

**VIRTUAL TERMINALS<sup>TM</sup> USER'S MANUAL**

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## INTRODUCTION

Virtual Terminals (VT) is a powerful enhancement to the standard multitasking capability of Multiuser Concurrent DOS (MC-DOS) allowing 8- and 16-bit users to enjoy the advantage of concurrency in a secure multiuser environment. With Virtual Terminals, up to four (4) different programs can share the screen and keyboard of a properly equipped serial terminal. The user can pick which program is currently attached to the actual screen and keyboard, and can switch instantly from program to program simply by pressing specially programmed function keys.

Before Virtual Terminals, much of your computer's potential power was wasted. Consider this typical scenario: You are running a general ledger package and printing out a report that takes an hour. All other terminals on your system are busy. The phone rings, and a client requests critical information that you could easily retrieve from your database file... if only you were not in the middle of your general ledger report. Your options are: call your customer back in an hour; bump some other user off of the system; abort the general ledger program and invoke your database manager, find the information, exit from the database manager, reload your general ledger package, and start your report again from the beginning. None of these alternatives is satisfactory.

With Virtual Terminals, you simply hit a key to switch to a different Virtual Terminal screen, invoke your database manager (which may already be loaded, ready to go), ask for the required information, and perhaps hit another key to switch instantly to a client billing program that is already loaded and waiting for input. All this could be going on while the general ledger package continues to grind away uninterrupted in the background.

By eliminating the distracting and time consuming process of repeatedly loading and unloading programs, Virtual Terminal software maximizes your productivity and accuracy and minimizes your frustration. Your computer will become less like an adversary and more like a wonderfully powerful tool.

Virtual Terminals can be used with any 8- or 16-bit program compatible with CP/M 2.2, CP/M-86, MP/M II, MP/M-86 or MC-DOS. Terminals supported include the TeleVideo 925 and 950, the GCS-80, the Freedom 200, the Qume QVT 108, or any multi-page terminal that emulates the TeleVideo 950. You can even mix different types of terminals on one system.

## USER'S GUIDE TO THIS MANUAL

This manual is divided into three sections:

1. **Installing VT**
2. **Using VT**
3. **The KEYS Program**

The system manager should become familiar with all three sections. Users need only read **Sections 2 and 3.**

### Conventions

Gifford Computer Systems has written this manual to conform to certain stylistic conventions for your reading convenience. They are as follows:

- 1) System prompts and any messages that appear on your screen appear in **boldface** lettering, e.g. **OA>**.
- 2) The status of any toggle switch is in UPPER CASE lettering, e.g. "The Status Line is **OFF**."
- 3) System commands are in UPPER CASE lettering and are preceded by a system prompt, e.g. **OA>VITYS**.
- 4) Single keystroke commands are encased in parentheses, e.g. (A).
- 5) File names and file types are in UPPER CASE lettering, e.g. **VITYS.SAM**.
- 6) References to any other sections of this manual are in **boldface** lettering, e.g. "Refer to **page 12**."
- 7) References to any other manuals are in UPPER CASE lettering and underlined, e.g. "Refer to the MULTIUSER CONCURRENT DOS USER'S MANUAL."
- 8) When a caret (^) appears before a character, press the Control key while typing that character. Thus, ^C means to press the CTRL and C keys simultaneously.
- 9) A question mark (?) in a file name is a "wildcard" character for which a specific numeral must actually be substituted.

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## SECTION ONE: INSTALLING VIRTUAL TERMINALS

### INTRODUCTION TO SECTION 1

**SECTION 1** provides essential information on Virtual Terminals (VT) memory requirements and procedures for installing your VT software. This section also provides a brief explanation of the operation of VT and of the KEYS program and instructions for customizing your PASSWD file. We urge you to be patient and follow the instructions carefully, so that your VT software is customized precisely to accommodate your particular terminal and application needs.

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## SECTION ONE: INSTALLING VIRTUAL TERMINALS

### 1.1 REQUIREMENTS

#### System Requirements

In order to run Virtual Terminals (VT), you must have the Gifford Multiuser Concurrent DOS operating system, and hardware that supports MC-DOS.

#### System Memory Requirements

Any program that is run on a Virtual Terminal requires the same amount of memory as it would if it were run on a standard terminal. For example, a single physical VT terminal equipped with four (4) pages of RAM and running four 8-bit programs concurrently would require 256K of RAM, the same amount of system memory as would be required by four standard terminals running those same programs.

#### Terminal Requirements

For a terminal to support Virtual Terminals, it must be able to use extra pages of screen memory, and must have supplementary RAM installed in the terminal itself. Terminals that can be adapted include the Freedom 200, the TeleVideo 925 and TeleVideo 950, the Qume QVT 108, and the GCS-80. The number of screens that can be attached to each terminal corresponds in most cases to the number of pages of memory that each terminal supports. For terminals currently supported by VT, the maximum number of pages is listed below:

<u>Terminal</u>	<u>Maximum # of pages</u>
Freedom 200	4
TeleVideo 950	4
TeleVideo 925	2
Qume QVT-108	2
GCS-80	4*

VT compatible terminals can be mixed together on the same system with standard, single page terminals. Also, different types of VT compatible terminals can be combined on the same system.

\* The GCS-80 can support up to 5 pages of display RAM, but Virtual Terminals only supports 4 of these pages of display memory.

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### MULTIUSER CONCURRENT DOS SYSTEM DISK

Your master system diskette, labelled MULTIUSER CONCURRENT DOS SYSTEM DISK, includes the following files:

<u>File name</u>	<u>Description</u>
CCPMINIT.COMD	Automatically reads the VTTY5 file at system startup, so that MC-DOS knows how you have configured your Virtual Terminals.
VCMODE.COMD	Specifies how MC-DOS treats screen output from background Virtual Terminals.
VTTY5.SAM	Sample terminal initialization file
KEYS.COMD	Utility for programming special function keys
VTGCS80.KEY	Sample function key template for GCS-80 terminal
VT950.KEY	Sample function key template for TeleVideo 950 or Freedom 200 terminals

All of your other MC-DOS system files have been programmed to run in conjunction with Virtual Terminals software.

If Gifford Computer Systems has installed your Virtual Terminals program for you, your system diskettes will have on them XIOS files appropriate for your system configuration.

### MULTIUSER CONCURRENT DOS XIOS DISK

This disk contains the XIOS (extended input/output system) file options that are available to you, should you decide to reconfigure your system. If you decide to increase the number of physical or virtual terminals that your system supports, and either of the new values is greater than your current XIOS specifies, you must use the GENCCPM command to reconfigure MC-DOS with an XIOS of larger capacity. The instructions for selecting an alternate XIOS file to accommodate any changes to your system configuration are documented in the manual entitled CUSTOMIZING YOUR MULTIUSER CONCURRENT DOS SYSTEM.

## **SECTION ONE: INSTALLING VIRTUAL TERMINALS**

### **1.2 INSTALLATION OVERVIEW**

The label of your MC-DOS master floppy diskette has the title **MULTIUSER CONCURRENT DOS SYSTEM DISK**. If you want to change your system configuration, choose a new XIOS file from the **MULTIUSER CONCURRENT DOS XIOS FILES** diskette to accommodate your new system configuration. You must use the **VTTY.SAM** file that is provided on your disk labelled **MULTIUSER CONCURRENT DOS SYSTEM DISK** to create a file called **VTTY.S**. An additional program, **KEYS.COM**, has been included on your master diskette for running Virtual Terminals.

