VM700A Configuration Guidebook

Video Measurement Set

Operator's Guidebook

Tektronix
Television Systems

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Video Measurement Set

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Part No. 070-8593-00
Product Group 21
First Printing: March, 1992

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Read This First!

This VM700A Configuration Guidebook is designed to quickly get new users up to speed on use of the instrument. The guidebook is organized in a logical progression of instruction, from the basic operating principles to the more complicated automatic functions that the VM700A can perform.

You will get the most out of the instrument by carefully reading the information contained in each chapter of this Guidebook, and referring to the VM700A Operator's Manual where noted.

The authors realize, however, that many new owners have an immediate requirement to use the VM700A, and that studying this guidebook chapter-by-chapter may not be practical at the outset. The following quick-start reference is provided, therefore, for persons requiring direct access to information on how to perform specific tasks with the VM700A:

- **The Power-Up Sequence:** What to expect when you turn the VM700A on, and how to confirm proper operation. **See Section 1.2.2, Page 1-10.**
- **Setting the Internal Clock:** How to set the VM700A internal clock, which appears on printouts and displays. **See Section 3.1.1, Page 3-2.**
- **Using the Waveform Mode:** How to perform basic waveform monitoring functions; typical measurement examples are provided. **See Section 2.2, Page 2-2.**
- **Using the Vector Mode:** How to perform basic vector monitoring functions; typical measurement examples are provided. **See Section 2.3, Page 2-7.**
- **Using the Picture Mode:** How to perform basic picture monitoring functions. **See Section 2.4, Page 2-12.**
- **Using the Measure Mode:** How to perform Measure Mode tests; typical examples are provided. **See Section 6.3 Page 6-16.**
- **Configuring the Measure Mode:** How to customize Measure Mode tests; examples are provided. **See Section 6.1, Page 6-1.**
- **Using the Auto Mode:** How to perform Auto Mode tests; examples are provided. **See Section 7.1.8, Page 7-20.**
- **Configuring the Auto Mode:** How to customize Auto Mode tests; examples are provided. **See Section 7.1, Page 7-1.**
- **Using the Function Keys:** How to program and use Function Keys; examples are provided. **See Section 8.1, Page 8-1.**

Conventions used in this guidebook are listed in **Section 1.1.1, Page 1-2.** *Important Note*: the step-by-step instructions given in this guidebook usually begin with the instruction "Press the Configure button." This step will take you to the configuration screen from the Waveform, Vector, or Picture modes. You must, therefore, be in either the Waveform, Vector, or Picture modes before

beginning the procedure. Simply press either the Waveform, Vector, or Picture buttons on the front panel of the VM700A to enter the respective operating mode.

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Safety Summary

This summary of safety information is intended for operations personnel. Specific warnings and cautions will be found throughout the VM700A Operator's Manual.

- **Use the Proper Power Source.** This product is intended to operate from a power module connected to a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.
- **Ground the Product.** This product is grounded through the grounding conductor of the power module ac cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power module ac cord is essential for safe operation.
- **Danger May Arise From Loss of Ground.** Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.
- **Use the Proper Fuse.** To avoid fire hazard, use only the fuse of correct type, voltage rating, and current rating as specified in the parts list for your product. Refer fuse replacement to qualified service personnel.
- **Do Not Operate in Explosive Atmospheres.** To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.
- **Do Not Operate Without Covers.** To avoid personal injury, do not remove the product covers or panels. Do not operate the product without all covers and panels properly installed.
- **Refer Servicing to Qualified Personnel.** If problems develop with the instrument, refer all servicing to a qualified technician trained in the operation of this product.
- **Do Not Service Alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.
- **Observe Warning Labels.** Stickers stating *CAUTION* indicate a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property, including the equipment itself. *DANGER* indicates a personal injury hazard immediately accessible as you are reading the marking.

CHAPTER 1

INTRODUCTION TO THE VM700A

1.1 Introduction

The VM700A video measurement set is a highly accurate, multipurpose television signal test instrument. It features an easy-to-use interface that combines *hardkeys* and touch screen *softkeys* (menus) for accessing the many different operating modes of the instrument. The VM700A may be used for basic television waveform and vectorscope monitoring, and as an automated measurement instrument.

This guidebook is intended to provide the user a quick and easy introduction to configuring and using the VM700A for automatic video measurements. Typical applications of the VM700A include the following:

- Making a selected set of measurements on a transmission link, checking against predetermined sets of limits, and highlighting measurements where limits are exceeded.
- Monitoring a transmission link over an extended period of time to determine if measurements drift outside predetermined limits. All such errors may be logged to a printer or external computer.
- Tracking the performance of a transmission link by creating reports of selected measurements at specific times.

1.1.1 Conventions

The following conventions are used throughout this guidebook.

- The VM700A has a group of keys on the front panel. These are referred to in this guidebook as *buttons*. The first letter of each hardkey button is always capitalized in this handbook.
- Softkeys are menu options displayed on the screen. Selection of these items is made by touching the screen at the appropriate location. Softkeys are shown in this guidebook capitalized in **bold** type.
- The VM700A includes a number of directories and sub-directories. In this guidebook directory names are shown in *italics*. Most directory names also include the tilde character (~) and/or underscore (_).
- The directories of the VM700A include a number of files. File names are capitalized in this guidebook. Some file names also include the tilde character (~) and/or underscore (_).
- Examples are provided in this guidebook for a number of file maintenance operations. They are denoted by the heading, **Example**.
- Example files shown throughout this handbook are generated using the **Print** softkey. In the majority of cases, they are identical to those appearing on the screen of the VM700A.
- *Important Note*: the step-by-step instructions given in this guidebook usually begin with the instruction "Press the Configure button." This step will take you to the configuration screen from the Waveform, Vector, or Picture modes. You must, therefore, be in either the Waveform, Vector, or Picture modes before beginning the procedure. Simply press either the Waveform, Vector, or Picture buttons on the front panel of the VM700A to enter the respective operating mode.

Printed versions of the Selected~Measurements files show only those measurements that are selected. The screen of the VM700A indicates both selected and deselected measurements. For the purposes of illustration in this guidebook, both selected and deselected measurement are shown in the illustrations.

- References provided throughout this guidebook refer to the VM700A Operator's Manual, supplied with the instrument.
- References made to the System~Default files refer to those parameters loaded — in the absence of any user-created files — when first powering-up the instrument. They are not erasable. The System~Default files provide a basis for generating user-specific files stored in the instrument.
- Directory and file names in the VM700A are case-sensitive. For filenames to be accessed from a remote computer, it is necessary to key in both the path and file name. You must use the exact punctuation and capitalization for both the path and the file name or the instrument will be unable to locate your file. This is in contrast to file names used for PC applications, where file and directory names are not case-sensitive.

1.2 Inside the VM700A

While the VM700A may be used for basic television waveform monitoring and as a vectorscope, its real capabilities lie in the many dedicated measurement choices available, which include:

- Default limits.
- User editing of measurement limits.
- User programmable measurement functions.
- Graphic and/or text displays of measurement results.

Tolerance limits for measurements may be set-up to meet special needs, or the chosen default limits used. Automatic measurement may be programmed for time-related activities, and the results output to an external computer for logging. Use of an external computer also permits a remote operator to be alerted to an out-of-tolerance condition.

The tasks that the VM700A performs are dictated by either default or user-editable files that control operation of the instrument. Configuring the VM700A files to perform the needed measurements, and altering the default limits are two of the more challenging tasks to master quickly. The Function Key feature is another powerful utility, but again, it requires some time to master. The Function feature enables building any number of special measurement sets and operating sequences that run automatically when activated.

This guidebook addresses each task individually, and then explains how to combine the elements to gain access to the full power of the VM700A.

1.2.1 Front Panel Controls

The major functions of the VM700A are controlled by the front panel hardkeys. These buttons access major functions of the instrument or alter the mode of operation of the selected function. The Control knob is a multipurpose device. Its action is associated with the selected function of the VM700A. The Control knob may be used to position cursors, expand the display, select menu choices, or any number of other functions.

The face of the VM700A display is touch sensitive; when you touch it with your finger in a menu box or variable parameter area, that menu choice or parameter is selected. The boxed area is the *touch zone* for making the selection with your finger. When a softkey is selected, the boxed area is highlighted to show activation and a beep is heard. If the selection area represents a variable that may be set, the Control knob is used to scroll through the valid choices for that parameter. Figure 1.1 shows the front panel of the VM700A.

The functions of the hardkey buttons are as follows:

- **Waveform:** Selects the Waveform display mode. Additional functions are available by pressing the Menu button. Help is also available on the

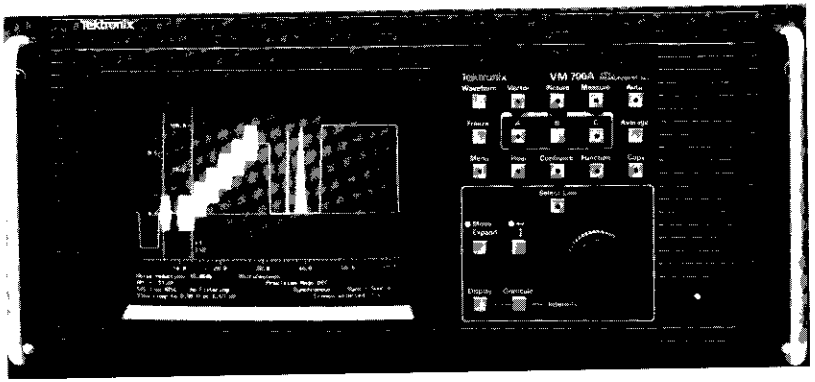

Figure 1.1 Front panel of the VM700A measurement test set.

displayed softkeys. The Control knob may be used to adjust the horizontal (time) and vertical (amplitude) positions and scales. The default Control knob action is *Horizontal Move*. Figure 1.2 shows a typical waveform monitor display. (Measurements in the Waveform mode are discussed in Chapter 5.)

- **Vector:** Selects the Vector display mode. Additional functions are available by pressing the Menu button. Help is also available on the displayed softkeys. The Control knob may be used to adjust phase (angle) with Move selected, and gain with *Expand* selected. The default Control knob action is phase angle. Figure 1.3 shows a typical vectorscope display. (Measurements in the Vector mode are discussed in Chapter 5.)
- **Picture:** Selects the Picture display mode. The selected input source is displayed as a slow-update representation of the signal being monitored. The system (selected) line is highlighted and the line number is displayed. The Control knob changes the system line, scrolling the highlighted line through the displayed picture. Figure 1.4 shows a typical picture display.
- **Measure:** Selects the manual measurement mode. The available measurements are displayed when the Measure button is pressed. The Measure mode offers the user an extensive list of measurements that may be specialized for a wide variety of applications. (The Measure mode is discussed in Chapter 6.)
- **Auto:** Selects the Auto measurement mode. The Auto mode performs a pre-determined set of measurements, and the results are printed to the screen in tabular form. The Control knob is used to scroll the data. Values

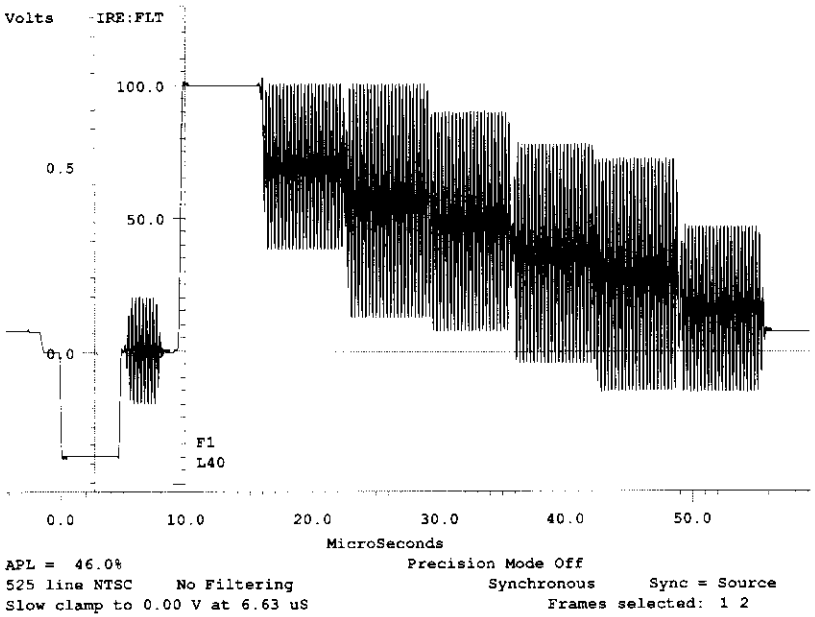

Figure 1.2 Typical waveform monitor display of color bars.

are compared to specific *Caution* and *Alarm* limits. The measurements selected to run in the Auto mode are started when the Auto button is pressed. (The Auto mode is discussed in Chapter 7.)

- **Freeze:** Stops data acquisition and keeps 25 lines on either side of the system line for four consecutive color frames. The display may be manipulated normally, but activities are limited to movement within the acquired lines. The Freeze mode is cleared when leaving the current mode, or when the Freeze button is pressed a second time.
- **Source A:** Selects the A input for the signal source. Holding down the A button and then quickly pressing the B or C buttons will give A-B or A-C, respectively. Holding down the A button on its own for more than 1 second inverts both source and sync; the button LED flashes to indicate this mode.
- **Source B:** Selects the B input for the signal source. Holding down the B button and then quickly pressing the A or C buttons will give B-A or B-C, respectively. Holding down the B button on its own for more than

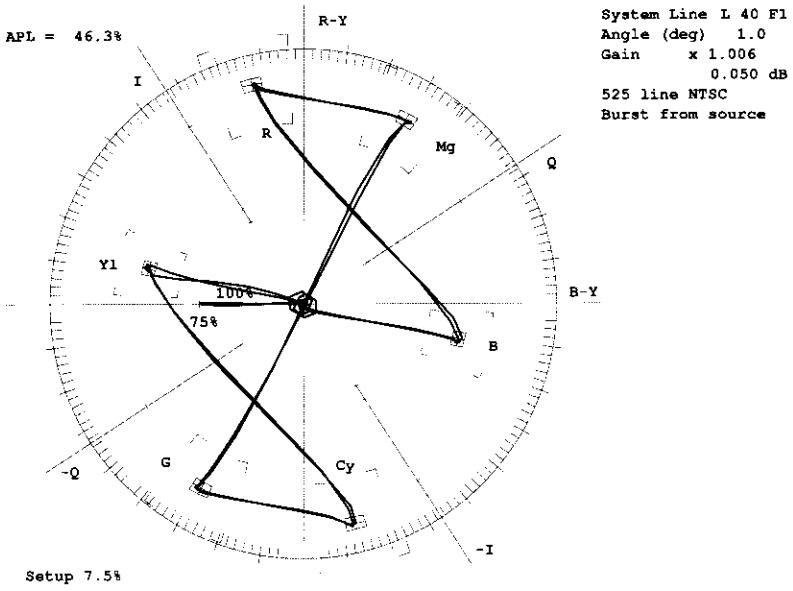

Figure 1.3 Vectorscope display of color bars.

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1 second inverts both source and sync; the button LED flashes to indicate this mode.

- **Source C:** Selects the C input for the signal source. Holding down the C button and then quickly pressing the A or B buttons will give C-A or C-B, respectively. Holding down the C button on its own for more than 1 second inverts both source and sync; the button LED flashes to indicate this mode.
- **Average:** Enables noise reduction. The noise reduction settled to at a given point in time appears as a readout on the screen. When averaging is engaged, this value will start at 0 and count up to the selected noise reduction value. The integral LED is lit when averaging is active.
- **Menu:** Normally the menu choices for a mode are not displayed so that graphics may be viewed full screen. Pressing the Menu button brings up the available menus that are used to modify an operating mode. The Menu utility provides softkeys appropriate to the current operating mode for more user options. Some of these softkeys lead to further sub-menus. Figure 1.5 shows a Vector mode display with the on-screen menu active.

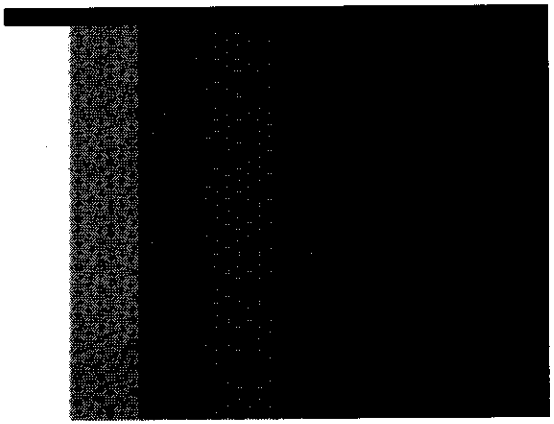

Figure 1.4 Picture display of color bars.

- **Help:** When this selection is in effect, pressing a hardkey or touching a softkey brings up a brief description of the operation of the selected control. Pushing the Help button a second time will clear the Help function.
- **Configure:** Used to set/read the system clock, change the instrument Configuration files, and define (but not execute) user functions. (The file system of the VM700A is discussed in Chapter 3.)

The Configuration screen display is shown in Figure 1.6. Note that the amount of used and available non-volatile memory is given, and the installed options are listed.

- **Function:** Displays user-defined functions and directories of user-defined functions. Selecting a Function begins execution of that event. Selecting a directory displays the Functions within that directory. The main Function directory is empty when shipped from the factory. (Chapter 8 discusses Function Keys.)

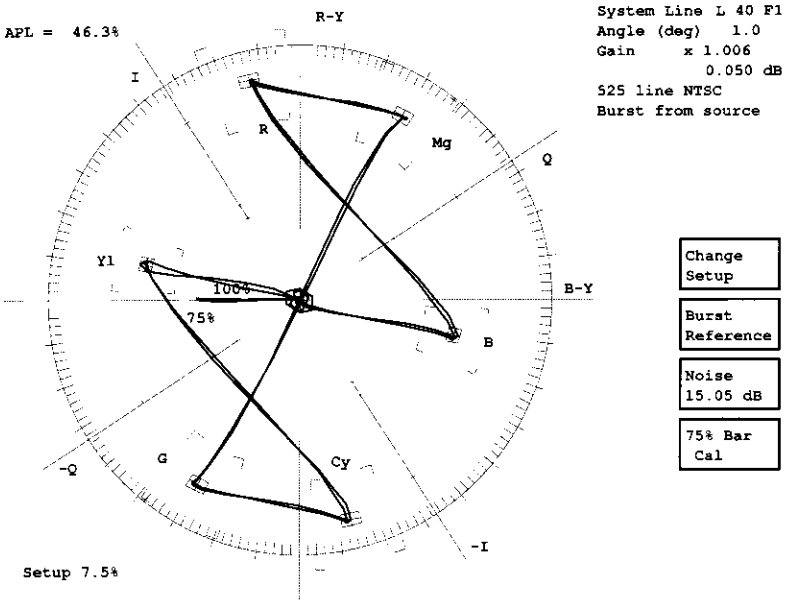

Figure 1.5 On-screen menu in the Vector mode.

- **Copy:** Sends a copy of the screen to the currently-selected printer port, set up in the Configure mode (see Chapter 2). After pressing Copy, the copy request can be canceled with the **Cancel Copy** softkey that appears in the Configure menu. Multiple presses of the Copy button may cause outputs to que up in a print buffer within the instrument. The integral LED blinks to indicate operation of the Copy process.
- **Select Line:** Selects the system line using the Control knob and activates a line-selected sub-menu (if no menu is up, or only the top level menu is active).
- **Move/Expand:** Works in conjunction with the Arrow button to let you move or expand the graphic waveform display. The LED indicators next to the buttons show which selection of the hardkey is in effect.
- **Display:** Controls the intensity of the display. To change the intensity, rotate the Control knob while holding down the Display button. In the Picture mode, the Display button controls the brightness of the screen.
- **Graticule:** Controls the intensity of the graticule. To change the intensity, rotate the Control knob while holding down the Graticule button.

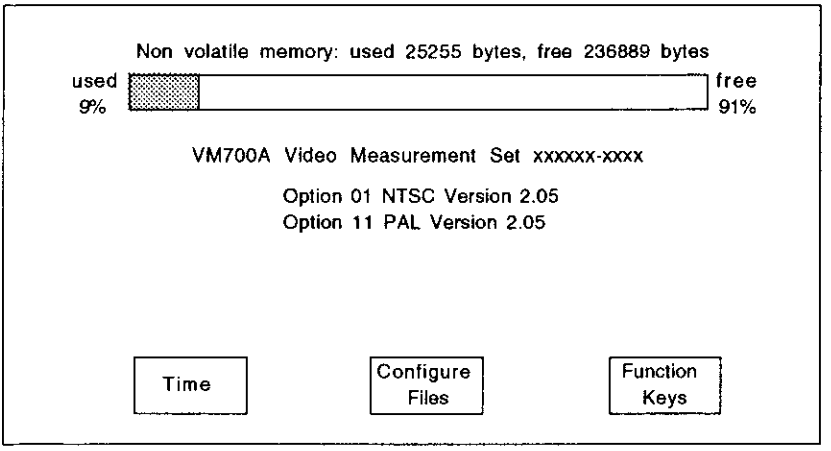

Figure 1.6 Configure mode menu.

In the Picture mode, the Graticule button controls the contrast of the display.

- **Arrows Button:** Selects either the horizontal or vertical direction for the Control knob.
- **Control Knob:** A variable-purpose control device used to adjust system parameters.
- **Power:** Switches the VM700A on and off. Note that the front panel power switch works in conjunction with a rear panel master ac power switch.

At power-up, the instrument sequences through a series of self-tests. The more complicated tests may be bypassed if desired. It is recommended, however, that the test sequence be allowed to run its normal course. Remember that on power-down, certain parameters may be lost if the appropriate files are not saved as recommended in this guidebook.

1.2.1.A *Operator's Manual Reference: 1-1/1-5*

1.2.2 Power-Up Sequence

An extensive power-up test routine is performed automatically by the VM700A. Tests are run on the major system elements. First, a low level diagnostic run is conducted. Then detailed tests are conducted on the various circuits and systems within the instrument. The test sequence can be aborted with the on-screen **Abort Test** softkey.

Pass/fail grading is given on each test. In the event of a problem, the circuit in question is highlighted (in reverse video), and the power up test routine stops. The user is given three options:

- Continue the test sequence.
- Rerun the test in question.
- Abort the diagnostic routine.

If no response is given by the user, the tests will automatically resume after a 60 second delay.

After a complete check of all system components, including optional circuit cards, the VM700A is ready for use.

