Programmer Manual

Tektronix

VM700T Video Measurement Set
RS-232 Interface

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Table of Contents

Status and Events

Examples

Appendices

List of Figures

List of Tables

Preface

This manual describes the VM700T Video Measurement Set programming capabilities for the RS–232C interface. The manual is organized as follows:

Getting Started provides a brief introduction to the remote control features of the VM700T, lists some related software that may prove useful for the remote control task, and tells you how to connect a PC and the VM700T Video Measurement Set to allow them to talk to each other.

VM700T Commands first provides a table summarizing the remote control commands. Then each command is discussed in detail giving the syntax form of the command, the descriptive form of the command, and an explanation of what the command does. One or more examples of how the command is used is also provided in this part of the discussion.

Status Events lists the error and warning messages produced by function playback and remote operation.

Examples tells you how to write programs to control the VM700T without human intervention. A sample program that reads a file of VM700T commands, executes them, and logs both commands and data to a file is included. (A computer, not just a terminal, is required to perform the operations described in this section.) Included in this section is a discussion of using a modem to monitor the operation of the VM700T, and a discussion of how to create and playback functions.

Appendix A: GET/SET Keywords, lists and describes the keywords that can be used with the VM700 family get and set commands.

Appendix B: Getting Measurement Results, shows the format of the results files produced by each VM700T measurement.

Getting Started

Getting Started

With its various modes and measurements available in a single instrument, the VM700T Video Measurement Set is a great tool for enhancing measurement productivity. Learning to use the VM700T programming capability can make it even more productive.

For instance, by defining a function on the VM700T, you can make it execute repetitive sequences of commands, either from the front panel or under computer control.

By connecting the VM700T to a terminal, an IBM PC, or a PC-compatible computer, you can perform any operation available from the front panel, and more. Additional capabilities include logging the commands sent to and the data returned by the VM700T, and branching to different parts of a program based upon earlier results.

Related Programs

Tektronix sells the following programs for use with the VM700T (all require an IBM PC or compatible computer):

- VMT: The VMT program facilitates communication between PC-compatible computers and VM700/VM700A/VM700T Video Measurement Sets. It features a menu-driven interface for common operations, as well as extra commands to add decision making and conditional branching capabilities.
- VMBKUP: This program package actually consists of three programs, VMFTP, VMTERM, and VMBACKIT, that transfer files between the VM700T and an IBM PC or compatible. VMFTP transfers one file at a time, using the familiar FTP protocol. VMTERM is a terminal emulator program that you can use to control the VM700A/VM700T remotely. VMBACKIT transfers several files at a time, and is useful primarily for backing up file sets from the VM700A/VM700T onto a PC.
- VMREMGR: The VMREMGR program displays VM700A/VM700T graphics on a VGA screen. Note: The VM700T also has a direct VGA output to provide this feature.

See your Tektronix representative for information about any of these programs.

Connecting the PC and the VM700T

This section discusses the wiring necessary to connect the VM700T to a computer, terminal, or modem. Successful communication also requires correct settings for Communications Setup file parameters. Setting the Communications Setup file parameters is discussed in *Simple Remote Control* beginning on page 4–1.

The rear panel of the VM700T features three video loop-through inputs, one external sync loop-through, two RS-232C DTE ports (Port 0 and Port 1), a parallel printer port, and a remote-control (contact-closure) connector, labeled "Alarm" (Figure 1–1). The Option 48 instruments also have a GPIB connector. Operation of the GPIB interface for remote control is discussed in the Option 48 GPIB Interface Programmer Manual.

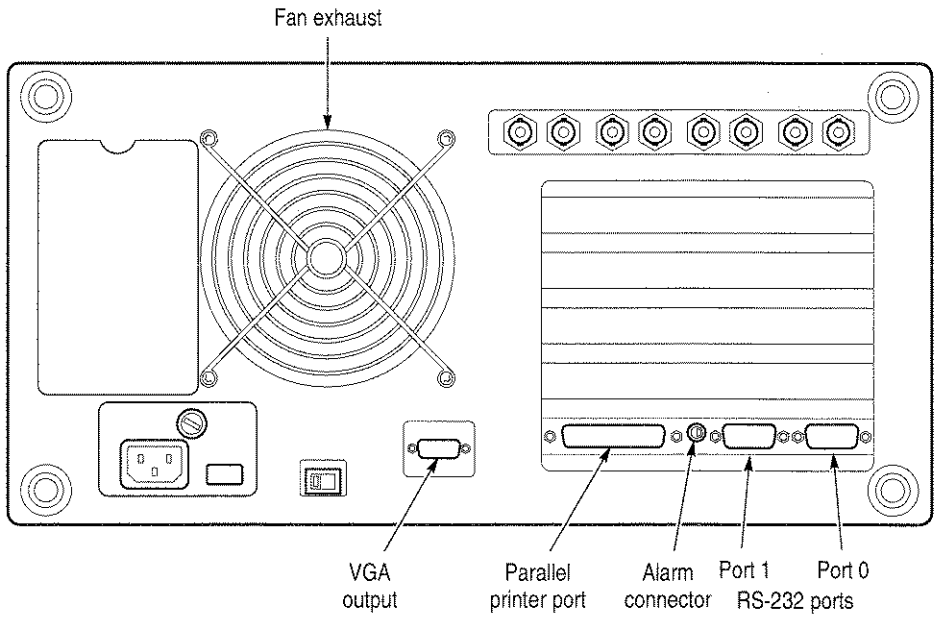


Figure 1–1: VM700T rear panel

RS-232C Connections. The two RS-232C DTE ports of the VM700T (Port 0 and Port 1) are used to output graphics and reports to a printer, as well as for remote operation via a modem or direct serial connection. Both connectors are located on the CPU I/O board and are accessible on the rear panel. Both are 9-pin male "D" connectors.

Table 1–1 lists the input and output signals used by the RS-232C ports.

Table 1–1: Signals Used by VM700T RS-232C Ports

Pin	Signal	Notes
1	DCD (Data Carrier Detect)	Required for modem connections only. This signal typically comes from a modem and indicates that a phone connection is made.
2	RD (Receive Data)	The VM700T receives data on this pin.
3	TD (Transmit Data)	The VM700T transmits data on this pin.
4	DTR (Data Terminal Ready)	Required for modem connections only. This pin is always high when the VM700T is turned on. When DTR is asserted, the modem knows it is connected to a "live" PC/terminal.
5	SG (Signal Ground)	
7	RTS (Request to Send data to the VM700T)	With hardware flow control (CTS/RTS selected), normally RTS connects to the CTS line of a terminal, and the line is active when the VM700T is ready to receive data. When the receive buffers of the VM700T are nearing capacity, RTS goes inactive, indicating to the sending device to stop transmitting data. With software flow control set to XON/XOFF or with None selected, RTS is always active.
8	CTS (Clear to Send)	With Flow Control (CTS/RTS selected), the VM700T is enabled to transmit data by a high level on pin 8, and is disabled by a low level. It is normally connected to the RTS line of a terminal. With Flow Control (None or XON/XOFF selected), the VM700T transmits data regardless of the CTS level.

The pin numbers given for the Terminal (DTE) are the most common locations for the corresponding signals. Note that there is considerable deviation from this "common" configuration and that not all devices use control lines in the manner described under this topic. Refer to the instruction manual of the equipment you are connecting to the VM700T to determine exactly how it should be connected.

Note also that both ends of the DTE to DTE cable are typically female connectors. The DTE to DCE cable is female on the VM700T (DTE) end, and typically male on the modem (DCE) end.

Table 1–2 shows the pin configuration for a cable connecting the 9-pin connector of the VM700T to a 9-pin connector on a PC or terminal.

Table 1–2: VM700T 9-Pin to PC 9-Pin null modem cable

VM700T Cable End (9-Pin Female)	PC Cable End (9-Pin Female)
3 – Transmit Data (TD)	2 – Receive Data (RD)
2 – Receive Data (RD)	3 – Transmit Data (TD)
5 – Signal Ground (SG)	5 – Signal Ground (SG)
8 – Clear to Send (CTS)	7 – Request to Send (RTS)
7 – Request to Send (RTS)	8 – Clear to Send (CTS)

Table 1–3 shows the pin configuration for a cable connecting the 9-pin male connector of the VM700T to a 25-pin connector on a PC or terminal.

Table 1–3: VM700T 9-Pin to PC 25-pin null modem cable

VM700T Cable End (9-Pin Female)	PC Cable End (25-Pin Female)
2 (RD)	2 – Transmit Data (TD)
3 (TD)	3 – Receive Data (RD)
5 (SG)	7 – Signal Ground (SG)
7 (RTS)	5 – Clear to Send (CTS)
8 (CTS)	4 – Request to Send (RTS)

Table 1–4 shows the pin configuration for a cable connecting the 9-pin connector of the VM700T to a 9-pin connector on a modem.

Table 1–4: VM700T 9-Pin to modem 9-pin cable

VM700T Cable End (9-Pin Female)	Modem Cable End (9-Pin Male)
1 (DCD)	1 – Data Carrier Detect (DCD)
2 (RD)	2 – Transmit Data (TD)
3 (TD)	3 – Receive Data (RD)
4 (DTR)	4 – Data Terminal Ready (DTR)
5 (SG)	5 – Signal Ground (SG)
7 (RTS)	7 – Request to Send (RTS)
8 (CTS)	8 – Clear to Send (CTS)

Table 1–5 show the pin configuration for a cable connecting the 9-pin connector of the VM700T to a 25-pin connector on a modem.

Table 1–5: VM700T 9-Pin to Modem 25-Pin Cable

VM700T Cable End (9-Pin Female)	Modem Cable End (25-Pin Male)
Shield (ground)	1 – Frame Ground (FG)
3 (TD)	2 – Transmit Data (TD)
2 (RD)	3 – Receive Data (RD)
7 (RTS)	4 – Request to Send (RTS)
8 (CTS)	5 – Clear to Send (CTS)
5 (GND)	7 – Signal Ground (SG)
1 (DCD)	8 – Data Carrier Detect (DCD)
4 (DTR)	20 – Data Terminal Ready (DTR)

VM700T Remote Commands

VM700T Remote Commands

This section describes the VM700T commands for use in functions and remote operation. For each command, the following information is included:

- the syntax form for the command
- the descriptive form for the command
- the scope of the command, (that is, whether the command can be used in function playback, remote operation, or both)
- the VM700T software version the command runs on
- an explanation of what the command does
- one or more examples of how the command is used

Command Summary

Table 2–1 summarizes the VM700T commands and their uses.

Table 2–1: VM700T Commands

Command	Scope	Purpose
appset	Function playback	Records state information about an application. Not user-editable.
appstart	Function playback	Starts an application's execution within a function. Not user-editable.
cancelcopy	Remote operation	Clears print spooler.
cknob	Function playback	Turns control knob continuously, a specified number of clicks over a specified amount of time.
computer	Remote operation	Sets VM700T to be controlled by a computer.
control	Both	Sends characters out control port.
controlbreak	Both	Sends break sequence out control port.
delay	Function playback	Pauses function execution for a user-specified time.
disptext	Function playback	Displays text messages, pauses function execution.
execute	Both	Executes a VM700T application.
exit	Remote operation	Terminates remote operation, closes PC connection

Table 2–1: VM700T Commands (Cont.)

Command	Scope	Purpose
filesin	Remote operation	Returns names of all files in a directory.
get	Remote operation	Returns configuration values specified by keyword.
getclock	Remote operation	Returns date and time from VM700T system clock.
getresults	Both	Writes a results file for current application.
hardkey	Both	Presses and releases a front-panel button.
hardpress	Both	Presses, but does not release, a front-panel button.
hardrelease	Both	Releases a front-panel button.
knob	Both	Rurns the control knob.
loop	Function playback	Re-starts current function from beginning
playback	Both	Executes a function.
print	Both	Sends formatted file to print spooler.
query	Remote operation	Returns information about a VM700T keyword.
quit	Remote operation	Terminates remote operation, closes PC connection.
remote	Remote operation	Initiates remote control in non-protocol mode.
rename	Both	Renames file on the VM700T.
res	Remote operation	Sends ASCII string containing result of current measurement out remote port.
resoff	Remote operation	Turns off previous reson command.
reson	Remote operation	Similar to res, but sends continuous stream of measurement results out remote port.
restoreconfig	Both	Restores configuration values from VM700T files.
return	Function playback	Returns a function to the calling function.
set	Both	Sets configuration values specified by keyword.
setclock	Remote operation	Sets date and time on VM700T system clock.
show	Remote operation	Returns contents of specified file.
softkey	Both	Presses and releases a specified soft key.
softpress	Both	Presses, but does not release, a specified soft key.
softrelease	Both	Releases a specified soft key.

Table 2–1: VM700T Commands (Cont.)

Command	Scope	Purpose
spool	Both	Sends ASCII file to print spooler.
stop	Function playback	Exits from all functions currently executing.
terminal	Remote operation	Sets VM700T to be controlled from a terminal.
touchpress	Both	Touches VM700T screen at specified X, Y location.
touchrelease	Both	Releases previous touchpress.
?	Function playback	Tests keyword, executes command if keyword returns true.
?!	Function playback	Tests keyword, executes command if keyword returns false.

Remote Control and Playback Commands

The remote control and function playback commands are presented in this manual as follows:

Syntax Form: `command` *argument(s)*

Descriptive Form: `command` *argument(s)*

The syntax form gives the name of the command and the types of arguments it takes, if any. The descriptive form gives the name of the command and the meanings of the arguments it takes. The word "`command`" is the actual command name. Arguments and their meanings are shown in *italic*. Optional arguments are enclosed with [ ]. Examples are included for most commands with arguments.

appset

Syntax Form: `appset` *string number*

Descriptive Form: `appset` *variable_name value*

Scope: function playback

The `appset` command encodes the state of an application within a function. This helps ensure that the function plays back correctly.

`Appset` commands only appear in functions learned from the front panel. They are not meant to be edited by a user. Editing an `appset` command could lead to unpredictable results.

appstart

Syntax Form: `appstart`

Descriptive Form: `appstart`

Scope: function playback

Sending `appstart` ends a list of appset commands and starts the application. This command is required for correct function playback. Do not delete it.

cancelcopy

Syntax Form: `cancelcopy`

Descriptive Form: `cancelcopy`

Scope: remote operation

Sending `cancelcopy` clears the print spooler. The command is equivalent to touching the Cancel Copy soft key after pressing the Configure button while the VM700T contains spooled data.

cknob

Syntax Form: `cknob` *integer integer*

Descriptive Form: `cknob` *number-of-clicks tenths-of-seconds*

Scope: function playback

See also: `knob`

The `cknob` command turns the control knob a specified number of clicks over a specified period of time. The effect of a single click depends on the current application and the current screen scaling. A positive number of clicks turns the knob clockwise; a negative number of clicks turns the knob counterclockwise. Time units are specified in tenths of seconds.

Example:

```
VM700T> cknob 50 30
```

This command turns the control knob clockwise 50 clicks over a period of three seconds.

computer

Syntax Form: `computer`

Descriptive Form: `computer`

Scope: remote operation

See also: `remote, terminal`

The `computer` command sets the VM700T to be controlled by a computer. This command is used only in no-protocol mode. After this command is executed, characters are not echoed, there is no space after the prompt, and any errors or messages are returned encoded. See *Status Events*, starting on page 3–1, for information about the encoded error messages returned by the VM700T. See also `remote and terminal`.

control

Syntax Form: `control` *string*

Descriptive Form: `control` *sequence_of_characters_to_send*

Scope: function playback, remote operation

The `control` command sends a user-specified string out the control port. This string can be any sequence of ASCII characters, or any of the following:

^x	a control character, for example, ^G (bell) or ^M (carriage return)
$nn	a hexadecimal number, where n is 0–9, A–F, or a–f
\$	the '$" character
\^	the '^' character
\\	the '\' character
\<LF>	a trailing '\' on a line says to ignore end-of-line

The `control` command is usually used to control a device attached to the VM700T, such as a modem. Note that communication through the `control` command is one-way only. There is no feed-back from the controlled device. This means that if the controlled device is not powered on, or is not even attached, or is sent an incorrect string, the VM700T function or program will continue executing.

Note also that the control statement does not add characters to delimit messages. Thus, if the device being controlled requires that messages be delimited with a carriage return, line feed, or carriage-return/line-feed sequence, those characters must be included in the string accompanying the `control` command.

Examples:

```
VM700T> control ^G
```

This example sends a bell character out the Control Port.

```
VM700T> control ATDT123-4567^M
```

This example sends the ASCII string "ATDT123-4567", followed by carriage return, out the Control Port.

controlbreak

Syntax Form: `controlbreak` *number*

Descriptive Form: `controlbreak` *tenths-of-seconds*

Scope: function playback, remote operation

A `controlbreak` sends a break character out the control port for the specified number of time units (tenths of seconds).

Example:

```
VM700T> controlbreak 10
```

This command sends a break character out the control port for one second.

NOTE. *If* `controlbreak` *is executed from remote control or function playback immediately after a* `control` *command has printed characters to the port, the break character may be actually transmitted for a shorter time than requested. (This happens because of the way the VM700T buffers* `control` *and* `control-break` *requests.) To ensure that the break character is sent for the full amount of time requested, allow sufficient time for all characters printed with the* `control` *command to finish printing before issuing the* `controlbreak` *command.*

delay

Syntax Form: `delay` *number*

Descriptive Form: `delay` *tenths-of-seconds*

Scope: function playback

The `delay` command pauses function execution for a specified amount of time, given in tenths of seconds.

Example:

```
VM700T> delay 10
```

This command pauses function execution for a full second.

disptext

Syntax Form: `disptext` *string*[*\newline string...*]

Descriptive Form: `disptext` *string*[*\newline string...*]

Scope: function playback

The `disptext` command displays a user-specified message on the VM700T front panel. When the message appears on the VM700T front panel, function execution stops until you touch the display screen.

Up to 79 characters can appear on a line. You can create a multi-line message by ending a line with a backslash character ("\").

If the `disptext` command is contained in a function being played back from remote control, the message appears on the remote terminal if the Remote Control/Message Display item in the Communication Setup file is set to Remote. In this case, function execution stops until you type a carriage return.

If the Remote Control/Message Display item in the Communication Setup file is set to VM700 Screen, the message appears on the display screen of the VM700T even when the function is being played back from remote control. Function execution stops until you touch the display screen.

Example:

```
disptext Hello, world!
```

When this line is executed in a function, it displays the message "Hello, world!" on the VM700T display. Function execution stops until you touch the screen.

```
disptext \

Roses are red,\

Violets are blue,\

Sugar is sweet,\

And so's a million dollars tax-free.
```

When this line is executed in a function, it displays four lines of doggerel on the VM700T display. Function execution resumes when you touch the screen.

execute

Syntax Form: `execute` *string*

Descriptive Form: `execute` *application-name*

Scope: function playback, remote operation

Sending the `execute` command starts a VM700T application. An application is one of the executable files (with exceptions noted below) found in the Instrument Operations, VM700 Diagnostics, or Video Measurements directories in the Executable Files directory. Selecting an operational mode application (Waveform, Vector, Picture, or Auto) is equivalent to pressing one of the mode buttons on the front panel; the LED lights up on the corresponding button. Selecting a measurement or diagnostic application is equivalent to touching a soft key from one of the Measure-mode windows.

Example:

```
VM700T> execute ChromLum~GainDelay
```

This example starts the ChromLum Gaindelay application.

When specifying application names in functions or remote operation commands, it is important to match the case (upper or lower) and any special characters used in the application's name. Table 2–2 lists the applications you can execute under remote control and gives their exact names in functions and remote operation commands. Refer to *Naming Conventions* on page 2–30 for information about the rules for specifying application names.

Table 2–2: Applications Available in Functions and Remote Control[a]

Instrument Operations				
Configure [a, b]	FTP	Function [b]	Measure [b]	Picture
SystemInit	Vector	Waveform		
VM700T Diagnostics [c]				
Acquisition~ Diagnostic	AdcGain~ Adjustment	AnalogInput~ Diagnostic	AudioAnalog~ Diagnostic	AudioProcessor~ Diagnostic
CalDac~ Adjustment	Controller~ Diagnostic	DiagsLoop	FilterBoard~ Diagnostic	Genlock~ Diagnostic
Measure~ Sinewave	Measure~ Squarewave	Measure~ Temperature		
Video Measurements				
Bar~LineTime	Bounce	Burst~Frequency	ChromLum~ GainDelay	Chrominance~ AMPM
Chrominance~ FreqResp (NTSC only)	Chrominance~ NonLinearity	ColorBar	DGDP	GroupDelay~ SinX_X
H_Blank	H_Timing	ICPM	Jitter	Jitter~Long_Time
K_Factor	Line~Frequency	Luminance~ NonLinearity	MultiBurst	Noise~Spectrum
SCH_Phase	TwoField	VITS~ID (NTSC only)	V_Blank	Video~Standard
Echo/rounding (Option 1G)				
Echo	Rounding~Errors			
Teletext (Option 20)				
SoundInSync	Teletext			
Camera Testing (Option 21)				
Colorimetry	Defects	Detail	Fixed_Pattern~ Noise	Frequency~ Response
Gamma	Geometry~Registration	Shading	Vertical~Smear	
Component (Option 30)				
Bowtie	Component~ Channel_Delay	Component~ColorBar	Component~ K_Factor	Component~ LevelMeter
Component~ Multiburst	Component~Noise	Component~ NonLinearity	Component~Vector	Lightning

Table 2–2: Applications Available in Functions and Remote Control[a] (Cont.)

Audio (Option 40 and Option 41)				
Audio~Analyzer	Audio~Monitor	Audio~Spectrum	Calibrate~ AudioBoard	Identify~ Audio_Hardware
Multitone	View_Audio~ Auto_Test			

a **Additional applications may be included as further VM700T options are introduced. Press the Measure key to find out what applications are available for your VM700T.**

b **The Configure, Function, and Measure files in the** Instrument~Operations **directory cannot be selected via remote control.**

c **Diagnostic routines can be selected via remote control, but passed test results are not returned. However, errors are logged to the** Diagnostic~Errors **file which can be read via remote control.**

exit

Syntax Form: `exit`

Descriptive Form: `exit`

Scope: remote operation

The exit command terminates the remote session and closes the connection between the VM700T and the computer or terminal. exit takes no arguments. exit is equivalent to quit.

filesin

Syntax Form: `filesin` *string*

Descriptive Form: `filesin` *VM700T_directory*

Scope: remote operation

The `filesin` command returns the names of all files in the specified directory.

Example:

```
VM700T> filesin /nvram0/FunctionKeys/myfiles
myfile1      myfile2      myfile3
VM700T>
```

get

Syntax Form: `get` *string* [A|B|C]

Descriptive Form: `get` *keyword* [A|B|C]

Scope: remote operation

See also: `set`

The get command returns the configuration file value specified by *keyword* on the channel specified by *channel_letter*. The *keywords* available are listed in Appendix B.

Example:

```
VM700T> get VSTA
NTSC
VM700T> get DHSM A
Meas_Set_1
VM700T>
```

The first command in the example returns the current video standard for source A. (In this case, it's NTSC.) The second command in the example returns the name of the current Selected Measurements File for source A when using the NTSC standard. (The file's name is Meas_Set_1.)

getclock

Syntax Form: `getclock`

Descriptive Form: `getclock`

Scope: remote operation

The `getclock` command returns the date and time from the VM700T system clock in the form:

```
mon dd hh:mm:ss yyyy
```

where *mon* is the first three letters of the month, *dd* is the day of the month, *hh* is the current hour, *mm* is the minute, *ss* is the second, and *yyyy* is the current year. `getclock` takes no arguments.

Example:

```
VM700T> getclock
Jul 28 14:54:37 1996
```

getresults

Syntax Form: `getresults` *[verbose]* [*string*[*string*]]

Descriptive Form: `getresults` *[verbose]* [*keyword*[*keyword*]]

Scope: function playback, remote operation

The `getresults` command stores Measure or Auto mode measurement results in default files in the Measurement~Results directory. In Measure mode, entering `getresults` with no argument(s) stores the measurement results for the current measurement. If no measurement is currently being executed, the message Request not supported is returned. If a measurement is being executed, the message Results in file: *filename* is returned. Use the `show filename` command to view the results.

Example:

```
VM700T> getresults
Results in file: ChromLum~GainDelay
```

Entering `getresults verbose` in Measure mode stores additional information for DGDP, Groupdelay~SinX_X, Luminance~NonLinearity, and Noise~Spectrum measurements. The information is displayed as one or more rows of unlabeled numbers, and is set off from the main file display by a line of plus signs (++++).

For DGDP and Luminance~NonLinearity, the additional data are the readouts at each step level in the display.

For Groupdelay~SinX_X, 82 additional measurement results are provided, at various frequencies. The first group of results shows the energy in dB, while the second group shows the delay in ns. Initial frequency is 138.5 kHz, with an increment of 69.3 kHz. Frequency and increment are calculated using the following formulas (based on a sub-carrier frequency, F_{sc}, of 4.43316875 MHz):

freq (Groupdelay) = $2 \times F_{sc}/64$, *increment (Groupdelay)* = $F_{sc}/64$

For Noise~Spectrum, 198 additional measurements are provided, at various frequencies. The additional data represents noise energy in dB at the frequency. Initial frequency is 34.6 kHz, with frequency increment 34.6 kHz. Frequency and increment are calculated using the following formulas (based on a sub-carrier frequency, F_{sc}, of 4.43316875 MHz):

freq (Noise~Spectrum) = $F_{sc}/128$
increment (Noise~Spectrum) = $F_{sc}/128$

In Auto mode, entering `getresults` with no argument(s) executes the current selected measurement list and stores the results in the Measurement~Results Auto file. The message "Results in file: Auto" is returned.

You can also use the `getresults` command in Auto mode with one or more keyword arguments. The keywords, listed in Appendix B, in effect specify a temporary selected measurements list that overrides the active Selected Measurements file. The new selected measurements stay in effect until a `restoreconfig` command or a `set` command specifying the Selected Measurements file is issued.

Example:

```
VM700T> execute H_Timing
VM700T> getresults
H_Timing
VM700T>
```

This command sequence executes the H_Timing measurement, then stores the results in file /nvram0/ConfigFiles/Measurement~Results/H_Timing.

```
VM700T> execute Auto
VM700T> getresults PBAA PBRT PSTB
Results in file: Auto
```

This command sequence creates a temporary selected measurements list of three measurements: Luminance Bar Amplitude, Bar Rise Time, and Sync-to-Burst Start.

hardkey

Syntax Form: `hardkey` *string*

Descriptive Form: `hardkey` *button_name*

Scope: function playback, remote operation

See also: `hardpress, hardrelease`

Using the `hardkey` command is equivalent to pressing and releasing a specified front panel button. The `hardkey` command has the same effect as `hardpress` followed by `hardrelease`; however, in general `hardkey` should be used instead of these commands.

Example:

```
VM700T> hardkey Vector
```

This command has the same effect as pressing the Vector button on the front panel.

Front panel button names are listed in Table 2–3.

Table 2–3: Front Panel Button Names

A	Display	Picture
Auto	Freeze	SelectLine
Average	Graticule	Vector
B	Help	Waveform
C	Menu	XY *(Arrow selector)*
Copy	MoveExpand	

NOTE. *The Configure, Function, and Measure buttons cannot be selected in functions or remote operation.*

When specifying button names in functions or remote operation commands, it is important to match the name shown in Table 2–3 exactly, including upper or lower case.

hardpress

Syntax Form: `hardpress` *string*

Descriptive Form: `hardpress` *button_name*

Scope: function playback, remote operation

See also: `hardkey, hardrelease`

The `hardpress` command is equivalent to pressing a specified front panel button without releasing it. The button remains pressed (held in) until a `hardrelease` command is received. The `hardpress` and `hardrelease` commands should be used with buttons that need to be held while another action takes place. For all other buttons, use `hardkey`. Front-panel button names are listed in Table A-3. Note also that if a button toggles (for example, Freeze and Average) you can use `hardpress` again to turn it off.

When specifying button names in functions or remote operation commands, it is important to match the name shown in Table 2–3 exactly, including upper or lower case.

Example:

```
VM700T> hardpress Display
VM700T> knob 50
VM700T> hardrelease Display
```

This command sequence presses and holds the Display button, increases the display intensity by turning the knob clockwise fifty clicks, then releases the Display button.

hardrelease

Syntax Form: `hardrelease` *string*

Descriptive Form: `hardrelease` *button_name*

Scope: function playback, remote operation

See also: `hardkey, hardpress`

A `hardrelease` command indicates that the specified front panel button has been released. Front-panel button names are listed in Table A-3. When specifying button names in functions or remote operation commands, it is important to match the name shown in Table 2–3 exactly, including upper or lower case.

Example:

```
VM700T> hardrelease Display
```

This example releases the Display button on the front panel. See also the example accompanying the explanation of `hardpress`.

knob

Syntax Form: `knob` *integer*

Descriptive Form: `knob` *number_of_clicks*

Scope: function playback, remote operation

See also: `cknob`

The `knob` command turns the control knob a specified number of clicks. The effect of a single click depends on the current application and the current screen scaling. A positive number of clicks turns the knob clockwise; a negative number of clicks turns the knob counterclockwise.

Example:

```
VM700T> knob -50
```

This command turns the knob 50 clicks counterclockwise.

loop

Syntax Form: `loop`

Descriptive Form: `loop`

Scope: function playback

The `loop` command restarts a function from its first statement. Functions containing a `loop` statement will only exit if they contain a branch that leads to a `return` statement, or if the Function button is pressed on the front panel, or if the VM700T is turned off.

Example:

```
execute Waveform appstart
            appstart
delay 50
execute Vector appstart
            appstart
delay 50
execute H_Timing appstart
            appstart
            delay 50
            loop
```

This example function cycles through Waveform, Vector, and H_Timing at five-second intervals. Function execution can be stopped by pressing the Function button on the front panel.

playback

Syntax Form: `playback` *string*

Descriptive Form: `playback` *function_name*

Scope: function playback, remote operation

The `playback` command calls and executes a function. The default path for the function is /nvramØ/FunctionKeys. If the function is contained in a subdirectory of /nvramØ/FunctionKeys, that subdirectory must be included in the argument of the `playback` command.

Example:

```
VM700T> playback my_dir/junk
```

This example plays back a function named "junk" in directory "my_dir", which is a subdirectory of /nvramØ/FunctionKeys.

print

Syntax Form: `print` *string*

Descriptive Form: `print` *VM700T_file*

Scope: function playback, remote operation

See also: `spool`

The `print` command sends a formatted file to the print spooler. The file's format is specified by the Format item for the Copy port in the Communications Setup file . The default path for the file is the Measurement~Results directory, but other files can be specified with a full pathname or a path relative to the Measurement~Results directory. Compare `spool`.

Example:

```
VM700T> print ChromLum~Gaindelay
```

This example sends the file ChromLum~Gaindelay from directory Measurement~Results to the print spooler, in the format currently specified by the Format item for the Copy port in the Communications Setup file.

```
VM700T> print /rom/ConfigFiles/Measurement~Locations/
NTSC/System~Default
```

This example prints the default Measurement Locations file for the NTSC standard, in the format currently specified by the Format item for the Copy port in the Communications Setup file. (Note that the path shown only applies to VM700T units equipped with both Option 01, NTSC, and Option 11, PAL.)

query

Syntax Form: `query` *string*

Descriptive Form: `query` *keyword*

Scope: remote operation

A `query` command returns information about the VM700T keyword used as its argument. In computer mode, information returned includes the type and range of permissible values for each field returned by the get command or used as an argument by the set command. If the field specifies a numeric value, the permissible range of numbers is returned. If the field specifies a file name or choice of other discrete values, the values that can be used as an argument are listed.

In terminal mode, the query command also tells you whether or not the keyword is channel-specific (that is, if it requires a channel-letter when used in a `get` or `set` command)

Examples:

(Terminal mode)

```
VM700T> query VSCA
channel independent
field 1 is a file name. Possible names are:
System^Default
VM700T> query LZCL
channel specific
field 1 is an integer value with range 1 to 625
VM700T> query SPOA
channel independent
field 1 is a string. Possible strings are:
none SLIP
```

(Computer mode)

```
VM700T> query VSCA
F1: file list:
System^Default
VM700T> query LZCL
F1: integer 1 625
VM700T> query SPOA
F1: string list:
None
SLIP
VM700T>
```

quit

Syntax Form: `quit`

Descriptive Form: `quit`

Scope: remote operation

See also: `exit`

The `quit` command terminates the remote session and closes the connection between the VM700T and the computer or terminal. The `quit` command takes no arguments; `quit` is equivalent to `exit`.

remote

Syntax Form: `remote`

Descriptive Form: `remote`

Scope: remote operation

See also: `computer, terminal`

The `remote` command initiates remote control in non-protocol mode only. You must enter remote mode before any other remote command is valid. The `remote` command takes no arguments.

rename

Syntax Form: `rename` *string string*

Descriptive Form: `rename` *old_filename new_filename*

Scope: function playback, remote operation

The `rename` command changes the name of a file in the Measurement~Results directory. This command is particularly useful when you want to get two or more results files from the same measurement and compare them. You can get the results from the first measurement, rename the results file for the first measurement, then get a second results file from the same measurement. You can then either compare the two results files visually or transfer their contents to a computer for automated comparison.

Example:

```
VM700T> rename H_Timing H_Timing_1
```

This command changes the file named "H_Timing" in the Measurement~Results directory to "H_Timing_1".

```
execute H_Timing
delay 50
getresults
rename H_Timing H_Timing_old
delay 18000
getresults
```

This sequence of function commands starts the H_Timing application, delays five seconds, then records measurement results from the application. It then changes the name of the measurement results file from "H_Timing" to "H_Timing_old". It then waits one half-hour, and records measurement results from the application again. The two measurement results files, "H_Timing" and "H_Timing_old", can then be compared for differences.

res

Syntax Form: `res [-v] [`*number*`[ `*number*`...]]`

Descriptive Form: `res [-v] [`*position-of-result*`[ `*position-of-result*`...]]`

Scope: remote operation

See also: `resoff, reson`

The `res` command returns an encoded or human-readable ASCII string containing the result of the measurement executing on the VM700T. The `res` command can be used whenever a measurement that returns a result is executing on the VM700T. (Most measure-mode measurements return results.)

The `-v` option tells `res` to produce the verbose (human-readable) form of the output. The default is the encoded form of the output, intended to be read by computers.

The optional *number* arguments specify the ordinal numbers of measurement results desired. For example, if a measurement produces seven results and you only want results 1, 2, and 5, you would issue the command `res 1 2 5`.

Deciphering res Results: the –v Option. Results returned by `res` are deciphered differently, depending on whether or not the `-v` option is present in the command line.

Consider the following command sequence:

```
execute H_Timing
getresults
show H_Timing
```

This sequence of commands transfers the H_Timing measurement results file out the VM700T remote port, in the following form:

```
  Measurement Results          Channel B          Tue Jul 30 11:16:12

H Timing
Line =  17

Average Off
-------------------------------------------------------------------------
Sync Rise Time            255.8   n sec
Sync Fall Time            260.0   n sec
Sync Width                  4.69  u sec
Sync Level                301.2   mV
Burst Level               306.0   mV
Sync to Burst Start         5.52  u sec
Burst Width                 2.19  u sec
-------------------------------------------------------------------------
```

The equivalent result, generated by the following command sequence using the –v option:

```
execute H_Timing
res -v
```

looks like this:

```
18 1:255841 2:260041 3:46944 4:301249 5:306049 6:55244
7:21944
```

This result is interpreted as follows:

- The first number (18) uniquely identifies the measurement application that generated the result. The H_Timing measurement's identification number is 18.
- The second and succeeding numbers have the form XX:YYYYYY. The digit(s) to the left of the colon signify the data item number. In the H_Timing measurement, 1 is the sync rise time value, 2 is the sync fall time value, etc. The digits to the right of the colon indicate the measurement result, encoded as follows:
  - If D is the number of digits in the measurement result, the leftmost D-2 digits specify the mantissa of the measurement result, normalized to a number between 0 and 10 (preceded by a minus sign if the mantissa is negative). For example, if the measurement result is 301149, the mantissa of the number is 3.011.

- The rightmost two digits specify the power of ten by which the mantissa is multiplied, plus fifty. Thus, if the multiplier is 10^{-6} ("micro"), the rightmost two digits in the data item are 44. If the multiplier is 10^{3} ("kilo"), the rightmost two digits in the data item are 53.

- If N is the total number of measurement results returned, the total number of data items sent is always equal to 2N +1: one for the measurement's identifying number, followed by an ordinal number and the data value for each measurement result.

- An asterisk character ('*') returned as data indicates that a measurement result is unavailable. This happens, for instance, when the VM700T is unable to find or recognize a signal feature necessary for a particular measurement.

Deciphering res Results: No -v Option. When used without the `-v` option, `res` returns an encoded string containing the same information as the string returned by the `-v` option, but in compressed form. Each byte of the human-readable message maps to a nibble (that is a half-byte or four bits) in the encoded message, as shown in Table 2–4.

Table 2–4: Encoding Scheme for res Command Results

ASCII Character	Hexadecimal Encoding
'0'–'9'	0–9
Space	A
–	B
*	C
End-of-Buffer	D

Note that the colon character does not appear in the table. This is because colon characters are only output as visual delimiters for the human-readable form of the measurement result. In the encoded form, only space characters are output as delimiters.

If an odd number of nibbles encode a measurement set, the nibble following the end-of-buffer nibble is filled with another end-of-buffer nibble.

Notes About Interpreting res Results. The `res` command only reports results that are in the application's current "measurement loop." This means that `res` may not return all results that may be contained in a measurement results file on each pass. Results that are returned, however, are uniquely identified so that a computer program (or a human reader) can always correctly identify them.

Example:

```
VM700T>execute V_Blank
VM700T>hardkey Menu
VM700T>softkey Equalizer_Pulse
VM700T>hardkey Freeze
VM700T>getresults
V_Blank
 VM700T>show V_Blank
   Measurement Results          Channel A          Fri Aug 09
12:39:59

 V Timing Measurement
 Average Off
 ------------------------------------------------------------
 Equalizer Pulse           2.29  u sec
 Equalizer Pulse 10%       2.42  u sec
 Serration Pulse           4.75  u sec
 Serration Pulse 10%       4.62  u sec
 ------------------------------------------------------------
 VM700T>res -v
 28 1:22944 2:24244
 VM700T>softkey Serration_Pulse
 VM700T>hardkey Freeze
 VM700T>hardkey Freeze
 VM700T>getresults
 V_Blank
 VM700T>show V_Blank
   Measurement Results          Channel A          Fri Aug 09
 12:41:26

 V Timing Measurement
 Average Off
 ------------------------------------------------------------
 Equalizer Pulse           2.29  u sec
 Equalizer Pulse 10%       2.42  u sec
 Serration Pulse           4.75  u sec
 Serration Pulse 10%       4.62  u sec
 ------------------------------------------------------------
 VM700T>res -v
 @28 3:47544 4:46244
```

The example shown above runs the V_Blank application and brings up the Equalizer Pulse display. The `getresults` command returns four distinct data values: two for equalizer pulse data, and two for serration pulse data. The `res` command, however, returns only the two equalizer pulse values (labeled "1:" and "2:", respectively).

Bringing up the Serration Pulse display and invoking `getresults` returns four distinct data values. Executing `res` at this time, however, returns only the two serration pulse values (labeled "3." and "4:", respectively).

resoff

Syntax Form: `resoff`

Descriptive Form: `resoff`

Scope: remote operation

See also: `res, reson`

The resoff command tells the VM700T to stop sending measurement results out its remote port. It is used to "turn off" a previous reson command.

reson

Syntax Form: `reson`

Descriptive Form: `reson`

Scope: remote operation

See also: `res, resoff`

The `reson` command works similarly to `res`, except that `reson` sends a continuous stream of measurement results out the remote port of the VM700T, instead of a single result. The stream of results is sent asynchronously, so that the VM700T can still recognize and respond to incoming commands (such as resoff). reson can be used with or without the `-v` option, to produce encoded or human-readable ASCII results.

Reading the VM700T reson Output Stream. When `reson` is issued, the VM700T begins sending results data out the remote port. At this point, there are, in effect, two separate data streams coming from the VM700T. The first is the normal data stream for remote control, consisting of prompts, echoed commands, viewed file output, and other output generated by remote control requests. For example:

```
VM700T> execute ColorBar
VM700T> getresults
Results are available in file 'ColorBar'.
VM700T>
```

In this example output, the prompts and the Results message were generated by the VM700T in response to a specific input request. By contrast, the results data produced while the VM700T is executing `reson` are sent *asynchronously*, without any specific request after the original `reson` command. For example:

```
VM700T> reson
VM7{results data}00A> {results data}{results data}...
```

Notice that in this example some of the results data arrived in the middle of the VM700T prompt string, making the VM700T output appear garbled. In order to separate the two data streams, you must know how they were combined.

