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Product Group 21

VM700A
Option 30 Component Measurements
OPERATOR'S MANUAL

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OPERATOR'S SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

Terms In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property or loss of data.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

Terms As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property, including the equipment itself. Refer to the manual for information.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

Protective ground (earth) terminal.

SAFETY INFORMATION

Use the Proper Power Source. This product is intended to operate from a power source that will not apply more than 250 V 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.

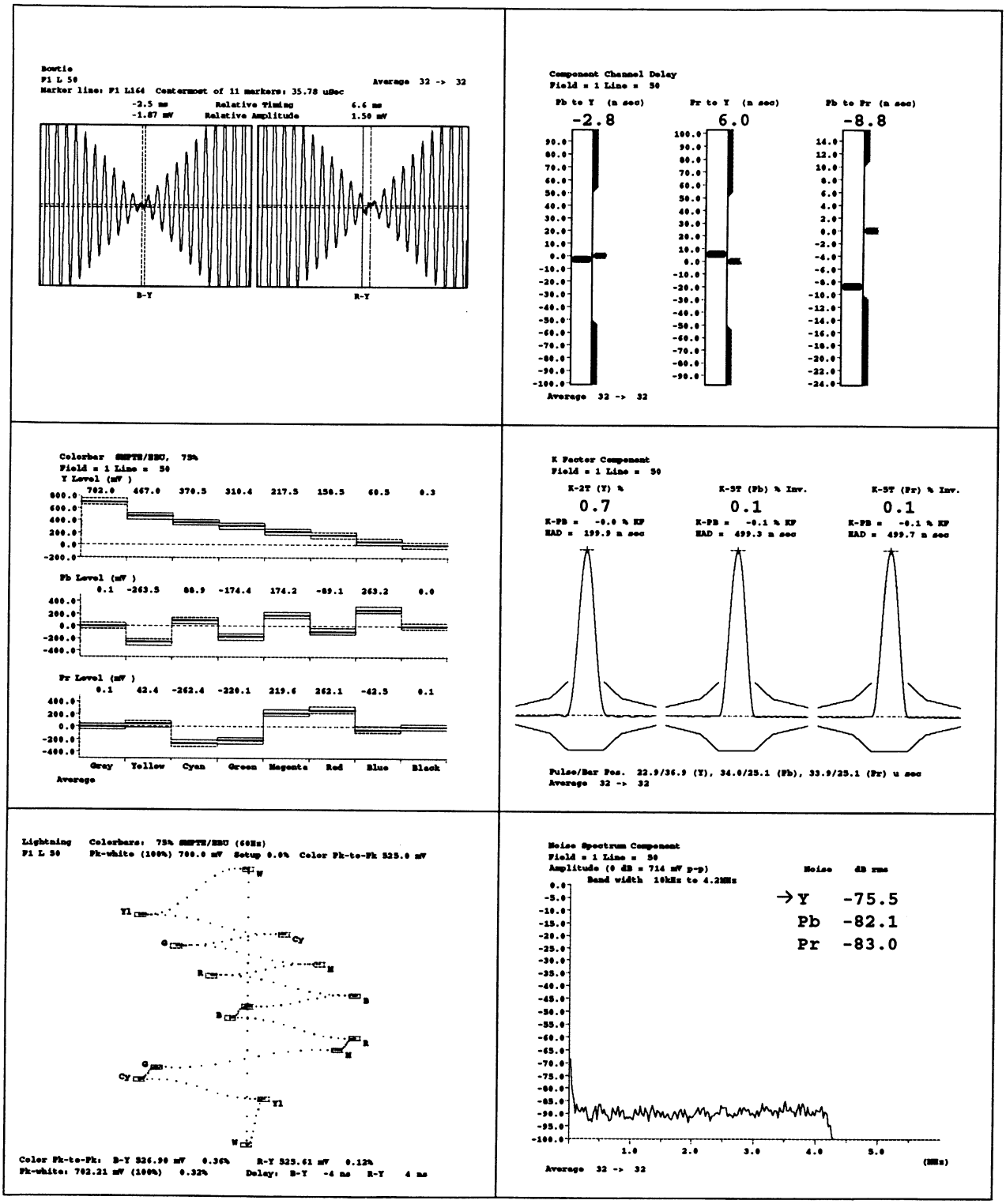
Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective-ground connection by way of the grounding conductor in the power 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.

Do Not Remove Covers. To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.



VM700A Option 30 Component Measurement.

Section 1
INTRODUCTION

The VM700A Option 30 (Component measurements) gives you access to the following twelve measurements:

Bowtie — measures timing and amplitude differences

Channel Delay — similar to Bowtie, but works with signals containing jitter

ColorBar — measures the Y, Pb, and Pr amplitudes of each chroma packet

K_Factor — measures K-2T, K-5T, and Pulse-to-Bar ratio on component input signals

LevelMeter — monitors peak-to-peak amplitude of a component signal

Lightning — two XY displays sharing the same screen

Luminance NonLinearity — measures luminance nonlinear distortion

Component MultiBurst — measures frequency response

Noise Spectrum — measures noise level and performs spectrum analysis

Overlay — displays stacked or superimposed Y, Pb, and Pr component inputs

Parade — displays side-by-side Y, Pb, and Pr component inputs

Vector — an X-Y display of the Pb and Pr components.

Softkeys for the Component measurements appear in the Measure Mode's Video Options directory window when Option 30 is installed in your VM700A.

To view the Video Options directory window, press the Measure button on the front panel. If the VM700A was in the Video Options directory when you last used Measure Mode, the Video Options directory will be displayed. Otherwise, press the Video Options softkey at the bottom of the display to view the Video Options directory.

Section 2
CONFIGURING THE COMPONENT MEASUREMENT OPTION

INTRODUCTION TO CONFIGURING THE OPTION

The approach to configuring the VM700A's Component measurement option is similar to that used for its other video functions. A series of files and directories provide default parameters that the VM 700A uses to measure video signals. If your application requires parameters other than the defaults supplied with the VM700A, you may configure the Component measurement option according to your preferences. To configure and use new parameters in Component measurements, you must perform these steps:

1. Create your own Component Measurement Limits file (i.e., "NewLimits") and configure it with your limits.
2. Create your own Video Source file (i.e., "NewSource") and select "NewLimits" as the limits file to be used.
3. Configure the Source_Selection Video file to select the "NewSource" file as a source file for one or all of the channels (A, B, or C) as needed for your measurements.