#### **VTTY.S**

The **VTTY.S** file is an ASCII file, much like the **TTY.S** file, that tells the VT kernel what terminals on your system can support VT and describes some technical characteristics of these terminals. A sample file, **VTTY.SAM**, is included on your master system diskette. You can change this file with a text editor like WordStar so that reconfiguring your system is easy, but you cannot add more Virtual Terminal screens than are allowed by the XIOS on your diskette label. If you want to add more screens than the existing XIOS supports, you must choose a new XIOS and PIP it onto your master disk.

#### **KEYS.COM**

The **KEYS** program allows you to program TeleVideo 950, Freedom 200, and GCS-80 function keys by creating template files which contain the character sequences that you wish each function key to send. These template files can be easily created and modified by an editor such as WordStar, and you can create large libraries of templates.

#### **Disabling Virtual Terminals**

If for any reason you want to disable the virtual terminals capability on your terminal, this can be done by entering a one (1) in field number 7 of your **VTTY.S** file. After you do this, you must reboot your system in order to disable virtual terminals.

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### How Many Terminals are Supported by Your XIOS?

The label of your system master diskette, marked MULTIUSER CONCURRENT DOS SYSTEM DISK, tells you how many physical terminals and virtual terminals your installed system can support. The number of physical terminals that can be supported is indicated by the third and fourth digits of the XIOS name that is printed on your master diskette label. The number of virtual terminals that can be supported is indicated by the fifth and sixth digits of the XIOS name. This is illustrated in the sample below:

```
XIOS Type   : X1070702
              ^^^^
Physical terminals supported = 07
Extra VT screens supported   = 07
```

The example above indicates that this system supports a maximum of seven physical terminals and seven extra virtual terminal screens. Two things should be noted here. First, you do not actually need seven physical terminals connected to your system, nor do you even need enough serial ports to support that many terminals, for the number embedded in your XIOS name to be valid. Secondly, it is possible to select another XIOS from your diskette labelled MULTIUSER CONCURRENT DOS XIOS DISK. This is explained in the document CUSTOMIZING YOUR MULTIUSER CONCURRENT DOS SYSTEM. The technique that is described here will apply to any XIOS that you install.

### Counting the Number of Additional VT Screens

If you are using a TeleVideo 950, Freedom 200, or GCS-80 terminal, the maximum number of Virtual Terminals that each terminal can support is four (4), so the number of additional screens per terminal will vary, at your discretion, between one (1) and three (3). If you are using a TeleVideo 925 or a Qume QVT 108 terminal, the maximum number of Virtual Terminals that each terminal can support is two (2), so the maximum number of additional screens per terminal is one (1).

To count the number of additional VT screens on your system, construct a table like the one on the next page, listing the terminals on your system and the number of pages of screen memory actually installed in each terminal and intended for use with VT.

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Table 1: Sample Terminal Configuration

Terminal Number/Type (number from TTYS file)	Total Screen Pages	Additional VT Screens
0: TeleVideo 950	4	3
1: TeleVideo 925	2	1
2: Adds Viewpoint	1	0
3: Qume QVT-104	1	0
4: Freedom 200*	4	2
		<hr/>
	Additional VT screens:	6

\*In this example, only two of the Freedom 200's four pages of screen memory have been designated for use with VT.

In the above example, the total number of additional VT screens is 6. This means that your XIOS must have at least a six in the "additional VT screens" field of its name. The best XIOS to select from your XIOS disk would have a "7" in this field, since you can either have 7 or 15, and 15 would be larger than you need, wasting space in RAM. Note that it is possible to mix terminals that support extra pages of internal RAM with ones that do not, and that it is not necessary to use all installed terminal RAM as extra VT screens. A modem is counted as a terminal, and if you attach a modem to a system that supports Virtual Terminals for that modem, someone who logs onto your system via that modem will be able to use Virtual Terminals, if the physical terminal from which they are calling your modem matches the terminal described in your VTTYS file.

The last two digits in a XIOS name show the number of list devices (printers and plotters) in your system. Unless the number in the XIOS that you select matches the total number of printers and plotters attached to your system, you will either waste space in RAM (if the XIOS number is larger) or you will only be able to use the printers or plotters whose device numbers in the LPRS file are smaller than the number of printers specified in the XIOS that you selected.

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### 1.3 THE VTTY5 FILE

The initialization and customization of your VT program is specified in the VTTY5 file. The VTTY5 file contains a series of lines, each of which describes one physical terminal intended for use as Virtual Terminals. Every physical terminal with additional screens must have an entry in the VTTY5 file in order to be supported by VT. If the terminal does not have an entry in the VTTY5 file, that terminal will be treated as a standard, single page terminal. The VTTY5 file is automatically read by the CCPMINIT program during the boot sequence, and must reside on user area 0 of drive A: in order for VT to operate.

#### Special Codes for the VTTY5 File

The VTTY5 file is an ASCII file that can be created with the WordStar text editor in non-document mode. Since many of the fields in the VTTY5 file require the ESCAPE character (Hex 1B) and/or certain control characters, the VTTY5 file supports a special coding convention by which non-printing characters may be entered and easily recognized by the user. The VTTY5 file also supports codes for useful functions such as screen identification.

VT interprets a slash (/) in the VTTY5 file as the beginning of a special code sequence that indicates that the following character represents either a non-printing character or a special function. The list below describes these special code sequences.

/ Indicates the beginning of a special code sequence.

// Represents an ASCII slash character in the VTTY5 file.

/: Enables you to enter a colon in the VTTY5 file without initiating another field.

/D Causes a one (1) tick delay (1/60th of a second). This will cause a 1/60th of a second delay if VT encounters it as part of a command string in fields 9, 10, 11, 12, 13, 14, or 15. This is important because some terminals need a delay between the time that they receive a command string and the time that they switch screens. If the terminal needs more than 1/60th of a second, embed more than one /D in the field.

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- `/E` Represents an ESCAPE (1BH) in the VTTYS.
- `/V` Represents an ASCII equivalent of the relative VT terminal number, starting at 0. This will always be a number between 0 and 3. This can be useful in field 10 of the VTTYS file to switch to a specific VT screen.
- `/v` Represents an ASCII equivalent of the relative VT terminal number + 1. This will always be a number between 1 and 4. This can be useful in field 15 of the VTTYS file to cause the status line to display the current VT screen. This option is provided because some users can become confused when the first VT screen is numbered 0 instead of 1.
- `/N` Sends a line feed (0AH).
- `/O` Sends a null character (0H), for a much briefer delay than `/D`.
- `/O/O` Automatically updates the status line each time that you switch to a new virtual terminal screen.
- `/^` Followed by any character converts that character to a control character. Thus, `/^K` would be interpreted as **Control K** (^K).
- `/R` Sends a carriage return (0DH).
- `/C` Indicates the logical terminal number which MC-DOS assigns to the current screen, i.e., the number which MC-DOS would return if you typed `CONSOLE` from the current screen. Should be a decimal number between 0 and 32. Every VT screen on the system has a unique logical terminal number.
- `/P` Indicates the physical terminal number as indicated in the VTTYS file. Usually between 0 and 6. MC-DOS assigns every VT screen of the same physical terminal shares this number.
- `/L` Displays the current leadin character that you have established.
- `/n` Displays the current foreground terminal program name (without the file type) in the right-hand corner of your status line.