The VM700A self-diagnostic routines thoroughly evaluate each of the instrument's major hardware components. The primary intent of the diagnostics is to provide a high degree of confidence that measurement results produced by the instrument are correct. The diagnostics can also supply useful information for board-level fault isolation.

If errors are encountered during the power-up sequence, the operator is notified through an on-screen message. Consult the VM700A Operator's Manual for further information.

1.2.2.A *Operator's Manual Reference: 3-17, 11-1/11-3*

1.2.3 Bypassing Power-Up Tests

The full power-up test sequence can require one minute or more to complete, depending upon the number and types of options installed in the instrument. To bypass the test routine for a quick start, hold in the Waveform button while turning the power on.

1.2.3.A *Operator's Manual Reference: 11-2*

1.2.4 User-Selected Diagnostics

High-level diagnostics can be executed on demand, or executed in a continuous loop. To initiate a diagnostic routine on a sub-system of the instrument, perform the following steps:

- Press the Measure button.
- Select the **Diags** (Diagnostics) softkey. Observe that the VM700A diagnostics directory is now displayed.
- Use the Control knob to scroll through the diagnostic routine files.

The diagnostic directory includes user-selectable routines that permit step-by-step troubleshooting of the VM700A. Two utilities of particular note include:

- **Measure Temperature:** Provides a digital readout of the internal operating temperature of the instrument. Press the Measure button to exit the utility and return to the diagnostics menu.
- **Warm Boot:** Executes a reset of the VM700A. The user is prompted to press the front panel Source C button to continue, or the Measure button to abort.

- To run one of the other diagnostic routines, touch the softkey representing the appropriate diagnostic in the directory window.
- When each diagnostic starts, you are prompted to select a *run mode* from the softkeys at the bottom of the screen.

The available run mode choices include the following:

- **PowerUp Mode:** Runs the selected diagnostic the same way it would during power-up.
- **Interactive Mode:** Provides a greater level of detail for most tests within the diagnostic routine than the PowerUp mode. The Interactive mode lists all tests within each test family, and indicates whether the instrument passed or failed each test.

- Press the Measure button to return to the VM700A diagnostics directory.
- To exit the diagnostics directory, press the Waveform, Vector, or Picture button.

1.2.4.A *Operator's Manual Reference: 3-18, 11-4/11-7*

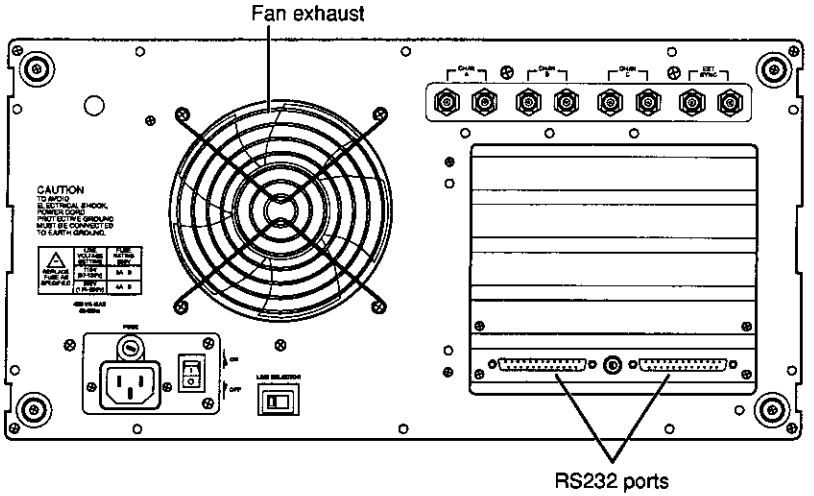

Figure 1.7 Back panel of the VM700A.

1.2.5 Input/Output Connections

Signal input connections are located on the back panel of the instrument. NTSC and/or PAL inputs are connected to BNC connectors for Channels A, B, and C. 75 ohm termination is required. An input is also provided for external sync. Loop-through is provided on all inputs.

The two serial communications ports are located on the back panel, as shown in Figure 1.7. The ports are used to connect the instrument to a printer and/or to a personal computer for remote control. Before a printer can be used with the VM700A, the appropriate communications port must be configured. (See Section 3.2.1.)

1.2.5.A *Operator's Manual Reference: 2-3/2-8*

1.2.6 Instrument Options

The basic options for the VM700A are the video standard used. The instrument can be operated as an NTSC-standard instrument (Option 01), a PAL-standard instrument (Option 11), or as a dual-standard instrument when both options are included.

Other options for the VM700A include:

- Teletext measurements (Option 20)
- Camera measurements (Option 21)
- Component measurements (Option 30)
- Audio measurements (Option 40)

1.2.6.A *Operator's Manual Reference: 1-1, 1-2, 10-1/10-6*

CHAPTER 2

BASIC OPERATING MODES

2.1 Introduction to Measurements

The VM700A is — in addition to its automated measurement capabilities — a highly accurate waveform and vectorscope monitor. The basic measurement modes of the VM700A include the following:

- Waveform
- Vector
- Picture

The Measure mode and Auto mode are specialized functions that are discussed in Chapters 6 and 7, respectively.

2.2 Waveform Mode

The Waveform mode is the default power-up mode of the VM700A. The Waveform mode can present a real-time waveform display (at 25 updates per second) when half a video line or less is displayed. Slower update rates result under the following conditions:

- When more than half a video line is displayed.
- When a very full display is present.

For the PAL television standard, the VM700A acquires 4 frames of an 8 field color sequence. You can select which frames are displayed in the Select Line menu; the default is all four frames displayed. There is no implicit field selection. Use the Select Line menu (see Section 2.2.2) to move to the desired field within a frame.

2.2.1 Controlling the Waveform Display

Hardkey buttons provide the basic controlling functions of the Waveform mode. To enter the Waveform mode from any other mode, simply press the Waveform button. The functions of other hardkeys that affect the Waveform mode are as follows:

- **Select Line:** When the Select Line button is pressed, the Control knob scrolls through line numbers; a readout is given on the display. When the proper line number has been found, press Select Line a second time to disengage the function.

Note that changing the line number in this way is not permanent. The setting will be lost when the VM700A is powered-down.

- **Move:** When entering the Waveform mode, the Control knob default function is *Horizontal Move*. The graticule readout along the horizontal axis tracks movement of the waveform as the Control knob is adjusted.
- **Expand:** The Expand function is selected by pressing the Move/Expand button. The displayed waveform expands from the center point of the screen. Expand is also selected when the active area of the screen is touched. (The active area of the screen is that area above the horizontal graticule line.) The point touched becomes the point about which the display expands. To move or expand the display vertically, check to see that the arrow direction button indicator is Vertical, and then rotate the Control knob.
- **Display Intensity:** Adjustment of the display intensity is accomplished by pushing and holding the Display button and turning the Control knob.

- **Graticule Intensity:** Adjustment of graticule intensity is accomplished by pressing and holding the Graticule button and turning the Control knob.
- **Freeze:** Under the Freeze mode, the VM700A acquires four consecutive frames of 50 lines each and freezes the display. Freeze is initiated by pressing the Freeze button. The Freeze mode is deactivated by pressing the Freeze button a second time. When Freeze is selected, it is not possible to scroll through the entire field.
- **Average:** Enables noise reduction. The noise reduction settled to at a given point in time appears under the time graticule at the left of the screen. When averaging is engaged, this value will start at 0 and count up to the selected noise reduction value. The integral LED is lit when averaging is active.

The default value for the Average function is 15 dB. The range of adjustment possible under the Waveform mode is 0-30 dB. To adjust this parameter:

- Press the Menu button to display the on-screen menu.
- Select **Noise**. The softkey will illuminate.
- Adjust the Control knob to the desired amount of noise reduction.
- Select the **Noise** softkey a second time to accept the new value. This returns the Control knob to its default function.
- Press the Menu button to remove the on-screen menu.

The next time Average is engaged, the new value of noise reduction will be used.

2.2.1.A *Operator's Manual Reference: 4-2/4-4*

2.2.2 On-Screen Readouts and Menu System

On-screen data readouts and extensive softkey menus provide exceptional flexibility over measurements in the Waveform mode. The primary on-screen readouts include:

- **Graticule:** The Waveform mode graticule tracks the expansion and contraction of the waveform, in both the horizontal and vertical directions. This ensures that the graticule is always calibrated regardless of the gain (expansion factor). The graticule labels adjust automatically.
- **Line Identification:** A readout of the displayed field and line number is always shown. If a single line or a fraction of a line of video is displayed, the readout is located just above the horizontal graticule scale, to the right of the vertical scale. If more than one line is displayed, the readout is found to the right of the sync tip for each line.
- **Horizontal Reference Line:** The horizontal reference line is a stationary line across the display. This line is provided for checking and comparing

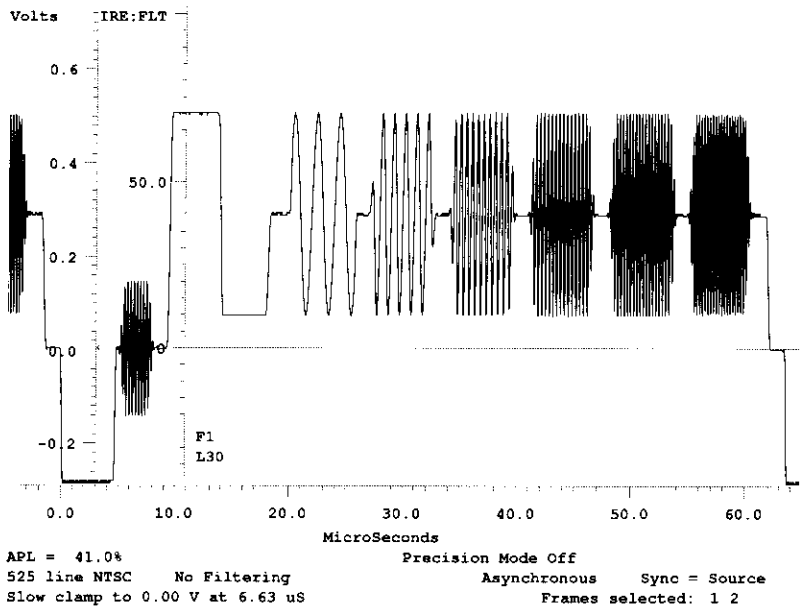

Figure 2.1 VM700A display in the Waveform mode.

signal levels. The line also provides a reference for measuring amplitudes in the **Cursors** mode, and can be used to get a quick measure of tilt on a bar top.

- **Status Lines:** The lines of text directly below the horizontal graticule scale are referred to as the "status lines." The status lines provide information regarding the operating state of the VM700A.

A typical Waveform mode display is shown in Figure 2.1. The status lines provide the following information:

- The first line of text displays the units for the horizontal graticule scale (µs or ns). This line also indicates when the VM700A is performing self-calibration.
- The second line gives the APL (Average Picture Level), and the on/off status of the Precision mode and Sound-In-Sync.
- The third line reports the television standard in use (NTSC or PAL), what type of Filtering is in effect, the method of sampling in use (Synchronous/Asynchronous), and the Sync setting.

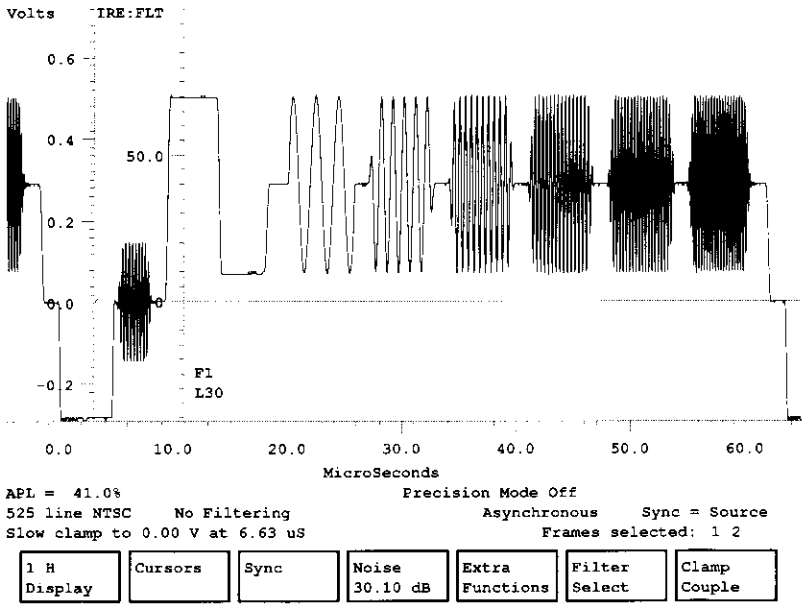

Figure 2.2 Waveform mode display with the softkey menus.

- The fourth line describes the clamping status, and which of the four frames are currently selected.

Pressing the front panel Menu button while in the Waveform mode displays a row of softkeys along the bottom of the display, as shown in Figure 2.2. This row of softkeys is known as the Waveform Menu. The entire Waveform Menu tree is shown in Figure 2.3. The menu bar is removed from the display by pressing the front panel Menu button a second time. See the VM700A Operator's Manual for a detailed discussion of the Waveform menu system.

2.2.2.A *Operator's Manual Reference: 4-2, 4-3, 4-5/4-16*

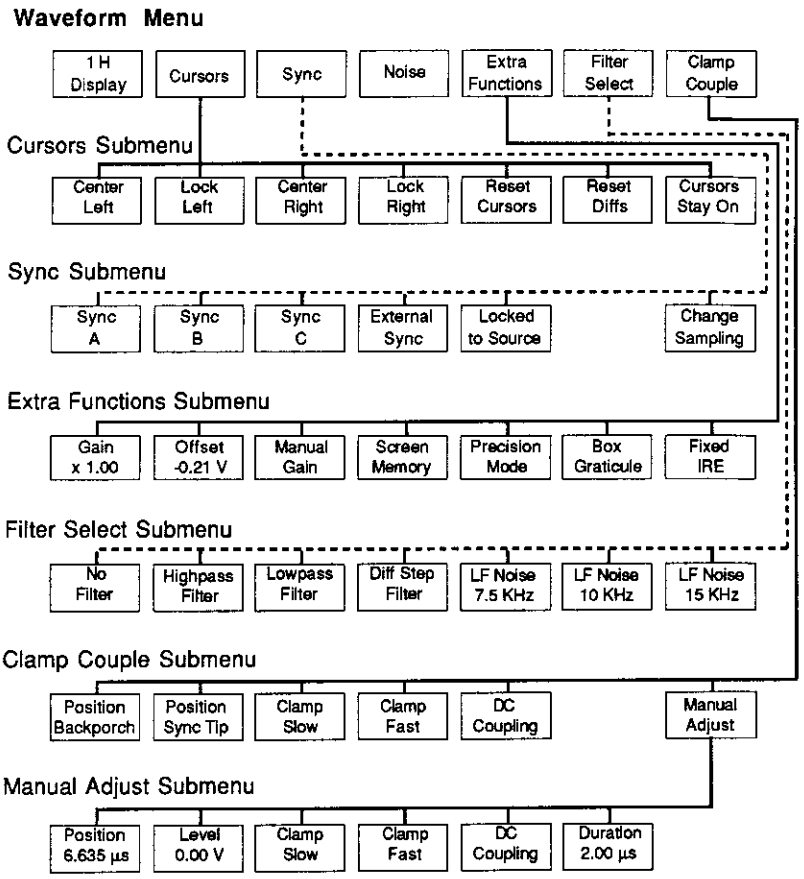

Figure 2.3 Menu tree for the Waveform mode of the VM700A.

2.3 Vector Mode

The Vector mode of the VM700A provides a conventional vector display with operational parameters that may be easily changed for a variety of measurements. Because the display is digitally derived, a single line is displayed with full brightness. The Vector mode includes an electronic graticule and the following on-screen information:

- Digital readout of the line selection mode (*system line* or *vector line*).
- Displayed field and line number.
- Phase angle in degrees.
- Gain in both dB and *times gain*.
- Average picture level (APL).
- Setup level.
- Burst source.

Figure 2.4 shows a typical red field Vector mode display.

2.3.1 Controlling the Vector Display

Hardkey buttons provide the basic controlling functions of the Vector mode. To enter the Vector mode from any other mode, simply press the Vector button. The functions of other hardkeys that affect the Vector mode are as follows:

- **Select Line:** In the Vector mode, pressing the Select Line button changes the Control knob function to a digital line selector.

In this mode, an on-screen menu is displayed on the right hand side of the screen, as shown in Figure 2.5. The softkeys perform the following functions:

- **Field Toggle:** Displays the system line in the *other* field. For PAL, if the current line is between 1 and 313, the **Field Toggle** softkey adds 313. If the current line is between 314 and 625, the softkey subtracts 313.
- **Find Colorbars:** Searches from the system line through the frame for a line containing color bars, and displays it if found.
- **Vector Line:** When highlighted, this softkey changes the Vector mode line independently of the system line.
- **Field n Line nn (NTSC)/Line n (PAL):** Displays the line specified by the softkey. To change the line number, select and hold the softkey to be changed. Turn the Control knob until the new line number is found. Release the softkey.

After the line parameters have been set, press the Select Line button a second time to remove the on-screen menu and return the Control knob it its normal

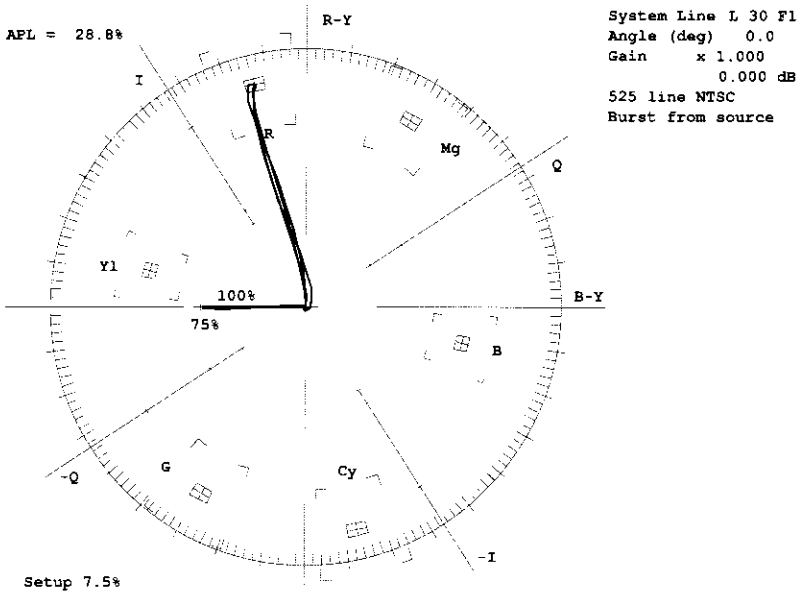

Figure 2.4 Red field Vector mode display.

function.

- **Move:** When entering the Vector mode, the Control knob default function is *Phase Angle*. As a phase shifter, the Control knob rotates the display in 0.1° increments, as indicated by the Angle (degree) readout in the upper right corner of the display.
- **Expand:** The Expand function is selected by pressing the Move/Expand button. The displayed waveform expands from the center point of the screen. Expand is also selected when the active area of the screen is touched. The Gain readout in the upper right hand corner of the display indicates the current Gain setting with a multiplier (x) and in dB.
- **Display Intensity:** Adjustment of the display intensity is accomplished by pushing and holding the Display button while turning the Control knob.
- **Graticule Intensity:** Adjustment of graticule intensity is accomplished by pressing and holding the Graticule button while turning the Control knob.

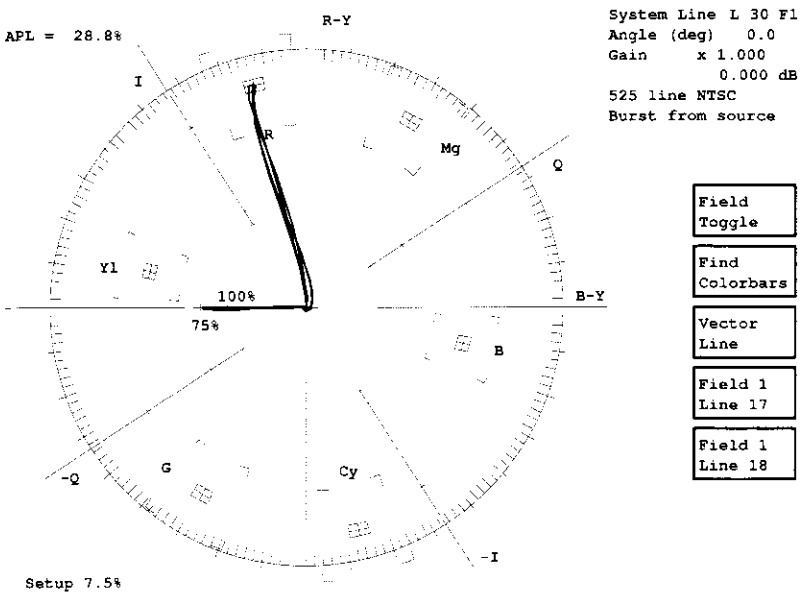

Figure 2.5 Vector mode Select Line menu.

- **Freeze:** Under the Freeze mode, the VM700A acquires four consecutive frames of 50 lines each and freezes the display. Freeze is initiated by pressing the Freeze button. The Freeze mode is deactivated by pressing the Freeze button a second time.
- **Average:** Enables noise reduction. The noise reduction settled to at a given point in time appears under the time graticule at the upper left hand corner of the screen. When averaging is engaged, this value will start at 0 and count up to the selected noise reduction value. The integral LED is lit when averaging is active.

The default value for the Average function is 15 dB. The range of adjustment possible under the Vector mode is 0-30 dB. To adjust this parameter:

- While in the Vector mode, press the Menu button to display the on-screen menu.
- Select **Noise**. The softkey will illuminate.
- Adjust the Control knob to the desired amount of noise reduction.