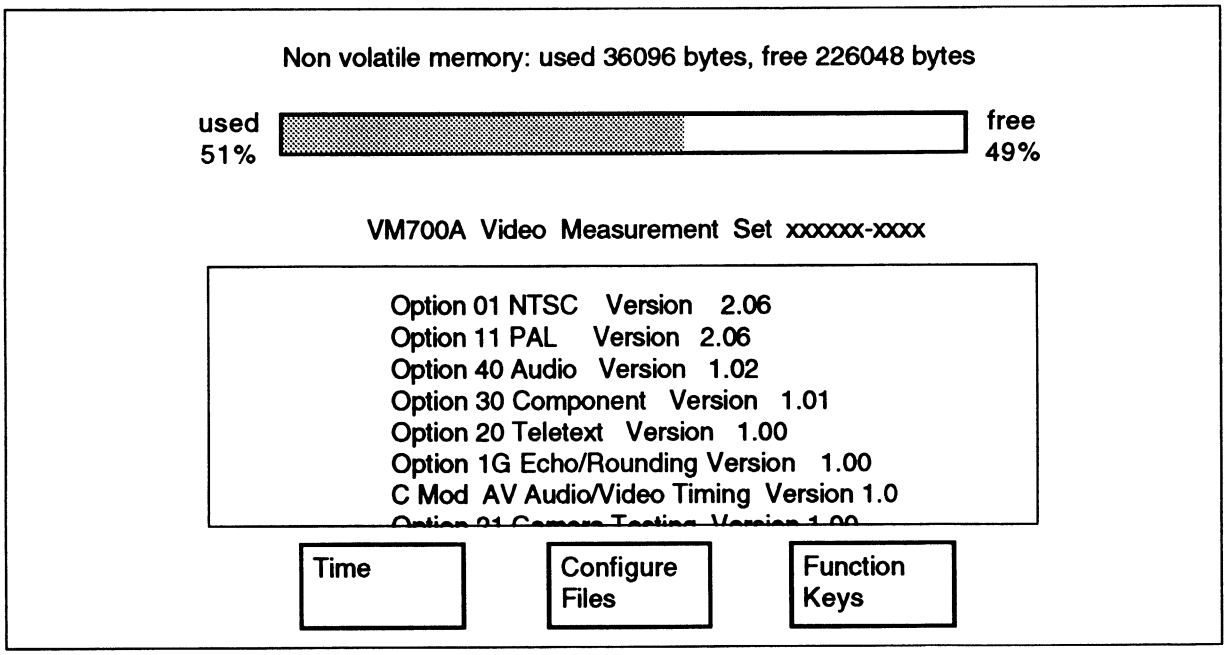


Figure 2-1. The Configure menu.

The following text describe these steps.

Begin configuration of the Component measurement option by pressing the Configure button. The screen displays a memory use indicator, information about instrument option versions, and three softkeys (touch-screen buttons). See Figure 2-1.

Press the Configure Files softkey to begin configuration.

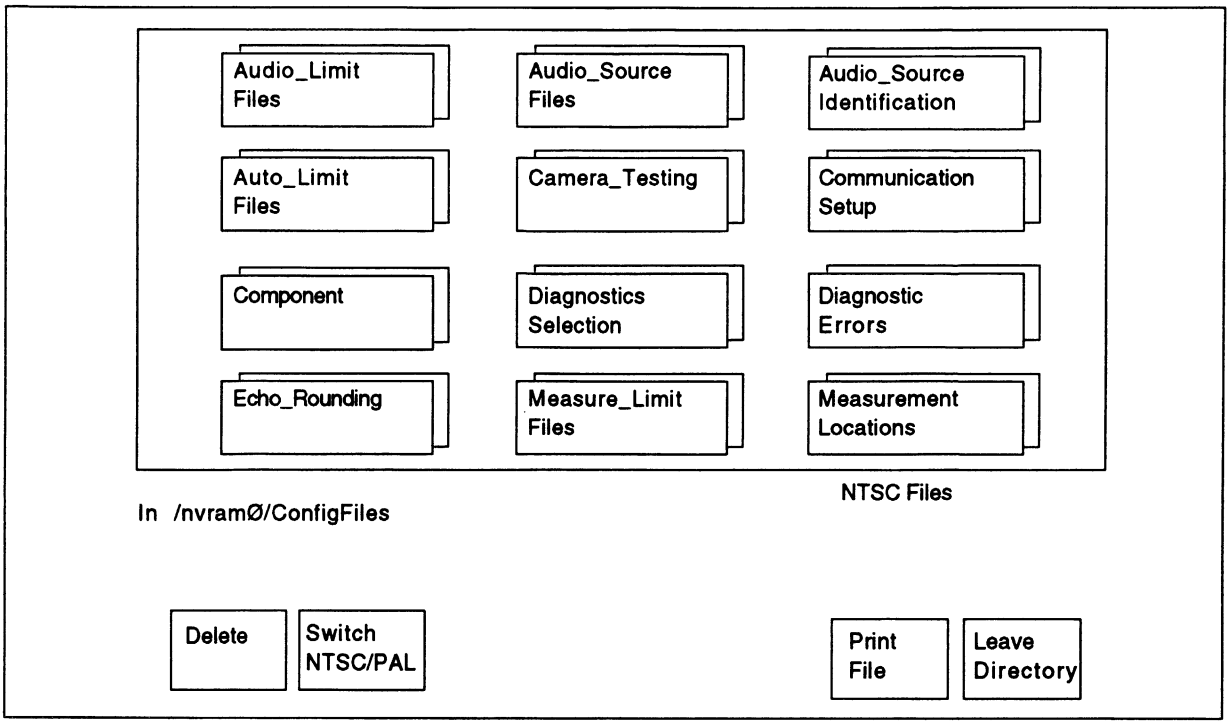


Figure 2-2. Configure menus choices.