- /p#** A slash p, followed by a relative virtual terminals number, will display on the status line, the name of the program that is running on each of your virtual terminals.
- /e** Displays on the status line, the ^P symbol, if the MC-DOS control character ^P printer toggle is ON.
- /l** Displays on the status line, the number of the printer or plotter to which you are connected.
- /s** Displays on the status line the ^S symbol, which represents the characters used to stop the scrolling of a screen.
- /o** Displays on the status line the ^O symbol, which is the toggle used to "flush", or throw away, the characters that are output to background screens. The FLUSH option of the VCMODE program does **not** cause this symbol to be displayed.
- /m** There are three arguments that can be used in conjunction with this VTTY5 code to display the background screen output: "bufd," "dynam," and "flsh," respectively corresponding to the BUFFERED, DYNAMIC, and FLUSH options of the VCMODE program. The VCMODE program allows you to dynamically select the way that characters are output from programs running on background virtual terminals. The effect of each of these three arguments is discussed in detail in **Section 1.5**.

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### The 16 VTTYs Fields

The VTTYs file is made up of sixteen (16) fields that are separated by colons. A description of these fields and their functions follows:

- 1) Indicates the physical terminal number as it appears in the first field of the corresponding line of the TTYs file. This field allows you to identify to VT, the physical terminal that you are describing. If you move the physical terminal that you are describing to another I/O port on your system, this number will change and you must modify this field accordingly.
- 2) Reserved for future use (RFU) by Gifford Computer Systems.
- 3) RFU.
- 4) RFU.
- 5) RFU.
- 6) Specifies the number of pages of memory available in your terminal. The kinds of terminals compatible with VT and the number of pages that they support is documented on page 2 of this manual. This field should contain a 2 for a TeleVideo 925, a 4 in the case of a TeleVideo 950 or Freedom 200, and a 5 for a GCS-80.

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

- 7) Specifies the number of actual VTs that you want running on a specific terminal. For example, you can have four (4) pages of memory and support only two (2) Virtual Terminals. This field can take on values between one (1) and four (4). If you enter a one (1) in this field, your terminal will not be affected by VT software. Any number that you enter that is higher than one (1) will give you that same number of screens for your terminal plus all of the other VT capabilities. The total number of system screens, combining both standard and VT screens, may be less than, but must not exceed the number for which the system was installed during the GENCCPM procedure. If more VT screens are requested than the system can accommodate, they will be ignored.
- 8) Contains your "leadin" character. The VT software looks for the leadin character to indicate that the subsequent character will be a command to change screens. You can select any leadin character that you wish. If you leave this field blank your leadin character will be a Control hyphen or Control underscore (Hex 1F). For TeleVideo 925s, the leadin character should be a Control A (Hex 1), since the special function keys of the 925 always send a Control A as their first character. This would be entered in this field as: /<sup>^</sup>A.
- 9) Contains the initialization sequence that is sent to the terminal when the system is first booted. This field can get fairly complex, and it is recommended that you study this manual's sample VTTY5 entry for your specific terminal. If this field is left blank, no terminal initialization will take place.

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- 10) Contains the character sequence required by your terminal to switch directly to a specified screen. If your terminal has the capability of switching directly to a specified screen, as does a GCS-80, then this field should be filled, and fields 11 and 12 should be left blank. If your terminal is unable to switch directly to a specified screen, but can only go up or down one screen at a time, this field must be left blank. In the case of the Freedom 200 and the TeleVideo 925 and 950, this field must be left blank.
- 11) Contains the character sequence required by your terminal to cause an upward screen switch. For example, VT would use these characters to tell the terminal to switch upward from screen #2 to screen #3. For terminals which support direct screen switching and so have an entry in field 10, as in the case of the GCS-80, this field should be left blank. For the Freedom 200 and the TeleVideo 925 and 950, this field should have an ESCAPE K, which would be entered in this field as `/EK`. If you have a `/0/0` embedded in this field, preceded by `/EK`, your status line will automatically reflect each time that you switch to a new virtual terminal screen.
- 12) Contains the character sequence required by your terminal to cause a downward screen switch. For example, VT would use these characters to tell the terminal to switch downward from screen #2 to screen #1. For terminals that support direct screen switching and so have an entry in field 10, as in the case of the GCS-80, this field should be left blank. For the Freedom 200 and the TeleVideo 925 and 950, this field should have an ESCAPE J, which would be entered in this field as `/EJ`. If you have a `/0/0` embedded in this field, preceded by `/EJ`, your status line will automatically reflect each time that you switch to a new virtual terminal screen.

**Note:** If an entry is made only in field 11 or only in field 12, VT assumes that the terminal's screen switching software will roll over, that is, in the upward direction go from screen 4 around to screen 0, or in the downward direction go from screen 0 around to screen 4. If your terminal supports both upward and downward screen switching, make the proper entries in both fields so that VT executes your screen switch as efficiently as possible.

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- 13) Contains the sequence of characters required by your terminal to turn ON the Status Line. This field should also contain the sequence of characters required to load text into the Status Line. For the Freedom 200, the GCS-80, and the TeleVideo 925 and 950, this field should have an ESCAPE g ESCAPE f ESCAPE G 4, which would be entered in this field as `/Bg/Bf/BG4`.
- 14) Contains the sequence of characters needed to turn OFF the Status Line. For the Freedom 200, the GCS-80, and the TeleVideo 925 and 950, this field should have a carriage return which would be entered in this field as `/R`.
- 15) Describes the Status Line display. Whatever text that you want entered into the Status Line should be in this field.
- 16) Comment field.

### Examples of Virtual Terminals Command Strings

The sample lines on the following pages can be used as a model to help you understand how the VTTY5 file and its special codes work and to give you a head start in creating your own VTTY5 file. Each entry is explained in some detail in order to give you an idea of how to use the special codes in the VTTY5 file. The three sample lines analyzed below are contained on your master system diskette on a file called VTTY5.SAM. It is recommended that you borrow these lines intact for the initial creation of your VTTY5 file, using one line for each VT terminal on your system, in each case selecting the line that matches your terminal, and modifying only field 1, which must correspond to the logical terminal number of each terminal as indicated in the corresponding entry of your TTY5 file. The first sample command string is for a TeleVideo 950 or Freedom 200 terminal. The second sample is for a TeleVideo 925 and the third is for a GCS-80. Do not use a carriage return to break up lines that contain more than 80 characters— WordStar in non-document mode will allow you to enter lines of any length.



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- 13 This field entry enables the Status Line to be turned ON; enables the Load Status Line; and enables the Status Line to be displayed in reverse video.
- 14 This field entry disables the Load Status Line.
- 15 The status line for this terminal will display the current process being run on each of the four virtual terminals, the current printer number, the ^P connection to the printer toggle, the ^S stop scrolling toggle, and the ^O throw away background character output toggle.
- 16 This comment field reads "TeleVideo 950 with 4 pages."





