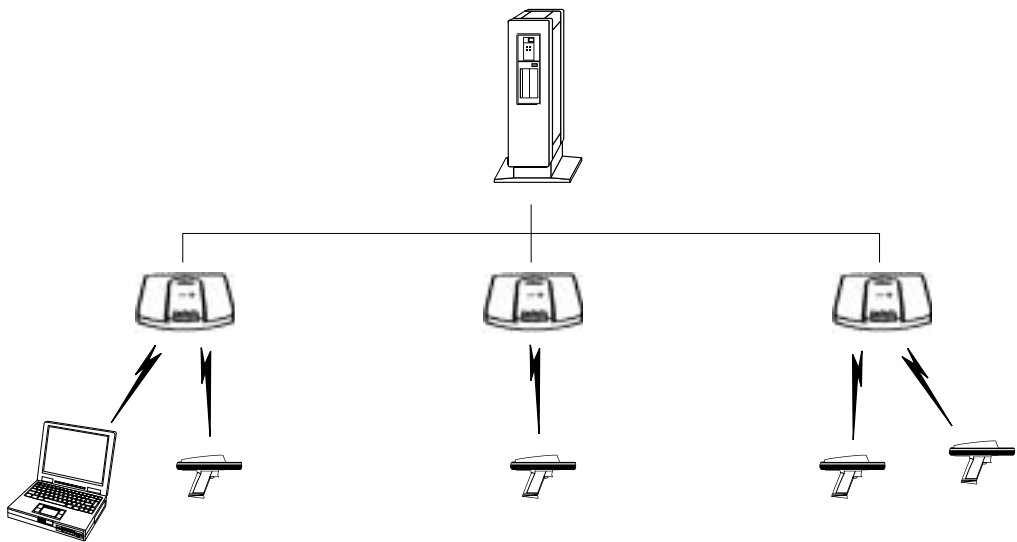
networks and radio-equipped MUs, as shown in Figure 1-1. MUs include the full line of Symbol Spectrum24 terminals, scanners, third-party devices, or other devices equipped with a PCMCIA slot.

The AP monitors Ethernet traffic and forwards appropriate Ethernet messages to MUs over the Spectrum24 network. It also monitors MU radio traffic and forwards MU packets to the Ethernet LAN.

Spectrum24 devices, like other Ethernet devices, have unique, hardware-encoded MAC or IEEE addresses. MAC addresses determine the device sending or receiving data. The MAC address is a 48-bit number written as six hexadecimal bytes separated by colons. For example:

00:A0:F8:24:9A:C8

A Symbol terminal communicating with an AP appears on the network as a peer to other network devices. The wireless interface is transparent.



**Figure 1-1. Spectrum24 network with a single host**

The VT220 program provides three basic functions:

- It receives characters from the host and displays them on the terminal's screen.

- It transmits characters back to the host by either assembling characters in a buffer before sending them when the operator presses `[Enter]` (block mode), or by sending each character immediately (character mode). In either mode, scanned characters are sent immediately to the host.
- Upon receipt of the application exit command (`[Esc]ATnn`), VT220 exits and sets the DOS error level code to the number specified by *nn*. A batch file containing a call to VT220 can use this status code to determine whether to execute a program.

The VT220 program has operating parameters which can be set according to your needs. The options can be set using screens displayed on the terminal, or they can be preset in a configuration file which is loaded automatically on the terminal.

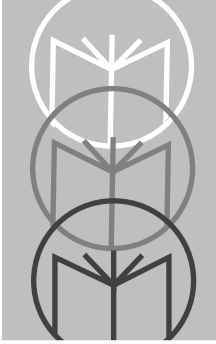
In addition to operating parameters, the operation of VT220 can be customized in other ways. For example, you can add programs (such as a custom application or menu program), change switches to modify how programs, libraries, and drivers are activated by the terminal, and modify files to fit the needs of your particular application.



## **Host System Requirements**

A host system must meet the following requirements:

- The host must have an Ethernet interface using a Telnet TCP/IP network protocol.
- If BootP or DHCP servers are used, the server must be accessible to the remote terminal via the access points.
- The host must be configured to accept login IDs from the remote terminals.



## *Chapter 2*

### *Installing VT220 on a PC*

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## **Chapter Overview**

This chapter describes how to install the VT220 Terminal Emulation Program from the installation diskette onto an IBM-compatible personal computer (PC).

The PC where VT220 is initially installed does not have to be connected to the Spectrum24 network where the program will eventually be used. In many cases, the program is installed on a separate development PC where it is used to create a custom VT220 hex file. The VT220 hex file is then copied to a PC or Unix workstation on the Spectrum24 network so it can be downloaded to terminals on the network.

Follow this same procedure to install the VT220 Terminal Emulation Program for Spectrum One networks.



## Installing VT220

1. Check the environment variables of the PC where VT220 will be installed. If the DOS APPEND command is used to append directories, remove or remark out all APPENDs. Reboot the PC.
2. Insert the VT220 Terminal Emulation Program diskette into the diskette drive.
3. Display the DOS prompt:

C:>

4. Enter the following command:

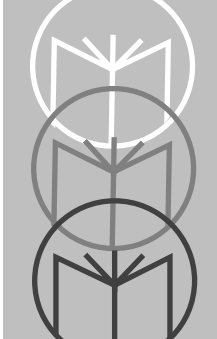
a:install (or b:install *if disk is in drive B*)

5. The installation program asks which hard disk to install on:

Enter drive letter of hard disk [c]:

Press  to accept the default of drive C, or type the letter for the drive you want and then press . The installation program begins installing files in the \S3VT220 directory on the specified drive.

6. When installation is complete, remove the installation diskette and store it in a safe place.
7. If you disabled APPEND commands at the beginning of this procedure, enable them. Reboot the PC.



## *Chapter 3*

# *Downloading and Running VT220 on a Terminal*

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## Chapter Overview

This chapter describes how to download VT220 files to a Symbol terminal and then use the VT220 files to emulate a DEC VT220 terminal and access applications on the host computer.

Each terminal that runs in VT220 terminal emulation mode uses three hex files downloaded to the terminal's nonvolatile memory (NVM) and flash disk. The hex files include all programs and files needed for a terminal to run VT220. The base software must be loaded via LWP.HEX and UPD802.HEX. Normally, the factory load of LWP and UPD802 is satisfactory. If a newer version of LWP is needed, or if the flash disk is damaged, these base hex images must be loaded onto the terminal.

For the terminal emulator itself, you can load either the standard hex file VT220.HEX or a customized hex file that you create. See Chapter 4, *Customizing the Hex File*, for a description of how to create a custom hex file.



## Copying the Hex File to a Connected PC

VT220 may have been installed on a PC not connected to the Spectrum24 network, such as a development PC. If this is the case, you need to copy the VT220 hex file to a PC or Unix computer that can download to Symbol terminals.

The computer where the hex file is copied to is usually a host computer but may be any PC that can connect to the serial port of the terminal cradle.

You can copy either the standard VT220.HEX file or a custom hex file that you create. See Chapter 4, *Customizing the Hex File*, for a description of how to create a custom hex file.

If you are copying the hex file to a PC, you can use the DOS COPY command, Windows File Manager, or any other standard method to copy files. If you are copying the hex file to a Unix computer, use the doscopy command.

## Downloading the Base Software to a Terminal

Normally, terminals for Spectrum24 networks are delivered with the base nonvolatile memory (NVM) hex images already loaded. If the terminal must be reloaded, an LWP hex image and a UPD802 hex image must be loaded into the terminal NVM. These procedures are described in the appropriate Product Reference Guide for the terminal. A generic procedure is provided here as a convenient reminder.

1. On the terminal, format the flash disk with FLSHFMT.EXE. Enter at the DOS prompt:

```
flshfmt
```

When asked, answer yes to confirm.

2. Place the terminal in the cradle and boot the terminal in command mode. (See Appendix C, *Terminal Boot Sequences*, for the key combination used to put a terminal in command mode.)
3. Use **↓** to select “Program loader” on the terminal. Press **Enter**.
4. Use the terminal arrow keys and **Enter** to select the speed and communication parameters to match the downloading computer. Usually, the defaults are acceptable, with the exceptions that the speed can be greater than 9600 baud and Xon/Xoff should be used with 38400 baud.
5. On the downloading computer, change to the directory with the LWP and UPD802 images and the SENDHEX.EXE program. To send LWP at 38400 baud on COM2, enter at the DOS prompt:

```
sendhex LWP 384 2
```

6. The terminal should be displaying the prompt to start the download. Press **Enter** to start the download.
7. The downloading computer should be displaying the prompt to press **Enter** when the remote is ready. Press **Enter** to begin the download.

The downloading computer and the terminal should display percentages and addresses, respectively, indicating the download is progressing.

At the completion of the download, the terminal should display status 0000 indicating a successful download. Any other status code indicates a failed download.



8. Cold boot the terminal. Choose to “Use Flash as-is” at the prompt on the terminal. Several files should be unzipped during the boot process.
9. Boot the terminal in command mode. Repeat the above instructions to download the UPD802.HEX image, substituting UPD802 where LWP was specified in the first download.
10. Cold boot the terminal. If 802.11 protocol is necessary, press ‘Y’, at the “Update S/W” prompt. If 802.11 protocol is **not** necessary, press ‘N’ or accept the default by not pressing any key during the 4 second delay.



## Downloading the Hex File to a Terminal

1. Put the terminal into command mode. (See Appendix C, *Terminal Boot Sequences*, for the key combination used to put a terminal in command mode.) When the terminal is in command mode, the terminal display looks like this:

```
COMMAND MODE

Select function
Self test
```

2. Connect the terminal to the computer with the hex file in one of the following ways:
  - By inserting the terminal into a cradle connected to the downloading computer.
  - By connecting the terminal to the downloading computer using a PIM cable, PC adapter, and RS-232 null-modem cable.
3. Press **↓** to display the program loader option, then press **Enter** to select it.
4. If there are programs currently in the terminal's NVM, a message like this is displayed:

```
WARNING: EEPROM
WILL BE ERASED

CONTINUE? <ENT>
```

Press **Enter** to erase all programs in NVM.

5. The terminal prompts you to select the baud rate. Use the **↓** and **↑** keys to highlight the baud rate for the downloading computer's communication port (usually 38,400), then press **Enter** to select it.
6. The terminal prompts you for the data bits, parity, and flow control parameters to use. You can normally press **Enter** to accept the defaults. For flow control, use Xon/xoff if the baud rate is 38,400 and no flow control for lower baud rates.
7. After entering all communications parameters, the terminal displays the following prompt:

```
Start? <ENT>
```



Press  to continue.

8. At the downloading computer, change to the \S3VT220 directory (or whichever directory contains the sendhex command and the desired VT220 hex file) and enter the following command:

*sendhex file baud port*

Where:

<i>file</i>	VT220 hex file name without the .hex extension (VT220 for the standard hex file VT220.HEX). Include the path name for the file if it is in a different directory.
<i>baud</i>	matches the baud rate set on the terminal
<i>port</i>	1 for COM1, 2 for COM2

9. At the downloading computer, the following message is displayed:

Press Enter when the remote is ready...

Press  to begin the download.

When the download is complete, a status code is displayed on the terminal. The code 0000 indicates a successful download, and any other code indicates that the download was unsuccessful.

## Downloading the Emulator via BootP/DHCP

The BootP and DHCP protocols provide a method to automatically install or update VT220 software on the terminal. This description uses “BootP/DHCP” to indicate either method as being the one in use. Between executions, the emulator maintains lease start, renewal, rebind, and expiration times in file D:\DHCP.RST. When VT220 starts, it first reads this file to initialize its timers.

To install VT220 on a terminal that does not have VT220 installed:

1. Install gstart.bat and SYMBSVTP.ZIP in the tftp file directory on the BootP/DHCP server
2. Configure the BootP or DHCP server to automatically send the gstart.bat file via tftp when the terminal boots.
3. Cold boot the terminal.

To update VT220 on a terminal that does have VT220 installed:

1. Confirm that steps 1 and 2 above have been completed.
2. Modify the gstart.bat file on the BootP/DHCP server to write a new ID number to IDENT.TXT. Do this by updating the number in the line that is similar to:

```
echo ID=29010 >ident.txt
```

3. Modify the SYMBSVTP.ZIP file on the BootP/DHCP server to include the desired changes for the new version.
4. Cold boot the terminal.

## Troubleshooting

### Terminal Fails to tftp the Automatic Download File

Use a tftp client on a network machine to test tftp of the gstart.bat file. If the client on the network machine is unable to download gstart.bat, check the server tftp directory to confirm the existence of the file and that the directory and file permissions are set correctly to allow the wireless LAN clients to download the file. Check that gstart.bat is specified for automatic download in the DHCP configuration on the server.



### **Terminal Fails to tftp the Updated Software**

Confirm that SYMBSVTP.ZIP on the server tftp directory is the updated version.

Use a tftp client on a network machine to test tftp of the SYMBSVTP.ZIP file. If the client on the network machine is unable to download SYMBSVTP.ZIP, check the server tftp directory to confirm that the directory and file permissions are set correctly to allow the wireless LAN clients to download the file.

### **VT220 Exits with Illegal Lease Length Message**

Check the lease length configuration on the server. Double check the time units of the lease length specification. VT220 will not accept leases shorter than 120 seconds.

## Starting VT220 and Accessing a Host Application

1. Perform a cold boot on the terminal. (See Appendix C, *Terminal Boot Sequences*, for the key combination used to cold boot a terminal.) After the cold boot, if the distribution has not been customized, the terminal displays the following:

```
SVTP220 SIII n.nn-nn

1. Go To Logon
2. File Transfer
3. Configure
4. Scan

Select/Clr:
```

2. Select option 3 (Configure). Select option 1, VT220 Term (SVTP). Select option 1, Host Name. Set the host name to either an IP address or a name that resolves to an acceptable address to find a host.

This menu can also be used to change the keyboard map. Select option 3, 4, or 5 to load the desired keyboard map.

3. At the SVTP220 menu, select option 1 (Go To Logon).
4. If the terminal is not properly configured for the host, this message is displayed:

```
Connecting [hostname]....
Can't get hostname host entry
```

If this message is displayed, correct the host name specification.

5. If this is the first time you are running VT220 on the terminal and/or there is no SVTP.CFG file, the Set Options menu is displayed (example for a PDT6840):



```
--- SET OPTIONS ---  
  
1-Host Name:  hostname  
2-Printer:   PS1001  
3-Port Number:  23  
4-Term. Type:  vt220  
5-Local echo:  No  
6-Trans mode:  Char  
7-KB Timeout:  30  
8-Letter case: Unchg  
9-More...  
  
Enter or 1 - 9  
Clr/Esc = Exit
```

You should at least set the host name as needed and then press . See *Modifying VT220 Operating Parameters (SVTP.CFG)* on page 4-6 for a description of each option.

6. The following message is briefly displayed:

Connected.

From this point on, the terminal has successfully begun a Telnet session on the host. You see the login screens for the host system. After logging in, the selected application is in control of the terminal.

## Exiting VT220 Terminal Emulation

To force the terminal to exit from a VT220 application, press **[Alt]-[X]**. The following message is displayed:

Press <CLR> to exit. Any other key to continue.

Press the **[CLR]** key (may be the **[Esc]** key on some terminals) to exit.

The host may use the Attention (**[Esc]**AT $nn$ ) command to cause the terminal to exit from VT220 emulation and sets the DOS error code to a number specified by  $nn$ .



## Switching Between Terminal Emulation Modes

The VT220 program is normally used to emulate a VT220 terminal. If desired, however, you can use VT220 to emulate a VT100 or VT52 terminal.

The VT220 program is normally set to VT220 mode or VT100 mode through the AUTOEXEC.BAT file and/or other batch files downloaded with the VT220 hex file and run on the terminal. The mode can also be switched using the options on the Configure Menu 2 for the SVTP program.

The host application can also use the Select Compatibility Level (DECSCL) command to set the emulation mode to either VT220 or VT100 for compatibility with an application. See *Select Compatibility Level (DECSCL)* on page 6-16 for a description of the DECSCL command.

When in VT220 or VT100 mode, you can switch to VT52 mode using the Set Mode and Reset Mode commands. Once in VT52 mode, you can return to VT220/VT100 mode using the Enter ANSI Mode command. See Chapter 6, *Commands and Control Characters*, and Appendix B, *Command Quick Reference*, for command descriptions.



## Command Line Configuration Options

There are VT220 command line options that you can enter at the terminal's DOS prompt. The options display the configuration menus, display the configuration menus in read-only mode, or specify a host name or list. Command line options are not case sensitive.

### *Changing VT220 Options*

Options for running VT220 are normally set through the downloaded VT220 hex file. You can use the standard option settings specified by the standard VT220.HEX file, or you can create a custom hex file which specifies different option settings. See Chapter 4, *Customizing the Hex File*, for a description of how to create a custom hex file.

If you want to use different option settings than those specified in the hex file, however, you can use the Set Options menu to change option settings.

If the batch file menu provides a configuration option similar to option 3 on the default batch file menu, it is best to use that option and let the batch file manage the read/write accessibility of the flash disk.

If you want to run the VT220 Set Options menu from the command line, you must first set the flash disk to write mode with the following command:

```
flshctl /w
```

To display the Set Options menu, enter the following command at the terminal's DOS prompt:

```
svtp -C
```

**Note:** You can also use a slash (/) instead of a hyphen (-).

After entering `svtp -C` command, the following screen is displayed (example for a PDT6840):



```
--- SET OPTIONS ---  
  
1-Host Name:  xxxxxxx  
2-Printer:    xxxxxxx  
3-Port Number: 23  
4-Term. Type: vt220  
5-Local echo:  No  
6-Trans mode:  Char  
7-KB Timeout:  30  
8-Letter case: Unchg  
9-More...  
  
Enter or 1 - 9  
Clr/Esc = Exit
```

You can press **Enter** to accept the current option settings, or you can make changes as needed and then press **Enter**. See *Modifying VT220 Operating Parameters (SVTP.CFG)* on page 4-6 for a description of each option.

To change settings for an option, press the number of the option. If there are multiple settings for an option, you may need to press the option number several times to display the desired setting.

When the currently displayed options are set as needed, you can press the number of the More selection to display additional options. There are several screens of options.

When all options are changed as needed, press **Enter** to continue. If needed, you can select the More option at the last screen to return to the first screen of options.

After you exit from the VT220 Set Options menu, you must set the flash disk to read-only mode with the following command:

```
flshctl \ro
```

## *Displaying VT220 Options*

Options for running VT220 can be displayed in read-only mode. The Set Options menus to change option settings.

To display the Set Options menus read-only, add the 'R' option. Enter the following command at the terminal's DOS prompt:

```
svtp -C -R
```

**Note:** You can also use a slash (/) instead of a hyphen (-).

After entering the command, the screens displayed are the same as in *Changing VT220 Options*, above. No changes can be made to the configuration, however.

## *Specifying a Host or Host List*

VT220 can be started with a host or host list specified on the command line.

To specify a host, enter the following command at the terminal's DOS prompt:

```
svtp -H<hostname>
```

**Note:** You can also use a slash (/) instead of a hyphen (-).

The host name should follow the 'H' immediately, no intervening space.

To specify a host list, enter the following command at the terminal's DOS prompt:

```
svtp -L
```

**Note:** You can also use a slash (/) instead of a hyphen (-).

VT220 will start by displaying the list of host names in the file D:\HOST.CFG and allowing the operator to choose the host for the Telnet session. VT220 will attempt to Telnet to that host for the session.



## Notes for Unix Users

To allow the use of the VT220/VT100 commands, Unix users must set the terminal type to VT220 or VT100. The scripts shown below work for most installations. If your system uses a shell different from those shown, refer to your system documentation.

### *C Shell Users*

```
% setenv TERM vt $nnn$ 
```

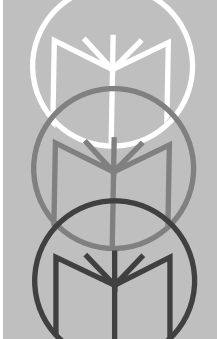
where  $nnn$  indicates the terminal type (220 for VT220, 100 for VT100).

### *Bourne Shell Users*

```
$ TERM=vt $nnn$   
$ export TERM
```

where  $nnn$  indicates the terminal type (220 for VT220, 100 for VT100).

You should also disable tab expansion to spaces and disable suspend when running in VT52 mode.



## Chapter 4

### *Customizing the Hex File*

---

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## Chapter Overview

This chapter describes how to create a custom VT220 hex file. When downloaded and run on a terminal, a custom hex file allows the terminal to use non-standard VT220 operating parameters without using the SVTP option screens. See *Changing VT220 Options* on page 3-15 for a description of the SVTP option screens.

You can also use the hex file to add new functionality. For example, you can:

- Add programs such as a custom application or menu program.
- Change switches to modify how programs, libraries, and drivers are activated by the terminal.
- Modify files to fit the needs of your particular application.

The process of creating a custom hex file consists of modifying one or more setup files and then using the User Configuration Tool to create the hex file from the setup files.



## Files Needed to Create a Custom Hex File

In addition to the files copied from the VT220 installation diskette, creating a custom hex file requires files from the Application Development Kit (ADK, SW-10441-07). Table 4-1 lists the files required.

**Table 4-1. Files needed to create a custom hex file**

ADK Files
COMMAND.COM
ERR3000.SYS
ETA3000.SYS
KBD3000.SYS
NULLSYS.HEX
SCAN.EXE
SCAN3000.EXE
TDREM.EXE



## Keyboard Definition Maps

VT220 utilizes the keyboard map implemented by the terminate-and-stay-resident utility KBD3000.EXE. The distribution file SYMBSVTP.BAT loads KBD3000.EXE and provides an example of how to implement automatic loading of the standard, VT100, or VT220 keyboard maps. The *Series 3000 Application Programmer's Reference Manual* explains the use of KBD3000.EXE.

The keyboard map can be changed via the terminal keyboard. See *Starting VT220 and Accessing a Host Application* on page 3-11 for more information.

Keyboard maps (.KBD files) for various terminals are shipped in the VT220 distribution. The keyboard map files that are not used may be removed from a customized hex file to save space and installation time. See *Modifying the Response File* on page 4-22 for a description of how to trim the unused .KBD files from a hex file.

Most applications are best implemented with the standard keyboard map. The standard map has the advantages of implementing key functionality as shown on the terminal keyboard and simulating the familiar PC keyboard.

The VT220 keyboard maps (or VT100 keyboard maps, if applicable) provide more accurate emulation of a DEC VT220 terminal keyboard for host applications that take advantage of the DEC features. The main advantages are access to function keys **[F11]–[F20]**, more complete screen panning control via the keyboard, and more complete cursor movement control via the keyboard.



## Modifying VT220 Operating Parameters (SVTP.CFG)

The SVTP.CFG file specifies operating parameters used when a terminal runs VT220 emulation. Operating parameters can also be set using the Set Options screens on the terminal as described in *Changing VT220 Options* on page 3-15. Specifying parameters in the SVTP.CFG file, however, allows the desired parameters to be selected automatically without using the Set Options screens.

Use a standard DOS editor to modify SVTP.CFG. When modifying the file, observe the following rules:

- Do not change the directive names (the text before the = character on each line).
- Do not include any spaces on a line.
- A carriage return (\013) and line feed (\010) must follow each entry. Most ASCII editors provide the necessary carriage return and line feed characters.

The SVTP.CFG file cannot be renamed. It is recommended to save a copy or backup of the original SVTP.CFG so that you can troubleshoot any problems.

The default SVTP.CFG includes the following:

```
sHostName=hostname
sPortNumber=23
sRFTimeOut=None
sTermType=vt220
Cursor=SOFT
DefCol=20
sAutoEnter=Off
sBLTimeOut=15
sEcho=No
sKBTimeOut=30
sLetter=Unchg
sMaskChar=UNDLN
sScrnLock=Off
sTrans=Char
UseLogScrSz=Off
```

```

sRemLead128=Off
sRemoveCkDig=Off
sScanAhead=On
sScanPref=Off
sScanTerm=CR
sShowSymbol=On
sSymb=Off
sUPCACKDig=Default
sUPCECKDig=Default
sUPCElCkDig=Default
Printer=PS1001
Printer Port=COM1
Print Status=Off
ShowPrnError=On

```

Tables 4-2 to 4-5 describe the options for each parameter. The corresponding name of each parameter on the Set Options screens is shown in parentheses at the beginning of the parameter description.

**Table 4-2. Connection Parameters in SVTP.CFG**

Parameter	Description
sHostName	<p>(Host Name.) Specifies a host name in a DNS table or an IP address of the host. The first step of hostname resolution is performed by checking for an environment variable with the same name. If the environment variable exists name resolution is continued with the value of the environment variable. For instance, you can set the hostname to SIADDR to use the DHCP/BOOTP server as your host.</p> <p>The special name "LIST" is reserved to specify a host list defined in the file D:\HOST.CFG. The format of HOST.CFG is one entry per line of the format:</p> <pre>&lt;name&gt;=&lt;ip address&gt;</pre>
sPortNumber	(Port Number.) Specifies the Telnet port number.
sTermType	(Term. Type.) Specifies the VT terminal type.



**Table 4-2. Connection Parameters in SVTP.CFG (continued)**

Parameter	Description
sRFTIMEout	(RFTIMEout.) Specifies the number of seconds that no response is received after the terminal transmits to the transceiver. If the specified timeout period elapses without response, the terminal user is prompted whether to continue. If the user does not continue, the program is aborted and the DOS error level is set to 10. Options are None, 30, 60, and 300. If set to None, the RF Timeout feature is disabled.

**Table 4-3. Screen and Keyboard Parameters in SVTP.CFG**

Parameter	Description
Cursor	(Cursor.) Specifies whether the cursor mode is hardware or software mode. Options are Hard and Soft.
DefCol	(Default Col.) Specifies the default column width of the screen.
DefRow	(Default Row.) Specifies the default row height of the screen.
sAutoEnter	(sAutoEnter.) Specifies whether the auto-enter keyboard input is enabled. Options are On or Off. The default is Off. When set to On, the input data will be sent to the host after either the Enter key ( <u>Enter</u> ) or a Function key (F0-F9) is pressed. When set to Off, the input data will not be sent to the host until the Enter key ( <u>Enter</u> ) is pressed in the block mode.
sBLTimeOut	(BLTimeOut.) Specifies the number of seconds the backlight should remain on before automatically turning off. If the timeout is None, the automatic power off feature is disabled. Options are None, 15, 30, 60, and 180.

**Table 4-3. Screen and Keyboard Parameters in SVTP.CFG (continued)**



Parameter	Description
sEcho	(Local echo.) Specifies whether VT220 displays characters typed on the terminal independently of the host echo. Options are Yes (on) and No (off). When set to No, characters typed on the terminal are sent to the host, but only characters sent from the host are displayed on the terminal.
sKBTimeOut	(KBTimeout.) Specifies the number of seconds the keyboard must be idle before the terminal automatically powers down. Options are None, 30, 60, and 300.
sLetter	(Letter case.) Specifies the case of alpha characters (a-z) sent to the host. Options are Unchg, Upper, and Lower. When set to Unchg, characters are sent to the host in the case (upper or lower) they are entered. The Upper option sends all characters as uppercase, and the Lower option sends all characters as lowercase.
sMaskChar	(sMaskChar.) Specifies the input Mask Character. The syntax is sMaskChar=<ASCII CHAR> where <ASCII CHAR> can be: UNDLN - the underline character '_'. DOTCH - the dot character '.'. SPACE - the blank space character. For example: Use the underline character for Mask Character sMaskChar=UNDLN.