The screen now displays a series of soft-key options in a window (see Figure 2-2). Scroll the window to view all the menu choices by turning the front panel knob. The following sections describe the procedure for configuring the VM700A Component measurement option.

CONFIGURING THE COMPONENT MEASUREMENT LIMITS FILE

Touch the Component softkey to enter the Component measurement limits file directory. The screen displays the System Default file and user limit files (if any have been created). See Figure 2-3. You may press a softkey to view the parameters in any file, but the System Default file parameters cannot be modified.

If the parameters in the System Default file are acceptable, the VM700A uses them (if this file is the selected measurement limits file) for making measurements on the input video signals. If you must modify the Component measurement limits, use the procedures given in the following text.

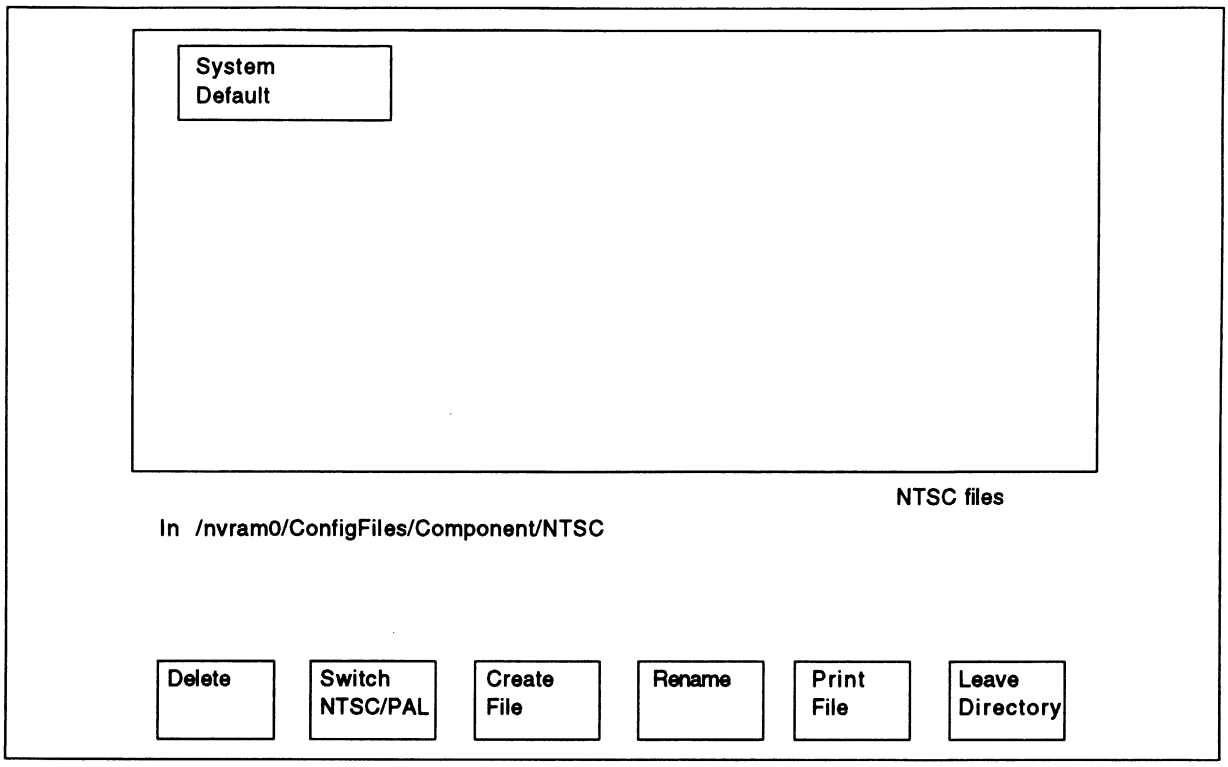


Figure 2-3. Component measurement limit menu choices.

To modify the measurement limits in the System Default file, you must do the following:

- Create a new measurement limits file
- Select an existing file to be used as a template
- Name the file you are creating
- Edit the information in the new file as necessary
- Accept the edits
- Save the new file

CREATING A COMPONENT MEASUREMENT LIMITS fILE

1. Touch the Create File softkey.

The query line (the top line of the display) asks you to select a file to be used as a template for your new file.

2. Touch the appropriate softkey (for example, System Default).
3. The screen displays a keyboard, from which you may type a name for your new file.
4. When you have named the file, press the Done key.

The VM700A now displays the new file containing the Component measurement limits from the file you selected as the template. You may edit the parameters in this file.

Editing a Component measurement limit text parameter

Change any Component measurement limit text parameter using the following procedure:

1. Rotate the knob to highlight the line containing the parameter you wish to change. This includes the title line in the configuration file. Use a descriptive file name for help in identifying it later.
2. Select the parameter you want to change by touching it.
3. Rotate the knob to increase or decrease the parameter's value.
4. Touch the Accept Input softkey to accept the change.

NOTE

If you change a parameter and then decide you don't want to keep the change, press the No change & Exit softkey. The VM700A verifies that you want to exit without changing anything by asking you to touch the No change & Exit softkey again.

To return to the file you created, touch the softkey on the display (the file you created now appears there).

If you are making extensive changes to the file, you may avoid losing all your changes by pressing the Update & Exit softkey after each change and then re-entering the file. That way, if you make a mistake and must exit the file, your earlier work will be retained while the most recent change (or mistake) is eliminated.

DELETING A COMPONENT MEASUREMENT LIMIT FILE

You may delete a modified Component measurement limit file with this procedure:

1. In the Component files directory, touch the Delete softkey.

The query line (the top line of the display) asks you to select a file to be deleted.

2. Select the file to be deleted by touching its softkey.

The VM700A begins the deletion process.

NOTE

You may halt file deletion by pressing the Cancel softkey (in the same position as the Delete softkey before the deletion process started). You may also halt file deletion by touching the screen image of the file.

CONFIGURING THE VIDEO SOURCE FILES

Touch the Video_Source Files softkey to enter the Video Source Files directory. The screen displays the video source files.