When the two data streams are encoded, all characters in the normal output data stream are printable ASCII characters in the range 0 to 127, inclusive. By contrast, the initial character for the measurement results data stream is a nonprintable character, with a decimal value of at least 127. To be specific, the initial character of a data packet produced by `reson` has decimal value 182 (hex value B6); the initial character of a data packet produced by `reson -v` has decimal value 183 (hex value B7).

Thus, a computer program reading the output data stream from the VM700T need only compare each received character with the value 127. Any character greater than 127 introduces a measurement results data packet, and a handler function should be called to process the incoming data. The handler function should return when the end-of-buffer nibble (hex value 13) is encountered.

restoreconfig

Syntax Form: `restoreconfig`

Descriptive Form: `restoreconfig`

Scope: function playback, remote operation

Sending a `restoreconfig` command restores configuration values from the Configure files. Exiting a function or exiting remote operation does not automatically restore these values; `restoreconfig` must be issued to do so. Note that the system line and other global variables are not restored with `restoreconfig`.

return

Syntax Form: `return`

Descriptive Form: `return`

Scope: function playback

See also: `stop`

Sending `return` exits the currently executing function and returns to its calling function. Compare `stop`.

rgoff

Syntax Form: `rgoff`

Descriptive Form: `rgoff`

Scope: remote operation

See also: `rgon`

Sending `rgoff` takes the VM700T out of remote graphics mode. This command is only of interest to someone writing remote applications for the VM700T.

rgon

Syntax Form: `rgon`

Descriptive Form: `rgon`

Scope: remote operation

See also: `rgoff`

Sending `rgon` puts the VM700T into remote graphics mode. This command is only of interest to someone writing remote applications for the VM700T.

set

Syntax Form: `set` *string* [A|B|C] *number|string* [*number|string...*]

Descriptive Form: `set` *keyword* [A|B|C] *value* [*value...*]

Scope: function playback, remote operation

See also: `get`

The `set` command defines the configuration values to be used during the remote session. The keywords available to use with `set` are listed in Appendix B. Configuration values changed with `set` remain in effect until they are changed by another `set` command, `restoreconfig` is executed, or the instrument is powered off. Note that the system line and other global variables can be changed with `set` but are not restored with `restoreconfig`.

Example:

```
VM700T> set GLN5 100
VM700T> set GLN6 18
VM700T> set SPCF PostScript
```

This command sequence sets the system line for NTSC to 100, the system line for PAL to 18, and the serial port copy format to PostScript.

setclock

Syntax Form: `setclock` *string*

Descriptive Form: `setclock` *date_and_time_string*

Scope: remote operation

See also: `getclock`

The `setclock` command sets the date and time on the system clock, using the following format:

```
mon dd hh:mm:ss yyyy
```

where *mon* is the first three letters of the month, *dd* is the day of the month, *hh* is the current hour, *mm* is the minute, *ss* is the second, and *yyyy* is the current year. Hours are specified in 24-hour format (00 for midnight, 23 for 11 p.m.).

Example:

```
VM700T> setclock Aug 11 17:07:22 1996
```

show

Syntax Form: `show` *string*

Descriptive Form: `show` *filename*

Scope: remote operation

The `show` command returns the contents of a specified file. The default path for the file is the Measurement~Results directory, but other files can be specified by supplying a full pathname or a path relative to the Measurement~Results directory.

Example:

```
VM700T> show /nvram0/ConfigFiles/Video~Source
     The default file for video sources
  Channel A Video Source:     xmiter
  Channel B Video Source:     switcher
  Channel C Video Source:     System~Default
```

This example returns the contents of file Video~Source in directory /nvramØ/ ConfigFiles.

softkey

Syntax Form: `softkey` *string*

Descriptive Form: `softkey` *softkey_name*

Scope: function playback, remote operation

See also: `softpress, softrelease`

The `softkey` command (soft key used as one word) is equivalent to pressing and releasing a specified soft key. The `softkey` command has the same effect as `softpress` followed by `softrelease`; however, in general `softkey` should be used instead of these commands.

When specifying soft key names in functions or remote operation commands, it is important to match the case (upper or lower) and any special characters used in the name of the soft key. See *Naming Conventions* on page 2–30 for information about the rules for specifying soft key names.

Example:

```
VM700T> softkey ITS_Search
```

This example is equivalent to pressing and releasing a soft key labeled ITS Search on the touch screen.

softpress

Syntax Form: `softpress` *string*

Descriptive Form: `softpress` *softkey_name*

Scope: function playback, remote operation

See also: `softkey, softrelease`

Using `softpress` is equivalent to pressing a specified soft key without releasing it. The soft key remains pressed (held in) until a `softrelease` or `touchrelease` command is received. The `softpress` and `softrelease` commands should be used with soft keys that need to be held while another action takes place. For all other soft keys, use the `softkey` command. Note also that if a soft key function toggles, you can use `softpress` again to turn it off.

When specifying soft key names in functions or remote operation commands, it is important to match the case (upper or lower) and any special characters used in the soft key name. See *Naming Conventions* on page 2–30 for information about the rules for specifying soft key names.

Example:

```
VM700T> softpress Rescale
```

This command is equivalent to pressing a soft key labeled Rescale without releasing it.

softrelease

Syntax Form: `softrelease`

Descriptive Form: `softrelease`

Scope: function playback, remote operation

See also: `softkey, softpress`

Receiving a `softrelease` command indicates that a soft key has been released.

spool

Syntax Form: `spool` *string*

Descriptive Form: `spool` *filename*

Scope: function playback, remote operation

See also: `print`

The spool command sends an unformatted, ASCII-text file to the print spooler. The default path for the file is the Measurement~Results directory, but other files can be specified with a full pathname or a path relative to the Measurement~Results directory. Compare print.

Example:

```
VM700T> spool ChromLum~GainDelay
```

This examples sends the file ChromLum~Gaindelay from directory Measurement~Results to the print spooler, in ASCII-text format.

```
VM700T> spool
/rom/ConfigFiles/Measurement~Locations/NTSC/System~Default
```

This example prints the default Measurement Locations file for the NTSC standard, in ASCII-text format. (Note that the path shown only applies to VM700T units equipped with both Option 01, NTSC, and Option 11, PAL.)

stop

Syntax Form: stop

Descriptive Form: stop

Scope: function playback

See also: return

Sending stop exits all functions in the current call sequence.

terminal

Syntax Form: terminal

Descriptive Form: terminal

Scope: remote operation

See also: computer, remote

Sending terminal sets the VM700T to be controlled from a terminal. The terminal command is used only in no-protocol mode. When terminal is specified, characters are echoed, there is a space following the prompt, and any errors or messages are returned as text. Compare computer.

touchpress

Syntax Form: touchpress *number number*

Descriptive Form: touchpress *x_coordinate y_coordinate*

Scope: function playback, remote operation

See also: touchrelease

Sending `touchpress` indicates that a specified x,y location on the touchscreen is being "touched." The 0,0 location is the upper left corner of the screen. The X range is 0 to 639; the Y range is 0 to 479. If the X,Y location is within a soft key icon, the soft key action is executed.

Example:

```
VM700T> touchpress 200 330
```

This example "touches" the screen location 200 units to the right and 330 units down from the upper left corner of the screen.

touchrelease

Syntax Form: `touchrelease`

Descriptive Form: `touchrelease`

Scope: function playback, remote operation

See also: `softpress, touchpress`

The `touchrelease` command indicates a soft key or touchscreen location has been released.

? and ?! Constructs

The ? construct is followed by any configuration keyword and a single command. During function playback, if the keyword has non-zero value, the rest of the line following the ? construct is executed. Otherwise,function execution continues with the next statement in the function.

The `?!` construct is similar, except that the rest of the line is executed if the keyword has a value of zero. Otherwise,function execution continues with the next statement in the function.

The `?` and `?!` constructs are available only during function playback. They are typically used to test the value of a Carrier Detect line in order to control communications with a modem, or to test the global out-of-limits (GOOL) flag to see if an application found one or more measurements that were out-of-limits.

Using ? and ?! With the Carrier Detect Flag

Syntax Form: `?GCD0` *string* | `?GCD1` *string* |
`?!GCD0` *string* | `?!GCD1` *string*

Descriptive Form: `?GCD0` *command* | `?GCD1` *command*
`?!GCD0` *command* | `?!GCD1` *command*

Scope: function playback

?GCD0 tests the status of the Carrier Detect line on Port 0. ?GCD1 tests the status of the Carrier Detect line on Port 1. If the value returned is 1 (true), then *command* is executed. Otherwise, function execution continues with the next statement in the function.

?!GCD0 and ?!GCD1 function similarly, except that *command* is executed if the value returned is 0 (false).

?GCD0, ?GCD1, ?!GCD0, and ?!GCD1 are primarily used to control communication with a modem connected to the VM700T.

Example:

```
?GCD0 return
delay 5
loop
```

This first line of this example tests the status of the Carrier Detect line on serial port 0. If the test returns true, the function returns to its caller. If it returns false, the function waits one half-second, then loops back to the first command.

Using ? and ?! with the Global Out-of-Limits Flag

Syntax Form:	?GOOL *string* | ?!GOOL *string*
Descriptive Form:	?GOOL *command* | ?!GOOL *command*
Scope:	function playback

The ?GOOL query returns the status of the global out-of-limits flag. If the most recently executed application fould one or more measurements that were out-of-limits, this flag is set to TRUE. If the global out-of-limits flag returns 1 (true) when ?GOOL is executed, then *command* is executed. Otherwise, function execution continues with the next statement in the function.

The ?!GOOL query functions similarly, except that *command* is executed if the value returned is 0 (false).

The GOOL flag must be reset to 0 explicitly within a function. It is a good programming practice to do this just before executing a measurement application.

Example:

```
set GOOL 0
execute K_Factor
getresults
?GOOL print K_Factor
```

The first line of this sample function sets the global out-of-limits flag to 0. The second and third lines execute a measurement application (in this case, K_Factor) and write a results file from it. The last line tests to see if the global out-of-limits flag was asserted, i.e., if any measurement returned an out-of-limits value since the last time the out-of-limits flag was de-asserted. If `?GOOL` returns true, then the command "print K_Factor" is executed to print out the results file.

Naming Conventions

This section tells where to find the legal button names, and discusses the rules for forming application, softkey, and function names for use in function and remote operation commands.

Button Names

Table 2–3, accompanying the description of the `hardkey` command on page 2–12, lists the legal button names.

Major-Mode Applications

Major-mode applications are reachable with single-button presses in front-panel operation. These applications are Waveform, Vector, Picture, and Auto. Major-mode applications can be executed in functions or remote operation using the `execute` or `hardkey` commands, followed by the button or application name.

Example:

```
VM700T> execute Waveform
VM700T> hardkey Waveform
VM700T> execute Vector
VM700T> hardkey Vector
VM700T> execute Picture
VM700T> hardkey Picture
VM700T> execute auto
VM700T> hardkey auto
```

All of these example commands cause the major-mode applications named in them to execute.

Measure-Mode Applications

Measure-mode applications are the applications available when you press the Measure front-panel button. These include measure-mode video measurements and diagnostics. They may also include optional video measurements and audio measurements, if your VM700T is equipped with options.

To form the application name for a measure-mode application, use the name exactly as displayed in the directory window. If the name is split over two lines, substitute a tilde character ('~') for the carriage return between the two parts of the name.

Examples:

The H_Timing measurement, whose soft key looks like this in the video-measurements directory window:

H_Timing

would be executed like this:

```
VM700T> execute H_Timing
```

The ChromLum Gaindelay measurement, whose soft key looks like this in the video-measurements directory window:

```
ChromLum
GainDelay
```

would be executed like this with a remote command:

```
VM700T> execute ChromLum~GainDelay
```

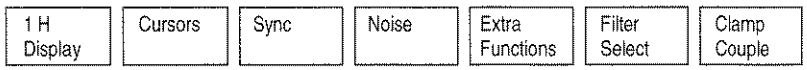
It is important to match upper and lower case and any special characters that appear in the application name *exactly.*

Soft Key and Function Names

The general rule for forming a soft key name is to take the spelling and capitalization from the text displayed, omit any variable part, and join all words with an underscore character ('_').

Examples:

The default set of soft keys that appears on the screen when you press the Menu button while the VM700T is in Waveform mode looks like this:



A function that executes Waveform and presses each of these soft keys in turn is as follows:

```
execute Waveform
hardkey Menu
softkey H_Display
delay 20
softkey Cursors
delay 20
hardkey Menu
delay 10
softkey Sync
delay 20
```

```
hardkey Menu
delay 10
softkey Noise_dB
delay 10
softkey Noise_dB
delay 10
softkey Extra_Functions
delay 20
hardkey Menu
delay 10
softkey Filter_Select
delay 20
hardkey Menu
delay 10
softkey Clamp_Couple
delay 20
hardkey Menu
delay 10
hardkey Menu
```

The `delay` commands are inserted between the various `softkey` and `hardkey` commands so that you can see the effects of each command when the function is replayed.

Note that a `hardkey Menu` command follows the commands to touch the Cursors, Sync, Extra_Functions, Filter_Select, and Clamp_Couple soft keys. This is because each of these soft keys displays a submenu when touched. `hardkey Menu` returns you to the top-level menu of an application from any submenu.

Note also that the Noise_dB soft key is touched twice in succession. This is because this soft key toggles on and off. The first command highlights the soft key. At this point you can change the value displayed in the soft key by means of a `knob` command. The second command turns the soft key highlight off.

Select Line Soft Keys

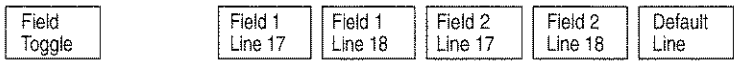
The exceptions to the soft key naming rule are the soft keys that select a system line after you press the Select Line button.

For most Measure-mode applications, the names for these soft keys are Preset*N*, where *N* varies from 1 to the number of line soft keys available.

For the Waveform, Vector, ICPM, Bowtie, and Lightning applications, however, the names for these soft keys are Preset*Nstd*, where *N* again varies from 1 to the number of soft keys available, and *std* can be either NTSC or PAL.

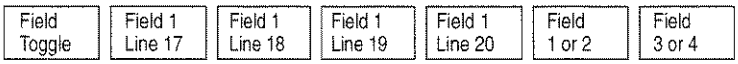
Examples:

The default soft keys that appear when you press the Select Line button in the Bar LineTime application while using the NTSC standard are:



The names of these soft keys, from left to right, are: Field_Toggle, Preset1, Preset2, Preset3, Preset4, Default_Line.

The default soft keys that appear when you press the Select Line button in the Waveform application while using the NTSC standard are:



The names of these soft keys, from left to right, are: Field_Toggle, Preset1NTSC, Preset2NTSC, Preset3NTSC, Preset4NTSC, Field_1_or_2, and Field_3_or_4.

The default soft keys that appear when you press the Select Line button in the Waveform application while using the PAL standard are:

The names of these soft keys, from left to right, are: Field_Toggle, Preset1PAL, Preset2PAL, Frame_1, Frame_2, Frame_3, and Frame_4.

Table 2–5 tells whether each video application uses the PresetN form or the PresetNstd form of line selection soft key names. It also lists the video applications that do not use presets in their line selection soft keys, as well as those that do not use the Select Line button.

Audio applications don't use the Select Line button.

For video applications not listed here (that is, applications that may come in future option packages for the VM700T), the easiest way to ascertain which form of the Select Line soft key name to use is to create a function that uses those soft keys. You can then examine the function for `softpress` commands that correspond to the soft keys you wish to use. The `softpress` commands will show the correct names for the soft keys.

Table 2–5: Select Line Soft Key Names

Preset Form	Soft Key Names
Uses PresetN	Bar~LineTime ChromLum~GainDelay Chrominance~FreqResp Chrominance~NonLinearity ColorBar DGDP Echo GroupDelay~SinX_X H_Timing K_Factor Luminance~NonLinearity MultiBurst Noise~Spectrum Rounding~Errors ShortTime~Distortion SoundInSync Teletext TwoField
Uses PresetNstd	Bowtie ICPM Lightning Vector Waveform
Doesn't Use Presets	Chrominance~AMPM
Doesn't Use Select Line	Bounce Burst~Frequency H_Blank Jitter Jitter~LongTime Line~Frequency Picture SCH_Phase VITS~ID V_Blank Video~Standard

Status and Events

Status and Events

This section lists the error and feedback messages returned by the VM700T, and their meanings.

Command Input Error Messages

Table 3–1: Command Input Errors

Computer Mode	Terminal Mode	Computer Mode	Terminal Mode
?001	Bad command argument	?017	Remote not enabled
?002	Sub-function not found	?101	Request filtered
?003	Playback nesting too deep	?102	Screen event not key
?004	Function directory inaccessible	?103	Unknown softkey
?005	Function not found	?104	Invalid softkey
?006	Unknown command	?105	Unwanted hardkey
?007	Unknown hardkey	?106	Unknown input
?008	Out of memory	?107	Not found
?009	Recursive function call	?108	Request not supported
?010	Bad command in this context	?109	No server resources
?011	Name too long	?110	Illegal name
?012	No filename	?111	Not writable
?013	Line too long	?112	Not readable
?014	Command only meaningful for non-IP connections	?113	No permission
?015	Bad time format (use getclock)	?114	Bad argument(s)
?016	Function playback in progress. Enter ^C to stop it.		

Feedback Messages

Table 3–2: Messages

Computer Mode	Terminal Mode	Computer Mode	Terminal Mode
a	Function playback in progress. Enter ^C to stop it.	!006	Hit CR to continue.
a	Function playback continues...	!007	Remote terminated.
a	Function playback terminated.	!008	Remote has been terminated locally.
a	Function playback completed.	@*name* b	Results in file *name* b
!005	c	!010	application-specific message

a **This message has no computer mode equivalent.**

b ***Name* is the file where measurement results are stored after a getresults command.**

c **This message indicates that a function is displaying text on the screen or else an error has occurred in function playback. This message has no terminal mode equivalent.**

NOTE. *In computer mode, a @ is returned after successful command completion; a ! precedes a message; and a ? precedes an error.*

Examples

Simple Remote Control

This section describes how to control the VM700T remotely, using a terminal emulator program such as Kermit or Telnet. It assumes that you already have a terminal emulator program on your PC, and that you know how to use it.

The section concerns itself with the specific operations required to control the VM700T in a terminal session, where the user types commands into the PC or terminal one at a time. *Computer-Based Remote Control*, starting on page 4–17, tells how to write programs that control the VM700T without requiring human intervention or supervision.

Remote operation on the VM700T is performed via the serial (RS-232-C) ports on the rear panel. The Getting Started section entitled "Connecting the PC and the VM700T," discusses the VM700T RS-232-C port requirements in detail and shows typical cable wiring configurations.

The VM700T has two modes for remote control: "no-protocol" mode and "SLIP" mode. The VM700T is in "no-protocol" mode when the Protocol setting for the Remote Control port in the Communication Setup file has a value of "None". The VM700T is in "SLIP" mode when the "Protocol" setting for the Remote Control port in the Communication Setup file has a value of "SLIP".

In no-protocol mode, the VM700T and the PC/terminal communicate without any special communications protocol. There is simply a cable connection between the VM700T and the PC/terminal, over which commands and data are exchanged. When the VM700T is in no-protocol mode, you can use any commonly available communications program, such as Kermit, ProComm, or Qmodem.

No-protocol mode has two important limitations:

- In no-protocol mode, there is no control to ensure that information is not corrupted in transit between the VM700T and the PC/terminal.
- No-protocol mode cannot be used to write files onto the non-volatile memory in the VM700T. This limitation ensures that corrupted information will not be written into the critical operating files and settings of VM700T file system.

Protocol, or SLIP, mode establishes an error-free connection between the VM700T and the PC, through the use of data checking and re-transmission techniques. When the VM700T is in SLIP mode, it lets you write files into its non-volatile memory, by means of programs such as FTP (File Transfer Protocol, for which implementations exist on many platforms, including PC's).

Communicating with the VM700T when it is in SLIP mode requires that you have a program running on the PC that implements SLIP (Serial Line Internet Protocol). Several SLIP implementations are commercially available.

The one in use by the VM700T developers at Tektronix is called "PC/TCP," and is produced by FTP Software, Inc.[1] Other packages available for PC's and compatibles include KA9Q/NET,[2] BW?TEL,[3] CMU PC/IP,[4] MIT PC/IP,[5] FUSION,[6] Internet-PC,[7] PC-NFS, [8] and WIN/PC.[9]

If you only need to send commands and receive data from the VM700T and do not need to send files into it, you should consider using Tektronix' VMT program. This program is made to communicate with the VM700T. It incorporates more knowledge of the VM700T than a general-purpose terminal emulator can, and makes the task of remote control of the VM700T considerably easier. To order the VMT program, contact your Tektronix sales representative.

Tektronix also makes available a set of programs called VMBKUP, consisting of the VMFTP program (for one-file-at-a-time transfers) and VMBACKIT (for multiple-file transfers). These programs are highly recommended if your major purpose in transferring files is simply to back up data residing on the VM700T. See your Tektronix sales representative for more details about the VMBKUP software package.

The rest of this section tells you how to perform common VM700T operations using either a no-protocol terminal emulator (for example, Kermit) or a SLIP-protocol one (for example, Telnet). Whether the VM700T is in no-protocol mode or SLIP mode, the steps you use to perform most actions during a terminal session are the same. The operations described in this section include the following:

- how to start a terminal session
- how to read or set configuration parameter values
- how to `execute` measurements
- how to get measurement results
- how to end a terminal session
- how to transfer files (SLIP mode only)

1 **Contact: FTP Software, Inc., 26 Princess St., Wakefield, MA 01880.**

2 **Contact: Phil Karn, KA9Q, 25-B Hillcrest Rd., Warren, NJ 07060.**

3 **Contact: Beame & Whiteside Software Ltd., 259 Fiddler's Green Road, Ancaster, Ontario, Canada L9G 1W9.**

4 **Contact: Drew D. Perkins, Carnegie Mellon University, 4910 Forbes Ave., Pittsburgh, PA 15213**

5 **Contact: M.I.T. Microcomputer Center, Room 11-209, 77 Massachusetts Ave., Cambridge, MA 02139.**

6 **Contact: Network Research Corporation, 2380 N. Rose Avenue, Oxnard, CA 93030.**

7 **Contact: Sirius Systems, Inc., Box 2202, Petersburg, VA 23804.**

8 **Contact: Sun Microsystems, Inc., 2550 Garcia Ave., Mountain View, CA 94043.**

9 **Contact: The Wollongong Group, 1129 San Antonio Road, Palo Alto, CA 94303.**

Starting a Terminal Session

Before you start a terminal session with the VM700T, you should check several things:

1. Verify that a serial port on the PC and a serial port on the VM700T are connected via an RS-232-C cable;
2. Verify that the correct drivers are loaded on the PC, if you intend to use SLIP mode. (Check your CONFIG.SYS file; if you are using PC/TCP, for instance, it should contain two lines that load the SLIP.SYS and IPCUST.SYS drivers, respectively.)
3. Check the settings contained in the Communication Setup file in the /nvram0/ConfigFiles directory. To do so, do the following:
   a. Display the Communications Setup file on the VM700T screen (press the Configure button, touch the Configure Files soft key, touch the icon for the Communications Setup file). Check the following settings:
   b. Remote Control Port should be set to the port that the RS-232-C cable is connected to.
   c. Message Display should be set to Remote if you want messages from VM700T functions to be displayed on the PC/terminal, or to VM700 Screen if you want messages to be displayed on the VM700T screen.
   d. If you are using no-protocol mode, Non-SLIP Interfacing mode should be set to Terminal.
   e. Scroll to the communications parameters (Protocol, Baud Rate, Flow Control, Character Size, Parity, Reset Character, Carrier Detect) for the remote control port (0 or 1).
   f. If you are using no-protocol mode, set Protocol to None, otherwise set it to SLIP.
   g. Set the baud rate as desired.
   h. Set flow control to CTS/RTS for hardware flow control, XON/XOFF for software flow control, whichever your communications program supports. Note that in SLIP mode, Flow Control becomes CTS/RTS regardless of the setting displayed.
   i. Set Character Size to an appropriate value. (A value of 8 almost always works.) Note that in SLIP mode, Character Size becomes 8 regardless of the setting displayed.
   j. Set the Reset Character to "none" on the Remote port.

k. Set Carrier Detect to "disabled". (This parameter is not currently used, but is reserved for future use.)

4. Start your communications program, and configure it to send commands out the communications port connected to the VM700T.

5. Type the command `remote`.

At this point, further presses of the carriage return key should return the VM700T prompt on a new line. You are now communicating with the VM700T via remote connection.

Executing Measurements

The `execute` command starts applications on the VM700T. It takes a single parameter, the name of the application being invoked. When an application name takes two lines to display on the screen, the parameter name is formed using a "~" (tilde) between the two lines. See the description of the `execute` command in *VM700T Remote Commands* on page 2–7 for a complete list of VM700T applications.

NOTE. *New applications may be included as new version of the* VM700T *are introduced. Press the Measure key to find out what applications are available for your* VM700T.

Examples:

```
VM700T> execute Vector
```

starts Vector Mode on the VM700T.

```
VM700T> execute Chrominance~NonLinearity
```

starts the Chrominance~NonLinearity measurement on the VM700T.

Getting Measurement Results

To make a measurement and retrieve the results remotely, do the following:

1. Start the measurement, using the `execute` command ("`execute` *application-name*").

2. Send the `getresults` command.

3. Send the command `show` *application-name*.

The execute command starts the application. The getresults command takes a "snapshot" of the application's measurements and stores them in a file in the Measurement Results directory. When the results are written in the file, the VM700T sends a message out the control port, consisting of the filename in which the results were stored. This is always the same as the application name.

Each invocation of getresults writes a new set of measurement values into the Measurement Results directory. This new set overwrites the previous contents of the Measurement Results file for the current application name. For example, if the H_Timing measurement is running, issuing the getresults command writes the current measurement results into a file called H_Timing in the Measurement Results directory. Issuing getresults again writes a new set of results into a file with the same name (H_Timing) in the same directory (Measurement Results). The results produced by the first getresults command are lost.

You can save results from successive getresults commands by using the rename command, or by using logging or file-saving features available with your telecommunications program.

When a measure-mode application is running, getresults takes a single, optional argument. That argument is the keyword verbose, which for certain measurements provides a complete list of measured points. The measurements that accept the verbose argument are DGDP, Luminance~NonLinearity, Noise~Spectrum, and GroupDelay~SinX_X .

Measure-mode video measurements also write out their results (just as if a getresults command was issued) when exiting (for example,when another measurement or mode is started). Note, however, that while the getresults command always ensures that completed measurement results are written, simply exiting a measurement may not.

In Auto mode, getresults can take a list of arguments, each consisting of the four-letter keyword of an Auto-mode measurement. If getresults is issued without any arguments, the results of measurements specified by the current selected measurements file are written to the results file.

When a list of measurements is specified as arguments to getresults, Auto mode continues to make only the measurements specified in the list until another getresults command is sent with a new list, or until the current selected measurements file is reset, or until a restoreconfig command is sent. Thus, if you want results from multiple passes of the same measurements list, only the first getresults command need supply the measurement list. Subsequent getresults commands without arguments will return results from the same list.

show sends the contents of a specified file out the control port. The show command takes a single argument, consisting of the name of the file to be sent. If no pathname is supplied in the show command's argument, the file is assumed to be a results file, residing in the Measurement Results directory.

Most often, the show command is used along with getresults to retrieve or view measurement results just written. However, any file can be viewed with the show command, by specifying either a relative path from the Measure~Results directory, or an absolute system path.

Examples:

```
VM700T> execute K_Factor
VM700T> getresults
Results in file: K_Factor
VM700T> show K_Factor
Measurement Results Channel A Thu Sep 28 14:28:42
2T Pulse K Factor Waveform->Pulse & Bar
Line = 17
Graticule CCIR-2T
Average Off
------------------------------------------------------------
K-2T 0.6 % KF
K-PB -0.2 % KF
PB Ratio 99.0 %
HAD 201.0 n sec
------------------------------------------------------------
VM700T>
```

This example executes the K_Factor measurement, stores the results in a file called K_Factor in the Measurement Results directory, and displays the results on the PC/terminal screen.

```
VM700T> execute Auto
VM700T> getresults PBAM PTTK PSYA
Results in file: Auto
VM700T>
```

This example puts the VM700T into Auto mode, measures the PAL Bar Amplitude Error, 2T Pulse K-Factor, and Sync Amplitude Error for the current channel, then writes the results into a file named Auto in the Measurement Results directory.

```
VM700T> show /nvram0/ConfigFiles/Auto_Limit~Files/PAL/Studio
```

This example displays a file called Studio from the directory of PAL Auto_Limit Files.

Printing Files

The `print` command sends VM700T files to the Copy port (which is usually attached to a printer). The file is printed in two steps. First, the file is copied into the print spooler directory. Then, the print spooler sends it out to the Copy port. The VM700T prompts for a new command as soon as the file is submitted to the spooler; the file need not have actually printed out yet.

The `print` command formats files in accordance with the Copy Format entry in the Communications Setup file. "Formatting" a file means generating page headers, page ejects, and special printer commands, depending on the printer type.

The spool command is similar to print, except that it does not format the file. spool is used when the page formatting implemented by the `print` command is not wanted. The `spool` command differs from `show` in that `spool` is available from remote operation or from function playback, while `show` is only available from remote operation. In addition, `spool` and `print` spool the output file to the Copy port, while `show` simply outputs the file to the Remote Control port.

Function Playback

Function playback can be started from remote control with the `playback` command. The `playback` command takes a single argument, and that is the name of the function to play back. If the function is in a subdirectory, the subdirectory name must be included in the argument.

Example:

```
VM700T> playback Special~Measurements/TransDGDP
```

This example plays back a function called TransDGDP, stored in a directory called Special~Measurements in the /nvram0/FunctionKeys directory.

When a function is being played back remotely, it stops before finishing if issued a Ctrl-C, or upon exit from remote control. If remote control is terminated locally (by pressing the Configure button) while remote function playback is in progress, the function playback stops also.

Informational messages are displayed when functions are played back remotely. The location of the message display is controlled by the Remote Control/Message Display entry in the Communications Setup file. If this entry is set to "VM700T Screen", messages appear on the VM700T screen, and you have to touch the screen to continue function playback. If this entry is set to "Remote", messages appear on the PC or terminal screen, and you have to type `Return` to continue function playback.

Note that when certain commands that normally provide a response (especially `getresults`) are issued from function playback, the response is not seen on the PC or terminal screen. This is true even if the function playback command was issued during remote operation. In such cases, it is important to know EXACTLY what the function is doing, and to store results away periodically for later retrieval.

Example:

Consider the following function, which makes the same Differential Gain video measurement five times, saving the results for retrieval later:

```
execute DGDP
hardkey Menu
softkey ITS_Search # let it find the right line
hardkey Menu
# make 5 passes for retrieval later
getresults
rename DGDP DGDP1
delay 36000 #delay one hour
getresults
rename DGDP DGDP2
delay 36000 #delay one hour
getresults
rename DGDP DGDP3
delay 36000 #delay one hour
getresults
rename DGDP DGDP4
delay 36000 #delay one hour
getresults
rename DGDP DGDP5
```

Playing back this function from remote operation would produce no output on the screen. If the individual commands were issued directly, each `getresults` command would return the string "Results in file: DGDP." By using the `rename` command, however, it is easy to store away results in the Measurement Results directory for later retrieval with the `show` command.

Reading/Setting Configuration Parameters

Configuration Files

The VM700T reads several files when it is powered up. The Source_Selection Video file specifies a file from the Video_Source Files directory, one for each channel. VM700T units equipped with both Option 01 and Option 11 specify a file from the Video_Source Files directory for each channel and for each standard (NTSC and PAL).

Files from the Video_Source Files directory tell the VM700T what files to read in other directories to get configuration information. These files and their corresponding directories include the following:

- Auto Limits File: tells what file to read from the Auto_Limit Files directory to get the caution and alarm limits on Auto-mode measurements.
- Measure Limits File: tells what file to read from the Measure_Limit Files directory to get the alarm limits on Measure-mode measurements.
- Measurement Locations File: tells what file to read from the Measurement Locations directory to get the line/position locations of Measure-mode measurements.
- Selected Measurements File: tells what file to read from the Selected_Measurements directory to get the list of selected Auto-mode measurements.
- Option directory files (such as, Component, Teletext, and so on): tells what file to read from the directory given by the option name to get the configuration parameters for that option.

All these files are stored in the nonvolatile memory of the VM700T. At start-up time, the files are read into random-access memory, where they are referenced as needed when the instrument makes measurements or performs other operations.

Configuration Keywords

Each configuration parameter has a unique keyword, consisting of four characters (capital letters or digits). Some keywords also require that a channel specification be included. For example, to find out the PAL Bar Amplitude Error limits for channel A in Auto mode, you would use the keyword and channel specification PBAM A.

Some keywords do not reflect a value from the configuration files, but instead record a specific part of the instrument state. Examples include the following keywords:

- GSRC, which specifies the current video source (channel A, B, or C, or some combination thereof),
- GSSR, which specifies whether or not the signal is locked to source, and
- GLN6, which sets or returns the global line number when using the PAL standard. The corresponding keyword for NTSC is GLN5.

You can find out the current setting of any configuration parameter with the get command. You can set most configuration parameters with the `set` command. Note that these commands modify only the configuration values kept in the memory of the instrument; the files stored in non-volatile memory are not touched.

Therefore, after power to the instrument is cycled, or after the `restoreconfig` command is `executed`, or after a function key is aborted, the actual configuration of the instrument again reflects the values in the files.

Some configuration parameters, especially those relating to communications, such as baud rate, character size, and so on, cannot be set remotely. Parameters that can only be read but not set are listed as "read-only" parameters in *Appendix A: Get/Set Keywords*.

Getting Configuration Parameters

You find out the current value of any VM700T configuration parameter by using the `get` command and the parameter of the keyword. The syntax of the `get` command is as follows:

```
get keyword [channel]
```

Not all keywords require a channel specification. See Appendix B for a complete list of VM700T keywords, their syntaxes, and their meanings.

Example:

```
VM700T> get PBAM A
-5.00 5.00 -10.00 10.00
VM700T>
```

The command `get PBAM A` returns the lower caution, upper caution, lower alarm, and upper alarm limits in effect for the PAL Bar Amplitude Error Auto measurement on channel A.

Setting Configuration Parameters

You can specify the value of any settable VM700T configuration parameter by using the `set` command, followed by the parameter's keyword, a channel specification (if applicable), and the correct number of data values for that parameter. The syntax of the `set` command is as follows:

```
set keyword [channel] value [value[ value...]]
```

Not all keywords require a channel specification. Refer to *Appendix A: Get/Set Keywords* for a complete list of VM700T keywords, their syntax, and their meaning.

Some of the numeric values associated with a keyword might be undefined (represented in the configuration files by a ——— field). To set a value to undefined, use the string "undef" (see examples, below).

When a keyword has several values associated with it (for example, the set of four floating point numbers associated with Auto measurements limits), you can keep a value unchanged by using the string "same" (see examples, below).

Reading in a new configuration file is like re-setting every one of the parameters named in that file. For example, if you set new values for a PAL Auto

measurement limit, and then reset the Auto Limits File name for that channel (keyword: CHAF), you effectively over-write the parameter values you just set. This leads to an important rule: *read in configuration files first, then set individual parameters.*

Examples:

```
VM700T> set PBAM A -6. 6. -12. 12.
```

changes the caution and alarm values used for the PAL Bar Amplitude Error Auto measurement on channel A, and

```
VM700T> set SPCF PostScript
```

changes the current copy format to PostScript.

```
VM700T> set PSNP A 42.0 undef 42.0 undef
```

sets the lower caution limit and the lower alarm limit for the Signal-to-Noise Periodic measurement to 42.0 db, and sets the upper limits to "undefined."

```
VM700T> set PBAE A same same same 12.0
```

sets the upper alarm limit for Burst Amplitude Error in Auto mode on Channel A to 12 percent, and leaves the others unchanged.

Restoring Configuration Parameters

The `restoreconfig` command re-reads all configuration values from the configuration files.

Note that when you record a function, the VM700T puts many `set` commands at the start of the function file, and puts a `restoreconfig` command at the end. These commands make it possible to reproduce the exact state in which a VM700T function was recorded when the function is played back. Upon function completion, the `restoreconfig` command returns the VM700T to its power-up state. (Be warned, however, that any user-specified parameter settings not stored in a file when the `restoreconfig` command is `executed` are lost.)

Most of the keywords set at the beginning of a function are not associated with the configuration files, but with the current global state of the instrument: values like GLN5/GLN6 (global line number), GACP (clamp position in microseconds for channel A), and GCCC (clamp coupling value for channel C). These keywords are not included in any configuration file, thus there is no concept of restoring these values.

There are three configuration values recorded at the beginning of a function that are normally specified from configuration files. These are the names of the video source files for each channel (VNCA, VNCB, and VNCC for NTSC; VSCA, VSCB, and VSCC for PAL). The trailing `restoreconfig` command undoes the effect of these final three `set` commands when the function is finished playing back.

If the `restoreconfig` command is deleted from the function, the state of the VM700T remains as it was when the function key was finished being recorded, which might be different than what is currently in the NVRAM files.

Getting the System Clock Time

The `getclock` command returns the VM700T's system date and time. The `getclock` command does not take any parameters.

Example:

```
VM700T> getclock
Sep 20 11:03:04 1989
```

Setting the System Clock Time

The `setclock` command sets the VM700T system date and time feature. The `setclock` command takes a single parameter in the same format the instrument returns it as a result of a `getclock` command.

Example:

```
VM700T> setclock Aug 20 20:04:00 1996
```

Ending a Terminal Session

To end a terminal session, type `quit` or `exit` to break the remote connection with the VM700T. Then, exit your telecommunications program.

Transferring Files (SLIP Mode Only)

The VM700T must be in SLIP mode to allow you to transfer files into it. This section tells you how to put the VM700T into SLIP mode, and how to use the telnet and ftp programs to transfer files to the VM700T.

If your major purpose in transferring files is simply to back up data residing on the VM700T, or to restore files originally backed up from the VM700T, you may wish to consider a set of programs that Tektronix makes available called VMBKUP. VMBKUP consists of the VMFTP program used for one-file-at-a-time transfers, and VMBACKIT used for backing up multiple files. See your Tektronix sales representative for more details about the VMBKUP software package.

Putting the VM700T into SLIP Mode

Use the following steps to put the VM700T into SLIP mode from the front panel:

1. Press the Configure button.
2. Touch the Configure Files soft key.

3. Turn the knob until the icon for the Communication Setup file appears in the directory window.
4. Touch the icon for the Communication Setup file.
5. Turn the knob until you can read the Port entry for the Remote Control parameter group. It will read None, Serial Port 0, or Serial Port 1. If it is already set to the serial port that the PC is connected to, skip to step 10. Otherwise, continue with the next step.
6. Turn the knob until the "Port" line in the Remote Control parameter group is highlighted.
7. Touch the line on the screen. A box appears around the highlighted line.
8. Turn the knob until the desired value appears.
9. Touch the line on the screen again, or touch the "Accept Input" soft key.
10. Turn the knob until you can read the Protocol entry in the "Port" parameter group for the Remote Control port. If it is already set to SLIP, you're done. Touch the "Update & Exit" soft key to exit the editing session. Otherwise, continue with the next step.
11. Turn the knob until the "Protocol" line in the "Port" parameter group for the Remote Control port is highlighted.
12. Touch the line on the screen. A box appears around the highlighted line.
13. Turn the knob until the value "SLIP" appears.
14. Touch the line on the screen again, or touch the "Accept Input" soft key.
15. Touch the Update & Exit soft key to exit the editing session.

Starting ftp

FTP (File Transfer Protocol) transfers files from one computer to another, using the TCP/IP protocol.

FTP connections take place between a *server* and a *client*. The server listens on a TCP/IP logical port for connection requests. The client issues a connection request to a waiting server, and a connection is made during which files can be transferred.

File transfers are managed between FTP participants through commands from the client and responses from the server. There are commands available to send and receive files, to change the server's working directory, to get directory listings, to create new directories, and to remove directories and files.