## SECTION ONE: INSTALLING VIRTUAL TERMINALS

- 13 This field entry enables the Status Line to be turned ON; enables the Load Status Line; enables the Status Line to be displayed in reverse video.
- 14 This field entry disables the Load Status Line.
- 15 The status line for this terminal will display the current process being run on each of the four virtual terminals, and will display a vertical bar between each of the processes, the letters "printer =" followed by the current printer number, and "Virtual Terminal" followed by the number of the virtual terminal in ASCII.
- 16 This comment field reads "TeleVideo 925 with 2 pages."



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- 13 This field entry enables the Status Line to be turned ON; enables the user to load the Status Line with text; enables the Status Line to be displayed in reverse video.
- 14 This field entry disables the Status Line.
- 15 The status line for this terminal will display the current process being run on each of the four virtual terminals, the name of the current foreground program being run, the letters "flsh" will be displayed indicating that the background character output is being thrown away.
- 16 This comment field reads: "GCS-80 with 5 pages."

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

### 1.4 HOW TO USE VIRTUAL TERMINALS

#### Direct Operation of VT Functions

The VT kernel modifies your MC-DOS operating system so that certain character sequences are intercepted before they are passed through to an application program. These character sequences are introduced by the leadin character that you defined in field 8 of your VTTY5 file. The leadin character tells the system that the subsequent character is an instruction to switch VT screens. Virtual Terminals supports the ability to switch directly to a specific VT screen.

After you have established your leadin character in field 8 of the VTTY5 file, your options are as follows:

Command Sequence	Function
1) leadin 0	switches to first VT screen.
leadin 1	switches to second VT screen.
leadin 2	switches to third VT screen.
leadin 3	switches to fourth VT screen.
leadin @(RETURN)	same as leadin 0.
leadin A(RETURN)	same as leadin 1.
leadin B(RETURN)	same as leadin 2.
leadin C(RETURN)	same as leadin 3.
(RETURN=carriage return)	

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

Thus, if your leading character is a Control Underscore (^\_), you could switch directly to the third VT screen by typing:

```
^_ 3
```

If your application program uses control underscore for some dedicated purpose, you should change your leadin character to something that is not otherwise used.

The leadin @, A, B, and C options are provided because the TeleVideo 925 has fixed function keys rather than programmable ones. Function key F1 on a TeleVideo 925 sends a ^A @ (RETURN), F2 sends a ^A A (RETURN), F3 sends a ^A B (RETURN), and F4 sends a ^A C (RETURN). If you wish to use the function keys on a TeleVideo 925 to switch VT screens, you must establish a Control A in your VTTY5 file as your leadin character, but you must be aware that any time that you enter a Control A followed by an upper case A and a carriage return, you will switch to the first VT screen.

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

### 1.5 VCMODE

The VCMODE program allows you to dynamically change certain background operating characteristics of your VT terminals. There are five arguments available with the VCMODE program. They are:

VCMODE BUFFERED  
VCMODE SIZE=N  
VCMODE DYNAMIC  
VCMODE FLUSH  
VCMODE HELP

If you invoke VCMODE without an argument, as in:

```
QA>VCMODE
```

your screen will tell you the background mode for your current virtual terminal. If the background mode is set to BUFFERED, the program will tell you the maximum file size:

```
Background Mode for Virtual Terminal 0 is buffered  
Maximum file size = 10K
```

The HELP option of VCMODE allows you to extract information about the VCMODE program itself, including all of VCMODE's primary command arguments. If you type:

```
QA>VCMODE HELP
```

the terminal will display a general description of the VCMODE command.

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

The VCMODE program allows you to dynamically select the way that VT will handle characters that are output to background screens, i.e., screens which you are not currently monitoring. VCMODE outputs characters to background screens in three different modes.

The BUFFERED mode saves the first n kilobytes (n times 1024 characters) that any application program attempts to output to a background screen and stores those characters in a temporary buffer area of your hard disk. You can specify the maximum size of the disk buffer file with the SIZE=n option of the VCMODE program. You must be in BUFFERED mode to use the SIZE option.

You can cause the current VT screen to operate in BUFFERED mode by typing:

```
QA>VCMODE BUFFERED
```

To set the maximum size of the disk buffer to 15K, type:

```
QA>VCMODE SIZE=15
```

If you invoke a program and then switch your screen to another virtual terminal, up to 15K of background output (in this example) could be sent to the disk buffer. Once this RAM buffer fills up, your background program will pause as soon as it tries to send an additional character to the buffer. When you switch back to a BUFFERED virtual terminal that has sent screen output to the disk, any characters stored in the disk buffer are immediately sent to your screen, and the program resumes execution. The temporary buffer files are automatically erased from the disk after BUFFERED output is displayed to the screen. This is the default output mode of VT, and was created so that background programs whose screen output is critical can run as long as possible without losing characters.

## **SECTION ONE: INSTALLING VIRTUAL TERMINALS**

In some programming and technical applications, however, it is helpful to see output in real time from a background process. The DYNAMIC option allows you to monitor screen output as it is produced by a detached program, without concern that the background process will pause if your disk buffer becomes full. A background virtual terminal in DYNAMIC mode sends character output directly to the screen, rather than to a disk buffer.

You can cause the current VT screen to operate in DYNAMIC mode by typing:

```
0A>VCMODE DYNAMIC
```

### **Background Mode for Virtual Terminal n set to Dynamic with Output**

If you invoke a program from a virtual terminal whose VCMODE status in "DYNAMIC mode with output," the character output will be displayed on screen, even if you switch to another virtual terminal. That is, even though your keyboard and screen are attached to a different foreground virtual terminal, a program running in the background on a DYNAMIC virtual terminal can still write to your physical screen.

VCMODE also provides a FLUSH option to suppress screen output from a background virtual terminal. For example:

```
5C>VCMODE FLUSH
```

### **Background Mode for Virtual Terminal n set to Dynamic with Flushing**

With the FLUSH option, characters sent to the screen by a background process go neither to the screen nor to a disk buffer, but are discarded, and go nowhere. The FLUSH mode prevents a background virtual terminal from sending characters to the screen, even when you bring that virtual terminal back to the foreground. When you return to a virtual terminal that is operating in FLUSH mode, the screen will not display any output, but will only show what was on the screen previously.



## SECTION ONE: INSTALLING VIRTUAL TERMINALS

### 1.6 THE KEYS PROGRAM

It is convenient to use programmable function keys to switch VT screens, since you can then go from screen to screen with a single keystroke. Your master system diskette has a file on it called KEYS.CMD that allows you to program the function keys of a TeleVideo 950, a Freedom 200, or a GCS-80. The KEYS program simply executes a template file that you can create with WordStar in non-document mode. This template file contains a code for each programmable key followed by the character sequence that you wish each key to generate. Since you specify the template file that you want to execute when you run the KEYS program, you can create an unlimited library of templates to match various applications. Since these template files can be created with any editor such as WordStar, they are extremely easy to generate and maintain.

Several template files have been included on your MULTIUSER CONCURRENT DOS SYSTEM diskette that allow you to program function keys for use with the VT program. These templates all have the file type .KEY. For the TeleVideo 950 and Freedom 200 terminals, the VT950.KEY file that is on your master system diskette is written to program function keys one (1) through four (4) to switch directly to the first through fourth VT screens respectively. To program your TeleVideo 950 or Freedom 200 function keys using this template, type:

```
QA>KEYS VT950
```

For the GCS-80 terminal, the VTGCS80.KEY file specifies the top four keys on your 18-key pad, left to right, to switch to VT screens one through four respectively. If you have a GCS-80 terminal, you would program these function keys by typing:

```
QA>KEYS VTGCS80
```

## SECTION ONE: INSTALLING VIRTUAL TERMINALS

Both these .KEY templates use Control underscore (^\_) as the leadin character to switch screens, so if your VTTY5 file specifies a different leadin character, these templates must be modified.