You may select and press a softkey to display the parameters in a file, but the parameters in the files may not be modified. To modify file parameters, you must do the following:

- Create a file
- Select the existing file to be used as a template
- Name the file you created
- Edit the information in the new file as necessary

- Accept the edits

If the system default video source file is acceptable, the VM700A will use this file as it performs video measurements. If you must modify the video source file, read the following paragraphs.

Editing the Video source file

To modify the Video Source file, follow this procedure:

1. Touch the Create File softkey.

The query line (the top line of the display) asks you to select the file to be used as a template for your new file.

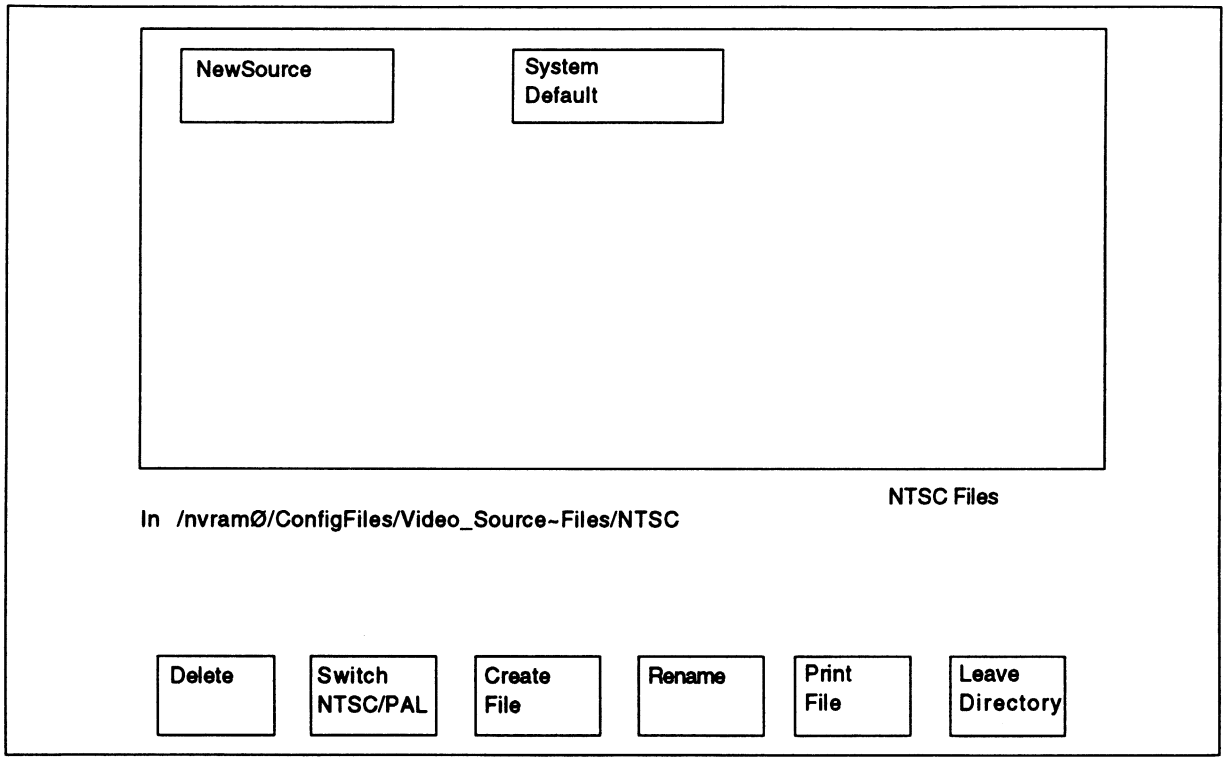


Figure 2-4. Selecting a file to use as a template.

2. Touch the appropriate softkey for the file you want to use (for example, System Default).
3. The screen displays a keyboard, from which you may type the name for your new file.
4. Press the Done key.

The VM700A now displays the contents of the new file containing the video source data from the file you selected as the template. You may modify the parameters in this file.

Changing the Video Source Parameters

Change the Video Source parameters using the following procedure:

1. Rotate the knob to highlight the line containing the parameter you want to change (in this case, you would highlight the line "Component: System~Default").
2. Select a parameter by touching it (touch "Component: System~Default").

3. Rotate the knob to change the parameter or value (select the name of the new Video Source file).
4. Touch the Accept Input softkey to accept the change.

NOTE

If you change a parameter and then decide you don't want to keep the change, press the No change & Exit softkey. The VM700A verifies that you want to exit without changing anything by asking you to touch the No change & Exit softkey again.

To return to the file you created, touch the softkey on the display (the file you created now appears there).

If you are making extensive changes to the file, you may avoid losing all your changes by pressing the Update & Exit softkey after each change and then re-entering the file. That way, if you make a mistake and must exit the file, your earlier work will be retained while the most recent change (or mistake) is eliminated.

For more information about the other selections in the Video Source file, refer to the operator's manual for your NTSC, PAL, or dual-standard VM700A.

CONFIGURING SOURCE SELECTION VIDEO

The video limit files used by the VM700A for video measurements are configured in the Video Limit Files directory and specified in the Video Source Files directory. Likewise, the video source files are configured in the Video Source Files directory and specified in the Source Selection Video directory.

In the Source Selection Video file you may select a video source file (if you intend to use a source file other than the system default) for each of three sources.

Specifying a Video source file

To specify an video source file, use the following procedure:

1. Touch the Source_Selection Video softkey.
2. Rotate the front panel knob to highlight the source for which you are specifying a video source file (source A, B, or C).
3. Touch the highlighted source file to select it.
4. Rotate the front panel knob to change the video source file selection.
5. When you have selected a video source file, touch the Accept Input softkey.
6. If the change is correct, touch the Update & Exit softkey, otherwise, touch the No change & Exit softkey.

NOTE

If you change the video source file and then decide to exit the directory and cancel the change, you must press the Accept Input softkey, followed by the No change & Exit softkey. The VM700A verifies that you want to exit the Source Selection Video directory and cancel any changes by asking you to touch the No change & Exit softkey again.

Section 3
USING THE COMPONENT MEASUREMENT TOOLS

BOWTIE MEASUREMENT

The Bowtie measurement measures timing and amplitude differences between the three channels in an analog component system, using a "bowtie" signal available from some component signal generators.