**Table 4-3. Screen and Keyboard Parameters in SVTP.CFG (continued)**

Parameter	Description
sScrnLock	<p>(Scrn Lock.) Specifies whether the terminal display position is locked in the upper left corner of the VT220 screen area. Options are Off and On.</p> <p>When set to On, the terminal display will not automatically scroll around the VT220 screen area as the cursor moves. The user can reposition the screen using the panning keys.</p> <p>The host can also control the state of the screen lock option using the following commands.</p> <p>Off: <input type="button" value="Esc"/> %0L</p> <p>On: <input type="button" value="Esc"/> %1L</p> <p>See Chapter 5, <i>Screen Handling</i> for information about terminal display position in the VT220 screen area.</p>
sTrans	<p>(Trans mode.) Specifies character transmission mode to Block (block mode) or Char (character mode).</p> <p>Block mode saves all typed characters in a buffer until the operator presses <input type="button" value="Enter"/>. Character mode transmits each character to the host as soon as it is entered into the terminal.</p>
UseLogScrSz	<p>(UseLogScrSz.) Defines the maximum screen size. Options are On or Off. The default is Off.</p> <p>When set to On, VT220 will define the maximum screen size equal to the terminal screen size. The default maximum screen size is 24x80.</p>

**Table 4-4. Scan Parameters in SVTP.CFG**

Parameter	Description
sRemLead128	(Rem128Lead.) Removes, or reports the leading digit of the Code 128 barcodes. May be On or Off. If sRemLead128=On, then the leading digit of the bar code will be removed. If sRemLead128=Off, then the leading digit of the bar code will be reported.
sRemoveCkDig	(sRemoveCkDig.) Removes the check digit from the label type EAN-8 barcodes. If sRemoveCkDig=On, then the ending character of the bar code will be deleted; otherwise, there is no change on the bar code.
sScanAhead	<p>(Scan Ahead.) Specifies whether the host is allowed to control the use of the scanner to scan ahead. Options are On and Off.</p> <p>When set to Off, the host can enable or disable scanning using the following commands.</p> <p>Disable:  %0S</p> <p>Enable:  %1S</p> <p>When set to On, the scanner is also automatically disabled each time it successfully decodes a label.</p>
sScanPref	<p>(sScanPref.) Adds a scan prefix character for the scanned data. Options are On or Off.</p> <p>If the line sScanPref=On appears in the file, then the caret character, ^ (ASCII 0x5E), will be prefixed to every scanned input. This function can be disabled if sScanPref=Off. This parameter would be independent of other parameters and would appear before the symbology field, if symbology is turned on.</p>
sScanTerm	(Scan Term.) Sets the key sequence appended to the end of scanned data. Options are None, Tab, EscTab, and CR (carriage return).
sShowSymbol	<p>(sShowSymbol.) Specifies whether a symbology character displays on the terminal's display with scanned data. Options are On or Off. The default is On.</p> <p><b>Note:</b> The scan prefix character will not display on the screen if sScanPref=Off.</p>

**Table 4-4. Scan Parameters in SVTP.CFG (continued)**

Parameter	Description																																
sSymb	<p>(Symbology.) Specifies whether a character indicating the symbology type is added at the beginning of data from scanned barcodes. Options are Off and On.</p> <p>When set to On, the character added to the scanned data is the value of the label type plus hex 41. Label types are listed in the <i>Series 3000 Application Programmer's Reference Manual</i>. As of the date of this draft, the following translations are defined:</p> <table><tr><th>Data ID</th><th>Label Type</th><th>Data ID</th><th>Label Type</th></tr><tr><td>A</td><td>UPC E0</td><td>H</td><td>Code 39</td></tr><tr><td>B</td><td>UPC E1</td><td>I</td><td>Discrete 2 of 5</td></tr><tr><td>C</td><td>UPC A</td><td>J</td><td>Interleaved 2 of 5</td></tr><tr><td>D</td><td>MSI</td><td>K</td><td>Code 11</td></tr><tr><td>E</td><td>EAN 8</td><td>L</td><td>Code 93</td></tr><tr><td>F</td><td>EAN 13</td><td>M</td><td>Code 128</td></tr><tr><td>G</td><td>Codebar</td><td></td><td></td></tr></table>	Data ID	Label Type	Data ID	Label Type	A	UPC E0	H	Code 39	B	UPC E1	I	Discrete 2 of 5	C	UPC A	J	Interleaved 2 of 5	D	MSI	K	Code 11	E	EAN 8	L	Code 93	F	EAN 13	M	Code 128	G	Codebar		
Data ID	Label Type	Data ID	Label Type																														
A	UPC E0	H	Code 39																														
B	UPC E1	I	Discrete 2 of 5																														
C	UPC A	J	Interleaved 2 of 5																														
D	MSI	K	Code 11																														
E	EAN 8	L	Code 93																														
F	EAN 13	M	Code 128																														
G	Codebar																																
sUPCAckDig	<p>(UPCA CkDig.) Reports, removes, or uses the scanner default setting for the check digit from the label type UPCA barcodes. May be On, Off, or Default. If sUPCAckDig=On, then the check digit character of the bar code will be added to the bar code. If sUPCAckDig=Off, there is no check digit added to the bar code. If sUPCAckDig=Default, the current setting in the scanner is unchanged; it controls whether or not the check digit is reported. If configured to On or Off, the scanner setting is changed and will persist until reconfigured or until the terminal is cold booted.</p>																																



**Table 4-4. Scan Parameters in SVTP.CFG (continued)**

Parameter	Description
sUPCECkDig	(UPCE CkDig.) Reports, removes, or uses the scanner default setting for the check digit from the label type UPCE barcodes. May be On, Off, or Default. If sUPCECkDig=On, then the check digit character of the bar code will be added to the bar code. If sUPCECkDig=Off, there is no check digit added to the bar code. If sUPCECkDig=Default, the current setting in the scanner is unchanged; it controls whether or not the check digit is reported. If configured to On or Off, the scanner setting is changed and will persist until reconfigured or until the terminal is cold booted.
sUPCE1CkDig	(UPCE1 CkDig.) Reports, removes, or uses the scanner default setting for the check digit from the label type UPCE1 barcodes. May be On, Off, or Default. If sUPCE1CkDig=On, then the check digit character of the bar code will be added to the bar code. If sUPCE1CkDig=Off, there is no check digit added to the bar code. If sUPCE1CkDig=Default, the current setting in the scanner is unchanged; it controls whether or not the check digit is reported. If configured to On or Off, the scanner setting is changed and will persist until reconfigured or until the terminal is cold booted.

**Table 4-5. Print Parameters in SVTP.CFG**


Parameter	Description
Printer	(Printer.) Specifies the printer type. Options are PS1000, PS1001, PS1004, Line Printer, Comtec, and Rascal.
Printer Port	(Printer Port.) Specifies the port used by the printer. Options are COM1 and RJ41. The RJ41 option is used for Symbol 3310 terminals.









**Table 4-5. Print Parameters in SVTP.CFG**

Parameter	Description
Print Status	(Print Status.) Specifies whether the status of the print job is sent to the host. Options are On and Off. (See <i>Printer Control (PCONTROL)</i> on page 6-41.)
ShowPrnError	(ShowPrnError.) Specifies whether a printer error dialogue is displayed on the terminal seeking a response from the operator. Options are On and Off. (See <i>Show Printer Errors (SYMSPE)</i> on page 6-43.)
































## Redefining Function Keys (FUNC.DEF)

By default, the function keys send the character sequences specified by DEC. On DEC terminals, DEC reserves certain function keys for DEC-specific terminal hardware control and does not implement the  shifted function keys. Symbol terminals do not have those DEC hardware characteristics.



















































The set of keys that send sequences have been extended in VT220 to include keys reserved or unimplemented by DEC. Table 4-6 lists the function keys and their default transmitted character sequences. The  symbol indicates keys that Symbol has added to the DEC definition.



Some  function key sequences are especially significant on certain Symbol terminals, such as the  key on the Wearable 1000 that sends the - sequence in its unshifted state. The  shifted function keys are referred to as “personal” keys.

**Table 4-6. Function Key Default Transmitted Sequences**

Symbol Proprietary	Logical Key	Default Output	Scan Code (Decimal)
		 [11~	59
		 [12~	60
		 [13~	61
		 [14~	62
		 [15~	63
		 [17~	64
		 [18~	65
		 [19~	66
		 [20~	67
		 [21~	69
		 [23~	87
		 [24~	88
		 [25~	89

**Table 4-6. Function Key Default Transmitted Sequences (continued)**

Symbol Proprietary	Logical Key	Default Output	Scan Code (Decimal)
	 F14	 [26~	90
	 F15	 [28~	91
	 F16	 [29~	92
	 F17	 [31~	93
	 F18	 [32~	94
	 F19	 [33~	95
	 F20	 [34~	96
	 -  F1	 %11~	104
	 -  F2	 %12~	105
	 -  F3	 %13~	106
	 -  F4	 %14~	107
	 -  F5	 %15~	108
	 -  F6	 %16~	109
	 -  F7	 %17~	110
	 -  F8	 %18~	111
	 -  F9	 %19~	112

If desired, you can redefine function keys   when running VT220 on a terminal. Function key redeclarations are specified in the FUNC.DEF file.

If you want to redefine a function key, enter a line in FUNC.DEF as follows:

```
FnMACRO=string
```

where *n* is the number of the function key (1-20) and *string* is the character string to be entered by the function key.

When editing FUNC.DEF, note that:

- Each line must be terminated with a carriage return.

- Escape sequences must be entered in decimal format `\ddd`, such as `\010` for line feed, `\013` for carriage return, and `\027` for escape. VT220 will convert all escape sequences from decimal format to the equivalent binary values.

Example:

```
F1MACRO=\027[0P\013CR
```

where *CR* is a carriage return inserted by the text editor.

- The string may be a maximum of 50 characters in the FUNC.DEF file.

The “personal” keys (the Alt shifted function keys) can be redefined in FUNC.DEF by a declaration that differs slightly from the function key declaration, beginning with ‘P’ instead of ‘F’.

If you want to redefine a personal key, enter a line in FUNC.DEF as follows:

```
PnMACRO=string
```

where *n* is the number of the personal key (1-9) and *string* is the character string to be entered by the personal key.

Example to assign the string “Shipped” to the P1 key on the Wearable 1000 wrist computer:

```
P2MACRO=ShippedCR
```

where *CR* is a carriage return inserted by the text editor.

If none of the function keys and personal keys are redefined, FUNC.DEF is empty.



## Expect Processing

Expect/Reply processing of the input stream is active when the emulator starts. When the emulator receives an expect pattern, it replies to the host with the associated reply pattern. This enables the user to create simple scripts that can automatically log in to the system and perform simple operations.

This processing is implemented in the file EXPECT.CFG that is normally created during custom configuration of the emulator and downloaded to the terminal in the hex file or the tftp file.

Expect and reply patterns are each specified on separate lines in the file. The parameter format in EXPECT.CFG is:

sExpect<n>=<pattern>

sReply<n>=<reply>

The value <n> may be between 1 and 9, inclusive. The expect patterns are processed sequentially beginning with 1 and each is only processed once. The processing ends when there is not an expect pattern n+1 or  $(n+1) = 10$ . The patterns and replies can contain any character that does not represent a VT220 command. The escape characters '\n', '\r', and '\ddd' may be used to specify a new line, carriage return, or ASCII character of decimal value 'ddd', respectively.

## Example AUTOSVTP.BAT File

The following is an example of an AUTOSVTP.BAT file. This file is designed to be used as the terminal's AUTOEXEC.BAT file. The /a line in the standard response file shown on page 4-22 includes the AUTOSVTP.BAT file in the VT220 hex file so that it can be loaded as AUTOEXEC.BAT on the terminal.

If desired, this file can be given a name other than AUTOSVTP.BAT. If it has a different name, be sure to modify the /a line in the response file to reflect the new filename. Whatever name is given to the file here, it is renamed as AUTOEXEC.BAT when downloaded to the terminal.

```
@echo off
path a:;b:;d:
set NO87=true
scan3000

rem --- test bios 1.08 problem, 3500 46-key & 3100 46-key use
rem --- 3800 46-key map
ckterm
if errorlevel 2 goto 3100Type
if errorlevel 1 goto 3100Type
goto NOT3100
:3100Type
helpb108
:NOT3100
rem ---

tsrreg

utl click -ON
if exist d:3135v100.kbd goto warm_boot
copy b:3135v100.kbd d:\ > NUL
copy b:3137v220.kbd d:\ > NUL
copy b:3335v100.kbd d:\ > NUL
copy b:3335v220.kbd d:\ > NUL
copy b:3356v100.kbd d:\ > NUL
copy b:3356v220.kbd d:\ > NUL
```



```
copy b:3395v100.kbd d:\ > NUL
copy b:3835v100.kbd d:\ > NUL
copy b:3835v220.kbd d:\ > NUL
copy b:3846v100.kbd d:\ > NUL
copy b:3846v220.kbd d:\ > NUL
copy b:3954v100.kbd d:\ > NUL
if exist b:srcp.cfg copy b:srcp.cfg d:\ > NUL
if exist b:svtp.cfg copy b:svtp.cfg d:\ > NUL
:warm_boot
rem --- If WarmBoot, check for keyboard setup
if exist d:\keyboard.vt1 goto kbvt1
if exist d:\keyboard.vt2 goto kbvt2
if exist d:\keyboard.std goto kbstd
rem --- Load VT220 keyboard (also by default)
:kbvt2
echo Loading VT220 keyboard...

ckterm
if errorlevel 3 goto vSaturn
if errorlevel 2 goto V23lxx35
if errorlevel 1 goto v23lxx46
:v23lxx35
kbd3000 -STD=a VT220
goto vtkey1
:v23lxx46
kbd3000 -STD=f 3846v220
goto vtkey1
:vSaturn
rem No vt220 keyboard map for Saturn terminal.
:vtkey1

date < b:svtp.ini > keyboard.vt2
time < b:svtp.ini >> keyboard.vt2
if exist keyboard.std del keyboard.std
if exist keyboard.vt1 del keyboard.vt1
goto kbdone
rem --- Load VT100 keyboard
```



```
:kbvt1
echo Loading VT100 keyboard...
rem kbd3000 -STD=a VT100 -AUX=a VT100

ckterm
if errorlevel 3 goto vlSaturn
if errorlevel 2 goto vl3lxx35
if errorlevel 1 goto vl3lxx46
:vl3lxx35
kbd3000 -STD=a VT100 -AUX=a VT100
goto vtkey2
:vl3lxx46
kbd3000 -STD=f 3846v100
goto vtkey2
:vlSaturn
rem No VT220 keyboard map for Saturn terminal.
:vtkey 2

date < b:svtp.ini > keyboard.vt1
time < b:svtp.ini >> keyboard.vt1
if exist keyboard.std del keyboard.std
goto kbdone
rem --- Load standard keyboard
:kbstd
echo Using standard keyboard...
date < b:svtp.ini > keyboard.std
time < b:svtp.ini >> keyboard.std
if exist keyboard.vt1 del keyboard.vt1
rem --- Start SVTP menu
:kbdone
symsvtp
exit
```



## Modifying the Response File

**Note:** Before you modify the response file, review the *Series 3000 Application Programmer's Reference Manual* and the *Series 3800 System Software Reference Manual* for information about the modules used and the User Configuration Tool.

The information in the response file tells the User Configuration Tool how to create the hex file. Each line in the response file instructs the User Configuration Tool to perform a specific operation.

When VT220 is installed as described in Chapter 2, a standard version of the response file (VT220.RSP) is copied from the installation diskette. It is recommended to save the custom response file under a different name than the standard file so that you can troubleshoot problems by comparing the custom file to the standard file.

It is also recommended to save a custom hex file under a different name than the standard VT220.HEX. To rename the file, change the last line of the response file to reflect the new hex file name. For example, to save the hex file as RECEIVE.HEX, the last line would be as follows:

```
/h /256 /320 /co receive.hex
```

The standard VT220.RSP file includes the following:

```
nullsys.hex
/s command.com
/c config.flc
/a autoexec.vt
/r init.exe
!
/u flashdsk.sys
/u flshctl.exe
/u flshfmt.exe
/u flash.bat
!
/u err3000.sys
/u eta3000.sys
```

```

/u pkunzjr.com
!
/u _files.zip
/u autosvtp.bat
/u ident.txt
/l 62995-01

/h /256 /320 vt220.hex

```

The switches used in VT220.RSP are described in Table 4-7.

**Table 4-7. Switches in the VT220.RSP response file**

Switch	Description
/256	Use up to 256K or NVM (same as /j). This switch is required to use more than 128K of NVM.
/a	Loads the specified file in the terminal's NVM as AUTOEXEC.BAT.
/c	Loads the specified file in the terminal's NVM as CONFIG.SYS.
/h	Produces a hex image file with the specified filename.
/j	Use up to 256K or NVM (same as /256). This switch is required to use more than 128K of NVM.
/l	Specifies the program label for the hex image file. Typically includes a part number and version number. Label format is: #####-CCCCCCC or #####/CCCCCCC where ##### is a five-digit part number and CCCCCC is up to seven characters specifying the version.
/r	Loads the specified file as a resident code file. You can specify multiple files, but each file must be on its own line beginning with the /r switch.
/rs	Loads the specified file as a split resident code file. You can specify multiple files, but each file must be on its own line beginning with the /rs switch.
/s	Loads the specified file as the command shell (usually COMMAND.COM).
/u	Loads the specified file as a user file. You can specify multiple files, but each file must be on its own line beginning with the /u switch.



See the *Series 3000 Application Programmer's Reference Manual* for additional information about switches.

## Creating the VT220 Hex File

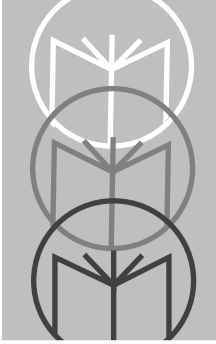
Once you have changed SVTP.CFG, FUNC.DEF, and the response file as needed, you are ready to create the VT220 hex file. The hex file is created with the User Configuration Tool USRCFG.EXE. To create a hex file with the User Configuration Tool, enter the following command at the DOS prompt:

```
usrcfg @rspfilename
```

where *rspfilename* is the filename of the response file, including the extension.

The User Configuration Tool creates the hex file with the filename specified in the last line of the response file. Once the hex file is created, it must be downloaded to one or more terminals as described in Chapter 3, *Downloading and Running VT220 on a Terminal*.





## *Chapter 5*

### *Screen Handling*

---

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## **Chapter Overview**

The screen size for VT220 terminals is either 80 columns by 24 rows or 132 columns by 24 rows. The Symbol terminals emulating a VT220 terminal can only display a small portion of the VT220 screen, however. This chapter describes how the VT220 program handles the display of information from the VT220 screen area on the terminal screen.

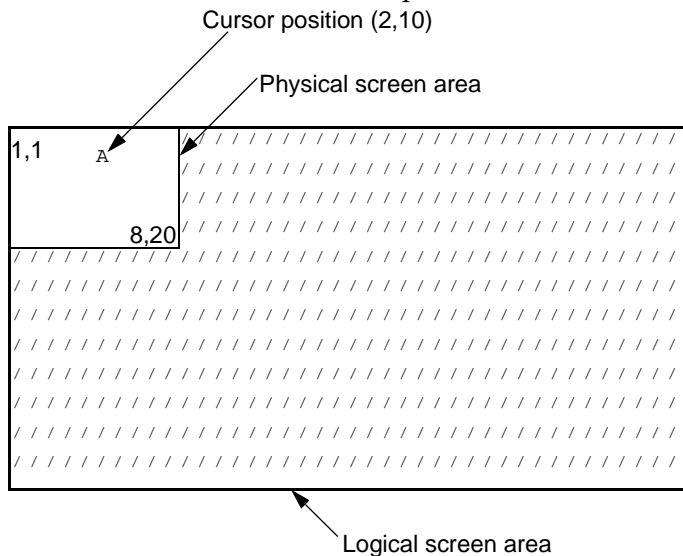


## Physical vs. Virtual Screen

When a Symbol terminal uses VT220 emulation to access a host application, data for the full VT220 screen (80 x 24 or 132 x 24) is available to the terminal, but only a portion (usually 8 x 20) can be displayed on the terminal's smaller screen. The terminal's physical screen therefore acts as a "window" which can move around a virtual screen maintained by the VT220 emulation program.

The size of the virtual screen (80 x 24 or 132 x 24) is controlled with the Set Mode and Reset Mode commands. The position of the physical screen display in the virtual screen is controlled with cursor movement and panning commands.

If the host sends commands to reposition the cursor outside the current physical screen, the location of the physical screen shifts to include the new cursor location commanded. Figure 5-1 shows the physical screen in the upper left corner of the virtual screen with the cursor position at row 2 column 10.



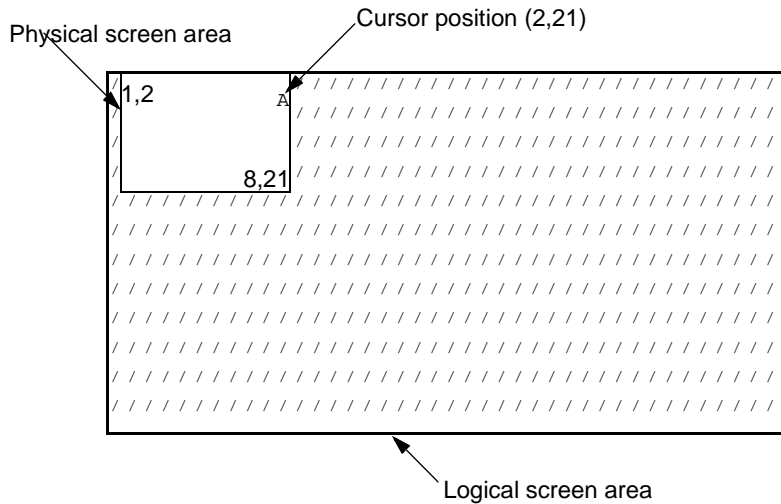
**Figure 5-1. Position of physical screen before cursor move**

following command would move the cursor to row 2 column 21:

`[Esc][2;21H`

Since the new cursor position is outside the boundary of the physical screen, the physical screen would shift in the virtual screen to include the new cursor position as shown in Figure 5-2. The same would be true for a cursor position command that required movement vertically.

The VT220 program will not move the physical screen outside the boundaries of the virtual screen. If the VT220 program received a command to move past the current virtual screen boundaries, scrolling and cursor movement would stop at the boundary of the virtual screen.



**Figure 5-2. Position of physical screen after cursor move**



## Panning

The VT220 program responds to keyboard commands from the operator to reposition the physical screen on the virtual screen. These commands are called “panning” and include the following:

Pan Up	Move up one physical screen.
Pan Down	Move down one physical screen.
Pan Left	Move left one physical screen.
Pan Right	Move right one physical screen.
Home	Move the physical screen to the leftmost position on the same row of the virtual screen.
End	Move the physical screen to the rightmost position on the same row of the virtual screen.
Page Up	Same as Pan Up.
Page Down	Same as Pan Down.

When the physical screen pans as a result of these keys, the cursor position is left unaffected and may remain undisplayed. However, a subsequent cursor positioning command from the host causes the physical screen to be repositioned to its last unpanned location with any adjustment required to include the new cursor location.

**Note:** Panning may not work as described on all terminals when using the standard keyboard map.

## Text Wrapping

Text wrapping is controlled by setting the VT220 wraparound mode to On or Off. When the terminal wraparound mode is On, a character that is positioned beyond the size of the terminal's virtual screen automatically wraps to the beginning of the next line.

When the wraparound mode is off, all characters positioned beyond the virtual terminal screen are overwritten at the last column position. When a newline character is received, the cursor moves to the beginning of the next line and again begins displaying characters.

To set the wraparound mode to On, use the Set Mode command as follows:

`[Esc][?7h`

To reset the wraparound mode, use the Reset Mode command as follows:

`[Esc][?7l`



## Scrolling Region

The scrolling region is a set of rows on the physical screen where text from the virtual screen is displayed. By default, the scrolling region is defined as rows 1-8, but the scrolling region could be defined as only some of the rows on the physical display. For example, rows 3-6 could be defined as the scrolling region, thereby allowing rows 1-2 to display a static header and rows 7-8 to display a static footer.

The following commands control the scrolling region:

Set Top and Bottom Margin	Sets the top and bottom margins of the scrolling region.
Index	Moves the cursor down one row without changing the column. If the cursor is currently at the bottom margin, data in the scrolling region is scrolled up one line.
Reverse Index	Moves the cursor up one row without changing the column. If the cursor is currently at the top margin, data in the scrolling region is scrolled down one line.
Next Line	Moves the cursor down one row and to the far left column. If the cursor is currently at the bottom margin, data in the scrolling region is scrolled up one line.

**Note:** The Cursor Position (CUP), Cursor Up (CUU), and Cursor Down (CUD) commands operate normally but do not scroll data in the scrolling region.

To set the scrolling region as lines 9-16, turn text wrapping on, and position the cursor to the location where text begins, send the following commands from the host:

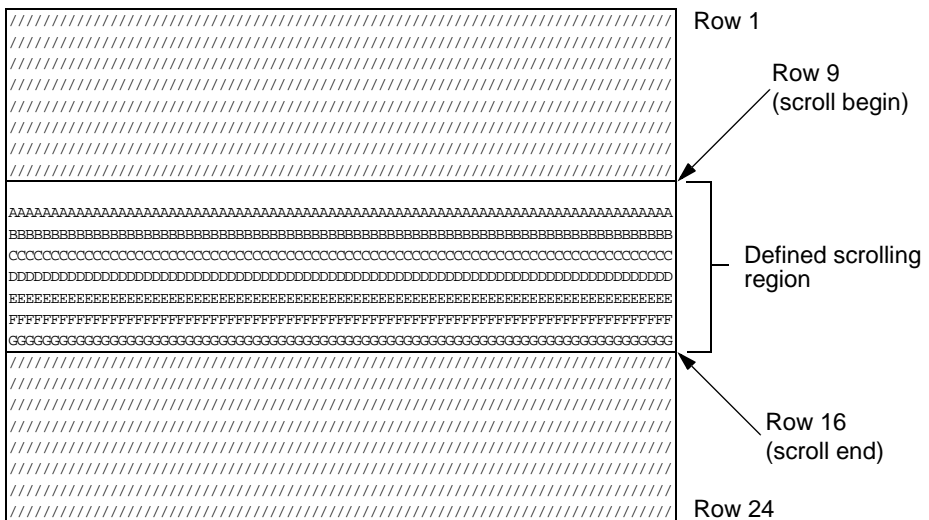
```
[Esc][9;16r
```

```
[Esc][?7h
```

```
[Esc][9,1H
```

In this case, the scrolling region would be defined as shown in Figure 5-3.

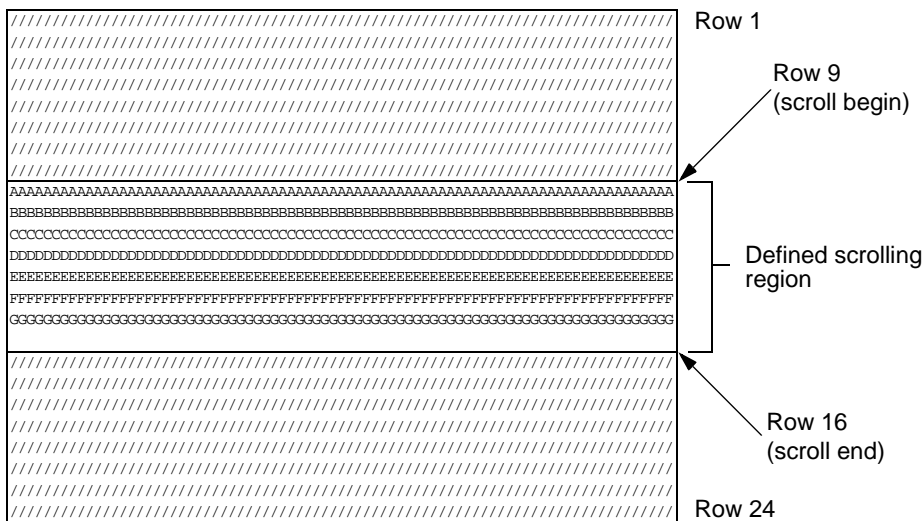
If the Reverse Index command was used, the cursor would remain in row 9 column 1 of the physical screen, and text in the scrolling region would scroll down one line (see Figure 5-4).





If the Index command was then used seven times, the cursor would move to row 16 column 1, and text in the scrolling region would scroll up one line (see Figure 5-5).

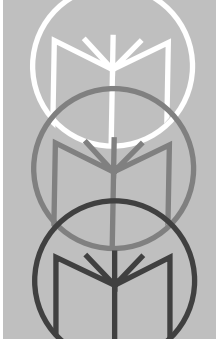
If a command causes the cursor to move below the bottom line of the scrolling region, the lines in the currently defined region move up one row and a blank line is inserted at the bottom of the region (see Figure 5-5). If a commands causes the cursor to move above the top line of the scrolling region, the lines in the currently defined region move down one row and a blank line is inserted at the top of the region.



**Figure 5-5. Scrolling region after Index command**

Any lines scrolled out of the scrolling region are lost. If the scrolling region is scrolled in one direction and then scrolled in the opposite direction, blank lines appear in place of the lines that were previously scrolled out of the region (see Figure 5-5). Scrolling region commands affect the entire virtual screen so that lines lost due to region scrolling are lost from the entire virtual screen, not just the area displayed on the physical screen.





## Chapter 6

# Commands and Control Characters

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## Chapter Overview

This chapter describes the commands and control characters that can be sent from the host to a terminal running in VT220, VT100, or VT52 mode.

Commands are also listed in Appendix B, *Command Quick Reference*.

The VT220 program provides a subset of the DEC VT220 terminal command set plus proprietary Symbol commands.

Each command description includes the proper syntax, arguments (if applicable), and an example. All row and column coordinate numbers are specified with ASCII characters.



# Control Characters

## *Overview of Character Sets and Control Characters*

The VT220 terminal has two character sets (C0 and C1) active at any one time, with C0 mapped to the lower 128 bytes in the 256 byte active character table and C1 mapped to the upper 128 bytes. There are also four graphic character sets (G0, G1, G2, and G3) that are stored internally and subsequently loaded with Designate Hard Character Set (DHCS) commands. For details on the specific font representations, see the *DEC VT220 Programming Manual*.

A terminal running in VT220 mode can utilize both the C0 (lower) and C1 (upper) character sets and all four graphic character sets (G0-G3). A terminal running in VT100 or VT52 mode can only access the C0 character set and the G1 and G2 graphic character sets. Because of this limitation, terminals running in VT100 and VT52 mode cannot directly utilize control characters in the C1 character set that are available for VT220 mode. As an alternative, there are Esc commands which can be used in VT100 or VT52 mode to perform the same function as the control characters available to VT220 mode in the C1 character set.

There are two tables in the following pages which list control characters:

- Control characters in the C0 character set. These characters are available for all modes (VT220, VT100, and VT52).
- Control characters in the C1 character set. In this table, the Hex Code column lists the character from the C1 character set which can be used in VT220 mode, and the Command Equivalent column lists the equivalent Esc command that can be used in VT100 or VT52 mode.