The VM700T implements the FTP protocol in such a way that it can act as an FTP server, while a computer connected to it can act as an FTP client. In order to use FTP to access the file system of the VM700T, you must have an FTP client

program running on the computer connected to the VM700T. In addition, the FTP program must be running on the VM700T. You can use FTP on any serial port configured for SLIP protocol.

To start the ftp program on the VM700T from the front panel do the following steps:

1. Press the Measure button.
2. Go to the /nvram0/Executable~Files/Instrument~Operations directory.
3. Touch the FTP soft key.

The VM700T is ready to be connected to a remote host.

To start the ftp program on the VM700T from remote control do the following steps:

1. Start telnet on your PC, and connect to the VM700T. You can use the ipaddress of the VM700T directly (for example, `telnet 254.254.254.2`, as configured in the /nvram∅/IpConfig file), or you can use a pseudonym from a hosts table entry (for example, `telnet VM700T`).
2. Type the command `execute FTP`.
3. Type the command `quit`.
4. Start ftp on your PC, using either the ip address of the VM700T (for example, `ftp 254.254.254.2`, as configured in the /nvram∅/IpConfig file) or a pseudonym from a hosts table entry (such as, `ftp VM700T`).

If password checking is enabled on the VM700T, you must issue the `PASS` command with the correct password before file access is granted.

Using ftp

Once you have established an ftp connection between the VM700T and your PC, you can transfer files between the PC and the VM700T, find out or set the current VM700T directory, list the files in the current VM700T directory, and quit from the ftp session (among other operations). See your ftp program documentation for a complete list of program capabilities.

The `put` command transfers files from the PC to the VM700T.

Example:

The following command transfers a file named "test.fnc" from the PC to the current directory in the VM700T:

```
ftp:VM700T> put test.fnc

foreign file (default test.tnc):Transferred 91 bytes in 1
seconds (728 bits/sec, 91 bytes/sec)
250 File transfer complete

ftp:VM700T>
```

Certain VM700T files are not writable via FTP — these generally being those which control communication parameters of the VM700T.

When you try to write a configuration file, the file is compared against an internal template to ensure that it will be readable when needed by the VM700T. If this check fails, an error is returned, and the file is not written. To ensure the proper file format, it is a good idea to first read a valid matching configuration file from the VM700T, modify it locally, then write it back.

NOTE. *Configuration files, when successfully written, will not take effect in the* VM700T *until the* `restoreconfig` *command is issued from a remote connection or function playback, or until you cycle power on the* VM700T.

The `get` command transfers files from the VM700T to the PC.

Example:

The following command transfers a file named "Func1" from the VM700T's current directory to the PC.

```
ftp:VM700T> get Func1
local file (default Func1): func1.txt
Transferred 91 bytes in 0 seconds
250 File transfer complete
ftp:VM700T>
```

The `pwd` command returns the current VM700T directory.

Example:

```
ftp:VM700T> pwd
257 Current directory is "/nvram0/FunctionKeys".
ftp:VM700T>
```

The `cd` command sets the current VM700T directory.

Example:

```
ftp:VM700T> cd /nvram0/ConfigFiles
250 Change of directory successful.
ftp:VM700T>
```

The `ls` command lists the files in the current VM700T directory.

Example:

```
ftp:VM700T> ls
Timed~Functions
Func1
Transferred 24 bytes in 1 seconds (192 bits/sec, 24
bytes/sec)
250 File listing complete.
ftp:VM700T>
```

The `dir` command is similar to `ls`, but also returns the size (in bytes) of each directory entry. Entries with a size of 0 are most likely (but are not necessarily) directories.

Example:

```
ftp:VM700T> dir
      0  Timed~Functions
     85  Func1
Transferred 42 bytes in 0 seconds
250 File listing complete.
ftp:VM700T>
```

Both `quit` and `exit` terminate the ftp connection.

Example:

```
ftp:VM700T> quit
C:\>
```

Computer-Based Remote Control

This section describes how to write programs to control the VM700T remotely, without operator intervention.

There are several reasons you may wish to write a program to control the VM700T instead of controlling it from a terminal or using its front panel. These are the following:

- a greater degree of automatic operation. Repetitive operations are more efficient and less prone to error when executed from a program than manually.
- faster execution. A set of operations written into a program will generally execute faster than the same operations performed manually.
- ability to branch. You may wish to make some measurement, then perform different action depending on the results of the measurement. Since the VM700T command language contains only limited branching constructs, any alternative courses of action you may wish to take can't be written into a VM700T function. They must be written into a program.

A "shell" program that you can use as a template for your own programs appears later in this chapter. Before presenting it, however, this chapter discusses several other matters you must consider when writing programs to control the VM700T. Those things discussed are the following:

- the programming language you are going to use
- whether or not you need a communications library for the language you choose
- how the VM700T communicates with a computer program, including how the VM700T signals the following conditions:
  - acceptance of a command
  - error conditions
  - completion of a transmission and readiness to accept another command

Programming Languages

Before you start to write programs to control the VM700T, you have to decide what language to write the program in. You can write programs to control the VM700T in any programming language you like. However, you will probably want to use a language for which libraries of routines are available to handle data communications. BASIC, C, and Pascal are good choices. The sample program presented in this chapter is written in Microsoft QuickBASIC. (C and Pascal users should have no problem understanding the BASIC code; the reverse is probably not true, which is why the program appears in BASIC.)

Communications Libraries

You will probably want to purchase a commercial library of communications routines to use with your program if any of the following applies:

- your program uses SLIP mode to transfer files between the PC and the VM700T
- you are writing in any language other than BASIC and using only no-protocol data transfers
- you are using CTS/RTS flow control

Communications packages currently available for BASIC, C, and Pascal (and the companies that produce them) include the following:

BASIC:	QuickComm (Software Interphase)
C:	C Asynch Manager (Blaise Computing), Comm Library (Greenleaf Software), C Communications Toolkit (Magna Carta), Silverware C Asynch Library (SilverWare), Essential Communications (South Mountain Software)
Pascal:	Pascal Asynch Manager (Blaise Computing)

In addition, the section entitled *Simple Remote Control* beginning on page 4–1 lists sources for commercially available SLIP implementations.

Communicating with the VM700T

Before you can write programs to control the VM700T, you must know how the VM700T communicates with a computer and understand the following:

- terminal versus computer mode (such as local versus remote echo)
- VM700T responses that indicate: acceptance of a command; error conditions; completion of a transmission
- exceptions to the previous item: the `playback` command.

Terminal versus Computer Mode

When remotely controlled, the VM700T operates in either *terminal* mode or *computer* mode.

Terminal mode is intended for use when the VM700T is being controlled interactively from an actual terminal (with no processing capabilities). In terminal mode the VM700T acts as follows:

- echoes characters it receives
- adds a space after sending its prompt
- sends error messages as alphabetic text

Computer mode is intended for use when the VM700T is being controlled by a computer program, without human intervention. In computer mode, the VM700T acts as follows:

- does not echo characters it receives
- sends only its prompt when execution of a command is completed (no additional space)
- sends error messages as numerical encodings, not alphabetic text

When you write a computer program to control the VM700T, the VM700T is best used in computer mode.

VM700T Responses

In computer mode, the VM700T responds to commands in one of two ways.

- The VM700T sends an '@' character if the command was successful.
- The VM700T sends a '?' character or '!' character followed by a three-digit error encoding if the command was not successful.

After sending the '@' character, the VM700T sends any data transmission initiated by the command (for example, `show` *filename*). When this data transmission is complete, the VM700T sends the remote prompt to indicate readiness to accept another command.

The exception to this rule is the `playback` command. After it receives a `playback` command, the VM700T sends no '@'. Once function playback begins, the next character the computer program receives from the VM700T will be either a '?' or '!' character (if an error occurs during function playback, or if the VM700T sends an informational message) or the characters that make up the remote prompt.

After sending the '?' or '!' character and a three-digit error identifier, the VM700T sends the remote prompt, unless the error is returned because remote operation has been terminated.

Structure of a VM700T Program

Once you know the rules that the VM700T uses to respond to commands, you can determine what the structure of a generic VM700T remote control program should be. Such a program can be divided into three parts:

- initialize variables, then establish communication and remote operation
- execute and respond to commands
- clean up

The first part of the program sets up any variables that will be required, opens any files that will be required, opens a communications channel to the VM700T, then (in no-protocol mode) sends the command "remote". If this operation is successful, the LED in the front panel Configure button starts blinking. This indicates that the VM700T is now in remote mode and is being controlled by the computer program. (You can terminate remote operation from the front panel by pressing the Configure button. If remote operation is terminated in this way in no-protocol mode, it can be restarted by sending the command "remote".)

The main loop of the program sends a command to the VM700T, reads the response from the VM700T, performs an appropriate action depending on the response received (such as branching to another part of the program, displaying an error message, logging data into a file, and so on), reads the VM700T prompt, then loops back to send another command. This loop may also need to handle flow control (such as, telling the VM700T to stop sending characters until the ones already sent can be processed, and restarting the flow of characters from the VM700T once they are processed). The main loop of the program should execute until the setting of some variable indicates that program execution is complete.

The final part of the program performs final cleanup functions (writing out and closing files, closing communications channels, restoring the initial configuration of the VM700T, and so on).

Sample Program: SHELL.BAS

The following pages list and explain a sample program called SHELL.BAS to control the VM700T. You can use this sample program as a starting point from which to write your own VM700T programs.

Before running the program, make sure that the VM700T is properly set up for communicating with the PC: the proper cable is connected to the proper port on both the PC and the VM700T, the remote port is set correctly in the Communication~Setup file, the baud rate is set correctly, and all the other communication parameters are right. When running SHELL.BAS, make sure that Flow Control for the remote port in the VM700T is set to XON/XOFF.

A listing of the SHELL.BAS program follows, along with comments about what each section of the program does.

Program Overview

SHELL.BAS is written in Microsoft QuickBASIC. SHELL.BAS accepts as input a user-specified text file containing VM700T commands, written one command to a line. The program reads and executes each command sequentially. SHELL.BAS logs all commands and data in another user-specified file, in addition to displaying them on the PC screen.

SHELL.BAS demonstrates many items of interest in writing programs for the VM700T, including the following operations:

- how to acquire the VM700T prompt the first time, so that it can be monitored to indicate the completion of a transmission from the VM700T
- how to handle VM700T responses to commands
- how to handle XON/XOFF flow control
- how to decode VM700T error codes

Preliminaries

Lines 1 through 35 perform some preliminary tasks before the main part of the program starts.

Lines 5 through 10 declare several functions and subroutines that will be used later.

Lines 12 through 18 set up some global variables that will be needed later.

Lines 19 through 35 get the names of the input and output files from the keyboard, open the files, then start the output file by writing the date, the time and the names of the input and output files.

Establishing Communication

Lines 37 through 42 establish communication with the VM700T.

Line 38 sets up output port COM1 on the PC to communicate at 9600 baud, no parity, eight data bits, one stop bit, send a line feed with each RETURN, and initialize the DSR (Data Set Ready) line to 0.

Line 39 sends the command `remote` out port COM1.

Line 40 calls the `GetPrompt` function, which waits for the response from the VM700T and records the VM700T prompt for later use in recognizing end-of-transmission.

Line 41 displays the prompt character sequence on the screen. Line 42 writes the prompt character sequence to the output file.

Main Program Loop

Lines 44 through 94 form the main program loop.

Lines 46 through 79 form a large WHILE loop that executes as long as there are lines to be read from the input file and no fatal error has been encountered.

Line 47 reads a line from the input file. If the line read is not blank, line 49 prints it on the screen, line 50 writes it to the output file, and line 51 sends it to the VM700T by calling `PutCmd`.

Lines 52 through 67 handle the case where `PutCmd!` returns a non-zero value, such as an error or warning message happened during execution of the last command.

Program Listing

Table 4–1: Sample Program Listing

Line	
	`' sample program for controlling VM700T`
	`' reads text file containing VM700T commands`
	`'`
	`' declarations`
5	`DECLARE FUNCTION ReadError! (return$)`
	`DECLARE FUNCTION ReadString (text$, start$, p$)`
	`DECLARE FUNCTION PutCmd! (Cmd$, return$)`
	`DECLARE FUNCTION getPrompt$ (i%)`
	`DECLARE SUB gettimeout (i%)`
10	`DECLARE SUB VMError (c!, message$)`
	`'`
	`' preliminaries`
	`holdoff = 0 'used for XON/XOFF flow control`
	`xon$ = CHR$(17) 'used for XON/XOFF flow control`
15	`xoff$ = CHR$(19) 'used for XON/XOFF flow control`

Table 4–1: Sample Program Listing (Cont.)

```
Line
        return$ = ""
        fatalerror = 0
        CLS
        ' get name of file to read commands from
20      infile$ = ""
        WHILE infile$ = ""
          INPUT "Name of command file (input):", infile$
          WEND
        OPEN infile$ FOR INPUT AS #2
25
        ' get name of file to log results to
        outfile$ = ""
        WHILE outfile$ = ""
          INPUT "Name of log file (output):", outfile$
30        WEND
        OPEN outfile$ FOR OUTPUT AS #3
        PRINT #3, DATE$
        PRINT #3, TIME$
        PRINT #3, "Input file:"; infile$
35      PRINT #3, "Output file:"; outfile$

        ' setup
         OPEN "com1:9600,N,8,1,LF,DS0" FOR RANDOM AS #1
         PRINT #1, "remote"
40       prompt$ = getPrompt$(1)
         PRINT "Prompt: "; prompt$
         PRINT #3, "Prompt: "; prompt$
        'main loop
45       'read lines from input file
         WHILE NOT (EOF(2)) AND fatalerror = 0
           LINE INPUT #2, inputline$
           IF inputline$ <> "" THEN
             PRINT inputline$
50           PRINT #3, inputline$
             c = PutCmd!(inputline$, return$)
             IF c <> 0 THEN
               fatalerror = 1
               IF c < 0 THEN
55               PRINT "Error encountered:"; -c
                 PRINT #3, "Error encountered:"; -c
               ELSE
                 PRINT "Warning message:"; c
                 PRINT #3, "Warning message:"; c
60               END IF
               CALL VMError(c, message$)
```

Table 4–1: Sample Program Listing (Cont.)

```
Line
                PRINT message$
                PRINT #3, message$
                IF c <> 7 AND c <> 8 AND c <> -17 THEN
65                c = PutCmd!("quit", return$)
                  END IF
                END IF
              IF fatalerror = 0 THEN
                d = 0
70              DO UNTIL d = 1
                  d = ReadString(c$, return$, prompt$)
                  PRINT c$
                  PRINT #3, c$
                  LOOP
75              PRINT prompt$;
                PRINT #3, prompt$;
                END IF
              END IF
            WEND
80        IF fatalerror = 0 THEN
            PRINT:PRINT "End of input file reached"
            PRINT #3,:PRINT #3, "End of input file reached"
            PRINT "quit"
            PRINT #3, "quit"
85          c = PutCmd!("quit", return$)
            IF c <> 0 THEN CALL VMError(c, message$)
          ELSE 'fatalerror=1
            PRINT "Fatal error encountered"
            PRINT "Program terminated"
90          PRINT #3, "Fatal error encountered"
            PRINT #3, "Program terminated"
            END IF
          CLOSE ALL
          END
95        FUNCTION getPrompt$ (i%)
          SHARED holdoff
          SHARED xon$, xoff$
           DO
           LOOP UNTIL NOT EOF(i%)
100       loopa1:
          '
          ' Check if the input buffer is up to 128 bytes.
          ' If it is, then send xoff to stop transmission
          '
105         IF LOC(i%) > 128 THEN
              holdoff = 1
```

Table 4–1: Sample Program Listing (Cont.)

Line	
	PRINT #i%, xoff$; END IF
	'
110	' If there are characters to read in, then do so,
	'
	IF LOC(i%) > 0 THEN c$ = INPUT$(LOC(i%), #1) text$ = text$ + c$
115	END IF
	'
	' If there are no more characters left, and tx has been held off,
	' then turn it back on with xon.
	'

120	IF holdoff AND LOC(1) = 0 THEN
	holdoff = 0
	PRINT #i%, xon$;
	END IF

	'
125	' Check for eof, and loop for a while in case it was only momentary.
	'
	IF NOT EOF(i%) THEN GOTO loopa1 FOR j = 1 TO 4000
	IF NOT EOF(i%) THEN EXIT FOR
130	NEXT
	'
	' If the loop was exited early, then continue with reading.
	'
	IF j < 4000 THEN GOTO loopa1
135	getPrompt$ = text$
	END FUNCTION
	FUNCTION PutCmd (Cmd$, return$)
	PRINT #1, Cmd$
140	PutCmd = ReadError(return$)
	END FUNCTION
	FUNCTION ReadError (return$)
	return$ = ""
	ErrCode = 0
145	' Read in VM700T Computer response
	DO UNTIL LOC(1) > 0
	LOOP
	c$ = INPUT$(1, #1)
	IF c$ = "?" OR c$ = "!" THEN
150	DO UNTIL LOC(1) >= 3
	LOOP

Table 4–1: Sample Program Listing (Cont.)

```
Line
            num$ = INPUT$(3, #1)
            ErrCode = VAL(num$)
            IF c$ = "?" THEN
155           ErrCode = -ErrCode
              END IF
          ELSEIF c$ <> "@" THEN
            return$ = c$
          END IF
160     ReadError = ErrCode
        END FUNCTION

        FUNCTION ReadString (text$, start$, p$)
        SHARED holdoff
165     SHARED xon$, xoff$
         DO                          ' Wait until there are
           LOOP UNTIL NOT EOF(1)     ' Characters to read.
         temp$ = start$              ' Initialize temp$
         last = 0                    ' Flag for prompt found
170
         p = 1                       ' Initialize prompt count
         FOR i = 1 TO LEN(start$)
         temp2$ = MID$(start$, i, 1)
         temp3$ = MID$(p$, i, 1)
175      IF temp2$ = temp3$ THEN p = p + 1 ELSE p = 1
         NEXT

         done = 0                  ' Set done flag to zero
180      DO WHILE done = 0
        '
        ' Check if the input buffer is up to 128 bytes.
        ' If it is, then send xoff to stop transmission
        '
185        IF LOC(1) > 128 THEN
             holdoff = 1
             PRINT #1, xoff$;
           END IF
        '
190     ' If there are characters to read in, then read one in.
        '
           IF LOC(1) > 0 THEN
             c$ = INPUT$(1, #1)
             IF ASC(c$) = 10 THEN        ' If linefeed, then done
195            done = 1
             ELSEIF ASC(c$) <> 13 THEN   ' Skip carriage returns
               temp$ = temp$ + c$        ' Add it to string
```

Table 4–1: Sample Program Listing (Cont.)

```
Line
                d$ = MID$(p$, p, 1)
                IF d$ <> c$ THEN          ' Is it part of prompt?
200               p = 1                   ' No
                ELSE
                  IF p = LEN(p$) THEN  ' Was it the whole prompt?
                    done = 1                  ' Yes
                    found = 1                 ' Prompt found
205                 text$ = MID$(temp$, 1, LEN(temp$) - p)  ' Remove prompt
                  ELSE
                    p = p + 1
                  END IF
                END IF
210           END IF
            END IF
          ' If there are no more characters left, and tx has
          ' been held off, then turn it back on with xon.
215         IF holdoff AND LOC(1) = 0 THEN
              holdoff = 0
              PRINT #1, xon$;
            END IF
          '
220       ' Check for eof, and loop for a while in case it was only momentary.
            IF EOF(1) AND NOT done THEN
              FOR j = 1 TO 4000
                IF NOT EOF(1) THEN EXIT FOR
              NEXT
225       ' If the loop was exited early, then continue reading.
              IF j > 4000 THEN EXIT DO
            END IF
          LOOP
          IF found = 0 THEN text$ = temp$ ' Line if data without prompt
230       ReadString = found
          END FUNCTION
          SUB VMError (c!, message$)
            SELECT CASE c!
            CASE -1
235           message$ = "Bad command argument"
            CASE -2
              message$ = "Sub-function not found"
            CASE -3
              message$ = "Playback nesting too deep"
240         CASE -4
              message$ = "Function directory inaccessible"
            CASE -5
              message$ = "Function not found"
```

Table 4–1: Sample Program Listing (Cont.)

Line	
	CASE -6
245	message$ = "Unknown command"
	CASE -7
	message$ = "Unknown hardkey"
	CASE -8
	message$ = "Out of memory"
250	CASE -9
	message$ = "Recursive function call"
	CASE -10
	message$ = "Bad command in this context"
	CASE -11
255	message$ = "Name too long"
	CASE -12
	message$ = "No filename"
	CASE -13
	message$ = "Line too long"
260	CASE -14
	message$ = "Command only meaningful for non-IP connections"
	CASE -15
	message$ = "Bad time format (use getclock)"
	CASE -16
265	message$ = "Function playback in progress. Type ^C to stop it."
	CASE -17
	message$ = "Remote not enabled"
	CASE -101
	message$ = "Request filtered"
270	CASE -102
	message$ = "Screen event not key"
	CASE -103
	message$ = "Unknown softkey"
	CASE -104
275	message$ = "Invalid softkey"
	CASE -105
	message$ = "Unwanted hardkey"
	CASE -106
	message$ = "Unknown input"
280	CASE -107
	message$ = "Not found"
	CASE -108
	message$ = "Request not supported"
	CASE -109
285	message$ = "No server resources"
	CASE -110
	message$ = "Illegal name"
	CASE -111

Table 4–1: Sample Program Listing (Cont.)

```
Line
                message$ = "Not writable"
290           CASE -112
                message$ = "Not readable"
              CASE -113
                message$ = "No permission"
              CASE -114
295             message$ = "Bad argument(s)"
              CASE 5
                message$ = "Error occurred in function playback"
              CASE 6
                message$ = "Type carriage return to continue"
300           CASE 7
                message$ = "Remote terminated"
              CASE 8
                message$ = "Remote has been terminated locally"
              CASE 10
305             message$ = "Application returned error status"
            END SELECT
          END SUB
```

Lines 68 through 78 handle the case where PutCmd returns a zero value, such as where the last command executed successfully. Line 71 calls function Read-String to read characters from the VM700T and print them, both on the screen and into the output file, until it sees the VM700T prompt.

Lines 80 through 86 print appropriate messages, both on the screen and in the output log file, when the end of the input file is reached.

Lines 88 through 92 print appropriate messages, both on the screen and in the output log file, when program execution is halted because of a VM700T error condition.

Function GetPrompt

Function GetPrompt reads characters from the VM700T until the VM700T stops sending characters. The characters it reads in are assumed to be the VM700T prompt, which the VM700T uses to signal end-of-transmission.

Lines 96 through 98 declare variables holdoff, xon$ and xoff$ to be "shared" variables. Shared variables share their values with other procedures and functions and with the main program. These are similar to "static" variables in other programming languages.

Lines 100 through 108 check to see if the input buffer is past the "critical" point, defined as 128 bytes. (The LOC function returns the number of characters in the input buffer for a specified communications channel.) If the input buffer contains

128 bytes or more, the program sets the value of variable holdoff to 1 ("true"), then sends the XOFF character to the VM700T.

Lines 110 through 115 read a line of input from the VM700T into variable c$, then appends the contents of c$ to variable text$.

Lines 117 through 123 check to see if the input buffer is empty and the variable holdoff is set to 1. If both of these conditions hold, the programs sets holdoff to 0 and sends the XON character to the VM700T.

Lines 127 loops back to line 100 if "end-of-file" has not been seen from the VM700T.

Lines 128 through 130 simply delay to give the VM700T a chance to transmit another character, in order to avoid spurious end-of-transmission readings.

Line 134 tests to see if the FOR...NEXT loop in lines 128 through 130 was exited early. If it was, the program loops back to line 100. Otherwise, line 135 assigns the contents of variable text$ to function `GetPrompt`, and line 136 returns from the function call.

Function PutCmd

`Function PutCmd` sends a string out the COM1 port to the VM700T, then calls function `ReadError` to see if the VM700T accepts the string as a command.

Function ReadError

`Function ReadError` reads characters from the VM700T to determine if a command sent by `PutCmd` caused a VM700T error condition.

If the first character that `ReadError` reads is an "@" character, the command was successful.

If the first character that `ReadError` reads is a "?" or "!" character, the command caused an error condition or returned a warning. `ReadError` reads the next three characters and returns them in ErrCode.

If the first character that `ReadError` reads is not an "@", "?", or "!", then a playback command is executing, and the first character is probably the first character of the VM700T prompt string. It is returned in variable return$ for special handling by the calling routine in this instance.

Function ReadString

`Function Readstring` reads characters from the VM700T until it reads the VM700T prompt. It then returns all characters read up to the start of the VM700T prompt.

Parameter text$ contains the string that `ReadString` returns.

Parameter start$ contains the string that `ReadString` starts out with when it is called. This is usually the null string, but may also contain characters returned by a previous call to `ReadError`.

Parameter p$ contains the VM700T prompt string. Characters read in from the VM700T are compared to this string to see if the end of the VM700T transmission has been reached.

If `ReadString` finds the VM700T prompt, it returns a value of 1. If it times out without finding the VM700T prompt, it returns a value of 0.

Sub VMError `Subroutine VMError` takes a number as input and returns an error or warning message corresponding to that number.

Monitoring Auto-Mode Operation and Modem Control

Monitoring Auto-Mode Operation

A common use of the remote capabilities of the VM700T is to monitor Auto-mode measurements and print a warning message when test results are out of limits.

When doing this, it is important to remember that remote monitoring is different from remote control. The VM700T doesn't have to be in remote mode to allow you to monitor tests. You can simply attach a printer or terminal to the VM700T log port to monitor test results.

If you want to monitor Auto mode measurements while the VM700T is under remote control, you must avoid sending commands to the VM700T at the same time that the VM700T is sending log data to the computer. Doing so can cause the two data streams (log data and commands) to interfere with each other, with unpredictable results.

The following sections explain how to monitor Auto mode operation, in remote mode or otherwise.

Monitoring Auto-Mode Operation Without Remote Control

To monitor Auto mode operation without putting the VM700T under remote control, use the following procedure:

1. Attach the monitoring device (printer, terminal, data logger, or similar device) to the Log port of the VM700T. To find out which port is the Log port, check the Log Port entry in the Communication Setup file.
2. In the Communication Setup file, set the format of the Log port to an appropriate setting for the monitoring device (for example, ASCII Printer, PostScript, Epson LQ, or Parallel).
3. Press the Auto button.

A message appears on the monitoring device when a measurement falls outside its alarm limits, or when a measurement transitions from outside its alarm limits to within its alarm limits. Refer to *Consecutive Errors Parameter* on page 4–34 for more information about when a measurement is logged.

Monitoring Auto-Mode Operation With Remote Control

To monitor Auto mode operation when the VM700T is under remote control, use the following procedure:

1. Set the Remote Control port and the Log port to the same serial port in the Communication Setup file.

2. Establish a connection between the PC and the VM700T.
3. Execute the Auto measurement.
4. Read the prompt from the VM700T, indicating that the command to execute Auto mode has been received.
5. Wait for further response from the VM700T. This will be a message indicating that an alarm limit has been violated.
6. Take appropriate action with the alarm message (for example, write it into a file or branch to another section of program).

The following topic, *Consecutive Errors Parameter,* has more information about when a measurement is logged.

Consecutive Errors Parameter

The VM700T sends a message out the Log port when on of the following actions occurs:

- a measurement transitions from within its alarm limits to outside its alarm limits
- a measurement transitions from outside its alarm limits to within its alarm limits

The "consecutive errors before reporting" parameter specified in the current Auto Limits file controls the frequency with which log messages are sent. For a log message to be sent concerning a measurement, that measurement must fall outside its alarm limits for the number of Auto mode cycles specified by the consecutive errors parameter. (An Auto-mode cycle is a single pass through the currently selected Auto-mode measurements.)

Once a log message is sent warning of an out-of-limits measurement, the next message concerning that measurement will be sent only if the measurement falls within its alarm limits for the number of Auto mode cycles specified by the consecutive errors parameter.

Successive messages about a measurement continue in this fashion, one indicating that an alarm limit has been violated, the next indicating that the measurement has returned to its alarm limit range. This method of operation keeps the data monitoring device from being bombarded with a stream of repetitive alarm-violation messages.

Modem Control

If you connect the VM700T remote port to a modem, you can set up functions that dial the modem, acquire a carrier signal, transmit data over a telephone line, and hang up the telephone. In order to use the VM700T in this way, the modem must be set up to meet certain requirements:

- The modem must be silent. It must not issue characters to be read by the VM700T, or echo back characters sent to it by the VM700T. This means, for instance, that Hayes-compatible modems should be set to not return results codes, and to not echo received characters.
- The modem should use hardware flow control to signal readiness to receive data, or to halt data transmission from the VM700T.

The Control Command

The `control` command sends a specified string of characters out the VM700T Control port. (Note: The Control port referred to in the previous sentence is not the same as the Remote Control port. It is a distinct entry in the Communication Setup file.) You typically use control to send commands to a modem or switcher.

The string can be any sequence of ASCII characters, or any of the following:

```
^x        a control character,  such as, ^G (bell)
                                or ^M (carriage return)
$nn       a hexadecimal number, where n is 0-9, A-F, or a-f
\$        the '$" character
\^        the '^' character
\\        the '\' character
\<LF>     a trailing '\' on a line says to ignore end-of-line
```

Note that communication through the `control` command is one-way only. There is no feed-back from the controlled device. This means that if the controlled device is not powered on, or is not even attached, or is sent an incorrect string, the VM700T function or program will continue executing.

Note also that the control statement does not add characters to delimit messages. Thus, if the device being controlled requires that messages be delimited with a carriage return, line , or carriage-return/line-feed sequence, those characters must be included in the string accompanying the `control` command.

Examples:

```
VM700T> control ^G
```

This example sends a bell character out the Control Port.

```
VM700T> control ATDT123-4567^M
```

This example sends the ASCII string "ATDT123–4567", followed by carriage return, out the Control Port.

The ? and ?! Constructs

The ? construct is followed by any configuration keyword and a single command. During function playback, if the keyword has non-zero value, the rest of the line following the ? construct is executed. Otherwise,function execution continues with the next statement in the function.

The ?! construct is similar, except that the rest of the line is executed if the keyword has a value of zero. Otherwise,function execution continues with the next statement in the function.

The ? and ?! constructs are available only during function playback. They are typically used to test the value of a Carrier Detect line in order to control communications with a modem, or to test the global out-of-limits (GOOL) flag to see if an application found one or more measurements that were out-of-limits.

Example:

```
?GCD0 return
delay 5
loop
```

This first line of this example tests the status of the Carrier Detect line on serial port 0. If the test returns true, the function returns to its caller. If it returns false, the function waits one half-second, then loops back to the first command.

A "Generic" Modem Control Function

Functions that dial up a telephone line, send data, then hang up the telephone take a standard form composed of the following four parts:

- send the modem the command to dial the telephone
- wait until the telephone connection is established
- send the data
- hang up the telephone

The following discussion demonstrates the use of each of these parts.

The Main Function. The following function sends a command to a modem to dial a telephone number, calls a function that waits until the telephone connection is established, runs the H_Timing measurement, obtains its results, sends the results over the telephone line, then hangs up the phone:

```
control ATDT123-4567^M
delay 10
playback waitforCD
execute H_Timing
getresults
spool H_Timing
playback hangup
```

Note that the `control` command does not delimit the sequence of characters it sends by a carriage return or line feed. Therefore, a carriage return (^M) had to be appended to the string sent by the `control` command.

Note also that the `spool` command sends the contents of the H_Timing measurement results file out the Copy port. Thus, the Copy port and the Control port must be configured to the same physical port if this function is to work.

The waitforCD Function. The Main function shown above called a function called "waitforCD" immediately after sending the command to the modem to dial the telephone. The waitforCD function simply consists of a test to see if Carrier Detect is high, followed by an immediate return from the function if the test returns true, or a short delay and a loop back to the start if the test returns false:

```
?GCD0 return
delay 5
loop
```

The hangup Function. To disconnect a telephone connection, Hayes-compatible modems must send three "attention" characters (by default, these are plus signs), followed by the command `ath`, followed by a carriage return. A brief delay between each attention character makes sure it is received properly and the modem takes appropriate action.

Note that the `?GCD0` and `?GCD1` commands refer to physical and not logical ports. Thus, if the Copy port is ever changed from 0 to 1 or 1 to 0, any functions using the `?GCD0` or `?GCD1` commands will have to be changed as well.

```
control +
delay 4
control +
delay 4
control +
delay 20
control ath^M
```

Functions

VM700T functions are user-defined sequences of commands. Functions can be recorded as a sequence of front-panel actions, or edited with the VM700T on-screen function editor.

Once a function is stored in the VM700T, it can be executed from the front panel by pressing the Function button, followed by touching the soft key corresponding to the function. Functions can also be executed from remote operation.

Functions can be used to execute a sequence of commands repeatedly and reliably.

They are also useful as programming aids. Sometimes, the best way to find out a command sequence to send over remote control is to record a function that performs the same action, and then examine the function to see how it works.

Lastly, functions can also be used as building blocks to be called from within remote programs (or other functions). Programs are much smaller and easier to write if they can simply play back a sequence of prerecorded functions.

The Function Keys Directory

The Function Keys directory (/nvram0/FunctionKeys) contains user-defined functions, the Timed Events directory, and user-created directories that can contain other functions. To display the Function Keys directory, do the following:

1. If the VM700T is in Configure mode, press the Configure button to exit it.
2. Press the Configure button.
3. Touch the `Function Keys` soft key. This displays the FunctionKeys directory and the Function Keys menu (Figure 4–1).

Figure 4–1: Function Keys menu

You can use the Function Keys directory window and the main Function Keys menu to create functions, view functions, edit functions, print functions, delete functions, create subdirectories, delete subdirectories, and rename functions or subdirectories. The rest of this section describes each of these operations.

Creating Functions

To create a new function from the front panel, bring up the Function Keys directory and main Function Keys menu. Then, touch the `Create Function` soft key. This brings up an on-screen keyboard (see Figure 4–2) that you can use to type in the name of the new function.

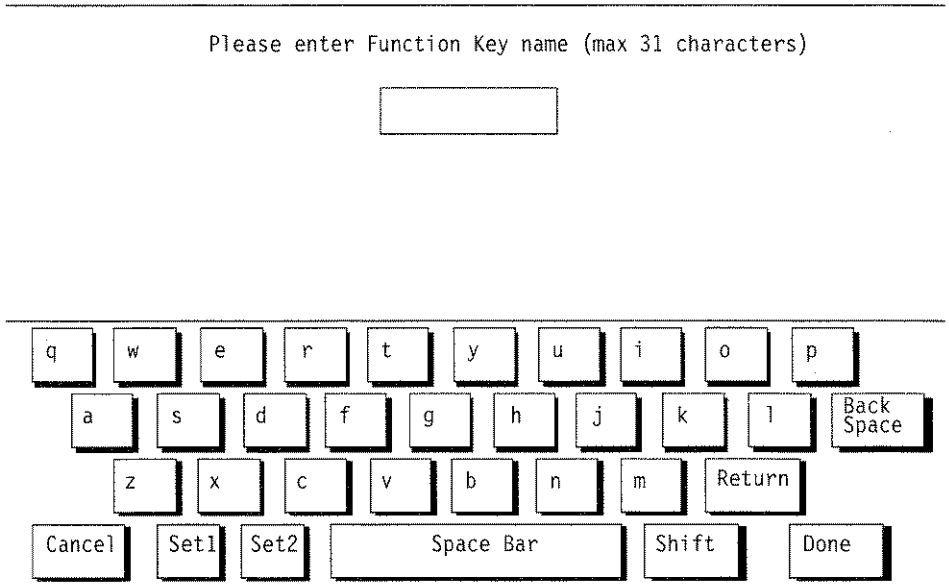


Figure 4–2: VM700T on-screen keyboard

When you name the function to be created, keep the following rules in mind:

- No spaces are allowed in the name; use an _ (underline) or . (dot) to separate words in a name.
- Use only upper and lower case letters, numerals, and the following special characters: _ (underline), . (dot), – (minus sign), + (plus sign, : (colon), and ~ (tilde) in names.
- Forward slash (/) and reverse slash (\) are not permitted in the function name.
- Use the Return key to place a word on the second line of the name. The '~' key also places a word on the second line of the name. For example, typing "Transmitter~Functions" would place the word "Functions" below "Transmitter" when the icon for the function appears in the Function Keys directory.
- A maximum of 31 characters are allowed in a name.

- When neither Set 1 nor Set2 is highlighted, you can type lowercase and uppercase English alphabet characters. The lowercase Set1 character set allows you to enter numerals and punctuation characters. The uppercase Set1 and the Set2 character set allow you to enter various special characters and accented characters for use in non-English language function names.

  Both the Set1 and Set2 character keys and the Shift soft key "lock" when selected. Set1 and Set2 are unlocked by touching the same key again or touching the unselected key of the pair. Shift is unlocked by touching Shift again.

After typing the name, touch Done.

Press Cancel to quit the process without creating the function.

Learn Mode

If you entered a name for the function, the VM700T goes into learn mode. The LED on the Configure button blinks while to indicate this. In learn mode, the VM700T records all user interactions with the front panel. The VM700T displays the Learn Mode menu (Figure 4–3), containing soft keys used in recording functions. The learn mode soft keys are described below.

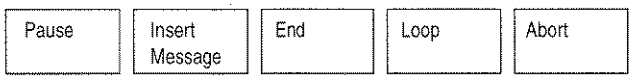


Figure 4–3: Learn Mode menu

Pause — Selecting the Pause soft key suspends function recording. This allows you to press VM700T controls without making those actions part of the recorded function. (The subsequent state of the VM700T, however, IS recorded.) When you want to resume function recording, press the Configure button, touch Pause a second time, and press the Configure button again.

Insert Message — Selecting the Insert Message soft key displays the on-screen keyboard, with which you can enter a message of up to four lines of 76 characters each. When the function plays back, the message will be displayed in the lower left corner of the screen at the appropriate point in the playback sequence. When the message appears, function playback pauses and the message "Press screen to continue" is also displayed. Touch any point on the screen to continue function playback.

End Selecting the End soft key terminates function recording. The VM700T remains in the Function Keys directory in Configure mode. When executed, a Function Key terminated with End plays back once and stops.

Loop Selecting the Loop soft key terminates function recording. The VM700T remains in the Function Keys directory in Configure mode. When executed, a Function Key terminated with Loop plays back continuously until halted by pressing the Function button again.

Abort Selecting the Abort soft key during function recording deletes the function you were creating.

Editing Functions

To edit a function once it has been learned, bring up the Function Keys directory and main Function Keys menu. Then, touch the icon corresponding to the function you wish to edit. This brings up the Function Editing menu (Figure 4–4).

Figure 4–4: Function editing menu

To edit a line:

1. Highlight the line to be edited, using the control knob (that is, rotate the knob until the line you wish to edit appears in the center of the screen, brighter than the surrounding lines).
2. Touch the line. The on-screen keyboard appears.
3. Use the knob, the backspace key, and other keys of the on-screen keyboard to modify the line.
4. Touch Done when you have finished editing the line.

To insert a line:

1. Highlight the line following the insertion point, using the control knob (that is, rotate the knob until the line after the insertion point appears in the center of the screen, brighter than the surrounding lines).
2. Touch the Insert Line soft key. The on-screen keyboard appears.

3. Enter the new line, using the on-screen keyboard.
4. Touch Done when the new line is completed.

To delete a line:

1. Highlight the line to be deleted, using the control knob (that is, rotate the knob until the line to be deleted appears in the center of the screen, brighter than the surrounding lines).
2. Touch the Delete Line soft key.

To save changes and exit:

Touch the Update & Exit soft key.

To exit without saving changes:

1. Touch the No Change & Exit soft key.
2. If you have made changes to the function, a message appears on the screen, warning you that the function has been changed.

- If you really don't want to save the changes, touch the No Change & Exit soft key again.
- If you want to save the changes instead, touch the Update & Exit soft key.

Adding Comments to a Function

You can add comments to a function by preceding the comment with a "#" (pound sign) character. Any characters appearing on a line after a "#" character are ignored.

Annotating a Function

You can annotate a function (that is, you can add descriptive text explaining what the function does) with up to three lines of text. The annotation text appears when you press the Function button on the front panel.

To annotate a function:

1. Bring up the function for editing. From the Function Keys directory, touch the icon corresponding to the function to be edited.
2. Insert a line at the beginning of the function, by highlighting the first line of the function and touching the Insert Line soft key.
3. Type the text of the annotation line, making sure that the first character is a "#" (pound sign) character.
4. Repeat steps 2 and 3, if desired, to insert up to three annotation lines.
5. Touch the Update & Exit soft key to save changes to the function.