To set up the VM700A to run the Bowtie measurement, connect the Luminance (Y) output signal to Channel A, the B-Y signal to Channel B, and the R-Y signal to Channel C, then make sure that the incoming signal is a "bowtie" signal.

Bowtie Display

The Bowtie display consists of two voltage-vs-time 1H displays of Y minus B-Y and Y minus R-Y, shown side by side. Figures 3-1 shows a typical Bowtie measurement display.

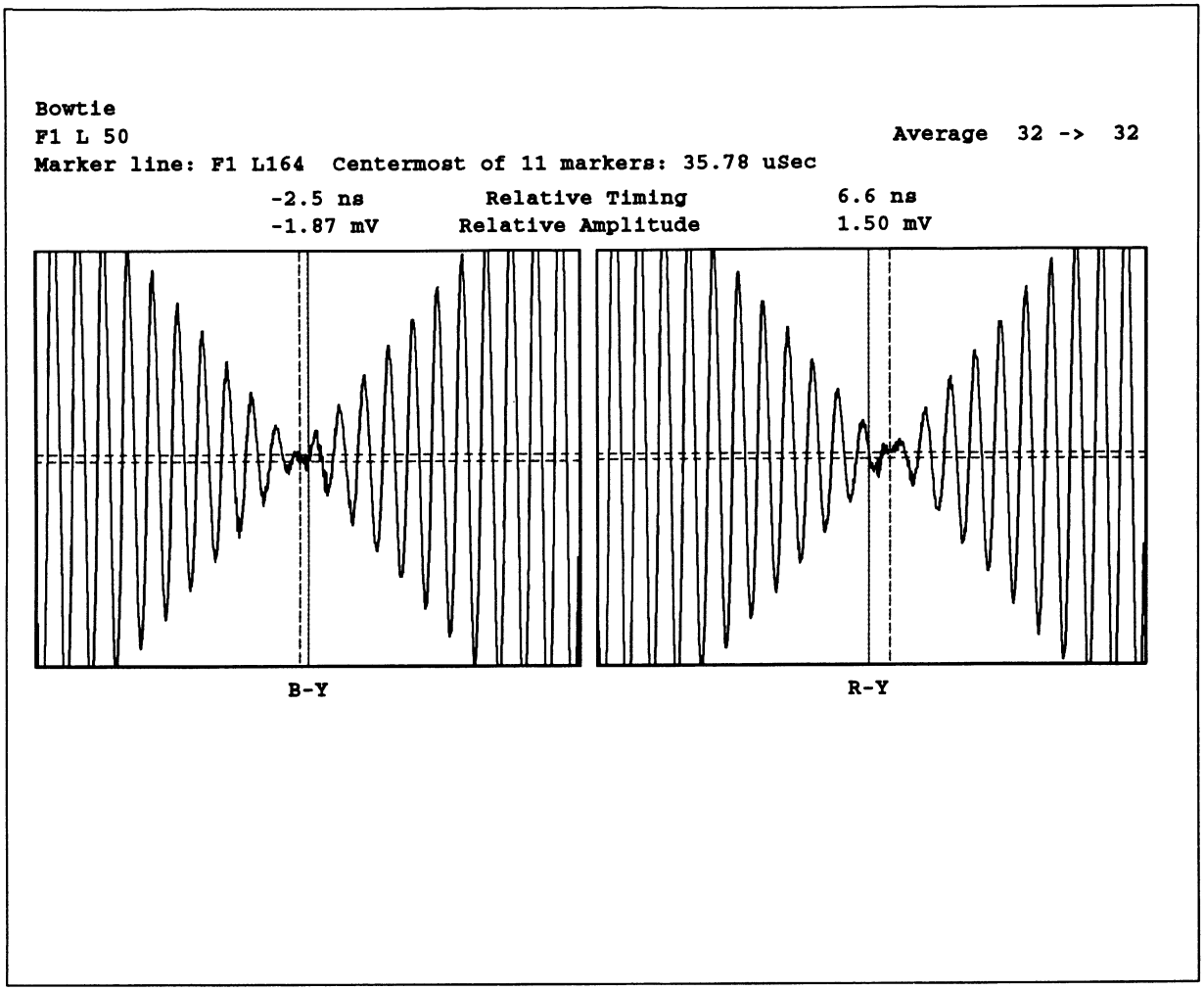


Figure 3-1. The Component measurement Bowtie display.

An ideal set of component signals (i.e., one exhibiting neither timing nor amplitude differences) produces waveforms that cross the exact center or "null" point of both graphs. A solid vertical line in the center of each graph indicates where the theoretical null point is expected to occur. A dashed vertical line in each graph indicates where the null point is actually found. Two horizontal lines indicate the top and bottom of the waveform at the measured null point. For an ideal set of component signals, the two vertical lines would coincide, as would the two horizontal lines. The greater the separation between the two lines in either pair, the greater the timing or amplitude difference in the component signals (Figure 3-1).

A digital readout above each graph indicates the timing difference between the channels and the peak-to-peak difference between luminance and chrominance at the measured null point. Other information, shown on the first two lines of the Bowtie display, includes the name of the measurement; the field and line number on which the measurement is being made; and an indication of the number of data points averaged and the total number of points to be averaged (only appears when averaging is on).

The VM700A also displays the field and line number of the marker line, the number of markers found, and the location of the centermost marker relative to the leading edge of the sync pulse. This number is used as the reference location of the null point.

Bowtie Menus

Pressing the Menu button when the Bowtie measurement is running displays the Bowtie main menu. The Bowtie menu hierarchy is shown in Figure 3-2.