## Control Character Tables

**Table 6-1. Control characters in the C0 character set**

Mnemonic	Hex Code	Name	Description
NUL	0x00	Null	No action.
ENQ	0x05	Enquiry	Generates Symbol answerback message. When ENQ is received from the host, the terminal returns the following: <i>name ; version ; id ; type ; contents \$</i> where: <ul style="list-style-type: none"> <li>• <i>name</i> is the emulator program name</li> <li>• <i>version</i> is the emulator program version</li> <li>• <i>id</i> is the terminal ID</li> <li>• <i>type</i> is the terminal type</li> <li>• <i>contents</i> is the content of the SVTP_ENQ environment variable, if it exists (this field is omitted if SVTP_ENQ does not exist)</li> </ul>
BEL	0x07	Bell	Rings the bell.
BS	0x08	Backspace	Moves cursor back one position.
HT	0x09	Horizontal Tab	Performs a horizontal tab.
LF	0x0A	Line Feed	Generates a line feed or new line.
VT	0x0B	Vertical Tab	Performs a vertical tab.
FF	0x0C	Form Feed	Processed as a line feed.
CR	0x0D	Carriage Return	Moves cursor to left margin on current line.
SO	0x0E	Shift Out	Invokes the LS1 command.
SI	0x0F	Shift In	Invokes the LS0 command.



**Table 6-1. Control characters in the C0 character set (continued)**



Mnemonic	Hex Code	Name	Description
DC1	0x11	Device Control 1	X-ON, terminal sends characters.
DC3	0x013	Device Control 3	X-OFF, terminal stops sending characters.
CAN	0x18	Cancel	Terminates parsing of an <code>[Esc]</code> or DCS command with no error character displayed.
SUB	0x1a	Substitute	Terminates parsing of an <code>[Esc]</code> or DCS command and displays a reversed question mark.
ESC	0x1B	Escape	Starting character of an escape sequence, or terminates an escape sequence once it is started.
DEL	0x7F	Delete	Ignored when received.

**Table 6-2. Control characters in the C1 character set**

Mnemonic	Hex Code	Command Equivalent	Name	Description
IND	0x84	<code>[Esc]</code> D	Index	Index command.
NEL	0x85	<code>[Esc]</code> E	Next Line	Next Line command.
HTS	0x88	<code>[Esc]</code> H	Horizontal Tab Set	Horizontal tab set command.
RI	0x8D	<code>[Esc]</code> M	Reverse Index	Reverse Index command.
SS2	0x8E	<code>[Esc]</code> N	Single Shift G2	Performs a single shift of G2.
SS3	0x8F	<code>[Esc]</code> O	Single Shift G3	Performs a single shift of G3.
DCS	0x90	<code>[Esc]</code> P	Device Control String	Opening delimiter for a device control string.



**Table 6-2. Control characters in the C1 character set (continued)**

Mnemonic	Hex Code	Command Equivalent	Name	Description
CS1	0x9B	 [	Command Sequence Introducer	Processed as a command sequence introducer the same way as ESC [.
ST	0x9C	 \\	String Terminator	Closing delimiter for a device control string.



## VT220/VT100 Mode Commands

**Note:** Commands marked with **symbol** are Symbol proprietary commands.

### *Scanner Control*

#### BAR CODE TYPE IDENTIFIER (SYMBCTI)

**symbol**

`[Esc] %PnY`

where  $Pn = '0'$  to set symbology reporting off (default)  
or  $'1'$  to set symbology reporting on

Sets symbology reporting on or off.

#### CHECK DIGIT CONTROL (SYMCDL)

**symbol**

`[Esc] %PnC`

where  $Pn = '1'$  (ASCII char) to remove the check digit,  
or  $'0'$  to report the unmodified bar code.

Removes the check digit from label type EAN-8 bar codes.

## SCAN AHEAD CONTROL (SYMSAC)



**[Esc]** %PnS

If the scan ahead option is disabled for the terminal, this command is used to enable or disable scanning. When the scanner successfully decodes a label, the scanner is disabled.

**Table 6-3. Pn values for SYMSAC command**

Pn	Meaning
0	Disables scanning.
1	Enable scanning (default).

## SCAN LED CONTROL (SYMLED)



**[Esc]** %Pf;P1;Pt D

where *Pf* is the LED On time in 100th seconds,  
*P1* is the LED Off time in 100th seconds,  
*Pt* is the number of times.

Controls the scanner decode light On/Off and number of times.

Example: The scanner decode light is on 150 milliseconds and off 200 milliseconds five times.

<1B><25><31><35><3B><32><30><3B><35><44>(Hex value)

**Note:** The test offline program, TESTLED.EXE, has been included in the Hex file. Use the **[CLR]** key to exit from the VT220 menu. You can run this program from the DOS prompt.



## SCANNED DATA IDENTIFIER (SYMSDI)



`[Esc]%Pn;Pcp` (prefix)

`[Esc]%Pn;Pcx` (suffix)

Sets prefix or suffix character to add to the scanned bar code on or off and optionally specifies the character to be used for the prefix or suffix.

If *Pn* is '0' (the default), the prefix/suffix is set Off. If *Pn* is '1', the prefix/suffix is set On.

If *Pc* is '0' (the default), the character is unchanged (initially value 94, the '^'). If *Pc* is a number, the parameter is the decimal ASCII value of character.

### Examples

`[Esc]%1;65p` turns the prefix identifier on and sets it to 'A'.

`[Esc]%0;115x` or `<Esc>%0x` turns the suffix identifier off.

`[Esc]%1;115x` turns the suffix identifier on and sets it to 's'.

## SCANNER CONTROL (SYMSCTL)



`[Esc]%Pns`

The scan control escape sequence provides finer control of the scanner than scan ahead can support. It directly turns the scanner on and off at the host's request.

If *Pn* is '0', scanning is disabled. If *Pn* is '1' (the default), scanning is enabled.

## Terminal Control

### BACKLIGHT CONTROL (SYMBCTL)



`[Esc] %P1;P2b`

The backlight control escape sequence provides control of the backlight from the host. The backlight can be turned on or off and the backlight timeout value can be set.

If *P1* is '0', the backlight is turned off. If *P1* is '1' (the default), the backlight is turned on.

If *P2* is '0' (the default), the backlight timeout value is not changed. If *P2* is 1-255, the backlight timeout is changed to *P2* seconds.

### BEEP CONTROL (SYMBSC)



`[Esc] %Pf;P1;Pt T`

where      *Pf* is the frequency in 100 Hertz,  
              *P1* is the length of time to beep in 100 ms,  
              *Pt* is the number of times to beep.

Sets the tone frequency and the number of times to beep.

Example: The tone frequency is 1500 Hertz, the length of the beep is 300 milliseconds, and the number of beeps is two.

`<1B><25><31><35><3B><33><3B><32><54>` (Hex value)

The delay time between beeps is fixed to 100 milliseconds.

**Note:** The test tone offline program, TESTTONE.EXE, has been included in the Hex file. Use the `[CLR]` key to exit from the VT220 menu. You can run this program from the DOS prompt. It will help you to select the tone frequency you want.



## KEYBOARD STATE CONTROL (SYMKSC)



**[Esc]** %PnK

where Pn is a byte ASCII value defined as listed in Table 6-4.

**Table 6-4. Pn values for SYMKSC command**

Pn	Meaning
0	UNSHIFTED state
1	SHIFTED state
2	CONTROL state
3	ALTERNATE state
5	NUMBER LOCK state
6	CAPSLOCK (Alpha Char) state
7	FUNCTION state

Selects any keyboard state for a 35-key terminal. This command only can be accepted by VT220 if the terminal is a 3100, 3300, or 3800 and the number of keys is 35.

## LOCAL ECHO CONTROL (SYMLE)



**[Esc]** %PnE

where Pn = '0' - Disable local echo mode,  
'1' - Enable local echo mode.

This command allows host application to set the local echo mode.

**Note:** It will not overwrite the value of the sEcho parameter in the configuration file SVTP.CFG.

## SCREEN LOCK (SYMSL)



`[Esc] %Pk;Pr;PcL`

Prevents the screen from automatically scrolling as the cursor moves. The user can reposition the screen with the panning keys. The screen lock escape sequence is able to position the location of the locked portion of the screen.

If *Pk* is '1', the screen is locked (the default). If *Pk* is '0', the screen is unlocked.

*Pr* can be from '1' to the max number of rows or number of logical rows (default is '1').

*Pc* can be from '1' to the max number of columns or number of logical columns (default is '1').

## SEND MAC ADDRESS (SYMMAC)



`[Esc] %M`

This escape sequence allows the host to query the terminal for its MAC address. The MAC address is returned in the following uppercase hex format:

`XX.XX.XX.XX.XX.XX`

Example MAC address:

`00.A0.F8.27.B5.17`

If the client is unable to determine the MAC address of the terminal, it responds with '00.00.00.00.00.00.'

## TRANSMIT MODE CONTROL (SYMTMC)



`[Esc] %PnB`

where *Pn* = '0' - Specifies character transmission mode to block mode.

'1' - Specifies character transmission mode to character mode.

This command allows the host application to set the transmit mode.

**Note:** It will not overwrite the value of the *sTrans* parameter in the configuration file SVTP.CFG.



## Compatibility Level

### SELECT COMPATIBILITY LEVEL (DECSCL)

<code>[Esc][61"p</code>	<i>Level 1 (VT100 mode)</i>
<code>[Esc][62"p</code>	<i>Level 2 (VT200 mode, 8-bit controls)</i>
<code>[Esc][62;0"p</code>	<i>Level 2 (VT200 mode, 8-bit controls)</i>
<code>[Esc][62;1"p</code>	<i>Level 2 (VT200 mode, 7-bit controls)</i>
<code>[Esc][62;2"p</code>	<i>Level 2 (VT200 mode, 8-bit controls)</i>

Sets the terminal to the specified level of operation for compatibility with applications. There are two levels: level 1 (VT100 mode) and level 2 (VT200 mode). There are also options for setting the number of bits for control characters. See the *DEC VT220 Programmer's Reference Manual* for more information about the difference between modes.

#### Example

`[Esc][62"p`

#### Resulting Action

Sets the terminal to Level 2 compatibility (VT200 mode) with 8-bit control characters.



## Character Set Selection

### DESIGNATING HARD CHARACTER SETS (DHCS)

<code>[Esc](final</code>	<i>G0 character set</i>
<code>[Esc])final</code>	<i>G1 character set</i>
<code>[Esc]*final</code>	<i>G2 character set</i>
<code>[Esc]+final</code>	<i>G3 character set</i>

Designates a hard character set as G0-G3, with *final* indicating the character set to use.

**Table 6-5. Final character values for DHCS command**

Character Set	Final Character
ASCII	B
DEC supplemental	<
DEC special graphics	0
British	A
Dutch	4
Finnish	C or 5
French	R
French Canadian	Q
German	K
Italian	Y
Norwegian/Danish	E or 6
Spanish	Z
Swedish	H or 7
Swiss	=



## Example

**Esc**)Q

## Resulting Action

Designates French Canadian as the G1 character set.

## LOCKING SHIFTS (LS)

Performs a locking shift of a graphic character set into either GL or GR. Locking shifts lock the character set in for any subsequent characters.

**Table 6-6. Syntax for Locking Shifts command**

Syntax	Result	Description
<b>Shift In</b> *	LS0	Lock shift G0 (default).
<b>Shift Out</b> **	LS1	Lock shift G1.
<b>Esc</b> -	LS1R	Lock shift G1 right.
<b>Esc</b> n	LS2	Lock shift G2.
<b>Esc</b> )	LS2R	Lock shift G2 right.
<b>Esc</b> o	LS3	Lock shift G3.
<b>Esc</b>	LS3R	Lock shift G3 right.

\* Control character SI (0x0F).

\*\* Control character SO (0x0E).

## SELECT 7-BIT C1 CONTROL TRANSMISSION (S7C1T)

**Esc** **Space** F

Return all C1 codes in their 7-bit representation.

## SELECT 8-BIT C1 CONTROL TRANSMISSION (S8C1T)

**Esc** **Space** G

Return all C1 codes in their 8-bit representation.





## SINGLE SHIFTS (SS)

`[Esc]N`      *Single shift G2*

`[Esc]O`      *Single shift G3*

Single shifts a character set in for the following character and then returns to the previous character set.

## Terminal Modes

### ATTENTION (AT)



`[Esc]ATnn`

Terminates VT220 with DOS exit code *nn*.

#### Example

`[Esc]AT00`

#### Resulting Action

VT220 terminates, then the SVTP menu is displayed.

### KEYPAD APPLICATION MODE (DECKPAM)

`[Esc]=`

Selects the application keypad mode. The keypad keys send application control function sequences.

#### Example

`[Esc]=`

#### Resulting Action

The terminal switches to application keypad mode.

## KEYPAD NUMERIC MODE (DECPNM)

**[Esc]>**

Selects the numeric keypad mode so that the keypad keys send numeric control function sequences. Terminals are normally in numeric keypad mode when powered up or reset, so this command is only needed if the keypad is switched to alpha mode by the user or another command.

### Example

**[Esc]>**

### Resulting Action

The terminal switches to numeric keypad mode.

## RESET MODE (RM)

**[Esc][Ps;...;Ps1**

Resets one or more of the modes according to the following parameters:

**Table 6-8. Ps values for RM command**

Ps	Mnemonic	Mode Name	Mode
2	KAM	Keyboard action	Unlocked
4	IRM	Insert/replace	Replace
12	SRM	Send/receive	On
20	LMN	Line feed/new line	Line feed
?1	DECDKM	Cursor key mode	Cursor
?2	DECANM	ANSI/VT52 mode	VT52
?3	DECCOLM	Column mode	80 column
?5	DECSCNM	Screen mode	Normal
?6	DECOM	Origin mode	Absolute
?7	DECAWM	Wraparound	Off
?8	DECARM	Auto repeat	Off

**Table 6-8. Ps values for RM command (continued)**

Ps	Mnemonic	Mode Name	Mode
?18	DECPFF	Print form feed	Off
?19	DECPEX	Print scrolling region extent	Scrolling region
?25	DECTCEM	Text cursor enable	Off
?42	DECNRCM	Character set	Multinational

This command is ignored if *Ps* is not present or has any other values.

## SET MODE (SM)

**Esc** [*Ps* ; . . . ; *Psh*

Sets one or more display modes according to the following parameters:

**Table 6-9. Ps values for SM command**

Ps	Mnemonic	Mode Name	Mode
2	KAM	Keyboard action	Locked
4	IRM	Insert/replace	Insert
12	SRM	Send/receive	Off
20	LMN	Line feed/new line	New line
?1	DECDKM	Cursor key mode	Application
?2	DECANM	ANSI/VT52 mode	N/A
?3	DECCOLM	Column mode	132 column
?5	DECSCNM	Screen mode	Reverse
?6	DECOM	Origin mode	Relative
?7	DECAWM	Wraparound	On
?8	DECARM	Auto repeat	On
?18	DECPFF	Print form feed	On
?19	DECPEX	Print scrolling region extent	Full screen

**Table 6-9. *Ps* values for SM command (continued)**

Ps	Mnemonic	Mode Name	Mode
?25	DECTCEM	Text cursor enable	On
?42	DECNRCM	Character set	National

This command is ignored if *Ps* is not present or if it has any other value. The mode remains set until it is reset by a Reset Mode (RM) sequence.

## *Cursor Positioning*

### **CURSOR BACKWARD (CUB)**

`[Esc] [ PnD`

Moves the cursor *Pn* columns to the left. If *Pn* is '0', moves the cursor to the left one column. If *Pn* is not present, a value of 1 is assumed. Movement stops upon reaching the left margin. The command is ignored if the cursor is already in the far left margin.

#### **Example**

`[Esc] [ 3 ; 4H`                      *Move cursor to (3,4)*

`[Esc] [ 2D`                              *Move cursor backward two columns*

#### **Resulting Action**

The cursor moves to (3,2).



## CURSOR DOWN (CUD)

`[Esc] [ PnB`

Moves the cursor down *Pn* rows without changing the column. If *Pn* is '0', moves the cursor down one row. If *Pn* is not present, a value of 1 is assumed. Cursor movement stops upon reaching the bottom row or the bottom of the scrolling region. (No scrolling occurs.) This command is ignored if the cursor is already at the bottom row.

### Example

`[Esc] [ 3 ; 4H`      *Move cursor to (3,4)*  
`[Esc] [ 2B`      *Move cursor down two rows*

### Resulting Action

The cursor moves to (5,4).

## CURSOR FORWARD (CUF)

`[Esc] [ PnC`

Move the cursor *Pn* columns to the right. If *Pn* is '0', the cursor moves to the right one column. If *Pn* is not present, a value of 1 is assumed. This command stops upon reaching the right margin. This command is ignored if the cursor is already in the far right column.

### Example

`[Esc] [ 3 ; 4H`      *Moves cursor to (3,4)*  
`[Esc] [ 2C`      *Move cursor forward 2 characters*

### Resulting Action

The cursor moves to (3,6).



## CURSOR POSITION (CUP)

`[Esc] [ Pr ; Pc H`

Moves the cursor to row *Pr* and column *Pc*. A value of 0 for *Pr* or *Pc* is assumed equivalent to the first row or first column. If either *Pr* or *Pc* is missing, a value of 1 is assumed. If both are missing, the cursor moves to the home position (1,1). This command is ignored upon reaching either the right margin or the bottom row or both. This sequence operates in the same manner as the HVP command.

### Example

`[Esc] [ 3 ; 4 H`                      *Move cursor to (3,4)*

### Resulting Action

The cursor moves to (3,4).

## CURSOR POSITION REPORT (CPR)

`[Esc] [ Pr ; Pc R`

Returns the current cursor row (*Pr*) and column (*Pc*) position to the host. This sequence is a response to the host's Device Status Report (DSR) command.

### Example

`[Esc] [ 3 ; 4 H`                      *Move cursor to (3,4)*

`[Esc] [ 6 n`                          *Device Status Report*

### Resulting Action

VT220 returns the following sequence to the host:

`[Esc] [ 3 ; 4 R`



## CURSOR UP (CUU)

`[Esc] [ PnA`

Moves the cursor up  $Pn$  rows without changing the column. If  $Pn$  is '0', moves the cursor up one row. If  $Pn$  is not present, a value of 1 is assumed. This command stops upon reaching the top row or the top of the scrolling region. (No scrolling occurs.) It is ignored if the cursor is already at the top row.

### Example

`[Esc] [ 5 ; 4H`      *Move cursor to (5,4)*  
`[Esc] [ 2A`      *Move cursor up two rows*

### Resulting Action

The cursor moves to (3,4).

## HORIZONTAL AND VERTICAL POSITION (HVP)

`[Esc] [ Pr ; Pc f`

Moves the cursor to row  $Pr$  and column  $Pc$ . A value of 0 for  $Pr$  is interpreted as the first row. A value of 0 for  $Pc$  is interpreted as the first column. If both  $Pr$  and  $Pc$  are absent, the cursor moves to the home position. This sequence functions identically to CUP.

### Example

`[Esc] [ 3 ; 4 f`      *Move cursor to (3,4)*

### Resulting Action

The cursor moves to (3,4).

## INDEX (IND)

`[Esc]D`

Moves the cursor down one row without changing the column. This is the same as the IND control character in the C1 character set (0x84). If the cursor is at the bottom margin of the scrolling region, the scrolling region is scrolled up one line, and a blank line is inserted at the bottom of the scrolling region. If the cursor is positioned outside of the scrolling region when the command is received, no scrolling occurs.

### Example

`[Esc][3;4H`                      *Move cursor to (3,4)*

`[Esc]D`                              *Move cursor down one row*

### Resulting Action

The cursor moves to (4,4).

## NEXT LINE (NEL)

`[Esc]E`

Moves the cursor down one row and to the far left column. This is the same as the NEL control character for the C1 character set (0x85). If the cursor is at the bottom margin of the scrolling region, the scrolling region is scrolled up one line and a blank line is inserted at the bottom margin of the scrolling region. If the cursor is positioned outside of the scrolling region when the command is received, no scrolling occurs.

### Example

`[Esc][3;4H`                      *Move cursor to (3,4)*

`[Esc]E`                              *Move cursor down one row, far left column*

### Resulting Action

The cursor moves to (4,1).



## RESTORE CURSOR (DECRC)

**Esc** 8

Restores the state specified by the Save Cursor (DECSC) command. If a Save Cursor command has not been issued, the state is set as follows:

- Cursor moves to the Home position
- Origin mode is reset
- No character attributes are assigned
- Default character set mapping is established

### Example

<b>Esc</b> [ 3 ; 4H	<i>Move cursor to (3,4)</i>
<b>Esc</b> 7	<i>Save cursor position</i>
<b>Esc</b> [ 6 ; 8H	<i>Move cursor to (6,8)</i>
<b>Esc</b> 8	<i>Restore cursor position</i>

### Resulting Action

The cursor moves to (3,4).

## REVERSE INDEX (RI)

**Esc** M

Moves the cursor up one row without changing the column. This is the same as the RI control character in the C1 character set (0x8D). If the cursor is currently at the top margin of the scrolling region, the scrolling region is scrolled down one line and a blank line is inserted at the top of the scrolling region. If the cursor is positioned outside the scrolling region when the command is received, no scrolling occurs.

### Example

<b>Esc</b> [ 3 ; 4H	<i>Move cursor to (3,4)</i>
<b>Esc</b> M	<i>Move cursor up one row</i>

**Resulting Action**

The cursor moves to (2,4).

**SAVE CURSOR (DECSC)**

`[Esc]7`

Saves the following information:

- Current cursor position
- Graphic rendition
- Character set shift state
- State of the wrap flag
- State of origin mode
- State of selective erase

**Example**

<code>[Esc][3;4H</code>	<i>Move cursor to (3,4)</i>
<code>[Esc]7</code>	<i>Save cursor position</i>
<code>[Esc][6;8H</code>	<i>Move cursor to (6,8)</i>
<code>[Esc]8</code>	<i>Restore cursor position</i>

**Resulting Action**

The cursor moves to (3,4).



## Tab Stops

### HORIZONTAL TABULATION SET (HTS)

`[Esc]H`

Sets a horizontal tab stop at the current position.

**Note:** By default, tab stops are set every eight characters (9, 17, 25 and so on).

#### Example

`[Esc][3;4H`      *Move cursor to (3,4)*

`[Esc]H`      *Set tab at column 4*

`[Esc][5;1H`      *Move cursor to (5,1)*

`[Tab]`      *Tab character*

#### Resulting Action

The cursor moves to position (5,4).

**TABULATION CLEAR (TBC)**`[Esc] [ Psg`

Clears one or all tab stops according to the following parameters:

**Table 6-10. *Ps* values for TBC command**

Ps	Meaning
0	Clears tab stop at current cursor position.
3	Clears all tab stops.

If *Ps* is not present, a value of 0 is assumed.

**Example**

<code>[Esc] [ 3 ; 4H</code>	<i>Move cursor to (3,4)</i>
<code>[Esc] H</code>	<i>Set tab at column 4</i>
<code>[Esc] [ 5 ; 8H</code>	<i>Move cursor to (5,8)</i>
<code>[Esc] [ 3 ; 4H</code>	<i>Move cursor to (3,4)</i>
<code>[Esc] [ 0g</code>	<i>Clear tab at column 4</i>
<code>[Esc] [ 2 ; 1H</code>	<i>Move cursor to (2,1)</i>

**Resulting Action**

The cursor moves to position (2,1).



## Character Attributes

### SELECT CHARACTER ATTRIBUTES (DECSCA)

`[Esc][Ps*q`

Selects whether characters are erasable by the DECSEL and DECSED commands.

**Table 6-11. Ps values for DECSCA command**

Ps	Meaning
0	All attributes off. (Does not apply to SGR command.)
1	Designate characters as not erasable with DECSEL and DECSED commands.
2	Designate characters as erasable with DECSEL and DECSED commands.

#### Example

`[Esc][1*q`

#### Resulting Action

Characters are erasable with DECSEL and DECSED commands.



## Line Attributes

### DELETE LINE (DL)

`[Esc] [ PnM`

Deletes *Pn* lines at the cursor position (default is one line). If *Pn* is a larger number than there are lines remaining on the page, the deletion will end at the bottom of the page. The cursor is also reset to the first position in the line.

#### Example

`[Esc] [ 2M`

#### Resulting Action

Deletes two lines at the cursor position.

### DOUBLE-HEIGHT LINE (DECDHL)

`[Esc] #3`      *top half*

`[Esc] #4`      *bottom half*

Displays the current line as part of a double-height, double-width line. Since the terminal is unable to display these characters, they are represented as double-spaced characters to retain proper spacing. See also DECDWL and DECSWL.

#### Example

`[Esc] #3`

#### Resulting Action

The terminal displays the current line as the top half of a double-height, double-width line.



## DOUBLE-WIDTH LINE (DECDWL)

`[Esc]#6`

Displays the current line as a double-width line. Since the terminal is unable to display these characters, they are represented as double-spaced characters to retain proper spacing. See also DECDHL and DECSWL.

### Example

`[Esc]#6`

### Resulting Action

The terminal displays the current line as a double-width line.

## SINGLE-WIDTH LINE (DECSWL)

`[Esc]#5`

Displays the current line as a single-width line. See also DECDHL and DECDWL.

### Example

`[Esc]#5`

*Displays current line as a single-width line.*

### Resulting Action

If current line was previously a double-width line, returns the display of the line to a single-width line.

## Editing

### DELETE CHARACTERS (DCH)

`[Esc] [ PnP`

Deletes *Pn* characters starting at the cursor position. If *Pn* is greater than the number of characters remaining on the line, the deletion ends at the right margin. Data which was previously on the line is shifted to the left.

#### Example

`[Esc] [ 6P`

#### Resulting Action

The character at the cursor position and the five characters to the right of the cursor position are deleted. Characters to the right of the deleted characters are shifted left six columns.

### INSERT CHARACTERS (ICH)

`[Esc] [ Pn@`

Inserts *Pn* characters starting at the cursor position (default is one character). If *Pn* is greater than the number of characters remaining on the line, the insertion ends at the right margin. Characters previously on the line are shifted to the right.

#### Example

`[Esc] [ 3 ; 4H`                      *Move cursor to (3,4)*

`[Esc] [ 6@`                          *Insert 6 characters at cursor position*

#### Resulting Action

Six characters are inserted at 3,4, and all characters from 3,5 to the end of the line are shifted right six columns.



## INSERT LINE (IL)

`[Esc] [ PnL`

Inserts  $Pn$  lines at the cursor position (default is one line). If  $Pn$  is greater than the number of lines remaining on the page, the insertion ends at the bottom of the page. The cursor is reset to the first position in the line.

### Example

`[Esc] [ 3 ; 4H`

*Move cursor to (3,4)*

`[Esc] [ 2L`

*Insert 2 lines at cursor position*

### Resulting Action

Two lines are inserted at the cursor position.

## Erasing

## ERASE CHARACTER (ECH)

`[Esc] [ PnX`

Erases  $Pn$  characters at the cursor position. A single character is erased if  $Pn$  is '0' or '1'. Character attributes are reset to normal and no reformatting of the screen occurs. The cursor remains at the same position.

### Example

`[Esc] #8`

*Fill screen with the letter E*

`[Esc] [ 3 ; 4H`

*Move cursor to (3,4)*

`[Esc] [ 4X`

*Erase 4 characters at cursor position*

### Resulting Action

Characters from 3,4 to 3,7 are erased.

**ERASE DISPLAY (ED)**`[Esc] [PsJ`

Erases part or all of the display according to the parameter *Ps*:

**Table 6-12. *Ps* values for ED command**

Ps	Meaning
0	Erase from cursor to the end of the screen, inclusively.
1	Erase from the start of the screen to the cursor, inclusively.
2	Erase all of the display.

If *Ps* is not present, a value of 0 is assumed and the cursor is not moved.

**Example**

<code>[Esc] #8</code>	<i>Fill screen with the letter E</i>
<code>[Esc] [ 3 ; 4H</code>	<i>Move cursor to (3,4)</i>
<code>[Esc] [ 0J</code>	<i>Erase from cursor to end of screen</i>

**Resulting Action**

Characters from the cursor to the end of the screen are erased, including the character at the current cursor position.



## ERASE LINE (EL)

`[Esc] [PsK`

Erases part or all of the current line according to the parameter *Ps*.

**Table 6-13. *Ps* values for EL command**

Ps	Meaning
0	Erase from the cursor to the end of the line, inclusively.
1	Erase from the start of the line to the cursor, inclusively.
2	Erase the entire line.

If *Ps* is not present, a value of 0 is assumed. The cursor is not moved.

### Example

`[Esc] #8`                      *Fill screen with the letter E*  
`[Esc] [ 3 ; 4H`              *Move cursor to (3,4)*  
`[Esc] [ OK`                    *Erase from cursor to end of line*

### Resulting Action

Characters from the cursor to the end of the line are erased, including the character at the cursor.

## SELECTIVE ERASE IN DISPLAY (DECS ED)

`[Esc] [ ?PsJ`

Selectively erases part of the display depending upon the parameter chosen and the erasable character attributes set with DECSCA.

**Table 6-14. *Ps* values for DECS ED command**

Ps	Meaning
0	Erase from cursor to end of screen, inclusive.
1	Erase from start of screen to cursor, inclusive.
2	Erase entire display.

**Example**`[Esc] [ ? 2J`**Resulting Action**

The entire display is erased.

**SELECTIVE ERASE IN LINE (DECSEL)**`[Esc] [ ? PsK`

Selectively erases part of the current line depending upon the parameter chosen and the erasable character attributes set with DECSCA.