The annotation text (that is, the first one, two, or three lines of comments, inserted as defined above) will appear next to the icon for the function when you press the Function button on the front panel.

Speeding Up or Slowing Down a Function

When you record a function from the front panel, it plays back EXACTLY the way you recorded it-including the delay time between actions. This time is recorded in the form of `delay` commands that appear in the function. The argument following each `delay` command is the amount of time, in tenths of seconds, for the function to pause before continuing execution. Editing the argument following each `delay` command, or deleting the `delay` command altogether, is an easy way to speed up or slow down function playback.

Note, however, that some measurements take a certain amount of time to set up before their results become valid (or, in some cases, before they can obtain results at all). Therefore, it is a good idea to reduce, but not eliminate, the delay time following most `execute` or `appstart` commands.

Another useful way to modify the timing of a function is to change `knob` commands to `cknob` commands. While `knob` commands only specify an amount by which to turn the knob, `cknob` commands specify both an amount to turn the knob and a time over which to turn it continuously. Thus, while `knob` commands execute near-instantaneously, `cknob` commands execute over a user-specified period of time (given in tenths of seconds). `cknob` commands are most useful when you want to watch the progress of the function while you are turning the knob. `knob` commands, conversely, are most useful when you simply want to turn the knob, then observe the result or perform another action.

Function Playback

Once recorded, functions can be played back from the front panel or from remote operation. The following sections describe both kinds of function playback operation.

Function Playback from the Front Panel

To play back a function from the VM700T Front Panel:

1. Press the Function button.
2. Touch the icon corresponding to the function you wish to play back.

The VM700T performs the sequence of actions you recorded, taking almost exactly the same amount of time as when it was recorded. (See *Speeding Up or Slowing Down a Function*, on page 4–44, if you want to modify the time the function takes to run.) The Function button LED flashes while a function is being played back. Pressing the Function button during function playback cancels the playback, and it leaves the VM700T in the state it was in when function playback was cancelled.

If there is a playback error, or if a `disptext` command is encountered, an appropriate message is displayed on the bottom of the VM700T screen, along with a request that the screen be touched to continue playback.

When you execute a function terminated with End, the function plays back once and exits. When you execute a function terminated with Loop, the function loops continuously until the Function button is pressed to cancel playback.

The `restoreconfig` command is added by default to functions create with the `Create Function` soft key. This command restores various VM700T operating parameters to the values contained in the configuration files. If you wish, you can delete this command when editing the function.

When you abort a function, a `restoreconfig` command is always executed automatically.

Function Playback from Remote Operation

To play back a function from remote operation, send the `playback` command:

```
VM700T> playback function-name
```

If the function is in a subdirectory, the directory name must be included in the argument to the `playback` command. For example, if the function is named TransDGDP and is stored in directory Special~Measurements within the Function Keys directory, the `playback` command would be:

```
VM700T> playback Special~Measurements/TransDGDP
```

When a function is playing back remotely, it can be terminated by pressing Ctrl-C on the remote keyboard, or by pressing the Configure button on the front panel (which also terminates the remote control session).

If the "Message Display:" line in the Communication~Setup file is set to "VM700 Screen", a message appears when the `playback` command is first issued, telling you that function playback is in progress and how to stop it:

```
VM700T> playback Special~Measurements/TransDGDP
Function playback in progress. Enter ^C to stop it.
```

If the function finishes normally, the following message appears:

```
Function playback completed
```

If function playback is terminated with a Ctrl-C, the following message appears:

```
Function playback terminated
```

If there is a playback error, or if a `disptext` command is encountered, an appropriate message is displayed.

If the Message Display line in the Communications~Setup file is set to VM700 Screen, error messages or text from `disptext` commands are displayed on the

VM700T screen. To continue function playback, touch the screen. If the Message Display line in the Communications~Setup file is set to Remote, error messages or text from `disptext` commands are displayed on the terminal screen, followed by the message

```
Hit CR to continue
```

Pressing return on the remote terminal displays the following message:

```
Function playback continues...
```

Function Playback on Power Up

There is a special function file that can be created for use on powering up the VM700T. The Powerup function file is looked for by the VM700T as part of the initialization process, and, if found, played back immediately after initialization has finished. The powerup function file is created in exactly the same manner as other function files. If there is a state or measurement mode you want the VM700T to be in or series of measurements that needs to be done after power is either turned on or restored after a power loss, the powerup function key file may be used to perform the required steps.

Subdirectories

If you have many functions defined in the Function Keys directory, it is often convenient to store them in subdirectories. This reduces clutter in the Function Keys directory window, and makes it easier to find the function you want for a specific task.

Creating Subdirectories

To create a new subdirectory in the Function Keys directory (or in any of its subdirectories), use the following steps:

1. Bring up the Function Keys directory by pressing the Configure button, then touching the `Function Keys` soft key.

   If you wish to create a subdirectory within an existing subdirectory of the Function Keys directory, touch the icon(s) of the sequence of subdirectories until the VM700T screen displays the subdirectory in which you will create the new subdirectory.

2. Touch the `Create Directory` soft key. The VM700T displays the on-screen keyboard that you can use to type in the name for the new subdirectory. When typing in a subdirectory name, follow the same rules as for typing in function names (listed in *Creating Functions* on page 4–40).

Traversing the Directory Hierarchy

You can think of the Function Keys directory and its subdirectories as being organized in a hierarchy, with the Function Keys directory at the top, any subdirectories it contains on the next level below, any subdirectories contained in the subdirectories on the next level below and so forth (see Figure 4–5).

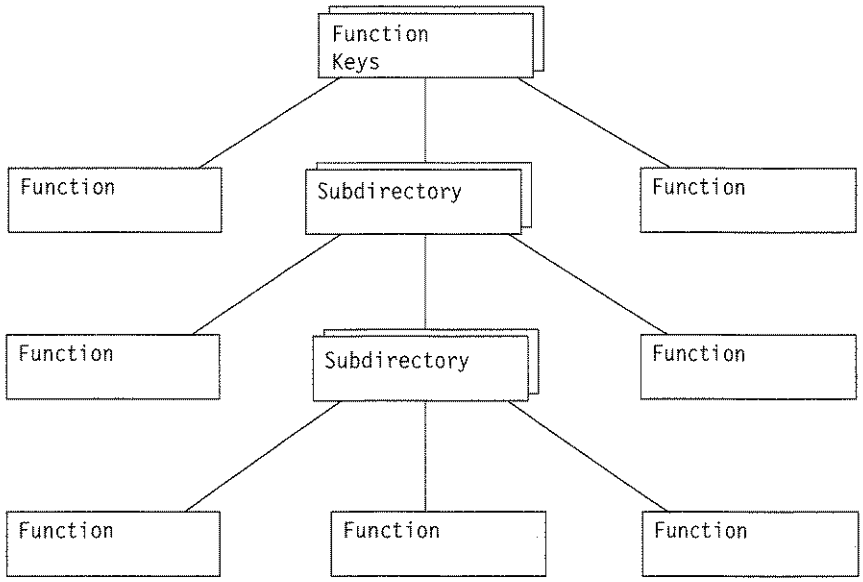


Figure 4–5: Function Keys directory hierarchy

To travel down the hierarchy (that is, from a directory to one of its subdirectories), touch the icon corresponding to the directory you wish to see.

To travel up the hierarchy (that is, from a subdirectory to the directory the next level above), touch the `Leave Directory` soft key at the bottom right of the screen.

Deleting Functions and Subdirectories

To delete a function or empty subdirectory, bring up the main Function Key menu, then touch the `Delete` soft key, followed by the icon corresponding to the function or directory. The VM700T beeps at one-second intervals while the selected icon slowly disintegrates on the screen. Once the disintegration starts, you have six seconds to cancel the Delete command, either by touching the `Delete` soft key again or by touching the screen anywhere inside the directory window. Canceling the Delete process leaves the function or subdirectory intact (nothing is deleted).

A directory that is not empty cannot be deleted. Its icon disintegrates, but reappears after the disintegration process completes.

Renaming Functions and Subdirectories

To rename a function or subdirectory, bring up the main Function Key menu, then touch the `Rename` soft key, followed by the icon corresponding to the icon or function to be renamed. The on-screen keyboard appears, allowing you to type the new function or directory name. When typing in a new name, follow the naming rules listed in *Creating Functions* starting on page 4–40.

Printing Function Contents

To print the contents of a function, bring up the main Function Key menu, then touch the `Print File` soft key, followed by the icon corresponding to the function to be printed.

You can cancel the print request by entering the main Configure menu (you may have to press the Configure button twice), and then selecting the `Cancel Copy` soft key.

Appendices

Appendix A: Get/Set Keywords

This appendix documents the keywords used with the get and set commands. For each get/set keyword letter-group, it gives the syntax of the set command and the get result, an explanation of what the keywords in the letter-group do, and one or more examples of the use of keywords from the group. This is followed by an alphabetized table of all the keywords in the group and their meaning.

"A" Group: Audio Configuration

"A" keywords report on or set the values of Audio Option Configuration parameters. These keywords can only be used on a VM700T equipped with Option 40 (Audio).

Get commands used with the "A" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "A" group keywords take different arguments, depending on the keyword. The form of each Set command used with "A" group keywords is documented in the pages that follow.

Table A-1: "A" Keywords: Audio Configurations

Keyword	Description	Keyword	Description
A33T	0.33 test level	ALEM	Level Meter
ADAA	Dead Air Alarm	ALIL	Lineup level
AERR	Error reporting	ALIM	Audio Limit File
AEXT	External termination	ALIS	Lissajous display
AHPT	Audio Printout Title	ARIA	Report in Auto

A33T A33T specifies the 0.33 Test Level in dBu. The set command takes one argument after the channel letter. Legal values are integers from –6 to 14.

```
VM700T> get A33T A
0
VM700T> set A33T A 1
VM700T>
```

ADAA ADAA specifies the amount of time the VM700T waits before it reports an error when it encounters a period of silence. The set command takes one argument after the channel letter. Legal values are: disabled, 15 sec, 30 sec, 1 min, 2 min, 5 min, 30 min, or 60 min. Disabled is the default.

```
VM700T> get ADAA A
disabled
VM700T> set ADAA A 1 min
VM700T>
```

AERR AERR specifies whether or not audio errors for the specified audio source should be added to the video error report. The set command takes one argument after the channel letter. Legal values are enabled or disabled. Disabled is the default.

```
VM700T> get AERR A
enabled
VM700T> set AERR A disabled
VM700T>
```

AEXT AEXT informs the VM700T about the value of the VM700T's external termination. The set command takes one argument after the channel letter. Legal values are: 50, 75, 125, 150, 300, 600, 10k.

```
VM700T> get AEXT A
600
VM700T> set AEXT 10k
```

AHPT AHPT specifies the title that appears on audio report printouts. The set command takes one argument after the channel letter. It consists of an arbitrary string up to 50 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> get AHPT A
VM700T> Audio Measurements
VM700T> set AHPT A Fred's Audio Measurements
VM700T> get AHPT A
Fred's Audio Measurements
VM700T>
```

ALEM ALEM specifies the meter ballistics for the bar-graph level meters in the Audio Monitor display. The set command takes one argument after the channel letter. Legal values are: PPM:DIN45406, PPM:NORDIC, PPM:TEK760[1], or VU. The default is PPM:DIN45406.

```
VM700T> get ALEM A
PPM:DIN4506
VM700T> set ALEM A PPM:TEK760
VM700T> get ALEM A
PPM:TEK760
VM700T>
```

ALIL ALIL specifies the meter equivalency in dBu for the VU and dBu scales used in the Audio Monitor display. The set command takes one argument after the channel letter. Legal values are integers from –10 to 10. The default is 0.

```
VM700T> get ALIL A
0
VM700T> set ALIL A 1
VM700T>
```

ALIM ALIM specifies the Audio Limit File used by the VM700T. The set command takes one argument, the name of the file, after the channel letter. This file is found in directory /nvram0/ConfigFiles/ Audio_Limit~Files.

```
VM700T> get ALIM A
System~Default
VM700T> set ALIM A ShortHaul
VM700T> get ALIM A
ShortHaul
VM700T>
```

ALIS ALIS specifies the type of Lissajous display used in the Audio Monitor. The set command takes one argument after the channel letter. Legal values are x/y or soundstage. The default is soundstage.

```
VM700T> get ALIS A
soundstage
VM700T> set ALIS A x/y
VM700T> get ALIS A
x/y
VM700T>
```

1 **Similar to the Tektronix 760 meter, but with its –8 dB tick mark labeled "TEST." The lineup level is at the TEST (–8 dB) tick on this meter. Ballistics are the same as for the DIN 45406 meter.**

ARIA ARIA tells the VM700T whether or not to display an audio report in Video Auto mode. The set command takes one argument after the channel letter. Legal values are enabled or disabled. Disabled is the default.

```
VM700T> get ARIA A
disabled
VM700T> set ARIA A enabled
disabled
VM700T> get ARIA A
enabled
VM700T>
```

"B" Group: Audio Limit Files

"B" keywords report on or set the measurement limits for Audio auto Mode measurements. These keywords can only be used on a VM700T equipped with Option 40 (Audio).

Get commands used with the "B" keywords have the following form::

```
get <keyword> <channel-letter>
```

Set commands used with "B" group keywords take different arguments, depending on the keyword. The form of each Set command used with "B" group keywords is documented in this section.

Table A-2: "B" Keywords: Audio Limit Filles

Keyword	Description	Keyword	Description
BARF	Amplitude response frequency breaks	BHDF	Total harmonic distortion frequency breaks
BARL	Amplitude response lower limit	BHDL	Total harmonic distortion lower limit
BARU	Amplitude response upper limit	BHDU	Total harmonic distortion upper limit
BCEF	Compandor error (fall)	BING	Insertion gain
BCER	Compandor error (rise)	BSNR	Signal to noise ratio
BCRT	Crosstalk plus noise	BSPF	Stereo phase difference frequency breaks
BGDF	Stereo gain difference frequency breaks	BSPL	Stereo phase difference lower limit
BGDL	Stereo gain difference lower limit	BSPU	Stereo phase difference upper limit
BGDU	Stereo gain difference upper limit		

BARF BARF sets the frequencies of the break points for the amplitude response vs. frequency measurement. The set command takes eight arguments after the channel letter, each representing the frequency (in Hz) of a break point. Each argument must be an integer between 20 and 20000, inclusive.

```
VM700T> get BARF A
20  50  250  251  1000  10000  10001  20000
VM700T> set BARF A 30 60 300 301 1500 15000 15001 20000
VM700T> get BARF A
30  60  300  301  1500  15000  15001  20000
VM700T>
```

BARL BARL sets the lower amplitude limits of the break points for the amplitude response vs. frequency measurement. The set command takes eight arguments after the channel letter, each representing the lower limit (in dB) of a break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BARL A
-1.00  -1.00  -1.00  -0.30  -0.30  -0.30  -1.00  -1.00
VM700T> set BARL A -0.5 -0.5 -0.5 0 0 0 -0.5 -0.5
VM700T> get BARL A
-0.5  -0.5  -0.5  0  0  0  -0.5  -0.5
VM700T>
```

BARU BARU sets the upper amplitude limits of the break points for the amplitude response vs. frequency measurement. The set command takes eight arguments after the channel letter, each representing the upper limit (in dB) of each break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BARU A
0.30  0.30  0.30  0.30  0.30  0.30  0.30  0.30
VM700T> set BARU A 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
VM700T> get BARU A
0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
VM700T>
```

BCEF BCEF specifies the lower and upper limits in decibels for the difference between the measured compander response of the signal and the expected response on a high-to-low transition. The set command takes two arguments after the channel letter, representing the lower and upper limits, respectively. Legal values are floating point numbers in the range –120 to 120, inclusive, or "undef", which indicates no limit set.

```
VM700T> get BCEF A
---  0.50
VM700T> set BCEF A undef  0.75
```

```
VM700T> get BCEF A
---  0.75
VM700T>
```

BCER BCER specifies the lower and upper limits in decibels for the difference between the measured compander response of the signal and the expected response on a low-to-high transition. The set command takes two arguments after the channel letter, representing the lower and upper limits, respectively. Legal values are floating point numbers in the range –120 to 120, inclusive, or "undef", which indicates no limit set.

```
VM700T> get BCER A
---  0.50
VM700T> set BCER A undef  0.75
VM700T> get BCER A
---  0.75
VM700T>
```

BCRT BCRT specifies the lower and upper limits in decibels for the crosstalk plus noise measurement. The set command takes two arguments after the channel letter, representing the lower and upper limits, respectively. Legal values are floating point numbers in the range –120 to 0, inclusive, or "undef", which indicates no limit set.

```
VM700T> get BCRT A
---  -50.00
VM700T> set BCRT A undef  -75.00
VM700T> get BCRT A
---  -75.00
VM700T>
```

BGDF BGDF sets the frequencies of the break points for the stereo gain difference measurement. The set command takes eight arguments after the channel letter, each representing the frequency (in Hz) of a break point. Each argument must be an integer between 20 and 20000, inclusive.

```
VM700T> get BGDF A
20  50  250  251  1000  10000  10001  20000
VM700T> set BGDF A 20 50 300 301 1500 15000 15001 20000
VM700T> get BGDF A
20  50  300  301  1500  15000  15001  20000
VM700T>
```

BGDL BGDL sets the lower amplitude limits of the break points for the stereo gain difference measurement. The set command takes eight arguments after the channel letter, each representing the lower limit (in dB) of a break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BGDL A
-1.00  -1.00  -1.00  -0.30  -0.30  -0.30  -1.00  -1.00
VM700T> set BGDL A -1 -0.5 -0.5 -0.3 -0.3 -0.3 -0.5 -1
VM700T> get BGDL A
-1.00  -0.5  -0.5  -0.30  -0.30  -0.30  -0.5  -1.00
VM700T>
```

BGDU BGDU sets the upper amplitude limits of the break points for the stereo gain difference measurement. The set command takes eight arguments after the channel letter, each representing the upper limit (in dB) of a break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BGDU A
0.30  0.30  0.30  0.30  0.30  0.30  0.30  0.30
VM700T> set BGDU A 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
VM700T> get BGDU A
0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
VM700T>
```

BHDF BHDF sets the frequencies of the break points for the harmonic distortion measurement. The set command takes eight arguments after the channel letter, each representing the frequency (in Hz) of a break point. Each argument must be an integer between 20 and 20000, inclusive.

```
VM700T> get BHDF A
20  50  200  400  1000  2000  4000  6000
VM700T> set BHDF A 20 50 300 500 1200 2400 4800 9600
VM700T> get BHDF A
20  50  300  500  1200  2400  4800  9600
VM700T>
```

BHDL BHDL sets the lower amplitude limits of the break points for the harmonic distortion measurement. The set command takes eight arguments after the channel letter, each representing the lower limit (in dB) of a break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BHDL A
0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
VM700T> set BHDL A -5 -5 -5 -5 -5 -5 -5 -5
VM700T> get BHDL A
-5.0  -5.0  -5.0  -5.0  -5.0  -5.0  -5.0  -5.0
VM700T>
```

BHDU BHDU sets the upper amplitude limits of the break points for the harmonic distortion measurement. The set command takes eight arguments after the channel letter, each representing the upper limit (in dB) of a break point. Each number must be between –120 and 120, inclusive.

```
VM700T> get BHDU A
0.30  0.30  0.30  0.30  0.30  0.30  0.30  0.50
VM700T> set BHDU A 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
VM700T> get BHDU A0.50  0.50  0.50  0.50  0.50  0.50
0.50  0.50
VM700T>
```

BING BING specifies the lower and upper limits in decibels for the difference between the actual and the expected audio signal level. Legal values are floating point numbers in the range –120 to 120, inclusive, or "undef", which indicates no limit set.

```
VM700T> get BING A
-0.50  0.50
VM700T> get BING A -0.75 0.75
VM700T> get BING A
-0.75  0.75
VM700T>
```

BSNR BSNR specifies the lower and upper limits in decibels for both the weighted and unweighted signal-to-noise ratios. Legal values are floating point numbers in the range –120 to 120, inclusive, or "undef", which indicates no limit set.

```
VM700T> get BSNR A
70.00  ---
VM700T> set BSNR A 75.00 undef
VM700T> get BSNR A
75.00  ---
VM700T>
```

BSPF BSPF sets the frequencies of the break points for the stereo phase measurement. The set command takes eight arguments after the channel letter, each representing the frequency (in Hz) of a break point. Each argument must be an integer between 20 and 20000, inclusive.

```
VM700T> get BSPF A
20  50  200  400  1000  2000  4000  6000
VM700T> set BSPF A 20 50 300 500 1200 2400 4800 9600
VM700T> get BSPF A
20  50  300  500  1200  2400  4800  9600
VM700T>
```

BSPL BSPL sets the amplitudes of the lower limits at the break points for the stereo phase difference measurement. The set command takes eight arguments after the channel letter, each representing the lower limit (in dB) at a break point. Each number must be between 0 and 180, inclusive.

```
VM700T> get BSPL A
0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
VM700T> set BSPL A 1 1 1 1 1 1 1 1
VM700T> get BSPL A
1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
VM700T>
```

BSPU BSPU sets the amplitudes of the upper limits at the break points for the stereo phase difference measurement. The set command takes eight arguments after the channel letter, each representing the upper limit (in dB) at a break point. Each number must be between 0 and 180, inclusive.

```
VM700T> get BSPU A
6.00  6.00  3.00  3.00  3.00  3.00  6.00  6.00
VM700T> set BSPU A 6 6 4.5 3 3 4.5 6 6
VM700T> get BSPU A
6.00  6.00  4.50  3.00  3.00  4.50  6.00  6.00
VM700T>
```

"C" Group: Configuration File

"C" keywords report on or set the values of Configuration File parameters. These keywords can only be used on VM700T's equipped with Option 11 (PAL standard).

Get commands used with the "C" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with the "C" keywords have the following form:

```
set <keyword> <channel-letter> <argument>
```

where <argument> is the text to which the setting associated with the keyword is to be set.

Table A-3: "C" Keywords: Configuration File (PAL)

Keyword	Description	Keyword	Description
CHAF	Auto Limits File	CHSN	Source Name
CHMF	Measure Limits File	CHSS	Sync Source
CHML	Measurements Location File	COCP	Component option config file for PAL
CHPT	Printout Title	COER	Echo & Rounding option config file for PAL
CHSM	Selected Measurements File	COTT	Teletext option config file for PAL

CHAF CHAF specifies the Auto Limits File for PAL operation. This file is found in directory /nvram0/ConfigFiles/Auto_Limit~Files/PAL.

```
VM700T> get CHAF A
System~Default
VM700T> set CHAF A My_Auto_Limits
VM700T> get CHAF A
My_Auto_Limits
VM700T>
```

CHMF CHMF specifies the Measure Limits File for PAL operation. This file is found in directory /nvram0/ConfigFiles/Measure_Limit~Files/PAL.

```
VM700T> get CHMF A
System~Default
VM700T> set CHMF A My_Meas_Limits
VM700T> get CHMF A
My_Meas_Limits
VM700T>
```

CHML CHML specifies the Measurements Location File for PAL operation. This file is found in directory /nvram0/ConfigFiles/Measurement~Locations/PAL.

```
VM700T> get CHML A
System~Default
VM700T> set CHML A My_Meas_Locs
VM700T> get CHML A
My_Meas_Locs
VM700T>
```

CHPT CHPT specifies the title that appears on printouts generated by the VM700T. It consists of an arbitrary string up to 50 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> get CHPT A
VM700T> Video Measurement Set
VM700T> set CHPT A Yahoo!
VM700T> get CHPT A
Yahoo!
VM700T>
```

CHSM CHSM specifies the Selected Measurements File for Auto Mode PAL-standard operation. This file is found in directory /nvram0/ConfigFiles/Selected~Measurements/PAL.

```
VM700T> get CHSM A
System~Default
VM700T> set CHSM A My_Sel_Meas
VM700T> get CHSM A
My_Sel_Meas
VM700T>
```

CHSN CHSN specifies the source name for PAL-standard operation. This name is printed across the top of printouts generated by Auto mode or by pressing the Copy button. It consists of an arbitrary string up to 32 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> get CHSN A
System Default
VM700T> set CHSN A Our_Transmitter
VM700T> get CHSN A
Our_Transmitter
VM700T>
```

CHSS CHSS specifies the synchronization source for PAL-standard operation. This value can be set to one of the following strings (case-sensitive): Channel A, Channel B, Channel C, External, or Locked to Source.

```
VM700T> get CHSS A
Locked to Source
VM700T> set CHSS A Channel A
VM700T> get CHSS A
Locked to Source
VM700T>
```

COCP COCP specifies the configuration file for the Component option in PAL-standard operation. This file is found in directory /nvram0/ConfigFiles/Component/PAL. This keyword is only valid for PAL-standard VM700T's with Option 30 (Component) installed.

```
VM700T> get COCP A
System Default
VM700T> set COCP A My_Comp_File
VM700T> get COCP A
My_Comp_File
VM700T>
```

COER COER specifies the configuration file for the Echo & Rounding option in PAL-standard operation. This file is found in directory / nvram0/ConfigFiles/Echo_Rounding/PAL. This keyword is only valid for PAL-standard VM700T's with Option 1G (Echo/Rounding) installed.

```
VM700T> get COER A
System Default
VM700T> set COER A My_ER_File
VM700T> get COER A
My_ER_File
VM700T>
```

COTT COTT specifies the configuration file for the Teletext option in PAL-standard operation. This file is found in directory /nvram0/ConfigFiles/Teletext/PAL. This keyword is only valid for PAL-standard VM700T's with Option 20 (Teletext) installed.

```
VM700T> get COTT A
System Default
VM700T> set COTT A My_TT_File
VM700T> get COTT A
My_TT_File
VM700T>
```

"D" Group: Configuration File

"D" keywords report on or set the values of Configuration File parameters. These keywords can only be used on VM700T's equipped with Option 01 (NTSC standard).

Get commands used with the "D" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with the "D" keywords have the following form:

```
set <keyword> <channel-letter> <argument>
```

where <argument> is the text to which the setting associated with the keyword is to be set.

Table A-4: "D" Keywords: Configuration File (NTSC)

Keyword	Description	Keyword	Description
DHAF	Auto Limits File	DHSN	Source Name
DHMF	Measure Limits File	DHSS	Sync Source
DHML	Measurements Location File	DOCP	Component option config file for NTSC
DHPT	Printout Title	DOER	Echo & Rounding option config file for NTSC
DHSM	Selected Measurements File	DOTT	Teletext option config file for NTSC

DHAF DHAF specifies the Auto Limits File for NTSC operation. This file is found in directory /nvram0/ConfigFiles/Auto_Limit~Files/NTSC.

```
VM700T> get DHAF A
System~Default
VM700T> set DHAF A My_Auto_Limits
VM700T> get DHAF A
My_Auto_Limits
VM700T>
```

DHMF DHMF specifies the Measure Limits File for NTSC operation. This file is found in directory /nvram0/ConfigFiles/Measure_Limit~Files/NTSC.

```
VM700T> get DHMF A
System~Default
VM700T> set DHMF A My_Meas_Limits
VM700T> get DHMF A
My_Meas_Limits
VM700T>
```

DHML DHML specifies the Measurements Location File for NTSC operation. This file is found in directory /nvram0/ConfigFiles/Measurement~Locations/NTSC.

```
VM700T> get DHML A
System~Default
VM700T> set DHML A My_Meas_Locs
VM700T> get DHML A
My_Meas_Locs
VM700T>
```

DHPT DHPT specifies the title that appears on printouts generated by the VM700T. It consists of an arbitrary string up to 50 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> get DHPT A
VM700T> Video Measurement Set
VM700T> set DHPT A Yahoo!
VM700T> get DHPT A
Yahoo!
VM700T>
```

DHSM DHSM specifies the Selected Measurements File for Auto Mode NTSC-standard operation. This file is found in directory / nvram0/ConfigFiles/Selected~Measurements/NTSC.

```
VM700T> get DHSM A
System~Default
VM700T> set DHSM A My_Sel_Meas
VM700T> get DHSM A
My_Sel_Meas
VM700T>
```

DHSN DHSN specifies the source name for NTSC-standard operation. This name is printed across the top of printouts generated by Auto mode or by pressing the Copy button. It consists of an arbitrary string up to 32 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> get DHSN A
System Default
VM700T> set DHSN A Our_Transmitter
VM700T> get DHSN A
Our_Transmitter
VM700T>
```

DHSS DHSS specifies the synchronization source for NTSC-standard operation. This value can be set to one of the following strings (case-sensitive): Channel A, Channel B, Channel C, External, or Locked to Source.

```
VM700T> get DHSS A
Locked to Source
VM700T> set DHSS A Channel A
VM700T> get DHSS A
Locked to Source
VM700T>
```

DOCP DOCP specifies the configuration file for the Component option in NTSC-standard operation. This file is found in directory /nvram0/ConfigFiles/Component/NTSC. This keyword is only valid for NTSC-standard VM700T's with Option 30 (Component) installed.

```
VM700T> get DOCP A
System Default
VM700T> set DOCP A My_Comp_File
VM700T> get DOCP A
My_Comp_File
VM700T>
```

DOER DOER specifies the configuration file for the Echo & Rounding option in NTSC-standard operation. This file is found in directory / nvram0/ConfigFiles/Echo_Rounding/NTSC. This keyword is only valid for NTSC-standard VM700T's with Option 1G (Echo/Rounding) installed.

```
VM700T> get DOER A
System Default
VM700T> set DOER A My_ER_File
VM700T> get DOER A
My_ER_File
VM700T>
```

DOTT DOTT specifies the configuration file for the Teletext option in NTSC-standard operation. This file is found in directory /nvram0/ConfigFiles/Teletext/NTSC. This keyword is only valid for NTSC-standard VM700T's with Option 20 (Teletext) installed.

```
VM700T> get DOTT A
System Default
VM700T> set DOTT A My_TT_File
VM700T> get DOTT A
My_TT_File
VM700T>
```

"E" Group: Component Configuration (NTSC)

"E" keywords report on or set the values of Component Option Configuration parameters. These keywords can only be used on NTSC-standard VM700T's equipped with Option 30 (Component).

Get commands used with the "E" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "E" group keywords take different arguments, depending on the keyword. The form of each Set command used with "E" group keywords is documented in the pages that follow.

Table A-5: "E" Keywords: Component Configuration (NTSC)

Keyword	Description	Keyword	Description
EBC1	Pb CB color #1 (mV)	ELCP	Lightning color pk-pk ampl error (%)
EBC2	Pb CB color #2 (mV)	ELPW	Lightning pk-white ampl error (%)
EBC3	Pb CB color #3 (mV)	EMKL	Marker field and line
EBC4	Pb CB color #4 (mV)	EPRI	Probe Input
EBC5	Pb CB color #5 (mV)	ERC1	Pr CB color #1 (mV)
EBC6	Pb CB color #6 (mV)	ERC2	Pr CB color #2 (mV)
EBC7	Pb CB color #7 (mV)	ERC3	Pr CB color #3 (mV)
EBC8	Pb CB color #8 (mV)	ERC4	Pr CB color #4 (mV)
EBHA	Pb K-Factor Pulse HAD	ERC5	Pr CB color #5 (mV)
EBKB	Pb K-PB Factor (%)	ERC6	Pr CB color #6 (mV)
EBKF	Pb K Factor (%)	ERC7	Pr CB color #7 (mV)
EBM1	Pb MB Packet #1 (dB)	ERC8	Pr CB color #8 (mV)
EBM2	Pb MB Packet #2 (dB)	ERCI	Stored Reference Channel Independent
EBM3	Pb MB Packet #3 (dB)	ERHA	Pr K-Factor Pulse HAD
EBM4	Pb MB Packet #4 (dB)	ERKB	Pr K-PB Factor (%)
EBM5	Pb MB Packet #5 (dB)	ERKF	Pr K Factor (%)
EBM6	Pb MB Packet #6 (dB)	ERM1	Pr MB Packet #1 (dB)
EBM7	Pb MB Packet #7 (dB)	ERM2	Pr MB Packet #2 (dB)
EBM8	Pb MB Packet #8 (dB)	ERM3	Pr MB Packet #3 (dB)
EBM9	Pb MB Packet #9 (dB)	ERM4	Pr MB Packet #4 (dB)
EBMB	Pb Multiburst Packets	ERM5	Pr MB Packet #5 (dB)
EBMF	Pb Multiburst flag (mV)	ERM6	Pr MB Packet #6 (dB)
EBNL	Pb Non-Linearity (%)	ERM7	Pr MB Packet #7 (dB)
EBNO	Pb Noise Level (dB rms)	ERM8	Pr MB Packet #8 (dB)

Table A-5: "E" Keywords: Component Configuration (NTSC) (Cont.)

Keyword	Description	Keyword	Description
EBPP	Pb P-P Amplitude (mV) (3 values)	ERM9	Pr MB Packet #9 (dB)
EBRD	Pb to Pr Delay (nsec) (3 values)	ERMB	Pr Multiburst Packets
EBWL	Bowtie field and line	ERMF	Pr Multiburst flag (mV)
EBWT	Bowtie interchannel delay (ns)	ERNL	Pr Non-Linearity (%)
EBYD	Pb to Y Delay (nsec) (3 values)	ERNO	Pr Noise Level (dB rms)
ECSD	Colorbar standard	ERPP	Pr P-P Amplitude (mV) (3 values)
ERYD	Pr to Y Delay (nsec) (3 values)	EYM2	Y MB Packet #2 (dB)
ETNM	T (nsec)	EYM3	Y MB Packet #3 (dB)
EYC1	Y CB color #1 (mV)	EYM4	Y MB Packet #4 (dB)
EYC2	Y CB color #2 (mV)	EYM5	Y MB Packet #5 (dB)
EYC3	Y CB color #3 (mV)	EYM6	Y MB Packet #6 (dB)
EYC4	Y CB color #4 (mV)	EYM7	Y MB Packet #7 (dB)
EYC5	Y CB color #5 (mV)	EYM8	Y MB Packet #8 (dB)
EYC6	Y CB color #6 (mV)	EYM9	Y MB Packet #9 (dB)
EYC7	Y CB color #7 (mV)	EYMB	Y Multiburst Packets
EYC8	Y CB color #8 (mV)	EYMF	Y Multiburst flag (mV)
EYHA	Y K-Factor Pulse HAD	EYNL	Y Non-Linearity (%)
EYKB	Y K-PB Factor (%)	EYNO	Y Noise Level (dB rms)
EYKF	Y K Factor (%)	EYPA	Y Peak Amplitude (mV) (3 values)
EYM1	Y MB Packet #1 (dB)	EYSA	Y Sync Amplitude (mV) (3 values)

EBC1 – EBC8 Keywords EBC1 through EBC8 return or set the lower and upper alarm limits for Pb CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get EBC1 A
-50.00  50.00
VM700T>
```

EBHA EBHA returns or sets the half-amplitude duration for the Pb(B) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get EBHA A
7
VM700T>
```

EBKB EBKB returns or sets the lower and upper alarm limits for the Pb K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get EBKB A
-5.00  1.00
VM700T>
```

EBKF EBKF returns or sets the lower and upper alarm limits for the Pb K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get EBKF A
0.00  5.00
VM700T>
```

EBM1 – EBM9 Keywords EBM1 through EBM9 return or set the lower and upper alarm limits, in dB, for Pb(B) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get EBM1 A
-1.00  1.00
VM700T>
```

EBMB EBMB returns or sets the number of Pb (B) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get EBMB A
5
VM700T>
```

EBMF EBMF returns or sets the lower and upper alarm limits, in mV, for the Pb (B) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get EBMF A
300.00  700.00
VM700T>
```

EBNL EBNL returns or sets the lower and upper alarm limits for Pb (B) non-linearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get EBNL A
0.00  5.00
VM700T>
```

EBNO EBNO returns or sets the lower and upper alarm limits for the rms Pb (B) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get EBNO A
---  -45.00
VM700T>
```

EBPP EBPP returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) Peak-to-Peak Amplitude, in mV, in the Component LevelMeter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get EBPP A
665.00  735.00  700.00
VM700T>
```

EBRD EBRD returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) to Pr (R) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get EBRD A
-10.00  10.00  0.00
VM700T>
```

EBWL EBWL specifies the field and line used for Bowtie measurements. The set command takes two arguments after the channel letter, representing the field number and line number, respectively.

```
VM700T> get EBWL A
1  45
VM700T> set EBWL A 1 50
VM700T> get EBWL A
1  50
VM700T>
```

EBWT EBWT specifies the lower and upper alarm limits of interchannel delay (in ns) for Bowtie measurements. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –100 to +100, inclusive, or "undef", which indicates no limit set.

```
VM700T> get EBWT A
-10.00  10.00
VM700T> set EBWT A -5 5
VM700T> get EBWT A
-5.00  5.00
VM700T>
```

EBYD EBYD returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) to Y (G) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get EBYD A
-50.00  50.00  0.00
VM700T>
```

ECSD ECSD returns or sets the ColorBar standard used for the Component ColorBar application. Legal values are: GBR 700, GBR 700 Setup, GBR 714, GBR 714 Setup, YPbPr SMPTE/EBU, YPbPr 714 Betacam Setup, YPbPr 714 Betacam, and YPbPr 700 MII Setup.

```
VM700T> get ECSD A
YPbPr SMPTE/EBU
VM700T>
```

ELCP ELCP specifies the lower and upper alarm limits of color peak-to-peak amplitude error, in percent. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –10 to +10, inclusive, or "undef", which indicates no limit set.

```
VM700T> get ELCP A
-2.00  2.00
VM700T> set ELCP A -5 5
VM700T> get ELCP A
-5.00  5.00
VM700T>
```

ELPW ELPW specifies the lower and upper alarm limits of peak-to-white amplitude error, in percent. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –10 to +10, inclusive, or "undef", which indicates no limit set.

```
VM700T> get ELPW A
-2.00  2.00
VM700T> set ELPW A -5 5
VM700T> get ELPW A
-5.00  5.00
VM700T>
```

EMKL EMKL specifies the field and line location of the marker used in Bowtie measurements. The set command takes two arguments after the channel letter, representing the field number and line number, respectively.

```
VM700T> get EMKL A
1  164
VM700T> get EMKL A 1 140
VM700T> get EMKL A
1  140
VM700T>
```

EPRI EPRI tells the VM700T whether or not to use special calibration factors for a probe input. Legal values are "yes" and "no". "Yes" tells the VM700T to use the special calibration factors; "no" uses the standard factors.

NOTE. *The EPRI setting applies to all measure-mode applications, not just the component applications.*

```
VM700T> get EPRI A
no
VM700T>
```

ERC1 – ERC8 Keywords ERC1 through ERC8 return or set the lower and upper alarm limits for Pr CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get ERC1 A
-50.00  50.00
VM700T>
```

ERCI ERCI tells the VM700T whether or not stored reference values are shared by all channels for each standard, or are stored independently from channel to channel. Legal values are "yes" and "no". "Yes" means reference values are stored independently of each other; "no" means reference values are shared by all channels for each standard.

NOTE. *The ERCI setting applies to all measure-mode applications, not just the component applications.*

```
VM700T> get ERCI A
no
VM700T>
```

ERHA ERHA returns or sets the half-amplitude duration for the Pr(R) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get ERHA A
7
VM700T>
```

ERKB ERKB returns or sets the lower and upper alarm limits for the Pr K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get ERKB A
-5.00  1.00
VM700T>
```

ERKF ERKF returns or sets the lower and upper alarm limits for the Pr K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get ERKF A
0.00  5.00
VM700T>
```

ERM1 – ERM9 Keywords ERM1 through ERM9 return or set the lower and upper alarm limits, in dB, for Pr (R) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get ERM1 A
-1.00  1.00
VM700T>
```

ERMB ERMB returns or sets the number of Pr (R) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get ERMB A
5
VM700T>
```

ERMF ERMF returns or sets the lower and upper alarm limits, in mV, for the Pr (R) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get ERMF A
300.00  700.00
VM700T>
```

ERNL ERNL returns or sets the lower and upper alarm limits for Pr (R) non-linearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get ERNL A
0.00  5.00
VM700T>
```

ERNO ERNO returns or sets the lower and upper alarm limits for the rms Pr (R) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get ERNO A
---  -45.00
VM700T>
```

ERPP ERPP returns or sets the lower and upper alarm limits and the arrow setting for the Pr (R) Peak-to-Peak Amplitude, in mV, in the Component LevelMeter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get ERPP A
665.00  735.00  700.00
VM700T>
```

ERYD ERYD returns or sets the lower and upper alarm limits and the arrow setting for the Pr (R) to Y (G) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get ERYD A
-50.00  50.00  0.00
VM700T>
```

ETNM ETNM returns or sets the T duration, in nsec. Legal values are integers from 50 to 150, inclusive.