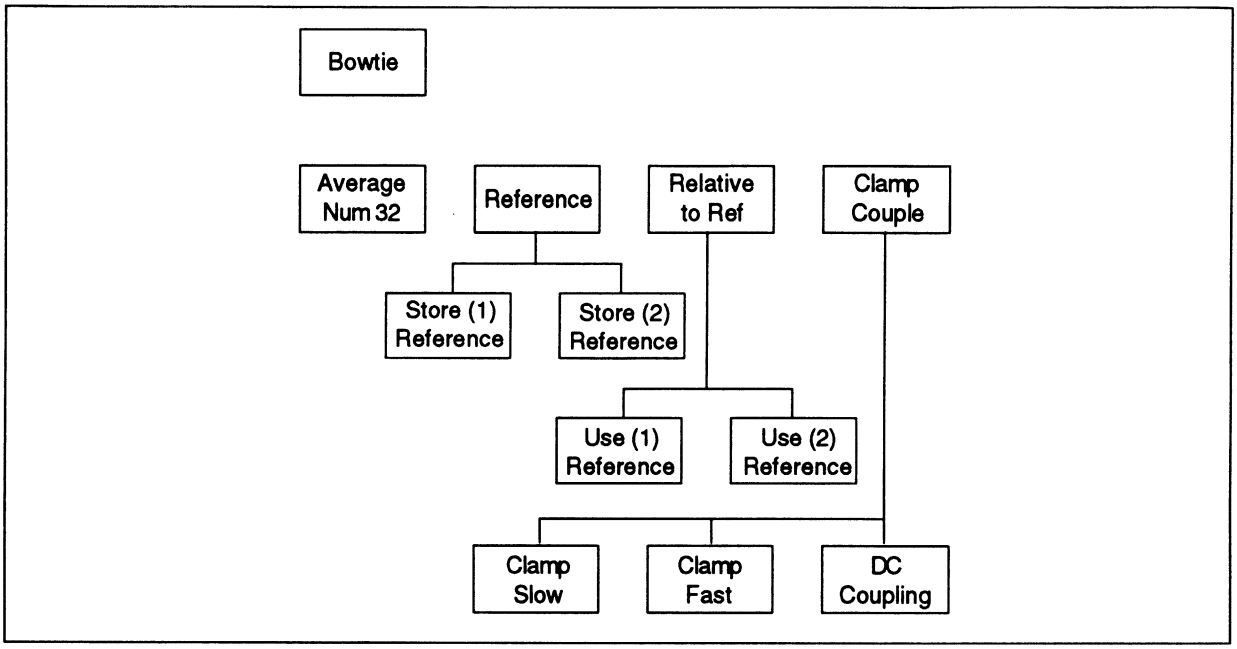


Figure 3-2. Bowtie menu tree.

Bowtie Main Menu

`Average Num nnn`

Average Num: specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.

`Reference`

Reference: displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2).

`Relative to Ref.`

Relative To Ref: displays the two stored reference selections that can be used to compensate the signal being measured. Displayed reference results are the compensated values, and include a system degradation factor computed from the difference between reference and nominal values.

`Clamp Couple`

Clamp Couple: displays the softkeys that adjust the Bowtie measurement's clamping mode.

Reference Submenu

Store (1) Reference

Store (1) Reference: begins averaging up to 256 and stores current display values as user reference (1) when released.

Store (2) Reference

Store (2) Reference: begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Relative to Reference Submenu

Use (1) Reference

Use (1) Reference: selects user-defined Reference (1) to compensate the signal being measured.

Use (2) Reference

Use (2) Reference: selects user-defined Reference (2) to compensate the signal being measured.

NOTE

Before you can use either reference for measurement compensation, you must store a value (with the Store (n) reference softkey) in the reference.

Clamp Couple Submenu

Clamp Slow

Clamp Slow: selects slow clamp speed. This speed allows hum effects to be visible, but is useful in coping with large DC offsets on an input signal.

Clamp Fast

Clamp Fast: selects fast clamp speed. This speed removes DC offset, hum, and bounce effects from the signal. This is the default clamp setting for the Bowtie measurement.

DC Coupling

DC Coupling: selects DC coupling (no clamping).

CHANNEL DELAY

This measurement is similar to Bowtie and uses the same input signal. Its bar-level displays work well in manufacturing environments, for at-a-glance comparisons (see Figure 3-3).

Unlike the Bowtie measurement, Channel Delay can work with signals containing jitter. It can also perform delay measurements at frequencies other than the standard 500 kHz for Y and 502 kHz for Pb and Pr channels.

For example, Bowtie performs measurements only at 500 kHz in the Y, and 502 kHz in the Pb and Pr channels. With its Frequency Set submenu, the Channel Delay measurement lets you set the signal measurement frequency.

Figure 3-4 shows the Channel Delay menu tree.