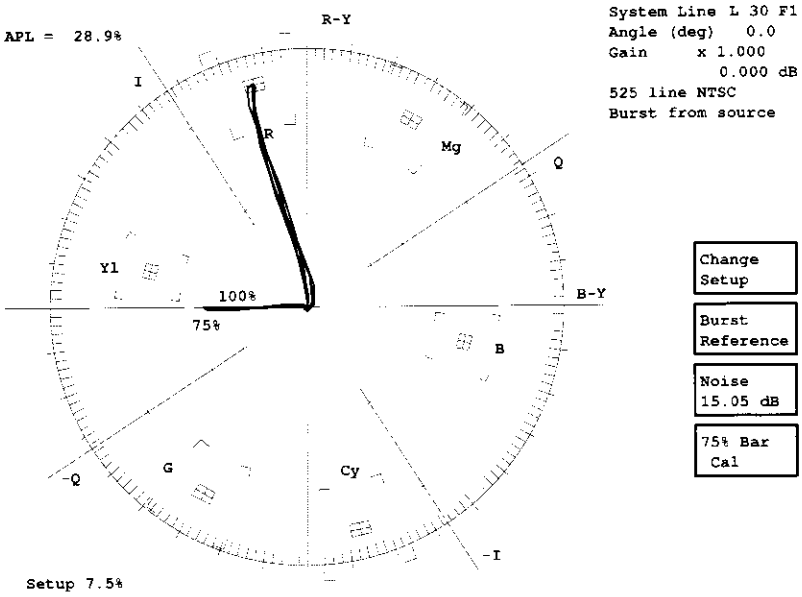

Figure 2.6 Vector mode display with the softkey menus.

- Select the **Noise** softkey a second time to accept the new value. This returns the Control knob to its default function.
- Press the Menu button to remove the on-screen menu.

The next time Average is engaged, the new value of noise reduction will be used.

2.3.1.A *Operator's Manual Reference: 5-1, 5-2*

2.3.2 Vector Menu System

On-screen data readouts and softkey menus provide measurement flexibility in the Vector mode. Pressing the front panel Menu button while in the Vector mode displays a row of softkeys along the right hand side of the display, as shown in Figure 2.6. This row of softkeys is known as the Vector Menu. The Vector Menu tree is shown in Figure 2.7. The menu bar is removed from the display by pressing the front panel Menu button a second time. The menu choices perform

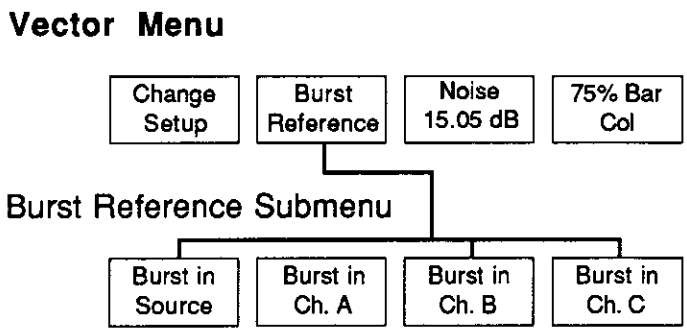

Figure 2.7 Vector mode menu tree.

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the following functions:

- **V-Axis Switch (PAL only):** Inverts the vector around the V-axis for a line with a -V axis burst. This switch has no effect on lines with a +V axis burst.
- **Display Select V (PAL only):** Toggles between display of lines with a +V axis, a -V axis, or both axes (the default condition).
- **Change Setup (NTSC only):** Toggles the graticule for a proper display of a color bar signal with either 7.5% setup or 0% setup.
- **Noise:** Sets the amount of noise reduction in decibels when the Average button is pressed. For PAL, each V-axis is averaged separately. The higher the noise reduction, the longer it takes to settle the signal. (See Section 2.3.1.)
- **Cal:** Rotating the Control knob in the Vector mode changes the gain or phase angle, which can leave the VM700A uncalibrated for angle or amplitude. Touching the **Cal** softkey returns the Vector mode to the default calibrated state, with phase angle set to 0.0°, and gain to 1.000 (0.0 dB).
- **Burst Reference:** Brings up a sub-menu to select the reference source for color burst.

When the **Burst Reference** softkey is selected, a sub-menu appears, offering the following choices:

- **Burst in Source:** Sets the color burst reference to the current signal source.
- **Burst in Ch. A:** The color burst reference is set to the A channel.
- **Burst in Ch. B:** The color burst reference is set to the B channel.
- **Burst in Ch. C:** The color burst reference is set to the C channel.

2.3.2.A *Operator's Manual Reference: 5-2, 5-3*

2.3.3 Picture Mode

Pressing the Picture button brings up a low-resolution TV display that creates a pseudo-gray scale by an algorithmic manipulation of the display's two bitplanes. The number of the system line is displayed in the upper left hand corner of the screen. The Select Line function is always on in the Picture mode. The bright line in the display indicates the position of the system line.

The Menu button brings up two selections:

- **Default Brightness**
- **Default Contrast**

The Freeze function may be initiated by pressing the Freeze button. The display is returned to its normal state by pressing Freeze a second time.

2.3.3.A *Operator's Manual Reference: 7-1*

CHAPTER 3

CONFIGURING THE VM700A

3.1 Basic Configuration Parameters

The operating parameters of the VM700A are stored in non-volatile memory, and are loaded into the instrument at power-up. No programming of the instrument is required for day-to-day operation.

Measure mode and Auto mode measurements can be customized for particular applications, the parameters of which are stored in non-volatile memory. The specific measurements can be executed at any time.

Before these functions can be fully accessed, however, it is necessary to perform two configuration steps:

- Set the internal real time clock.
- Configure the communications ports.

You also have the option of activating a password to prevent unauthorized changes to files and directories in the non-volatile memory of the VM700A.

3.1.1 Setting the Internal Clock

Certain timed functions within the VM700A require input from the instrument's internal real time clock. Also, accurate date/time stamps on displays and files require that the clock be set to correct local time. Use the following procedure to set the VM700A clock:

- Press the Configure button.
- Select the **Time** softkey. A menu for setting the internal clock of the VM700A is displayed, along with the current instrument time. This display is shown in Figure 3.1.
- Select the **Year**, **Month**, **Date**, **Hour**, **Minute**, and **Second** softkeys in any order. As each softkey is selected, rotate the Control knob to set the correct time. When setting the **Seconds** (using an accurate time source) set the clock to a good reference point for updating the instrument to the exact time, such as 00 seconds.
- Select the **Load Time** softkey at the exact time when setting against an accurate time source. Both the analog clock display and the digital readout are updated at the moment you touch the **Load Time** softkey.
- Press the Configure button to exit the Configure menu and return the instrument to the previously-selected function.

3.1.1.A *Operator's Manual Reference: 3-8*

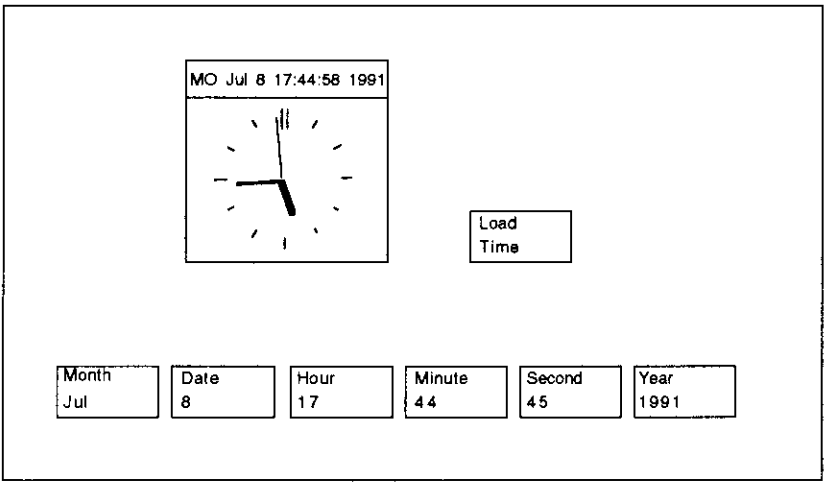

Figure 3.1 Setting the internal clock of the VM700A.

3.1.2 Creating a Password

The VM700A can be configured to require a password for permission to create, rename, edit and delete directories, Function Keys, and files. When the password function is enabled (through hardware DIP switches), a Password file appears in the *Configure Files* directory. (For information on the hardware DIP switches, see the Operator's Manual reference.)

To initially set a password:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Password** file.
- Touch the screen to the right of the password text. The keyboard will appear.
- Enter the password text using the keyboard. Up to 15 characters are permitted.
- Select **Done** when completed.
- Select **Update & Exit** to put the new password into effect, or press **Cancel** or **Exit** to leave without entering a password.
- Press the Configure button to return the VM700A to its previous operating mode.

Unless the password function has been enabled by selecting password text, the password is null. No password is needed to Update & Exit, Rename, Delete, or Create a directory or file. After a password is set, it will be requested when you attempt to Update & Exit, Rename, Delete, or Create a file or directory. If the correct password is entered, the requested action is completed. The VM700A allows three unsuccessful attempts to enter the Password before displaying the message, "No Password, no access!" and canceling the requested action.

3.1.2.A *Operator's Manual Reference: 3-22*

3.1.3 Changing an Existing Password

The password can be changed by using the following procedure:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Password** file.
- Type the current password and press **Done**.
- Touch the screen to the right of the password text. The keyboard will appear.
- Enter the new password text using the keyboard. Up to 15 characters are permitted.
- Select **Done** when completed.

- Select **Update & Exit** to put the new password into effect, or press **Cancel** or **Exit** to leave the old password in effect.
- Press the Configure button to return the VM700A to its previous operating mode.

Changing the password to null has the same effect as disabling the password function.

3.1.3.A *Operator's Manual Reference: 3-22*

3.2 Communicating with External Devices

The VM700A has the ability to communicate with an external printer, terminal, or personal computer. This capability permits reports of various types to be generated, and complete remote control of the instrument from a distant site. In order to access these functions, you must first configure the Communication~Setup file.

The VM700A has two RS-232-C ports. Either port may be attached to one of the following devices:

- An ASCII printer.
- Epson printer.
- HP LaserJet printer.
- PostScript printer.
- A modem.
- An external computer or terminal for remote operation.

3.2.1 Communication~Setup File

The Communication~Setup file tells the VM700A how the RS-232-C ports are configured. The factory default settings are for an Epson LQ-850 printer connected to serial port 1.

The VM700A has two physical ports:

- Serial port 0.
- Serial port 1.

The instrument also has five *logical* ports:

- **Copy:** The port to which screen dumps, generated by pressing the Copy button, and printouts generated by the Configure mode **Print File** softkey are sent.
- **Report:** The port to which Timed Event reports are sent.
- **Log:** The port to which error reports are sent. Errors are logged when the VM700A, running in the Auto mode, determines that a parameter is out of limits for a predetermined number of consecutive measurements.
- **Control Port:** A port used to permit control of external devices, such as a signal generator. Commands to the control port are issued through Function Keys or from a remote PC.
- **Remote Control:** The port used to connect the VM700A to a modem, terminal, or PC for remote operation.

Communication setup

Copy
- Port: Serial Port 1
- Format: PostScript

Report
- Port: Serial Port 1
- Format: PostScript

Log
- Port: None
- Format: Epson LQ

Control Port: Serial Port 1

Remote Control
- Port: Serial Port 1
- Prompt: VM700A
- Message Display: Remote
- Non-SLIP Interfacing Mode: Computer

Port 0

Protocol:	None
Baud Rate:	19200
Flow Control:	CTS/RTS
Character Size:	8
Parity:	None
Reset Character:	None
Carrier Detect:	Disabled

Port 1

Protocol:	None
Baud Rate:	19200
Flow Control:	CTS/RTS
Character Size:	8
Parity:	None
Reset Character:	None
Carrier Detect:	Disabled

Figure 3.2 Communication~Setup file.

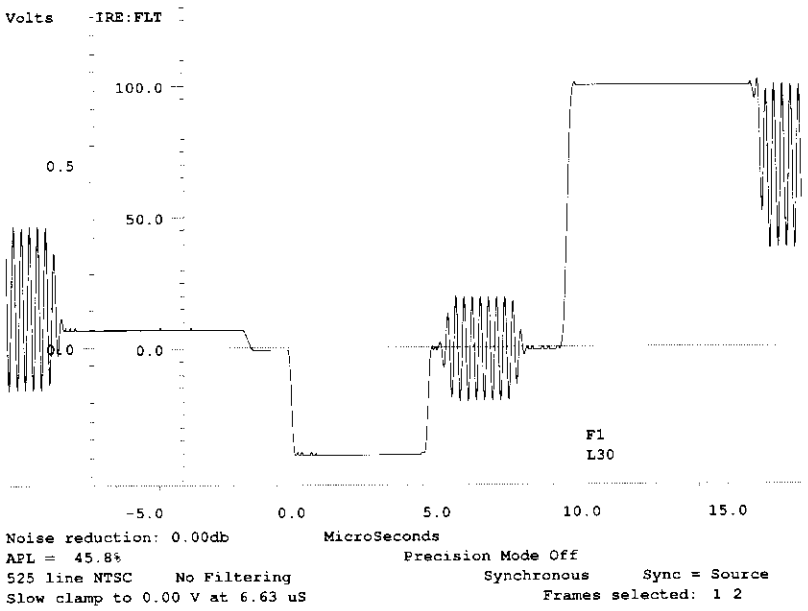

Figure 3.3 Expanded waveform mode display of color bar signal captured with the Copy button.

Use the following procedure to modify the contents of the Communication~Setup file:

- Press the Configure button.
- Select **Configure Files**.
- Select **Communication Setup** file.
- Rotate the Control knob to scroll the screen and highlight the line that contains the parameter you wish to change.
- Touch the parameter that you wish to change.
- Rotate the Control knob to display the desired parameter.
- Select **Accept Input** to accept the new value and return the Control knob to its scrolling function.

Example: To change the Copy printer port from the default Port 1 to Port 0, perform these steps:

1. Using the Control knob, scroll to line "Port" under the "Copy" heading.
2. Touch the screen at the parameter "Serial Port 1."

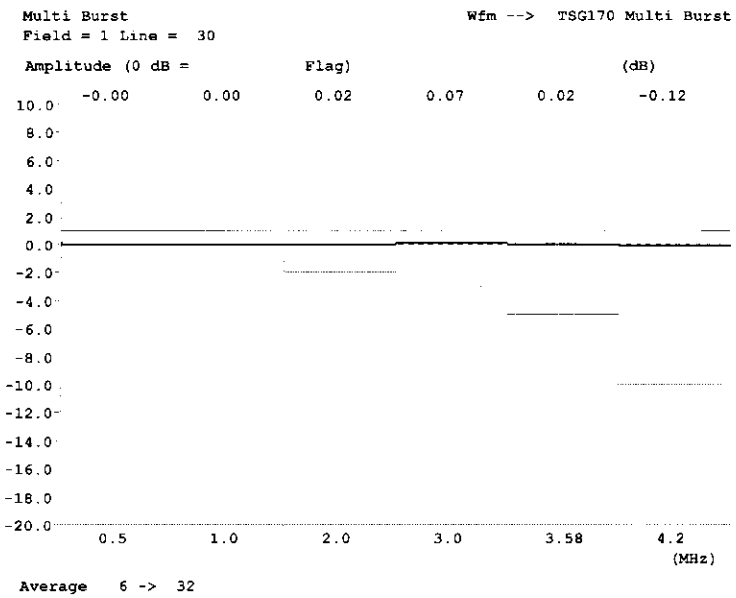

Figure 3.4 Graphic display of multi-burst measurement captured with the Copy button.

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3. Turn the Control knob until the parameter "Serial Port 0" appears.
4. Select **Accept Input** to accept the new value.

- Finish your work on the Communication~Setup file by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.
- Return to normal operation by pressing the Configure button.

An example Communication Setup file is shown in Figure 3.2. The first four groups of lines in the file (after the title line) assign a physical port and a format to each logical port. Giving a port a *None* setting disables the logical port's function.

Note that the VM700A can only copy to a printer with a serial RS-232-C port. For printing text files only, such as Auto Results, almost any ASCII printer is suitable. If hardcopy of graphics is required (for example, with waveform and vector displays), one of the following printers is required:

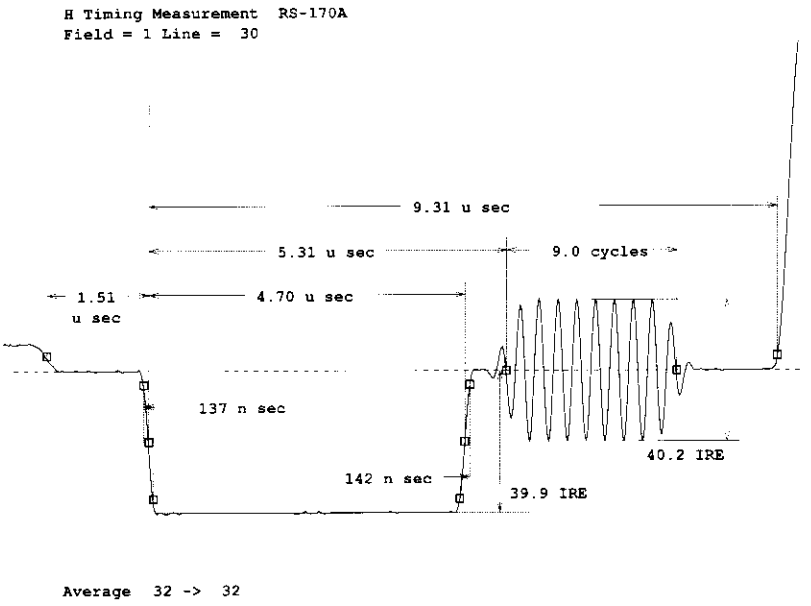

Figure 3.5 Horizontal timing measurement display captured with the Copy button.

- Epson LQ-850 printer.
- PostScript printer.
- HP LaserJet printer.

Figures 3.3, 3.4, and 3.5 show example printouts for a variety of measurements captured simply by pressing the Copy button. Note that normal operation of the instrument can be resumed immediately after pressing the Copy button because the information for the copy is held in print spooler memory.

3.2.1.A *Operator's Manual Reference: 2-3/2-8, 3-15, 3-16*

3.3 The Power-up Function

If you create a Function Key and give it the name *powerup*, the VM700A will playback that Function immediately after the instrument has completed its startup routine. This permits the user to specify any actions that should be performed as a result of powering-up the VM700A. See Chapter 8 for more details on Function Keys.

CHAPTER 4

FILE MANAGEMENT

4.1 Software Structure of the VM700A

The VM700A receives its primary operating information from a group of files stored in non-volatile memory. These files control such areas of the instrument as:

- Which measurements are performed in the Auto mode.
- What measurement limits should be in effect for Auto mode tests. The limits determine what values are used as upper and lower bounds before a *Caution* or *Alarm* is triggered.
- The timing of Auto mode reports.
- On which line(s) Auto or Measure mode measurements will be made, and (where applicable) at what position within the line(s).
- To which output port printouts, screen dumps, periodic reports, or error logs should be sent, and in what format.

4.1.1 Configure Utilities

The Configure button provides access to utilities that allow you to edit files that control the VM700A operating environment. Pressing the Configure button

brings up the main Configure display, which provides the following information:

- The amount of non-volatile memory used, and the free memory (in bytes). Both graphic and numeric readouts are provided.
- A label line with the name of the instrument and a 10-digit code number. The code is as follows: Date (*yymmdd*) and a factory-specified tracking number.
- A list of the installed options and software versions.
- Three softkeys, labeled **Time**, **Configure Files**, and **Function Keys**. If a printing operation is cued in the internal print buffer, another softkey labeled **Cancel Copy** is also displayed.

The softkeys in the main Configure menu perform the following actions:

- **Time:** Pressing this softkey brings up a display and sub-menu that allows you to set the internal clock of the VM700A. (See Section 3.1.1.)
- **Configure Files:** Pressing this softkey brings up a display of the */nvram0/ConfigFiles* directory, which provides access to files and directories that control operation of the VM700A. (*nvram* stands for non-volatile random access memory.)
- **Function Keys:** Pressing this softkey brings up a display of the */nvram0/FunctionKeys* directory, along with a sub-menu that lets you delete a function, create a directory, create a function, rename a function, and print a Function Key file.
- **Cancel Copy:** Pressing this softkey clears all copies in the VM700A print buffer.

The Configure mode, like other modes, may be selected at any time. When the Configure button is pressed a second time to deselect Configure, the instrument returns to the mode or application that was active when Configure was selected.

4.1.1.A *Operator's Manual Reference: 3-1, 3-2*

4.1.2 Directory Structure

The directory structure of the VM700A can be likened to that of a personal computer. The *root directory* has three primary sub-directories:

- */rom/*: Read-only memory directories and files that control the VM700A.
- */nvram0/*: Non-volatile random access memory directories and files that may be programmed by the user.
- *Spooler/*: File storage space for the VM700A print spooler.

Configuration files, which manage the basic operating parameters of the VM700A, reside in one or more subdirectories of the */rom/* and */nvram0/* directories, beginning with the */rom/ConfigFiles* and */nvram0/ConfigFiles* directories. Figure 4.1 shows a simplified directory tree of the VM700A as shipped from the factory.

Operation of the instrument in the Measure and Auto modes is controlled by means of a hierarchy of files and directories that starts with the Source_Selec-

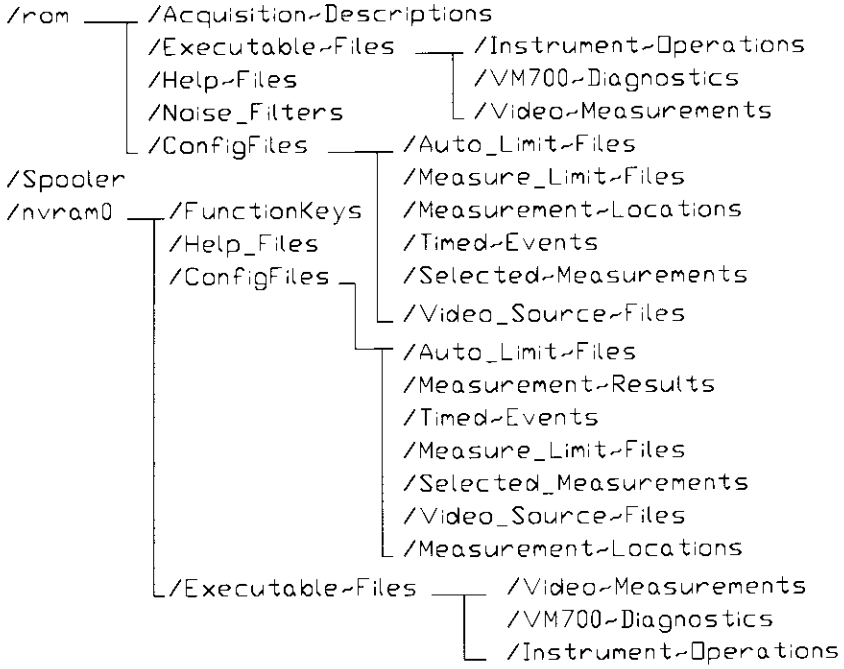

Figure 4.1 Simplified directory tree of the VM700A as shipped from the factory.

tion~Video file in the */nvram0/ConfigFiles* directory, and extends to other files in subdirectories of */nvram0/ConfigFiles*. By changing the contents of these files and subdirectories, you can customize the VM700A to suit specific measurement requirements, and switch quickly between instrument setups as needed to perform different operations.