Remember that the programmable function keys on all of the terminals mentioned are volatile, meaning that once power to the terminal is turned OFF, you must run the KEYS program again in order to reprogram your keys. This is an appropriate job for LOGIN.SUB and USERINIT.SUB.

The KEYS program is described in detail in Section 3 of this manual.

### 1.7 WARNINGS

- 1) The WRITE utility now returns a warning if you attempt to send a message to a screen that is not being monitored. If this occurs, run the WHO program which will display that user's current Virtual Terminal screen.
- 2) If your VTTY5 file has been set up to allocate four (4) Virtual Terminal screens to your terminal, make sure that when you are finished using your terminal, you log out of all four screens. If you fail to log out of a background screen, it will be possible for an unauthorized person to enable that screen and gain access to the system.

## SECTION TWO: USING VIRTUAL TERMINALS

### INTRODUCTION TO SECTION 2

This section assumes that your Virtual Terminals program has already been installed by your system manager. It is intended to provide the non-technical user of VT with enough information to take advantage of Virtual Terminals without having to become an expert in its installation and use. Before reading this section, you should read Chapter 1 and Chapter 2 of Gifford's MULTIUSER CONCURRENT DOS USER'S MANUAL.

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## SECTION TWO: USING VIRTUAL TERMINALS

### 2.1 THE VIRTUAL TERMINALS ENVIRONMENT

Virtual Terminals give you the advantage of having more than one terminal available to help with your work without costing you extra money or desk space. To understand how to take advantage of Virtual Terminals, you should imagine that you actually do have several terminals before you. But instead of having multiple keyboards, which would not be of much use since you could only use one at a time, you have instead only what is useful: multiple screens. And though all the screens share the same glass tube, you can switch from one screen to the other instantly as though you were changing channels on a television set. You can start a program running on one screen, switch to another screen to start another program, and so on until you run out of things to do or screens on which to do them. Different screens can even output to different printers, so you could have several programs printing documents or reports simultaneously.

You will find as you grow accustomed to the idea of Virtual Terminals— the idea of multiple screens sharing a single keyboard— that your interaction with the computer will take on a qualitative change. Instead of operating your machine, you will manage it. Instead of hitting some keys and waiting for results, you will orchestrate simultaneous tasks. Things you never tried because there are only so many hours in a day, you will begin to do routinely. You are likely to become more efficient, more productive, and more creative. You are bound to have more fun.

## SECTION TWO: USING VIRTUAL TERMINALS

### 2.2 GETTING STARTED - A PRACTICE RUN

The first thing you must find out about your Virtual Terminals (VT) installation is the number of screens that your terminal supports. Your system manager will have this information. The most screens possible for a single terminal are four, and, generally, the more the better.

#### Logging In

When you first sit down at a terminal running under VT you will notice only a slight difference, if any, between the screen display and a normal screen display. The only difference should be the status line, the 25th line at the bottom of your screen. If your system manager has installed this feature, the status line should have a display saying something like:

#### Virtual Terminal 1

It may contain other information, since this line can be customized, but it should at least tell you the Virtual Terminal screen number, i.e., whether you are currently looking at the first, second, third, or fourth screen of your terminal. When your system first boots, you should be looking at the first VT screen.

Your screen should also display your usual MC-DOS sign-on message along with the login prompt,

#### Name:

You should log in to this screen the same way that you would log in to a standard MC-DOS terminal, giving an account name and a password. You can also run any program that you could normally run, such as WordStar, SuperCalc, or dBASE II. Invoke some program with which you are familiar.

## SECTION TWO: USING VIRTUAL TERMINALS

This is where the real difference begins between VT and standard MC-DOS. Ask your system manager whether the function keys on your terminal have been programmed to switch screens. In the case of a TeleVideo 925 or 950 or a Freedom 200, the F2 key at the top left part of the keyboard could be programmed to cause the terminal to switch to screen # 2. Press F2. (If F2 has not been programmed, press the CTRL and the underscore keys (^\_) simultaneously, then the 2 key.) You should instantly see a fresh screen with the name prompt again. Also, the status line should now say:

### Virtual Terminal 2

Again you must log in, though you can use a different valid account name if you like. You can also run any standard program on this new screen. Invoke a program, and allow it to load. Now press either F1 or control underscore (^\_), followed by a one (1). You should instantly be back looking at your original screen, Virtual Terminal #1.

From the first screen, type:

```
QA>WHO -A
```

You should see displayed both of the accounts which you opened. Notice that an asterisk (\*) appears next to the terminal corresponding to the screen that you are currently monitoring. If other people are using the system, an asterisk will appear beside all of the account names whose screens are currently being monitored.

## SECTION TWO: USING VIRTUAL TERMINALS

### Logging Out - Conserving Memory

Now type:

```
QA>LOGOUT
```

from screen #1. You should be back at the login prompt. Note that everything looks as though the system is back where it was before your session began. But remember there is still a program running in the background on screen #2. Though that program is probably simply waiting for input and so is not slowing down the system, it is nevertheless wasting at least 64K of memory. Which means that somebody on another VT screen may not be able to load a program. When you log out of a Virtual Terminals environment, log out of all VT screens, not just the current one.

You have just been around the track once with Virtual Terminals and you now know about 90% of what is necessary to know about the Virtual Terminals software in order to use it productively. The rest of this section will deal with some of the finer details of Virtual Terminals.

### 2.3 SWITCHING VT SCREENS

#### Using the Leadin Character to Switch Screens

You can cause VT to switch you to any screen by typing what is called the **leadin character** followed by the number of the screen, 0 through 3, which you wish to monitor. The leadin character can be any character you select, though the default character is a Control underscore (^\_), entered by depressing the CTRL and the underscore keys simultaneously. (This obscure character was selected as the default leadin character because outside of VT it is rarely used. If this is your first time with VT, there is a good chance that you have never before typed this character.)

## SECTION TWO: USING VIRTUAL TERMINALS

The commands to switch directly to any screen are listed below:

Virtual Screen	Command Sequence
first	^ 0
second	^ 1
third	^ 2
fourth	^ 3

^ \_ = Control underscore

If you are currently monitoring your first VT screen and you want to look at your third screen, you would enter: (^\_) 2. Note that the number you enter is one less than the number of the Virtual screen, since the screen switch command considers the first screen to be 0.

### Using Programmable Function Keys to Switch Screens

Though it is possible to switch VT screens by using the above technique, it is not convenient. It is much faster and more accurate to use your terminal's special function keys to switch screens. All terminals known to support VT have a number of special function keys which may be used for just such a purpose. In the case of the TeleVideo 925 and 950, and the Freedom 200, the top row of keys are inscribed "F1", "F2", "F3", and so on. The KEYS program allows you to program these special function keys so that when you press them they automatically send any characters that you desire. If you program them to send the VT leadin sequences listed above, you will be able to switch directly to any VT screen with a single keystroke.