```
VM700T> get ETNM A
125
VM700T>
```

EYC1 – EYC8 Keywords EYC1 through EYC8 return or set the lower and upper alarm limits for Y CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get EYC1 A
-50.00  50.00
VM700T>
```

EYHA EYHA returns or sets the half-amplitude duration for the Y(G) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get EYHA A
2
VM700T>
```

EYKB EYKB returns or sets the lower and upper alarm limits for the Y K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get EYKB A
-5.00  1.00
VM700T>
```

EYKF EYKF returns or sets the lower and upper alarm limits for the Y K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get EYKF A
0.00  5.00
VM700T>
```

EYM1 – EYM9 Keywords EYM1 through EYM9 return or set the lower and upper alarm limits, in dB, for Y (G) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get EYM1 A
-1.00  1.00
VM700T>
```

EYMB EYMB returns or sets the number of Y (G) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get EYMB A
6
VM700T>
```

EYMF EYMF returns or sets the lower and upper alarm limits, in mV, for the Y (G) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get EYMF A
300.00  700.00
VM700T>
```

EYNL EYNL returns or sets the lower and upper alarm limits for Y (G) non-linearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get EYNL A
0.00  5.00
VM700T>
```

EYNO EYNO returns or sets the lower and upper alarm limits for the rms Y (G) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get EYNO A
---  -45.00
VM700T>
```

EYPA EYPA returns or sets the lower and upper alarm limits and the arrow setting for the Y (G) Peak Amplitude, in mV, in the Component Level-Meter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get EYPA A
678.60  750.00  714.30
VM700T>
```

EYSA EYSA returns or sets the lower and upper alarm limits and the arrow setting for the Y (G) Sync Amplitude, in mV, in the Component Level-Meter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get EYSA A
271.40  300.00  285.70
VM700T>
```

"F" Group: Component Configuration (PAL)

"F" keywords report on or set the values of Component Option Configuration parameters. These keywords can only be used on PAL-standard VM700T's equipped with Option 30 (Component).

Get commands used with the "F" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "F" group keywords take different arguments, depending on the keyword. The form of each Set command used with "F" group keywords is documented in the pages that follow.

Table A-6: "F" Keywords: Component Configuration (PAL)

Keyword	Decription	Keyword	Description
FBC1	Pb CB color #1 (mV)	FLCP	Lightning color pk-pk ampl error (%)
FBC2	Pb CB color #2 (mV)	FLPW	Lightning pk-white ampl error (%)
FBC3	Pb CB color #3 (mV)	FMKL	Marker line
FBC4	Pb CB color #4 (mV)	FPRI	Probe Input
FBC5	Pb CB color #5 (mV)	FRC1	Pr CB color #1 (mV)
FBC6	Pb CB color #6 (mV)	FRC2	Pr CB color #2 (mV)
FBC7	Pb CB color #7 (mV)	FRC3	Pr CB color #3 (mV)
FBC8	Pb CB color #8 (mV)	FRC4	Pr CB color #4 (mV)
FBHA	Pb K-Factor Pulse HAD	FRC5	Pr CB color #5 (mV)
FBKB	Pb K-PB Factor (%)	FRC6	Pr CB color #6 (mV)
FBKF	Pb K Factor (%)	FRC7	Pr CB color #7 (mV)
FBM1	Pb MB Packet #1 (dB)	FRC8	Pr CB color #8 (mV)
FBM2	Pb MB Packet #2 (dB)	FRCI	Stored Reference Channel Independent
FBM3	Pb MB Packet #3 (dB)	FRHA	Pr K-Factor Pulse HAD
FBM4	Pb MB Packet #4 (dB)	FRKB	Pr K-PB Factor (%)
FBM5	Pb MB Packet #5 (dB)	FRKF	Pr K Factor (%)
FBM6	Pb MB Packet #6 (dB)	FRM1	Pr MB Packet #1 (dB)
FBM7	Pb MB Packet #7 (dB)	FRM2	Pr MB Packet #2 (dB)
FBM8	Pb MB Packet #8 (dB)	FRM3	Pr MB Packet #3 (dB)
FBM9	Pb MB Packet #9 (dB)	FRM4	Pr MB Packet #4 (dB)
FBMB	Pb Multiburst Packets	FRM5	Pr MB Packet #5 (dB)
FBMF	Pb Multiburst Flag (mV)	FRM6	Pr MB Packet #6 (dB)
FBNL	Pb Non-Linearity (%)	FRM7	Pr MB Packet #7 (dB)
FBNO	Pb Noise Level (dB rms)	FRM8	Pr MB Packet #8 (dB)

Table A-6: "F" Keywords: Component Configuration (PAL) (Cont.)

Keyword	Decription	Keyword	Description
FBPP	Pb P-P Amplitude (mV) (3 values)	FRM9	Pr MB Packet #9 (dB)
FBRD	Pb to Pr Delay (nsec) (3 values)	FRMB	Pr Multiburst Packets
FBWL	Bowtie line	FRMF	Pr Multiburst Flag (mV)
FBWT	Bowtie interchannel delay (ns)	FRNL	Pr Non-Linearity (%)
FBYD	Pb to Y Delay (nsec) (3 values)	FRNO	Pr Noise Level (dB rms)
FCSD	Colourbar standard	FRPP	Pr P-P Amplitude (mV) (3 values)
FRYD	Pr to Y Delay (nsec) (3 values)	FYM2	Y MB Packet #2 (dB)
FTNM	T (nsec)	FYM3	Y MB Packet #3 (dB)
FYC1	Y CB color #1 (mV)	FYM4	Y MB Packet #4 (dB)
FYC2	Y CB color #2 (mV)	FYM5	Y MB Packet #5 (dB)
FYC3	Y CB color #3 (mV)	FYM6	Y MB Packet #6 (dB)
FYC4	Y CB color #4 (mV)	FYM7	Y MB Packet #7 (dB)
FYC5	Y CB color #5 (mV)	FYM8	Y MB Packet #8 (dB)
FYC6	Y CB color #6 (mV)	FYM9	Y MB Packet #9 (dB)
FYC7	Y CB color #7 (mV)	FYMB	Y Multiburst Packets
FYC8	Y CB color #8 (mV)	FYMF	Y Multiburst Flag (mV)
FYHA	Y K-Factor Pulse HAD	FYNL	Y Non-Linearity (%)
FYKB	Y K-PB Factor (%)	FYNO	Y Noise Level (dB rms)
FYKF	Y K Factor (%)	FYPA	Y Peak Amplitude (mV) (3 values)
FYM1	Y MB Packet #1 (dB)	FYSA	Y Sync Amplitude (mV) (3 values)

FBC1 – FBC8 Keywords FBC1 through FBC8 return or set the lower and upper alarm limits for Pb CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get FBC1 A
-50.00  50.00
VM700T>
```

FBHA FBHA returns or sets the half-amplitude duration for the Pb(B) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get FBHA A
7
VM700T>
```

FBKB FBKB returns or sets the lower and upper alarm limits for the Pb K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get FBKB A
-5.00  1.00
VM700T>
```

FBKF FBKF returns or sets the lower and upper alarm limits for the Pb K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get FBKF A
0.00  5.00
VM700T>
```

FBM1 – FBM9 Keywords FBM1 through FBM9 return or set the lower and upper alarm limits, in dB, for Pb(B) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get FBM1 A
-1.00  1.00
VM700T>
```

FBMB FBMB returns or sets the number of Pb (B) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get FBMB A
5
VM700T>
```

FBMF FBMF returns or sets the lower and upper alarm limits, in mV, for the Pb (B) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get FBMF A
300.00  700.00
VM700T>
```

FBNL FBNL returns or sets the lower and upper alarm limits for Pb (B) non-linearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get FBNL A
0.00  5.00
VM700T>
```

FBNO FBNO returns or sets the lower and upper alarm limits for the rms Pb (B) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get FBNO A
---  -45.00
VM700T>
```

FBPP FBPP returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) Peak-to-Peak Amplitude, in mV, in the Component LevelMeter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get FBPP A
665.00  735.00  700.00
VM700T>
```

FBRD FBRD returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) to Pr (R) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get FBRD A
-10.00  10.00  0.00
VM700T>
```

FBWL FBWL specifies the line used for Bowtie measurements. The set command takes one argument after the channel letter, representing the line number.

```
VM700T> get FBWL A
45
VM700T> set FBWL A 50
VM700T> get FBWL A
50
VM700T>
```

FBWT FBWT specifies the lower and upper alarm limits of interchannel delay (in ns) for Bowtie measurements. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –100 to +100, inclusive, or "undef", which indicates no limit set.

```
VM700T> get FBWT A
-10.00  10.00
VM700T> set FBWT A -5 5
VM700T> get FBWT A
-5.00  5.00
VM700T>
```

FBYD FBYD returns or sets the lower and upper alarm limits and the arrow setting for the Pb (B) to Y (G) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get FBYD A
-50.00  50.00  0.00
VM700T>
```

FCSD FCSD returns or sets the ColorBar standard used for the Component ColorBar application. Legal values are: GBR 700, GBR 700 Setup, GBR 714, GBR 714 Setup, YPbPr SMPTE/EBU, YPbPr 714 Betacam Setup, YPbPr 714 Betacam, and YPbPr 700 MII Setup.

```
VM700T> get FCSD A
YPbPr SMPTE/EBU
VM700T>
```

FLCP FLCP specifies the lower and upper alarm limits of color peak-to-peak amplitude error, in percent. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –10 to +10, inclusive, or "undef", which indicates no limit set.

```
VM700T> get FLCP A
-2.00  2.00
VM700T> set FLCP A -5 5
VM700T> get FLCP A
-5.00  5.00
VM700T>
```

FLPW FLPW specifies the lower and upper alarm limits of peak-to-white amplitude error, in percent. The set command takes two arguments after the channel letter, representing the lower and upper limit, respectively. Legal values are numbers from –10 to +10, inclusive, or "undef", which indicates no limit set.

```
VM700T> get FLPW A
-2.00  2.00
VM700T> set FLPW A -5 5
VM700T> get FLPW A
-5.00  5.00
VM700T>
```

FMKL FMKL specifies the line location of the marker used in Bowtie measurements. The set command takes one argument after the channel letter, representing the line number.

```
VM700T> get FMKL A
164
```

```
VM700T> get FMKL A 140
VM700T> get FMKL A
140
VM700T>
```

FPRI FPRI tells the VM700T whether or not to use special calibration factors for a probe input. Legal values are "yes" and "no". "Yes" tells the VM700T to use the special calibration factors; "no" uses the standard factors.

NOTE. *The FPRI setting applies to all measure-mode applications, not just the component applications.*

```
VM700T> get FPRI A
no
VM700T>
```

FRC1 – FRC8 Keywords FRC1 through FRC8 return or set the lower and upper alarm limits for Pr CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get FRC1 A
-50.00  50.00
VM700T>
```

FRCI FRCI tells the VM700T whether or not stored reference values are shared by all channels for each standard, or are stored independently from channel to channel. Legal values are "yes" and "no". "Yes" means reference values are stored independently of each other; "no" means reference values are shared by all channels for each standard.

NOTE. *The FRCI setting applies to all measure-mode applications, not just the component applications.*

```
VM700T> get FRCI A
no
VM700T>
```

FRHA FRHA returns or sets the half-amplitude duration for the Pr(R) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get FRHA A
7
VM700T>
```

FRKB FRKB returns or sets the lower and upper alarm limits for the Pr K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get FRKB A
-5.00  1.00
VM700T>
```

FRKF FRKF returns or sets the lower and upper alarm limits for the Pr K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get FRKF A
0.00  5.00
VM700T>
```

FRM1 – FRM9 Keywords FRM1 through FRM9 return or set the lower and upper alarm limits, in dB, for Pr (R) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get FRM1 A
-1.00  1.00
VM700T>
```

FRMB FRMB returns or sets the number of Pr (R) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get FRMB A
5
VM700T>
```

FRMF FRMF returns or sets the lower and upper alarm limits, in mV, for the Pr (R) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get FRMF A
300.00  700.00
VM700T>
```

FRNL FRNL returns or sets the lower and upper alarm limits for Pr (R) nonlinearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get FRNL A
0.00  5.00
VM700T>
```

FRNO FRNO returns or sets the lower and upper alarm limits for the rms Pr (R) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get FRNO A
---  -45.00
VM700T>
```

FRPP FRPP returns or sets the lower and upper alarm limits and the arrow setting for the Pr (R) Peak-to-Peak Amplitude, in mV, in the Component LevelMeter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get FRPP A
665.00  735.00  700.00
VM700T>
```

FRYD FRYD returns or sets the lower and upper alarm limits and the arrow setting for the Pr (R) to Y (G) Delay, in nsec, in the Component Channel Delay application. Legal values are floating point values from –400 to 400, inclusive.

```
VM700T> get FRYD A
-50.00  50.00  0.00
VM700T>
```

FTNM FTNM returns or sets the T duration, in nsec. Legal values are integers from 50 to 150, inclusive.

```
VM700T> get FTNM A
125
VM700T>
```

FYC1 – FYC8 Keywords FYC1 through FYC8 return or set the lower and upper alarm limits for Y CB colors in the Component ColorBar application. The settings are in milliVolts. Legal values are floating point numbers from –500 to 500, inclusive. The color ordering is as follows: 1, gray; 2, yellow; 3, cyan; 4, green; 5, magenta; 6, red; 7, blue; 8, black.

```
VM700T> get FYC1 A
-50.00  50.00
VM700T>
```

FYHA FYHA returns or sets the half-amplitude duration for the Y(G) K-Factor pulse, in T units. Legal values are integers from 2 to 8, inclusive.

```
VM700T> get FYHA A
2
VM700T>
```

FYKB FYKB returns or sets the lower and upper alarm limits for the Y K-PB factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from –50 to 50, inclusive.

```
VM700T> get FYKB A
-5.00  1.00
VM700T>
```

FYKF FYKF returns or sets the lower and upper alarm limits for the Y K-factor, as a percentage, in the Component K-Factor application. Legal values are floating point numbers from 0 to 99.9, inclusive.

```
VM700T> get FYKF A
0.00  5.00
VM700T>
```

FYM1 – FYM9 Keywords FYM1 through FYM9 return or set the lower and upper alarm limits, in dB, for Y (G) packets 1 through 9 in the Component Multiburst application. Legal values are floating point numbers from –40 to 40, inclusive.

```
VM700T> get FYM1 A
-1.00  1.00
VM700T>
```

FYMB FYMB returns or sets the number of Y (G) multiburst packets. Legal values are integers from 3 to 9, inclusive.

```
VM700T> get FYMB A
6
VM700T>
```

FYMF FYMF returns or sets the lower and upper alarm limits, in mV, for the Y (G) multiburst flag in the Component Multiburst application. Legal values are floating point numbers from 0 to 999.9, inclusive.

```
VM700T> get FYMF A
300.00  700.00
VM700T>
```

FYNL FYNL returns or sets the lower and upper alarm limits for Y (G) nonlinearity in the Component NonLinearity application. Legal values are floating-point numbers from 0 to 50, inclusive.

```
VM700T> get FYNL A
0.00  5.00
VM700T>
```

FYNO FYNO returns or sets the lower and upper alarm limits for the rms Y (G) noise level, in dB, in the Component Noise application. Legal values are floating point numbers from –100 to 0, inclusive.

```
VM700T> get FYNO A
---  -45.00
VM700T>
```

FYPA FYPA returns or sets the lower and upper alarm limits and the arrow setting for the Y (G) Peak Amplitude, in mV, in the Component Level-Meter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get FYPA A
678.60  750.00  714.30
VM700T>
```

FYSA FYSA returns or sets the lower and upper alarm limits and the arrow setting for the Y (G) Sync Amplitude, in mV, in the Component Level-Meter application. Legal values are floating point numbers from 500 to 2000, inclusive.

```
VM700T> get FYSA A
271.40  300.00  285.70
VM700T>
```

"G" Group: Remote Configuration

"G" keywords report on or set the values of parameters that control the way the VM700T communicates with a PC or remote terminal.

`Get` commands used with the "G" keywords have the following form:

```
get <keyword>
```

`Set` commands used with "G" group keywords take different arguments, depending on the keyword. The form of each `Set` command used with "G" group keywords is documented in the pages that follow.

Table A-7: "G" Keywords: Remote Configuration

Keyword	Description	Range	Meaning or Units
GACC	Clamp Coupling, Source A	0 - 3	0 = DC, 1 = AC, 2 = FAST, 3 = SLOW
GACL	Clamp Level, Source A	–128 - 127	mV
GACP	Clamp Position, Source A		µs
GACW	Clamp Width, Source A	0 - 3	0 = 0.5, 1 = 0.67, 2 = 1.0, 3 = 2.0 µs
GAFA	Frame Algorithm, Source A	0 - 2	0 = normal synchronous frame pulse, 1 = block field mode (for VTRs), 2 = synthesized frame pulse, arbitrary phase
GALM	Lock Mode, Source A	0 - 3	0 = TV line lock (phase locked to video), 1 = phase locked to crystal, 2 = external strobe, 3 = 20.25 MHz strobe
GASS	Sound-In-Sync, Source A	0, 1	0 = Off, 1 = On
GBCC	Clamp Coupling, Source B	0 - 3	0 = DC, 1 = AC, 2 = FAST, 3 = SLOW
GBCL	Clamp Level, Source B	–128 – 127	mV
GBCP	Clamp Position, Source B		µs
GBCW	Clamp Width, Source B	0 - 3	0 = 0.5, 1 = 0.67, 2 = 1.0, 3 = 2.0 µs
GBFA	Frame Algorithm, Source B	0 - 2	see GAFA (above)
GBLM	Lock Mode, Source B	0 - 3	see GALM (above)
GBSS	Sound-In-Sync, Source B	0, 1	0 = Off, 1 = On
GCCC	Clamp Coupling, Source C	0 - 3	0 = DC, 1 = AC, 2 = FAST, 3 = SLOW
GCCL	Clamp Level, Source C	–128 - 127	mV
GCCP	Clamp Position, Source C		µs
GCCW	Clamp Width, Source C	0 - 3	0 = 0.5, 1 = 0.67, 2 = 1.0, 3 = 2.0 µs
GCFA	Frame Algorithm, Source C	0 - 2	see GAFA (above)
GCLM	Lock Mode, Source C	0 - 3	see GALM (above)
GCSS	Sound-In-Sync, Source C	0, 1	0 = Off, 1 = On

Table A-7: "G" Keywords: Remote Configuration (Cont.)

Keyword	Description	Range	Meaning or Units
GLN6	System Line Number	1 - 625	current line number
GSNC	Sync	0 - 3	0 = A, 1 = B, 2 = C, 3 = External
GSRC	Source	0 - 7	0 = Source A, 1 = B, 2 = C, 3 = A - B, 4 = B - C, 5 = A -C, 6 = -A, 7= -B.
GSSR	Locked to Source	0, 1	0 = Off; 1 = On
GSYI	Sync Inverted	0, 1	0 = normal sync; 1 = inverted sync

GACC, GBCC, GCCC GACC, GBCC, and GCCC specify the clamp coupling mode for sources A, B, and C, respectively. The set command takes one argument, an integer from 0 to 3, inclusive.

A setting of 0 indicates DC coupling (no clamping) is in effect.

A setting of 1 indicates AC coupling is in effect.

A setting of 2 indicates that fast clamp coupling is in effect. This removes DC offset, hum, and bounce from the signal.

A setting of 3 indicates that slow clamp coupling is in effect. This still allows hum effects to be visible, but is useful in coping with large DC offsets on an input signal.

```
VM700T> get GACC
```

GACL, GBCL, GCCL GACL, GBCL, and GCCL specify the clamping level for sources A, B, and C, respectively. The set command takes one argument, representing the clamping level in milliVolts.

```
VM700T> get GACL
```

GACP, GBCP, GCCP GACP, GBCP, and GCCP specify the clamping position for sources A, B, and C, respectively.. The set command takes one argument, representing the clamping position in µsec.

```
VM700T> get GACP
```

GACW, GBCW, GCCW GACW, GBCW, and GCCW specify the clamp width for sources A, B, and C, respectively. The set command takes one argument , an integer from 0 to 3, inclusive. A value of 0 sets the clamp width to 0.5 µsec. A value of 1 sets the clamp width to 0.67 µsec. A value of 2 sets the clamp width to 1.0 µsec. A value of 3 sets the clamp width to 2.0 µsec.

```
VM700T> get GACW
```

GAFA, GBFA, GCFA GAFA, GBFA, and GCFA specify the frame algorithm used for sources A, B, and C, respectively. The set command takes one argument , an integer from 0 to 2, inclusive. A value of 0 sets the frame algorithm to a normal synchronous frame pulse. A value of 1 sets the frame algorithm to block field mode. A value of 2 sets the frame algorithm to an arbitrary-phase, synthesized frame pulse.

```
VM700T> get GAFA
```

GALM, GBLM, GCLM GALM, GBLM, and GCLM specify the lock mode for sources A, B, and C, respectively. The set command takes one argument , an integer from 0 to 3, inclusive. A value of 0 sets the lock mode to TV line lock (phase locked to video). A value of 1 sets the lock mode to "phase-locked to crystal." A value of 2 sets the lock mode to external strobe. A value of 3 sets the lock mode to a 20.25-MHz strobe.

```
VM700T> get GALM
```

GASS, GBSS, GCSS GASS, GBSS, and GCSS turns Sound-in-Sync off or on for sources A, B, and C, respectively. The set command takes one argument , 0 or 1. A value of 0 turns Sound-In-Sync off. A value of 1 turns Sound-In-Sync on.

```
VM700T> get GASS
```

GAST The GAST flag is similar to the GOOL flag, but it will be set TRUE if an Audio Auto Measurement starts (in other words, when it detects the first FSK preamble of the audio test sequence). So, a function can be played back at the same time as an Audio Measurement starts. The state of the GAST flag may be found by using the get GAST command, and it may be set using the set GAST command. The arguments are 0 and 1.

The flag is useful for triggering the audio and the video measurements at the same time from a remote site, and when the video has to start a specific timing such as VTR playback testing.

The GAST flag must be reset by the user to the state needed for the conditional testing.

```
set GAST 0
?GAST return
delay 10
loop
```

GLN5 GLN5 specifies the system line number for NTSC. The set command takes one argument , an integer from 1 to 525, representing the line number. Lines in field 1 are numbered from 1 to 263. Lines in field 2 are numbered from 264 to 525.

```
VM700T> get GLN5
```

GLN6 GLN6 specifies the system line number for PAL. The set command takes one argument , an integer from 1 to 625, representing the line number.

```
VM700T> get GLN6
```

GOOL GOOL specifies the value of the global out-of-limits flag. The set command takes one argument , 0 (false) or 1 (true). This parameter is set to 1 whenever a measurement application finds a value outside of its lower-to-upper limit range. The status of the global out-of-limits flag can be tested with the **?GOOL** command. The global out-of-limits flag must be reset to 0 explicitly within a function; it does not return to 0 when tested. See the description of the **?GOOL** command in Appendix A for an example showing the use of the GOOL keyword within a function.

GRLY The ALARM connector on the rear panel of the VM700T (located between the two serial ports connectors) is not active. The internal relay that controls the contact closure is accessible via a set command.

set GRLY 0 opens the relay and set GRLY 1 closes the relay.

The set may be used in a Function Key in conjunction with the GOOL (global-out-of-limits) flag in a Function Key to turn on an alarm indicator.

A second application for a program to monitor some condition for the out-of-limits to occur and use set GRLY 1 to close the relay for a period of time to sound an alarm, then open it again with set GRLY 0 to shut the alarm off.

```
VM700T> get GSNC
```

GSNC GSNC specifies the sync source. The set command takes one argument, an integer from 0 to 3, inclusive. Values of 0, 1, 2, and 3 set the sync source to A, B, C, and external, respectively.

```
VM700T> get GSNC
```

GSRC GSRC specifies the signal source. The set command takes one argument , an integer from 0 to 7, inclusive. Values of 0, 1, and 2 set the signal source to A, B, or C, respectively. A value of 3 sets the signal source to A-B. A value of 4 sets the signal source to B-C. A value of 5 sets the signal source to A-C. A value of 6 sets the signal source to -A. A value of 7 sets the signal source to -B.

```
VM700T> get GSRC
```

GSSR GSSR turns Locked to Source off or on. The set command takes one argument, 0 or 1. A value of 0 turns Locked to Source off. A value of 1 turns Locked to Source on.

```
VM700T> get GSSR
```

GSYI GSYI controls sync inversion. The set command takes one argument, 0 or 1. A value of 0 sets sync to normal. A value of 1 inverts the sync.

```
VM700T> get GSYI
```

"H" Group: Echo/Rounding Configuration (NTSC)

"H" keywords report on or set the values of Echo/Rounding Option Configuration parameters. These keywords can only be used on an NTSC-standard VM700T equipped with Option 1G (Echo/Rounding).

Get commands used with the "H" keywords have the following form:

```
get <keyword> <channel-letter>
```

The form of each Set command used with "H" group keywords is documented below.

Table A-8: "H" Keywords: Echo/Rounding Configuration (NTSC)

Keyword	Description	Range
HROB	NTSC Rounding of black (%)	–50.00 to 50.00
HROW	NTSC Rounding of white (%)	–50.00 to 50.00

HROB HROB specifies the lower and upper limits, in percent, for the Rounding of the Black measurement. The set command takes two arguments after the channel letter, representing the values of the lower and upper limits, respectively. Legal values are numbers between –50 and 50, inclusive, or "undef", which indicates no limit set.

```
VM700T> get HROB A
-1.00  1.00
VM700T> set HROB A undef 1
VM700T> get HROB A
---  1.00
VM700T>
```

HROW HROW specifies the lower and upper limits, in percent, for the Rounding of the White measurement. The set command takes two arguments after the channel letter, representing the values of the lower and upper limits, respectively. Legal values are numbers between –50 and 50, inclusive, or "undef", which indicates no limit set.

```
VM700T> get HROW A
-1.00  1.00
VM700T> set HROW A undef 1
VM700T> get HROW A
---  1.00
VM700T>
```

"I" Group: Echo/Rounding Configuration (PAL)

"I" keywords report on or set the values of Echo/Rounding Option Configuration parameters. These keywords can only be used on a PAL-standard VM700T equipped with Option 1G (Echo/Rounding).

Get commands used with the "I" keywords have the following form:

```
get <keyword> <channel-letter>
```

The form of each Set command used with "I" group keywords is documented in the pages that follow.

Table A-9: "I" Keywords: Echo/Rounding Configuration (PAL)

Keyword	Description	Range
IROB	PAL Rounding of black (%)	–50.00 to 50.00
IROW	PAL Rounding of white (%)	–50.00 to 50.00

IROB IROB specifies the lower and upper limits, in percent, for the Rounding of the Black measurement. The set command takes two arguments after the channel letter, representing the values of the lower and upper limits, respectively. Legal values are numbers between –50 and 50, inclusive, or "undef", which indicates no limit set.

```
VM700T> get IROB A
-1.00  1.00
VM700T> set IROB A undef 1
VM700T> get IROB A
---  1.00
VM700T>
```

IROW IROW specifies the lower and upper limits, in percent, for the Rounding of the White measurement. The set command takes two arguments after the channel letter, representing the values of the lower and upper limits, respectively. Legal values are numbers between –50 and 50, inclusive, or "undef", which indicates no limit set.

```
VM700T> get IROW A
-1.00  1.00
VM700T> set IROW A undef 1
VM700T> get IROW A
---  1.00
VM700T>
```

"J" Group: Teletext Configuration (NTSC)

"J" keywords report on or set the values of Teletext Option Configuration parameters. These keywords can only be used on an NTSC-standard VM700T equipped with Option 20 (Teletext).

Get commands used with the "J" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "J" group keywords take different arguments, depending on the keyword. The form of each Set command used with "J" group keywords is documented in the pages that follow.

Table A-10: "J" Keywords: Teletext Configuration (NTSC)

Keyword	Description	Keyword	Description
J0LV	'0' Level (mV)	JPPM	P-P Amplitude (mV)
J1LV	'1' Level (mV)	JPPP	P-P Amplitude (%)
JDES	Data End to Sync (µsec)	JRIA	Run In Amplitude (mV)
JDLW	Data Line Width (µsec)	JRIB	Run In Bits (bits)
JEHM	Eye Height (mV)	JRIS	Run In Start (µsec)
JEHP	Eye Height (%)	JTTL	Teletext field and line
JEWP	Eye Width (%)	JTUN	Timing Unit

J0LV J0LV specifies the lower and upper limits of the '0' level in milliVolts for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbersfrom –50 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get J0LV A
-18.00  18.00
VM700T> set J0LV A -20 20
VM700T> get J0LV A
-20.00  20.00
VM700T>
```

J1LV J1LV specifies the lower and upper limits of the '1' level in milliVolts for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get J1LV A
482.00  518.00
```

```
VM700T> set J1LV A 475 525
VM700T> get J0LV A
475.00  525.00
VM700T>
```

JDES JDES specifies the lower and upper limits for data-end-to-sync in microseconds for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 99.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JDES A
1.00  3.00
VM700T> set JDES A 0.5 5
VM700T> get JDES A
0.5  5.00
```

JDLW JDLW specifies the lower and upper limits for data line width in microseconds for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 99.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JDLW A
52.00  59.00
VM700T> set JDLW A 50 60
VM700T> get JDLW A
50.00  60.00
VM700T>
```

JEHM JEHM specifies the lower and upper limits for eye height in milliVolts for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JEHM A
350.00  500.00
VM700T> set JEHM A 300 600
VM700T> get JEHM A
300.00  600.00
VM700T>
```

JEHP JEHP specifies the lower and upper limits for eye height in percent for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JEHP A
70.00  100.00
VM700T> set JEHP A 75 undef
VM700T> get JEHP A
75.00  ---
VM700T>
```

JEWP JEWP specifies the lower and upper limits for eye width in percent for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JEWP A
70.00  100.00
VM700T> set JEWP A 75 undef
VM700T> get JEWP A
75.00  ---
VM700T>
```

JPPM JPPM specifies the lower and upper limits for peak-to-peak amplitude in milliVolts for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JPPM A
500.00  650.00
VM700T> set JPPM A 550 undef
VM700T> get JPPM A
550.00  ---
VM700T>
```

JPPP JPPP specifies the lower and upper limits for peak-to-peak amplitude in percent for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 100 to 200, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JPPP A
100.00  130.00
```

```
VM700T> set JPPP A 105 150
VM700T> get JPPP A
105.00  150.00
VM700T>
```

JRIA JRIA specifies the lower and upper limits for run-in amplitude in milli-Volts for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JRIA A
482.00  518.00
VM700T> set JRIA A 480 520
VM700T> get JRIA A
480.00  520.00
VM700T>
```

JRIB JRIB specifies the lower and upper limits of the number of run-in bits for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 6 to 25, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JRIB A
14.00  18.00
VM700T> set JRIB A 6 25
VM700T> get JRIB A
6.00  25.00
VM700T>
```

JRIS JRIS specifies the lower and upper limits for run-in start time in micro-seconds for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 7 to 15, inclusive, and "undef", which indicates no limit set.

```
VM700T> get JRIS A
9.00  11.00
VM700T> get JRIS A 8.5 12
VM700T> get JRIS A
8.50  12.00
VM700T>
```

JTTL JTTL specifies the field and line location for the Teletext measurement on NTSC-standard VM700T's. The set command takes two arguments after the channel letter, indicating the field and line number, respectively.

```
VM700T> get JTTL A
1  15
VM700T> set JTTL A 1 10
VM700T> get JTTL A
1  10
VM700T>
```

JTUN JTUN specifies the display timing unit for the Teletext measurement on NTSC-standard VM700T's. The set command takes one argument after the channel letter, indicating the current timing unit. Legal values are usec (for microseconds) and Tc (for "clock periods", equal to 0.1746 μsec).

```
VM700T> get JTUN A
usec
VM700T> set JTUN A Tc
VM700T> get JTUN A
Tc
VM700T>
```

"K" Group: Teletext Configuration (PAL)

"K" keywords report on or set the values of Teletext Option Configuration parameters. These keywords can only be used on a PAL-standard VM700T equipped with Option 20 (Teletext).

Get commands used with the "K" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "K" group keywords, shown in Table A-11 take different arguments, depending on the keyword. The form of each Set command used with "K" group keywords is documented following the table.

Table A-11: "K" Keywords: Teletext Configuration (PAL)

Keyword	Description	Keyword	Description
K0LV	'0' Level (mV)	KRIS	Run In Start (µsec)
K1LV	'1' Level (mV)	KS0L	SIS '0' Level (mV)
KDES	Data End to Sync (µsec)	KS1L	SIS '1' Level (mV)
KDLW	Data Line Width (µsec)	KS2L	SIS '2' Level (mV)
KDTM	Data Timing (µsec)	KS3L	SIS '3' Level (mV)
KEHM	Eye Height (mV)	KSHM	SIS Eye Height (mV)
KEHP	Eye Height (%)	KSHP	SIS Eye Height (%)
KEWP	Eye Width (%)	KSPM	SIS P-P Amplitude (mV)
KPPM	P-P Amplitude (mV)	KSPP	SIS P-P Amplitude (%)
KPPP	P-P Amplitude (%)	KSWP	SIS Eye Width (%)
KRIA	Run In Amplitude (mV)	KTTL	Teletext line
KRIB	Run In Bits (bits)		

K0LV K0LV specifies the lower and upper limits of the '0' level in milliVolts for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbersfrom –50 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get K0LV A
-18.00  18.00
VM700T> set K0LV A -20 20
VM700T> get K0LV A
-20.00  20.00
VM700T>
```

K1LV K1LV specifies the lower and upper limits of the '1' level in milliVolts for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get K1LV A
482.00  518.00
VM700T> set K1LV A 475 525
VM700T> get K1LV A
475.00  525.00
VM700T>
```

KDES KDES specifies the lower and upper limits for data-end-to-sync in microseconds for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 99.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KDES A
1.00  3.00
VM700T> set KDES A 0.5 5
VM700T> get KDES A
0.5  5.00
```

KDLW KDLW specifies the lower and upper limits for data line width in microseconds for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 99.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KDLW A
52.00  59.00
VM700T> set KDLW A 50 60
VM700T> get KDLW A
50.00  60.00
VM700T>
```

KDTM KDTM specifies the lower and upper limits for data timing in microseconds for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 10 to 15, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KDTM A
11.00  13.00
VM700T> set KDTM A 10 15
```

```
VM700T> get KDTM A
10.00  15.00
VM700T>
```

KEHM KEHM specifies the lower and upper limits for eye height in milliVolts for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KEHM A
350.00  500.00
VM700T> set KEHM A 300 600
VM700T> get KEHM A
300.00  600.00
VM700T>
```

KEHP KEHP specifies the lower and upper limits for eye height in percent for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KEHP A
70.00  100.00
VM700T> set KEHP A 75 undef
VM700T> get KEHP A
75.00  ---
VM700T>
```

KEWP KEWP specifies the lower and upper limits for eye width in percent for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KEWP A
70.00  100.00
VM700T> set KEWP A 75 undef
VM700T> get KEWP A
75.00  ---
VM700T>
```

KPPM KPPM specifies the lower and upper limits for peak-to-peak amplitude in milliVolts for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KPPM A
500.00  650.00
VM700T> set KPPM A 550 undef
VM700T> get KPPM A
550.00  ---
VM700T>
```

KPPP KPPP specifies the lower and upper limits for peak-to-peak amplitude in percent for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 100 to 200, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KPPP A
100.00  130.00
VM700T> set KPPP A 105 150
VM700T> get KPPP A
105.00  150.00
VM700T>
```

KRIA KRIA specifies the lower and upper limits for run-in amplitude in milliVolts for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KRIA A
482.00  518.00
VM700T> set KRIA A 480 520
VM700T> get KRIA A
480.00  520.00
VM700T>
```

KRIB KRIB specifies the lower and upper limits of the number of run-in bits for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 6 to 25, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KRIB A
14.00  18.00
VM700T> set KRIB A 6 25
VM700T> get KRIB A
6.00  25.00
VM700T>
```

KRIS KRIS specifies the lower and upper limits for run-in start time in microseconds for the Teletext measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 7 to 15, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KRIS A
9.00  11.00
VM700T> get KRIS A 8.5 12
VM700T> get KRIS A
8.50  12.00
VM700T>
```

KS0L KS0L specifies the lower and upper limits of the '0' level in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from –999.9 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KS0L A
-330.00  -270.00
VM700T> set KS0L A -350 -250
VM700T> get KS0L A
-350.00  -250.00
VM700T>
```

KS1L KS1L specifies the lower and upper limits of the '1' level in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from –999.9 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KS1L A
-97.00  -37.00
VM700T> set KS1L A -100 -30
VM700T> get KS1L A
-100.00  -30.00
VM700T>
```

KS2L KS2L specifies the lower and upper limits of the '2' level in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from –999.9 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KS2L A
137.00  197.00
VM700T> set KS2L A 130 200
VM700T> get KS2L A
130.00  200.00
VM700T>
```

KS3L KS3L specifies the lower and upper limits of the '3' level in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from –999.9 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KS3L A
370.00  430.00
VM700T> set KS3L A 350 450
VM700T> get KS3L A
350.00  450.00
VM700T>
```

KSHM KSHM specifies the lower and upper limits of eye height in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KSHM A
163.00  233.00
VM700T> set KSHM A 160 240
VM700T> get KSHM A
160.00  240.00
VM700T>
```

KSHP KSHP specifies the lower and upper limits of eye height in percent for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KSHP A
70.00  100.00
VM700T> set KSHP A 75 undef
VM700T> get KSHP A
75.00  undef
VM700T>
```

KSPM KSPM specifies the lower and upper limits of peak-to-peak amplitude in milliVolts for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 999.9, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KSPM A
700.00  910.00
VM700T> set KSPM A 650 950
VM700T> get KSPM A
650.00  950.00
VM700T>
```

KSPP KSPP specifies the lower and upper limits of peak-to-peak amplitude in percent for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 100 to 200, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KSPP A
100.00  130.00
```

```
VM700T> set KSPP A 110 undef
VM700T> get KSPP A
110.00  undef
VM700T>
```

KSWP KSWP specifies the lower and upper limits of eye width in percent for the SoundInSync measurement on PAL-standard VM700T's. The set command takes two arguments after the channel letter, indicating the lower and upper limits, respectively. Legal values are numbers from 0 to 100, inclusive, and "undef", which indicates no limit set.

```
VM700T> get KSWP A
70.00  100.00
VM700T> set KSWP A 75 undef
VM700T> get KSWP A
75.00  undef
VM700T>
```

KTTL KTTL specifies the line location for the Teletext measurement on PAL-standard VM700T's. The set command takes one argument after the channel letter, indicating the line number.