All *ConfigFiles* subdirectories except for *Auto_Limit~Files* (for NTSC) and *Measurement~Results* contain a file named System~Default. System~Default files are used as templates to create new files in a directory. Because the System~Default files reside in */rom/* subdirectories, they cannot be modified. It should be noted that the *Auto_Limit~Files* directory actually contains five different default files, rather than a single System~Default file.

Note that directory and file names in the VM700A are case-sensitive. For filenames to be accessed from a remote computer, it is necessary to key in both the path and file name. You must use the exact punctuation and capitalization for both the path and the file name or the instrument will be unable to locate your file. This is in contrast to file names used for PC applications, where file and directory names are not case-sensitive.

4.1.2.A *Operator's Manual Reference: 3-9*

4.2 Configure Directory Structure

To view the contents of the *nvram0/ConfigFiles* directory, follow these steps:

- Press the Configure button.
- Select the **Configure Files** softkey.

Within the directory window are several icons representing directories and files:

- Directory icons consists of two overlapping rectangles.
- File icons consist of single rectangles.
- Below the directory window is the path line, which indicates the displayed directory's location in the overall structure.
- Below the directory window are thee softkeys, **Delete**, **Print File** and **Leave Directory**.

Directories are organized in a "tree" structure. Touching the icon of a directory displayed in a window opens that directory. Pressing the **Leave Directory** softkey closes the directory and displays the next higher directory in the structure.

Dual standard instruments (NTSC *and* PAL) feature a softkey labeled **Switch NTSC/PAL** in many of the Configure mode menus. Selecting this option toggles the VM700A between the NTSC and PAL configuration file structures. A readout below the directory window indicates which standard is currently active.

4.2.1 Read-Only Directories and Files

All of the directories and most of the files supplied with the VM700A are read-only. They cannot be edited, renamed, or deleted. Files can, however, be copied to create a new file that may be edited. Only files that you have created can be renamed or deleted.

Supplied read-only files can be viewed by selecting them, which displays the file contents. All read-only files are stored in ROM, while all editable files are stored in non-volatile memory (*nvram*). Therefore, when you select a System~Default file, the path name shown below the file will indicate */rom/ConfigFiles/subdirectory name/System~Default*.

4.2.1.A *Operator's Manual Reference: 3-4*

4.2.2 Create a File

Files are created within the Configure Files (ConfigFiles) directory. You can create a file by copying the contents of one file to another, and then modifying the contents to suit the application. To create a file:

- Press the Configure button.
- Select **Configure Files**.
- Touch the icon corresponding to the directory in which you want to add the new file.
- Select the **Create File** softkey. The following prompt is then displayed at the top of the screen: "Please select a file as template."
- Touch the icon corresponding to the file you want to copy. This action copies the contents of the selected file to the new file.
- A box appears in the center of the directory window and a keyboard appears below it. The characters you select (type) appear in the box.

Type the new file name, observing the following rules:

- Spaces are not allowed in file names. Use an underline (_) or dot (.) to separate words in a name.
- Pressing the **Set1** softkey allows you to enter numerals and punctuation characters.
- Pressing the **Set2** softkey allows you to enter various special characters.
- Pressing the **Shift** softkey allows you to enter upper-case characters, or more punctuation characters (in the case of the shifted version of Set1).
- Both the Set1 and Set2 character keys and the Shift key lock when selected. Set1 and Set2 are unlocked by touching the same key again, or by touching the unselected key of the pair.
- Shift is unlocked by touching **Shift** again.
- A maximum of 31 characters are allowed in a file name.
- Use only upper- and lower-case letters, numbers, and the following punctuation characters: underscore (_), dot (.), minus sign (-), plus sign (+), colon (:), and tilde (~) in names.
- Use the tilde character (~) to place a word on the second line of the name. Only one tilde can be used in a file name.
- The keyboard does not include the equivalent of a "Delete" key. To delete a character, position the cursor one space ahead of the character to be deleted and use the "Backspace" key.
- After typing the name, select **Done** to complete creation of the file.

Now that you have created a new file, you may edit it to suit a given application. Editing is discussed in Section 4.2.4.

- If you make a mistake in creating a new file and want to abort the process, select the **Cancel** softkey.
- Press the Configure button to return to the previous instrument mode.

4.2.2.A *Operator's Manual Reference: 3-4, 3-5*

4.2.3 Delete a File

From time-to-time it may be necessary or advisable to perform file system maintenance. It is good practice to delete old files that are no longer used. This makes the process of finding active files easier.

Use the following steps to delete a file. Remember that you can only delete files that you have created. System files cannot be deleted:

- Press the Configure button.
- Select **Configure Files**.
- Touch the icon corresponding to the directory in which you want to delete the file.
- Select the **Delete** softkey. The VM700A prompts you to select a file.
- Select the icon corresponding to the file to be deleted. Remember to select the appropriate *file*, and not a directory. (Directories cannot be deleted unless you follow the steps outlined in Chapter 8 for Function Keys.)
- The icon containing the name of the selected file changes to reverse video and begins to disintegrate, while the VM700A beeps at one second intervals.
- This disintegration/deletion process lasts 6 seconds. It can be stopped by touching the screen inside the directory window, or by deselecting the **Delete** softkey (press **Delete** a second time).
- Stopping the deletion process before completion preserves the file in its original form.

The 6 second delay permits you to evaluate — for one last time — whether you really want to delete the file.

After the file disappears, you may perform any other file maintenance in the current directory, or change directories by pressing the **Leave Directory** softkey. When you are finished with file maintenance:

- Press the Configure button to return to the previous instrument mode.

4.2.3.A *Operator's Manual Reference: 3-5*

4.2.4 Edit a File

The power of the VM700A lies in the ability to customize measurements for any number of specific applications. This customization is performed by creating new files to control the instrument, and editing them as necessary to accomplish the required task.

The process of creating a new file is discussed in Section 4.2.2. Use the following steps to edit the file. Remember that you can only edit files that you have created. System~Default files cannot be edited:

- Press the Configure button.
- Select **Configure Files**.
- Touch the icon corresponding to the directory in which you want to edit the file.
- Select the icon corresponding to the file you wish to edit. This action will display the contents of the file.

If you have just created a file and it is currently on the display screen, bypass the previous 4 steps and begin editing the file immediately:

- View the contents of the file by rotating the Control knob to scroll the file up or down.
- The line in the center of the window will appear highlighted.
- To edit a parameter within a file, use the Control knob to highlight the line you wish to change. Note that some files, such as those in the *Selected~Measurements* sub-directory, are edited by using the softkeys shown below the file.
- For parameter-oriented files, touch the highlighted line at the parameter to be changed.

There are four possible responses to this action:

1. If the line or a portion of the line that you touched may not be edited, the VM700A produces a "click" sound, and the screen will not change.
2. If the selected line contains words or characters to be changed, a keyboard will appear on the lower half of the instrument display screen.
3. If the selected line contains one of a limited number of specific parameters, a box will appear around the element to be edited. Use the Control knob to cycle through the available choices.
4. If you are editing a file that specifies whether elements are "selected" or "unselected" (such as the Selected~Measurements file), you edit the file by touching the screen next to an element to place the element in the "selected" or "unselected" group.

- Edit as many lines of the file as necessary. When your work is complete, select **Update & Exit** to close the file.
- If needed, perform other file work in the current directory, or in another directory.

- Press the Configure button to return the VM700A to the previous operating mode.

4.2.4.A *Operator's Manual Reference: 3-6, 3-7*

4.2.5 Print a File

Any VM700A file can be printed for further examination and reference. Use the following procedure.

- Press the Configure button.
- Select the **Configure Files** or **Function Keys** directory softkey, depending on which type of file you want to print.
- Select the appropriate subdirectory (if applicable).
- Select the **Print File** softkey.
- Select the icon corresponding to the file you wish to print.
- The Copy button will blink to indicate that the file has been sent to the printer.
- Press the Configure button to return to the previous instrument mode.

The file will be printed to the serial port designated as the Copy Port (see Section 3.2.1). The Copy button LED will illuminate while the VM700A creates a print file; the LED will then flash until the file has been sent to the printer.

To stop a file print job:

- Press the Configure button to return to the initial Configure menu.
- Select the **Cancel Copy** softkey. This softkey only appears when the Copy button LED is flashing. Touching this softkey cancels printouts in progress and deletes all files queued for printing.
- Press the Configure button to return to the previous instrument mode.

4.2.5.A *Operator's Manual Reference: 3-7, 3-8*

CHAPTER 5

SOURCE_SELECTION~VIDEO FILE

5.1 VM700A Organizational Structure

The Source_Selection~Video file functions as the top-level organizational element of the VM700A. The Source_Selection~Video file assigns a file in the *Video_Source~Files* directory to each of the instrument's signal sources (A, B, and C). When a given source is selected, the VM700A receives parameter information from the Source_Selection~Video file and the other files to which that file points. Figure 5.1 illustrates the relationship between the Source_Selection~Video file and other directories and files in the instrument.

Figure 5.2 shows the contents of an unmodified Source_Selection~Video file. You will note that each channel is assigned a given standard (in this case all three channels are NTSC). For dual standard instruments, PAL and NTSC can be used on any of the three channels. The source file (in this case System~Default) points to particular file in the *Video_Source~Files* directory. Files in the *Video_Source~Files* directory, in turn, point to other directories and files, depending on the operating mode.

For the Measure mode, the following files are used:

- Measure_Limit files in the *Measure_Limit~Files* directory.
- Measurement~Locations files in the *Measurement~Locations* directory.

For the Auto mode, the following files are used:

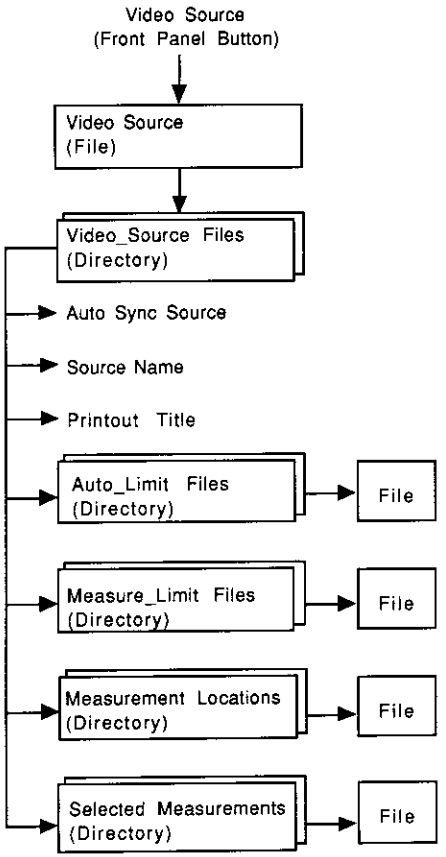

Figure 5.1 Hierarchy of the Source_Selection~Video file system.

- Selected~Measurements files in the *Selected~Measurements* directory.
- Measurement~Locations files in the *Measurement~Locations* directory.
- Auto_Limits files in the *Auto_Limits~Files* directory.

In the case of Figure 5.2, the files specified in the Source_Selection~Video file are all System~Default. This is how the instrument is shipped from the factory. To customize the VM700A for your own applications, you can create new files in all of the directories discussed so far in this section.

Video	NTSC Video Standard	Source File Name
Source A:	NTSC	System~Default
Source B:	NTSC	System~Default
Source C:	NTSC	System~Default

Figure 5.2 Default Source_Selection~Video file.

5.1.1 Changing Video Standards

For dual-standard instruments, the Source_Selection~Video file provides for switching between NTSC and PAL operation. Separate files in the *Video_Source~Files* directory include configuration data for instrument operation under the NTSC and PAL standards. To change the operating standard of the VM700A:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Source_Selection Video** file.
- View the contents of the file by rotating the Control knob to scroll the file up or down.
- Scroll until the "desired channel" line is highlighted.
- Select the entry under the **Video Std.** column by touching it.
- Rotate the Control knob until the appropriate video standard (NTSC or PAL) appears.
- Select **Update & Exit**.

The operating standard is now changed for that channel.

As you can see, the Source_Selection~Video file provides you with some powerful features. First, each front panel source input (Source A, Source B, and Source C) can access not only different measurement parameters, but different operating standards as well.

- Press the Configure button to return to the previous instrument mode.

5.1.1.A *Operator's Manual Reference: 3-10*

5.1.2 File System Overview

Files in the *Video_Source~Files* directory tell the VM700A where to find important operating parameters. A printout of the System~Default Video_Source file is shown in Figure 5.3. The files contain the following entries:

- **Auto Limits File:** The name of the file in the *Auto_Limit~Files* directory that specifies the limits used for Auto mode measurements. (See Section 7.1.4.)
- **Measure Limits File:** The name of the file in the *Measure_Limit~Files* directory that specifies the limits used for Measure mode activities. (See Section 6.1.3.)
- **Measurements Location File:** The name of the file in the *Measurement~Locations* directory that specifies the default frame lines and intra-line positions from which to make measurements in both the Measure and Auto modes (see Sections 6.1.1 and 7.1.1, respectively).
- **Selected Measurements File:** The name of the file in the *Selected~Measurements* directory that defines which measurements are to be monitored when the VM700A is in the Auto mode. (See Section 7.1.3.)
- **Auto Sync Source:** Specifies the synchronization source for the Auto mode. Possible values include: Channel A, Channel B, Channel C, External, or Locked to Source. The first four selections use the specified sources for synchronization. Locked to Source uses whichever source is selected when the instrument goes into the Auto mode. (See Section 5.1.4.)
- **Source Name:** Specifies the text to be printed across the top of printouts generated by the Auto mode or the Copy button. The text may be set to any appropriate string (up to 33 characters) that helps identify the source. (See Section 5.1.5.)
- **Printout Title:** Specifies the text to be printed (above the Source Name text) across the top of printouts generated by pressing the Copy button. This text may be set to any appropriate string (up to 49 characters) that helps identify the source. (See Section 5.1.6.)

Taken together, the parameter values contained in files in the *Video_Source~Files* directory (and sub-directories of *Video_Source~Files*) define a complete measurement and reporting environment.

5.1.2.A *Operator's Manual Reference: 3-12*

Channel Configuration System Defaults File

Auto Limits File:	EndToEnd
Measure Limits File:	System~Default
Measurements Location File:	System~Default
Selected Measurements File:	System~Default
Auto Sync Source:	Locked to Source
Source Name:	System Default
Video Printout Title:	VM700A Video Measurement Set

Figure 5.3 Contents of the System~Default Video_Source file.

5.1.3 Creating a New File

A new file may be created in the *Video_Source~Files* directory to perform a particular series of tests. Until a new file is created and enabled in the Source_Selection~Video file, the System~Defaults are used by the VM700A to control Auto and Measurement mode operations. Remember that System~Default files cannot be edited. To change the operating conditions, you must create a new Video_Source file. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Video_Source Files** directory.
- Select **Create File**.
- The VM700A will prompt you for a file to be used as a template.
- Select **System Default** or any other existing file as a starting point.
- A box appears in the center of the directory window and a keyboard is displayed below it. The characters you select (type) appear in the box. Type the new file name, observing the rules outlined in Section 4.2.2.
- Press **Done** when you have finished naming the new file.

The new file is now displayed, and may be edited. See Chapter 6 for applications using the Measure mode, or Chapter 7 for applications using the Auto mode.

5.1.4 Auto Sync Source Setup

The factory default configuration for the Auto Sync Source is *Locked to Source*. This parameter may be changed if necessary on a file you have already created in the *Video_Source~Files* directory. (See Section 5.1.3.) Remember that System~Default files cannot be edited. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Video_Source Files** directory.
- Select the file to be changed.
- Using the Control knob, scroll to the "Auto Sync Source" line.
- Touch the parameter to the right of the line. A box will appear around it.
- Use the Control knob to select the new sync source.
- Push **Accept Input** to return the Control knob to its scrolling function.
- If other parameters of the new file need to be changed, including Source Name and Printout Title, modify those items before closing the file. (See Sections 5.1.5 and 5.1.6.)
- Select **Update & Exit** to finish the process. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.
- Press the Configure button to return the VM700A to its previous activity.

5.1.4.A *Operator's Manual Reference: 3-12*

5.1.5 Source Name Setup

The factory default text for the Source Name in the Video_Source file is "System Default." This text string may be changed if necessary on a file you have already created in the *Video_Source~Files* directory. (See Section 5.1.3.) Remember that System~Default files cannot be edited. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Video_Source Files** directory.
- Select the file to be edited.
- Using the Control knob, scroll to the "Source Name" line.
- Touch the text string to the right of the line. A box will appear around it.
- Use the keyboard displayed below the file to enter a new text string. Observe the rules outlined in Section 4.2.2. Note, however, that spaces may be used in the text string. Up to 33 characters may be used as a Source Name.

- If other parameters of the new file need to be changed, including Auto Sync Source and Printout Title, modify those items before closing the file. (See Sections 5.1.4 and 5.1.6.)
- Select **Done** after the text string has been entered.
- Select **Update & Exit** to finish the process. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.
- Press the Configure button to return the VM700A to its previous activity.

5.1.5.A *Operator's Manual Reference: 3-12*

5.1.6 Printout Title Setup

The factory default text for the Printout Title in the Video_Source file is "VM700A Video Measurement Set." This text string may be changed if necessary on a file you have already created in the *Video_Source~Files* directory. (See Section 5.1.3.) Remember that System~Default files cannot be edited. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select the **Video_Source Files** directory.
- Select the file to be changed.
- Using the Control knob, scroll to the "Video Printout Title" line.
- Touch the text string to the right of the line. A box will appear around it.
- Use the keyboard displayed below the file to enter a new text string. Observe the rules outlined in Section 4.2.2. Note however that spaces may be used in the text string. Up to 49 characters may be used as a Printout Title.
- Select **Done** after the text string has been entered.
- If other parameters of the new file need to be changed, including Auto Sync Source and Source Name, modify those items before closing the file. (See Sections 5.1.4 and 5.1.5.)
- Select **Update & Exit** to finish the process. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.
- Press the Configure button to return the VM700A to its previous activity.

5.1.6.A *Operator's Manual Reference: 3-12*

CHAPTER 6

USING MEASURE MODE

6.1 Introduction to Measure Mode Files

The VM700A configuration files discussed in this chapter are used to define the operating parameters of the instrument when used in the Measure mode. The Configure button accesses the utilities that permit editing of the configure files. The System~Default files programmed into the instrument at the factory cannot be edited, but the user can create files that may be changed as needed for a variety of applications.

Measure mode activities are controlled by files contained in two sub-directories of the */ConfigFiles/* directory:

- *Measurement~Locations*
- *Measure_Limit~Files*

When a Measure mode activity is executed, the VM700A goes to these two directories to read files that control: (1) the video signal line number for key measurement parameters, and (2) the *high* and *low* limits that are permissible for each measured parameter. Note that the Measure mode only uses the Measurement~Locations file for the system line number when the **Default Line**

softkey is pressed. Otherwise, the Measure mode uses the current active system line number for measurements.

When the VM700A is shipped from the factory, System~Default files are placed in the *Measurement~Locations* and *Measure_Limit~Files* directories. If you want to change the defaults, you must create a new file, and then make the appropriate changes to that file.

After you have created one or more new files in the *Measurement~Locations* and/or *Measure_Limit~Files* directories, you must enable them. This function is accomplished by modifying the contents of: (1) the Video_Source file, and (2) the Source_Selection~Video file.

6.1.1 Measurement~Locations File

In the Measure mode, the VM700A will make measurements on any selected line. The instrument permits the user to select specific lines for a variety of measurements, including the following:

- *Pulse* and *bar*, where locations of the 2T pulse and bar must be specified.
- *Chrominance to luminance gain and delay*, where locations of the modulated pulse and pulse width (i.e. 20T or 10T) must be specified.
- *Multiburst*, where locations of the burst packets must be specified. (Note that the factory set locations for multiburst are correct for the multiburst signal generated by the Tektronix TSG271 (PAL) or 1910 (NTSC) signal generators.)

Other measurements — for both PAL and NTSC — such as linearity and differential gain/differential phase have automatic routines that search along the line for standard signals and set the locations accordingly.

This section of the VM700A Configuration Guidebook details how these important parameters may be entered into a Measurement~Locations file, which is then allocated to a Video_Source file, and in turn to the Source_Selection~Video file. In This way the VM700A will automatically refer to a set of specific measurement locations every time the Measure mode is used.

Alternatively, the revised measurement locations may be specified at the time the measurement is made. These locations, however, are held in volatile memory and will be lost when the instrument is powered-down. If this method is chosen for operation, and the parameters set in the System~Default file located in the *Measure_Limit~Files* directory are acceptable, go directly to Section 6.3 (Using the Measure Mode).

The files in the *Measurement~Locations* directory contain information used by both the Measure and Auto modes. The Measurement~Locations file for each channel is designated in the active file in the *Video_Source~Files* directory. At this point it might be helpful to look again at Figure 4.1 (see page 4-3) to reinforce how the files of the VM700A interrelate.

6.1.2 Changing the Measurement~Locations File

If the video signal line selections specified in the System~Default file do not meet the needs of a specific measurement, you will need to create a new file with the correct parameters. This is accomplished with the Measurement~Locations file. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Measurement Locations**.
- Create a new file using **Create File**.

The VM700A will ask for a file to be used as a template. Select the System~Default file or any other available file as the starting point for defining a new set of locations for the Measure mode. The System~Default file, which is always present, contains factory-set measurement locations that cannot be changed unless copied into a new file.

Because the Measurement~Locations file controls both the Measure and Auto mode locations, if you have already created a new file for Auto mode applications (discussed in Section 7.1.2), you can simply modify that file. It is neither necessary nor desirable to create multiple Measurement~Locations files specifically for the Auto and Measure modes. Remember that only one file can be active at a given time.

- Enter the name of the new file using the keyboard function.
- Select **Done** when the file name has been completed. Note that file names cannot include carriage returns or spaces. To get a second line in the file name, use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.

Now that you have created a new file, you can adjust the Measure mode line selection parameters to meet the requirements of the application. Perform these steps to change one or more line numbers:

- Rotate the Control knob to scroll the screen and highlight the Measure mode line parameter that you wish to change. Note that the Measurement~Locations file controls both Measure mode and Auto mode line numbers. For Measure mode applications, be sure to scroll past the Auto mode entries.
- Touch the appropriate line number; a box will appear around the number.
- Rotate the Control knob to select the desired line number.
- Select **Accept Input** to accept the parameters and return the Control knob to its scrolling function. (A typical Measurement~Locations file is shown in Figure 6.1.)