Run the KEYS program by typing the word KEYS, followed by the name of a template file. The template file contains the character sequences that you want the various function keys to send. **SECTION 3** of this manual explains how to use the KEYS program and how to create and maintain template files. It is sufficient for now to know that your system has several templates already written that allow you to program your special function keys for use with Virtual Terminals. The summaries on the following pages list these templates by name and describe the function keys that they program to cause VT to switch screens.



## SECTION TWO: USING VIRTUAL TERMINALS

VT950.KEY: KEYS template for TeleVideo 950 and Freedom 200

Function Key	Character Sequence	VT Function
F1	(^ ) 0	Switch to first VT Screen
F2	(^_) 1	Switch to second VT Screen
F3	(^_) 2	Switch to third VT Screen
F4	(^_) 3	Switch to fourth VT Screen

VTGCS80.KEY: KEYS template for GCS80 terminal

Function Key	Character Sequence	VT Function
COL MODE	(^ ) 0	Switch to first VT Screen
COPY BLOCK	(^_) 1	Switch to second VT Screen
WRITE BLOCK	(^_) 2	Switch to third VT Screen
BLOCK DEL	(^_) 3	Switch to fourth VT Screen

As an example, if you have a TeleVideo 950 or a Freedom 200 terminal that has been upgraded with extra pages of internal RAM, the first thing you should do after logging in to a freshly booted system is type:

QA>KEYS VT950

After you enter the above line from your terminal, pressing key F1 will switch you to the first VT screen, F2 to the second, F3 to the third, and F4 to the fourth. If for any reason your terminal is turned OFF, your function keys will be cleared and you must run the KEYS program again. Rebooting the system does not by itself require you to run the KEYS program again unless your terminal was turned OFF in the process.

## SECTION TWO: USING VIRTUAL TERMINALS

### Using Special Function Keys on a TeleVideo 925

If you have a TeleVideo 925 and you want to use use keys F1 and F2 to switch to the first and second VT screens, your system manager must set up the VTTY5 file accordingly. It does no good to run the KEYS program on a TeleVideo 925 since that terminal's function keys are "hard wired" to send special character sequences, and these keys cannot be reprogrammed. Note that a TeleVideo 925 can only support two VT screens.

If your TeleVideo 925 uses keys F1 and F2 to switch screens, you will notice when you type Control A (^A), as you may do when running WordStar, there will be no response until you type a subsequent key. Then both the Control A and the subsequent key will be executed. This is because the function keys on a 925 always send a Control A, which consequently must be selected as your leadin character if you want to use them.

## SECTION THREE: THE KEYS PROGRAM

### INTRODUCTION TO SECTION 3

**SECTION 3** provides detailed instructions on the operation of the KEYS program, a utility which makes it easy to program the special function keys of any terminal that emulates a TeleVideo 950. These terminals include the TeleVideo 950, the Freedom 200, and the GCS-80. This section describes the structure of KEY template files, shows how to create template files, and explains some of their limitations. A Function Key Symbol Table for the TeleVideo 950 is also documented in this section. Function Key Symbol Tables for the Freedom 200 and GCS-80 terminals can be found in **APPENDIX A**. **APPENDIX A** also provides sample KEYS files for the TeleVideo 950, Freedom 200, and GCS-80 terminals.

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## SECTION THREE: THE KEYS PROGRAM

### 3.1 THE PURPOSE OF THE KEYS PROGRAM

The KEYS program makes it convenient to program the special function keys of the TeleVideo 950, the Freedom 200, the GCS-80, and any other terminal whose function keys use TeleVideo 950 protocol. The KEYS program uses special template files that you can create with any ASCII text editor such as WordStar in non-document mode. You can create as many different template files as you wish, and so you can develop a whole library of function key definitions to suit various projects. To assign a template file to the function keys of your terminal, you simply execute the KEYS program by entering a line of the following form:

```
QA>KEYS template
```

where **template** is the name of a file whose file type is **.KEY**. Thus, to use a template file called **SAMPLE.KEY** to program your terminal's function keys, you must type:

```
QA>KEYS SAMPLE
```

### 3.2 THE STRUCTURE OF TEMPLATE FILES

Template files have a simple structure. A template file consists of a series of lines, each one dedicated to a specified function key. The first character in the line, called the key symbol, represents the key to be programmed, and the remaining characters, the text, represent the characters which the associated key should send whenever it is pressed. These template files must have a file name of no more than eight (8) characters, and must have **.KEY** as the file extension. For example, a file of key assignments for SuperCalc might be named **SC.KEY**, while a file of key assignments for dBASE II might be called **DBASE.KEY**.

### SECTION THREE: THE KEYS PROGRAM

To assign the definitions contained in a file called DBASE.KEY to the 18-key pad, type:

```
QA>KEYS DBASE
```

To reassign these keys according to a file called SC.KEY, type:

```
QA>KEYS SC
```

If KEYS.CMD is assigned SYS and RO status by the command:

```
QA>SET KEYS.CMD[SYS,RO]
```

a copy of KEYS.CMD in user area 0 can be invoked by all user areas of a logical drive.

## SECTION THREE: THE KEYS PROGRAM

### 3.3 USING WORDSTAR TO CREATE A TEMPLATE FILE

To create a template file, use WordStar to create a file in the non-document mode (i.e., from the "OPENING MENU" enter (N) rather than (D)). Give your file any name that you wish, but make sure that its extension is .KEY. For example, you could call a file TEST.KEY, but don't call it TEST.TRY.

Your file can have as many lines as you have logical function keys to program. For the TeleVideo 950 and the Freedom 200, a single key can send one message unshifted and a different message shifted, so in effect you have twice as many logical function keys as physical ones. The first character in each line must contain the symbol for the key that you wish to program. The actual symbol used to specify a function key is not dictated by the KEYS program, but is dependent on the terminal itself and should be defined in the user's manual for that terminal. The rest of the line can contain characters representing the data to be transmitted by the specified key.

### 3.4 LIMITATIONS ON THE NUMBER OF CHARACTERS THAT CAN BE PROGRAMMED

The characters which each function key is to send are not stored in the main memory of your computer, but in the internal memory of the terminal itself. Since this internal storage capacity is in all cases quite limited, you are restricted as to the number of characters you can assign to each function key and to each terminal. For example, the TeleVideo 950 allows up to 63 characters per function key and up to 256 characters total. The **Function Keys Symbol Tables** on the pages that follow and in **APPENDIX A** indicate for each terminal the maximum number of characters that are allowed per function key (corresponding to a line in the template file) and the maximum number of characters allowed per terminal (corresponding to the entire template file).

## SECTION THREE: THE KEYS PROGRAM

### 3.5 FUNCTION KEY SYMBOL TABLES

The **FUNCTION KEY SYMBOL TABLE FOR THE TELEVIDEO 950** shows the special symbols assigned to each key of the 950 terminal. Additional tables in the **Appendix** show the symbols used to represent programmable function keys on the Freedom 200 and the GCS-80 terminals. The TeleVideo 925 has no table, because it does not support programmable keys. If you have a terminal that supports TeleVideo 950 protocols but that is not included in these tables, you should be able to find the appropriate symbols by examining the documentation of the terminal in question. The symbols themselves are typically referred to in documentation as "pl values."