**Table 6-15. *Ps* values for DECSEL command**

<b>Ps</b>	<b>Meaning</b>
0	Erase from cursor to end of line, inclusive.
1	Erase from start of line to cursor, inclusive.
2	Erase entire line.

**Example**`[Esc] [ ? 2K`**Resulting Action**

The entire current line is erased.



## Scrolling Margins

### SET TOP AND BOTTOM MARGINS (DECSTBM)

`[Esc] [ Pt ; Pbr`

Sets the top and bottom margins of the screen (the scrolling region). *Pt* is the row number of the top margin. *Pb* is the row number of the bottom margin. If *Pt* is '0', the first row is the top margin. If neither parameter is present, the entire screen is the scrolling region. The minimum size of the scrolling region is two lines. The cursor is placed in the top left corner of the physical screen (row 1, column 1).

#### Example

`[Esc] [ 2 ; 4r`

*Set scrolling region as lines 2-4*

`[Esc] [ 7h`

*Set text wrap mode on*

`[Esc] [ 2 ; 1H`

*Move cursor to (2,1)*

#### Resulting Action

The terminal displays the contents of the text file. When line 4 has been filled and text remains to be displayed, the region scrolls up one line. Lines of the screen that are outside the region remain unchanged.



## Print Control

### PRINTER CONTROL (PCONTROL)

`[Esc][Pri`

Enables or disables auto print mode. If *Pn* is 5, auto print is enabled and subsequent lines are printed. If *Pn* is 4, auto print is disabled.

#### Example

`[Esc][5i`      *Enable auto print*

#### Resulting Action

Subsequent lines are printed. If the Printer Status option is On, the terminal sends an OK if printing is successful. If the Printer Status option is On and an error occurs, the terminal sends the following:

?x

where *x* is '1' if the printer is not ready or '2' if there is a printer write error.

### PRINTER QUERY (SYMPQ)



`[Esc]%5q<QueryString>[FS]<DefaultFailMessage>[FS]`

The printer query mode is only functional within print mode for the Comtec printer. Printer query mode waits for the printer to reply with a `[NUL]` terminated string (up to 511 bytes long) or until the BIOS call times out.

Either event ends the printer query mode. Printer query mode sends the printer reply to the host, or the `<DefaultFailMessage>` if the printer fails to reply. The ASCII Field Separator character terminates the strings in the printer query command. A `[NUL]` character may be used as the string terminator in place of the `[FS]` character.

The second string, the `<DefaultFailMessage>`, is optional, but the second string terminator is required. The built-in fail message is "Printer query failed."



## Example

The following is an example sent to a Comtec printer, assuming the emulator is not in print mode:

Test line

```
[Esc][5i[Esc]%5q[Esc]v[FS]Printer version failed[FS][Esc][4i
```

## Resulting Action

- Prints the line 'Test line' on the terminal.
- Sets print mode.
- Sets printer query mode.
- Sets the query string '[Esc]v'.
- Sets the default fail string 'Printer version failed.'
- Sends the query string to the printer (query the Comtec for its version).
- Sends the reply received from the printer (version string) to the host.
- Sets print mode off.

## SEND PRINT STATUS (SYMSPS)



```
[Esc]%Pnc
```

Sets printer status messages on the host on or off. If *Pn* is '0' (the default), printer status messages are not sent to the host. If *Pn* is '1', print status messages are sent to the host.

Print status messages can be turned on or off with Symbol-specific software commands. This setting formerly could be configured only in the SVTP.CFG file with the Printer Status parameter. The configuration setting (or default Off) is the initial state when svtp.exe starts.

The replies returned to the host are unchanged from the description in the manual. Briefly, if printing was successful, the string 'OK' is returned to the host. If the printer did not appear to be ready, the string '?1' is returned to the host.

### Examples

`[Esc]%1c`                      *turns print status messages on*

`[Esc]%0c`                      *turns print status messages off*

**Note:** At least one of the settings, Send Print Status (SYMSPS) or Show Printer Errors (SYMSPE) should be on. Otherwise, there will be no way of recovering from a printer failure on a given print request.

### SHOW PRINTER ERRORS (SYMSPE)



`[Esc]%Pnt`

Sets printer error messages on the terminal on or off. If *Pn* is '0' (the default), printer error messages are not displayed on the terminal. If *Pn* is '1', printer error messages are displayed on the terminal.

The display of built-in printer error messages on the terminal can be configured on or off and can be turned on or off by Symbol-specific software commands. The configuration setting (or the default On if there is no configuration setting) is the initial state when svtp.exe starts. Printer error messages on the terminal wait for the terminal operator to respond via the keypad.

If ShowPrnError is off and the print fails, the remainder of the characters to be sent to the printer are sent to the null printer immediately. All characters sent to the terminal disappear into the null printer until Print Control (PCONTROL) disable auto print command is received. Be sure to send the disable auto print command after every enable auto print command.

### Examples

`[Esc]%1t`                      *show printer error messages on the terminal*

`[Esc]%0t`                      *no printer error messages on the terminal*

**Note:** At least one of the settings, Send Print Status (SYMSPS) or Show Printer Errors (SYMSPE), should be on. Otherwise, there will be no way of recovering from a printer failure on a given print request.



## User-Defined Keys

### DEFINE USER KEYS (DECUDK)

*DCSPc;P1|Ky1/St1;Ky2/St2;...Kyn/StnST*

Specifies definitions for user-defined keys. The SF1-SF20 keys are also supported, unlike a true VT220 terminal. *DCS* is the device control string control character (0x90). The *Pc* parameter determines which keys are cleared by the new definition. The *P1* parameter determines whether the key definitions are locked after you load them. Once a key is locked, it can only be unlocked by restarting the VT220 program. *Ky1/Ky2/Kyn* indicates the key number to be redefined, and *St1/St2/Stn* indicates the string to define for the corresponding key. You can redefine a single key (*Ky1* only) or a series of keys (*Ky1* to *Kyn*). *ST* is the string terminator control character (0x9C).

A key sequence is defined as a key selector number and a string representing the hexadecimal value of the desired string.

**Table 6-16. *Pc* values for DECUDK command**

<b>Pc</b>	<b>Meaning</b>
0	Clears all keys before loading new values (default).
1	Load new key values and clear old ones where previously defined.

**Table 6-17. *P1* values for DECUDK command**

<b>P1</b>	<b>Meaning</b>
0	Lock keys (cannot be redefined).
1	Do not lock keys (can be redefined).

**Table 6-18. Key selector numbers for DECUDK command**

Key	Number	Key	Number	Key	Number
SF1	11	SF8	19	SF15	28
SF2	12	SF9	20	SF16	29
SF3	13	SF10	21	SF17	31
SF4	14	SF11	23	SF18	32
SF5	15	SF12	24	SF19	33
SF6	17	SF13	25	SF20	34
SF7	18	SF14	26		

**Note:** For the SFn keys, see the Shift+Function keyboard in Appendix A, *Key Mapping*.

**Example**

`DCS0;0|34/5052494E54ST`

**Resulting Action**

Defines the string 'PRINT' on the user SF20 key, clears all unlocked definitions, and locks it into memory.



# Reports

## DEVICE ATTRIBUTES (DA)

- `[Esc] Pnc` *primary attributes*
- `[Esc] >Pnc` *secondary attributes*

For the primary device attributes, the host sends the command with either no *Pn* or with *Pn* equal to 0. The terminal response depends on the current emulation mode.

**Table 6-19. Responses to DA command (primary attributes)**

Mode	Response	Description
VT220	<code>[Esc] ?62;1;2;6;7;8;9c</code>	Service class 2 terminal (62) with 132 columns (1), printer port (2), selective erase (6), DRCS (7), UDK (8), and support for national replacement character sets (9).
VT100	<code>[Esc] ?1;2c</code>	VT100 terminal with AVO (advanced video option).
VT101	<code>[Esc] ?1;0c</code>	VT101 terminal.
VT102	<code>[Esc] ?6c</code>	VT102 terminal.

The secondary device attributes work the same as the primary except that the terminal responds with the terminal’s firmware version and hardware options in addition to the terminal ID.

### Example (Secondary Attributes)

`[Esc] >0c`

### Response

`[Esc] >1;Pv;Po`

This response indicates that the terminal is a VT220, the terminal firmware version is *Pv*, and the terminal has *Po* options installed.

## DEVICE STATUS REPORT (DSR)

**[Esc]** *[ Psn*

Requests/reports terminal status according to the parameter *Ps*:

**Table 6-20. *Ps* values for DSR command**

<b>Ps</b>	<b>Meaning</b>
0 or 3	Response from terminal: Terminal ready, no malfunctions
5	Request from host to report the terminal status using a DSR sequence.
6	Request from host: Reports the active position using a CPR sequence.
?10	Response from terminal: Printer is ready.
?11	Response from terminal: Printer is not ready.
?13	Response from terminal: No printer.
?15	Request from host to report printer status.
?20	Response from terminal: User-defined keys are unlocked.
?21	Response from terminal: User-defined keys are locked.
?25	Request from host to report lock status of user-defined keys.
?26	Request from host to report keyboard language.
?27; <i>Pn</i>	Response from terminal: Keyboard language is <i>Pn</i> . <i>Pn</i> is always 0 for unknown since keyboard is custom.

When the host sends a DSR with a value of 5 for *Ps*, a DSR sequence is returned to the host with a value of 0 for *Ps*. (The terminal is always ready.) This command is ignored if *Ps* is not present or if it is other than 5 or 6.

### Example

**[Esc]** *[ 5n                      Request device status*

### Resulting Action

The terminal returns **[Esc]***[0n* to indicate terminal is ready.



## IDENTIFY TERMINAL (DECID)

**Esc** Z

Requests that the terminal send a string identifying the terminal. This command has the same response as the Device Attribute (DA) command. See *Device Attributes (DA)* on page 6-46 for more information.

## Terminal Reset

### RESET TO INITIAL STATE (RIS)

**Esc** c

Resets the terminal to the following states:

- The screen is cleared.
- The cursor is set to the home position (row 1, column 1).
- Tabs are set to eight columns apart (at 9, 17, etc.).
- The entire screen is set to the scrolling region.
- Linefeed mode is on.
- Cursor key mode is reset (cursor mode).
- ANSI VT220 mode is on.
- 80 column mode is on.
- Normal screen mode (normal video) is on.
- Wraparound mode is off.
- Auto repeat mode is off.

#### Example

**Esc** c

*Reset to initial state*

#### Resulting Action

The terminal resets to the conditions stated above.



## SOFT TERMINAL RESET (DECSTR)

`[Esc][!p`

Resets many options and variables to their default state. Refer to the *DEC VT220 Programmer's Reference Manual* for more information.

### Example

`[Esc][!p`                      *Soft reset*

### Resulting Action

Options and variables are reset to their default state.

## Tests and Adjustments

## SCREEN ALIGNMENT DISPLAY (DECALN)

`[Esc]#8`

Fills the entire screen with the letter E. This command is provided only for compatibility with the VT220 command and has no use on Symbol terminals. It is normally used with VT220 terminal screens for focusing and alignment purposes.

### Example

`[Esc]#8`

### Resulting Action

The terminal displays the entire screen with letter Es. The screen is 24 lines by *N* columns, where *N* is either 80 or 132 depending on the number of columns set. See Set Mode and Reset Mode commands.



## Unsupported VT220/VT100 Commands

Since the Series 3000 terminal screen is much smaller than a VT220 terminal screen, and because there are other differences between a VT220 terminal and a radio terminal, some VT220 commands are inappropriate and are not supported.

The following VT220 commands are not supported:

- Display Controls Font
- Down-Line-Loadable Character Sets
- Display Controls Mode
- Keys: Find, Insert Here, Remove, Select, Prev Screen, Next Screen, Hold Screen, Print Screen, Set-Up, Data/Talk, and Break
- Printing commands: Auto Print Mode, Print Cursor Line, and Print Screen
- Set/Reset Mode: Scrolling (Smooth/Jump) and Text Cursor Enable
- Hardware tests

# VT52 Mode Commands

## *Cursor Up*

`[Esc]A`

Moves the cursor up one row without changing the column. This command is ignored if the current cursor position is the top row.

### **Example**

`[Esc]Y$#`            *Move cursor to (5,4)*

`[Esc]A`            *Move cursor up one row*

### **Resulting Action**

The cursor moves to (4,4).

## *Cursor Down*

`[Esc]B`

Moves the cursor down one row without changing the column. This command is ignored if the current cursor position is the bottom row.

### **Example**

`[Esc]Y$#`            *Move cursor to (5,4)*

`[Esc]B`            *Move cursor down one row*

### **Resulting Action**

The cursor moves to (6,4).



## Cursor Right

**Esc**C

Moves the cursor one column to the right. This command is ignored if the current cursor position is at the right margin.

### Example

**Esc**Y\$#

*Move cursor to (5,4)*

**Esc**C

*Move cursor right one column*

### Resulting Action

The cursor moves to (5,5).

## Cursor Left

**Esc**D

Moves the cursor one column to the left. This command is ignored if the current cursor position is at the left margin.

### Example

**Esc**Y\$#

*Move cursor to (5,4)*

**Esc**D

*Move cursor left one column*

### Resulting Action

The cursor moves to (5,3).

## Enter Graphics Mode

**ESC**F

Loads the DEC special character set in the font map.

### Example

**ESC**F      *Enter graphics mode*

### Resulting Action

The DEC special character set is loaded in the font map.

## Exit Graphics Mode

**ESC**G

Loads the ASCII character set in the font map.

### Example

**ESC**G      *Exit graphics mode*

### Resulting Action

The ASCII character set is loaded in the font map.

## Cursor Home

**ESC**H

Moves the cursor to the home position (row 1, column 1).

### Example

**ESC**Y\$#      *Move cursor to (5,4)*

**ESC**H      *Move cursor home*

### Resulting Action

The cursor moves to (1,1).



## Reverse Line Feed

**Esc** I

Moves the cursor up one row without changing the column. If a scrolling region is set with a top boundary other than row 1, this command is ignored if the current cursor position is at the top row (row 1).

### Example

**Esc** Y\$#

*Move cursor to (5,4)*

**Esc** I

*Move cursor up one row*

### Resulting Action

The cursor moves to (4,4).

## Erase To End of Screen

**Esc** J

Erases from cursor to the end (bottom right) of the logical screen, inclusively. The cursor remains at the current location.

### Example

**Esc** Y\$#

*Move cursor to (5,4)*

**Esc** J

*Erase to end of screen*

### Resulting Action

Characters from the cursor to the end of the screen are erased, including the character at the cursor.

## *Erase To End of Line*

`ESC`K

Erases from the cursor to the end of the line, inclusively. The cursor remains at the current location.

### **Example**

`ESC`Y\$#

*Move cursor to (5,4)*

`ESC`K

*Erase to end of the line*

### **Resulting Action**

Characters from the cursor to the end of the line, including the character at the cursor, are erased.

## *Enter Printer Controller Mode*

`ESC`W

Enables auto print mode.

### **Example**

`ESC`W

*Enable auto print*

### **Resulting Action**

Subsequent lines are printed.



## *Exit Printer Controller Mode*

**Esc**X

Exits auto print mode.

### **Example**

**Esc**X

*Disable auto print*

### **Resulting Action**

Subsequent lines are not printed.

## *Direct Cursor Address*

**Esc**YPrPc

Moves the cursor to the specified row and column. The row (*Pr*) and column (*Pc*) numbers are sent as ASCII codes whose values are the number plus 31 decimal (or 1F in hexadecimal). For example, if the space character (ASCII 32 decimal or 20 hexadecimal) was sent as *Pr*, it would be interpreted as the first row.

Both *Pr* and *Pc* are required. The two characters immediately following the letter 'Y' are used for *Pr* and *Pc*, respectively.

If an attempt is made to position past the right margin, the cursor is positioned at the right margin. If an attempt is made to position past the bottom row, the cursor is positioned at the bottom row.

### **Example**

Send the following sequence from the host to the terminal:

**Esc**Y\$#

*Move cursor to (5,4)*

### **Resulting Action**

The cursor moves to (5,4). The ASCII value of \$ and # are 36 and 35, respectively. These values minus 31 yield 5 and 4.



## Identify

`[Esc]Z`

The host requests the device attribute from the terminal by sending this sequence. The terminal responds with `[Esc]/Z`.

### Example

`[Esc]Z`

*Host requests device attribute*

### Resulting Action

The terminal responds with `[Esc]/Z`.

## Enter Alternate Keypad Mode

`[Esc]=`

Enables optional auxiliary keypad keys to send unique identifiable escape sequences for use by application programs.

### Example

`[Esc]=`

### Resulting Action

The terminal switches to alternate keypad mode.



## *Exit Alternate Keypad Mode*

Esc >

Returns to the normal keypad key sequences.

### **Example**

Esc >      *Terminal exits alternate keypad mode*

### **Resulting Action**

The terminal returns to the normal keypad key sequences.

## *Enter ANSI VT100 Mode*

Esc <

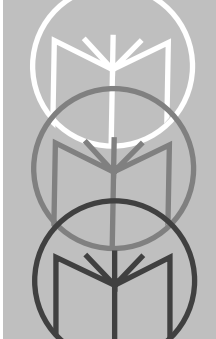
Exits VT52 mode and enters ANSI VT100 mode.

### **Example**

Esc <      *Terminal switches to VT100 mode*

### **Resulting Action**

The terminal returns to the VT100 ANSI mode.



## Appendix A

### Key Mapping

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This appendix includes figures showing key maps for the different keyboards provided with Symbol terminals.

This appendix includes figures for the following keyboards:

Keyboard	Page
Series 3100, 37-key keyboards	A-3
Series 3100, 46-key keyboards	A-10
Series 3300, 35-key keyboards	A-17
Series 3300, 56-key keyboards	A-24
Series 3800, 35-key keyboards	A-31
Series 3800, 46-key keyboards	A-38
Series 3900, 54-key keyboard	A-45
Series 6800, 46-key keyboard	A-52

**Note:** For Series 1000 wearable terminals, refer to the *Product Reference Guide*, 70-16192-02.

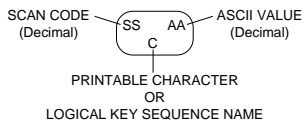
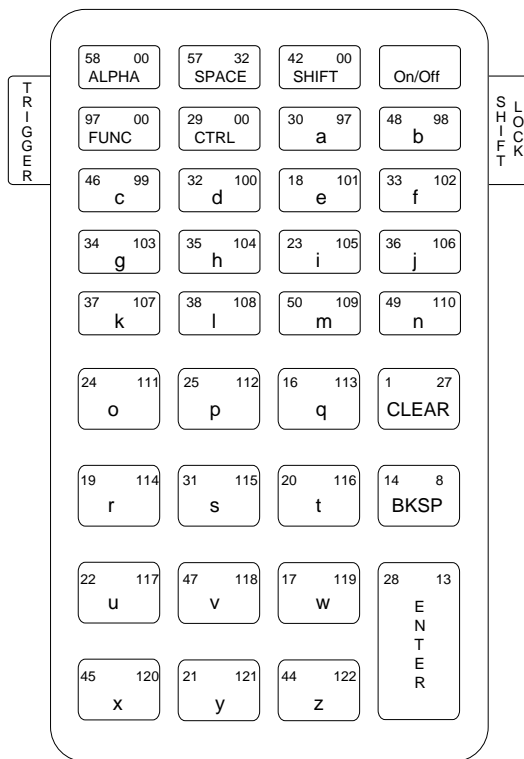
Each keyboard has seven modes of operation, as defined below:

Unshifted	The keys perform the normal functions indicated on the key cap.
Shift	Press the Shift key then another key on the keyboard. The keys perform the Shift functions indicated in the Shift figure.
Control	Press the Control key then another key on the keyboard. The keys perform the Control functions indicated in the Control figure.
Function	Press the Function key then another key on the keyboard. The keys perform the Function functions indicated in the Function figure.
Alpha Lock	Press the Alpha Lock key then another key on the keyboard. The keys perform the Alpha Lock functions indicated in the Alpha Lock figure.



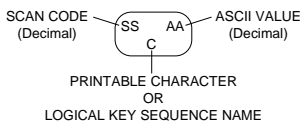
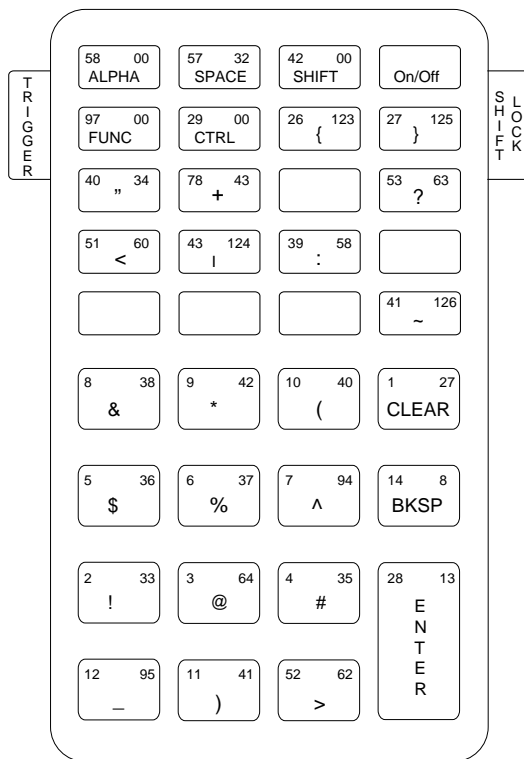
- |             |   |
|-------------|---|
| Number Lock | Press the Function key then the Alpha key. The keys perform the Number Lock functions indicated in the Number Lock figure.      |
| Alternate   | Press the Function key then the Control (CTRL) key. The keys perform the Alternate functions indicated in the Alternate figure. |

# Series 3100, 37-Key Keyboard—Unshifted

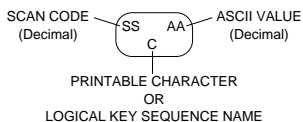
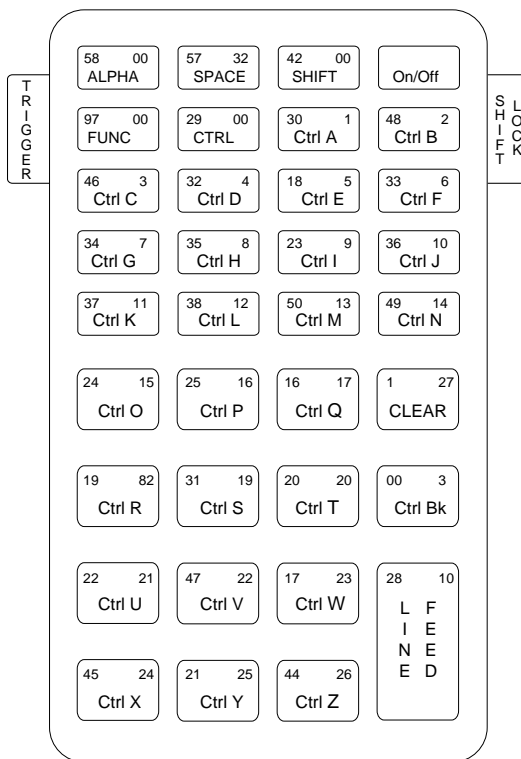




## Series 3100, 37-Key Keyboard—Shift

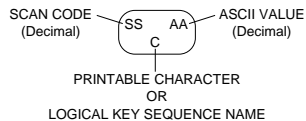
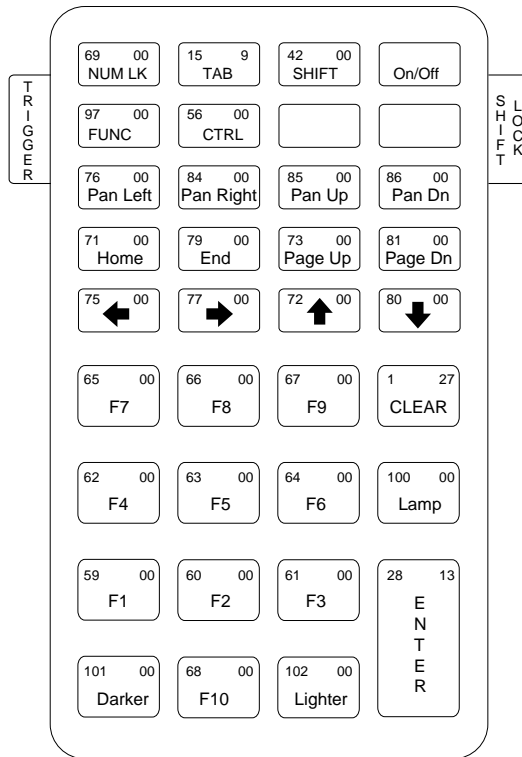


# Series 3100, 37-Key Keyboard—Control



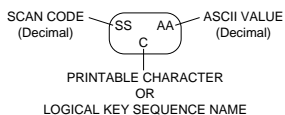
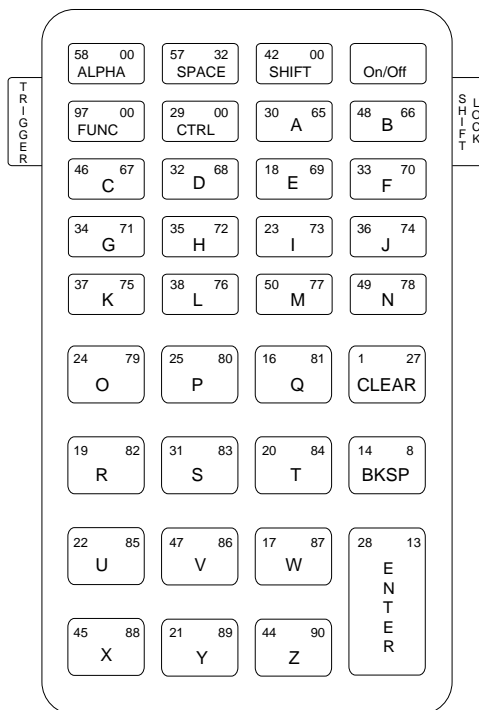


## Series 3100, 37-Key Keyboard—Function



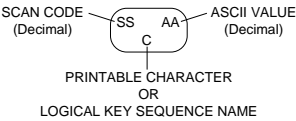
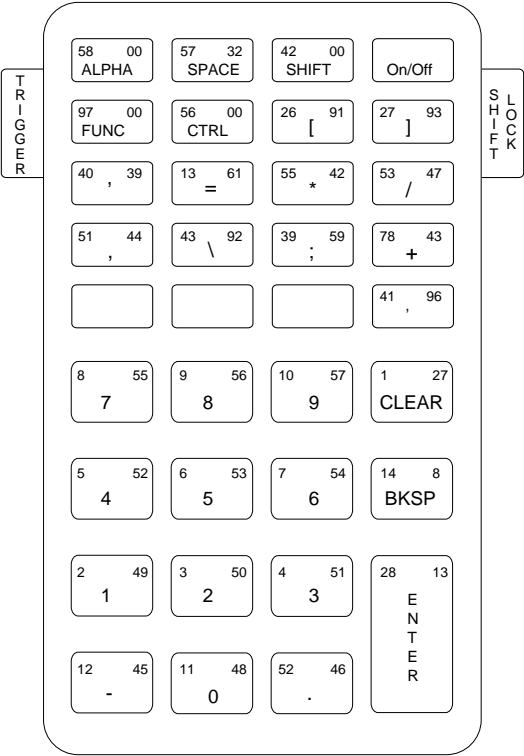


# Series 3100, 37-Key Keyboard—Alpha Lock

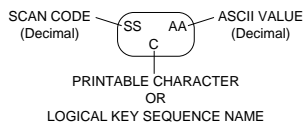
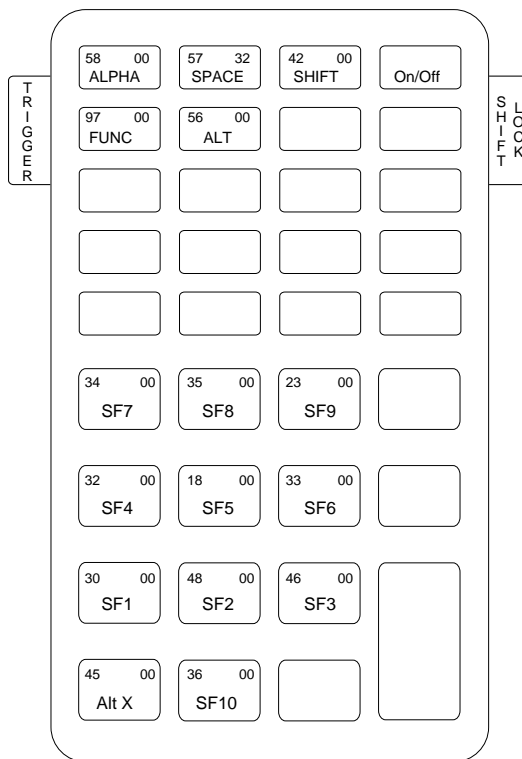