System Default measurement locations file

	Field	Line	Ref	Center Location
Zero Carrier Pulse	1	16	no	25.5 µs

Waveform mode

IRE reference from Zero Carrier Pulse (if enabled above) takes precedence over bar reference. If neither reference is available because it is either disabled, or enabled but not present, then 100 IRE = 714 mV is used.

IRE bar reference	no
Fix 0 IRE to	Back Porch

Auto Mode

	Field	Line
Composite	1	18
Multiburst	1	17
NTC-7 Combination	1	17
VIRS	1	19
Color Bars	2	17
Noise Line (Quiet)	1	12

Measure Mode (Default Line Select)

	Field	Line
Bar LineTime	1	18
Chroma Freq Resp	1	15
DGDP	1	18
Luma NonLinearity	1	18
Chroma NonLinearity	1	17
MultiBurst	1	18
ColorBar	2	17
GroupDelay SinX_X	2	18
Bounce	1	30
Noise Spectrum	1	12
H Timing	1	100
ChromLum GainDelay	1	18
K Factor	1	18
T Bar (SD)	1	18
Amplitude units	IRE	
Sampling	asynchronous	

Figure 6.1 System~Default Measurement~Locations file.

Example: The system default location for Color Bar measurement is Field 2, Line 17. Suppose you need to change that location to Field 2, Line 25. Follow these steps:

1. Create a new Measurement~Locations file called "Local_1". Follow the steps outlined previously in this section.
2. Scroll down to the Measure mode subheading. Next, scroll to the ColorBar entry.
3. Touch the line number (now 17). A box will appear around the number.
4. Turn the Control knob until the number 25 appears.
5. Select **Accept Input**.

- Finish by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Measurement~Locations file. The new file, however, will not be active until it is enabled by making the proper entry in the Video_Source~File.

Example Note: Keep your new file ("Local_1") for now; in Section 6.1.5 (Video_Source~Files) we will use it to illustrate how to enable the new Measurement~Locations file.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next higher branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

When you return to a session after modifying the active Measurement~Locations file, the VM700A will still be reading the old line numbers that existed when you entered the Configure mode. To update the display, access the on-screen Select Line menu by pressing the Select Line button, and touch the **Default Line** softkey.

6.1.2.A *Operator's Manual Reference: 3-20*

6.1.3 Measure_Limit~Files

Files in the *Measure_Limit~Files* directory contains limit information for Measure mode (manual) measurements. The files perform two functions:

- They place graphic limit markers on the screen in measurements (where applicable).
- They appear on printouts, controlled by one or more files in the *Measurement~Results* directory (see Section 6.2), when measurements exceed specified upper or lower limits.

The Measure_Limit~File used by the Measure mode is designated in the active file of the *Video_Source~Files* directory. Remember that the Video_Source~File specifies which Measure_Limit~File and which Measurement~Locations file will be used in the Measure mode. Section 6.1.5. explains how these files are enabled.

6.1.4 Changing the Measure_Limit~File

If the limits specified in the System~Default file do not meet the needs of a specific measurement, you will need to create a new file with the correct parameters. This is accomplished with the Measure_Limit~File. Follow these steps:

- Press Configure button.
- Select **Configure Files**.
- Select **Measure_Limit Files**.
- Create a new file with **Create File**.

The system will ask for a file to be used as a template. Select the System~Default file or any other available file as the starting point for defining a new set of measurement limits. The System~Default file contains factory-set measurement limits that cannot be changed unless copied into a new file.

- Enter the name of the new file using the keyboard function.
- Select **Done** when the file name has been completed. Note that file names cannot include carriage returns or spaces. To get a second line in the file name, use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.
- Identify the limits that need to be changed.
- Rotate the Control knob to scroll the screen and highlight the line with the limit you wish to change or remove.
- Touch the limit you wish to change or remove; a box will appear around the value.

- Rotate the Control knob to select the desired value, or select **Enter Undefined** if you wish to remove the limit.
- Select **Accept Input** to accept the parameters and return the Control knob to its scrolling function. (An example file is shown in Figure 6.2.)

Example: The System~Default file specifies a Noise Level upper limit of -45 dB rms. Let's assume that you want to change the maximum Noise Level limit to -50 dB rms. Follow these steps:

1. Create a new Measure_Limit~File called "Limit_1". Follow the steps outlined previously in this section.
2. Scroll down to the Noise Level entry.
3. Touch the upper limit number (now -45). A box will appear around the number.
4. Turn the Control knob until the number -50 appears.
5. Select **Accept Input**.

- Finish by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Measure_Limit~File. The new file, however, will not be active until it is enabled by making the proper entry in the Video_Source~File.

Example Note: Keep your new file ("Limit_1") for now; in Section 6.1.5 (Video_Source~Files) we will use it to illustrate how to enable the new Measure_Limit~File.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

Note that it is only necessary to alter the limits for those parameters that will be measured. All other limits may be left at the default values.

6.1.4.A *Operator's Manual Reference: 3-12, 3-13, 3-19*

Measurement Limits in Measure Mode

	Lower	Upper
Bar Level (ref. b1) (mV)	679.0	750.0
Bar Level (ref. Back Porch) (mV)	679.0	750.0
Sync Level (mV)	271.0	300.0
Sync to Bar Top (mV)	950.0	1050.0
Sync/Bar Ratio (%)	90.0	110.0
Line Time Distortion (% Bar)	0.0	5.0
Bar Tilt (Rec 569) (% Bar)	-5.0	5.0
Chrominance Non-Linearity (%)	-5.0	5.0
Chrom-Phase Non-Linearity (deg)	-5.0	5.0
Chrom-Lum Intermodulation (%)	-5.0	5.0
Chrominance Gain (%)	90.0	110.0
Chrominance Delay (nsec)	-40.0	40.0
Luminance Level Grey (mV)	494.0	786.0
Luminance Level Yellow (mV)	445.0	544.0
Luminance Level Cyan (mV)	360.0	440.0
Luminance Level Green (mV)	311.0	380.0
Luminance Level Magenta (mV)	231.0	282.0
Luminance Level Red (mV)	182.0	222.0
Luminance Level Blue (mV)	97.0	119.0
Luminance Level Black (mV)	48.0	59.0
Chrominance Level White (mV)	0.0	10.0
Chrominance Level Yellow (mV)	400.0	489.0
Chrominance Level Cyan (mV)	567.0	693.0
Chrominance Level Green (mV)	530.0	647.0
Chrominance Level Magenta (mV)	530.0	647.0
Chrominance Level Red (mV)	567.0	693.0
Chrominance Level Blue (mV)	400.0	489.0
Chrominance Level Black (mV)	0.0	10.0
Chrominance Phase Yellow (deg)	162.0	172.0
Chrominance Phase Cyan (deg)	278.0	288.0
Chrominance Phase Green (deg)	235.0	245.0
Chrominance Phase Magenta (deg)	55.0	65.0
Chrominance Phase Red (deg)	98.0	108.0
Chrominance Phase Blue (deg)	342.0	352.0
Differential Gain (%)	-5.0	5.0
Differential Gain (p-p) (%)	0.0	10.0
Differential Phase (deg)	-5.0	5.0
Differential Phase (p-p) (deg)	0.0	10.0
Sync Rise Time (nsec)	100.0	300.0

Figure 6.2 Example Measure_Limit~File.

Sync Fall Time (nsec)	100.0	300.0
Sync Width (µs)	4.5	4.9
Burst Level (mV)	250.0	310.0
Sync-to-Burst Start (µs)	5.30	5.32
Sync-to-Burst End (µs)	7.50	8.50
Burst Width (cycles)	8.50	9.50
Front Porch (µs)	0.50	2.50
Sync-to-Setup (µs)	8.00	11.00
Breezeway (µs)	0.30	0.80
2T Pulse K-Factor (%Kf)	0.0	5.0
K-Factor Pulse/Bar (%Kf)	-5.0	3.0
Pulse/Bar Ratio (%)	90.0	110.0
Pulse HAD (ns)	200.0	300.0
Lumininance Non-Linearity (%)	0.0	5.0
Multiburst Flag (mV)	400.0	750.0
MB Packet #1 (dB)	-1.0	1.0
MB Packet #2 (dB)	-1.0	1.0
MB Packet #3 (dB)	-2.0	1.0
MB Packet #4 (dB)	-3.0	1.0
MB Packet #5 (dB)	-5.0	1.0
MB Packet #6 (dB)	-10.0	1.0
Noise Level (dB rms)		-45.0
Crominance AM Noise (dB rms)		-40.0
Chrominance PM Noise (dB rms)		-40.0
Sin X/X At 0.50 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0
Sin X/X At 1.00 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0
Sin X/X At 2.50 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0
Sin X/X At 3.00 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0
Sin X/X At 3.58 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0
Sin X/X At 4.00 MHz		
Gain (dB)	-0.5	0.5
Grp Delay (nsec)	-15.0	15.0

Figure 6.2, Continued.

Sin X/X At 4.18 MHz		
Gain (dB)	-6.0	0.5
Grp Delay (nsec)	-15.0	15.0
SCH Phase (deg)	-40.0	40.0
Chroma Freq Flag (mV)	600.0	800.0
CF Packet #1 (dB)	-3.0	1.0
CF Packet #2 (dB)	-2.0	1.0
CF Packet #3 (dB)	-1.0	1.0
CF Packet #4 (dB)	-2.0	1.0
CF Packet #5 (dB)	-3.0	1.0
Equalizer Pulse Width (50% sync) (µs)	2.10	2.80
Equalizer Pulse Width (10% sync) (µs)	2.10	2.80
Serration Pulse Width (50% sync) (µs)	4.40	5.00
Serration Pulse Width (10% sync) (µs)	4.40	5.00
H Blank Start to Sync (µs)	-5.0	-0.5
H Blank End from Sync (µs)	8.00	12.00
H Blank Width (µs)	9.00	12.00
Burst Frequency Error (Hz)	-50.0	50.0
Line Frequency Error (%)	-1.0	1.0
Jitter in a Frame (p-p) (nsec)	0.0	100.0
Head SW Skew (Field 1) (µs)	-5.0	5.0
Head SW Skew (Field 2) (µs)	-5.0	5.0
Long Time Jitter (p-p) (µs)	0.0	5.0
ICPM (deg)	-5.0	5.0
Rising Edge SD (%)		1.0
Rise Time (nsec)	120.0	130.0
Falling Edge SD (%)		1.0
Fall Time (nsec)	120.0	130.0
SD at Cursor (%)		1.0

Figure 6.2, Continued.

6.1.5 Changing the Video_Source~File

The Video_Source~File ties together the desired Measurement~Locations file and Measure_Limit~File for use in a specific Measurement mode task. If you have created a new Measurement~Locations file and/or Measure_Limit~File, you must change the Video_Source~File to enable the new parameters. Proceed as follows:

- Press the Configure button.
- Select **Configure Files**.
- Select **Video_Source Files**.
- Create a new file with **Create File**.

The system will ask for a file to be used as a template. Select the System~Default file or any other available file as the starting point for defining a new set of measurement locations and/or measurement limits. The System~Default file, which is always present, points to further System Default files in the *Measurement~Locations* and *Measure_Limit~Files* directories.

- Enter the name of the new file using the keyboard.
- Select **Done** when completed. Note that files cannot have spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.
- Identify which entries in the file need to be changed.
- Rotate the Control knob to scroll the screen and highlight the line that contains the file you wish to modify.
- Touch the file name on the highlighted line; a box will appear around it.
- Rotate the Control knob to display the desired file.
- Select **Accept Input** to accept the configuration and return the Control knob to its scrolling function. (An example file is shown in Figure 6.3.)

Example: The System~Default Video_Source~File specifies System~Default files for both the *Measurement~Locations* and *Measure_Limit~Files* directories. In Section 6.1.2 we created a new Measurement~Locations file called "Local_1." In Section 6.1.4 we created a new Measure_Limit~File called "Limit_1." We now want to enable these two files. Follow these steps:

1. Create a new Video_Source~File called "Source_1". Follow the steps outlined previously in this section.
2. Scroll down to the Measure Limits File entry.
3. Touch the file name (now SystemDefault). A box will appear around the name.
4. Turn the Control knob until the name "Limit_1" appears.
5. Select **Accept Input**.
6. Next, scroll down to the Measurements Location File entry.
7. Touch the file name (now SystemDefault). A box will appear around the name.

Channel Configuration System Defaults File

Auto Limits File:	EndToEnd
Measure Limits File:	System~Default
Measurements Location File:	System~Default
Selected Measurements File:	System~Default
Auto Sync Source:	Locked to Source
Source Name:	System Default
Video Printout Title:	VM700A Video Measurement Set

Figure 6.3 System~Default Video_Source~File.

8. Turn the Control knob until the name "Local_1" appears.
9. Select **Accept Input**.

- Select **Update & Exit** to accept the changes. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Video_Source~File. The new file, however, will not be active until it is enabled by making the proper entry in the Source_Selection~Video file.

Example Note: Keep your new file ("Source_1") for now; in Section 6.1.6 (Source_Selection~Video) we will use it to illustrate how to enable the new Video_Source~File.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

Note that the Source Name and Printout Title entries in the Video_Source~File may also be changed. See Sections 5.1.5, and 5.1.6, respectively.

6.1.6 Changing the Source_Selection~Video File

The Source_Selection~Video file controls assignment of the three video inputs to the VM700A. As discussed in Chapter 5, the Source_Selection~Video file is the top-level organizational element of the instrument. Refer to Figure 4.1 (page 4-3) for an overview of the function of the Source_Selection~Video file.

If you have created a new Video_Source~File (discussed in Section 6.1.5), you must modify the Source_Selection~Video file to enable the new operating parameters. Proceed as follows:

- Press the Configure button.
- Select **Configure Files**.
- Select **Source_Selection Video**.
- Rotate the Control knob to scroll the screen and highlight the input on which you want to make changes.
- Touch the screen on the existing file name; a box will appear around it.
- Rotate the Control knob to display the desired file in the *Video_Source~Files* directory.
- Select **Accept Input** to accept the change and return the Control knob to its scrolling function. (Figure 6.4 shows a typical Source_Selection~Video file.)

Video NTSC Video Source File Name

	Standard	
Source A:	NTSC	System~Default
Source B:	NTSC	System~Default
Source C:	NTSC	System~Default
Timed Events:	System~Default	

Figure 6.4 Default Source_Selection~Video file.

Example: The Source_Selection~Video file, as shipped from the factory, specifies the System~Default file in the *Video_Source~Files* directory for each channel of the VM700A. In Section 6.1.5 we created a new Video_Source~File called "Source_1." We now want to enable that file so that it will be used whenever the Source B input is selected. Follow these steps:

1. Call up the Source_Selection~Video file by following the steps outlined previously in this section.
2. Scroll down to the Source B entry.

3. Touch the file name (now SystemDefault). A box will appear around the name.
4. Turn the Control knob until the name "Source_1" appears.
5. Select **Accept Input**.

- Finish the process by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the file. A prompt will ask you to confirm your action.

The new Video_Source~File, and the files to which it points, is now active on Source B.

Example Note: At this point you may want to reset the VM700A Measure mode files discussed in this chapter to their System~Default values. Simply follow the steps outlined so far to re-install the System~Default files in the following:
1. Measurement~Locations file (Section 6.1.2).
2. Measure_Limit~File (Section 6.1.4).
3. Video_Source~File (Section 6.1.5).
4. Source_Selection~Video file (this section).

Also, you may delete the new files you have created in the exercises outlined in this chapter. Follow the procedures detailed in Section 4.2.3 (Delete a File).

- Return to normal operation by pressing the Configure button.

6.1.6.A *Operator's Manual Reference: 3-10/3-12*

6.2 Printing Measure Mode Results

The VM700A has the ability to communicate with an external printer, terminal, or personal computer. This capability permits reports of various types to be generated, and complete remote control of the instrument from a distant site.

Files are written into the *Measurement~Results* directory when you exit a measurement in the Measure mode. One file with an appropriate name (such as "Bar LineTime") is written for each Measure mode measurement. If a file with the same name exists when the new file is written, the old file will be erased.

After results have been written to a Measurement~Results file, they can be printed by selecting the **Print File** softkey. The file can also be renamed, deleted, or viewed.

To print tabulated results of a measurement, follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Measurement Results**.
- Select **Print File**.
- Select the appropriate Results File.

Note that the results of each measurements file are only stored when that specific application mode is ended. If the relevant signal is removed before the measurement application is exited, invalid results will be stored in the Measurement~Results file.

6.2.0.A *Operator's Manual Reference: 3-15, 3-16, 3-21*

6.3 Using the Measure Mode

Pressing the Measure button on the front panel puts the VM700A into the Measure mode. In this mode, the instrument provides interactive control of measurement parameters, as well as graphical displays and digital readouts of measurement results.

The Measure mode is intended for use in interactive measurement of NTSC and PAL signal properties. This function is in contrast to the Auto mode (discussed in Chapter 7), which is intended for automatic, non-interactive, and continuous execution of user-specified measurements.

NTSC and PAL video measurements available through the Measure mode are described in detail in the VM700A Option 01 (NTSC) Measurements Supplemental Manual, and the VM700A Option 11 (PAL) Measurements Supplemental Manual.

For the purposes of illustration, the following examples of Measure mode functions are provided in this section:

- Horizontal sync timing.
- Vertical sync timing.
- Color Bar measurement (luminance level, chrominance level, and chrominance phase).

6.3.1 Measuring Horizontal Sync Parameters

Measurement of sync and burst parameters may be accomplished easily with the VM700A. Use the following procedure:

- Press the Measure button.
- Use the Control knob (if necessary) to scroll the display to **H_Timing**.
- Select **H_Timing**.
- Select the desired line. Note that the display indicates which line is being used for the measurement. In the default configuration, the VM700A makes its measurement on a single line in the field. Select the required line by pressing the Select Line button and rotating the Control knob. De-select the line function by pressing the Select Line button a second time.
- If required, use averaging to reduce noise. Press the Average button to switch to this mode. Because the VM700A makes measurements on a single line, any noise will cause variations in the measured results. This effect can be reduced by averaging the signal. When averaging is active, the instrument displays the results from 32 samples of the selected line. It is not merely taking the average of 32 *sequential* lines.

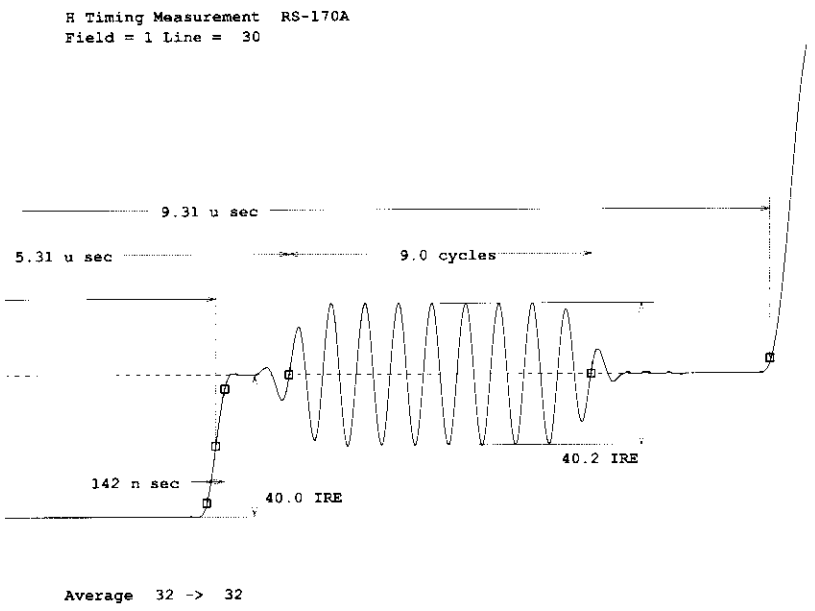

Figure 6.5 Expanded view of a sync waveform in the Measure mode.

If the measured results are still changing because of noise present on the input signal, the number of averages may be increased. Use the following procedure:

- Press the Menu button.
- Select **Average Num** and rotate the Control knob to increase the number of averages.
- Touch **Average Num** again to return the Control knob to its normal mode.

The VM700A permits detailed viewing of the sync waveform. Adjust the display using these steps:

- Use the Control knob to move the waveform on the screen as needed to permit viewing and measurement.
- To expand the display, touch the screen at the point of interest, and while continuing to touch the screen rotate the Control knob to expand the display. Figure 6.5 shows an expanded view of a sync waveform.

- Remove your finger from the screen to return the Control knob to its original mode.

Press the Measure button to return to the measurement selection menu.

6.3.1.A *Operator's Manual Reference: See NTSC/PAL Option Books*

6.3.2 Measuring Vertical Sync Parameters

Measurement of vertical blanking, equalizer pulse, and serration pulse parameters may be accomplished easily with the VM700A. Use the following procedure:

- Press the Measure button.
- Use the Control knob to scroll the display to **V_Blanking**.
- Select **V_Blanking**.
- Select the desired line. Note that the display indicates which line is being used for the measurement.

The VM700A permits detailed viewing of the sync waveform. Adjust the display using these steps:

- Press the Menu button.
- Four choices are available: **Equalizer Pulse**, **Serration Pulse**, **Blanking Display** (the default), and **V Sync Display**.
- Select **Equalizer Pulse**.
- The display changes to show the equalizer pulse waveform.
- If required, use averaging to reduce noise. Press the Average button to switch to this mode. Because the VM700A makes measurements on a single line, any noise will cause variations in the measured results. This effect can be reduced by averaging the signal. When averaging is active, the instrument displays the results from 32 samples of the selected line.

If the measured results are still changing because of noise present on the input signal, the number of averages may be increased. Use the following procedure:

- Select **Average Num** and rotate the Control knob to increase the number of averages.
- Touch **Average Num** again to return the Control knob to its normal mode. The new averaging value is now in effect.