## SECTION THREE: THE KEYS PROGRAM

### 3.6 FUNCTION KEY SYMBOL TABLE FOR THE TELEVIDEO 950

Table 3: Function Key Symbols for the TeleVideo 950

Maximum characters per key: 63

Maximum total characters: 256

KEY TO BE PROGRAMMED	SYMBOL IN TEMPLATE FILE
F1 (Unshifted)	1
F2 (Unshifted)	2
F3 (Unshifted)	3
F4 (Unshifted)	4
F5 (Unshifted)	5
F6 (Unshifted)	6
F7 (Unshifted)	7
F8 (Unshifted)	8
F9 (Unshifted)	9
F10 (Unshifted)	:
F11 (Unshifted)	;
F1 (Shifted)	<
F2 (Shifted)	=
F3 (Shifted)	>
F4 (Shifted)	?
F5 (Shifted)	@
F6 (Shifted)	A
F7 (Shifted)	B
F8 (Shifted)	C
F9 (Shifted)	D
F10 (Shifted)	E
F11 (Shifted)	F

To program the F4 key on a TeleVideo 950 or Freedom 200 to send the message: "THIS IS A TEST," your template file should have the following entry:

```
4THIS IS A TEST
```



## SECTION THREE: THE KEYS PROGRAM

The numeral 4 in the first column tells the KEYS program to program the F4 key, and the rest of the line tells the KEYS program the sequence of characters that the F4 key should send. If you create a template file containing the above line and call it F4TEST.KEY, you can use it to program the F4 key by typing:

```
QA>KEYS F4TEST
```

After running the above program, your F4 key should cause the terminal to display:

```
QA>THIS IS A TEST
```

Any combination of programmable keys can be designated in your template file, and key symbols may appear in any order. Executing the KEYS program will program only those keys specified in the template file, and will leave all other keys as they were. If a key symbol in a .KEY file is followed only by a caret (^), the designated key will be disabled when the KEYS program is run.

### 3.7 CONTROL CHARACTERS

To send control characters, each control character in the template file should be preceded by a caret (^). For example, to program the F2 key to send a control C, your template file should have the following entry:

```
2^C
```

The 2 in the first column specifies the F2 key, and the caret (^) character tells the KEYS program that the character to follow, the letter C, should be converted to a Control character.

## SECTION THREE: THE KEYS PROGRAM

Or, if you want to program the key labeled Insert Character on the Freedom 200 as a leadin character, type:

`^@`

The `^` in the first column indicates that the subsequent character, the `@` symbol in the template file, should be converted to a Control character.

An exception to the use of the caret (`^`) character occurs when you want to use the KEYS program to send the caret (`^`) character itself. This is accomplished by putting two consecutive caret (`^^`) characters into the KEYS file. See Section 3.8 below for instructions on how to send a Control caret (`^`).

### 3.8 SPECIAL CASES FOR CONTROL CHARACTERS:

**CONTROL `^` (CARET), CONTROL Y, AND CONTROL UNDERSCORE**

**(`_`)**

Certain control characters require special consideration:

#### **CONTROL `^` (caret)**

Since `^^` sends the caret character rather than a Control `^` (caret), you should use `^>` to send a Control `^` (caret). This will work because a Control `^` (caret) and a Control `>` (sign for greater than) both equal the same byte (1E Hexadecimal).

#### **CONTROL Y**

To program a Control Y into the text field of a KEYS file, you must use `^P^Y` and not just the `^Y`. The reason that `^P` must precede the `^Y` is that the Freedom 200 and TeleVideo 950 interprets `^Y` to mean "end of text." So if you want to program

### SECTION THREE: THE KEYS PROGRAM

your Delete Character (shifted) key to send the message, "This is a test," and you type the following string in a WordStar non-document file with .KEY as the file type:

```
^QTHIS ^YIS A TEST
```

the Freedom 200 and TeleVideo 950 interprets the ^Y to mean "end of text," and so will not recognize the text string that follows. To prevent this from happening, you must embed a ^P immediately before the ^Y. This tells the Freedom 200 or TeleVideo 950 that the character immediately following the ^P should be interpreted literally. So if you type:

```
^QTHIS P^Y IS A TEST
```

the Freedom 200 will recognize the ^Y as simply ^Y, and not as "end of text."

Please note that in the template file key symbol field of the KEYS file, it is all right to indicate a Control Y with a ^Y. So if you want to program your Scroll Down (shifted) key to send the message "This is a test," you must type:

```
^YTHIS IS A TEST
```

#### CONTROL UNDERSCORE (^\_)

The last entry to be wary of when using the KEYS program is the Cursor Down (shifted) key, represented by Control Underscore (^\_) in the template file. The ^\_ symbol is the default leading character for the Virtual Terminals program. The Virtual Terminals program assumes that if a 0,1,2, or 3 follow a Control Underscore (^\_), that you intend to switch to another Virtual Terminals screen. For example, if ^\_2 is typed, you will have just instructed Virtual Terminals to switch to Virtual Terminal screen #2. To avoid this confusion, make sure that if you're going to program the Cursor Down (shifted) key, don't use 0,1,2, or 3 at the beginning of the text string.

## SECTION THREE: THE KEYS PROGRAM

### 3.9 INCLUDING OR SUPPRESSING CARRIAGE RETURNS

If you want a programmable key to include a carriage return at the end of your data string, just end the corresponding line in the definition file with a carriage return. If you want a carriage return to occur in the middle of a line of text, insert a Control M (^M) at the desired location. If you do not want your data string to end with a carriage return, end the corresponding line with the caret (^). For example, to cause the F7 key on a TeleVideo 950 or Freedom 200 to send the message: "I CAN NAME THAT TUNE IN," your definition file should have the following entry:

```
7I CAN NAME THAT TUNE IN^
```

The numeral 7 in the first column tells the KEYS program to program key F7. The caret (^) tells the KEYS program not to add a carriage return to the data string sent by the F7 key.

### 3.10 COUNTING CHARACTERS

In counting programmed characters to determine whether they exceed the maximum number permitted on a given terminal, the following rules apply:

A carriage return counts as a character, so any line in your definition file that does not terminate with a caret (^) should only have twenty-five (25) data characters, for the GCS-80, 255 characters for the Freedom 200, and 63 for the TeleVideo 950. The caret (^) itself does not count as a character.

APPENDIX A

**Table 4: Function Key Symbol Table for the Freedom 200**  
 Maximum characters per key: 256  
 Maximum total characters: 256

KEY TO BE PROGRAMMED	SYMBOL IN TEMPLATE FILE
F1 (Unshifted)	1
F2 (Unshifted)	2
F3 (Unshifted)	3
F4 (Unshifted)	4
F5 (Unshifted)	5
F6 (Unshifted)	6
F7 (Unshifted)	7
F8 (Unshifted)	8
F9 (Unshifted)	9
F10 (Unshifted)	:
Insert Mode (Unshifted)	;
Insert Char (Unshifted)	^@
Delete Char (Unshifted)	^A
Insert Line (Unshifted)	^B
Delete Line (Unshifted)	^C
Erase EOL (Unshifted)	^D
Erase EOP (Unshifted)	^E
Send (Unshifted)	^F
Print (Unshifted)	^G
Scroll Up (Unshifted)	^H
Scroll Down (Unshifted)	^I
Word Left (Unshifted)	^J
Word Right (Unshifted)	^K
Cursor Up (Unshifted)	^N
Cursor Down (Unshifted)	^O
Cursor Left (Unshifted)	space
Cursor Right (Unshifted)	!
Clear/Home (Unshifted)	^L
Tab/Back Tab (Unshifted)	V
Return (Unshifted)	^M
Back Space (Unshifted)	Z