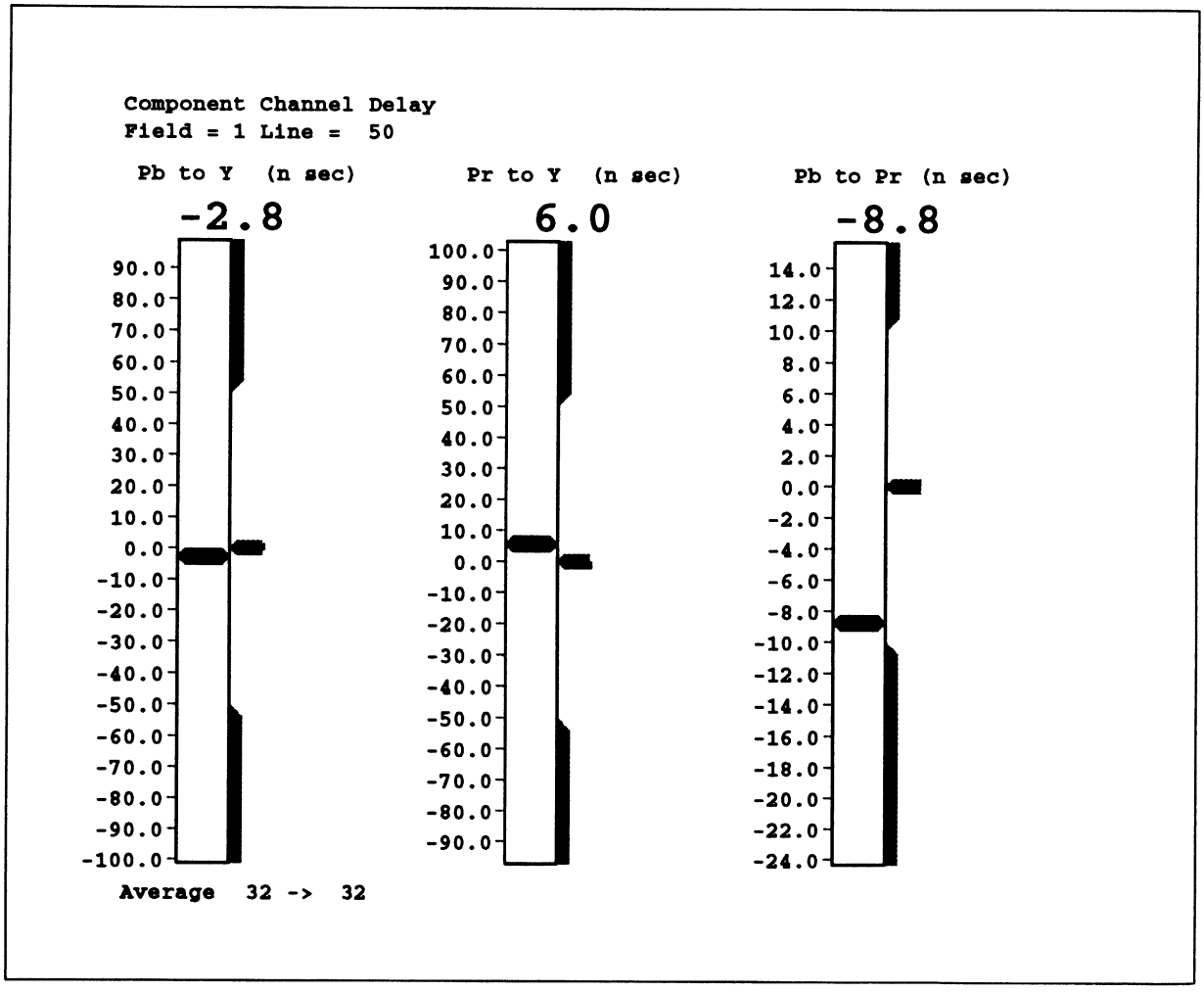


Figure 3-3. Channel Delay Display showing color-difference component delays.

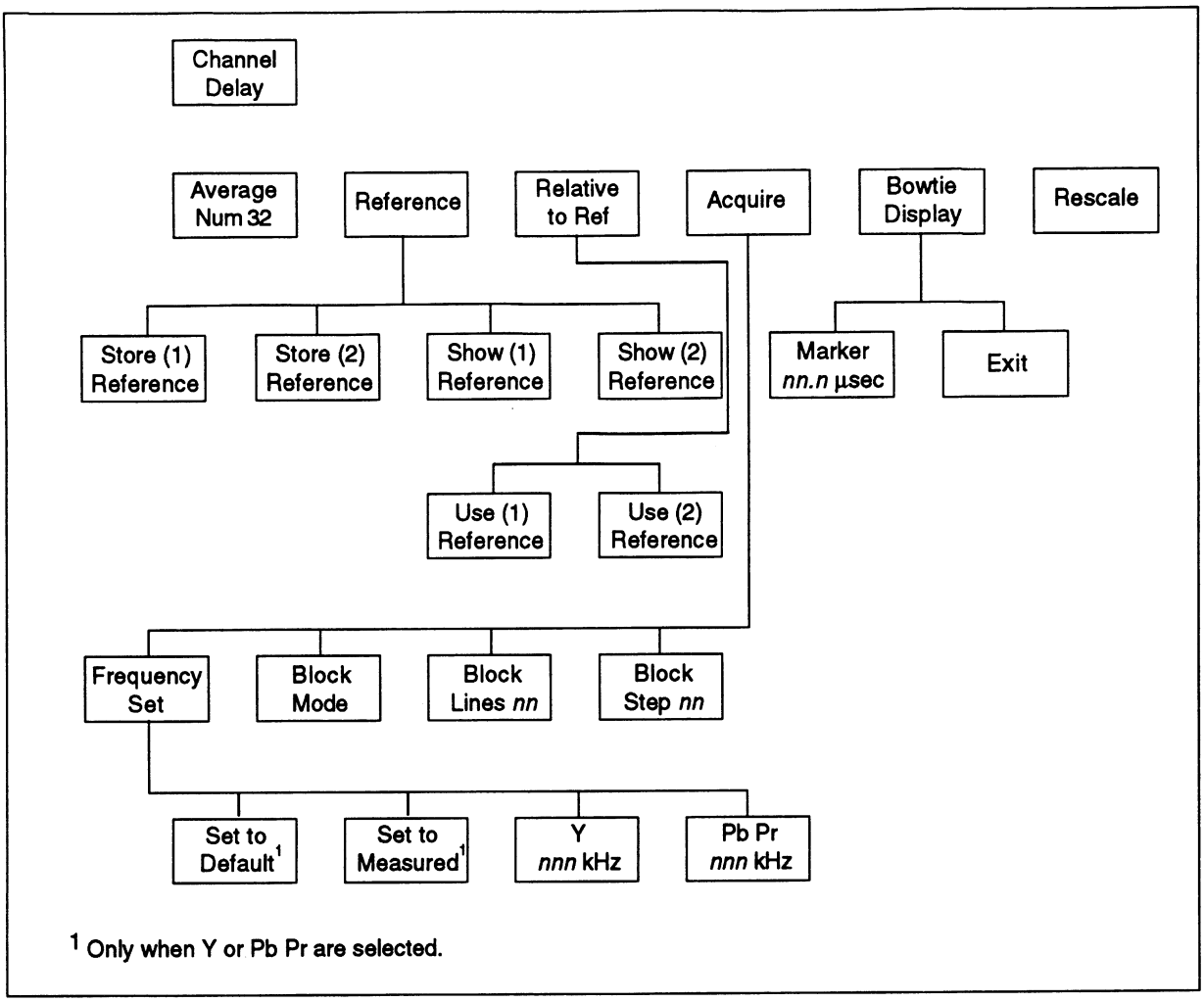


Figure 3-4. Channel Delay menu tree.

Channel Delay Main Menu

Average Num	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Reference	**Reference:** displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2), or show what is currently stored as user reference (1) or user reference (2).
Relative To Ref	**Relative To Ref:** displays the Relative to Reference submenu, which lets you subtract either of two stored reference values from the signal being measured. The displayed result is the difference between the measured signal and the reference value selected.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for frequency and block acquisition control.
Bowtie Display	**Bowtie Display:** displays the Bowtie Display submenu, which provides a Bowtie display with marker.