```
VM700T> get KTTL A
17
VM700T> set KTTL A 16
VM700T> get KTTL A
16
VM700T>
```

"L" Group: Measurement Locations (PAL)

"L" keywords report on or set the measurement locations for Measure Mode measurements on PAL-standard VM700T's.

Get commands used with the "L" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with the "L" keywords have the following form:

```
set <keyword> <channel-letter> <argument>
```

Table A-12 lists the legal and default values for the Set command used with each "L" group keyword.

Table A-12: "L" Keywords: Measurement Locations (PAL)

Keyword	Description	Units	Legal Values	Default
L2TC	2T Sine-Squared Pulse (B1) center location	µsec	number, 0 to 64 (inclusive)	26.0
L2TL	2T Sine-Squared Pulse (B1) line	line	integer, 1 to 625 (inclusive)	17
LBAL	Luminance bar line	line	integer, 1 to 625 (inclusive)	17
LBAR	Black Level Reference (b1)	µsec	number, 0 to 64 (inclusive)	36.0
LBAS	Luminance bar start location	µsec	number, 0 to 64 (inclusive)	12.0
LBAW	Luminance bar width (B2)	µsec	number, 0 to 64 (inclusive)	10.0
LCBL	Color Bar Line	line	integer, 1 to 625 (inclusive)	100
LLBR	Luminance Bar Reference (b2)	µsec	number, 0 to 64 (inclusive)	17.0
LLSL	5-Riser Luminance Staircase (D1) line	line	integer, 1 to 625 (inclusive)	17
LLSS	5-Riser Luminance Staircase (D1) start location	µsec	number, 0 to 64 (inclusive)	40.0
LMBL	Multiburst line	line	integer, 1 to 625 (inclusive)	18
LMC1	3-Level Mod. Pedestal (G2) packet 1 center	µsec	number, 0 to 64 (inclusive)	16.0
LMC2	3-Level Mod. Pedestal (G2) packet 2 center	µsec	number, 0 to 64 (inclusive)	20.0
LMC3	3-Level Mod. Pedestal (G2) packet 3 center	µsec	number, 0 to 64 (inclusive)	25.0
LMCL	3-Level Mod. Pedestal (G2) line	line	integer, 1 to 625 (inclusive)	331
LMFS	Multiburst flag start	µsec	number, 0 to 64 (inclusive)	12.0
LMFW	Multiburst flag width	µsec	number, 0 to 64 (inclusive)	8.0
LMMS	Measure Mode Sampling	---	asynchronous, synchronous	asynchronous
LMP1	Multiburst packet #1 center location	µsec	number, 0 to 64 (inclusive)	14.5

Table A-12: "L" Keywords: Measurement Locations (PAL) (Cont.)

Keyword	Description	Units	Legal Values	Default
LMP2	Multiburst packet #2 center location	µsec	number, 0 to 64 (inclusive)	20.5
LMP3	Multiburst packet #3 center location	µsec	number, 0 to 64 (inclusive)	26.5
LMP4	Multiburst packet #4 center location	µsec	number, 0 to 64 (inclusive)	32.5
LMP5	Multiburst packet #5 center location	µsec	number, 0 to 64 (inclusive)	38.5
LMP6	Multiburst packet #6 center location	µsec	number, 0 to 64 (inclusive)	44.5
LMPR	3-Level Mod. Pedestal (G2) reference	µsec	number, 0 to 64 (inclusive)	30.0
LMRE	Modulated Bar (G1) chroma end	µsec	number, 0 to 64 (inclusive)	28.0
LMRL	Modulated Bar (G1) line	line	integer, 1 to 625 (inclusive)	331
LMRR	Modulated Bar Lum-Reference (b6)	µsec	number, 0 to 64 (inclusive)	30.0
LMRS	Modulated Bar (G1) chroma start	µsec	number, 0 to 64 (inclusive)	14.0
LMSL	5-Riser Modulated Staircase (D2) line	line	integer, 1 to 625 (inclusive)	330
LMSS	5-Riser Modulated Staircase (D2) start location	µsec	number, 0 to 64 (inclusive)	40.0
LMUC	Modulated Pulse (F) center location	µsec	number, 0 to 64 (inclusive)	32.0
LMUH	Modulated Pulse (F) HAD	multiples of 100ns	20T, 10T	20T
LMUL	Modulated Pulse (F) line	line	integer, 1 to 625 (inclusive)	17
LQLL	Quiet line	line	integer, 1 to 625 (inclusive)	22
LSCA	5-Riser Chroma Amplitude	% of bar amplitude	40%, 20%	40%
LSID	Source ID line	line	integer, 1 to 625 (inclusive)	16
LSIL	Source ID start	µsec	number, 0 to 64 (inclusive)	26.0
LSIS	SIS present	- - -	yes, no	no
LSXX	Sin X/X Line	line	integer, 1 to 625 (inclusive)	100
LTBL	T Bar Start (SD) line	line	integer, 1 to 625 (inclusive)	17
LTBS	T Bar Start (SD) location	µsec	number, 0 to 64 (inclusive)	12.0
LTBW	T Bar Width (SD)	µsec	number, 0 to 64 (inclusive)	10.0
LZCC	Zero Carrier Pulse center location	µsec	number, 0 to 64 (inclusive)	35.0
LZCL	Zero Carrier Pulse line	µsec	integer, 1 to 625 (inclusive)	13

"M" Group: Measurement Locations (NTSC)

"M" keywords report on or set the measurement locations for Measure Mode measurements on NTSC-standard VM700T's.

All Get and Set commands used with the "M" keywords are channel-specific.

Get commands used with the "M" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with the "M" keywords have the following form:

```
set <keyword> <channel-letter> <argument> [<argument>]
```

set commands used with "M" group keywords have either one or two arguments, depending on the keyword. Table A-13 lists the legal and default values for the Set command used with each "M" group keyword.

Table A-13: "M" Keywords: Measurement Locations (NTSC)

Keyword	Description	Units	Legal Values	Default
MAMU	Amplitude units	IRE or volts	IRE, volts	IRE
MBNC	Bounce	Field and Line	1,2 / 10 to 262	1 30
MCBF	Color Bars	Field	1, 2	2
MCBL	Color Bars	Line	10 to 262	17
MCBT	ColorBar	Field and Line	1,2 / 10 to 262	2 17
MCFT	Chroma Freq Resp	Field and Line	1,2 / 10 to 262	1 15
MCIF	VIRS	Field	1, 2	1
MCIL	VIRS	Line	10 to 262	19
MCLG	ChromLum GainDelay	Field and Line	1,2 / 10 to 262	1 18
MCNT	Chrominance NonLinearity	Field and Line	1,2 / 10 to 262	1 17
MCVF	Composite VITS	Field	1, 2	1
MCVL	Composite VITS	Line	10 to 262	18
MDGT	DGDP	Field and Line	1,2 / 10 to 262	1 18
MEGD	GroupDelay SinX_X	Field and Line	1,2 / 10 to 262	2 18
MFGR	Fix 0 IRE to	- - -	Back Porch, 0 volts	Back Porch
MHTL	H Timing	Field and Line	1,2 / 10 to 262	1 100
MIRR	IRE bar reference	- - -	yes, no	no
MKFL	K Factor	Field and Line	1,2 / 10 to 262	1 18
MLNT	Luminance NonLinearity	Field and Line	1,2 / 10 to 262	1 18
MMBF	Multiburst	Field	1, 2	1
MMBL	Multiburst	Line	10 to 262	17

Table A-13: "M" Keywords: Measurement Locations (NTSC) (Cont.)

Keyword	Description	Units	Legal Values	Default
MMBT	MultiBurst	Field and Line	1,2 / 10 to 262	1 18
MNLF	Noise Line (Quiet)	Field	1, 2	1
MNLL	Noise Line (Quiet)	Line	10 to 262	12
MNSL	Noise Spectrum	Field and Line	1,2 / 10 to 262	1 12
MNVF	NTC-7 Combination	Field	1, 2	1
MNVL	NTC-7 Combination	Line	10 to 262	17
MPBT	Bar LineTime	Field and Line	1,2 / 10 to 262	1 18
MSAM	Sampling	- - -	synchronous, asynchronous	asynchronous
MTBL	T Bar (SD)	Field and Line	1,2 / 10 to 262	1 18
MZCA	Zero Carrier Pulse Ref	- - -	yes, no	no
MZCC	Zero Carrier Pulse	Center Location (µsec)	0 to 64	25.5
MZCF	Zero Carrier Pulse	Field	1, 2	1
MZCL	Zero Carrier Pulse	Line	10 to 262	16

"P" Group: Auto Mode Limits (PAL)

"P" keywords report on or set the limits for Auto Mode measurements on PAL-standard VM700T's.

Get commands used with the "P" keywords have the following form:

```
get <keyword> <channel letter>
```

Set commands used with the "P" keywords have the following form:

```
set <keyword> <channel letter> <arg1> <arg2> <arg3> <arg4>
```

where <arg1> is the lower caution limit, <arg2> is the upper caution limit, <arg3> is the lower alarm limit, and <arg4> is the upper alarm limit.

Table A-14 lists the legal ranges and default values for the Set command used with each "P" group keyword.

Table A-14: "P" Keywords: Auto Mode Limits (PAL)

Keyword	Description	Units	Legal Range	Default
P2CW	S/N.2 Chr-wgtd	dB	0 to 999.9	52.0, - - -, 42.0, - - -
P2LW	S/N.2 Lum-wgtd (567)	dB	0 to 999.9	58.0, - - -, 48.0, - - -
P2U9	S/N.2 Un-wgtd (569)	dB	0 to 999.9	58.0, - - -, 48.0, - - -
P2UN	S/N.2 Un-wgtd (567)	dB	0 to 999.9	60.0, - - -, 50.0, - - -
P2W9	S/N.2 Lum-wgtd (569)	dB	0 to 999.9	58.0, - - -, 48.0, - - -
PAPL	Ave. Picture Level	%	0 to 150	- - -
PBAA	Luminance Bar Amp	mv	0 to 999.9	650,750,600,800
PBAC	Luminance Bar Amp	% Carr	0 to 999.9	60,68,55,73
PBAE	Burst Ampl Error	%	–50 to 50	–3, 3 –10, 10
PBAM	Bar Ampl Error	%	–50 to 50	–5, 5 –10, 10
PBAT	Residual Carrier	% Carr	0 to 100	10, 12.5, 7.5, 15
PBAV	Burst Amplitude	mV	0 to 999.9	285, 315, 270, 330
PBDF	Peak Differential Gain	%	–50 to 50	- - -, 10, - - -, 20
PBLD	Baseline Distortion	% Bar	–50 to 50	–1, 1, –2, 2
PBLL	Blanking Level	% Carr	0 to 100	72, 76, 69, 79
PBPS	Broad Pulse Sep	µsec	0 to 20	4.5, 4.9, 4.4, 5.0
PBQD	Burst Quadrature Error	deg	–90 to 90	–2, 2, –5, 5
PBRT	Bar Rise Time	nsec	0 to 999.9	180, 220, 160, 240
PBTE	Bar Tilt (Rec 569)	% Bar	–40 to 40	–5, 5, –10, 10
PCBC	Burst Duration	Cycles	0 to 100	9, 11, 7.5, 12.5
PCBD	Burst Duration	µsec	0 to 20	2, 2.5, 1.7, 2.8

Table A-14: "P" Keywords: Auto Mode Limits (PAL) (Cont.)

Keyword	Description	Units	Legal Range	Default
PCEP	number of consecutive errors before printing	- - -	integer, 1 to 3	2
PCGP	Chr/Lum Gn (Mod Bar)	% Bar	–90 to 90	–10, 10, –20, 20
PCHW	S/N Chr-wgtd	dB	0 to 999.9	52, - - -, 42, - - -
PCLD	Chr/Lum Delay Ineq	%	–500 to 500	–40, 40, –50, 50
PCLI	Chr/Lum Intermod	% Bar	–50 to 50	–5, 5, –10, 10
PCRA	Chrom Ref Ampl Err	%	–50 to 50	–3, 3, –10, 10
PDGD	Pk-Pk Diff Gain	%	0 to 100	- - -, 10, - - -, 20
PDPD	Pk-Pk Diff Phase	Deg	0 to 100	- - -, 10, - - -, 20
PEPD	Equalizing Pulse	µsec	0 to 20	2.34, 2.36, 2.3, 2.4
PFPD	Front Porch	µsec	0 to 20	1.2, 1.8, 0.5, 3.0
PFTD	Field Time Distortion	%	–50 to 50	–1.0, 1.0, –2.0, 2.0
PGNP	Chr/Lum Gn (Mod Pls)	% Bar	–90 to 90	–10, 10, –20, 20
PICP	ICPM (Absolute)	deg	–50 to 50	–10, 10, –20, 20
PICR	ICPM (Rel Blanking)	deg	–50 to 50	–10, 10, –20, 20
PLBI	Line Blanking	µsec	0 to 20	11.7, 12.3, 9.1, 16.0
PLF1	10–1000 Hz LF Error	% Bar	0 to 50	0.0, 2.0, 0.0, 5.0
PLF5	50–550 Hz LF Error	% Bar	0 to 50	0.0, 2.0, 0.0, 5.0
PLFC	CCIR LF Error	% Bar	0 to 50	0.0, 2.0, 0.0, 5.0
PLND	Lum Nonlin Dist	%	0 to 50	- - -, 5.0, - - -, 10.0
PLSD	Sync Duration	µsec	0 to 20	4.6, 4.8, 4.5, 4.9
PLTD	Line Time Distortion	% Bar	0 to 40	0.0, 5.0, 0.0, 10.0
PLW9	S/N Lum-wgtd (569)	dB	0 to 999.9	58.0, - - -, 48.0, - - -
PMB1	MB Packet #1	% Flag	0 to 999.9	90, 110, 80, 120
PMB2	MB Packet #2	% Flag	0 to 999.9	90, 110, 80, 120
PMB3	MB Packet #3	% Flag	0 to 999.9	90, 110, 80, 120
PMB4	MB Packet #4	% Flag	0 to 999.9	90, 110, 80, 120
PMB5	MB Packet #5	% Flag	0 to 999.9	90, 110, 80, 120
PMB6	MB Packet #6	% Flag	0 to 999.9	90, 110, 80, 120
PMBB	Multiburst Flag	% Bar	0 to 999.9	55, 65, 50, 70
PMBM	Multiburst Flag	mV	0 to 999.9	385, 455, 350, 490
PPBR	Pulse/Bar Ratio Err	% Bar	–90 to 90	–10, 10, –20, 20
PPDG	Peak Diff Gain	%	–50 to 50	- - -, 10, - - -, 20
PPDP	Peak Diff Phase	Deg	–50 to 50	- - -, 10, - - -, 20
PSAV	Sync Amplitude	mV	0 to 999.9	285, 315, 270, 330

Table A-14: "P" Keywords: Auto Mode Limits (PAL) (Cont.)

Keyword	Description	Units	Legal Range	Default
PSBR	Sync/Bar Ratio	%	0 to 999.9	90, 110, 80, 120
PSBT	Sync to Bar Top	mV	0 to 2000	935, 1065, 870, 1130
PSCH	SCH Phase	deg	–90 to 90	–10, 10, –15, 15
PSFT	Sync Fall Time	nsec	0 to 999.9	170, 300, 140, 330
PSNP	S/N Periodic	dB	0 to 999.9	45.0, - - -, 40.0, - - -
PSNU	S/N Unweighted (567)	dB	0 to 999.9	60.0, - - -, 50.0, - - -
PSNW	S/N Lum-weighted (567)	dB	0 to 999.9	58.0, - - -, 48.0, - - -
PSRT	Sync Rise Time	nsec	0 to 999.9	170, 300, 140, 330
PSTB	Sync-to-Burst Start	µsec	0 to 20	5.5, 5.7, 5.4, 5.8
PSYA	Sync Amplitude Error	%	–50 to 100	–5, 5, –10, 10
PTTK	2T Pulse K-factor	% Kf	0 to 40	0, 1, 0, 4
PUN9	S/N Unweighted (569)	dB	0 to 999.9	60.0, - - -, 50.0, - - -

"R" Group: Auto Mode Limits (NTSC)

"R" keywords report on or set the limits for Auto Mode measurements on NTSC-standard VM700T's.

Get commands used with the "R" keywords have the following form:

```
get <keyword> <channel letter>
```

Set commands used with the "R" keywords have the following form:

```
set <keyword> <channel letter> <arg1> <arg2> <arg3> <arg4>
```

where <arg1> is the lower caution limit, <arg2> is the upper caution limit, <arg3> is the lower alarm limit, and <arg4> is the upper alarm limit.

The RFCB keyword is the only exception to these rules in the "R" group. get RFCB followed by a channel letter returns eighteen sets of limits, divided into three groups: amplitude error in percent for yellow, cyan, green, magenta, red, and blue; phase error in degrees for yellow, cyan, green, magenta, red, and blue; and chrominance/luminance ratio error in percent for yellow, cyan, green, magenta, red, and blue.

set RFCB is followed by a channel letter and 72 values (separated by spaces or tabs), specifying lower and upper caution limits and lower and upper alarm limits for each measurement listed in the previous paragraph.

Table A-15 lists the legal ranges and default values for each "R" group keyword used with the Set command.

Table A-15: "R" Keywords: Auto Mode Limits (NTSC)

Keyword	Description	Units	Legal Range	Default
R2LW	S/N.2 NTC7 Unwgtd	dB	0 to 100.0	- - -, - - -, 67.0, - - -
R2PR	2T Pulse K-Factor	% Kf	0 to 25	-.-.-, -.-.-, 0, 2.5
R2SU	S/N.2 Unif. Unwgtd	dB	0 to 100.0	- - -, - - -, 67.0, - - -
R2SW	S/N.2 Unif. Lum-wgtd	dB	0 to 100.0	- - -, - - -, 67.0, - - -
R2UW	S/N.2 NTC7 Lum-wgtd	dB	0 to 100.0	- - -, - - -, 67.0, - - -
RAPL	Average Picture Level	%	0 to 150	-.-.-, -.-.-, -.-.-, -.-.-
RBAA	Bar Amplitude	IRE	50 to 150	-.-.-, -.-.-, 96, 104
RBAP	Burst Amplitude	% sync	50 to 200	-.-.-, -.-.-, -.-.-, -.-.-
RBAT	Bar Top	% carr	0 to 50	10, 15 10 15
RBLL	Blanking Level	% carr	50 to 100	74, 76, 72.5, 77.5
RBVI	Blanking Variation	% Bar/IRE	0 to 40	-.-.-, -.-.-, -.-.-, -.-.-
RBVP	Blanking Variation	% carr	0 to 25	-.-.-, -.-.-, -.-.-, -.-.-
RBWC	(FCC) Burst Width	cycles	5 to 20	-.-.-, -.-.-, 8, 11

Table A-15: "R" Keywords: Auto Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
RBZU	(FCC) Breezeway	µsec	0 to 5	0.28, - - -, 0.4, - - -
RCEP	number of consecutive error(s) before printing	- - -	1 to 3	2
RCGP	Chroma-Lum Gain	%	50 to 200	95, 105, 93, 107
RCLD	Chroma-Lum Delay	nsec	–200 to 200	–45, 45, –60, 60
RDGD	Differential Gain	%	0 to 25	0, 7, 0, 10
RDPD	Differential Phase	deg	0 to 50	0, 2.2, 0, 3
REEE	IEEE–511 ST Dist	% SD	0 to 25	0, 2, 0, 3
REWP	(FCC) Equalizer Width	% S.W.	20 to 80	46, 54, 45, 55
RFCB	FCC Color Bars Measurement (18 sets of results)	% (6 sets) Deg (6 sets) %(6 sets)	–50 to 100	–15, 15, –20, 20 (6 sets) –7.5, 7.5, –10, 10 (6 sets) –15, 15, –20, 20 (6 sets)
RFM1	FCC MB Packet #1	% flag	20 to 100	- - -, - - -, 57.1, 63
RFM2	FCC MB Packet #2	% flag	20 to 100	- - -, - - -, 56.2, 64.2
RFM3	FCC MB Packet #3	% flag	20 to 100	- - -, - - -, 54.8, 65.6
RFM4	FCC MB Packet #4	% flag	20 to 100	- - -, - - -, 53.5, 67.3
RFM5	FCC MB Packet #5	% flag	20 to 100	- - -, - - -, 56, 64.3
RFM6	FCC MB Packet #6	% flag	20 to 100	- - -, - - -, - - -, - - -
RFMI	FCC Multiburst Flag	% Bar/IRE	50 to 150	92.5, 107.5, 90, 110
RFMP	FCC Multiburst Flag	% carr	0 to 50	10.6, 14.4, 10, 15
RFPU	(FCC) Front Porch	µsec	0 to 5	1.4, - - -, 1.3, - - -
RFTD	Field Time Distortion		–20 to 20	- - -, - - -, –3, 3
RHB4	(FCC) H Blank 4 IRE	µsec	5 to 20	10.85, 11.35, 10.5, 11.5
RICP	ICPM	deg	–50 to 50	–2, 2, –3, 3
RLND	Lum NL Dist DY	%	0 to 25	0, 7, 0, 10
RLTD	Line Time Dist	%	0 to 25	0, 1.4, 0, 2
RN2C	NTC7 20 IRE Chroma	IRE	0 to 50	- - -, - - -, 15, 25
RN8C	NTC7 80 IRE Chroma	IRE	40 to 120	- - -, - - -, 75, 85
RNCI	NTC7 Chr-Lum Intmd	IRE	–50 to 50	- - -, - - -, –4, 4
RNCP	NTC7 Chr NL Phase	deg	0 to 25	- - -, - - -, 0, 5
RNM1	NTC7 MB Packet #1	% flag	20 to 100	- - -, - - -, 47.6, 52.5
RNM2	NTC7 MB Packet #2	% flag	20 to 100	- - -, - - -, 46.8, 53.5
RNM3	NTC7 MB Packet #3	% flag	20 to 100	- - -, - - -, 45.7, 54.7
RNM4	NTC7 MB Packet #4	% flag	20 to 100	- - -, - - -, 44.6, 56.1
RNM5	NTC7 MB Packet #5	% flag	20 to 100	- - -, - - -, 46.7, 53.6

Table A-15: "R" Keywords: Auto Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
RNM6	NTC7 MB Packet #6	% flag	20 to 100	- - -, - - -, 43.6, 57.4
RNMI	NTC7 Multiburst Flag	% Bar/IRE	50 to 150	92.5, 107.5, 90, 110
RNMP	NTC7 Multiburst Flag	% carr	0 to 50	10.6, 14.4, 10,15
RPBR	Pulse/Bar Ratio	%	50 to 200	95.5, 104.5, 94, 106
RRBG	Rel Burst Gain	%	–50 to 100	–15, 15, –20, 20
RRBP	Rel Burst Phase	deg	–50 to 50	–7.5, 7.5, –10, 10
RRBW	RS–170A Burst Width	cycles	5 to 20	-.-.-, -.-.-, -.-.-, -.-.-
RREU	RS–170A Equalizer	µsec	0 to 5	2.21, 2.39, 2.18, 2.42
RRFP	RS–170A Front Porch	µsec	0 to 5	1.41, 1.59, 1.38, 1.62
RRHB	RS–170A H Blanking	µsec	5 to 20	10.71, 11.09, 10.65, 11.15
RRSS	RS–170A Sync-Setup	µsec	5 to 20	9.31, 9.49, 9.28, 9.52
RRSU	RS–170A Serration	µsec	2 to 10	4.61, 4.79, 4.58, 4.82
RRSW	RS–170A Sync Width	µsec	2 to 10	4.61, 4.79, 4.58, 4.82
RSBE	(FCC) Sync-to-Burst-End	µsec	5 to 20	5, 7.8, 5, 7.9
RSBS	Sync-to-Burst Start	µsec	0 to 25	5.21, 5.39, 5.18, 5.42
RSCH	SCH Phase	deg	–90 to 90	–45, 45, - - -, - - -
RSFN	(FCC) Sync Fall Time	nsec	0 to 999.9	0, 190, 0, 250
RSNP	S/N Periodic	dB	0 to 100	- - -, - - -, 57, - - -
RSNU	S/N Unified Unweighted	dB	0 to 100	- - -, - - -, 57, - - -
RSNW	S/N Unified Lum-Weighted	dB	0 to 100	- - -, - - -, 54, - - -
RSRN	(FCC) Sync Rise Time	nsec	0 to 999.9	0, 190, 0, 250
RSSU	(FCC) Sync-to-Setup	µsec	5 to 20	9.4, - - -, 9.2, - - -
RSVI	Sync Variation	% Bar/IRE	0 to 40	-.-.-, -.-.-, -.-.-, -.-.-
RSVP	Sync Variation	% carr	0 to 25	-.-.-, -.-.-, 0, 5
RSWU	(FCC) Serration Width	µsec	2 to 10	3.98, 4.92, 3.8, 5.1
RSYA	Sync Amplitude	% Bar/IRE	20 to 80	37, 43, 36, 44
RSYU	(FCC) Sync Width	µsec	2 to 10	4.5, 5, 4.4, 5.1
RULW	S/N NTC7 Lum-Weighted	dB	0 to 100	- - -, - - -, 54, - - -
RUUW	S/N NTC7 Unweighted	dB	0 to 100	- - -, - - -, 57, - - -
RVAI	Burst Amplitude	% Bar/IRE	20 to 80	37, 43, 36, 44
RVB2	V Blank 20 IRE F1	lines	15 to 30	20.1, 20.9, 19.9, 21.1
RVB3	V Blank 20 IRE F2	lines	15 to 30	20.1, 20.9, 19.9, 21.1
RVB4	(FCC) V Blank 4 IRE F1	lines	15 to 30	18.5, 20.5, 18, 21
RVB5	(FCC) V Blank 4 IRE F2	lines	15 to 30	18.5, 20.5, 18, 21
RVCB	VIRS Chroma Ampl	% burst	50 to 200	95, 105, 90, 110

Table A-15: "R" Keywords: Auto Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
RVCI	VIRS Chroma Ampl	% Bar/IRE	20 to 80	38, 42, 36, 44
RVCP	VIRS Chroma Phase	deg	–50 to 50	–5, 5, –10, 10
RVLR	VIRS Luminance Ref	% Bar/IRE	20 to 80	47.5, 52.5, 45, 55
RVSU	VIRS Setup	% Bar/IRE	0 to 25	5.7, 9.3, 5, 10

"S" Group: Communication Setup

"S" keywords report on or set the values of VM700T communication parameters.

`Get` commands used with the "S" keywords have the following form:

```
get <keyword>
```

`Set` commands used with "S" group keywords shown in Table A-16 take different arguments, depending on the keyword. Some "S" group keywords are "read-only" (they cannot be used with the set command). The form of each `Set` command used with "S" group keywords is documented following the table.

Table A-16: "S" Keywords: Communication Setup

Keyword	Description	Keyword	Description
SMSD	Remote Control Message Display	SP1P	Port 1 Parity
SP0A	Port 0 Protocol	SP1R	Port 1 Reset Character
SP0B	Port 0 Baud Rate	SPCF	Copy Format
SP0C	Port 0 Character Size	SPCO	Control Port
SP0D	Port 0 Carrier Detect	SPCP	Copy Port
SP0F	Port 0 Flow Control	SPLF	Log Format
SP0P	Port 0 Parity	SPLP	Log Port
SP0R	Port 0 Reset Character	SPRC	Remote Control Port
SP1A	Port 1 Protocol	SPRF	Report Format
SP1B	Port 1 Baud Rate	SPRO	Remote Control Prompt
SP1C	Port 1 Character Size	SPRP	Report Port
SP1D	Port 1 Carrier Detect	SRIM	Non SLIP Interfacing Mode
SP1F	Port 1 Flow Control		

SMSD SMSD specifies or reports on the destination for messages from the VM700T. SMSD is channel-independent. SMSD takes a single argument after the keyword. Legal values are Remote or VM700T Screen.

```
VM700T> get SMSD
Remote
VM700T> set SMSD VM700T> Screen
VM700T> get SMSD
VM700T> Screen
VM700T>
```

SP0A SP0A returns the communications protocol for port 0. SP0A is read-only (cannot be used with the set command). SP0A takes a single argument after the keyword. Legal values are None or SLIP.

```
VM700T> get SP0A
SLIP
VM700T>
```

SP0B SP0B returns the baud rate for port 0. SP0B is read-only (cannot be used with the set command). SP0B takes a single argument after the keyword. Legal values are 300, 600, 1200, 2400, 4800, 9600, or 19200.

```
VM700T> get SP0B
9600
VM700T>
```

SP0C SP0C returns the character size (number of bits per character) for port 0. SP0C is read-only (cannot be used with the set command). SP0C takes a single argument after the keyword. Legal values are 7 or 8.

```
VM700T> get SP0C
8
VM700T>
```

SP0D SP0D returns the status of carrier detect for port 0. SP0D is read-only (cannot be used with the set command). SP0D takes a single argument after the keyword. Legal values are disabled or enabled.

```
VM700T> get SP0D
disabled
VM700T>
```

SP0F SP0F returns the flow control setting for port 0. SP0F is read-only (cannot be used with the set command). SP0F takes a single argument after the keyword. Legal values are CTS/RTS, XON/XOFF, or None.

```
VM700T> get SP0F
CTS/RTS
VM700T>
```

SP0P SP0P returns the flow control setting for port 0. SP0P is read-only (cannot be used with the set command). SP0P takes a single argument after the keyword. Legal values are None, Odd, Even, Zero, or One.

```
VM700T> get SP0P
None
VM700T>
```

SP0R SP0R returns the flow control setting for port 0. SP0R is read-only (cannot be used with the set command). SP0R takes a single argument after the keyword. Legal values are None, Ctrl–A, Ctrl–B, Ctrl–C, Ctrl–D, Ctrl–E, Ctrl–F, Ctrl–G, Ctrl–H, Ctrl–I, Ctrl–J, Ctrl–K, Ctrl–L, Ctrl–M, Ctrl–N, Ctrl–O, Ctrl–P, Ctrl–Q, Ctrl–R, Ctrl–S, Ctrl–T, Ctrl–U, Ctrl–V, Ctrl–W, Ctrl–X, Ctrl–Y, or Ctrl–Z.

```
VM700T> get SP0R
None
VM700T>
```

SP1A SP1A returns the communications protocol for port 0. SP1A is read-only (cannot be used with the set command). SP1A takes a single argument after the keyword. Legal values are None or SLIP.

```
VM700T> get SP1A
SLIP
VM700T>
```

SP1B SP1B returns the baud rate for port 0. SP1B is read-only (cannot be used with the set command). SP1B takes a single argument after the keyword. Legal values are 300, 600, 1200, 2400, 4800, 9600, or 19200.

```
VM700T> get SP1B
9600
VM700T>
```

SP1C SP1C returns the character size (number of bits per character) for port 0. SP1C is read-only (cannot be used with the set command). SP1C takes a single argument after the keyword. Legal values are 7 or 8.

```
VM700T> get SP1C
8
VM700T>
```

SP1D SP1D returns the status of carrier detect for port 0. SP1D is read-only (cannot be used with the set command). SP1D takes a single argument after the keyword. Legal values are disabled or enabled.

```
VM700T> get SP1D
disabled
VM700T>
```

SP1F SP1F returns the flow control setting for port 0. SP1F is read-only (cannot be used with the set command). SP1F takes a single argument after the keyword. Legal values are CTS/RTS, XON/XOFF, or None.

```
VM700T> get SP1F
CTS/RTS
VM700T>
```

SP1P SP1P returns the flow control setting for port 0. SP1P is read-only (cannot be used with the set command). SP1P takes a single argument after the keyword. Legal values are None, Odd, Even, Zero, or One.

```
VM700T> get SP1P
None
VM700T>
```

SP1R SP1R returns the flow control setting for port 0. SP1R is read-only (cannot be used with the set command). SP1R takes a single argument after the keyword. Legal values are None, Ctrl–A, Ctrl–B, Ctrl–C, Ctrl–D, Ctrl–E, Ctrl–F, Ctrl–G, Ctrl–H, Ctrl–I, Ctrl–J, Ctrl–K, Ctrl–L, Ctrl–M, Ctrl–N, Ctrl–O, Ctrl–P, Ctrl–Q, Ctrl–R, Ctrl–S, Ctrl–T, Ctrl–U, Ctrl–V, Ctrl–W, Ctrl–X, Ctrl–Y, or Ctrl–Z.

```
VM700T> get SP1R
None
VM700T>
```

SPCF SPCF returns or sets the copy format (this is the format used to format output when the Copy button is pressed). SPCF takes a single argument after the keyword. Legal values are Epson LQ, PostScript, ASCII Printer, or HP LaserJet.

```
VM700T> get SPCF
None
```

```
VM700T> set SPCF PostScript
VM700T> get SPCF
PostScript
VM700T>
```

SPCO SPCO returns the name of the VM700T control port. The VM700T uses the control port to send characters in response to a **control** command. SPCO is read-only (cannot be used with the set command). SPCO takes a single argument after the keyword. Legal values are None, Serial Port 0, or Serial Port 1.

```
VM700T> get SPCO
None
VM700T>
```

SPCP SPCP returns or sets the name of the VM700T copy port. SPCP takes a single argument after the keyword. Legal values are None, Serial Port 0, or Serial Port 1.

```
VM700T> get SPCP
None
VM700T> set SPCP Serial Port 0
VM700T> get SPCP
Serial Port 0
VM700T>
```

SPLF SPLF returns or sets the log format (this is the format in which data logging information is sent). SPLF takes a single argument after the keyword. Legal values are Epson LQ, PostScript, ASCII Printer, or HP LaserJet.

```
VM700T> get SPLF
None
VM700T> set SPLF Epson LQ
VM700T> get SPLF
Epson LQ
VM700T>
```

SPLP SPLP returns or sets the name of the VM700T log port. SPLP takes a single argument after the keyword. Legal values are None, Serial Port 0, or Serial Port 1.

```
VM700T> get SPLP
None
VM700T> set SPLP Serial Port 0
VM700T> get SPLP
Serial Port 0
VM700T>
```

SPRC SPRC returns the name of the VM700T remote control port. SPRC is read-only (cannot be used with the set command). SPRC takes a single argument after the keyword. Legal values are None, Serial Port 0, or Serial Port 1.

```
VM700T> get SPRC
None
VM700T> set SPRC Serial Port 0
VM700T> get SPRC
Serial Port 0
VM700T>
```

SPRF SPRF returns or sets the report format (this is the format used to format timed reports). SPRF takes a single argument after the keyword. Legal values are Epson LQ, PostScript, ASCII Printer, or HP LaserJet.

```
VM700T> get SPRF
None
VM700T> set SPRF Epson LQ
VM700T> get SPRF
Epson LQ
VM700T>
```

SPRO SPRO returns or sets the VM700T remote control prompt. SPRO takes a single argument after the keyword. It consists of an arbitrary string up to 32 characters in length. "#" is a comment character; all characters appearing in the string after a "#" are ignored. To include a "#" in the string, precede it by a "\" character.

```
VM700T> set SPRO Archimedes>
Archimedes>
```

SPRP SPRP returns or sets the name of the VM700T report port (this is the port used to print timed reports). SPRP takes a single argument after the keyword. Legal values are None, Serial Port 0, or Serial Port 1.

```
VM700T> get SPRP
None
VM700T> set SPRP Serial Port 1
VM700T> get SPRP
Serial Port 1
VM700T>
```

SRIM SRIM returns the non-SLIP interfacing mode. SRIM is read-only (cannot be used with the set command). SRIM takes a single argument after the keyword. Legal values are Computer or Terminal.

```
VM700T> get SRIM
Terminal
VM700T>
```

"T" Group: Measure Mode Limits (PAL)

"T" keywords report on or set the limits for Measure Mode measurements on PAL-standard VM700T's.

Get commands used with the "T" keywords have the following form:

```
get <keyword> <channel letter>
```

Set commands used with the "T" keywords have the following form:

```
set <keyword> <channel letter> <arg1> <arg2>
```

where <arg1> and <arg2> are the lower and upper limits.

The TSX keywords are the only exceptions to these rules. Keywords TSX1 through TSX7 each specify the frequency at which the limits defined by TGN1 through TGN7 and TDL1 through TDL7 apply. Thus, the get command for any of the TSX keywords returns only one value, while the set command takes only one argument after the channel letter.

Table A-17 lists the legal ranges and default values for each "T" group keyword used with the Set command.

Table A-17: "T" Keywords: Measure Mode Limits (PAL)

Keyword	Description	Units	Legal Range	Default
TAMN	Chrominance AM Noise	dB rms	–100 to 0	----- –40.0
TBFE	Burst Freq Error	Hz	–360 to 360	–50.0 50.0
TBLV	Burst Level	mV	100 to 999.9	250.0 310.0
TBTE	Bar Tilt (Rec 569)	% Bar	–40 to 40	–5.0 5.0
TBWD	Burst Width	µsec	0 to 20	2.00 2.50
TCDL	Chrom Delay	nsec	–400 to 400	–40.0 40.0
TCGN	Chrom Gain	%	10 to 200	90.0 110.0
TCLB	Chrom Level Blue	mV	0 to 999.9	423.0 517.0
TCLC	Chrom Level Cyan	mV	0 to 999.9	598.0 730.0
TCLG	Chrom Level White	mV	0 to 999.9	0.0 10.0
TCLI	Chrom Lum Intermod	%	–50 to 50	–5.0 5.0
TCLK	Chrom Level Black	mV	–50 to 999.9	0.0 10.0
TCLM	Chrom Level Magenta	mV	0 to 999.9	558.0 682.0
TCLN	Chrom Level Green	mV	0 to 999.9	558.0 682.0
TCLR	Chrom Level Red	mV	0 to 999.9	598.0 730.0
TCLY	Chrom Level Yellow	mV	0 to 999.9	423.0 517.0
TCNL	Chrom Non Lin	%	–50 to 50	–5.0 5.0

Table A-17: "T" Keywords: Measure Mode Limits (PAL) (Cont.)

Keyword	Description	Units	Legal Range	Default
TCPB	Chrom Phase Blue	deg	0 to 360	342.0 352.0
TCPC	Chrom Phase Cyan	deg	0 to 360	278.0 288.0
TCPM	Chrom Phase Magenta	deg	0 to 360	55.0 65.0
TCPN	Chrom Phase Green	deg	0 to 360	235.0 245.0
TCPR	Chrom Phase Red	deg	0 to 360	98.0 108.0
TCPY	Chrom Phase Yellow	deg	0 to 360	162.0 172.0
TDGN	Diff Gain	%	–50 to 50	–5.0 5.0
TDGP	Diff Gain (p-p)	%	0 to 50	0.0 10.0
TDL1	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL2	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL3	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL4	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL5	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL6	Sin X/X Group Delay	nsec	–500 to 500	–12.0 12.0
TDL7	Sin X/X Group Delay	nsec	–500 to 500	–40.0 40.0
TDPH	Diff Phase	deg	–50 to 50	–5.0 5.0
TDPP	Diff Phase (p-p)	deg	0 to 50	0.0 10.0
TEFS	H Blanking End from Sync	µsec	0 to 20	8.00 12.00
TEP5	Equalizer Pulse Width (50% sync)	µsec	0 to 20	2.10 2.80
TFES	Falling Edge SD	%	0 to 50	----- 1.0
TFTM	Fall Time	nsec	0 to 360	90.0 105.0
TGN1	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN2	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN3	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN4	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN5	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN6	Sin X/X Gain	dB	–50 to 200	-0.5 0.5
TGN7	Sin X/X Gain	dB	–50 to 200	–1.0 0.5
THAD	HAD	nsec	50 to 999.9	150.0 250.0
THBW	H Blanking Width	µsec	0 to 20	9.00 14.00
TICP	ICPM	deg	–20 to 0 (argument 1) 0 to 20 (argument 2)	–5.0 5.0
TJIF	Peak-Peak Jitter in a Frame	µsec	0 to 999.9	0.0 100.0
TK2T	K–2T	%Kf	0 to 99.9	0.0 5.0
TKPB	K-PB	%Kf	–50 to 50	–5.0 3.0

Table A-17: "T" Keywords: Measure Mode Limits (PAL) (Cont.)

Keyword	Description	Units	Legal Range	Default
TLFE	Line Freq Error	%	–40 to 40	–1.0 1.0
TLLB	Lum Level Blue	mV	0 to 999.9	54.0 66.0
TLLC	Lum Level Cyan	mV	0 to 999.9	331.0 405.0
TLLG	Lum Level Grey	mV	0 to 999.9	630.0 770.0
TLLK	Lum Level Black	mV	–50 to 999.9	–10.0 10.0
TLLM	Lum Level Magenta	mV	0 to 999.9	195.0 234.0
TLLN	Lum Level Green	mV	0 to 999.9	277.0 339.0
TLLR	Lum Level Red	mV	0 to 999.9	141.0 173.0
TLLY	Lum Level Yellow	mV	0 to 999.9	419.0 512.0
TLNL	Lum Non Lin	%	0 to 50	0.0 5.0
TLTJ	Peak to Peak Long Time Jitter	µsec	0 to 40	0.0 5.0
TMB1	MB Packet 1	dB	–40 to 40	–1.0 1.0
TMB2	MB Packet 2	dB	–40 to 40	–1.0 1.0
TMB3	MB Packet 3	dB	–40 to 40	–2.0 1.0
TMB4	MB Packet 4	dB	–40 to 40	–3.0 1.0
TMB5	MB Packet 5	dB	–40 to 40	–5.0 1.0
TMB6	MB Packet 6	dB	–40 to 40	----- 1.0
TMBF	Multiburst Flag	mV	0 to 999.9	400.0 750.0
TMBL	Bar Level (Ref. B1)	mV	500 to 999.9	650.0 750.0
TMBT	Line Time Distortion	% Bar	0 to 40	0.0 5.0
TMSL	Sync Level	mV	100 to 999.9	288.0 315.0
TMVL	Bar Level (Ref. Back Porch)	mV	500 to 999.9	650.0 750.0
TMVP	Sync-to-Bar-Top	mV	500 to 2000	950.0 1050.0
TNLV	Noise Level	dB rms	–100 to 0	----- –45.0
TPBR	PB Ratio	%	10 to 200	90.0 110.0
TPMN	Chrominance PM Noise	dB rms	–100 to 0	----- –40.0
TPNL	Chrom Phase Non Lin	deg	–50 to 50	–5.0 5.0
TRES	Rising Edge SD	%	0 to 50	----- 1.0
TRTM	Rise Time	nsec	0 to 360	90.0 105.0
TSBR	Sync/Bar Ratio	%	0 to 999.9	90.0 110.0
TSBS	Sync-Burst Start	µsec	4 to 9.9	5.50 5.70
TSCH	SCH phase	deg	–360 to 360	–45.0 45.0
TSDC	SD at Cursor	%	0 to 50	----- 1.0
TSFT	Sync Fall Time	nsec	10 to 999.9	100.0 300.0

Table A-17: "T" Keywords: Measure Mode Limits (PAL) (Cont.)

Keyword	Description	Units	Legal Range	Default
TSK1	Head SW Skew (Field 1)	µsec	–40 to 40	–5.0 5.0
TSK2	Head SW Skew (Field 2)	µsec	–40 to 40	–5.0 5.0
TSP5	Serration Pulse Width (50% sync)	µsec	0 to 20	4.40 5.00
TSRT	Sync Rise Time	nsec	10 to 999.9	100.0 300.0
TSTS	H Blanking Start-Sync	µsec	–10 to 0	–5.0 -0.5
TSWD	Sync Width	µsec	2 to 9.9	4.5 4.9
TSX1	Sin X/X Freq	MHz	0.1 to 5.8	0.50
TSX2	Sin X/X Freq	MHz	0.1 to 5.8	1.00
TSX3	Sin X/X Freq	MHz	0.1 to 5.8	2.00
TSX4	Sin X/X Freq	MHz	0.1 to 5.8	3.00
TSX5	Sin X/X Freq	MHz	0.1 to 5.8	4.00
TSX6	Sin X/X Freq	MHz	0.1 to 5.8	4.30
TSX7	Sin X/X Freq	MHz	0.1 to 5.8	4.80

"U" Group: Measure Mode Limits (NTSC)

"U" keywords report on or set the limits for Measure Mode measurements on an NTSC-standard VM700T.

Get commands used with the "U" keywords have the following form:

```
get <keyword> <channel letter>
```

Set commands used with the "U" keywords have the following form:

```
set <keyword> <channel letter> <arg1> <arg2>
```

where <arg1> and <arg2> are the lower and upper limits.

The USX keywords are the only exceptions to these rules. Keywords USX1 through USX7 each specify the frequency at which the limits defined by UGN1 through UGN7 and UDL1 through UDL7 apply. Thus, the get command for any of the USX keywords returns only one value, while the set command takes only one argument after the channel letter.

Table A-18 lists the legal ranges and default values for each "U" group keyword used with the Set command.

Table A-18: "U" Keywords: Measure Mode Limits (NTSC)

Keyword	Description	Units	Legal Range	Default
UAMN	Chrominance AM Noise	dB rms	–100 to 0	---- –40.0
UBFE	Burst Freq Error	Hz	–360 to 360	–50.0 50.0
UBLV	Burst Level	mV	100 to 999.9	250.0 310.0
UBTE	Bar Tilt (Rec 569)	% Bar	–40 to 40	–5.0 5.0
UBWD	Burst Width	cycles	0 to 20	8.50 9.50
UBZW	Breezeway	µsec	0 to 20	0.30 0.80
UCDL	Chrom Delay	nsec	–400 to 400	–40.0 40.0
UCF1	CF Packet 1	dB	–40 to 40	–3.0 1.0
UCF2	CF Packet 2	dB	–40 to 40	–2.0 1.0
UCF3	CF Packet 3	dB	–40 to 40	–1.0 1.0
UCF4	CF Packet 4	dB	–40 to 40	–2.0 1.0
UCF5	CF Packet 5	dB	–40 to 40	–3.0 1.0
UCFF	Chroma Freq Resp Flag	mV	0 to 999.9	600.0 800.0
UCGN	Chrom Gain	%	10 to 200	90.0 110.0
UCLB	Chrom Level Blue	mV	0 to 999.9	400.0 489.0
UCLC	Chrom Level Cyan	mV	0 to 999.9	567.0 693.0
UCLG	Chrom Level Grey	mV	0 to 999.9	0.0 10.0

Table A-18: "U" Keywords: Measure Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
UCLI	Chrom Lum Intermod	%	–50 to 50	–5.0 5.0
UCLK	Chrom Level Black	mV	0 to 999.9	0.0 10.0
UCLM	Chrom Level Magenta	mV	0 to 999.9	530.0 647.0
UCLN	Chrom Level Green	mV	0 to 999.9	530.0 647.0
UCLR	Chrom Level Red	mV	0 to 999.9	567.0 693.0
UCLY	Chrom Level Yellow	mV	0 to 999.9	400.0 489.0
UCNL	Chrom Non Lin	%	–50 to 50	–5.0 5.0
UCPB	Chrom Phase Blue	deg	0 to 360	342.0 352.0
UCPC	Chrom Phase Cyan	deg	0 to 360	278.0 288.0
UCPM	Chrom Phase Magenta	deg	0 to 360	55.0 65.0
UCPN	Chrom Phase Green	deg	0 to 360	235.0 245.0
UCPR	Chrom Phase Red	deg	0 to 360	98.0 108.0
UCPY	Chrom Phase Yellow	deg	0 to 360	162.0 172.0
UDGN	Diff Gain	%	–50 to 50	–5.0 5.0
UDGP	Diff Gain (p-p)	%	0 to 50	0.0 10.0
UDL1	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL2	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL3	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL4	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL5	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL6	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDL7	Sin X/X Group Delay	nsec	–500 to 500	–15.0 15.0
UDPH	Diff Phase	deg	–50 to 50	–5.0 5.0
UDPP	Diff Phase (p-p)	deg	0 to 50	0.0 10.0
UEFS	H Blanking End from Sync	µsec	0 to 20	8.00 12.00
UEP1	Equalizer Pulse Width (10% sync)	µsec	0 to 20	2.10 2.80
UEP5	Equalizer Pulse Width (50% sync)	µsec	0 to 20	2.10 2.80
UFES	Falling Edge SD	%	0 to 50	----- 1.0
UFPR	Front Porch	µsec	0 to 20	0.50 2.50
UFTM	Fall Time	nsec	0 to 360	120.0 130.0
UGN1	Sin X/X Gain	dB	–50 to 20	-0.5 0.5
UGN2	Sin X/X Gain	dB	–50 to 20	-0.5 0.5
UGN3	Sin X/X Gain	dB	–50 to 20	-0.5 0.5
UGN4	Sin X/X Gain	dB	–50 to 20	-0.5 0.5
UGN5	Sin X/X Gain	dB	–50 to 20	-0.5 0.5

Table A-18: "U" Keywords: Measure Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
UGN6	Sin X/X Gain	dB	–50 to 20	-0.5 0.5
UGN7	Sin X/X Gain	dB	–50 to 20	–6.0 0.5
UHAD	HAD	nsec	50 to 999	200.0 300.0
UHBW	H Blanking Width	µsec	0 to 20	9.00 12.00
UICP	ICPM	deg	–20 to 0 (argument 1) 0 to –20 (argument 2)	–5.0 5.0
UJIF	Peak-Peak Jitter in a Frame	µsec	0 to 999.9	0.0 100.0
UK2T	K–2T	%Kf	0 to 99.9	0.0 5.0
UKPB	K-PB	%Kf	–50 to 50	–5.0 3.0
ULFE	Line Freq Error	%	–40 to 40	–1.0 1.0
ULLB	Lum Level Blue	mV	0 to 999.9	97.0 119.0
ULLC	Lum Level Cyan	mV	0 to 999.9	360.0 440.0
ULLG	Lum Level Grey	mV	0 to 999.9	494.0 786.0
ULLK	Lum Level Black	mV	–50 to 999.9	48.0 59.0
ULLM	Lum Level Magenta	mV	0 to 999.9	231.0 282.0
ULLN	Lum Level Green	mV	0 to 999.9	311.0 380.0
ULLR	Lum Level Red	mV	0 to 999.9	182.0 222.0
ULLY	Lum Level Yellow	mV	0 to 999.9	445.0 544.0
ULNL	Lum Non Lin	%	0 to 50	0.0 5.0
ULTJ	Peak to Peak Long Time Jitter	µsec	0 to 40	0.0 5.0
UMB1	MB Packet 1	dB	–40 to 40	–1.0 1.0
UMB2	MB Packet 2	dB	–40 to 40	–1.0 1.0
UMB3	MB Packet 3	dB	–40 to 40	–2.0 1.0
UMB4	MB Packet 4	dB	–40 to 40	–3.0 1.0
UMB5	MB Packet 5	dB	–40 to 40	–5.0 1.0
UMB6	MB Packet 6	dB	–40 to 40	–10.0 1.0
UMBF	Multiburst Flag	mV	0 to 999.9	400.0 750.0
UMBL	Bar Level	mV	500 to 999.9	679.0 750.0
UMBT	Line Time Distortion	% Bar	0 to 40	0.0 5.0
UMSL	Sync Level	mV	100 to 999.9	271.0 300.0
UMVL	Video Level	mV	500 to 999.9	679.0 750.0
UMVP	Video Pk-Pk	mV	500 to 2000	950.0 1050.0
UNLV	Noise Level	dB rms	–100 to 0	----- –45.0
UPBR	PB Ratio	%	10 to 200	90.0 110.0
UPMN	Chrominance PM Noise	dB rms	–100 to 0	----- –40.0

Table A-18: "U" Keywords: Measure Mode Limits (NTSC) (Cont.)

Keyword	Description	Units	Legal Range	Default
UPNL	Chrom Phase Non Lin	deg	–50 to 50	–5.0 5.0
URES	Rising Edge SD	%	0 to 50	----- 1.0
URTM	Rise Time	nsec	0 to 360	120.0 130.0
USBE	Sync-Burst End	µsec	0 to 20	7.50 8.50
USBR	Sync/Bar Ratio	%	0 to 999.9	90.0 110.0
USBS	Sync-Burst Start	µsec	4 to 9.9	5.30 5.32
USCH	SCH phase	deg	–360 to 360	–40.0 40.0
USDC	SD at Cursor	%	0 to 50	----- 1.0
USFT	Sync Fall Time	nsec	10 to 999.9	100.0 300.0
USK1	Head SW Skew Field 1	µsec	–40 to 40	–5.0 5.0
USK2	Head SW Skew Field 2	µsec	–40 to 40	–5.0 5.0
USP1	Serration Pulse Width (10% sync)	µsec	0 to 20	4.40 5.00
USP5	Serration Pulse Width (50% sync)	µsec	0 to 20	4.40 5.00
USRT	Sync Rise Time	nsec	10 to 999.9	100.0 300.0
USSU	Sync to Setup	µsec	0 to 20	8.00 11.00
USTS	H Blanking Start-Sync	µsec	–10 to 0	–5.0 -0.5
USWD	Sync Width	µsec	2 to 9.9	4.5 4.9
USX1	Sin X/X Freq	MHz	0.15 to 5.8	0.50
USX2	Sin X/X Freq	MHz	0.15 to 5.8	1.00
USX3	Sin X/X Freq	MHz	0.15 to 5.8	2.50
USX4	Sin X/X Freq	MHz	0.15 to 5.8	3.00
USX5	Sin X/X Freq	MHz	0.15 to 5.8	3.58
USX6	Sin X/X Freq	MHz	0.15 to 5.8	4.00
USX7	Sin X/X Freq	MHz	0.15 to 5.8	4.18

"V" Group: Video Source Selection

"V" keywords report on or set the active video source selection files.

Get commands used with the "V" keywords have the following form:

```
get <keyword>
```

Set commands used with the "V" keywords have the following form:

```
get <keyword> <file-name>
```

Table A-19 lists the "V" group keywords and their meanings.

Table A-19: "V" Keywords: Video Source Selection

Keyword	Description	Keyword	Description
VNCA	Source A NTSC Config File	VSCC	Source C PAL Config File
VNCB	Source B NTSC Config File	VSTA	Source A Video Standard
VNCC	Source C NTSC Config File	VSTB	Source B Video Standard
VSCA	Source A PAL Config File	VSTC	Source C Video Standard
VSCB	Source B PAL Config File	VSTE	Timed Events file

VNCA VNCA returns or sets the NTSC Video_Source File for Source A. This file is found in directory /nvram0/ConfigFiles/Video_Source~Files/NTSC.

```
VM700T> get VNCA
NewMeas
VM700T>
```

VNCB VNCB returns or sets the NTSC Video_Source File for Source B. This file is found in directory /nvram0/ConfigFiles/Video_Source~Files/NTSC.

```
VM700T> get VNCB
System~Default
VM700T>
```

VNCC VNCC returns or sets the NTSC Video_Source File for Source C. This file is found in directory /nvram0/ConfigFiles/Video_Source~Files/NTSC.

```
VM700T> get VNCC
System~Default
VM700T>
```

VSCA VSCA returns or sets the PAL Video_Source File for Source A. This file is found in directory /nvram0/ConfigFiles/ Video_Source~Files/PAL.

```
VM700T> get VSCA
NewMeas
VM700T>
```

VSCB VSCB returns or sets the PAL Video_Source File for Source B. This file is found in directory /nvram0/ConfigFiles/ Video_Source~Files/PAL.

```
VM700T> get VSCB
System~Default
VM700T>
```

VSCC VSCC returns or sets the PAL Video_Source File for Source C. This file is found in directory /nvram0/ConfigFiles/ Video_Source~Files/PAL.

```
VM700T> get VSCC
System~Default
VM700T>
```

VSTA VSTA returns or sets the video standard for Source A. Legal values are NTSC and PAL.

```
VM700T> get VSTA
NTSC
VM700T> set VSTA PAL
VM700T> get VSTA
PAL
VM700T>
```

VSTB VSTA returns or sets the video standard for Source B. Legal values are NTSC and PAL.

```
VM700T> get VSTB
NTSC
VM700T> set VSTB PAL
VM700T> get VSTB
PAL
VM700T>
```

VSTC VSTC returns or sets the video standard for Source C. Legal values are NTSC and PAL.

```
VM700T> get VSTC
NTSC
VM700T> set VSTC PAL
```

```
VM700T> get VSTC
PAL
VM700T>
```

VSTE VSTE returns or sets the current Timed Events File. This file is found in directory /nvram0/ConfigFiles/Timed~Events.

```
VM700T> get VSTE
System~Default
VM700T> set VSTE My_Events
VM700T> get VSTE
My_Events
VM700T>
```

"W" Group: Audio Source Selection

"W" keywords report on or set the active video source selection files.

Get commands used with the "W" keywords have the following form:

```
get <keyword>
```

Set commands used with the "W" keywords have the following form:

```
get <keyword> <file-name>
```

Table A-20 lists the "W" group keywords and their meanings.

Table A-20: "W" Keywords: Audio Source Selection

Keyword	Description	Keyword	Description
WACA	Source A Audio Config File	WACC	Source C Audio Config File
WACB	Source B Audio Config File		

WACA WACA returns or sets the Audio_Source File for Source A. This file is found in directory /nvram0/ConfigFiles/Audio_Source~Files.

```
VM700T> get WACA
0.33:00TEST
VM700T>
```

WACB WACB returns or sets the Audio_Source File for Source B. This file is found in directory /nvram0/ConfigFiles/Audio_Source~Files.

```
VM700T> get WACB
0.33:00TEST
VM700T>
```

WACC WACC returns or sets the Audio_Source File for Source C. This file is found in directory /nvram0/ConfigFiles/Audio_Source~Files.

```
VM700T> get WACC
0.33:00TEST
VM700T>
```

"X" Group: Camera Testing (NTSC)

"X" keywords report on or set the values of Camera Testing Option Configuration parameters. These keywords can only be used on an NTSC-standard VM700T equipped with Option 21 (Camera Testing).

Get commands used with the "X" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "X" group keywords take different arguments, depending on the keyword. The form of each Set command used with "X" group keywords is documented in the pages that follow.

Table A-21 lists the "X" group keywords and their meanings.

Table A-21: "X" Keywords: Camera Testing (NTSC)

Keyword	Description	Range
XCOS	Camera Output standard	Composite Composite Setup GBR 700 (system default) GBR 700 Setup GBR 714 GBR 714 Setup YPbPr SMPTE/EBU YPbPr 714 Betacam Setup YPbPr 714 Betacam YPbPr 700 MII Setup
XSWP	Frequency Response Packets	6 to 12
XB6F	Packets beyond 6 MHz — From	1 to 12
XB6T	Packets beyond 6 MHz — To	1 to 12
XSWL	Frequency Response field and line	Fields 1 or 2 Lines 1 to 262
XGDR	Reference (mV)	0 to 999.9 mV
XG01 to XG12	Y (G) Packet # 1 (dB) to Y (G) Packet #12 (dB)	–40 to +40 dB
XBDR	Reference (mV)	0 to 999.9 mV
XB01 to XB12	(B) Packet # 1 (dB) to (B) Packet #12 (dB)	–40 to +40 dB

Table A-21: "X" Keywords: Camera Testing (NTSC) (Cont.)

Keyword	Description	Range
XRDR	Reference (mV)	0 to 999.9 mV
XR01 to XR12	(R) Packet # 1 (dB) to (R) Packet #12 (dB)	–40 to +40 dB

XCOS XCOS returns or sets the camera output standard. Legal values for NTSC are: GBR 700, GBR 700 Setup, GBR 714, GBR 714 Setup, YPbPr SMPTE/EBU, YPbPr 714 Betacam Setup, YPbPr 714 Betacam, YPbPr 700 MII Setup.

```
VM700T> get XCOS A
GBR 714
VM700T>
```

XSWP XSWP returns or sets the number of frequency response packets. Legal values are integers from 6 to 12, inclusive.

```
VM700T> get XSWP A
12
VM700T>
```

XB6F XB6F returns or sets the number of the first frequency response packet beyond 6 MHz. Legal values are integers from 1 to 12, inclusive.

```
VM700T> get XB6F A
4
VM700T>
```

XB6T XB6T returns or sets returns or sets the number of the last frequency response packet beyond 6 MHz. Legal values are integers from 1 to 12, inclusive.

```
VM700T> get XB6T A
9
VM700T>
```

XSWL XSWL returns or sets the frequency response field and line. XSWL takes two arguments, a field number and a line number. Legal values for the first argument are integers from 1 to 2, inclusive. Legal values for the second argument are integers from 1 to 262, inclusive.

```
VM700T> get XSWL A
1  120
VM700T>
```

XGDR XGDR returns or sets lower and upper limits in mV for the reference on the Y (green) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get XGDR A
---  700.00
VM700T>
```

XG01 – XG12 Keywords XG01 through XG12 return or set the lower and upper limits in dB for packets 1 through 12 on the Y channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get XG01 A
-1.00  0.00
VM700T>
```

XBDR XBDR returns or sets lower and upper limits in mV for the reference on the B (blue) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get XBDR A
---  700.00
VM700T>
```

XB01 – XB12 Keywords XB01 through XB12 return or set the lower and upper limits in dB for packets 1 through 12 on the B (blue) channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get XB01 A
-1.00  0.00
VM700T>
```

XRDR XRDR returns or sets lower and upper limits in mV for the reference on the R (red) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get XRDR A
---  700.00
VM700T>
```

XR01 – XR12 Keywords XR01 through XR12 return or set the lower and upper limits in dB for packets 1 through 12 on the R (red) channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get XR01 A
-1.00  0.00
VM700T>
```

"Y" Group: Camera Testing (PAL)

"Y" keywords report on or set the values of Camera Testing Option Configuration parameters. These keywords can only be used on PAL-standard VM700T's equipped with Option 21 (Camera Testing).

Get commands used with the "Y" keywords have the following form:

```
get <keyword> <channel-letter>
```

Set commands used with "Y" group keywords take different arguments, depending on the keyword. The form of each Set command used with "Y" group keywords is documented in the pages that follow.

Table A-22 lists the "Y" group keywords and their meanings.

Table A-22: "Y" Keywords: Camera Testing (PAL)

Keyword	Description	Range
YCOS	Camera Output standard	Composite GBR YPbPr SMPTE/EBU
YSWP	Frequency Response Packets	6 to 12
YB6F	Packets beyond 6 MHz — From	1 to 12
YB6T	Packets beyond 6 MHz — To	1 to 12
YSWL	Frequency Response line	Lines 1 to 625
YGDR	Reference (mV)	0 to 999.9 mV
YG01 to YG12	Y (G) Packet # 1 (dB) to Y (G) Packet #12 (dB)	–40 to +40 dB
YBDR	Reference (mV)	0 to 999.9 mV
YB01 to YB12	(B) Packet # 1 (dB) to (B) Packet #12 (dB)	–40 to +40 dB
YRDR	Reference (mV)	0 to 999.9 mV
YR01 to YR12	(R) Packet # 1 (dB) to (R) Packet #12 (dB)	–40 to +40 dB

YCOS YCOS returns or sets the camera output standard. Legal values for PAL are: GBR and YPbPr SMPTE/EBU

```
VM700T> get YCOS A
GBR 714
VM700T>
```

YSWP YSWP returns or sets the number of frequency response packets. Legal values are integers from 6 to 12, inclusive.

```
VM700T> get YSWP A
12
VM700T>
```

YB6F YB6F returns or sets the number of the first frequency response packet beyond 6 MHz. Legal values are integers from 1 to 12, inclusive.

```
VM700T> get YB6F A
4
VM700T>
```

YB6T YB6T returns or sets returns or sets the number of the last frequency response packet beyond 6 MHz. Legal values are integers from 1 to 12, inclusive.

```
VM700T> get YB6T A
9
VM700T>
```

YSWL YSWL returns or sets the frequency response line. YSWL takes one argument. Legal values are integers from 1 to 625, inclusive.

```
VM700T> get YSWL A
1  120
VM700T>
```

YGDR YGDR returns or sets lower and upper limits in mV for the reference on the Y (green) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get YGDR A
---  700.00
VM700T>
```

YG01 – YG12 Keywords YG01 through YG12 return or set the lower and upper limits in dB for packets 1 through 12 on the Y channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get YG01 A
-1.00  0.00
VM700T>
```

YBDR YBDR returns or sets lower and upper limits in mV for the reference on the B (blue) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get YBDR A
---  700.00
VM700T>
```

YB01 – YB12 Keywords YB01 through YB12 return or set the lower and upper limits in dB for packets 1 through 12 on the B (blue) channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get YB01 A
-1.00  0.00
VM700T>
```

YRDR YRDR returns or sets lower and upper limits in mV for the reference on the R (red) channel. Legal values for each limit are integer or floating-point numbers from 0 to 999.9, inclusive.

```
VM700T> get YRDR A
---  700.00
VM700T>
```

YR01 – YR12 Keywords YR01 through YR12 return or set the lower and upper limits in dB for packets 1 through 12 on the R (red) channel. Legal values for each limit are integer or floating-point numbers from –40 to 40, inclusive.

```
VM700T> get YR01 A
-1.00  0.00
VM700T>
```

Appendix B: Measurement Result Files

This chapter shows the results file produced by each VM700T application.

The sample files shown in this chapter are all produced by executing the following sequence of commands:

```
execute application
getresult
show application
```

The VM700T applications are grouped as shown in Table B-1 through Table B-7.

Table B-1: NTSC/PAL Measurements

Auto	GroupDelay~SinX_X	MultiBurst
Bar~LineTime	H_Blank	Noise~Spectrum
Bounce	H_Timing	SCH_Phase
Burst~Frequency	ICPM	ShortTime~Distortion
ChromLum~GainDelay	Jitter	TwoField
Chrominance~AMPM	Jitter~Long_Time	VITS~ID (NTSC only)
Chrominance~FreqResp (NTSC only)	K_Factor	V_Blank
Chrominance~NonLinearity	Level~Meter	Video~Standard
ColorBar (NTSC)/ ColourBar (PAL)	Line~Frequency	
DGDP	Luminance~NonLinearity	

Table B-2: Diagnostics

Auto	GroupDelay~SinX_X	MultiBurst
ADC~Diagnostic	AudioProcessor~Diagnostic	Genlock~Diagnostic
Acquisition~Diagnostic	CalDac~Adjustment	Measure~Sinewave
AdcGain~Adjustment	Controller~Diagnostic	Measure~Squarewave
AnalogInput~Diagnostic	DiagsLoop	Measure~Temperature
AudioAnalog~Diagnostic	FilterBoard~Diagnostic	

Table B-3: Echo/Rounding (Option 1G) Measurements

Echo	Rounding~Errors	

Table B-4: Teletext (Option 20) Measurements

Teletext	SoundInSync	

Table B-5: Camera Testing (Option 21) Measurements

Colorimetry	Defects	Fixed_Pattern~Noise
Frequency~Response		

Table B-6: Component (Option 30) Measurements

Bowtie	Component~LevelMeter	Component~Vector
Component~Channel_Delay	Component~Multiburst	Lightning
Component~ColorBar	Component~Noise	
Component~K_Factor	Component~NonLinearity	

Table B-7: Audio (Option 40 and 41) Measurements

Audio~Analyzer	Calibrate~AudioBoard	View_Audio~Auto_Test
Audio~Monitor	Identify~Audio_Hardware	
Audio~Spectrum	Multitone	

NTSC/PAL Results Files

Note that results files from NTSC measurements frequently contain a line in the header that reads "Field = X Line = Y". The corresponding line in results files from PAL measurements reads simply "Line = Y". Except for this line, NTSC and PAL measurement results files do not differ, unless otherwise noted.

Auto (NTSC)

```
Channel A     Source  System Default     Fri Aug 30 16:42:20 1996
                          VM700T Video Measurement Set
System Default                                  Violated Limits
                                                  Lower  Upper
Source ID             -----                                     Not Found
Bar Top               ------  % Carr    **        10.0    15.0  ZC Pulse Unselected
Blanking Level        ------  % Carr    **        72.5    77.5  ZC Pulse Unselected
Bar Amplitude          100.5  IRE
Sync Amplitude          40.1  % Bar
Blanking Variation    ------  % Carr                            ZC Pulse Unselected
Blanking Variation       0.2  % Bar
Sync Variation        ------  % Carr    **         0.0     5.0  ZC Pulse Unselected
Sync Variation           0.1  % Bar
Burst Amplitude        100.3  % Sync
Burst Amplitude         40.2  % Bar
FCC H Blanking         11.24  us
FCC Sync Width          4.84  us
FCC Sync-Setup          9.66  us
FCC Front Porch         1.57  us
Sync to Burst End       7.86  us        *         5.00    7.80
Breezeway Width         0.54  us
FCC Burst Width          8.9  Cycles
Sync Risetime            141  ns
Sync Falltime            140  ns
RS-170A H Blanking     11.42  us        **       10.65   11.15
RS-170A Sync Width      4.70  us
RS-170A Sync-Setup      9.59  us        **        9.28    9.52
RS-170A Front Porch     1.65  us        **        1.38    1.62
Sync to Burst Start     5.31  us
RS-170A Burst Width      9.0  Cycles
V Blank 4 IRE F1        21.0  Lines     *        18.5    20.5
V Blank 4 IRE F2        21.0  Lines     *        18.5    20.5
V Blank 20 IRE F1       21.0  Lines     *        20.1    20.9
V Blank 20 IRE F2       21.1  Lines     *        20.1    20.9
FCC Equalizer           51.0  % S.W.
FCC Serration           4.51  us
RS-170A Equalizer       2.33  us
RS-170A Serration       4.66  us
VIRS Setup               7.5  % Bar
VIRS Luminance Ref      50.1  % Bar
VIRS Chroma Ampl        99.9  % Burst
VIRS Chroma Ampl        40.1  % Bar
VIRS Chroma Phase       -0.1  Deg
Line Time Distortion     0.1  %
Pulse/Bar Ratio         99.1  %
2T Pulse K-Factor        0.2  % Kf
IEEE-511 ST Dist      ------  % SD      **        0.0     3.0  No NTC-7 Comp VITS
S/N NTC7 Unweighted     77.2  dB                                 RMS
S/N NTC7 Lum-Wghtd      80.6  dB                                 RMS
S/N Unif Unweighted     76.7  dB                                 RMS
```

```
S/N Unif Lum-Wghtd      80.7  dB                                  RMS
S/N Periodic            ------ dB        **      57.0  -------  Random >> Periodic
S/N.2 NTC7 Unwghtd      78.0  dB                                  RMS
S/N.2 NTC7 Lum-Wghtd    82.1  dB                                  RMS
S/N.2 Unif Unwghtd      77.4  dB                                  RMS
S/N.2 Unif Lum-Wghtd    82.3  dB                                  RMS
Chroma-Lum Delay         1.7  ns
Chroma-Lum Gain        100.3  %
Differential Gain        0.21 %                                   At  48% APL
Differential Phase       0.09 Deg                                 At  48% APL
Lum Non-Linearity        0.39 %                                   At  48% APL
Relative Burst Gain      0.00 %                                   At  48% APL
Relative Burst Phase    -0.02 Deg                                 At  48% APL
FCC Multiburst Flag   ------- % Carr    **      10.0    15.0  No FCC Multiburst
FCC Multiburst Flag   ------- % Bar     **      90.0   110.0  No FCC Multiburst
FCC MB Packet #1      ------- % Flag    **      57.1    63.0  No FCC Multiburst
FCC MB Packet #2      ------- % Flag    **      56.2    64.2  No FCC Multiburst
FCC MB Packet #3      ------- % Flag    **      54.8    65.6  No FCC Multiburst
FCC MB Packet #4      ------- % Flag    **      53.5    67.3  No FCC Multiburst
FCC MB Packet #5      ------- % Flag    **      56.0    64.3  No FCC Multiburst
FCC MB Packet #6      ------- % Flag                          No FCC Multiburst
NTC7 Multiburst Flag  ------- % Carr    **      10.0    15.0  ZC Pulse Unselected
NTC7 Multiburst Flag  100.0   % Bar
NTC7 MB Packet #1      49.9   % Flag
NTC7 MB Packet #2      49.8   % Flag
NTC7 MB Packet #3      50.0   % Flag
NTC7 MB Packet #4      50.2   % Flag
NTC7 MB Packet #5      50.1   % Flag
NTC7 MB Packet #6      50.1   % Flag
NTC7 20 IRE Chroma     20.0   IRE                                 (Ref 40 IRE Chr)
NTC7 80 IRE Chroma     79.9   IRE                                 (Ref 40 IRE Chr)
NTC7 Chr NL Phase       0.2   Deg
NTC7 Chr-Lum Intmd      0.1   IRE                                 (Ref Lum Pedestal)
ICPM                  ------  Deg       **      -3.0     3.0  ZC Pulse Unselected
SCH Phase              -3.1   Deg
Field Time Dist       ------- % Bar     **      -3.00    3.00 Not Found
FCC Color Bars
                Amplitude Error      Phase Error     Chr/Lum Ratio Error
                    ( % )              ( Deg )             ( % )
   Yellow            0.1                0.0               -0.1
   Cyan              0.2                0.0               -0.1
   Green             0.2                0.1               -0.0
   Magenta          -0.1                0.2               -0.5
   Red               0.1                0.1               -0.2
   Blue              0.3                0.2               -0.3
```

Auto (PAL)

```
Channel B     Source  System Default     Fri Aug 30 16:45:12 1996
                          VM700T Video Measurement Set
System Default                                  Violated Limits
                                                  Lower  Upper
Source ID             ----                                      Not Found
Luminance Bar Ampl    ------  mV        **      600.0   800.0  Bar Not Found
Luminance Bar Ampl    ------  % Carr    **       55.0    73.0  Bar Not Found
Lum Bar Ampl Err      ------  %         **      -10.0    10.0  Bar Not Found
Line Time Distortion  ------  % Bar     **        0.0    10.0  Bar Not Found
Bar Tilt (Rec 569)    ------  % Bar     **      -10.0    10.0  Bar Not Found
Bar Rise Time         ------  ns        **      160.0   240.0  Bar Not Found
Baseline Distortion   ------  % Bar     **       -2.0     2.0  Bar Not Found
Blanking Level        ------  % Carr    **       69.0    79.0  Bar Not Found
```

Sync/Bar (Rel 3/7)	------	%	**	80.0	120.0	Bar Not Found
Sync to Bar Top	------	mV	**	870.0	1130.0	Bar Not Found
Pulse/Bar Ratio Err	------	% Bar	**	-20.0	20.0	Pulse Not Found
2T Pulse K-factor	------	% Kf	**	0.0	4.0	Pulse Not Found
C/L Gn Err (Mod Bar)	------	% Bar	**	-20.0	20.0	Not Found
Chr/Lum Delay Ineq	------	ns	**	-50.0	50.0	Pulse Not Found
C/L Gn Err (Mod Pls)	------	% Bar	**	-20.0	20.0	Not Found
Lum. Nonlin. Dist.	------	%	**	------	10.0	No Luminance Steps
Chrom Ref Ampl Err	------	%	**	-10.0	10.0	Not Found
Pk-Pk Diff Gain	------	%	**	------	20.0	Not Found
Peak Diff Gain	------	%	**	------	20.0	Not Found
Pk-Pk Diff Phase	------	Deg	**	------	20.0	Not Found
Peak Diff Phase	------	Deg	**	------	20.0	Not Found
Chr/Lum Intermod	------	% Bar	**	-10.0	10.0	Not Found
Sync Amplitude	302.2	mV				
Sync Ampl Error	0.7	%				
Residual Carrier	------	% Carr	**	7.5	15.0	Bar Not Found
Sync-to-Burst Start	5.51	us				
Burst Duration	2.18	us				
Burst Duration	9.7	Cycles				
Burst Amplitude	307.7	mV				
Burst Ampl Error	2.6	%				
Burst Ampl Diff	0.5	%				
Burst Quad Error	-0.2	Deg				
SCH Phase	5.8	Deg				
Sync Duration	4.68	us				
Sync Rise Time	251.3	ns				
Sync Fall Time	251.2	ns				
Front Porch	------	us	**	0.50	3.00	No Blanking Edge
Line Blanking	------	us	**	9.10	16.00	No Blanking Edge
Broad Pulse Sep	4.66	us				
Equalizing Pulse	2.34	us				
Multiburst Flag	------	% Bar	**	50.0	70.0	No Multiburst
Multiburst Flag	------	mV	**	350.0	490.0	No Multiburst
MB Packet #1	------	% Flag	**	80.0	120.0	No Multiburst
MB Packet #2	------	% Flag	**	80.0	120.0	No Multiburst
MB Packet #3	------	% Flag	**	80.0	120.0	No Multiburst
MB Packet #4	------	% Flag	**	80.0	120.0	No Multiburst
MB Packet #5	------	% Flag	**	80.0	120.0	No Multiburst
MB Packet #6	------	% Flag	**	80.0	120.0	No Multiburst
CCIR LF Error	0.1	% Bar				No Bar - Ref. 700 mV
50-550 Hz LF Error	0.2	% Bar				No Bar - Ref. 700 mV
10-1000 Hz LF Error	0.1	% Bar				No Bar - Ref. 700 mV
S/N Unweighted (567)	79.2	dB				No Bar - Ref. 700 mV
S/N Lum-wgtd (567)	84.9	dB				No Bar - Ref. 700 mV
S/N Chr-wgtd	83.6	dB				No Bar - Ref. 700 mV
S/N Periodic	72.0	dB				No Bar - Ref. 700 mV
S/N Unweighted (569)	80.7	dB				No Bar - Ref. 700 mV
S/N Lum-wgtd (569)	88.2	dB				No Bar - Ref. 700 mV
S/N.2 Unwgtd (567)	75.0	dB				No Bar - Ref. 700 mV
S/N.2 Lum-wgtd (567)	78.4	dB				No Bar - Ref. 700 mV
S/N.2 Chr-wgtd	72.6	dB				No Bar - Ref. 700 mV
S/N.2 Unwgtd (569)	76.9	dB				No Bar - Ref. 700 mV
S/N.2 Lum-wgtd (569)	84.0	dB				No Bar - Ref. 700 mV
ICPM (Absolute)	------	Deg	**	-20.0	20.0	No Luminance Steps
ICPM (Rel Blanking)	------	Deg	**	-20.0	20.0	No Luminance Steps
Field Time Dist	------	%	**	-2.0	2.0	Not Found

Bar~LineTime (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:00:05
Bar & LineTime                                    Waveform->FCC   Composite
Field = 1 Line =  18
Average Off
-------------------------------------------------------------------------
Bar Level(Ref. b1)          99.5  IRE
Bar Level(Back Porch)       99.6  IRE
Sync Level                  40.0  IRE
Sync to Bar Top            139.6  IRE
Sync/Bar Ratio             100.5  %
LineTime Dist (Rec. 567)     0.1  %
Bar Tilt (Rec. 569)          0.1  %
Bar Width                   18.0  u sec
-------------------------------------------------------------------------
```

Bounce (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 21 08:52:53
Bounce
Average Off
-------------------------------------------------------------------------
     (High APL)
Settling Time                0.0  sec
Blanking Dev. (+)            0.2  %
Blanking Dev. (-)           -0.2  %
Blanking Dev. (P-P)          0.4  %
Sync Amplitude              40.0  IRE
Sync Amp. Dev. (+)           0.5  %
Sync Amp. Dev. (-)          -0.4  %
Sync Amp. Dev. (P-P)         0.9  %
Bounce Amplitude           100.1  IRE
Bounce Amp. Dev. (+)         0.1  %
Bounce Amp. Dev. (-)        -0.1  %
Bounce Amp. Dev. (P-P)       0.3  %
     (Low APL)
Settling Time                0.0  sec
Blanking Dev. (+)            0.1  %
Blanking Dev. (-)           -0.2  %
Blanking Dev. (P-P)          0.3  %
Sync Amplitude              39.9  IRE
Sync Amp. Dev. (+)           0.6  %
Sync Amp. Dev. (-)          -0.6  %
Sync Amp. Dev. (P-P)         1.1  %
     (High,Low APL)
Blank Level Diff.            0.1  %
Sync Amp. Diff              -0.1  %
-------------------------------------------------------------------------
```

Burst~Frequency (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:03:45
Burst Frequency Measurement          (Ref. Ch-B Burst)
Average Off
-------------------------------------------------------------------------
Burst Frequency Error      -0.2  Hz
-------------------------------------------------------------------------
```

ChromLum~GainDelay (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:04:22
Chrom/Lum Gain Delay                              Waveform->FCC   Composite
Field = 1 Line =  18
Average Off
-------------------------------------------------------------------------
Chroma Gain                92.5  %
Chroma Delay               -3.7  n sec
-------------------------------------------------------------------------
```

Chrominance~AMPM (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:04:59
Chrominance AMPM                                  Waveform->appropriate
Full Field (Both Fields)
Band width  100Hz to 500kHz
Average Off
-------------------------------------------------------------------------
AM Noise                  -64.3  dB rms
PM Noise                  -64.2  dB rms
-------------------------------------------------------------------------
(0 dB = 714 mV p-p with AGC for 100% Chrominance Level)
```

Chrominance~FreqResp (NTSC only)

```
  Measurement Results          Channel A          Fri Aug 30 16:06:41
Chrominance Freq Resp                             Waveform->FCC Multi Burst
Field = 1 Line =  50
Average Off
-------------------------------------------------------------------------
0 dB = Packet #3           56.4  IRE
Packet #1 0.5 Mhz          0.15  dB
Packet #2 1.2 Mhz          0.10  dB
Packet #3 2.0 Mhz          0.00  dB
Packet #4 3.0 Mhz         -5.88  dB        *       -2.00       1.00
Packet #5 4.1 Mhz         -5.14  dB        *       -3.00       1.00
-------------------------------------------------------------------------
```

Chrominance~NonLinearity (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:07:20
Chrominance NonLinearity                          Waveform->Mod 3 Step
Field = 1 Line =  50
Average Off
-------------------------------------------------------------------------
Chroma Amp (Packet 1)        1.4  %
Chroma Amp (Packet 2)        0.0  Ref.
Chroma Amp (Packet 3)       -0.6  %
Chroma Phase (Packet 1)     -0.7  deg.
Chroma Phase (Packet 2)      0.0  Ref.
Chroma Phase (Packet 3)     -0.4  deg.
Chroma Intermod. (Packet 1)  0.2  %
Chroma Intermod. (Packet 2)  0.1  %
Chroma Intermod. (Packet 3) -0.1  %
-------------------------------------------------------------------------
```

ColorBar (NTSC & PAL)

Note that the name of this measurement (according to the results file) is "ColorBar" for NTSC and "ColourBar" for PAL.