# Series 3100, 37-Key Keyboard—Number Lock

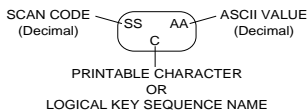
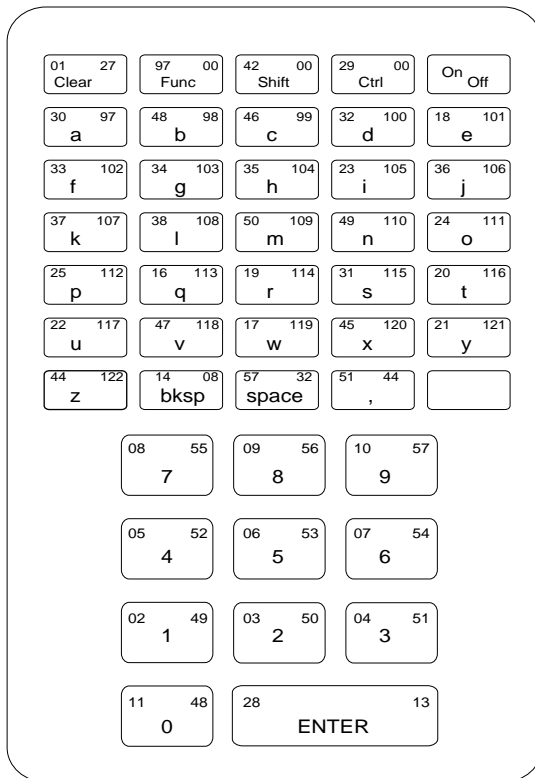


# Series 3100, 37-Key Keyboard—Alternate

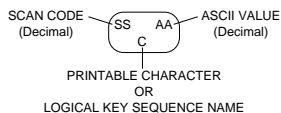
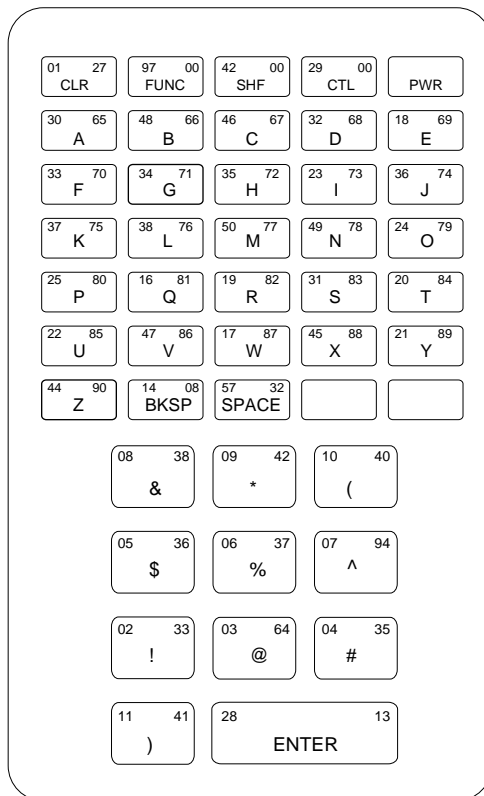




## Series 3100, 46-Key Keyboard—Unshifted

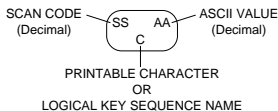
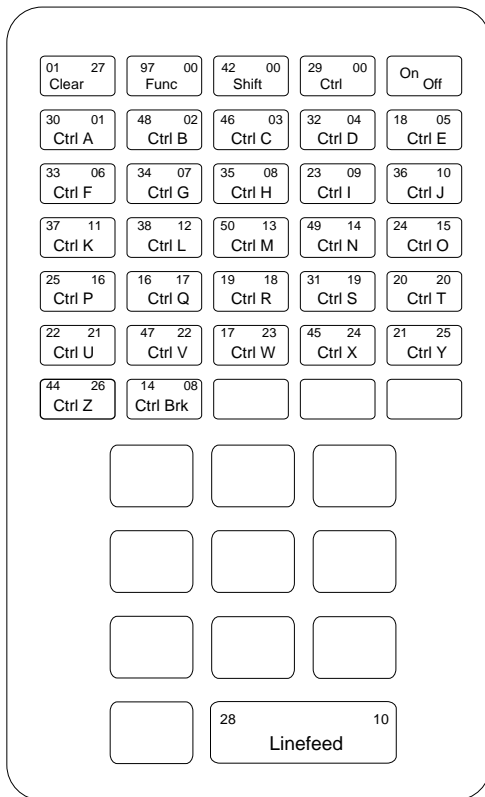


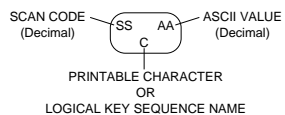
# Series 3100, 46-Key Keyboard—Shift





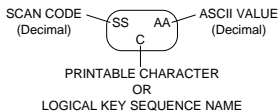
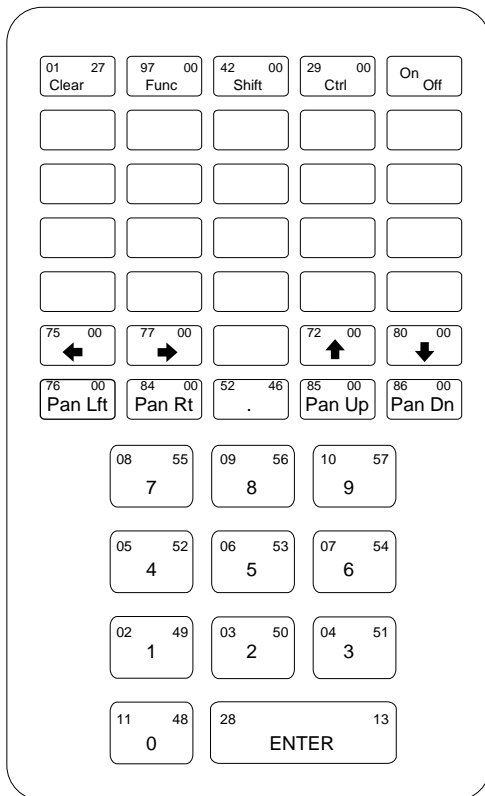
## Series 3100, 46-Key Keyboard—Control





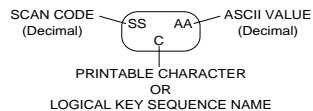
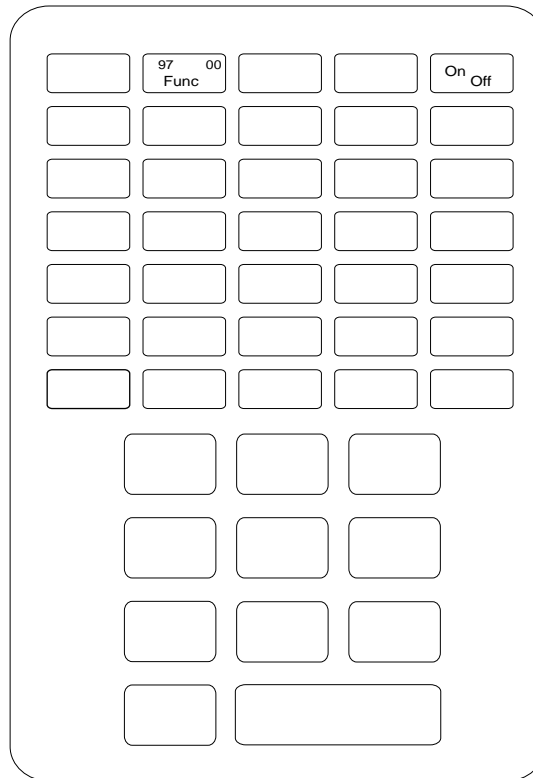


## Series 3100, 46-Key Keyboard—Alpha Lock



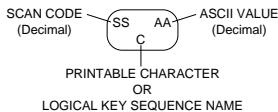
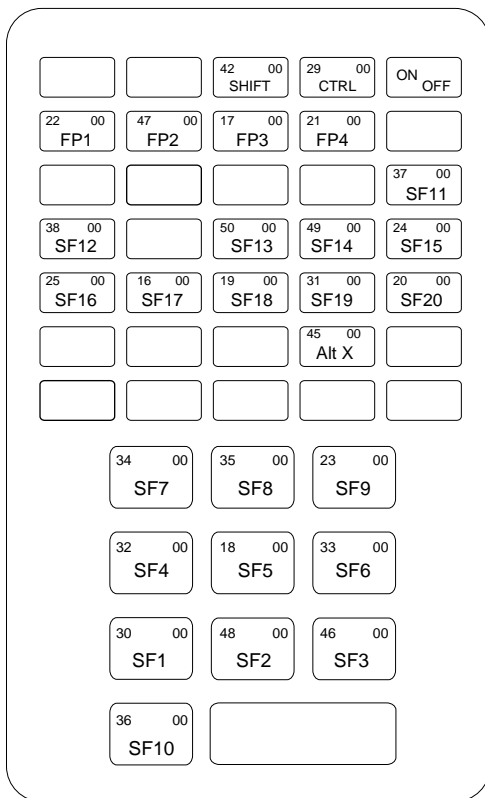


## Series 3100, 46-Key Keyboard—Number Lock

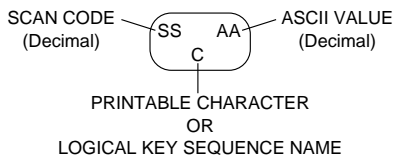
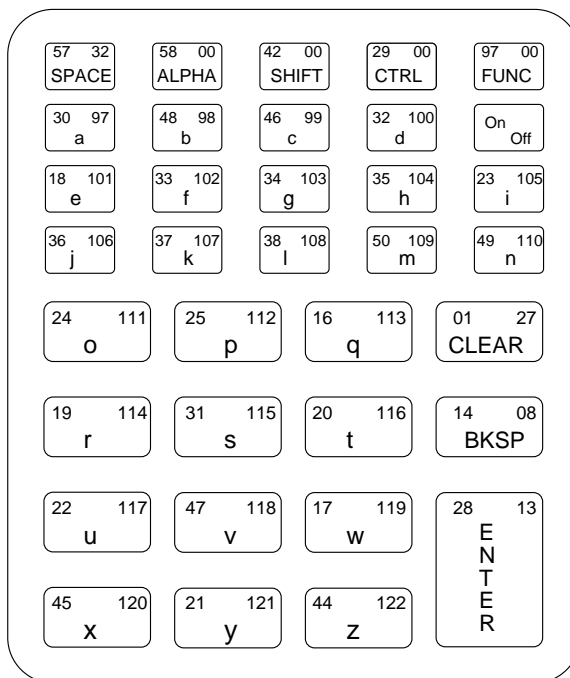




## Series 3100, 46-Key Keyboard—Alternate

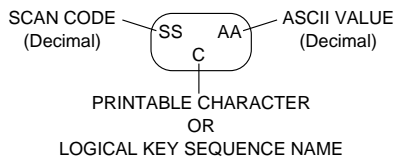
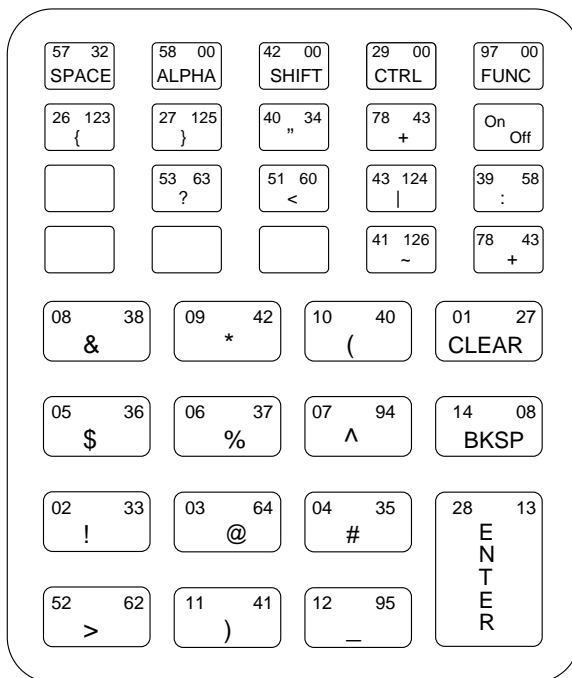


## Series 3300, 35-Key Keyboard—Unshifted

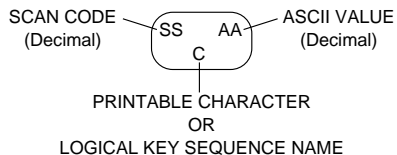
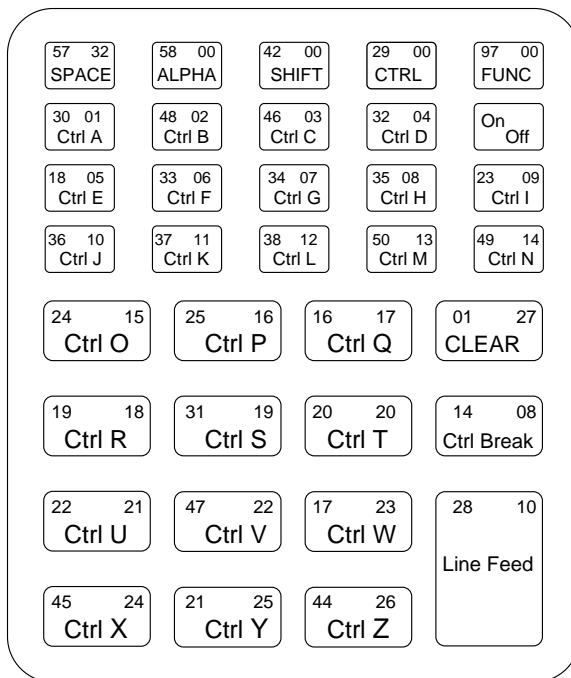


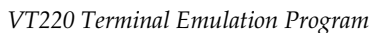


## Series 3300, 35-Key Keyboard—Shift



## Series 3300, 35-Key Keyboard—Control

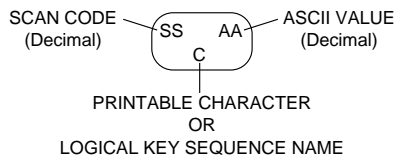
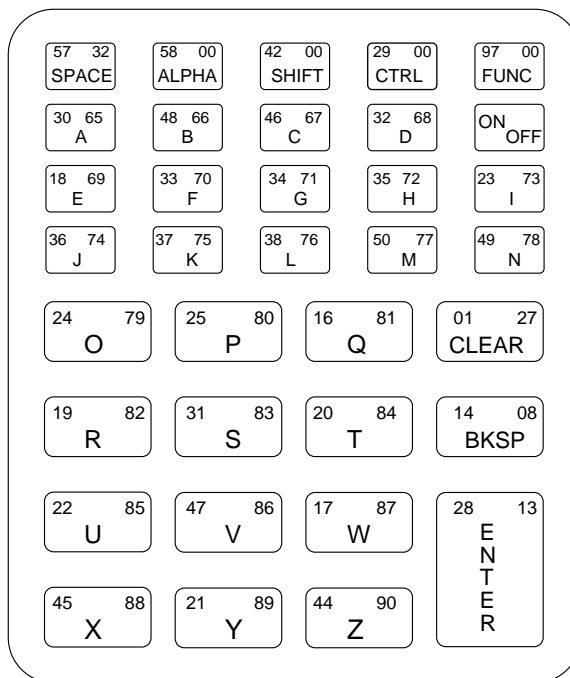




15 09 TAB	69 00 NUM LK	42 00 SHIFT	56 00 ALT	97 00 FUNC
76 00 Pan Lft	84 00 Pan Rt	85 00 Pan Up	86 00 Pan Dn	On Off
71 00 HOME	79 00 END	73 00 Pg Up	81 00 Pg Dn	
75 00 ←	77 00 →	72 00 ↑	80 00 ↓	
65 00 F7	66 00 F8	67 00 F9	01 27 CLEAR	
62 00 F4	63 00 F5	64 00 F6	100 00 LAMP	
59 00 F1	60 00 F2	61 00 F3	28 13 ENTER	
101 00 Darker	68 00 F10	102 00 Lighter		

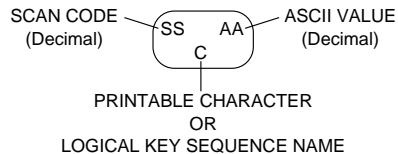
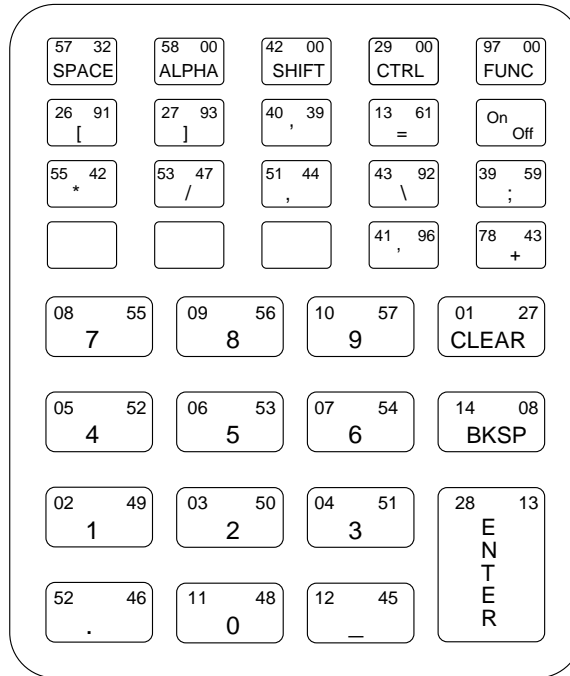


# Series 3300, 35-Key Keyboard—Alpha Lock



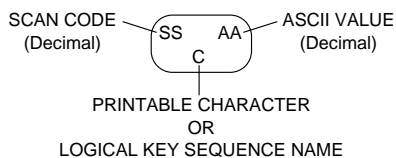
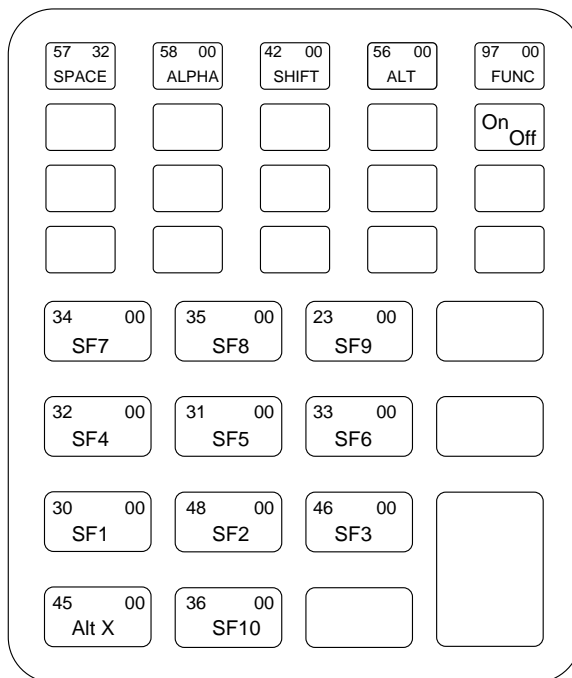


## Series 3300, 35-Key Keyboard—Number Lock



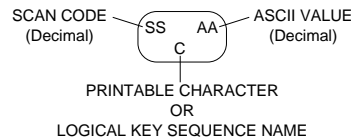
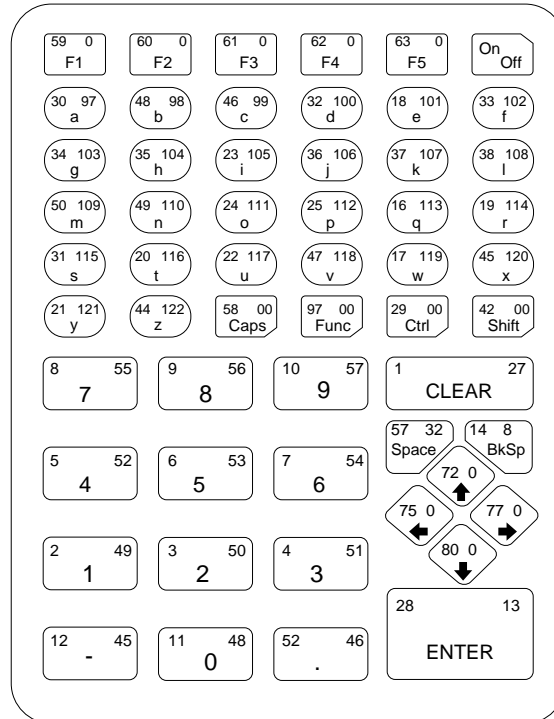


## Series 3300, 35-Key Keyboard—Alternate

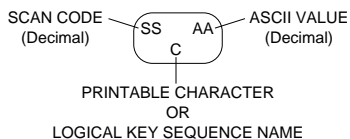
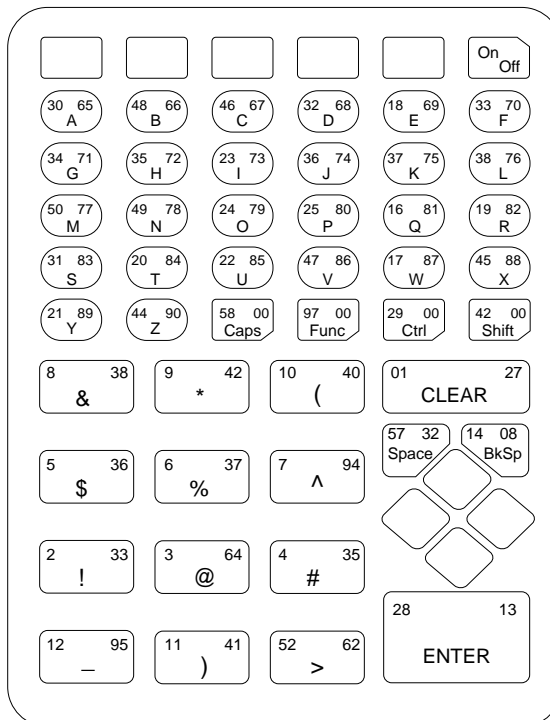




## Series 3300, 56-Key Keyboard—Unshifted

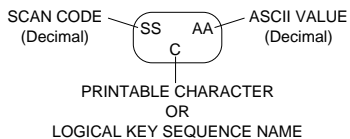
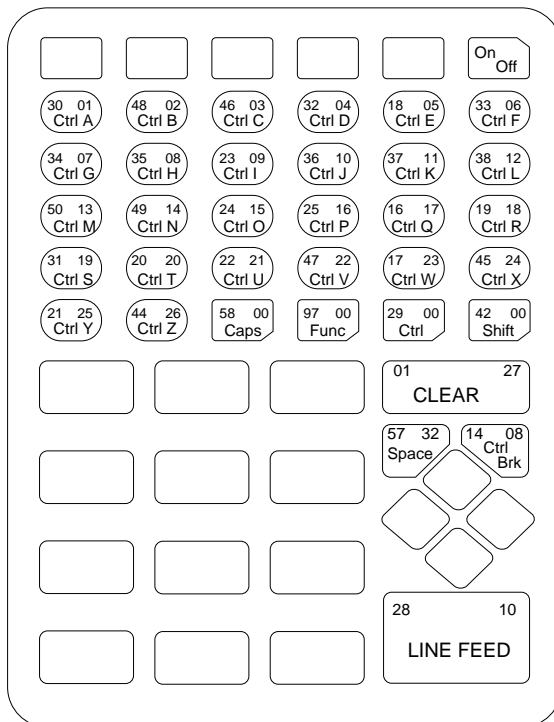


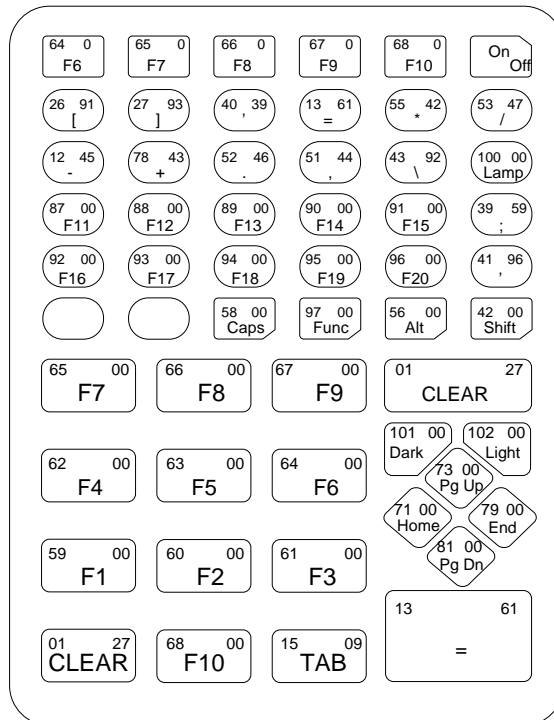
# Series 3300, 56-Key Keyboard—Shift





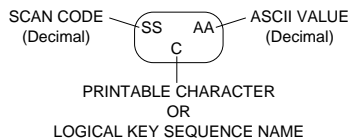
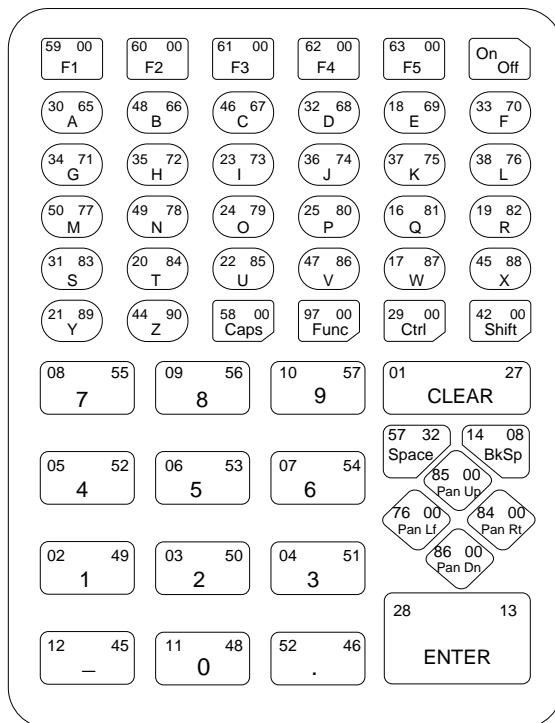
## Series 3300, 56-Key Keyboard—Control



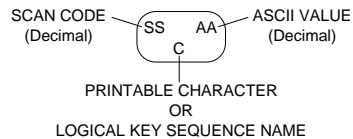
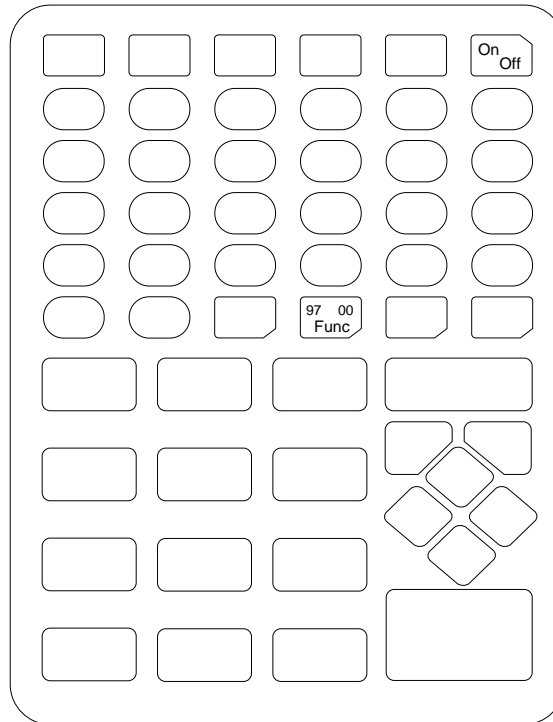




## Series 3300, 56-Key Keyboard—Alpha Lock

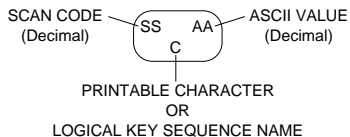
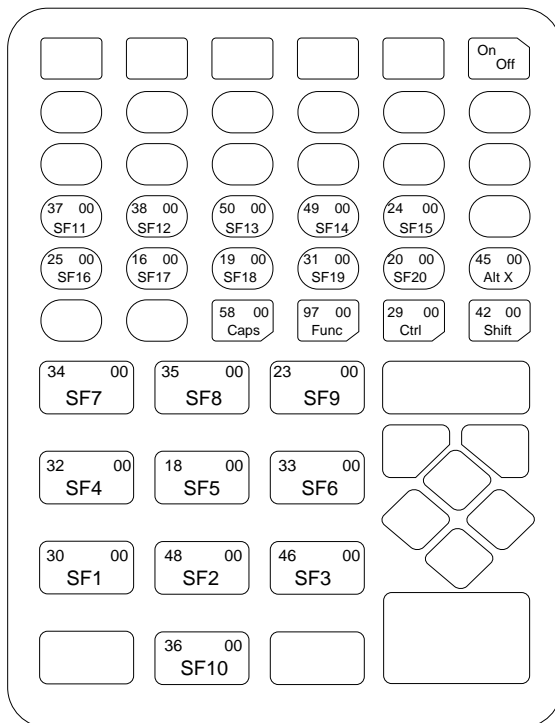