(continued on following page)

APPENDIX A

Table 4: Function Key Symbol Table for the Freedom 200 (continued)

KEY TO BE PROGRAMMED		SYMBOL IN TEMPLATE FILE
Line Feed	(Unshifted)	\
Enter	(Unshifted)	X
,	(Unshifted)	T
-	(Unshifted)	R
Point	(Unshifted)	P
0	(Unshifted)	#
1	(Unshifted)	&
2	(Unshifted)	'
3	(Unshifted)	)
4	(Unshifted)	+
5	(Unshifted)	-
6	(Unshifted)	/
7	(Unshifted)	H
8	(Unshifted)	J
9	(Unshifted)	L
00	(Unshifted)	N
F1	(Shifted)	<
F2	(Shifted)	=
F3	(Shifted)	>
F4	(Shifted)	?
F5	(Shifted)	@
F6	(Shifted)	A
F7	(Shifted)	B
F8	(Shifted)	C
F9	(Shifted)	D
F10	(Shifted)	E
Insert Mode	(Shifted)	F
Insert Char	(Shifted)	^P
Delete Char	(Shifted)	^Q
Insert Line	(Shifted)	^R

(continued on following page)

APPENDIX A

Table 4: Function Key Symbol Table for the Freedom 200 (continued)

KEY TO BE PROGRAMMED	SYMBOL IN TEMPLATE FILE
Delete Line (Shifted)	^S
Erase EOL (Shifted)	^T
Erase EOP (Shifted)	^U
Send (Shifted)	^V
Print (Shifted)	^W
Scroll Up (Shifted)	^X
Scroll Down (Shifted) *	^Y
Word Left (Shifted)	^Z
Word Right (Shifted)	^[
Cursor Up (Shifted) *	^>
Cursor Down (Shifted) *	^ (underscore)
Cursor Left (Shifted)	0 (zero)
Cursor Right (Shifted)	"
Clear/Home (Shifted)	^\
Tab/Back Tab (Shifted)	W
Return (Shifted)	^]
Back Space (Shifted)	[
Line Feed (Shifted)	]
Enter (Shifted)	Y
' (Shifted)	U
- (Shifted)	S
Point (Shifted)	Q
0 (Shifted)	\$
1 (Shifted)	&
2 (Shifted)	(
3 (Shifted)	*
4 (Shifted)	' (apostrophe)
5 (Shifted)	.
6 (Shifted)	G
7 (Shifted)	I
8 (Shifted)	K
9 (Shifted)	M
00 (Shifted)	O (upper case letter O)

\* Special case--refer to Section 3.8.

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Table 5: Function Key Symbol Table for GCS-80

Maximum characters per key: 26

Maximum total characters: 468

KEY TO BE PROGRAMMED 18-key pad only	SYMBOL IN TEMPLATE FILE
COL MODE	(
COPY BLOCK	)
WRITE BLOCK	*
BLOCK DEL	+
Hyphen key	-
Comma key	,
ENTER	/
Decimal point	.
Zero (0)	0
One (1)	1
Two (2)	2
Three (3)	3
Four (4)	4
Five (5)	5
Six (6)	6
Seven (7)	7
Eight (8)	8
Nine (9)	9

Remember that when creating a template file on the GCS-80, you should use the main keyboard rather than the 18 key-pad to the right of the main keyboard, since this pad may already be reprogrammed, and so may not put the proper character in column one (1) of your file. See Gifford's GCS-80 USER'S MANUAL for more information on programming the GCS-80 keys.



## APPENDIX A

### Sample KEYS File for TeleVideo 950/Freedom 200

For the TeleVideo 950 and Freedom 200 terminals, the VT950.KEY file has been included on your master system diskette. This is written to program function keys one (1) through four (4) to switch directly to the first through fourth VT screens, respectively. To program these function keys, simply type:

QA>KEYS VT950

If for any reason you need to re-create this KEYS assignment file, follow the instructions below:

1. In the WordStar OPENING MENU, type (N) for non-document.
2. Enter a file name for your key assignment file.

Example: VT950.KEY

3. In the non-document file, type the character of the key that you wish to reprogram, followed by your leadin character, as specified in field 8 of your VITYS file, and then the number of the destination VT screen.
4. The VT950.KEY file should contain the following lines of text:

```
1^ 0^  
2^-1^  
3^-2^  
4^-3^
```

In the example above, the first numeral in each line represents the number of the function key that you intend to program to switch to a specified VT screen. The control underscore (^\_) characters represent the leadin character that the VT program uses to tell the computer that the subsequent character is the number of the destination VT screen. The numeral following the leadin character is the number of the destination VT screen. The last character, a

## APPENDIX A

caret (^), signifies that you do not want a carriage return embedded at the end of each line.

5. When you have completed your new key assignments, save the non-document file and exit from WordStar.
6. Now type KEYS VT950 and the F1, F2, F3 and F4 keys on your terminal will now switch to VT screens 0, 1, 2, and 3, respectively.

## APPENDIX A

### Sample KEYS File for GCS-80

For the GCS-80 terminal, the VTGCS80.KEY file has been included on your master system diskette. This is written to program the COL MODE, COPY BLOCK, WRITE BLOCK and BLOCK DELETE keys to switch to VT screens 0, 1, 2, and 3, respectively. To program these function keys, simply type:

QA>KEYS VTGCS80

If for any reason, you need to re-create this KEYS assignment file, follow the instructions below:

1. In the WordStar OPENING MENU, type (N) for non-document.
2. Enter a file name for your key assignment file.

Example: VTGCS80.KEY

3. In the non-document file, type the character that corresponds to the key that you wish to reprogram, followed by your leadin character, as specified in field 8 of your VTTYS file, and then the number of the destination VT screen.
4. The VTGCS80.KEY file should contain the following lines of text:

```
(^ 0^  
)^_1^  
*^_2^  
+^_3^
```

In the example above, the special symbol at the beginning of each line represents the key to be programmed, according to the **Function Key Symbol Table on page 49**. The control underscore (^\_) characters represent the leadin character that the VT program uses to tell the computer that the subsequent character is the number of the destination VT screen. The numeral following the leadin character is the number of the destination VT screen. The last character, a

## APPENDIX A

caret (^), signifies that you do not want a carriage return embedded at the end of each line.

5. When you have completed your new key assignments, save the non-document file and exit from WordStar.
6. Now type KEYS VTGCS80 and the COL MODE, COPY BLOCK, WRITE BLOCK, and BLOCK DELETE keys on your terminal will now switch to VT screens 0, 1, 2, and 3, respectively.

**VT BUG REPORT**

This form should be used to report problems with the Virtual Terminals software or with this manual to Gifford Computer Systems. Every report will be reviewed by our Customer Support Department.

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Company/Organization: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Zipcode: \_\_\_\_\_

Telephone: \_\_\_\_\_

MC-DOS System Number: \_\_\_\_\_

MC-DOS Release Version: \_\_\_\_\_

State the exact problem and symptoms that you encountered with Virtual Terminals or KEYS below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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