```
  Measurement Results          Channel A          Fri Aug 30 16:07:45
ColorBar                                         Waveform->FCC Color Bar
Field = 1 Line =  50
Average Off
-------------------------------------------------------------------------
Luma Level (Gray)          95.2  IRE
Luma Level (Yellow)        64.3  IRE
Luma Level (Cyan)          50.7  IRE
Luma Level (Green)         42.8  IRE        *        43.5       53.2
Luma Level (Magenta)       30.0  IRE        *        32.3       39.5
Luma Level (Red)           22.1  IRE        *        25.5       31.1
Luma Level (Blue)           8.2  IRE        *        13.6       16.7
Luma Level (Black)          0.1  IRE        *         6.7        8.3
Chroma Level (Gray)         0.1  IRE
Chroma Level (Yellow)      60.1  IRE
Chroma Level (Cyan)        86.3  IRE
Chroma Level (Green)       81.4  IRE
Chroma Level (Magenta)     81.7  IRE
Chroma Level (Red)         87.4  IRE
Chroma Level (Blue)        61.8  IRE
Chroma Level (Black)        0.0  IRE
Chroma Phase (Yellow)     166.7  deg
Chroma Phase (Cyan)       283.5  deg
Chroma Phase (Green)      240.9  deg
Chroma Phase (Magenta)     60.9  deg
Chroma Phase (Red)        103.5  deg
Chroma Phase (Blue)       347.0  deg
-------------------------------------------------------------------------
```

DGDP (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:08:06
Differential Gain & Phase                        Waveform->NTC-7 Composite
Field = 2 Line =  18
Average Off
-------------------------------------------------------------------------
Differential Gain (min)   -6.10  %        *        -5.00       5.00
Differential Gain (max)    0.79  %
Differential Gain (p-p)    6.83  %
Differential Phase (min)  -1.41  deg
Differential Phase (max)   1.02  deg
Differential Phase (p-p)   2.43  deg
-------------------------------------------------------------------------
```

GroupDelay~SinX_X (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:08:52
Group Delay & Gain vs Frequency (SinX/X)         Waveform->Sin X/X
Field = 2 Line =  44
Reference Frequency at 0.20 MHz
Average Off
-------------------------------------------------------------------------
Amplitude (0.5 MHz)        -0.0  dB
Amplitude (1.0 MHz)        -0.1  dB
Amplitude (2.5 MHz)        -0.2  dB
```

```
Amplitude (3.0 MHz)        -0.2  dB
Amplitude (3.6 MHz)        -0.4  dB
Amplitude (4.0 MHz)        -0.6  dB        *         -0.5        0.5
Amplitude (4.2 MHz)        -0.6  dB
GroupDelay (0.5 MHz)       -5.5  n sec
GroupDelay (1.0 MHz)       15.9  n sec     *        -15.0       15.0
GroupDelay (2.5 MHz)        2.9  n sec
GroupDelay (3.0 MHz)        3.2  n sec
GroupDelay (3.6 MHz)       19.3  n sec     *        -15.0       15.0
GroupDelay (4.0 MHz)       13.8  n sec
GroupDelay (4.2 MHz)       -6.5  n sec
Cursor (3.58 MHz)          -0.4  dB     19.3 n sec
-------------------------------------------------------------------------
```

H_Blank (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:09:28
H_Blank  4 IRE (Field 1)  (Line  22 to 260)
-------------------------------------------------------------------------
H Blank Start             -1.69  u sec
H Blank End                9.47  u sec
H Blank Width             11.15  u sec
-------------------------------------------------------------------------
```

H_Timing (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:09:50
H Timing  (RS-170A)
Field = 2 Line =  44
Average Off
-------------------------------------------------------------------------
Sync Rise Time            148.8   n sec
Sync Fall Time            143.0   n sec
Sync Width                  4.71  u sec
Sync Level                 40.9   IRE
Burst Level                39.2   IRE
Sync to Burst Start         5.31  u sec
Burst Width                 9.0   cycles
Front Porch                 1.70  u sec
Sync to SetUp               9.48  u sec
-------------------------------------------------------------------------
```

ICPM (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:10:27
ICPM
Field = 2  Line =  44
Average Off
-------------------------------------------------------------------------
Min Angle             = -67.71 degrees      *    -5.0     5.0
Max Angle             =  66.33 degrees      *    -5.0     5.0
Pk-Pk Angle           = 134.04 degrees
(Absolute)
-------------------------------------------------------------------------
```

Jitter (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:10:50
Jitter Measurement    (Line  20 to 250)
Average Off
-------------------------------------------------------------------------
Peak to Peak Jitter         4.2  n sec
-------------------------------------------------------------------------
```

Jitter~Long_Time (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:11:20
Jitter Long Time Measurement   Frequency Lock Speed     1 sec
Average Off
-------------------------------------------------------------------------
Peak to Peak Jitter        0.006  u sec
-------------------------------------------------------------------------
```

K_Factor (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:11:49
2T Pulse K Factor                                 Waveform->FCC   Composite
Field = 1 Line =  18
Graticule EIA-2T
Average Off
-------------------------------------------------------------------------
K-2T                         0.3  % KF
K-PB                        -0.1  % KF
PB Ratio                    99.6  %
HAD                        254.9  n sec
-------------------------------------------------------------------------
```

Level~Meter (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Dec 20 15:57:43
Level Meter                                       Waveform->FCC Multi Burst
Field = 1 Line = 100
Average Off
-------------------------------------------------------------------------
Level(b-a)                 288.3  mV
-------------------------------------------------------------------------
a <--  6.5 u sec
b <-- 35.5 u sec
```

Line~Frequency (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:12:03
Line Frequency Measurement
Average Off
-------------------------------------------------------------------------
Line Frequency Error     -0.007  %
Line Frequency           15.733  kHz
Field Frequency          59.94  Hz
-------------------------------------------------------------------------
```

Luminance~NonLinearity (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:12:17
Luma Non Linearity                                Waveform->FCC   Composite
Field = 1 Line =  18
Average Off
-------------------------------------------------------------------------
LumaNonLinearity (p-p)     3.3  %
-------------------------------------------------------------------------
```

MultiBurst (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:12:40
Multi Burst                                       Waveform->FCC Multi Burst
Field = 1 Line =  17
Average Off
-------------------------------------------------------------------------
0 dB = 60 % of Flag       101.9  IRE
Packet #1 0.50 MHz         0.15  dB
Packet #2 1.25 MHz         0.10  dB
Packet #3 2.00 MHz         0.04  dB
Packet #4 3.00 MHz        -0.06  dB
Packet #5 3.58 MHz        -0.24  dB
Packet #6 4.10 MHz        -0.37  dB
-------------------------------------------------------------------------
```

Noise~Spectrum (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:13:50
Noise Spectrum                                    Waveform->Pedestal
Field = 1 Line =  10
Band width 100kHz to 5.0MHz (SC trap) (Tilt Null)
Average Off
-------------------------------------------------------------------------
Noise Level               -60.3  dB rms
Cursor 1                  -70.0  dB p-p    at  1.96 MHz
Cursor 2                 -107.2  dB p-p    at  3.58 MHz   -37.2 dB Diff
Noise Area in Cursors     -66.3  dB rms
-------------------------------------------------------------------------
```

SCH_Phase (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:14:36
SCH Phase
Average off
-------------------------------------------------------------------------
SCH Phase                      -2.3 deg
-------------------------------------------------------------------------
```

ShortTime~Distortion (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:15:07
Short Time Distortion                             Waveform->NTC-7 Composite
Field = 2 Line =  18
Graticule IEEE-511
Average Off
-------------------------------------------------------------------------
Rising Edge                 0.7  % SD
Rise Time                 131.5  nSec      *       120.0     130.0
```

```
Falling Edge                0.9  % SD
Fall Time                 130.0  nSec
```

TwoField (NTSC & PAL)

```
  Measurement Results         Channel A         Fri Aug 30 16:15:37
TwoField
Average Off
```

```
Field Time Dist           13.1  %
```

```
APL =  51.8 %
Slow Clamp at Back Porch
Luminance at (35.0 usec), Sync & Back Porch are displayed
```

VITS~ID (NTSC only)

```
  Measurement Results         Channel A         Fri Aug 30 16:16:09
Signal ID (System Line)                         Waveform->NTC-7 Composite
Field = 2 Line =  18
```

```
  Field 1                                 Field 2
Line 15 --> GCR 8 Fields Seq.          Line 15 --> GCR 8 Fields Seq.
Line 16 --> VIRS                       Line 16 --> Sin X/X
Line 17 --> FCC Multi Burst            Line 17 --> NTC-7 Combination
Line 18 --> FCC   Composite            Line 18 --> NTC-7 Composite
Line 19 --> Pedestal                   Line 19 --> Red Field
Line 20 --> Luminance Bar              Line 20 --> Mod Pedestal F-line
```

V_Blank (NTSC & PAL)

```
  Measurement Results         Channel A         Fri Aug 30 16:16:49
V Timing Measurement
Average Off
```

```
Equalizer Pulse           2.33  u sec
Equalizer Pulse 10%       2.47  u sec
Serration Pulse           4.66  u sec
Serration Pulse 10%       4.51  u sec
```

Video~Standard (NTSC & PAL)

```
    Video Standard                                Fri Aug 30 16:17:56
```

```
Source A: NTSC
Source B: NTSC
Source C: PAL
```

Diagnostics Results Files

The following Diagnostics applications produce no results file: AdcGain~Adjustment, Audio_TS_Tool, CalDac~Adjustment, Diagsloop, Measure~Sinewave, Measure~Squarewave, Warm_Reboot.

ADC~Diagnostic

ADC Diagnostic

Test	measmt	units	min	max	result
Mode checks					-Pass-
ADC bit patterns					-Pass-

Acquisition~Diagnostic

Acquisition Diagnostic

Test	measmt	units	min	max	result
Identify Board					-Pass-
RAM Test					-Pass-
FIFO Test					-Pass-
Load / Looping					-Pass-
Optional HW					-Pass-
External Triggers					-Pass-
Long Acquisitions	25	loops	25		-Pass-
Sample Dropping					-Pass-

AnalogInput~Diagnostic

Analog Input Diagnostic

Test	measmt	units	min	max	result
DVM					-Pass-
DC Paths					-Pass-
Gain Control					-Pass-
Cal DAC					-Pass-
Offset Control					-Pass-
Input Selection					-Pass-
A Bias Ctl					-Pass-
B Bias Ctl					-Pass-
C Bias Ctl					-Pass-
A Clamp					-Pass-
B Clamp					-Pass-
C Clamp					-Pass-

AudioAnalog~Diagnostic

Audio Analog Diagnostic

Test	measmt	units	min	max	result
DAC Calibration					-Pass-
ADC Calibration					-Pass-
ADC BitPatterns					-Pass-
Cal-Signal Paths					-Pass-
Attenuator Steps					-Pass-
Gain Steps					-Pass-
Notch Filters					-Pass-
Left Flatness	0.101	dB pp		0.300	-Pass-

AudioProcessor~Diagnostic

Audio Processor Diagnostic

Test	measmt	units	min	max	result
DSP Program RAM					-Pass-
DSP X Data RAM					-Pass-
DSP Y Data RAM					-Pass-
Sign Extend Buf					-Pass-
Shared Bus Timing					-Pass-
DSP Host Port					-Pass-
Audio Data Reg					--NA--
Interrupt Reg					-Pass-
Sample Dropping					--NA--

Controller~Diagnostic

Controller Diagnostic

Test	measmt	units	min	max	result
Identify Board					-Pass-
Control Registers					-Pass-
Overrange Detector					-Pass-
Clock Detector					-Pass-
A-Clamp Counter					-Pass-
B-Clamp Counter					-Pass-
C-Clamp Counter					-Pass-
Acq Sig0 Counter					-Pass-
Acq Sig1 Counter					-Pass-
Acq Sig2 Counter					-Pass-
Register File					--NA--
SM Settings RAM					-Pass-
SM Trigger RAM					-Pass-
SM Sequence RAM					-Pass-

FilterBoard~Diagnostic

FilterBoard Diagnostic

Test	measmt	units	min	max	result
Times 8 Gain	7.99	times	7.20	8.80	-Pass-
Filter slot 0					-Pass-
Filter slot 1					-FAIL-
Filter ID					-FAIL-
Freq response					--
Filter slot 2					-Pass-
Filter slot 3					-FAIL-
Filter ID					-FAIL-
Freq response					--
Filter slot 4					-Pass-
Filter slot 5					-Pass-

Genlock~Diagnostic

Genlock Diagnostic

Test	measmt	units	min	max	result
Status checks					-Pass-
NTSC VCO Lock					-Pass-
PAL VCO Lock					-Pass-

Measure~Temperature

```
Measure Temperature Results:
   Temperature:   30.8 C
```

Option 1G (Echo/Rounding) Results Files

Echo (NTSC & PAL)

```
 Echo Application Results: Fri Aug 30 16:33:33
Channel A
-------------------------------------------------------------------------
Cursor   Time     percent of Peak      dB rel Curve 1
  1     406 nsec        0.14             -36.96
  2     605 nsec        0.00             -129.50
```

Rounding~Errors (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:33:59
Rounding Errors                                   Waveform->Pulse
Line =  96
Average Off
-------------------------------------------------------------------------
(From  0.40 uS to  1.00 uS)
Rounding of White          0.3  %
Rounding of Black          0.0  %
-------------------------------------------------------------------------
```

Option 20 (Teletext) Results Files

SoundInSync (PAL Only)

```
  Measurement Results          Channel A          Fri Aug 30 16:37:29
SoundInSync
Line =  96 (SIS mode)
Accumulation 200 times
-------------------------------------------------------------------------
    (Eye Threshold = 1/250)
Eye Height                 86.2  %
                          201.0  mV
    (At Clock)
Eye Width                  77.5  %
    (At Middle)
'3' Level                 370.8  mV
'2' Level                 147.1  mV
'1' Level                 -86.1  mV
'0' Level                -310.9  mV
P-P Amplitude              106.0  %
                           722.5  mV
-------------------------------------------------------------------------
```

Teletext (NTSC & PAL)

```
  Measurement Results          Channel A          Fri Aug 30 16:19:59
Teletext                                        Waveform->Teletext
Field = 1 Line =  15
Accumulation 400 times
Timing Average Off
-------------------------------------------------------------------------
    (Eye Threshold = 1/250)
Eye Height                 45.9  %          *        70.0      100.0
                           28.1  IRE        *        49.0       70.0
    (At Clock)
Eye Width                  58.1  %          *        70.0      100.0
    (At Middle)
'1' Level                  66.0  IRE        *        67.5       72.5
'0' Level                   4.7  IRE        *        -2.5        2.5
P-P Amplitude            156.8  %          *       100.0      130.0
                           96.1  IRE        *        70.0       91.0
Run-In Start               9.91  u sec
Run-In Bits                16.0  bits
Data Line Width           50.32  u sec      *       52.00      59.00
Data End to Sync           3.32  u sec      *        1.00       3.00
Run-In Amplitude           52.7  IRE        *        67.5       72.5
-------------------------------------------------------------------------
```

Option 21 (Camera Testing) Results Files

NOTE. *These files show the types of results obtainable from the measurements. The results shown were not obtained using camera signals.*

Detail

```
  Measurement Results    Channel A              Fri Aug 21 08:19:06
Detail
Camera: cam1
Field = 1 Line = 22 (Synchronous)
Average Off
-------------------------------------------------------------------------
Detail (H Rising Edge)   >>>>>>   %
Detail (H Falling Edge)  >>>>>>   %
Detail (V Rising Edge)   ------   %
Detail (V Falling Edge)  ------   %
-------------------------------------------------------------------------
Field Rate Display Position  36.0 u sec
```

Gamma

```
  Measurement Results    Channels A, B, and C    Fri Aug 21 08:27:08
Gamma
Camera: cam1
-------------------------------------------------------------------------
Gamma (A)                ------
Gamma (B)                ------
Gamma (C)                ------
-------------------------------------------------------------------------
              (A)        (B)        (C)
step #1      172.3      171.5      171.0  mV
step #2      172.8      172.0      171.2  mV
step #3      172.8      172.8      172.2  mV
step #4      172.4      172.7      171.8  mV
step #5       71.7       72.0       71.6  mV
step #6      554.6      549.2      545.2  mV
step #7      643.1      641.1      639.4  mV
step #8      544.8      542.5      541.7  mV
step #9      544.9      542.5      541.8  mV
step #10     544.0      542.8      542.1  mV
step #11     544.0      542.5      541.8  mV
```

Geometry~Registration

```
Measurement Results      Channels A, B, and C    Fri Aug 21 08:21:06
Geometry/Registration
Camera: cam1
Porta-Pattern Chart
Averaged 0 Frames
-------------------------------------------------------------------------
Geometry (Ch A): Results Unavailable
Registration (Ch B): Results Unavailable
Registration (Ch C): Results Unavailable
```

Shading

```
Measurement Results      Channel A              Fri Aug 21 08:20:21
Shading
Camera: cam1
Acquired 1 Frame
-------------------------------------------------------------------------
Ave. Video Level:        10.0 IRE
V. Shading:               0.5 %
H Shading (Averaged):    82.0 %
H. Shading @ F1 L 22:    81.8 %
Max. H. Sh @ F1 L 23:    82.2 %
-------------------------------------------------------------------------
Measurement Widthg    1.0 uSec
Measurement Position:
Center  35.0 uSec from sync
```

Vertical~Smear

```
Measurement Results      Channel A              Fri Aug 21 08:19:46
Vertical Smear
Camera: cam1
Reference White Level    98 IRE  at f Stop Undefined
Smear Threshold Level     1 IRE  at f Stop Undefined
    Above aperture smear   -21.1 IRE
    Below aperture smear   -20.9 IRE
Eq. :: 20 * log(Ref White / Threshold) + 20 * log((Ref Iris / Smr Iris) ^ 2)
-------------------------------------------------------------------------
Smear: ----- dB
-------------------------------------------------------------------------
Measurement Width    1.0 uSec
Measurement Positions:
Aperture  Center  35.0 uSec from sync
Reference Center  20.0 uSec from sync
Reference White Level measured on F1 Line 102
Above aperture smear  measured on F1 Line   9
Below aperture smear  measured on F1 Line 189
```

Colorimetry

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 11:51:31
Colorimetry
Camera ID: Camera 1
Macbeth Chart, 24 Color Chips
3100K (Studio)
SMPTE Phosphors
Nominal Gamma
Default Ref.
-------------------------------------------------------------------------
                          DE     DH
Dk. Skin            =  46.0,   2.0
Lt. Skin            =  75.4,   1.4
Blue Sky            =  53.0,  16.9
Foliage             =  42.3,  13.0
Bl. Flower          =  54.5,  11.1
Bl. Green           =  82.4,  23.2
Orange              =  99.9,   5.3
Prpl. Blue          =  53.0,  19.2
Mod. Red            = 106.9,   0.4
Purple              =  35.9,   5.8
```

```
Yw. Green            =  77.1,  19.6
Or. Yellow           =  91.3,   6.1
Blue                 =  52.0,  17.5
Green                =  75.2,  23.9
Red                  = 122.0,   1.0
Yellow               =  92.3,   9.1
Magenta              =  98.1,   2.6
Cyan                 =  75.0,  25.3
White                =  92.1,   2.9
Neutrl 8             =  77.0,   1.6
Neutrl 6.5           =  61.6,   2.0
Neutrl 5             =  46.4,   2.2
Neutrl 3.5           =  30.1,   2.5
Black                =  15.1,   0.1
Average Weighted DE =  69.0
Average Weighted DH =   8.9
-------------------------------------------------------------------------
Measurement Width: 8 cycles ( 2.2 uSec)
Measurement Positions:
Packet # 1, F1 L 50, Center 13.0 uSec from sync
Packet # 2, F1 L 50, Center 22.0 uSec from sync
Packet # 3, F1 L 50, Center 30.9 uSec from sync
Packet # 4, F1 L 50, Center 39.5 uSec from sync
Packet # 5, F1 L 50, Center 48.0 uSec from sync
Packet # 6, F1 L 50, Center 56.7 uSec from sync
Packet # 7, F1 L105, Center 13.0 uSec from sync
Packet # 8, F1 L105, Center 22.0 uSec from sync
Packet # 9, F1 L105, Center 30.9 uSec from sync
Packet #10, F1 L105, Center 39.5 uSec from sync
Packet #11, F1 L105, Center 48.0 uSec from sync
Packet #12, F1 L105, Center 56.7 uSec from sync
Packet #13, F1 L160, Center 13.0 uSec from sync
Packet #14, F1 L160, Center 22.0 uSec from sync
Packet #15, F1 L160, Center 30.9 uSec from sync
Packet #16, F1 L160, Center 39.5 uSec from sync
Packet #17, F1 L160, Center 48.0 uSec from sync
Packet #18, F1 L160, Center 56.7 uSec from sync
Packet #19, F1 L220, Center 13.0 uSec from sync
Packet #20, F1 L220, Center 22.0 uSec from sync
Packet #21, F1 L220, Center 30.9 uSec from sync
Packet #22, F1 L220, Center 39.5 uSec from sync
Packet #23, F1 L220, Center 48.0 uSec from sync
Packet #24, F1 L220, Center 56.7 uSec from sync
```

Defects

```
  Measurement Results          Channel A          Thu Aug 29 17:43:05
CCD Defects
Camera: Camera 1
Room Temperature:  20.0 Celsius,    68 Fahrenheit
CCD H. Density: 728 Pixels
Threshold: 250 mV
Averaged 32 Frames
Largest Defect: 23 Pixels
Max Dev. Found: 404.9 mV
91 Bad Pixels Found
-------------------------------------------------------------------------
There is 1 Defect With 23 Bad Pixel(s).
There are 2 Defects With 18 Bad Pixel(s) Each.
There is 1 Defect With 14 Bad Pixel(s).
There is 1 Defect With 5 Bad Pixel(s).
```

```
There is 1 Defect With 3 Bad Pixel(s).
There are 2 Defects With 2 Bad Pixel(s) Each.
There are 6 Defects With 1 Bad Pixel(s) Each.
Field 1, Line 22, 21.92 uSec
Field 2, Line 22, 21.92 uSec
Field 1, Line 23, 21.92 uSec
Field 2, Line 23, 21.92 uSec
Field 1, Line 24, 21.92 uSec
Field 2, Line 24, 21.85 uSec
Field 1, Line 25, 21.85 uSec
Field 2, Line 25, 21.85 uSec, 22.06 uSec
Field 2, Line 244, 45.13 uSec
Field 1, Line 245, 45.13 uSec
Field 2, Line 245, 42.59 uSec, 45.13 uSec
Field 1, Line 247, 39.85 uSec, 57.57 uSec
Field 2, Line 247, 34.21 uSec
Field 1, Line 248, 34.21 uSec
Field 2, Line 250, 27.07 uSec, 49.05 uSec
Field 1, Line 251, 27.07 uSec, 49.05 uSec
Field 2, Line 251, 49.05 uSec
Field 1, Line 252, 49.12 uSec
Field 2, Line 252, 49.12 uSec
Field 1, Line 253, 49.12 uSec
Field 2, Line 255, 23.02 uSec, 49.19 uSec
Field 1, Line 256, 23.02 uSec, 49.12 uSec
Field 2, Line 256, 23.02 uSec, 49.12 uSec
Field 1, Line 257, 23.09 uSec, 49.12 uSec
Field 2, Line 257, 23.09 uSec, 49.05 uSec
Field 1, Line 258, 23.09 uSec, 49.05 uSec
Field 2, Line 258, 23.16 uSec, 49.05 uSec
Field 1, Line 259, 49.05 uSec
Field 1, Line 260, 16.91 uSec
Field 2, Line 261, 23.16 uSec
Field 1, Line 262, 23.16 uSec
Field 2, Line 262, 23.09 uSec
```

Fixed_Pattern~Noise

```
  Recorded Measurement Results        Channel A        Thu Aug 29 17:04:29
Fixed Pattern Noise
Camera: Camera 1
100kHz ~ 4.2MHz
------------------------------------------------------------------------
Fixed Pattern Noise      -33.1  dB
------------------------------------------------------------------------
Shading Removed
```

Frequency~Response

```
  Measurement Results    Channels A, B, and C    Thu Aug 29 16:07:21
Frequency Response, Depth of Modulation
Camera: Camera 1
Field = 2 Line = 120 (Synchronous)
Average  20
------------------------------------------------------------------------
G (A) Reference Packet # 1  319.3  mV
Packet # 1,                   0.0  dB
Packet # 2,                  -3.1  dB        *        -3.0       0.0
Packet # 3,                 -11.4  dB        *        -5.0       0.0
```

```
Packet # 4,                -26.0  dB
Packet # 5,                -29.2  dB
Packet # 6,                -29.4  dB
Packet # 7,                -29.8  dB
Packet # 8,                -28.3  dB
Packet # 9,                -28.0  dB
Packet #10,                -16.3  dB        *       -5.0       0.0
Packet #11,                 -6.8  dB        *       -3.0       0.0
Packet #12,                 -1.8  dB        *       -1.0       0.0
B (B) Reference Packet # 1  290.1  mV
Packet # 1,                  0.0  dB
Packet # 2,                 -3.6  dB        *       -3.0       0.0
Packet # 3,                -10.5  dB        *       -5.0       0.0
Packet # 4,                -23.8  dB
Packet # 5,                -25.7  dB
Packet # 6,                -26.9  dB
Packet # 7,                -25.3  dB
Packet # 8,                -24.9  dB
Packet # 9,                -26.2  dB
Packet #10,                -16.5  dB        *       -5.0       0.0
Packet #11,                 -5.6  dB        *       -3.0       0.0
Packet #12,                 -1.8  dB        *       -1.0       0.0
R (C) Reference Packet # 1  332.2  mV
Packet # 1,                  0.0  dB
Packet # 2,                 -4.1  dB        *       -3.0       0.0
Packet # 3,                -11.2  dB        *       -5.0       0.0
Packet # 4,                -23.1  dB
Packet # 5,                -28.5  dB
Packet # 6,                -29.2  dB
Packet # 7,                -30.1  dB
Packet # 8,                -29.2  dB
Packet # 9,                -25.5  dB
Packet #10,                -15.1  dB        *       -5.0       0.0
Packet #11,                 -6.6  dB        *       -3.0       0.0
Packet #12,                 -1.8  dB        *       -1.0       0.0
-------------------------------------------------------------------------
Measurement Width    2.0 uSec
Measurement Positions:
Packet # 1 Center   13.9 uSec from sync
Packet # 2 Center   17.5 uSec from sync
Packet # 3 Center   21.7 uSec from sync
Packet # 4 Center   25.8 uSec from sync
Packet # 5 Center   29.5 uSec from sync
Packet # 6 Center   33.5 uSec from sync
Packet # 7 Center   37.4 uSec from sync
Packet # 8 Center   41.3 uSec from sync
Packet # 9 Center   45.0 uSec from sync
Packet #10 Center   49.0 uSec from sync
Packet #11 Center   52.9 uSec from sync
Packet #12 Center   57.0 uSec from sync
```

Option 30 (Component) Results Files

The Component_Vector application produces no results file.

Bowtie

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 16:26:37
Bowtie
Field = 1  Line =  45
Artificial Reference in use at: 35.50 uSec
Average Off
-------------------------------------------------------------------------
Relative Timing B-Y       -4.7 ns
Relative Timing R-Y       -4.8 ns
Relative Amplitude B-Y    -3.15 mV
Relative Amplitude R-Y    -2.03 mV
-------------------------------------------------------------------------
```

Component~Channel_Delay

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 16:35:19
Component Channel Delay
Field = 1 Line =  50
Average  32
-------------------------------------------------------------------------
Pb to Y Delay Time         -2.7  n sec
Pr to Y Delay Time          6.0  n sec
Pb to Pr Delay Time        -8.8  n sec
-------------------------------------------------------------------------
```

Component~ColorBar

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 17:35:19
Component Colorbar
Field = 1 Line =  50
Average  32
SMPTE/EBU,  75%
-------------------------------------------------------------------------
Y  level  ( Gray  )      702.0  mV
Y  level  (Yellow )      466.9  mV
Y  level  ( Cyan  )      370.5  mV
Y  level  ( Green )      310.4  mV
Y  level  (Magenta)      217.5  mV
Y  level  (  Red  )      158.5  mV
Y  level  ( Blue  )       60.5  mV
Y  level  ( Black )        0.2  mV
Pb  level  ( Gray  )       0.1  mV
Pb  level  (Yellow )    -263.5  mV
Pb  level  ( Cyan  )      88.9  mV
Pb  level  ( Green )    -174.4  mV
Pb  level  (Magenta)     174.2  mV
Pb  level  (  Red  )     -89.1  mV
Pb  level  ( Blue  )     263.2  mV
Pb  level  ( Black )       0.0  mV
Pr  level  ( Gray  )       0.1  mV
Pr  level  (Yellow )      42.4  mV
Pr  level  ( Cyan  )    -262.3  mV
Pr  level  ( Green )    -220.0  mV
Pr  level  (Magenta)     219.5  mV
```

```
Pr  level  (  Red  )     262.1  mV
Pr  level  ( Blue  )     -42.5  mV
Pr  level  ( Black )       0.1  mV
-------------------------------------------------------------------------------
```

Component~K_Factor

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 15:35:19
Component K Factor
Field = 1 Line =  50
Graticule   EIA
Average  32
-------------------------------------------------------------------------------
K-2T (Y)                   0.8  % KF
K-5T (Pb)                  0.1  % KF
K-5T (Pr)                  0.1  % KF
HAD (Y)                  199.9  n sec
HAD (Pb)                 499.6  n sec
HAD (Pr)                 499.4  n sec
K-PB (Y)                  -0.0  % KF
K-PB (Pb)                 -0.1  % KF
K-PB (Pr)                 -0.1  % KF
-------------------------------------------------------------------------------
Pulse position    22.9 (Y), 34.0 (Pb), 33.9 (Pr) u sec
Bar position      36.9 (Y), 25.1 (Pb), 25.1 (Pr) u sec
Ref. position     ----- (Y), ---- (Pb), ---- (Pr) u sec  (---- = PulseLobe)
Measurement Area   100 (Y),  100 (Pb),  100 (Pr) %
T = 100 n sec
```

Component~LevelMeter

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 18:35:19
Component LevelMeter
Field = 1 Line =  50
Average  32
-------------------------------------------------------------------------------
Sync                      301.5  mV        *        271.4       300.0
Y                         701.9  mV
Pb                        702.3  mV
Pr                        699.3  mV
-------------------------------------------------------------------------------
Sync Tip       2.4 u sec
Back Porch     6.9 u sec
 Measurement Cycles( 4 Subcarrier Cycles)
Y Minus Pos    6.9 u sec
Y Plus Pos    11.5 u sec
 Measurement Cycles( 4 Subcarrier Cycles)
Pb Minus Pos  19.8 u sec
Pb Plus Pos   52.5 u sec
 Measurement Cycles( 4 Subcarrier Cycles)
Pr Minus Pos  26.1 u sec
Pr Plus Pos   46.0 u sec
 Measurement Cycles( 4 Subcarrier Cycles)
```

Component~Multiburst

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 19:35:19
Component Multiburst
Field = 1 Line =  50
Average  32
-------------------------------------------------------------------------
Flag (Y)                    421.2  mV
Packet #1 0.50 MHz (Y)      -0.00  dB
Packet #2 1.00 MHz (Y)      -0.02  dB
Packet #3 2.00 MHz (Y)      -0.07  dB
Packet #4 3.00 MHz (Y)      -0.08  dB
Packet #5 4.00 MHz (Y)      -0.13  dB
Packet #6 5.00 MHz (Y)      -0.15  dB
Flag (Pb)                   421.3  mV
Packet #1 0.50 MHz (Pb)     -0.00  dB
Packet #2 1.00 MHz (Pb)     -0.01  dB
Packet #3 1.50 MHz (Pb)     -0.05  dB
Packet #4 2.00 MHz (Pb)     -0.03  dB
Packet #5 2.50 MHz (Pb)      0.01  dB
Flag (Pr)                   419.4  mV
Packet #1 0.50 MHz (Pr)     -0.01  dB
Packet #2 1.00 MHz (Pr)     -0.01  dB
Packet #3 1.50 MHz (Pr)     -0.05  dB
Packet #4 2.00 MHz (Pr)     -0.04  dB
Packet #5 2.50 MHz (Pr)     -0.00  dB
-------------------------------------------------------------------------
Special Positioning:
 Y  Flag Position   9.3 u sec
 Y  Flag Width      5.6 u sec
 Y  Packet #1  Center  10.1 u sec (from flag)
 Y  Packet #2  Center  17.5 u sec (from flag)
 Y  Packet #3  Center  25.1 u sec (from flag)
 Y  Packet #4  Center  32.8 u sec (from flag)
 Y  Packet #5  Center  40.2 u sec (from flag)
 Y  Packet #6  Center  48.0 u sec (from flag)
 Y  Packet #1  Width    3.5 u sec
 Y  Packet #2  Width    3.0 u sec
 Y  Packet #3  Width    2.2 u sec
 Y  Packet #4  Width    2.2 u sec
 Y  Packet #5  Width    2.0 u sec
 Y  Packet #6  Width    1.4 u sec
 Pb Flag Position  10.1 u sec
 Pb Flag Width      5.6 u sec
 Pb Packet #1  Center  11.5 u sec (from flag)
 Pb Packet #2  Center  20.3 u sec (from flag)
 Pb Packet #3  Center  29.1 u sec (from flag)
 Pb Packet #4  Center  37.9 u sec (from flag)
 Pb Packet #5  Center  46.7 u sec (from flag)
 Pb Packet #1  Width    3.5 u sec
 Pb Packet #2  Width    2.5 u sec
 Pb Packet #3  Width    2.6 u sec
 Pb Packet #4  Width    2.2 u sec
 Pb Packet #5  Width    2.0 u sec
 Pr Flag Position  10.1 u sec
 Pr Flag Width      5.6 u sec
 Pr Packet #1  Center  11.5 u sec (from flag)
 Pr Packet #2  Center  20.3 u sec (from flag)
 Pr Packet #3  Center  29.1 u sec (from flag)
 Pr Packet #4  Center  37.9 u sec (from flag)
 Pr Packet #5  Center  46.7 u sec (from flag)
```

```
 Pr Packet #1  Width    3.5 u sec
 Pr Packet #2  Width    2.5 u sec
 Pr Packet #3  Width    2.6 u sec
 Pr Packet #4  Width    2.2 u sec
 Pr Packet #5  Width    2.0 u sec
```

Component~Noise

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 14:35:19
Component Noise
Line = 255
(Y)  Band width  10kHz to 5.0MHz
(Pb) Band width  10kHz to 2.5MHz
(Pr) Band width  10kHz to 2.5MHz
Average  32
-------------------------------------------------------------------------
Noise Level (Y)          -77.5  dB rms
Noise Level (Pb)         -81.3  dB rms
Noise Level (Pr)         -83.1  dB rms
-------------------------------------------------------------------------
```

Component~NonLinearity

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 20:35:19
Component NonLinearity
Field = 1 Line =  50
Average  32
-------------------------------------------------------------------------
LumaNonLinearity (Y)       0.0  %
LumaNonLinearity (Pb)      0.1  %
LumaNonLinearity (Pr)      0.1  %
-------------------------------------------------------------------------
Positioning (Y):    5 Steps
 1st Luminance Step  19.6 u sec
 End Luminance Step  52.7 u sec
Positioning (Pb):    5 Steps
 1st Luminance Step  19.6 u sec
 End Luminance Step  52.7 u sec
Positioning (Pr):    5 Steps
 1st Luminance Step  19.6 u sec
 End Luminance Step  52.7 u sec
```

Lightning

```
  Measurement Results    Channels A, B, and C    Fri Sept 06 16:20:50
Lightning
Field = 1  Line =  86
Average Off
-------------------------------------------------------------------------
Reference
  Colorbars:  75% SMPTE/EBU (60Hz)
  Pk-white (100%) 700.0 mV  Setup 0.0%  Color Pk-to-Pk 525.0 mV
Measured
  Color Pk-to-Pk  B-Y   701.79 mV          33.67%
  Color Pk-to-Pk  R-Y   700.22 mV          33.37%
  Pk-white              713.47 mV (100%)    1.92%
  Delay  B-Y             -6 ns
  Delay  R-Y             -7 ns
-------------------------------------------------------------------------
```

Options 40 and 41 (Audio) Results Files

The following Audio applications produce no results file: Calibrate~Audio-Board, Identify~Audio_Hardware.

Audio~Analyzer

```
 Audio Analyzer Measurement Results: Tue Aug 21 15:15:47
Input Number 1
-------------------------------------------------------------------------
Left Channel:
Frequency =    0.0 Hz
Level = -140.00 dBu
THD+N =   0.000 %
Right Channel:
Frequency =    0.0 Hz
Level = -140.00 dBu
THD+N =   0.000 %
Level Difference (L - R):    0.000 dB
Phase Difference (L - R):    0.00 deg
Left Level:
----------
Frequency (Hz)      Level (dBu)         Lower Limit         Upper Limit
Right Level:
-----------
Frequency (Hz)      Level (dBu)         Lower Limit         Upper Limit
Level Difference:
-----------------
Frequency (Hz)      Level Diff (dB)     Lower Limit         Upper Limit
Phase Difference:
-----------------
Frequency (Hz)      Phase Diff (deg)    Lower Limit         Upper Limit
Left THD+N:
----------
Frequency (Hz)      THD+N (%)           Lower Limit         Upper Limit
Right THD+N:
-----------
Frequency (Hz)      THD+N (%)           Lower Limit         Upper Limit
Channel Separation L -> R:
--------------------------
Frequency (Hz)      Separation (dB)     Lower Limit         Upper Limit
Channel Separation R -> L:
--------------------------
Frequency (Hz)      Separation (dB)     Lower Limit         Upper Limit
-------------------------------------------------------------------------
```

Audio~Monitor

```
 Audio Monitor Results: Tue Aug 21 15:15:53
 Left Meter Level  = >>>> dBu
 Right Meter Level = >>>> dBu
 Sum Meter Level   = >>>> dBu
```

Audio~Spectrum

```
 Audio Spectrum Measurement Results: Tue Aug 21 15:15:59
Input Number 1
-------------------------------------------------------------------------
View: SPECTRUM
```

```
High Resolution Mode: OFF
Active Channel: LEFT
Range:  10 dBu
Weighting Filter: None
Level (188 Hz - 20 kHz): >>>>>>> dBu
Average Off
-------------------------------------------------------------------------
```

Multitone

```
Multitone Measurement Results: Tue Aug 21 15:16:08
Input Number 1
-------------------------------------------------------------------------
Analyzed signal: MTone1
Left Level:
-----------
Ref:    0.00 dBu at     0 Hz
Frequency (Hz)      Level (dB)
Right Level:
-----------
Ref:    0.00 dBu at     0 Hz
Frequency (Hz)      Level (dB)
Level Difference:
-----------------
Frequency (Hz)      Level Diff (dB)
Phase Difference:
-----------------
Frequency (Hz)      Phase Diff (deg)
-------------------------------------------------------------------------
```

View_Audio~Auto_Test

```
  Measurement Results                          Tue Aug 21 15:16:12
View Audio Auto Test
-------------------------------------------------------------------------
At          Thu Dec 19 13:14:53 1991   Video Source: A   Audio Input: 1
Test Type   0.33 Program 01   Expected TEST level: 0 dBu
Source      TEK1

                                                          Violated Limits
                                    Left       Right          Lower   Upper
Insertion Gain Error (dB)          83.39      86.90     **    -0.50     0.50
Sweep Max. Gain (dB)            <-120.00   <-120.00     **   Limits Exceeded
Sweep Min. Gain (dB)            <-120.00   <-120.00     **   Limits Exceeded
Stereo Channel Assignment         Normal     Normal
THD+N (at 1020Hz) (%)              0.017      0.020
2nd Harmonic (at 1020Hz) (%)       0.002      0.001
THD+N (at 60Hz) (%)                0.017      0.020
2nd Harmonic (at 60Hz) (%)         0.003      0.003
3rd Harmonic (at 60Hz) (%)         0.001      0.001
Crosstalk (into channel) (dB)    -93.95     -92.99
SNR (unweighted) (dB)              92.04      87.94
SNR (weighted) (dB)                88.15      87.48
Max. Compandor Error (rise) (dB)   -0.00      -0.00
Max. Compandor Error (fall) (dB)   -0.00       0.00
Gain Difference (dB)            <-120.00                 **   Limits Exceeded
Phase Difference (deg.)            0.02
-------------------------------------------------------------------------
```

Index

Index

Symbols

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y