# Series 3300, 56-Key Keyboard—Number Lock



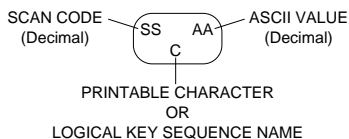
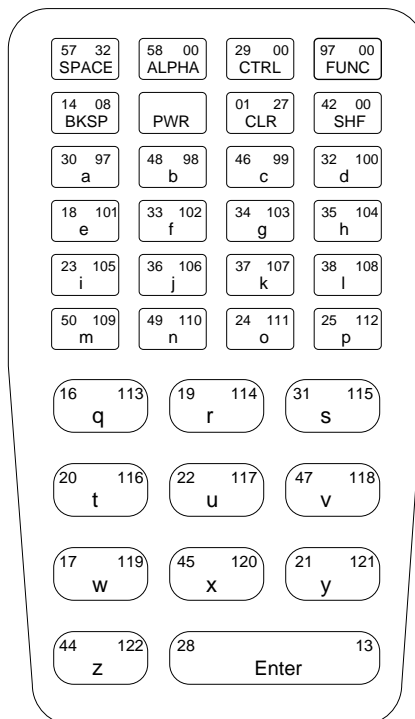


## Series 3300, 56-Key Keyboard—Alternate



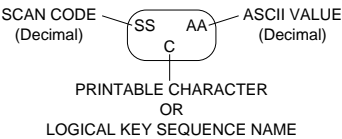
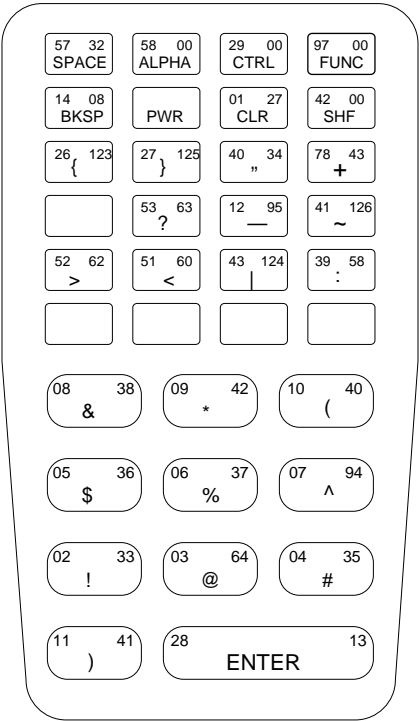


## Series 3800, 35-Key Keyboard—Unshifted

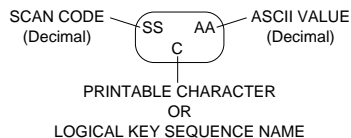
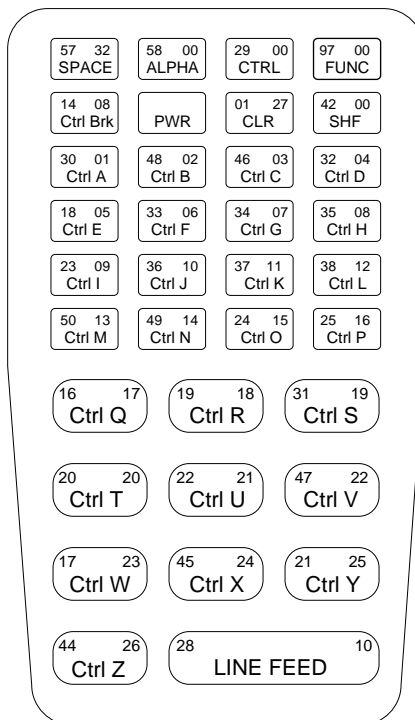




# Series 3800, 35-Key Keyboard—Shift

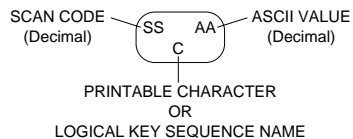
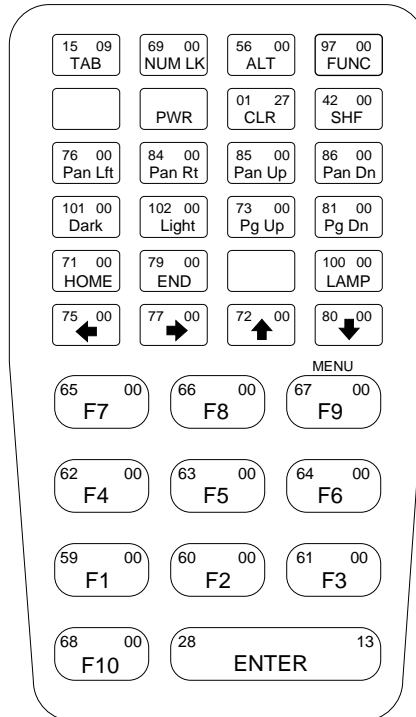


## Series 3800, 35-Key Keyboard—Control

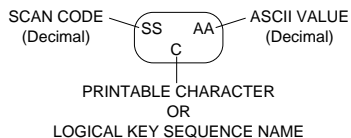
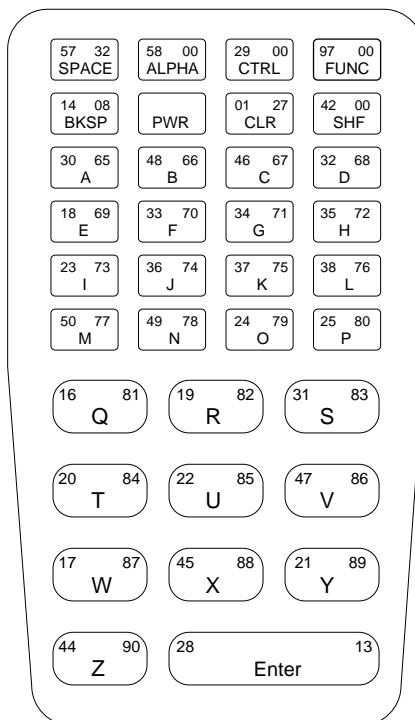




## Series 3800, 35-Key Keyboard—Function

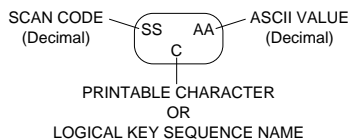
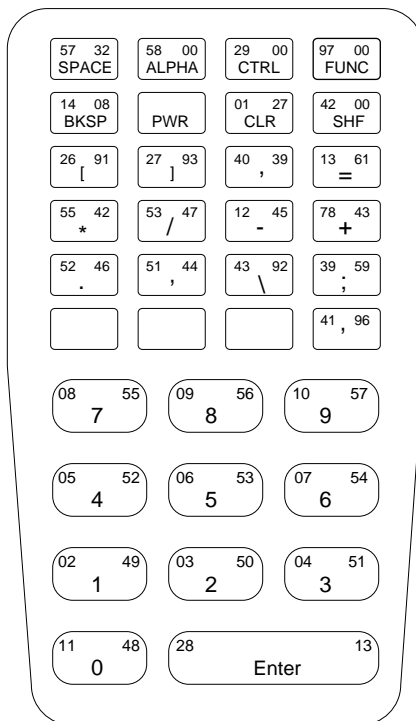


## Series 3800, 35-Key Keyboard—Alpha Lock

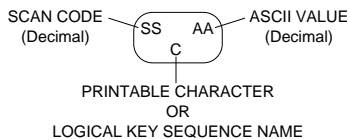
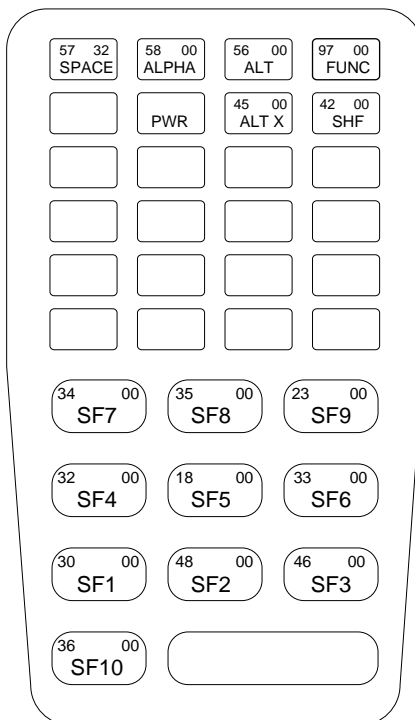




## Series 3800, 35-Key Keyboard—Number Lock

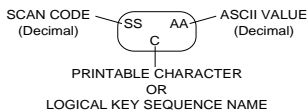
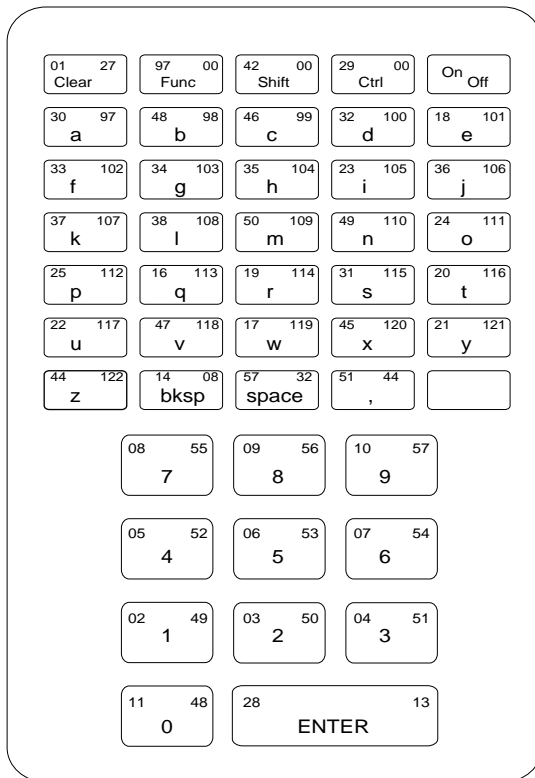


## Series 3800, 35-Key Keyboard—Alternate



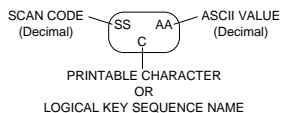
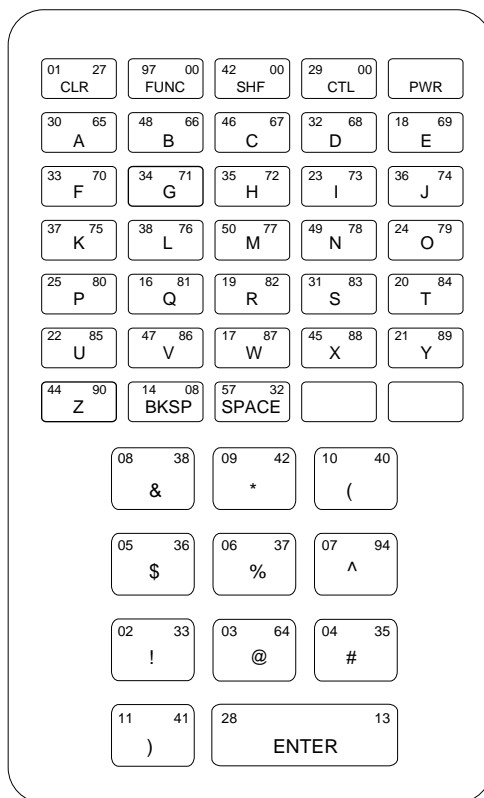


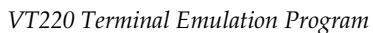
## Series 3800, 46-Key Keyboard—Unshifted





# Series 3800, 46-Key Keyboard—Shift

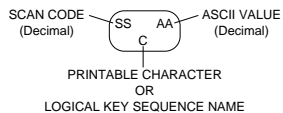
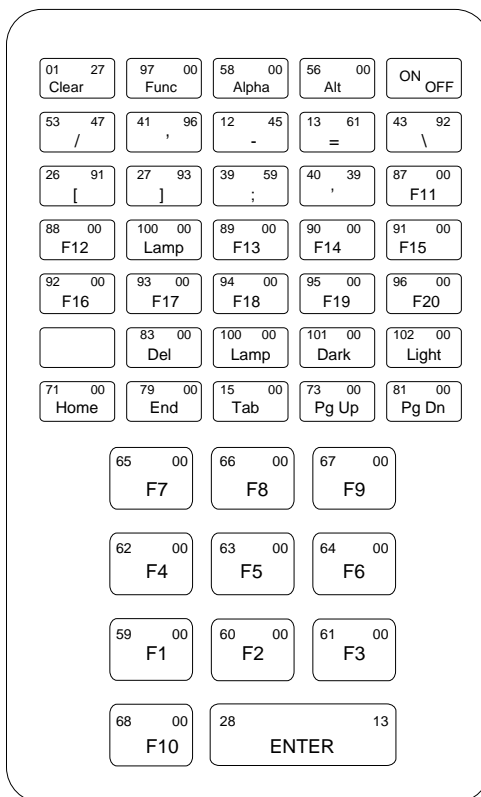




01 27 Clear	97 00 Func	42 00 Shift	29 00 Ctrl	On Off
30 01 Ctrl A	48 02 Ctrl B	46 03 Ctrl C	32 04 Ctrl D	18 05 Ctrl E
33 06 Ctrl F	34 07 Ctrl G	35 08 Ctrl H	23 09 Ctrl I	36 10 Ctrl J
37 11 Ctrl K	38 12 Ctrl L	50 13 Ctrl M	49 14 Ctrl N	24 15 Ctrl O
25 16 Ctrl P	16 17 Ctrl Q	19 18 Ctrl R	31 19 Ctrl S	20 20 Ctrl T
22 21 Ctrl U	47 22 Ctrl V	17 23 Ctrl W	45 24 Ctrl X	21 25 Ctrl Y
44 26 Ctrl Z	14 08 Ctrl Brk			
	28	10 Linefeed		

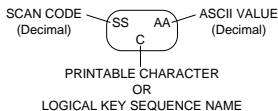
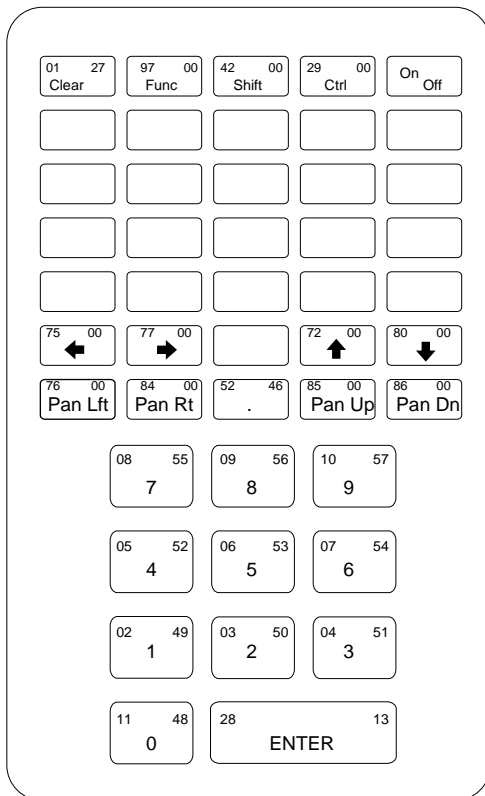


# Series 3800, 46-Key Keyboard—Function

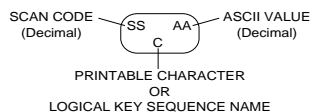
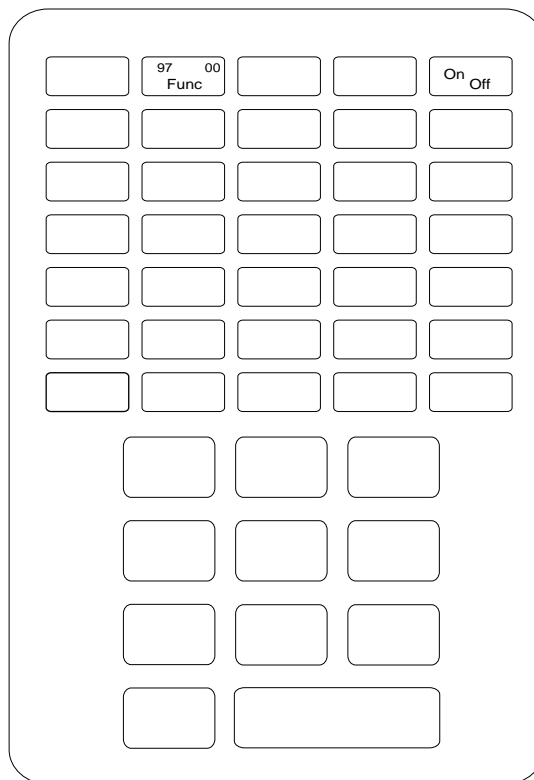




## Series 3800, 46-Key Keyboard—Alpha Lock

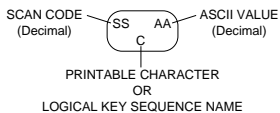
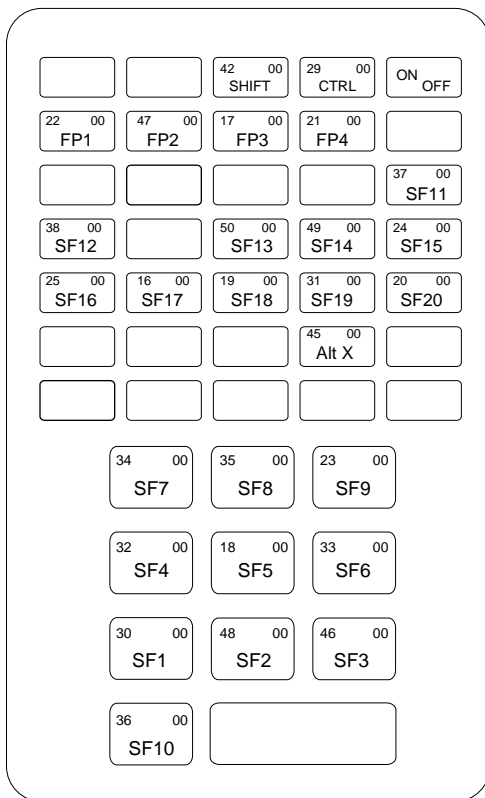


## Series 3800, 46-Key Keyboard—Number Lock



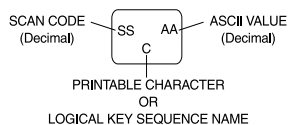


## Series 3800, 46-Key Keyboard—Alternate



# Series 3900, 54-Key Keyboard—Unshifted

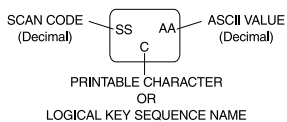
59 0 F1	60 0 F2	61 0 F3	62 0 F4	63 0 F5	75 0 ←	77 0 →	72 0 ↑	80 0 ↓	97 0 FUNC	0 0 ON OFF
30 97 a	48 98 b	46 99 c	32 100 d	18 101 e	33 102 f	34 103 g	8 55 7	9 56 8	10 57 9	29 0 CTRL
35 104 h	23 105 i	36 106 j	37 107 k	38 108 l	50 109 m	49 110 n	5 52 4	6 53 5	7 54 6	1 27 CLEAR
24 111 o	25 112 p	16 113 q	19 114 r	31 115 s	20 116 t	22 117 u	2 49 1	3 50 2	4 51 3	28 13 E N T E R
47 118 v	17 119 w	45 120 x	21 121 y	44 122 z	42 0 SHIFT	14 8 BACK SPACE	12 45 -	11 48 0	52 46 ■	





## Series 3900, 54-Key Keyboard—Shift

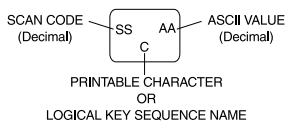
84 0 SHIFT F1	85 0 SHIFT F2	86 0 SHIFT F3	87 0 SHIFT F4	88 0 SHIFT F5	75 52 4 (NUM)	77 54 6 (NUM)	72 56 8 (NUM)	80 50 2 (NUM)	97 0 FUNC	0 0 ON OFF
30 65 A	48 66 B	46 67 C	32 68 D	18 69 E	33 70 F	34 71 G	8 38 &	9 42 *	10 40 (	29 0 CTRL
35 72 H	23 73 I	36 74 J	37 75 K	38 76 L	50 77 M	49 78 N	5 36 \$	6 37 %	7 94 ^	1 27 CLEAR
24 79 O	25 80 P	16 81 Q	19 82 R	31 83 S	20 84 T	22 85 U	2 33 !	3 64 @	4 35 #	28 13 E N T E R
47 86 V	17 87 W	45 88 X	21 89 Y	44 90 Z	42 0 SHIFT	14 8 BACK SPACE	12 95 —	11 62 >	52 46 ■	





# Series 3900, 54-Key Keyboard—Control

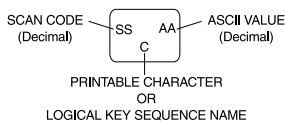
94 0 CTRL F1	95 0 CTRL F2	96 0 CTRL F3	97 0 CTRL F4	98 0 CTRL F5	115 0 CTRL LF	116 0 CTRL RT	141 0 CTRL UP	145 0 CTRL DN	97 0 FUNC	0 0 ON OFF
30 1 CTRL A	48 2 CTRL B	46 3 CTRL C	32 4 CTRL D	18 5 CTRL E	33 6 CTRL F	34 7 CTRL G	128 0	128 0	128 0	29 0 CTRL
35 8 CTRL H	23 9 CTRL I	36 10 CTRL J	37 11 CTRL K	38 12 CTRL L	50 13 CTRL M	49 14 CTRL N	128 0	128 0	7 30 CTRL 6	1 27 CLEAR
24 15 CTRL O	25 16 CTRL P	16 17 CTRL Q	19 18 CTRL R	31 19 CTRL S	20 20 CTRL T	22 21 CTRL U	128 0	3 0 CTRL 2	128 0	28 10 LINE FEED
47 22 CTRL V	17 23 CTRL W	45 24 CTRL X	21 25 CTRL Y	44 26 CTRL Z	42 0 SHIFT	14 8 CTRL BRK	12 31 CTRL —	128 0	128 0	





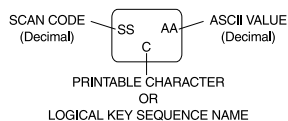
## Series 3900, 54-Key Keyboard—Function

64 0 F6	90 0 F7	91 0 F8	92 0 F9	93 0 F10	71 0 HOME	79 0 END	73 0 PgUP	81 0 PgDN	97 0 FUNC	0 0 ON OFF
30 97 a	48 98 b	46 99 c	32 100 d	18 101 e	33 102 f	34 103 g	41 96 ,	13 61 =	43 92 \	56 0 ALT
59 0 F1	101 0 Darker	102 0 Lighter	37 107 k	38 108 l	50 109 m	49 110 n	26 91 [	27 93 ]	39 59 ;	1 27 CLEAR
67 0 F9	25 112 p	16 113 q	19 114 r	68 0 F10	20 116 t	78 43 +(NUM)	40 39 '	51 44 ,	53 47 /	13 61 =
74 45 -(NUM)	55 42 +(NUM)	53 47 /(NUM)	21 121 y	44 122 z	42 0 SHIFT	57 32 SPACE	12 45 -	82 0 INS	83 0 DEL	



# Series 3900, 54-Key Keyboard—Alpha Lock

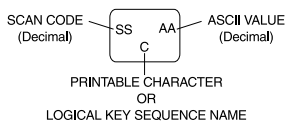
59 0 F1	60 0 F2	61 0 F3	62 0 F4	63 0 F5	75 0 ←	77 0 →	72 0 ↑	80 0 ↓	97 0 FUNC	0 0 ON OFF
30 65 A	48 66 B	46 67 C	32 68 D	18 69 E	33 70 F	34 71 G	8 55 7	9 56 8	10 57 9	29 0 CTRL
35 72 H	23 73 I	36 74 J	37 75 K	38 76 L	50 77 M	49 78 N	5 52 4	6 53 5	7 54 6	1 27 CLEAR
24 79 O	25 80 P	16 81 Q	19 82 R	31 83 S	20 84 T	22 85 U	2 49 1	3 50 2	4 51 3	28 13 E N T E R
47 86 V	17 87 W	45 88 X	21 89 Y	44 90 Z	42 0 SHIFT	14 8 BACK SPACE	12 45 —	11 48 0	52 46 ■	





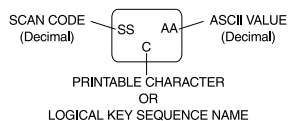
## Series 3900, 54-Key Keyboard—Number Lock

59 0 F1	60 0 F2	61 0 F3	62 0 F4	63 0 F5	75 0 ←	77 0 →	72 0 ↑	80 0 ↓	97 0 FUNC	0 0 ON OFF
30 97 a	48 98 b	46 99 c	32 100 d	18 101 e	33 102 f	34 103 g	8 55 7	9 56 8	10 57 9	29 0 CTRL
35 104 h	23 105 i	36 106 j	37 107 k	38 108 l	50 109 m	49 110 n	5 52 4	6 53 5	7 54 6	1 27 CLEAR
24 111 o	25 112 p	16 113 q	19 114 r	31 115 s	20 116 t	22 117 u	2 49 1	3 50 2	4 51 3	28 13 E N T E R
47 118 v	17 119 w	45 120 x	21 121 y	44 122 z	42 0 SHIFT	14 8 BACK SPACE	12 45 -	11 48 0	52 46 .	



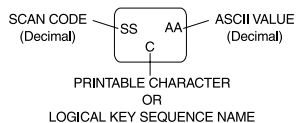
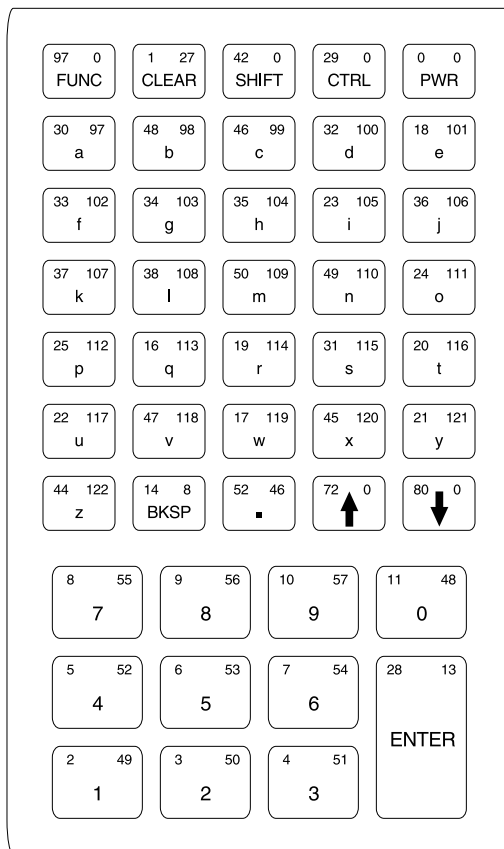
# Series 3900, 54-Key Keyboard—Alternate

104 0 ALT F1	105 0 ALT F2	106 0 ALT F3	107 0 ALT F4	108 0 ALT F5	128 0	128 0	128 0	128 0	97 0 FUNC	0 0 ON OFF
30 0 ALT A	48 0 ALT B	46 0 ALT C	32 0 ALT D	18 0 ALT E	33 0 ALT F	34 0 ALT G	126 0 ALT 7	127 0 ALT 8	128 0 ALT 9	128 0
35 0 ALT H	23 0 ALT I	36 0 ALT J	37 0 ALT K	38 0 ALT L	50 0 ALT M	49 0 ALT N	123 0 ALT 4	124 0 ALT 5	125 0 ALT 6	128 0
24 0 ALT O	25 0 ALT P	16 0 ALT Q	19 0 ALT R	31 0 ALT S	20 0 ALT T	22 0 ALT U	120 0 ALT 1	121 0 ALT 2	122 0 ALT 3	128 0
47 0 ALT V	17 0 ALT W	45 0 ALT X	21 0 ALT Y	44 0 ALT Z	42 0 SHIFT	57 32 SPACE	12 95 ALT --	11 62 ALT 0	128 0	

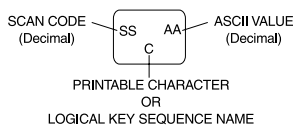
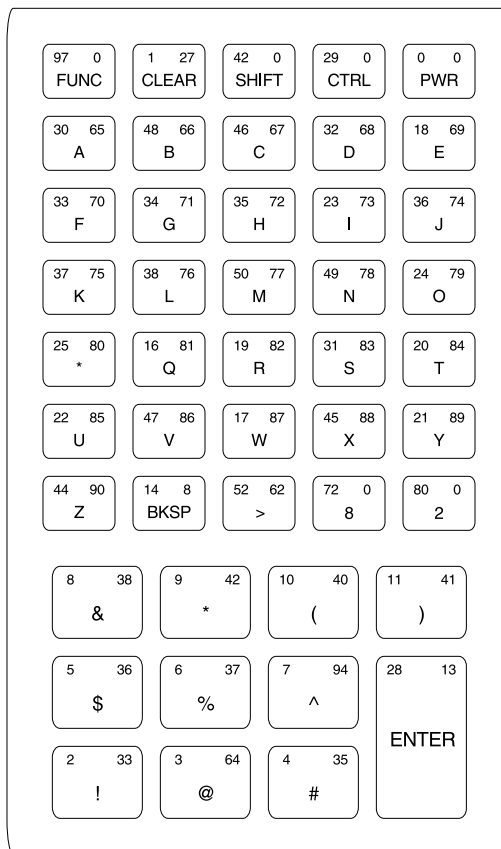