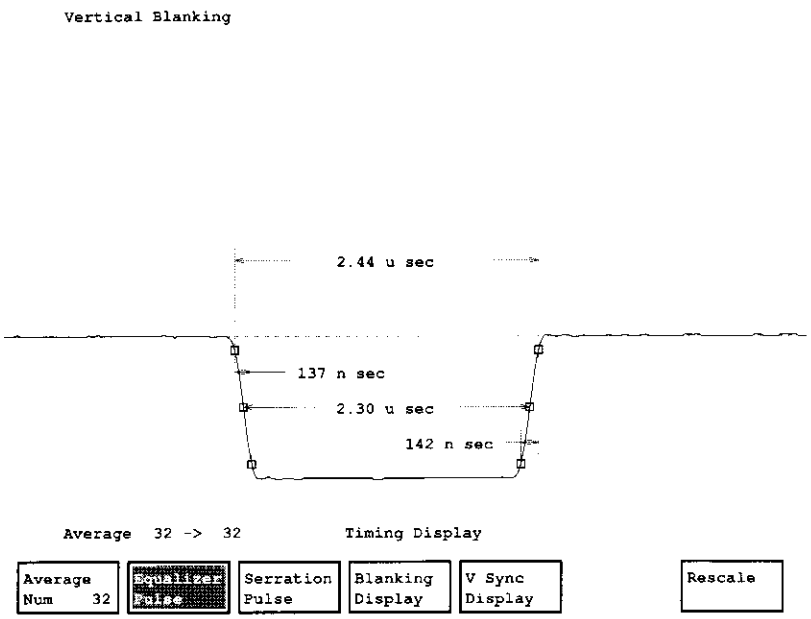

Figure 6.6 Expanded view of an equalizer pulse waveform in the Measure mode.

Use the Control knob to move the waveform on the screen as needed to permit viewing and measurement:

- To expand the display, touch the screen at the point of interest, and while continuing to touch the screen rotate the Control knob to expand the display. Figure 6.6 shows an expanded view of a vertical equalizer pulse.
- Remove your finger from the screen to return the Control knob its original mode.

Note that for the **Blanking Display** and **V Sync Display**, the Control knob will only function in the Line Select mode.

Press the Measure button to return to the measurement selection menu.

6.3.2.A *Operator's Manual Reference: See NTSC/PAL Option Books*

6.3.3 Measuring Color Bar Parameters

The VM700A Color Bar measurement checks the luminance level, chrominance level, and chrominance phase of each chroma packet, and displays them on three separate graticules. To perform the Color Bar measurement, follow these steps:

- Press the Measure button.
- Use the Control knob to scroll the display to **ColorBar**.
- Select **ColorBar**.
- Select the desired line. Note that the display indicates which line is being used for the measurement. Select the proper line by pressing the Select Line button and rotating the Control knob. De-select the line function by pressing the Select Line button a second time.

Note that when the Select Line button is pressed, a softkey menu appears on the display screen. The available options are:

- **Field Toggle**
- **Field 1, Line 17**
- **Field 1, Line 18**
- **Field 2, Line 17**
- **Field 2, Line 18**
- **Default Line**. Selecting this softkey will use the line specified in the active Measurement~Locations file.

Pressing the Select Line button a second time removes the menu.

The VM700A permits detailed viewing and measurement of Color Bar parameters. Adjust the display using these steps:

- Press the Menu button.

Seven menu choices are available:

- **Average Num**, used to set noise reduction.
- **Reference**, which includes a sub-menu.
- **Relative to Reference**, which includes a sub-menu.
- **dB Reference**, which includes a sub-menu.
- **Acquire**, which includes a sub-menu.
- **VITS Search**, used to find the VITS line.
- **Rescale**, used to change the vertical scale for better measurement resolution.

A screen display of the Color Bar luminance level, chrominance level, and chrominance phase readout is shown in Figure 6.7.

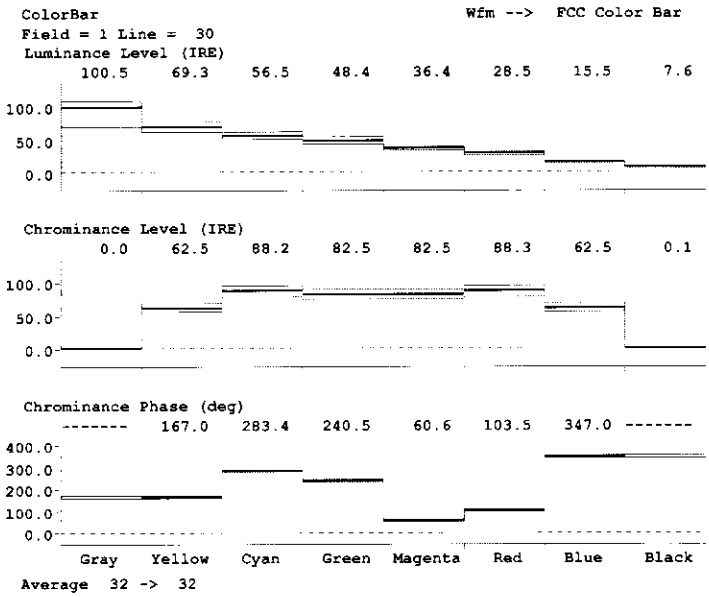

Figure 6.7 VM700A *color bar* measurement in the Measure mode.

- If required, use averaging to reduce noise. Press the Average button to switch to this mode. Because the VM700A makes measurements on a single line, any noise will cause variations in the measured results. This effect can be reduced by averaging the signal. When averaging is active, the instrument displays the results from 32 samples of the selected line.

If the measured results are still changing because of noise present on the input signal, the number of averages may be increased. Use the following procedure:

- Select **Average Num** and rotate the Control knob to increase the number of averages.
- Select **Average Num** again to return the Control knob to its normal mode. The new averaging value is now in effect.

Use the Control knob to move the waveform on the screen as needed to permit viewing and measurement:

- To expand the display, touch the screen at the point of interest, and while continuing to touch the screen rotate the Control knob to expand the display.
- Remove your finger from the screen to return the Control knob its original (Move) mode.
- The Move function can be controlled for each measurement. Touch inside the area of the appropriate graph (Luminance Level, Chrominance Level, or Chrominance Phase) to switch the Control knob Move function.

Press the Measure button to return to the measurement selection menu.

6.3.3.A *Operator's Manual Reference: See NTSC/PAL Option Books*

CHAPTER 7

USING AUTO MODE

7.1 Introduction to Auto Mode Files

The VM700A configuration files discussed in this chapter are used to define the operating parameters of the instrument when used in the Auto mode. The Configure button accesses the utilities that permit editing of the configure files. The System~Default files programmed into the instrument at the factory cannot be edited, but the user can create files that may be changed as needed for a variety of Auto mode applications.

Auto mode activities are controlled by files contained in three sub-directories of the */ConfigFiles/* directory:

- *Measurement~Locations*
- *Selected~Measurements*
- *Auto_Limit~Files*

When an Auto mode activity is executed, the VM700A goes to these directories to read files that control: (1) the video signal line number for key measurement

parameters, (2) the measurements that should be made, and (3) the *high* and *low* limits that are permissible for each measured parameter. When the VM700A is shipped from the factory, System~Default files are placed in each directory. If you want to change the defaults, you must create a new file, and then make the appropriate changes to that file.

After you have created one or more new files in the *Measurement~Locations*, *Selected~Measurements*, and/or *Auto_Limit~Files* directories, you must enable them. This function is accomplished by modifying the contents of: (1) the Video_Source file, and (2) the Source_Selection~Video file.

7.1.1 Measurement~Locations File

In the Auto mode, the VM700A will make measurements on any selected line. However, in the PAL mode under certain conditions, the instrument must be given information as to where the specific signal is located on the line. Both the PAL and NTSC instruments permit the user to select specific lines for a variety of measurements. Common PAL measurements include the following:

- *Pulse* and *bar*, where locations of the 2T pulse and bar must be specified.
- *Chrominance to luminance gain and delay*, where locations of the modulated pulse and pulse width (i.e. 20T or 10T) must be specified.
- *Multiburst*, where locations of the burst packets must be specified. (Note that the factory set locations for multiburst are correct for the multiburst signal generated by the Tektronix TSG271 (PAL) signal generator.)

In the NTSC instrument, line numbers for six basic test signals may be selected. Three of the most common measurements include the following:

- *FCC composite*
- *NTC-7 composite*
- *FCC colorbars*

This section of the VM700A Configuration Guidebook details how these important parameters may be entered into a Measurement~Locations file, which is then allocated to a Video_Source file, and in turn to the Source_Selection~Video file. In This way the VM700A will automatically refer to a set of specific measurement locations every time the Auto mode is used.

The files in the *Measurement~Locations* directory contain information used by both the Auto and Measure modes. The Measurement~Locations file for each channel is designated in the active file in the *Video_Source~Files* directory. At this point it might be helpful to look again at Figure 4.1 (see page 4-3) to reinforce how the files of the VM700A interrelate.

7.1.2 Changing the Measurement~Locations File

If the video signal line selections specified in the System~Default file do not meet the needs of an Auto mode measurement, you will need to create a new file with the correct parameters. This is accomplished with the Measurement~Locations file. Follow these steps:

- Press the Configure button.
- Select **Configure Files.**
- Select **Measurement Locations.**
- Create a new file using **Create File.**

The VM700A will ask for a file to be used as a template. Select the System~Default file or any other available file as the starting point for defining a new set of locations for the Auto mode. The System~Default file, which is always present, contains factory-set measurement locations that cannot be changed unless copied into a new file.

Because the Measurement~Locations file controls both the Auto and Measure mode locations, if you have already created a new file for Measure mode applications (discussed in Section 6.1.2), you can simply modify that file. It is neither necessary nor desirable to create multiple Measurement~Locations files specifically for the Auto and Measure modes.

- Enter the name of the new file using the keyboard function.
- Select **Done** when the file name has been completed. Note that file names cannot include carriage returns or spaces. To get a second line in the file name, use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.

Now that you have created a new file, you can adjust the Auto mode line selection parameters to meet the requirements of the application. Perform these steps to change one or more line numbers:

- Rotate the Control knob to scroll the screen and highlight the Auto mode line parameter that you wish to change. Note that the Measurement~Locations file controls both Auto and Measure mode line numbers. For Auto mode applications, be sure to stay within the Auto mode section.
- Touch the appropriate line number; a box will appear around the number.
- Rotate the Control knob to select the desired line number.
- Select **Accept Input** to accept the parameters and return the Control knob to its scrolling function. (A typical Measurement~Locations file is shown in Figure 7.1.)

System Default measurement locations file

	Field	Line	Ref	Center Location
Zero Carrier Pulse	1	16	no	25.5 µs

Waveform mode

IRE reference from Zero Carrier Pulse (if enabled above) takes precedence over bar reference. If neither reference is available because it is either disabled, or enabled but not present, then 100 IRE = 714 mV is used.

IRE bar reference	no
Fix 0 IRE to	Back Porch

Auto Mode

	Field	Line
Composite	1	18
Multiburst	1	17
NTC-7 Combination	1	17
VIRS	1	19
Color Bars	2	17
Noise Line (Quiet)	1	12

Measure Mode (Default Line Select)

	Field	Line
Bar LineTime	1	18
Chroma Freq Resp	1	15
DGDP	1	18
Luminance NonLinearity	1	18
Chrominance NonLinearity	1	17
MultiBurst	1	18
ColorBar	2	17
GroupDelay SinX_X	2	18
Bounce	1	30
Noise Spectrum	1	12
H Timing	1	100
ChromLum GainDelay	1	18
K Factor	1	18
T Bar (SD)	1	18
Amplitude units	IRE	
Sampling	asynchronous	

Figure 7.1 System~Default Measurement~Locations file.

Example: The system default location for Auto mode Multiburst measurement is Field 1, Line 17. Suppose you need to change that location to Field 1, Line 18. Follow these steps:

1. Create a new Measurement~Locations file called "Local_2". Follow the steps outlined previously in this section.
2. Scroll down to the Auto mode subheading. Next, scroll to the Multiburst entry.
3. Touch the line number (now 17). A box will appear around the number.
4. Turn the Control knob until the number 18 appears.
5. Select **Accept Input**.

- Finish by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Measurement~Locations file. The new file, however, will not be active until it is enabled by making the proper entry in the Video_Source~File.

Example Note: Keep your new file ("Local_2") for now; in Section 7.1.6 (Video_Source~Files) we will use it to illustrate how to enable the new Measurement~Locations file.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

7.1.2.A *Operator's Manual Reference: 8-4*

7.1.3 Changing the Selected~Measurements File

Files in the *Selected~Measurements* directory contain a list of all the measurements that the Auto mode can perform. The files allow you to select a subset of those measurements for specific applications. The current Selected~Measurements file provides the Auto mode with a list of measurements to perform, while the active Auto_Limit file (see Section 7.1.4) specifies the limits at which those measurements will generate Caution or Alarm messages.

The Selected~Measurements System~Default file is the only file in the *Selected~Measurements* directory when the VM700A is shipped. This file cannot be edited, and all measurements within the file are selected. If this situation is acceptable for your Auto mode application, no changes are required to the file. However, if you want to run only a portion of the available Auto mode tests, you must create a new file and change the contents to reflect the measurements you want to perform. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Selected Measurements**.
- Create a new file with **Create File**.

The system will ask for a file to be used as a template. Select the System Default file or any other available file as the starting point for defining a new set of selected measurements. The System~Default file, which is always present, has all of the measurements selected.

- Name the new file using the keyboard.
- Select **Done** when the file name has been completed. Note that file names cannot have spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.
- Select the required measurements for the application.

Measurements are selected by placing them on the left hand side of the screen. Measurements are deselected by placing them on the right hand side of the screen:

- Rotate the Control knob to scroll the screen and highlight the measurement of interest.
- Set the highlighted function to the appropriate side of the screen by touching either the left or right side.
- Continue this procedure until all required measurements have been selected.

Figure 7.2 shows a portion of a modified Selected~Measurements file. The measurements listed on the left are "selected" and those listed on the right are "unselected". Note that this operation may be simplified by the option of initially

Selected		Not Selected	
		RALP	Avg. Picture Level (5)
		RBAT	Bar Top (% Carr)
		RBLL	Blanking Level (% Carr)
		RBAA	Bar Amplitude (IRE)
		RSYA	Sync Amplitude (% Bar/IRE)
		RBVP	Blanking Variation (% Carr)
		RBVI	Blanking Variation (% Bar/IRE)
		RSVP	Sync Variation (% Carr)
		RSVI	Sync Variation (% Bar/IRE)
		RBAP	Burst Amplitude (% Sync)
		RVAI	Burst Amplitude (% Bar/IRE)
RHB4	FCC H Blanking (µs)		
RSYU	FCC Sync Width (µs)		
RSSU	FCC Sync-Setup (µs)		
RFPU	FCC Front Porch (µs)		
RSBE	Sync to Burst End (µs)		
RBZU	Breezeway Width (µs)		
RBWC	FCC Burst Width (Cycles)		
RSRN	Sync Risetime (ns)		
RSFN	Sync Falltime (ns)		
RRHB	RS-170A H Blanking (µs)		
RRSW	RS-170A Sync Width (µs)		
RRSS	RS-170A Sync-Setup (µs)		
RRFP	RS-170A Front Porch (µs)		
RSBS	Sync to Burst Start (µs)		
RRBW	RS-170A Burst Width (Cycles)		
		RVB4	V Blank 4 IRE F1 (Lines)
		RVB5	V Blank 4 IRE F2 (Lines)
		RVB2	V Blank 20 IRE F1 (Lines)
		RVB3	V Blank 20 IRE F2 (Lines)
		REWP	FCC Equalizer (% SW)
		RSWU	FCC Serration(µs)
		RREU	RS-170A Equalizer (µs)
		RRSU	RS-170A Serration(µs)
RFCB	FCC Color Bars		

Figure 7.2 A portion of a modified Selected~Measurements file.

selecting all or none of the measurements for change. This is accomplished by using the **Select None** or **Select All** softkeys.

Example: The System~Default Selected~Measurements file has all measurements selected. Suppose that for a particular application you only want to measure certain horizontal sync parameters. Follow these steps:

1. Create a new Selected~Measurements file called "Select_2". Follow the steps outlined previously in this section.
2. Scroll through the file. You will note that there are many possible measurements. Because you want to run only a small number of them, press the **Select None** softkey.
3. You will now have to go through the file and select the measurements to be conducted.
4. Scroll to "RHB4 FCC H Blanking (µs)." Touch the left hand side of the screen; the measurement will be transferred to the "selected" category.
5. Scroll to "RSYU FCC Sync Width (µ)." Touch the left hand side of the screen; the measurement will be transferred to the "selected" category.
6. Continue this process until all of the measurements you want to make have been selected.

- Finish and save the changes by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Selected~Measurements file. The new file, however, will not be active until it is enabled by making the proper entry in the Video_Source~File.

Example Note: Keep your new file ("Select_2") for now; in Section 7.1.6 (Video_Source~Files) we will use it to illustrate how to enable the new Selected~Measurements file.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

7.1.3.A *Operator's Manual Reference: 3-23, 8-4, 8-5*

7.1.4 Auto_Limit~File

The *Auto_Limit~Files* directory contains limit files used for the VM700A Auto mode. A limit file lists all of the measurements available for the Auto mode. Each measurement has limits that, when exceeded, produce Caution or Alarm messages on the display, and can generate error logging. Both Caution and Alarm limits can be set for every measurement.

The Auto_Limit~File in use is specified by the active file in the *Video_Source~Files* directory.

A file from the *Selected_Measurements* directory is used in conjunction with a file from the *Auto_Limit~Files* directory to provide the Auto mode with a list of measurements to be made, and the limits (high and low) for those measurements.

The first line of each file in the *Auto_Limit~Files* directory is the title line. The second line is the number of consecutive times the VM700A must find a value outside the Alarm limits (high or low) before sending a report of the error to the Log port. It should be noted that all Cautions and Alarms encountered in the Auto mode are displayed on the screen of the VM700A, however, only Alarms of a number equal to or greater than the consecutive errors limit are sent to the Log port.

Note that it is only necessary to alter the limits for those parameters that will be measured. All other limits may be left at their default values.

7.1.5 Changing the Auto_Limit~File

The VM700A includes a group of default files in the *Auto_Limit~Files* directory. If these do not meet your needs for a particular application, use the following procedure to create a new Auto_Limit file:

- Press Configure button.
- Select **Configure Files**.
- Select **Auto_Limit Files**.
- Create a new file with **Create File**.

The system will ask for a file to be used as a template. Select one of the System~Default files, or any other available file as the starting point for defining a new set of limits. The System~Default Auto_Limit~Files include the following:

- End to End
- Long Haul
- Medium Haul
- Short Haul
- Satellite

These System~Default files contains factory-set measurement limits that cannot be changed unless copied into a new file.

- Enter the name of the new file using the keyboard function.
- Select **Done** when the file name has been completed. Note that file names cannot include carriage returns or spaces. To get a second line in the file name, use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.
- Rotate the Control knob to scroll the screen and highlight the line with the limit you wish to change or remove.
- Touch the limit you wish to change or remove.
- Rotate the Control knob to select the desired value or select **Enter Undefined** if you wish to remove the limit.
- Select **Accept Input** to accept the parameters and return the Control knob to its scrolling function. (An example file is shown in Figure 7.3.)

Example: The System~Default Auto_Limit~File sets upper and lower limits for Caution and Alarm parameters. Suppose that you have an application in which you will be adjusting the signal path. You have selected the parameters you wish to check by creating a new Selected~Measurements file, "Select_2" (see Section 7.1.3). While you make adjustments to your system, you do not want Alarm reports generated. You, therefore, need to modify the Auto_Limit~File. Follow these steps:

1. Create a new Auto_Limit~File called "Limit_2". Follow the steps outlined previously in this section.
2. Scroll through the file. Note that because you are only conducting a limited number of measurements (determined by the "Select_2" file), you need to modify Alarm limits just for the parameters that are selected.
3. Scroll to "FCC H Blanking (μs)." Touch the Alarm Lower Limit value. A box will appear around it.
4. Turn the Control knob to set a new lower limit, or press the **Enter Undefined** softkey.
5. Press **Accept Input** to accept the new parameter.
6. Scroll to "FCC Sync Width (μ)." Touch the Alarm Lower Limit value. A box will appear around it.
7. Turn the Control knob to set a new lower limit, or press the **Enter Undefined** softkey.
8. Press **Accept Input** to accept the new parameter.
9. Continue this process until all of the limits you want to change have been adjusted.

- Finish by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

SystemDefault
This is the end-to-end supplied limits file for the NTSC version.
2 consecutive error(s) before reporting

	Caution		Alarm	
	Lower	Upper	Lower	Upper
Avg. Picture Level (%)	——	——	——	——
Bar Top (% Carr)	10.0	15.0	10.0	15.0
Blanking Level (% Carr)	74.0	76.0	72.5	77.5
Bar Amplitude (IRE)	——	——	96.0	104.0
Sync Amplitude (% Bar/IRE)	37.0	43.0	36.0	44.0
Blanking Variation (% Carr)	——	——	——	——
Blanking Variation (% Bar/IRE)	——	——	——	——
Sync Variation (% Carr)	——	——	0.0	5.0
Sync Variation (% Bar/IRE)	——	——	——	——
Burst Amplitude (% Sync)	——	——	——	——
Burst Amplitude (% Bar/IRE)	37.0	43.0	36.0	44.0

	Caution		Alarm	
	Lower	Upper	Lower	Upper
FCC H Blanking (µs)	10.85	11.35	10.50	11.50
FCC Sync Width (µs)	4.50	5.0	4.40	5.10
FCC Sync-Setup (µs)	9.4	——	9.20	——
FCC Front Porch (µs)	1.4	——	1.30	——
Sync to Burst End (µs)	5.0	7.80	5.0	7.90
Breezeway Width (µs)	0.28	——	0.40	——
FCC Burst Width (Cycles)	——	——	8.00	11.00
Sync Risetime (ns)	0.0	190.0	0.0	250.0
Sync Falltime (ns)	0.0	190.0	0.0	250.0
RS-170A H Blanking (µs)	10.71	11.09	10.65	11.15
RS-170A Sync Width (µs)	4.61	4.79	4.58	4.82
RS-170A Sync-Setup (µs)	9.31	9.49	9.28	9.52
RS-170A Front Porch (µs)	1.41	1.59	1.38	1.62
Sync to Burst Start (µs)	5.21	5.39	5.18	5.42
RS-170A Burst Width (Cycles)	——	——	——	——

	Caution		Alarm	
	Lower	Upper	Lower	Upper
V Blank 4 IRE F1 (Lines)	18.5	20.5	18.0	21.0
V Blank 4 IRE F2 (Lines)	18.5	20.5	18.0	21.0
V Blank 20 IRE F1 (Lines)	20.1	20.9	19.9	21.1
V Blank 20 IRE F2 (Lines)	20.1	20.9	19.9	21.1

Figure 7.3 Auto_Limit file System~Default values.