## Series 6800, 46-Key Keyboard—Unshifted

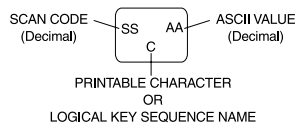
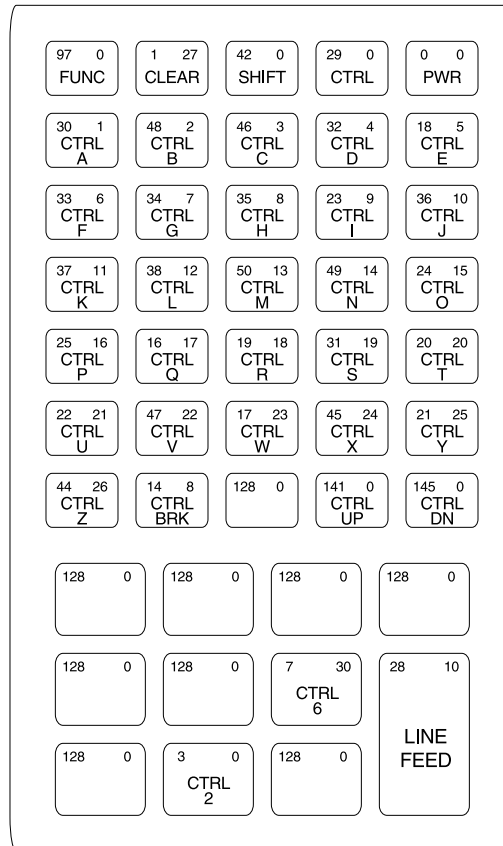


# Series 6800, 46-Key Keyboard—Shift



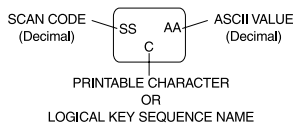
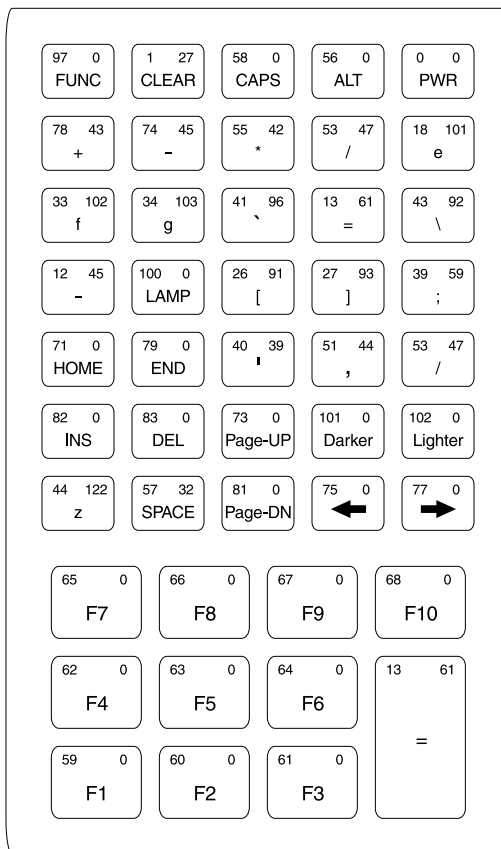


## Series 6800, 46-Key Keyboard—Control



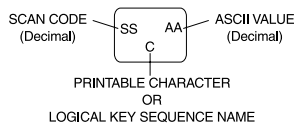
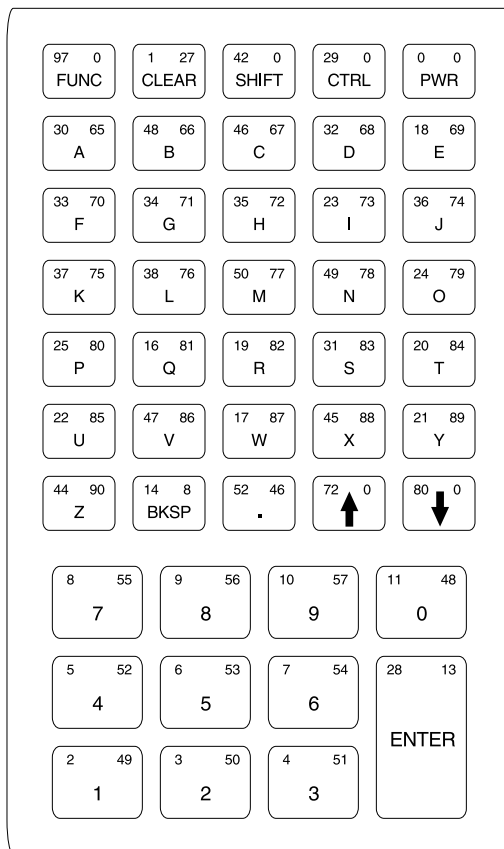


# Series 6800, 46-Key Keyboard—Function

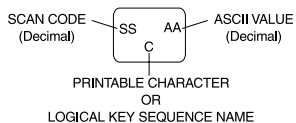
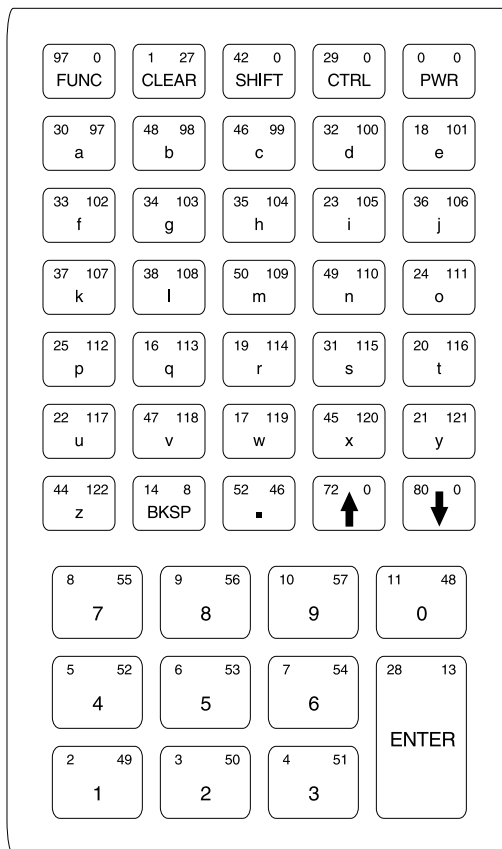




## Series 6800, 46-Key Keyboard—Alpha Lock

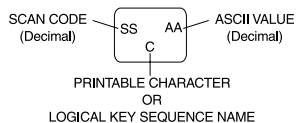
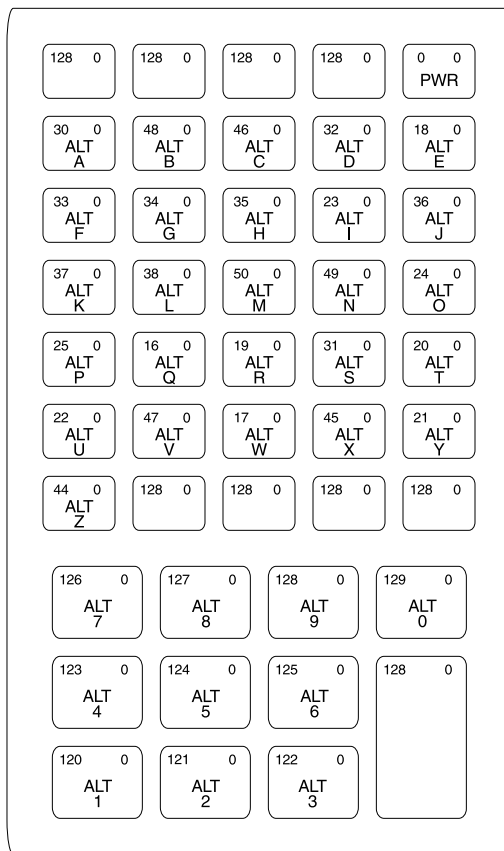


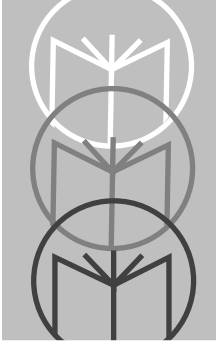
# Series 6800, 46-Key Keyboard—Number Lock





## Series 6800, 46-Key Keyboard—Alternate





## *Appendix B*

### *Command Quick Reference*

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This appendix is a quick reference of the commands that can be sent from the host to a terminal running in VT220, VT100, or VT52 mode. These commands are described in greater detail in Chapter 6, *Commands and Control Characters*.


The appendix includes two tables:

- Table B-1, *VT220/VT100 command quick reference*
- Table B-2, *Command quick reference—ASCII sort order*
- Table B-3, *VT52 command quick reference*
















The tables list the command syntax, a description of the command, and the page number in Chapter 6, *Commands and Control Characters*, where the command is described in greater detail.


**Table B-1. VT220/VT100 command quick reference**

Command	Syntax	Description	Page
<b>Scanner Control Commands</b>			
 Bar Code Type Identifier (SYMBCTI)	<code>[Esc] %PnY</code>	Sets symbology reporting on or off.	6-10
 Check Digit Control (SYMCDC)	<code>[Esc] %PnC</code>	Removes the check digit from label type EAN-8 bar codes.	6-10
 Scan Ahead Control (SYMSAC)	<code>[Esc] %PnS</code>	Enables/disables scan ahead.	6-11
 Scan LED Control (SYMLED)	<code>[Esc] %Pf;P1;PtD</code>	Controls the scanner decode light On/Off and the number of times.	6-11
 Scanned Data Identifier (SYMSDI)	<code>[Esc] %Pn;Pcp</code> (prefix) <code>[Esc] %Pn;Pcx</code> (suffix)	Sets prefix or suffix character to add to the scanned bar code on or off and optionally specifies the character to be used for the prefix or suffix.	6-12
 Scanner Control (SYMCTL)	<code>[Esc] %Pns</code>	Directly turns the scanner on and off at the host's request.	6-12
<b>Terminal Control Commands</b>			
 Backlight Control (SYMBCTL)	<code>[Esc] %P1;P2b</code>	Provides control of the backlight from the host.	6-13
 Beep Control (SYMBSC)	<code>[Esc] %Pf;P1;PtT</code>	Sets the tone frequency and number of times to beep.	6-13
 Keyboard State Control (SYMKSC)	<code>[Esc] %PnK</code>	Able to select any keyboard state for a 35-key terminal.	6-14
 Local Echo Control (SYMLE)	<code>[Esc] %PnE</code>	Allows host application to set the local echo mode.	6-14
 Screen Lock (SYMSL)	<code>[Esc] %Pk;Pr;PcL</code>	Enables/disables screen lock.	6-15
 Send MAC Address (SYMMAC)	<code>[Esc] %M</code>	Allows the host to query the terminal for its MAC address.	6-15

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.

**Table B-1. VT220/VT100 command quick reference (continued)**

Command	Syntax	Description	Page
 Transmit Mode Control (SYMTMC)	 % <i>Pn</i> B	Allows the host application to set the transmit mode.	6-15
<b>Compatibility Level</b>			
Select Compatibility Level (DECSCL)	 [62; <i>Pn</i> "p	Sets specified level of operation for compatibility with applications.	6-16
<b>Character Set Selection</b>			
Designating Hard Character Sets (DHCS)	See page 6-17	Designates a hard character set as G0-G3.	6-17
Locking Shifts (LS)	See page 6-18	Performs locking shift of graphic character set into either GL or GR.	6-18
Select 7-Bit C1 Control Transmission (S7C1T)	  F	Return all C1 codes in their 7-bit representation.	6-18
Select 8-Bit C1 Control Transmission (S8C1T)	  G	Return all C1 codes in their 8-bit representation.	6-18
Select Graphic Rendition (SGR)	 [ <i>Ps</i> ; . . . ; <i>Psm</i>	Selects graphic rendition (display characteristics).	6-19
Single Shifts (SS)	 N  O	Single shifts character set in for following character and then returns to previous character set.	6-20
<b>Terminal Modes</b>			
 Attention (AT)	 AT <i>nn</i>	Terminates VT220 with DOS exit code <i>nn</i> .	6-20
Keypad Application Mode (DECKPAM)	 =	Selects application keypad mode.	6-20
Keypad Numeric Mode (DECPNM)	 >	Selects the numeric keypad mode.	6-21
Reset Mode (RM)	 [ <i>Ps</i> ; . . . ; <i>Ps</i> ]	Resets one or more terminal modes.	6-21

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.















**Table B-1. VT220/VT100 command quick reference (continued)**


Command	Syntax	Description	Page
Set Mode (SM)	[ <i>Ps</i> ; . . . ; <i>Psh</i>	Sets one or more terminal display modes.	6-22
<b>Cursor Positioning</b>			
Cursor Backward (CUB)	[ <i>Pn</i> D	Moves cursor <i>Pn</i> columns left.	6-23
Cursor Down (CUD)	[ <i>Pn</i> B	Moves cursor down <i>Pn</i> rows.	6-24
Cursor Forward (CUF)	[ <i>Pn</i> C	Moves cursor <i>Pn</i> columns right.	6-24
Cursor Position (CUP)	[ <i>Pr</i> ; <i>Pc</i> H	Moves cursor to row <i>Pr</i> , column <i>Pc</i> .	6-25
Cursor Position Report (CPR)	[ <i>Pr</i> ; <i>Pc</i> R	Reports current cursor row ( <i>Pr</i> ) and column ( <i>Pc</i> ) position.	6-25
Cursor Up (CUU)	[ <i>Pn</i> A	Moves cursor up <i>Pn</i> rows.	6-26
Horizontal and Vertical Position (HVP)	[ <i>Pr</i> ; <i>Pc</i> f	Moves cursor to row <i>Pr</i> and column <i>Pc</i> .	6-26
Index (IND)	D	Moves cursor down one row.	6-27
Next Line (NEL)	E	Moves cursor down one row and to far left column.	6-27
Restore Cursor (DECRC)	8	Restores state specified by the DECSC command.	6-28
Reverse Index (RI)	M	Moves cursor up one row.	6-28
Save Cursor (DECSC)	7	Saves cursor position and graphic rendition.	6-29
<b>Tab Stops</b>			
Horizontal Tabulation Set (HTS)	H	Sets horizontal tab stop at current position.	6-30
Tabulation Clear (TBC)	[ <i>Psg</i>	Clears one or all tab stops.	6-31

Note: Italics indicates variable parameters, indicates Symbol proprietary command.







**Table B-1. VT220/VT100 command quick reference (continued)**

Command	Syntax	Description	Page
<b>Character Attributes</b>			
Select Character Attributes (DECSCA)	 [ <i>Ps</i> *q	Selects whether characters are erasable by DECSEL and DECSED commands.	6-32
<b>Line Attributes</b>			
Delete Line (DL)	 [ <i>Pn</i> M	Deletes <i>Pn</i> lines at cursor position.	6-33
Double-Height Line (DECDHL)	 #3	Displays current line as double-height, double-width line.	6-33
	 #4		
Double-Width Line (DECDWL)	 #6	Displays current line as double-width line.	6-34
Single-Width Line (DECSWL)	 #5	Displays current line as a single-width line.	6-34
<b>Editing</b>			
Delete Characters (DCH)	 [ <i>Pn</i> P	Deletes <i>Pn</i> characters starting at cursor position.	6-35
Insert Characters (ICH)	 [ <i>Pn</i> @	Inserts <i>Pn</i> characters starting at cursor position.	6-35
Insert Line (IL)	 [ <i>Pn</i> L	Inserts <i>Pn</i> lines at cursor position.	6-36
<b>Erasing</b>			
Erase Character (ECH)	 [ <i>Pn</i> X	Erases <i>Pn</i> characters at cursor position.	6-36
Erase Display (ED)	 [ <i>Ps</i> J	Erases part or all of display.	6-37
Erase Line (EL)	 [ <i>Ps</i> K	Erases part or all of current line.	6-38
Selective Erase in Display (DECSED)	 [ ? <i>Ps</i> J	Selectively erases part of the display.	6-38
Selective Erase in Line (DECSEL)	 [ ? <i>Ps</i> K	Selectively erases part of current line.	6-39

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.


**Table B-1. VT220/VT100 command quick reference (continued)**

Command	Syntax	Description	Page
<b>Scrolling Margins</b>			
Set Top And Bottom Margins (DECSTBM)	<code>[Esc] [ <i>Pt</i> ; <i>Pbr</i></code>	Sets top and bottom margins of screen.	6-40
<b>Print Control</b>			
Printer Control (PCONTROL)	<code>[Esc] [ <i>Pni</i></code>	Enables or disables auto print mode.	6-41
 Printer Query (SYMPQ)	See page 6-41	Used to query a Comtec printer.	6-41
 Send Print Status (SYMSPS)	<code>[Esc] %<i>Pnc</i></code>	Sets printer status messages on the terminal on or off.	6-42
 Show Printer Errors (SYMSPE)	<code>[Esc] %<i>Pnt</i></code>	Sets printer error messages on the terminal on or off.	6-43
<b>User-Defined Keys</b>			
Define User Keys (DECUDK)	See page 6-44	Specifies definitions for user-defined keys.	6-44
<b>Reports</b>			
Device Attributes (DA)	<code>[Esc] [ <i>Pnc</i></code> <code>[Esc] [ &gt;<i>Pnc</i></code>	Request/send device attributes.	6-46
Device Status Report (DSR)	<code>[Esc] [ <i>Psn</i></code>	Requests/reports terminal status.	6-47
Enquiry (ENQ)	<code>[ENQ]</code>	Requests answerback string.	6-7
Identify Terminal (DECID)	<code>[Esc] Z</code>	Requests terminal identification.	6-48
<b>Terminal Reset</b>			
Reset To Initial State (RIS)	<code>[Esc] c</code>	Resets the terminal.	6-48
Soft Terminal Reset (DECSTR)	<code>[Esc] [ !<i>p</i></code>	Resets options and variables to their default state.	6-49

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.


**Table B-1. VT220/VT100 command quick reference (continued)**

Command	Syntax	Description	Page
<b>Tests and Adjustments</b>			
Screen Alignment Display (DECALN)	<b>Esc</b> #8	Fills entire screen with letter E.	6-49

Note: *Italics* indicates variable parameters,  indicates Symbol proprietary command.

**Table B-2. Command quick reference—ASCII sort order**

Command	Syntax	Description	Page
Enquiry (ENQ)	<b>ENQ</b>	Requests answerback string.	6-7
Locking Shifts (LS)	<b>Shift Out</b>	Performs locking shift of graphic character set into either GL or GR.	6-18
Locking Shifts (LS)	<b>Shift In</b>	Performs locking shift of graphic character set into either GL or GR.	6-18
Select 7-Bit C1 Control Transmission (S7C1T)	<b>Esc</b> <b>Space</b> <b>F</b>	Return all C1 codes in their 7-bit representation.	6-18
Select 8-Bit C1 Control Transmission (S8C1T)	<b>Esc</b> <b>Space</b> <b>G</b>	Return all C1 codes in their 8-bit representation.	6-18
Double-Height Line (DECDHL)	<b>Esc</b> #3 <b>Esc</b> #4	Displays current line as double-height, double-width line.	6-33
Single-Width Line (DECSWL)	<b>Esc</b> #5	Displays current line as a single-width line.	6-34
Double-Width Line (DECDWL)	<b>Esc</b> #6	Displays current line as double-width line.	6-34

















Note: *Italics* indicates variable parameters,  indicates Symbol proprietary command.


**Table B-2. Command quick reference—ASCII sort order (continued)**

Command	Syntax	Description	Page
Screen Alignment Display (DECALN)	#8	Fills entire screen with letter E.	6-49
Printer Query (SYMPQ)	%5q	Used to query a Comtec printer.	6-41
Transmit Mode Control (SYMTCM)	%PnB	Allows the host application to set the transmit mode.	6-15
Check Digit Control (SYMCDC)	%PnC	Removes the check digit from label type EAN-8 bar codes.	6-10
Scan LED Control (SYMLED)	%Pf;Pl;Pt D	Controls the scanner decode light On/Off and the number of times.	6-11
Local Echo Control (SYMLE)	%PnE	Allows host application to set the local echo mode.	6-14
Keyboard State Control (SYMKSC)	%PnK	Able to select any keyboard state for a 35-key terminal.	6-14
Screen Lock (SYMSL)	%Pk;Pr;PcL	Enables/disables screen lock.	6-15
Send MAC Address (SYMMAC)	%M	Allows the host to query the terminal for its MAC address.	6-15
Scan Ahead Control (SYMSAC)	%PnS	Enables/disables scan ahead.	6-11
Beep Control (SYMBSC)	%Pf;Pl;Pt T	Sets the tone frequency and number of times to beep.	6-13
Bar Code Type Identifier (SYMBCTI)	%PnY	Sets symbology reporting on or off.	6-10
Backlight Control (SYMBCTL)	%Pl;P2b	Provides control of the backlight from the host.	6-13

















Note: Italics indicates variable parameters, indicates Symbol proprietary command.


**Table B-2. Command quick reference—ASCII sort order (continued)**

Command	Syntax	Description	Page
 Send Print Status (SYMSPS)	 % <i>Pnc</i>	Sets printer status messages on the terminal on or off.	6-42
 Scanned Data Identifier (SYMSDI) (prefix)	 % <i>Pn; PCp</i>	Sets prefix character to add to the scanned bar code on or off and optionally specifies the character to be used for the prefix.	6-12
 Scanner Control (SYMSCCTL)	 % <i>Pns</i>	Directly turns the scanner on and off at the host's request.	6-12
 Show Printer Errors (SYMSPE)	 % <i>Pnt</i>	Sets printer error messages on the terminal on or off.	6-43
 Scanned Data Identifier (SYMSDI) (suffix)	 % <i>Pn; PCx</i>	Sets suffix character to add to the scanned bar code on or off and optionally specifies the character to be used for the suffix.	6-12
Designating Hard Character Sets (DHCS)	 ( <i>PC</i>	Designates a hard character set as G0.	6-17
Designating Hard Character Sets (DHCS)	 ) <i>PC</i>	Designates a hard character set as G01.	6-17
Designating Hard Character Sets (DHCS)	 * <i>PC</i>	Designates a hard character set as G2.	6-17
Designating Hard Character Sets (DHCS)	 + <i>PC</i>	Designates a hard character set as G3.	6-17
Enter ANSI VT100 Mode	 <	Exits VT52 mode and enters ANSI VT100 mode.	6-58
Keypad Application Mode (DECKPAM)	 =	Selects application keypad mode.	6-20















Note: Italics indicates variable parameters,  indicates Symbol proprietary command.


**Table B-2. Command quick reference—ASCII sort order (continued)**

Command	Syntax	Description	Page
Enter Alternate Keypad Mode	 =	Terminal switches to alternate keypad mode.	6-57
Keypad Numeric Mode (DECPNM)	 >	Selects the numeric keypad mode.	6-21
Exit Alternate Keypad Mode	 >	Returns to normal keypad key sequences.	6-58
Save Cursor (DECSC)	 7	Saves cursor position and graphic rendition.	6-29
Restore Cursor (DECRC)	 8	Restores state specified by the DECSC command.	6-28
Cursor Up	 A	Moves cursor up one row.	6-51
 Attention (AT)	 AT <i>nn</i>	Terminates VT220 with DOS exit code <i>nn</i> .	6-20
Cursor Down	 B	Moves cursor down one row.	6-51
Cursor Right	 C	Moves cursor one column right.	6-52
Index (IND)	 D	Moves cursor down one row.	6-27
Cursor Left	 D	Moves cursor one column left.	6-52
Next Line (NEL)	 E	Moves cursor down one row and to far left column.	6-27
Enter Graphics Mode	 F	Loads DEC special character set.	6-53
Exit Graphics Mode	 G	Loads ASCII character set.	6-53
Horizontal Tabulation Set (HTS)	 H	Sets horizontal tab stop at current position.	6-30

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.

**Table B-2. Command quick reference—ASCII sort order (continued)**

Command	Syntax	Description	Page
Cursor Home	 H	Moves cursor to home position (row 1, column 1).	6-53
Reverse Line Feed	 I	Moves cursor up one row.	6-54
Erase To End of Screen	 J	Erases from cursor to end of the logical screen.	6-54
Erase To End of Line	 K	Erases from cursor to end of the line.	6-55
Reverse Index (RI)	 M	Moves cursor up one row.	6-28
Single Shifts (SS)	 N	Single shifts character set in for following character and then returns to previous character set.	6-20
	 O		
Enter Printer Controller Mode	 W	Enables auto print mode.	6-55
Exit Printer Controller Mode	 X	Exits auto print mode.	6-56
Direct Cursor Address	 Y <i>PrPc</i>	Moves cursor to row <i>Pr</i> , column <i>Pc</i> .	6-56
Identify Terminal (DECID)	 Z	Requests terminal identification.	6-48
Identify	 Z	Request terminal device attribute.	6-57
Soft Terminal Reset (DECSTR)	 [!p	Resets options and variables to their default state.	6-49
Select Character Attributes (DECSCA)	 [P <i>S</i> *q	Selects whether characters are erasable by DECSEL and DECSED commands.	6-32

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.















**Table B-2. Command quick reference—ASCII sort order (continued)**


Command	Syntax	Description	Page
Device Attributes (DA)	[ <i>&gt;Pn</i> C	Request/send device attributes.	6-46
Selective Erase in Display (DECSER)	[ <i>?Ps</i> J	Selectively erases part of the display.	6-38
Selective Erase in Line (DECSEL)	[ <i>?Ps</i> K	Selectively erases part of current line.	6-39
Select Compatibility Level (DECSCL)	[ <i>62;Pn</i> "p	Sets specified level of operation for compatibility with applications.	6-16
Insert Characters (ICH)	[ <i>Pn</i> @	Inserts <i>Pn</i> characters starting at cursor position.	6-35
Cursor Up (CUU)	[ <i>Pn</i> A	Moves cursor up <i>Pn</i> rows.	6-26
Cursor Down (CUD)	[ <i>Pn</i> B	Moves cursor down <i>Pn</i> rows.	6-24
Cursor Forward (CUF)	[ <i>Pn</i> C	Moves cursor <i>Pn</i> columns right.	6-24
Cursor Backward (CUB)	[ <i>Pn</i> D	Moves cursor <i>Pn</i> columns left.	6-23
Cursor Position (CUP)	[ <i>Pr;Pc</i> H	Moves cursor to row <i>Pr</i> , column <i>Pc</i> .	6-25
Erase Display (ED)	[ <i>Ps</i> J	Erases part or all of display.	6-37
Erase Line (EL)	[ <i>Ps</i> K	Erases part or all of current line.	6-38
Insert Line (IL)	[ <i>Pn</i> L	Inserts <i>Pn</i> lines at cursor position.	6-36
Delete Line (DL)	[ <i>Pn</i> M	Deletes <i>Pn</i> lines at cursor position.	6-33

Note: Italics indicates variable parameters, indicates Symbol proprietary command.








**Table B-2. Command quick reference—ASCII sort order (continued)**

Command	Syntax	Description	Page
Delete Characters (DCH)	 [ <i>PnP</i>	Deletes <i>Pn</i> characters starting at cursor position.	6-35
Cursor Position Report (CPR)	 [ <i>Pr</i> ; <i>PcR</i>	Reports current cursor row ( <i>Pr</i> ) and column ( <i>Pc</i> ) position.	6-25
Erase Character (ECH)	 [ <i>PnX</i>	Erases <i>Pn</i> characters at cursor position.	6-36
Device Attributes (DA)	 [ <i>Pnc</i>	Request/send device attributes.	6-46
Horizontal and Vertical Position (HVP)	 [ <i>Pr</i> ; <i>Pcf</i>	Moves cursor to row <i>Pr</i> and column <i>Pc</i> .	6-26
Tabulation Clear (TBC)	 [ <i>PSg</i>	Clears one or all tab stops.	6-31
Set Mode (SM)	 [ <i>PSi</i> . . . ; <i>Psh</i>	Sets one or more terminal display modes.	6-22
Printer Control (PCONTROL)	 [ <i>Pni</i>	Enables or disables auto print mode.	6-41
Reset Mode (RM)	 [ <i>PSi</i> . . . ; <i>PSl</i>	Resets one or more terminal modes.	6-21
Select Graphic Rendition (SGR)	 [ <i>PSi</i> . . . ; <i>PSm</i>	Selects graphic rendition (display characteristics).	6-19
Device Status Report (DSR)	 [ <i>PSn</i>	Requests/reports terminal status.	6-47
Set Top And Bottom Margins (DECSTBM)	 [ <i>Pt</i> ; <i>Pbr</i>	Sets top and bottom margins of screen.	6-40
Reset To Initial State (RIS)	 c	Resets the terminal.	6-48
Locking Shifts (LS)	 n	Performs locking shift of graphic character set into either GL or GR.	6-30

Note: *Italics* indicates variable parameters,  indicates Symbol proprietary command.

**Table B-2. Command quick reference—ASCII sort order (continued)**

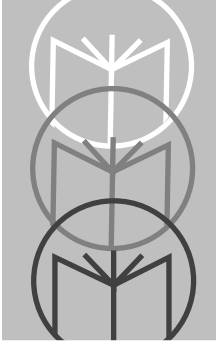
Command	Syntax	Description	Page
Locking Shifts (LS)	 o	Performs locking shift of graphic character set into either GL or GR.	6-30
Locking Shifts (LS)		Performs locking shift of graphic character set into either GL or GR.	6-30
Locking Shifts (LS)	 }	Performs locking shift of graphic character set into either GL or GR.	6-30
Locking Shifts (LS)	 ~	Performs locking shift of graphic character set into either GL or GR.	6-30
Define User Keys (DECUDK)	See page 6-44	Specifies definitions for user-defined keys.	6-44

Note: Italics indicates variable parameters,  indicates Symbol proprietary command.

**Table B-3. VT52 command quick reference**

Command	Syntax	Description	Page
Cursor Up	<b>Esc</b> A	Moves cursor up one row.	6-51
Cursor Down	<b>Esc</b> B	Moves cursor down one row.	6-51
Cursor Right	<b>Esc</b> C	Moves cursor one column right.	6-52
Cursor Left	<b>Esc</b> D	Moves cursor one column left.	6-52
Enter Graphics Mode	<b>Esc</b> F	Loads DEC special character set.	6-53
Exit Graphics Mode	<b>Esc</b> G	Loads ASCII character set.	6-53
Cursor Home	<b>Esc</b> H	Moves cursor to home position (row 1, column 1).	6-53
Reverse Line Feed	<b>Esc</b> I	Moves cursor up one row.	6-54
Erase To End of Screen	<b>Esc</b> J	Erases from cursor to end of the logical screen.	6-54
Erase To End of Line	<b>Esc</b> K	Erases from cursor to end of the line.	6-55
Enter Printer Controller Mode	<b>Esc</b> W	Enables auto print mode.	6-55
Exit Printer Controller Mode	<b>Esc</b> X	Exits auto print mode.	6-56
Direct Cursor Address	<b>Esc</b> Y <i>PrPc</i>	Moves cursor to row <i>Pr</i> , column <i>Pc</i> .	6-56
Identify	<b>Esc</b> Z	Request terminal device attribute.	6-57
Enter Alternate Keypad Mode	<b>Esc</b> =	Terminal switches to alternate keypad mode.	6-57
Exit Alternate Keypad Mode	<b>Esc</b> >	Returns to normal keypad key sequences.	6-58
Enter ANSI VT100 Mode	<b>Esc</b> <	Exits VT52 mode and enters ANSI VT100 mode.	6-58





## *Appendix C*

### *Terminal Boot Sequences*

---

This appendix lists the key sequences used to perform a cold boot, perform a warm boot, and enter command mode for each Symbol Series 3000 terminal.

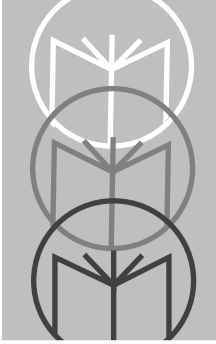
To use a boot sequence, follow these steps:

1. For a cold boot or command mode sequence, turn terminal power off. (For warm boot, leave power on.)
2. Press and **hold** the keys indicated in the table in the order listed **except** the **PWR** or **On/Off** key.
3. Press and release the **PWR** or **On/Off** key.
4. Release all other keys.



**Table C-1. Terminal boot sequences**

Terminal	Cold Boot	Warm Boot	Command Mode
56 key terminals 3300 Series	F1 F4 Enter On/Off	L Shift On/Off	A D On/Off
35 key terminals PDT 3100 3300 Series 3800 Series	Space Func ↑ PWR	+ / PWR	Bksp Shift PWR
46 key terminals 3100 Series 3800 Series 6800 Series	A B D PWR	4 5 PWR	F I PWR
54 key terminals 3910	F1 F4 Enter On/Off	Shift L On/Off	A D On/Off
27 key terminals 1000 Series	→ Enter PWR	P1 Enter PWR	Func Enter PWR



## *Appendix D*

### *Program Example*

---

This appendix includes an example of a program for a terminal using VT220 emulation. There are two files included:

1. The program file
2. The file SPA.H which is invoked by the program file



## Example Program File

```
#include "spa.h"

extern char Banner[];
extern RetailItemT RetailItemList[];
extern int RetailItemCount;
extern int ChangedFlag;

void ShelfPriceAudit(void)
{
    WPTR SPAwin;
    char Item[ITEM_LEN+1], Desc[19], NewPrice[PRICE_LEN+2];
    char OldPrice[PRICE_LEN+2];
    int i, ItemFound;
    char c;

    /* open window */
    SPAwin = wopen(0,0SCREEN_ROWS-1, SCREEN_COLS-1,"Shelf Price Audit"
    CenterSay(0,18,Banner);

    /* get item number */
    while (1)
    {
        strcpy(Item,"          ");
        at(1,1);
        eraeos();
        atsay(2,3,"Item #:");
        atget(3,3,Item,"XXXXXXXXXXXX");
        atsay(5,1,"ENTER to cancel");
        readgets();

        /* if blank, exit */
        if (isblank(Item)) break;

        /* verify item number */
        for (i=0, ItemFound=0; i < RetailItemCount; i++)
        {
            if (!strcmp(RetailItemList[i].item,Item,ITEM_LEN))
            {
                ItemFound = 1;
                break;
            }
        }
    }
}
```



---

```

    }
    if (!ItemFound)
    {
        Error("Invalid Item #");
        continue;
    }

    /* display info on screen */
    at(1,1);
    eraeos();
    atsay(1,1,"Vendor #:");
    atsay(1,12,RetailItemList[i].vendor);
    atsay(2,1,"I#");
    atsay(2,5,Item);
    strncpy(Desc, RetailItemList[i].desc, 18);
    Desc[18] = 0;
    CenterSay(3,18,Desc);
    sprintf(OldPrice,"%7.2f",(atof(RetailItemList[i].price) / 100));
    strcpy(NewPrice,OldPrice);
    atsay(5,1,"Price:");
    atget(5,11,NewPrice,"9999.99");
    readgets();

    if (!strcmp(NewPrice,OldPrice)) continue; /* if no change, ignore
    */
    /* otherwise, alter database */
    strncpy(RetailItemList[i].price, NewPrice, 4); /* first 4 */
    strncpy(RetailItemList[i].price+4, NewPrice+5, 2); /* last 2 */

    /* print a new ticket */
    fprintf(stderr,"\x1B[5i");
    fprintf(stderr,"! 0 100 320 1 \r\n");
    fprintf(stderr,"PITCH 100 \r\n");
    fprintf(stderr,"MULTIPLE 1 \r\n");
    fprintf(stderr,"R90 9x12(1,2) 100 20 Vendor:\r\n");
    fprintf(stderr,"R90 9x12(1,2) 100 100 %s\r\n",
    RetailItemList[i].vendor);
    fprintf(stderr,"R90 9x12(1,2) 75 20 Item:\r\n");
    fprintf(stderr,"R90 9x12(1,2) 75 100 %s\r\n",
    RetailItemList[i].desc);
    fprintf(stderr,"BARCODER UPCA 10 100 30 %s\r\n",
    RetailItemList[i].item);

```



```
fprintf(stderr,"R90 9x12(1,2) 50 20 Price:\r\n");
fprintf(stderr,"R90 9x12(1,2) 50 100 $%4.4s.%2.2s\r\n",
        NewPrice,NewPrice+5);
fprintf(stderr,"INDEX\r\n");
fprintf(stderr,"END\r\n");
fprintf(stderr,"\x1B[4i");

ChangedFlag = 1;
}

/* close window */
fclose(SPAwin);
}
```

## SPA.H File

```
/*
    spa.h -- header file for the retail demo receiving DSD screens.

    This function opens a small window (LRT size) and prompts the user
    for a price change. SPA = Shelf Price Audit.

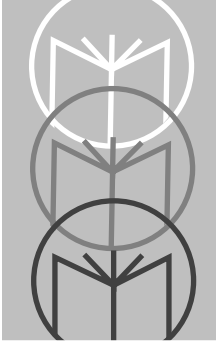
    Copyright (c) 1993
        Symbol Technologies, Inc.
*/

#ifndef _SPA_H
#define _SPA_h

/* INCLUDES ===== */
#include "definitions.h"

/* PROTOTYPES ===== */
void ShelfPriceAudit(void);

#endif /* _SPA_H */
```



## *Appendix E*

### *Spectrum One VT220 Terminal Emulation*

---

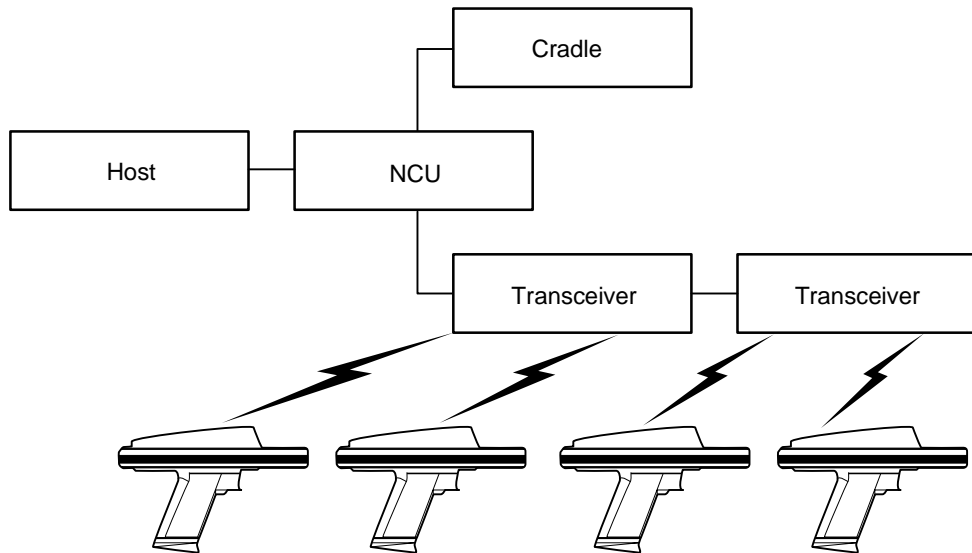
Terminal emulation on Spectrum One networks is not the same as on the newer Spectrum24 networks. This appendix describes the what is different about running VT220 terminal emulation on a Spectrum One network.

**Note:** A separate version of the VT220 Terminal Emulation Program for Spectrum One networks is available.

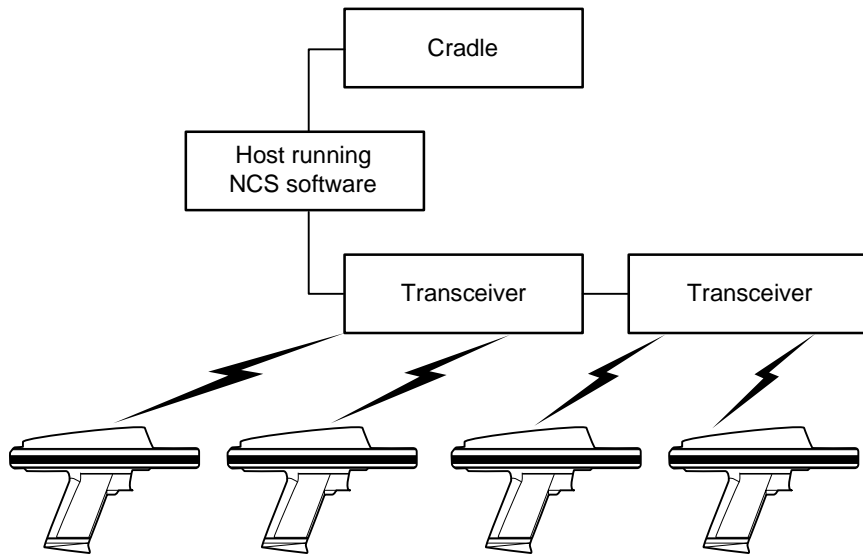


## Overview

The Spectrum One network can be connected to the host computer in several ways. Figures E-1 and E-2 show examples of network configurations using a Network Control Unit (NCU) and Network Control Software (NCS).



**Figure E-1. Spectrum One network with NCU**



**Figure E-2. Spectrum One network with NCS**



## Spectrum One—Copying the Hex File to the Host or NCU

VT220 may have been installed on a PC not connected to the Spectrum One network, such as a development PC. If this is the case, you need to copy the VT220 hex file to a PC or Unix computer on the Spectrum One network so that it can be downloaded to Symbol terminals.

The computer where the hex file is copied to is usually a host computer or a Network Control Unit (NCU, which is a dedicated PC used to control the Spectrum One network).

**Note:** If you use Spectrum One Network Control Software (NCS), you will not have a separate NCU. The NCS resides on a host computer and takes the place of the NCU.

You can copy either the standard SVTPS3.HEX file or a custom hex file that you create. See Chapter 4, *Customizing the Hex File*, and *Spectrum One—Files Needed to Create a Custom Hex File* on page E-8 for a description of how to create a custom hex file for Spectrum One.

If you are copying the hex file to a PC, you can use the DOS COPY command, Windows File Manager, or any other standard method to copy files. If you are copying the hex file to a Unix computer, use the doscopy command.

# Spectrum One—Starting VT220 and Accessing a Host Application

1. Perform a cold boot on the terminal. (See Appendix C, *Terminal Boot Sequences*, for the key combination used to cold boot a terminal.) After the cold boot, the terminal displays the following:

```
SVTP220 SIII n.nn-nn
```

1. Go To Logon
2. File Transfer
3. Configure
4. Scan

```
Select/Clr:
```

2. If this is the first time you are accessing the host application, do the following:
  - a. At the SVTP220 menu, select option 3 (Configure)
  - b. At the Configure Menu 1, select option 3 (Config Radio).
  - c. At the Set Radio Config menu, select option 1 (Reset Radio).
  - d. When the terminal prompts you for confirmation, press ☐Y. Any existing network configuration is cleared, and you return to the SVTP220 menu.
3. At the SVTP220 menu, select option 1 (Go To Logon).
4. If the terminal is not configured for the host, this message is displayed:

```
Checking Config...  
Place in cradle now!
```

If this message is displayed, insert the terminal into the cradle. After a moment, the following message is displayed:

```
Unit configured  
Remove from cradle
```

Remove the terminal from the cradle.



5. After opening a communications line to the host, a list of host connection programs is displayed. If you have created a custom VT220 hex file, there will be more than one version of VT220 listed. Use the **↓** and **↑** keys as needed to scroll through the list, then select the desired VT220 program.
6. If this is the first time you are running VT220 on the terminal and/or there is no SVTP.CFG file, the Set Options menu is displayed. The configuration can be edited as described in Chapter 3, *Downloading and Running VT220 on a Terminal*.

You can press **Enter** to accept the default option settings, or you can make changes as needed and then press **Enter**. See *Modifying VT220 Operating Parameters (SVTP.CFG)* on page 4-6 for a description of each option.

7. The following message is displayed:

Logon ready!

From this point on, you see the login screens for the host system. After logging in, the selected application is in control of the terminal.



# Spectrum One—Command Line Configuration Options

VT220 for Spectrum One has an additional command line option ('P') not available in the Spectrum24 version.

## **Changing the Communication Port**

To change the communication port, enter the following command at the terminal's DOS prompt:

```
svtp -PCOMn
```

where *n* is the number of the COM port (1 or 2).

**Note:** You must use an uppercase P. You can also use a slash (/) instead of a hyphen (-).

For example, to use COM1 for the communication port instead of the default, enter the following command:

```
svtp -PCOM1
```



## Spectrum One—Files Needed to Create a Custom Hex File

In addition to the files copied from the VT220 installation diskette, creating a custom hex file requires files from the Application Development Kit (ADK) and Spectrum One kit. Table E-1 lists the files required from each kit.

**Note:** The S1.BIN and S1\_ROM.EXE files are in the terminal system EPROM. However, the Spectrum One kit versions may be newer, and it is recommended to incorporate the Spectrum One kit versions into the hex file so that the terminal will use them instead of the EPROM versions.

**Table E-1. Files needed to create a custom hex file**

ADK Files	Spectrum One Files
COMMAND.COM	S1.BIN
ERR3000.SYS	S1_ROM.EXE
ETA3000.SYS	SLP.SYS
KBD3000.SYS	
NULLSYS.HEX	
SCAN.EXE	
SCAN3000.EXE	
TDREM.EXE	

## Spectrum One—Modifying the Response File

**Note:** Before you modify the response file, review the *Series 3000 Application Programming Manual* and the *Series 3800 System Software Reference Manual* for information about the modules used and the User Configuration Tool.

The information in the response file tells the User Configuration Tool how to create the hex file. Each line in the response file instructs the User Configuration Tool to perform a specific operation.

When VT220 is installed as described in Chapter 2, a standard version of the response file (STVP-HEX.RSP) is copied from the installation diskette. It is recommended to save the custom response file under a different name than the standard file so that you can troubleshoot problems by comparing the custom file to the standard file.

It is also recommended to save a custom hex file under a different name than the standard SVTPS3.HEX. To rename the file, change the last line of the response file to reflect the new hex file name. For example, to save the hex file as RECEIVE.HEX, the last line would be as follows:

```
/h /256 /320 /co receive.hex
```

The standard SVTP-HEX.RSP file includes the following:

```
nullsys.hex

/s command.com
/c svtp.sys
/a autosvtp.bat

/r sl_rom.exe
/r init.exe

/rs scan3000.exe
/rs utl.exe
/rs srcp.exe
/rs svtp.exe

/u 3135v100.kbd
```



```
/u 3137v220.kbd
/u 3335v100.kbd
/u 3335v220.kbd
/u 3356v100.kbd
/u 3356v220.kbd
/u 3395v100.kbd
/u 3835v100.kbd
/u 3835v220.kbd
/u 3846v100.kbd
/u 3846v220.kbd
/u 3954v100.kbd
/u dec_map.fnt

/u kbd3000.exe
/u err3000.sys
/u eta3000.sys
/u tdrem.exe
/u tsrreg.exe
/u slp.sys
/u sl.bin
/u scan.exe
/u modinit.exe
/u symbsvtp.bat
/u svtp.ini
/u func.def
/u auth.def
/u svtp.men
/u svtpcfg.men
/u svtpcfg2.men
/u keyclk.men
/u setradio.men
/u svtp.cfg
/u ckterm.exe
/u testtone.exe
/u testled.exe
/u srcp.cfg
/u helpb108.exe

/l 62291-2.70-00
```

---

```
/h /256 /320 /co svtps3.hex
```

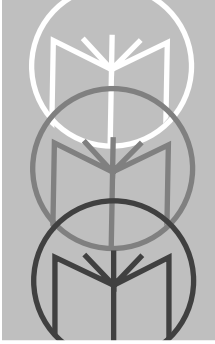
The switches used in SVTP-HEX.RSP are described in Table E-2.

**Table E-2. Switches in the SVTP-HEX.RSP response file**

Switch	Description
/256	Use up to 256K or NVM (same as /j). This switch is required to use more than 128K of NVM.
/a	Loads the specified file in the terminal's NVM as AUTOEXEC.BAT.
/c	Loads the specified file in the terminal's NVM as CONFIG.SYS.
/h	Produces a hex image file with the specified filename.
/j	Use up to 256K or NVM (same as /256). This switch is required to use more than 128K of NVM.
/l	Specifies the program label for the hex image file. Typically includes a part number and version number. Label format is: #####-CCCCCCC or #####/CCCCCCC where ##### is a five-digit part number and CCCCCC is up to seven characters specifying the version.
/r	Loads the specified file as a resident code file. You can specify multiple files, but each file must be on its own line beginning with the /r switch.
/rs	Loads the specified file as a split resident code file. You can specify multiple files, but each file must be on its own line beginning with the /rs switch.
/s	Loads the specified file as the command shell (usually COMMAND.COM).
/u	Loads the specified file as a user file. You can specify multiple files, but each file must be on its own line beginning with the /u switch.

See the *Series 3000 Application Programming Manual* for additional information about switches.





## Glossary

---

- AUTOSVTP.BAT** File included in the VT220 hex file and downloaded to a terminal as the terminal's AUTOEXEC.BAT file.
- base transceiver** A symbol device which has two-way communication with one or more portable terminals using RF technology.
- baud** In data communications, the rate at which data is transferred in bits per second, such as 9600 baud or 38,400 baud.
- Data consists of characters (bytes) that are either 7 bits or 8 bits long, and a start bit and stop bit are frequently added during communications to mark the beginning and end of each data byte. For communication of 8-bit data with one start bit and one stop bit, there are 10 bits of data sent for each byte of data. At 9600 baud, this would result in the transfer of 960 data bytes per second.
- See also* **data bits, flow control, parity, start bit, stop bit.**
- block mode** *See* **trans mode.**
- BL Timeout** Configuration parameter which specifies the number of seconds the keyboard must be idle before the display back light turns off.
- character mode** *See* **trans mode.**



**character sets** The VT220 terminal has two character sets (C0 and C1) active at any one time, with C0 mapped to the lower 128 bytes in the 256 byte active character table and C1 mapped to the upper 128 bytes. There are also four graphic character sets (G0, G1, G2, and G3) that are stored internally and subsequently loaded with Designate Hard Character Set (DHCS) commands.

A terminal running in VT220 mode can utilize both the C0 (lower) and C1 (upper) character sets and all four graphic character sets (G0-G3). A terminal running in VT100 or VT52 mode can only access the C0 character set and the G1 and G2 graphic character sets. Because of this limitation, terminals running in VT100 and VT52 mode cannot directly utilize control characters in the C1 character set that are available for VT220 mode. As an alternative, there are Esc commands which can be used in VT100 or VT52 mode to perform the same function as the control characters available to VT220 mode in the C1 character set. *See also* **control characters**.

**cold boot** A reset of a terminal which clears the terminal's RAM. *See also* **warm boot**.

**command mode** A mode available to Symbol terminals which can be used to access specific commands or functions, such as the program loader.

**control characters** Special characters in the C0 and C1 character sets which act like single-character commands that perform designated functions when sent to a terminal. *See also* **character sets**.

**cradle** Symbol device used to recharge batteries for a portable terminal and establish a direct communications link to the Spectrum One network and host computer. A terminal is placed in a slot in the cradle for charging and communications. Cradles can have one or four slots.



- data bits** In data communications, the number of bits in each byte of data (either 7 or 8). Each byte of data is a series of 1's and 0's which represents a single character (such as 01000001 for an 8-bit character). *See also* **baud, flow control, parity, start bit, stop bit**.
- DEC** Digital Equipment Corporation, developer of a VT220 terminal operating mode and command set which is emulated by the Symbol VT220 Terminal Emulation Program.
- flow control** In data communications, a method of controlling the transfer of data. In XON/XOFF flow control, for example, the receiver sends an XOFF character to instruct the sender to stop sending data. When the receiver is ready to resume, it sends an XON character to instruct the sender to start sending data again. XON/XOFF and no flow control are the most common settings used.  
*See also* **baud, data bits, parity, start bit, stop bit**.
- hex file** A file which uses hexadecimal characters, which are designated by a base 16 numbering system that uses a combination of digits and letters. The hex numbering system is frequently used in computer environments because it provides a convenient means of transitioning between decimal and binary numbering system values.  
For purposes of this guide, a hex file usually refers to a file which can be downloaded to a Symbol terminal. The VT220 hex file (either the standard file SVTPS3.HEX or a customized file) includes programs, batch files, and configuration information needed to run VT220 terminal emulation on a terminal.
- host application** A program or collection of programs that resides on a host computer, receives data from Symbol terminals, and sends prompts, messages, data, or programs to the terminals.



- host computer** A computer which can be connected to Symbol terminals through a Spectrum One network and which stores data and/or applications which can be accessed by the terminals.
- KB timeout** Configuration parameter which specifies the number of seconds the keyboard must be idle before the terminal automatically powers down.
- letter case** Configuration parameter which specifies the case of alpha characters (a-z) sent to the host (upper, lower, or unchanged). When set to unchanged, characters are sent in the case (upper or lower) they are entered.
- local echo** Configuration parameter which specifies whether characters typed on the terminal are displayed on the terminal's display.
- NCS** Network Control Software, Symbol software which resides on a host computer and manages a Spectrum One network. A Spectrum One network using NCS does not need a separate device such as an NCU to connect the Spectrum One network to the host.
- NCU** Network Control Unit, a separate computer which runs software to manage a Spectrum One network and connects the Spectrum One network to a host computer. *See also* **NCS**.
- NVM** Nonvolatile memory, which is memory that retains any stored data and programs when unit power is turned off, as opposed to standard RAM, which is cleared when unit power is turned off. NVM on Symbol terminals is used to store programs (such as the VT220 Terminal Emulation Program) and data.
- panning** Keyboard commands from the terminal operator to reposition the physical screen on the virtual screen. *See also* **physical screen**.

**parity** In data communications, a method used to verify correct transmission of 7-bit data. If a communication session is transferring 7-bit instead of 8-bit data, an eighth bit can be sent as a “parity bit.” This bit is used to indicate whether there are an even number of 1’s in the byte of data or an odd number. If there is an even number of 1’s in the data byte and the parity bit indicates there is an odd number, then the receiver knows that the data byte was not received correctly and can ask the sender to retransmit the data.

For even parity, a 0 parity bit indicates an even number of 1’s and 1 indicates an odd number. For odd parity, a 0 parity bit indicates an odd number of 1’s and 1 indicates an even number.

For 8-bit data, the eighth bit is used for the data itself and cannot be used as a parity bit, so parity for 8-bit data is always set to none or no parity.

See also **baud, data bits, flow control, start bit, stop bit.**

**PC** An IBM-compatible personal computer. The VT220 Terminal Emulation Program is installed on a PC.

**physical screen** When a Symbol terminal uses VT220 emulation to access a host application, data for the full VT220 screen (80 x 24 or 132 x 24) is available to the terminal, but only a portion (usually 8 x 20) can be displayed on the terminal’s smaller screen. The terminal’s physical screen therefore acts as a “window” which can move around a virtual screen maintained by the VT220 emulation program. *See also* **panning, scrolling region.**

The size of the virtual screen (80 x 24 or 132 x 24) is controlled with the Set Mode and Reset Mode commands. The position of the physical screen display in the virtual screen is controlled with cursor movement and panning commands.

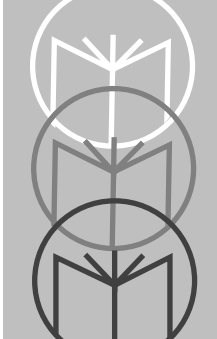


- port** A physical interface on a device used to connect it to another device. On a computer, serial ports (such as COM1 and COM2) are used to connect to Symbol devices on a Spectrum One network.
- radio terminal** *See* **terminal**.
- RAM** Random access memory. *See* **NVM**.
- response file** The file that determines are included in the hex file. The response file is processed by the User Configuration Tool to create the hex file. The standard version of the response file is STVP-HEX.RSP.
- RF** Radio frequency. For purposes of this guide, RF usually refers to a device (RF terminal) or technology (RF communications) that utilizes radio frequencies to transfer information.
- RF timeout** Configuration parameter which specifies the maximum number of seconds that no response is received after the terminal transmits to the transceiver. If the specified timeout period elapses without response, the terminal user is prompted whether to continue.
- scan ahead** Configuration parameter which specifies whether the host is allowed to control the use of the scanner to scan ahead.
- scan term** Configuration parameter which sets the key sequence appended to the end of scanned data.
- screen lock** Configuration parameter which specifies whether the terminal display position is locked in the upper left corner of the VT220 screen area.
- scrolling region** A set of rows on the physical screen where text from the virtual screen is displayed. By default, the scrolling region is defined as rows 1-8, but the scrolling region could be defined as only some of the rows on the physical display. For example, rows 3-6 could be defined as the scrolling region, thereby allowing rows 1-2 to display a static header and rows 7-8 to display a static footer. *See also* **physical screen**.

- sendhex** A program used to download a hex file (such as the VT220 hex file) to a Symbol terminal.
- Spectrum One** The Symbol network that links Symbol terminals with one or more host computers using RF communications. A Spectrum One network can be configured in a variety of ways with components such as base transceivers, cradles, and an NCU.
- start bit** In data communications, a signal that can be added during communications to mark the beginning of each data byte. *See also* **baud, data bit, flow control, parity, stop bit**.
- stop bit** In data communications, a signal that can be added during communications to mark the end of each data byte. *See also* **baud, data bit, flow control, parity, start bit**.
- SVTP.CFG** VT220 configuration file which specifies operating parameters used when a terminal runs VT220 emulation. Operating parameters can also be set using the Set Options screens on the terminal. Specifying parameters in the SVTP.CFG file, however, allows the desired parameters to be selected automatically without using the Set Options screens.
- STVP-HEX.RSP** *See* **response file**.
- SVTPS3.HEX** The standard VT220 hex file. *See* **hex file**.
- symbology** Configuration parameter which specifies whether a character indicating the symbology type is added at the beginning of data from scanned barcodes.
- terminal** In purposes of this guide, a terminal refers to a Symbol Series 3000 radio terminal which can run the VT220 Terminal Emulation Program.
- text wrapping** *See* **wraparound mode**.
- transceiver** *See* **base transceiver**.



- trans mode** Configuration parameter which specifies whether data is sent to the host in block mode or character mode.
- Block mode saves all typed characters in a buffer until the operator presses **Enter**. Character mode transmits each character to the host as soon as it is entered into the terminal.
- Unix** A multitasking operating system used for a variety of computers and workstations.
- User Configuration Tool** Symbol utility USRCFG.EXE used to process the response file and create the VT220 hex file.
- virtual screen** *See* **physical screen**.
- VT220 Terminal Emulation Program** A video terminal (VT) emulator for Symbol Series 3000 radio terminals operating over a Spectrum One network. The VT220 Terminal Emulation Program allows a Series 3000 terminal to connect to a host computer and behave like a VT220 terminal so that it can interact with VT220-compatible applications on the host. The VT220 program also allows a Symbol terminal to emulate a VT100 or VT52 terminal.
- warm boot** A reset of a terminal which saves any data or programs in the terminal's RAM. *See also* **cold boot**.
- wraparound mode** An operating mode which (when on) allows a character that is positioned beyond the size of the terminal's virtual screen to automatically wrap to the beginning of the next line.
- Wraparound mode is controlled by using the Set Mode and Reset Mode commands.



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