FCC Equalizer (% S.W.)	46.0	54.0	45.0	55.0
FCC Serration (µs)	3.98	4.92	3.80	5.10
RS-170A Equalizer (µs)	2.21	2.39	2.18	2.42
RS-170A Serration (µs)	4.61	4.79	4.58	4.82

	Caution		**Alarm**	
Color Bars	Lower	Upper	Lower	Upper
Ampl Error Yellow (%)	-15.0	15.0	-20.0	20.0
Ampl Error Cyan (%)	-15.0	15.0	-20.0	20.0
Ampl Error Green (%)	-15.0	15.0	-20.0	20.0
Ampl Error Magenta (%)	-15.0	15.0	-20.0	20.0
Ampl Error Red (%)	-15.0	15.0	-20.0	20.0
Ampl Error Blue (%)	-15.0	15.0	-20.0	20.0
Phase Error Yellow (Deg)	-7.5	7.5	-10.0	10.0
Phase Error Cyan (Deg)	-7.5	7.5	-10.0	10.0
Phase Error Green (Deg)	-7.5	7.5	-10.0	10.0
Phase Error Magenta (Deg)	-7.5	7.5	-10.0	10.0
Phase Error Red (Deg)	-7.5	7.5	-10.0	10.0
Phase Error Blue (Deg)	-7.5	7.5	-10.0	10.0
Chr/Lum Ratio Error Yellow (%)	-15.0	15.0	-20.0	20.0
Chr/Lum Ratio Error Cyan (%)	-15.0	15.0	-20.0	20.0
Chr/Lum Ratio Error Green (%)	-15.0	15.0	-20.0	20.0
Chr/Lum Ratio Error Magenta (%)	-15.0	15.0	-20.0	20.0
Chr/Lum Ratio Error Red (%)	-15.0	15.0	-20.0	20.0
Chr/Lum Ratio Error Blue (%)	-15.0	15.0	-20.0	20.0

	Caution		**Alarm**	
	Lower	Upper	Lower	Upper
VIRS Setup (% Bar/IRE)	5.7	9.3	5.0	10.0
VIRS Luminance Ref (% Bar/IRE)	47.5	52.5	45.0	55.0
VIRS Chroma Ampl (% Burst)	95.0	105.0	90.0	110.0
VIRS Chroma Ampl (% Bar/IRE)	38.0	42.0	36.0	44.0
VIRS Chroma Phase (Deg)	-5.0	5.0	-10.0	10.0
Line Time Distortion (%)	0.0	1.4	0.0	2.0
Pulse/Bar Ratio (%)	95.5	104.5	94.0	106.0
2T Pulse K-Factor (% Kf)	——	——	0.0	2.5
IEEE-511 ST Dist (% SD)	0.0	2.0	0.0	3.0

	Caution		**Alarm**	
	Lower	Upper	Lower	Upper
S/N NTC7 Unweighted (dB)	——	——	57.0	——
S/N NTC7 Lum-Wghtd (dB)	——	——	54.0	——

Figure 7.3, Continued.

S/N Unif Unweighted (dB)	——	——	57.0	——
S/N Unif Lum-Wghtd (dB)	——	——	54.0	——
S/N Periodic (dB)	——	——	57.0	——
S/N.2 NTC7 Unwgtd (dB)	——	——	57.0	——
S/N.2 NTC7 Lum-Wghtd (dB)	——	——	54.0	——
S/N.2 Unif Unwgtd (dB)	——	——	57.0	——
S/N.2 Unif Lum-Wghtd (dB)	——	——	54.0	——
Chroma-Lum Delay (ns)	-45.0	45.0	-60.0	60.0
Chroma-Lum Gain (%)	95.0	105.0	93.0	107.0
Differential Gain (%)	0.0	7.0	0.0	10.0
Differential Phase (Deg)	0.0	2.2	0.0	3.0
Lum Non-Linearity (%)	0.0	7.0	0.0	10.0
Relative Burst Gain (%)	-15.0	15.0	-20.0	20.0
Relative Burst Phase (Deg)	-7.5	7.5	-10.0	10.0

	Caution		**Alarm**	
	Lower	Upper	Lower	Upper
FCC Multiburst Flag (% Carr)	10.6	14.4	10.0	15.0
FCC Multiburst Flag (% Bar/IRE)	92.5	107.5	90.0	110.0
FCC MB Packet #1 (% Flag)	——	——	57.1	63.0
FCC MB Packet #2 (% Flag)	——	——	56.2	64.2
FCC MB Packet #3 (% Flag)	——	——	54.8	65.6
FCC MB Packet #4 (% Flag)	——	——	53.5	67.3
FCC MB Packet #5 (% Flag)	——	——	56.0	64.3
FCC MB Packet #6 (% Flag)	——	——	——	——

	Caution		**Alarm**	
	Lower	Upper	Lower	Upper
NTC7 Multiburst Flag (% Carr)	10.6	14.4	10.0	15.0
NTC7 Multiburst Flag (% Bar/IRE)	92.5	107.5	90.0	110.0
NTC7 MB Packet #1 (% Flag)	——	——	47.6	52.5
NTC7 MB Packet #2 (% Flag)	——	——	46.8	53.5
NTC7 MB Packet #3 (% Flag)	——	——	45.7	54.7
NTC7 MB Packet #4 (% Flag)	——	——	44.6	56.1
NTC7 MB Packet #5 (% Flag)	——	——	46.7	53.6
NTC7 MB Packet #6 (% Flag)	——	——	43.6	57.4

	Caution		**Alarm**	
	Lower	Upper	Lower	Upper
NTC7 20 IRE Chroma (IRE)	——	——	15.0	25.0
NTC7 80 IRE Chroma (IRE)	——	——	75.0	85.0
NTC7 Chr NL Phase (Deg)	——	——	0.0	5.0

Figure 7.3, Continued.

ICPM (Deg)	-2.0	2.0	-3.0	3.0
SCH Phase (Deg)	-45.0	45.0	——	——
Field Time Distortion (% Bar)	——	——	-3.0	3.0

Figure 7.3, Continued.

You now have a modified Auto_Limit~File. The new file, however, will not be active until it is enabled by making the proper entry in the Video_Source~File.

Example Note: Keep your new file ("Limit_2") for now; in Section 7.1.6 (Video_Source~Files) we will use it to illustrate how to enable the new Auto_Limit~File.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

7.1.5.A *Operator's Manual Reference: 3-13, 8-3, 8-4*

7.1.6 Changing the Video_Source~File

The Video_Source~File ties together the desired Measurement~Locations file, Selected~Measurements file, and Auto_Limit~File for use in a specific Auto mode task. If you have created a new Measurement~Locations file, Selected_Measurements file, and/or Auto_Limit~File, you must change the Video_Source~File to enable the new parameters. Proceed as follows:

- Press the Configure button.
- Select **Configure Files**.
- Select **Video_Source Files**.
- Create a new file with **Create File**.

The system will ask for a file to be used as a template. Select the System~Default file or any other available file as the starting point for defining a new set of Auto mode parameters. The System~Default file, which is always present, points to further System Default files in the *Measurement~Locations*, *Selected~Measurements*, and *Auto_Limit~Files* directories.

- Enter the name of the new file using the keyboard.
- Select **Done** when completed. Note that files cannot have spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.
- Identify which entries in the file need to be changed.
- Rotate the Control knob to scroll the screen and highlight the line that contains the file you wish to modify.
- Touch the file name on the highlighted line; a box will appear around it.
- Rotate the Control knob to display the desired file.
- Select **Accept Input** to accept the configuration and return the Control knob to its scrolling function. (An example file is shown in Figure 7.4.)

Example: The System~Default Video_Source~File specifies System~Default files for the *Measurement~Locations*, *Selected~Measurements*, and *Auto_Limit~Files* directories. In Section 7.1.2 we created a new Measurement~Locations file called "Local_2." In Section 7.1.3 we created a new Selected~Measurements file called "Select_2." In Section 7.1.5 we created a new Auto_Limit~File called "Limit_2." We now want to enable these three files. Follow these steps:

1. Create a new Video_Source~File called "Source_2". Follow the steps outlined previously in this section.
2. Scroll down to the Auto Limits File entry.
3. Touch the file name (now one of the System~Default files). A box will appear around the name.
4. Turn the Control knob until the name "Limit_2" appears.
5. Select **Accept Input**.
6. Next, scroll down to the Measurement Locations File entry.

Channel Configuration System Defaults File

Auto Limits File:	EndToEnd
Measure Limits File:	System~Default
Measurements Location File:	System~Default
Selected Measurements File:	System~Default
Auto Sync Source:	Locked to Source
Source Name:	System Default
Video Printout Title:	VM700A Video Measurement Set

Figure 7.4 System~Default Video_Source~File.

7. Touch the file name (now SystemDefault). A box will appear around the name.
8. Turn the Control knob until the name "Local_2" appears.
9. Touch **Accept Input**.
10. Scroll down to the Selected Measurements File entry.
11. Touch the file name (now SystemDefault). A box will appear around the name.
12. Turn the Control knob until the name "Select_2" appears.
13. Select **Accept Input**.

- Select **Update & Exit** to accept the changes. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

You now have a modified Video_Source~File. The new file, however, will not be active until it is enabled by making the proper entry in the Source_Selection~Video file.

Example Note: Keep your new file ("Source_2") for now; in Section 7.1.7 (Source_Selection~Video) we will use it to illustrate how to enable the new Video_Source~File.

At this point, select another file or directory to work on, or touch **Leave Directory** to access the next lower branch of the VM700A file tree.

- Return to normal operation by pressing the Configure button.

Note that the Source Name and Printout Title entries in the Video_Source~File may also be changed. See Sections 5.1.5, and 5.1.6, respectively.

7.1.6.A *Operator's Manual Reference: 3-10/3-12*

7.1.7 Changing the Source_Selection~Video File

The Source_Selection~Video file controls assignment of the three video inputs to the VM700A. As discussed in Chapter 5, the Source_Selection~Video file is the top-level organizational element of the instrument. Refer to Figure 4.1 (page 4-3) for an overview of the VM700A file structure.

If you have created a new Video_Source~File (discussed in Section 7.1.6), you must modify the Source_Selection~Video file to enable the Auto mode new operating parameters. Proceed as follows:

- Press the Configure button.
- Select **Configure Files**.
- Select **Source_Selection Video**.
- Rotate the Control knob to scroll the screen and highlight the input on which you want to make changes.
- Touch the screen on the existing file name; a box will appear around it.
- Rotate the Control knob to display the desired file in the *Video_Source~Files* directory.
- Select **Accept Input** to accept the change and return to Control knob to its scrolling function. (Figure 7.5 shows a typical Source_Selection~Video file.)

Example: The Source_Selection~Video file, as shipped from the factory, specifies the System~Default file in the *Video_Source~Files* directory for each channel of the VM700A. In Section 7.1.6 we created a new Video_Source~File called "Source_2." We now want to enable that file so that it will be used whenever the Source C input is selected. Follow these steps:

1. Call up the Source_Selection~Video file by following the steps outlined previously in this section.
2. Scroll down to the Source C entry.
3. Touch the file name (now SystemDefault). A box will appear around the name.
4. Turn the Control knob until the name "Source_2" appears.
5. Select **Accept Input**.

- Finish the process by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the Source_Selection~Video file. A prompt will ask you to confirm your action.

The new Video_Source~File, and the files to which it points, is now active on Source C.

Video	NTSC Video Source File Name	
	Standard	
Source A:	NTSC	System~Default
Source B:	NTSC	System~Default
Source C:	NTSC	System~Default

Figure 7.5 System~Default Source_Selection~Video file.

The Source_Selection~Video file is also used to enable Timed Events operations. See Section 7.3.

- Return to normal operation by pressing the Configure button.

7.1.7.A *Operator's Manual Reference: 3-10/3-12*

7.1.8 Using the Auto Mode

The Auto mode of the VM700A executes a predetermined list of measurements. Because of the large number of measurements typically performed, not all of the data can be displayed on the screen at once. The Control knob is used to scroll the display to view all of the measurements.

In Auto mode, the VM700A lists measurement names on the left-hand side of the display. Each name is followed by the measurement result, and a notation of the measurement reference (where applicable).

When user-defined limits are violated, the out-of-spec parameters are printed on the screen, and an indicator appears between the *Measurement Result* readout and the *Violated Limits-Lower* column. One of two indicators will appear:

- Single asterisk ("*"): indicates that a *Caution Limit* has been violated.
- Double asterisk ("**"): indicates that an *Alarm Limit* has been violated.

If a measurement cannot be made for some reason, the Result readout is replaced with a line of dashes, and is considered a Limit Violation. The nature of the problem that prevents a measurement from being made is usually noted in the *Comments* column of the display (far right side).

7.1.8.A *Operator's Manual Reference: 8-1, 8-2*

7.2 Communicating With External Devices

The VM700A has the ability to communicate with an external printer, terminal, or personal computer. This capability permits reports of various types to be generated, and complete remote control of the instrument from a distant site.

7.2.1 Printing Tabulated Results

Files are written into the *Measurement~Results* directory when you exit the Auto mode (assuming that the Auto mode had sufficient time to complete one cycle of selected measurements). One file with an appropriate name (such as "Auto") is written. If a file with the same name exists when the new file is written, the old file will be erased.

After results have been written to a Measurement~Results file, they can be printed by selecting the **Print File** softkey. The file can also be renamed, deleted, or viewed.

To print tabulated results of an Auto mode measurement, follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Measurement Results**
- Select **Print File**.
- Select the appropriate Results File. An example Auto mode printout is shown in Figure 7.6 (see next page).

Note that the results of each Auto mode are only stored when you exit the Auto mode. If the relevant signal is removed before the measurement application is ended, invalid results will be stored in the results file.

7.2.1.A *Operator's Manual Reference: 3-15, 3-16, 3-21*

Channel A	**Source System Default** VM700A Video Measurement Set				
System Default			Violated Limits		
			Lower	Upper	
Bar Top	—— % Carr	**	10.0	15.0	Bar Not Found
Blanking Level	—— % Carr	**	72.5	77.5	ZC Pulse Unselected
Bar Amplitude	—— IRE	**	96.0	104.0	Bar Not Found
Sync Amplitude	39.9 IRE				100 IRE = 714 mV
Blanking Variation	—— % Carr				ZC Pulse Unselected
Blanking Variation	0.2 IRE				100 IRE = 714 mV
Sync Variation	—— % Carr	**	0.0	5.0	ZC Pulse Unselected
Sync Variation	0.1 IRE				100 IRE = 714 mV
Burst Amplitude	100.4 % Sync				
Burst Amplitude	40.1 IRE				100 IRE = 714 mV
FCC H Blanking	—— µs	**	10.50	11.50	Not Found
FCC Sync Width	4.84 µs				
FCC Sync-Setup	—— µs	**	9.20	——	No Setup
FCC Front Porch	—— µs	**	1.30	——	No Setup
Sync to Burst End	7.87 µs	*	5.00	7.80	
Breezeway Width	0.56 µs				
FCC Burst Width	8.8 Cycles				
Sync Risetime	141 ns				
Sync Falltime	141 ns				
RS-170A H Blanking	—— µs	**	10.65	11.15	Not Found
RS-170A Sync Width	4.70 µs				
RS-170A Sync-Setup	—— µs	**	9.28	9.52	No Setup
RS-170A Front Porch	—— µs	**	1.38	1.62	No Setup
Sync to Burst Start	5.31 µs				
RS-170A Burst Width	9.0 Cycles				
V Blank 4 IRE F1	—— Lines	**	18.0	21.0	Not Found
V Blank 4 IRE F2	—— Lines	**	18.0	21.0	Not Found
V Blank 20 IRE F1	—— Lines	**	19.9	21.1	Not Found
V Blank 20 IRE F2	—— Lines	**	19.9	21.1	Not Found
FCC Equalizer	50.4 % S.W.				
FCC Serration	4.56 µs				
RS-170A Equalizer	2.30 µs				
RS-170A Serration	4.70 µs				
VIRS Setup	—— % Bar	**	5.0	10.0	Not Found
VIRS Luminance Ref	—— % Bar	**	45.0	55.0	Not Found
VIRS Chroma Ampl	—— % Burst	**	90.0	110.0	Not Found

Figure 7.6 Printed results of an Auto mode measurements file.

VIRS Chroma Ampl	—— % Bar	**	36.0	44.0	Not Found
VIRS Chroma Phase	—— Deg	**	-10.0	10.0	Not Found
Line Time Distortion	—— %	**	0.0	2.0	No Composite VITS
Pulse/Bar Ratio	—— %	**	94.0	106.0	No Composite VITS
2T Pulse K-Factor	—— % Kf	**	0.0	2.5	No Composite VITS
IEEE-511 ST Dist	—— % SD	**	0.0	3.0	No Composite VITS
S/N NTC7 Unweighted	72.8 dB				RMS (Ref 714 mV)
S/N NTC7 Lum-Wghtd	79.4 dB				RMS (Ref 714 mV)
S/N Unif Unweighted	71.9 dB				RMS (Ref 714 mV)
S/N Unif Lum-Wghtd	80.0 dB				RMS (Ref 714 mV)
S/N Periodic	—— dB	**	57.0	——	Random > Periodic
S/N.2 NTC7 Unwghtd	443.8 dB				RMS (Ref 714 mV)
S/N.2 NTC7 Lum-Wghtd			451.4 dB		
S/N.2 Unif Unwghtd	443.0 dB				RMS (Ref 714 mV)
S/N.2 Unif Lum-Wghtd	451.8 dB				RMS (Ref 714 mV)
Chroma-Lum Delay	—— ns	**	-60.0	60.0	No Composite VITS
Chroma-Lum Gain	—— %	**	93.0	107.0	No Composite VITS
Differential Gain	—— %	**	0.00	10.00	No Composite VITS
Differential Phase	—— Deg	**	0.00	3.00	No Composite VITS
Lum Non-Linearity	—— %	**	0.00	10.00	No Composite VITS
Relative Burst Gain	—— %	**	-20.00	20.00	No Composite VITS
Relative Burst Phase	—— Deg	**	-10.00	10.00	No Composite VITS
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	No NTC-7 Combination
NTC7 Multiburst Flag	—— % Bar	**	90.0	110.0	No NTC-7 Combination
NTC7 MB Packet #1	—— % Flag	**	47.6	52.5	No NTC-7 Combination
NTC7 MB Packet #2	—— % Flag	**	46.8	53.5	No NTC-7 Combination
NTC7 MB Packet #3	—— % Flag	**	45.7	54.7	No NTC-7 Combination
NTC7 MB Packet #4	—— % Flag	**	44.6	56.1	No NTC-7 Combination
NTC7 MB Packet #5	—— % Flag	**	46.7	53.6	No NTC-7 Combination
NTC7 MB Packet #6	—— % Flag	**	43.6	57.4	No NTC-7 Combination
NTC7 20 IRE Chroma	—— IRE	**	15.0	25.0	No NTC-7 Combination
NTC7 80 IRE Chroma	—— IRE	**	75.0	85.0	No NTC-7 Combination
NTC7 Chr NL Phase	—— Deg	**	0.0	5.0	No NTC-7 Combination

Figure 7.6, Continued.

NTC7 Chr-Lum Intmd	____ IRE	**	-4.0	4.0	No NTC-7 Combination
ICPM	____ Deg	**	-3.0	3.0	ZC Pulse Unselected
SCH Phase	0.4 Deg				
Field Time Dist	0.11 % Bar				Full-Field Sq. Wave
FCC Color Bars					
	Amplitude Error (%)		Phase Error (Deg)	(%)	Chr/Lum Ratio Error
Yellow	____ **		____ **	____ **	
Cyan	____ **		____ **	____ **	
Green	____ **		____ **	____ **	
Magenta	____ **		____ **	____ **	
Red	____ **		____ **	____ **	
Blue	____ **		____ **	____ **	

Figure 7.6, Continued.

7.2.2 Automatic Failure Logging Setup

The VM700A can be set up so that it will automatically provide an error printout when alarm limits are exceeded on the input signal. To activate this function, configure one of the physical serial ports to the Log function (see Section 3.2.1). Log is the *logical* port to which error reports are sent. Errors are logged when the VM700A, running the Auto mode, measures a parameter that is out of spec for a predetermined number of consecutive times.

When operating in the Auto mode, the VM700 continually cycles through all parameters and updates the selected measurements. A log can be created each time a measurement result crosses an Alarm Limit boundary, either when the measurement goes outside the limit or comes back within the limit. The Auto_Limits~File sets the number of consecutive errors that must occur before the fault is logged (see Section 7.1.4). An example error log is shown in Figure 7.7.

7.2.2.A *Operator's Manual Reference: 3-13, 3-14, 8-2/8-4*

Example error log:

			Violated Limits		
			Lower	Upper	
Bar Top	—— % Carr	**	10.0	15.0	Bar Not Found
Blanking Level	—— % Carr	**	72.5	77.5	ZC Pulse Unselected
Bar Amplitude	—— IRE	**	96.0	104.0	Bar Not Found
Sync Variation	—— % Carr	**	0.0	5.0	ZC Pulse Unselected
VIRS Setup	—— % Bar	**	5.0	10.0	Not Found
VIRS Luminance Ref	—— % Bar	**	45.0	55.0	Not Found
VIRS Chroma Ampl	—— % Burst	**	90.0	110.0	Not Found
VIRS Chroma Ampl	—— % Bar	**	36.0	44.0	Not Found
VIRS Chroma Phase	—— Deg	**	-10.0	10.0	Not Found
Line Time Distortion	—— %	**	0.0	2.0	No Composite VITS
Pulse/Bar Ratio	—— %	**	94.0	106.0	No Composite VITS
2T Pulse K-Factor	—— % Kf	**	0.0	2.5	No Composite VITS
IEEE-511 ST Dist	—— % SD	**	0.0	3.0	No Composite VITS

Figure 7.7 Example error log from the Auto mode of the VM700A.

7.3 Timed~Events

Files in the *Timed~Events* directory provide a facility for producing scheduled reports of Auto mode measurements. Timed events may also be used to initiate Functions at specific times. (Functions are discussed in Chapter 8.) Events occur at times specified in the current Timed~Events file. The Report port setting in the Communications~Setup file (see Section 3.2.1) must be set to Port 0 or Port 1 (not None), for reports to be generated. Timed~Events files use a 24-hour clock to specify event occurrences.

For report events, the VM700A looks in the *nvram0/Config-Files/Video_Source~Files* directory for the file named in the Timed~Events file. The Timed~Events file is enabled by placing the name of the active file in the Source_Selection~Video file.

When a report time occurs, the VM700A screen shows the Timed Report display, unless the instrument is in the remote mode. The Timed Report display includes the following data:

- A status line showing the channel and the Selected~Measurements file in use.
- A softkey labeled **Cancel Report**.
- The measurements being made.

Pressing the **Cancel Report** softkey halts execution of the Timed Report. After the report has been completed, the VM700A returns to the mode it was in when the report began.

The Copy button flashes until the report is either printed or canceled with the **Cancel Copy** softkey in the initial Configure menu.

7.3.1 Setting Up a Timed~Events File

The Timed~Events file tells the VM700A when to initiate an Auto mode Report. If your application does not require Auto mode execution and reports at specified times, you do not need to modify the Timed~Events file. If, however, your application does require that capability, a new Timed~Events file must be created. Follow these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Timed Events**.
- Create a new file with the **Create File** utility.

The system will ask for a file to be used as a template. The System~Default file may be used as a starting point. Alternatively, any other Timed~Events file may be used as a template.

- Name the new file using the keyboard.
- Select **Done** when the filename has been completed. Note that files cannot have spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.

Edit the file as necessary through the following steps:

- Rotate the Control knob to scroll the screen and highlight the line you want to change.
- Touch the parameter (Time, Channel, Type, or Selected File Name) on the line you wish to edit.
- Rotate the Control knob until the desired value appears.
- Select **Accept Input** to accept the data and return the Control knob to its scrolling function.
- You can enter a time of "Undefined" for an event by pressing the **Enter Undefined** softkey when the event time field is highlighted. An event with a time of "Undefined" is ignored.

You may also add lines to the Timed~Events file if necessary:

- Rotate the Control knob to highlight the last line of the file.
- Select the **Enter Report** softkey. The VM700A inserts a copy of the selected line below the current line.
- Edit the new line as necessary using the steps outlined previously in this section. Figure 7.8 shows a Timed~Events file edited to generate Auto mode reports at regular intervals.

System Default File for Timed Events

Time	Type	Channel	Selected File Name
15:32	report	A	System~Default
16:32	report	A	System~Default
17:32	report	A	System~Default
18:32	report	A	System~Default

Figure 7.8 Example Timed~Events file.

Example: In Section 7.1.6 we created a Video_Source~File named "Source_2." Let's assume that we want to automatically generate a report based on that Auto mode routine at 12:00 noon, using Source C as the input. Follow these steps:

1. Create a new Timed~Events file called "Events_2" by following the steps outlined previously in this section.
2. Use the Control knob to highlight a line that may be changed, or add a new line to the end of the file.
3. Touch the Time entry. A box will appear around the value.
4. Turn the Control knob until the time "12:00" appears.
5. Select **Accept Input**.
6. Touch the Type entry. A box will appear around the value.
7. Turn the Control knob until the text "report" appears.
8. Select **Accept Input**.
9. Touch the Channel entry. A box will appear around the value.
10. Turn the Control knob until the letter "C" appears.
11. Select **Accept Input**.
12. Touch the Selected File Name entry. A box will appear around the value.
13. Turn the Control knob until the text "Source_2" appears.
14. Select **Accept Input**.

- Finish the editing process by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the Timed~Events file. A prompt will ask you to confirm your action.

Your new Timed~Events file is now complete. To enable the file, you must make the appropriate entry in the Source_Selection~Video file, discussed in Section 7.1.7.

- Return to normal operation by pressing the Configure button.

7.4 Important Note

At this point you may want to reset the VM700A Auto mode files discussed in this chapter to their System~Default values. Simply follow the steps outlined so far to re-install the System~Default files in the following:

1. Measurement~Locations file (Section 7.1.2).
2. Selected~Measurements file (Section 7.1.3).
3. Auto_Limit~File (Section 7.1.5).
4. Video_Source~File (Section 7.1.6).
5. Source_Selection~Video file (Section 7.1.7.
6. Timed~Events file (Section 7.3.1)

Also, you may delete the new files you have created in the exercises outlined in this chapter. Follow the procedures detailed in Section 4.2.3 (Delete a File).

CHAPTER 8

FUNCTION KEYS

8.1 Introduction to Function Keys

The Function button provides a flexible method of making measurements. Individual routines may be combined to perform complex functions.

Function Keys feature a *learn* mode that simplifies programming. The user performs the required operations in the desired sequence and the steps are stored in a file that may be played back on demand.

Function Key routines are executed from the front panel Function button or from a PC at a remote location. Individual Functions can also be executed from within other Function Keys. Such embedded Functions provide the capability to build measurement routines in modules, simplifying programming.

Pressing the Function button displays the *FunctionKeys* directory, which contains sub-directories and Function Key files. Function Keys are executed from within the *FunctionKeys* directory.

8.1.1 Creating a Function Key Sub-Directory

Function Keys are created in the *FunctionKeys* directory, accessed through the Configure mode. A number of advanced measurements can be programmed through use of the Function utility, including conditional testing and branching to other sequences based on the state of a test result.

If you plan to create a number of different Function Keys, it is advisable that you make sub-directories of the */nvram0/FunctionKeys* directory to organize your new files.

Follow these steps to create a *Function Keys* sub-directory:

- Press the Configure button.
- Select **Function Keys**.
- Select **Create Directory**.
- A keyboard will appear to name the new directory. Type in the name of the new directory.
- Select **Done**. The directory is created, and the new directory becomes the current directory. This permits you to then create new files in the new directory. The path readout below the window shows the current directory path.

When assigning a directory name, observe the following rules:

- Spaces are not allowed in directory names. Use an underline (_) or dot (.) to separate words in a name.
- Pressing the **Set1** softkey allows you to enter numerals and punctuation characters.
- Pressing the **Set2** softkey allows you to enter various special characters.
- Pressing the **Shift** softkey allows you to enter upper-case characters, or more punctuation characters (in the case of the shifted version of Set1).
- Both the Set1 and Set2 character keys and the Shift key lock when selected. Set1 and Set2 are unlocked by touching the same key again, or by touching the unselected key of the pair.
- Shift is unlocked by touching **Shift** again.
- A maximum of 31 characters are allowed in a directory name.
- Use only upper- and lower-case letters, numbers, and the following punctuation characters: underline (_), dot (.), minus sign (-), plus sign (+), colon (:), and tilde (~) in names.
- The keyboard does not include the equivalent of a "Delete" key. To delete a character, position the cursor one space ahead of the character to be deleted and use the "Backspace" key.

Now that a new Function Key directory has been created, you may add files to it. See Section 8.1.3.

- When you are finished making or modifying files in the *FunctionKeys* directory, press **Leave Directory** to move one level lower on the directory tree. Or, press the Configure button to return to the previous instrument operating mode.

8.1.1.A *Operator's Manual Reference: 9-2*

8.1.2 Deleting a Function Key Sub-Directory

From time-to-time it may be necessary to perform file system maintenance on the *FunctionKeys* directory. You may, if necessary, delete sub-directories of the *FunctionKeys* directory that you have created. Follow these steps to delete a Function Key sub-directory:

- Press the Configure button.
- Select **Function Keys**.
- Select **Delete**.
- Select the directory to be deleted. Remember that only sub-directories of the *FunctionKeys* directory that you have created may be deleted.

Important Note: A directory must be empty of files before it can be deleted.

- The icon representing the selected directory "disintegrates" over a period of 6 seconds.
- To stop deletion, touch the screen anywhere inside the directory window before the disintegration is complete. Stopping the disintegration part way through this process has no effect on the directory.
- When you are finished making changes to the *FunctionKeys* directory, press **Leave Directory** to move one level lower on the directory tree. Or, press the Configure button to return to the previous instrument operating mode.

8.1.2.A *Operator's Manual Reference: 9-1*

8.1.3 Creating a Function Key File

Making new Function Key files is what the Function Key utility is all about. Follow these steps to create a new Function Key file:

- Press the Configure button.
- Select **Function Keys**.
- Select the appropriate Function Key sub-directory (if used).
- Select **Create Function**.

- A keyboard will appear to name the new file. Type in the name using the guidelines outlined in Section 4.2.2.
- Select **Done**.

The VM700A is now in the learn mode, and a new screen is displayed that contains additional softkeys used in programming a Function Key. In the learn mode, all user interactions with the instrument front panel are recorded. The Configure button LED blinks while the learn mode is active. Note that the learn mode is not active while the function programming screen is displayed. The function programming softkeys are:

- **Pause:** Selecting the **Pause** softkey suspends the learn mode while you set up the desired operational state of the VM700A.

When the instrument is properly set:
1. Press the Configure button to return to the Function Key programming menu.
2. Deselect **Pause** by pressing the softkey again.
3. Press the Configure button to transfer back to the operational state that you just setup.

- **Insert Message:** Selecting the **Insert Message** softkey displays the keyboard. You can enter up to four lines of 76 characters each. The text you type will be displayed in the lower section of the screen at the appropriate point in the Function Key playback sequence. When your text appears, the Function Key playback pauses, and the message "Press screen to continue" is displayed.
- **End:** Selecting the **End** softkey terminates the creation of a Function Key. The VM700A remains in the *FunctionKeys* directory in the Configure mode.
- **Loop:** Selecting the **Loop** softkey terminates creation of a Function Key, just as the **End** command. However, when executed, a Function Key terminated with **Loop** plays back continuously until halted by pressing the Function button again.
- **Abort:** Selecting the **Abort** softkey during the programming of a Function Key will delete the file you were creating.

After the Function Key file has been successfully created, press the Configure button to return the instrument to its previous operating state.

8.1.3.A *Operator's Manual Reference: 9-2, 9-3*

8.1.4 Example Function Key File

An example will help illustrate the process of creating a Function Key file. Follow these steps:

- Set-up the instrument in the Measure mode to check a series of convenient parameters on an input signal.
- Press the Configure button.
- Select **Function Keys**.
- Select the appropriate sub-directory, if used.
- Select **Create Function**.
- Name the Function using the keyboard.
- Select **Done** when the file name has been completed. Note that file names cannot include spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines specified in Section 4.2.2.
- If an operator prompt is desired, select **Insert Message** from the on-screen Function Key menu.
- Type in the operator prompt message as required.
- Press the Measure button.
- Select the appropriate Measure mode test.
- Make any adjustments necessary for the Measure mode test.
- Allow sufficient time for the VM700A to make the selected measurement.
- Press the Configure button.
- Select **End**.
- Return to normal operation by pressing the Configure button.

An example Function Key file is shown in Figure 8.1. Note the preamble at the beginning of the file. This preamble defines how the VM700A is set up at the beginning of the test, and forces the instrument to adopt exactly the same setup each time the Function Key is called. Also note the *disptext* command for the operator prompt text. In this example, the operator is instructed to "Switch generator to multiburst mode."

Correct operation of the Function Key utility can be verified by pressing the Function button and then selecting the routine that has just been programmed.

Remember that some settings of the VM700A are held in volatile RAM and are lost when the instrument is switched off. These include the *system line number*, which dictates the line that measurements will be made on, and presets for *line select* in both the waveform and vector displays. If required, a Function Key may be programmed that sets these parameters and others at power-up.

8.1.4.A *Operator's Manual Reference: 9-2, 9-3*

```
set VNCA System~Default
set VNCB System~Default
set VNCC System~Default
set GSRC 0
set GSSR 1
set GSNC 0
set GSYI 0
set GLN5 30
set GLN6 17
set GACP 6.63
set GACW 3
set GACL 0
set GACC 3
set GALM 1
set GAFA 0
set GASS 0
set GBCP 6.63
set GBCW 3
set GBCL 0
set GBCC 3
set GBLM 0
set GBFA 0
set GBSS 0
set GCCP 6.63
set GCCW 3
set GCCL 0
set GCCC 3
set GCLM 0
set GCFA 0
set GCSS 0
disptext \
Switch generator to multiburst mode
execute MultiBurst appstart
  appset averageMode_NTSC 1
  appstart
restoreconfig
```

Figure 8.1 Example of a Function Key file with operator text.

8.1.5 Executing a Function Key

After a Function Key has been created in the *FunctionKeys* directory of the Configure mode (see Section 8.1.3), it may be executed in the Function mode:

- Press the Function button.
- Select the appropriate directory, if used.
- Select the desired Function Key softkey by touching it.
- The Function Key is executed.

Note that the Function button LED flashes while a Function Key is being executed. Press the Function button at any time during execution to cancel a Function Key.

8.1.5.A *Operator's Manual Reference: 9-4*

8.1.6 Editing Function Key Files

When you create a Function Key, all interactions with the VM700A front panel are recorded, including the amount of time between each button press, softkey touch, or Control knob rotation. You can change any number of Function Key parameters, including timing and the amount of Control knob rotation, by editing the file.

Function Keys are edited in the *FunctionKeys* directory in the Configure mode. Follow these steps:

- Press the Configure button.
- Select **Function Keys**.
- Change to the appropriate sub-directory, if used.
- To edit a Function Key, touch the appropriate file.
- A list of commands that make up the selected Function Key is displayed on the screen.
- Rotate the Control knob to scroll through the commands.
- Four softkeys of the Function Key editor are displayed across the bottom of the screen.

The Function Key editor is simple to use. Four actions are allowed:

- **Insert Line:** Adds a line above the highlighted line in the file.
- **Delete Line:** Removes the highlighted line in the file.
- **Update & Exit:** Accepts the changes made to the file and exits the Function Key editor.
- **No Change & Exit:** Discards changes made to the file and exits the Function Key editor.

Touching a highlighted line will bring up the keyboard to allow you to edit Function Key command lines. Use the Control knob to move the cursor to the edit point; backspace over charactors to delete them. You can also delete a line and insert a new line in its place.

The command "restoreconfig" is automatically inserted as the last line of a Function Key file. Under normal circumstances, this command should remain the last entry. There are certain applications, however, where it may be advisable to delete the "restoreconfig" command. Unless you are an experienced user, it is recommended that the line be left in the file.

The commands used in Function Key files are listed in the Operator's Manual, pages 9-5/9-8.

8.1.6.A *Operator's Manual Reference: 9-4/9-8*

8.1.7 Example Function Key File Edit

The following steps illustrate how a Function Key file may be modified to add two new command lines.

- Press the Configure button.
- Select **Function Keys**.
- Switch to the appropriate sub-directory, if used.
- Select the desired Function Key file.
- Use the Control knob to scroll to the last line of the file. The command "restoreconfig" is (and usually should remain) the last line of the file.
- Use the **Insert Line** softkey to add a line.
- Add the appropriate Function Key command and value, if applicable (see the Operator's Manual, pages 9-5/9-8).
- Press **Done**.
- Repeat the previous three steps to add the second new line.
- Select **Update & Exit** to save the changes.

Figure 8.2 shows the file illustrated in Figure 8.1 modified to incorporate a hardcopy waveform dump. These edits are contained at the end of the file.

- Return to normal operation by pressing the Configure button.

Figure 8.3 shows the measured results of the Function Key routine illustrated in Figure 8.2.

Correct operation of the Function utility can be verified by pressing the Function button and then selecting the routine that you just programmed.

8.1.7.A *Operator's Manual Reference: 9-2/9-8*

```
set VNCA System~Default
set VNCB System~Default
set VNCC System~Default
set GSRC 0
set GSSR 1
set GSNC 0
set GSYI 0
set GLN5 30
set GLN6 17
set GACP 6.63
set GACW 3
set GACL 0
set GACC 3
set GALM 1
set GAFA 0
set GASS 0
set GBCP 6.63
set GBCW 3
set GBCL 0
set GBCC 3
set GBLM 0
set GBFA 0
set GBSS 0
set GCCP 6.63
set GCCW 3
set GCCL 0
set GCCC 3
set GCLM 0
set GCFA 0
set GCSS 0
disptext \
Switch generator to multiburst mode
execute MultiBurst appstart
  appset averageMode_NTSC 1
  appstart
hardkey Copy
restoreconfig
```

Figure 8.2 The Function Key file shown in Figure 8.1 edited to incorporate a hardcopy waveform dump.

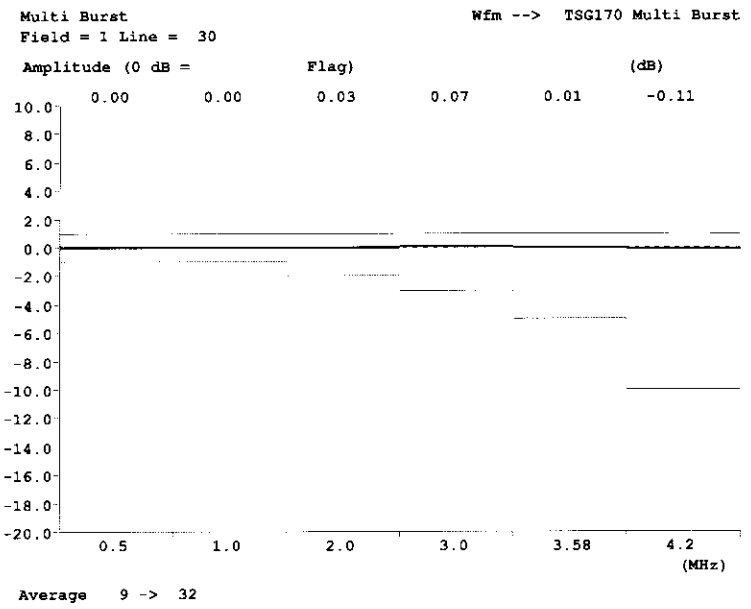

Figure 8.3 Printed results of the Function Key routine shown in Figure 8.2.

8.1.8 Merging Separate Function Key Files

Multiple Function Key routines may be strung together to create a powerful new Function Key file. Following these steps:

- Setup the instrument in the Measurement mode as required initially by the application.
- Press the Configure button.
- Select **Function Keys**.
- Select the appropriate sub-directory, if used.
- Select **Create Function**.
- Name the new Function using the keyboard.
- Select **Done** when the file name has been completed. Note that file names cannot include spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines given in Section 4.2.2.
- Select **End**.

- Press the Configure button twice.
- Select **Function Keys**.
- Select the appropriate sub-directory, if used.
- Select the new Function Key file.
- The contents of the Function Key file will be displayed.
- Use the Control knob to scroll to the last line of the file. The command "restoreconfig" is (and normally should remain) as the last line of the file.
- Use the **Insert Line** softkey to add a line.
- To add one or more separate Function Keys to the new Function Key file, insert the following statement: "playback [Function file name]". Remember, if the Function is in a subdirectory, the path must be included in the playback command.
- Repeat the previous three steps to add additional Function Key files to the new Function Key.
- Select **Update & Exit** to save the changes.

Figure 8.4 (next page) shows a Function file edited to add two other Function routines. The Functions (*HorizontalTiming* and *ColorBar*) are added at the end of the file following the *playback* statement.

- Return to normal operation by pressing the Configure button.

Correct operation of the Function Key utility can be verified by pressing the Function button and then selecting the routine that you just programmed.

8.1.8.A *Operator's Manual Reference: 9-4/9-8*

8.1.9 Deleting a Function Key File

A Function Key file may be deleted in the same way as any other file you create. See Section 4.2.3.

```
set VNCA System~Default
set VNCB System~Default
set VNCC System~Default
set GSRC 0
set GSSR 1
set GSNC 0
set GSYI 0
set GLN5 30
set GLN6 17
set GACP 6.63
set GACW 3
set GACL 0
set GACC 3
set GALM 1
set GAFA 0
set GASS 0
set GBCP 6.63
set GBCW 3
set GBCL 0
set GBCC 3
set GBLM 0
set GBFA 0
set GBSS 0
set GCCP 6.63
set GCCW 3
set GCCL 0
set GCCC 3
set GCLM 0
set GCFA 0
set GCSS 0
playback Horizontal~Timing
playback ColorBar
restoreconfig
```

Figure 8.4 A Function Key file edited to include two nested Function Keys.

8.2 Timed~Events

Files in the *Timed~Events* directory provide a facility for initiating Functions at specific times. Events occur at times specified in the current Timed~Events file. The Timed~Events file may also be used to generate Auto mode reports, as discussed in Section 7.3. Timed~Events files use a 24-hour clock to specify event occurrences.

When a Function time occurs, the VM700A executes the Function. When the Function has been completed, the instrument remains in the state specified by the body of the Function; it does not return to the state that it was in when the Function began.

8.2.1 Setting Up a Timed~Events File

A Timed~Events file tells the VM700A when to initiate a Function. You can create a Timed~Events file by following these steps:

- Press the Configure button.
- Select **Configure Files**.
- Select **Timed Events**.
- Create a new file with the **Create File** utility.

The system will ask for a file to be used as a template. The System~Default file may be used as a starting point. Alternatively, any other Timed~Events file may be used as a template.

- Name the new file using the keyboard.
- Select **Done** when the filename has been completed. Note that files cannot have spaces or carriage returns. To get a second line in the file name use the tilde character (~). Follow the guidelines for file names given in Section 4.2.2.

Edit the file as necessary through the following steps:

- Rotate the Control knob to scroll the screen and highlight the line in the file that you want to change.
- Touch the item (Time, Channel, Type, or Selected File Name) on the line you wish to edit.
- Rotate the control knob until the desired value appears.
- Select **Accept Input** to accept the data and return the Control knob to its scrolling function.
- You can enter a time of "Undefined" for an event by pressing the **Enter Undefined** softkey when the event time field is highlighted. An event with a time of "Undefined" is ignored.

System Default File for Timed Events

Time	Type	Channel	Selected File Name
6:45	function	B	Transmitter~Test1
12:20	function	B	Transmitter~Test2
15:32	report	A	System~Default
16:32	report	A	System~Default
17:32	report	A	System~Default
18:32	report	A	System~Default

Figure 8.5 Example Timed~Events file that includes both Function Key and Auto mode report commands.

You may also add lines to the Timed~Events file if necessary:

- Rotate the Control knob to highlight the last line of the file.
- Select the **Enter Function** softkey. The VM700A inserts a copy of the selected line below the current line.
- Edit the new line as necessary using the steps outlined previously in this section.

- Finish your work on the Timed~Events file by selecting **Update & Exit**. Or, select **No Change & Exit** to discard the changes to the new file. A prompt will ask you to confirm your action.

Figure 8.5 shows a typical Timed~Events file that includes both Function commands and Auto mode report commands. (See Section 7.3.1 for a detailed example of how to modify a Timed~Events file.)

Your new Timed~Events file is now complete. To enable the file, you must make the appropriate entry in the Source_Selection~Video file, discussed in Section 7.1.7.

- Return to normal operation by pressing the Configure button.

From time-to-time it may be necessary to delete various Timed~Event files. The process of deleting a Timed~Events file is identical to any other file you create in the VM700A. See Section 4.2.3 for details