Rescale

Rescale: rescales the display graticule for the appropriate displayed resolution.

Reference Submenu

Store (1) Reference

Store (1) Reference: begins averaging up to 256 and stores current display values as user reference (1) when released.

Store (2) Reference

Store (2) Reference: begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Show (1) Reference

Show (1) Reference: displays the date and values of user reference (1).

Show (2) Reference

Show (2) Reference: displays the date and values of user reference (2).

Relative to Reference Submenu

Use (1) Reference

Use (1) Reference: selects user-defined Reference (1) to compare with the signal being measured.

Use (2) Reference

Use (2) Reference: selects user-defined Reference (2) to compare with the signal being measured.

Acquire Submenu

Frequency Set

Frequency set: displays softkeys that let you select frequency acquisition options.

Block Mode

Block Mode: enables Block mode. The block starts at the system line.

Block Lines *nn*

Block Lines: sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.

Block Step *nnn*

Block Step: sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Bowtie Display Submenu

Marker *nn.n* µsec

Marker: allows marker position adjustment when you turn the knob with this softkey selected. The marker is not used for measurement.

Exit

Exit: exits the Bowtie display and returns to the previous display.

Frequency Set Submenu

Set To Default

Set To Default: resets the frequency to the default value.

Set To Measured

Set To Measured: sets the frequency to the measured value.

Y *nnn* kHz

Y *nnn* kHz: select the frequency for Y (source A).

Pb Pr *nnn* kHz

Pb Pr *nnn* kHz: displays softkeys for display and filters selection.

COLORBAR

ColorBar measures the Y, Pb, and Pr amplitudes of each chroma packet and displays them on three separate graticules as millivolt levels and their associated colors.

Each graticule includes the measurement limits (as set in the current Component measurements ConfigFiles directory) for each color; the limits are shown as a dashed horizontal line extending the width of each color. The ColorBar measurement display is shown in Figure 3-5. For information on setting the measurment limits, see the section on configuration.

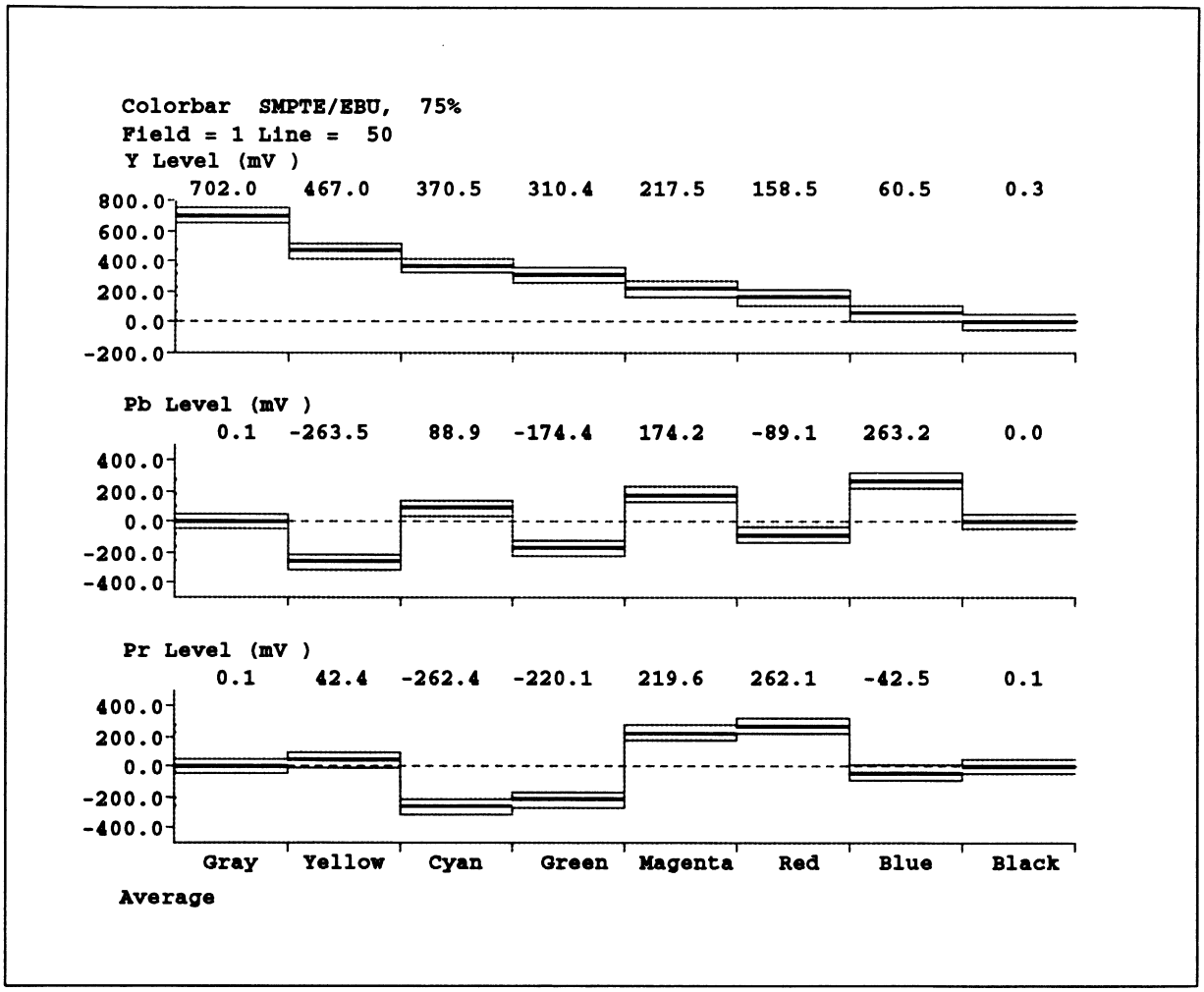


Figure 3-5. ColorBar display showing color difference component levels in mV.

Figure 3-6 shows the menu hierarchy for the ColorBar measurement.

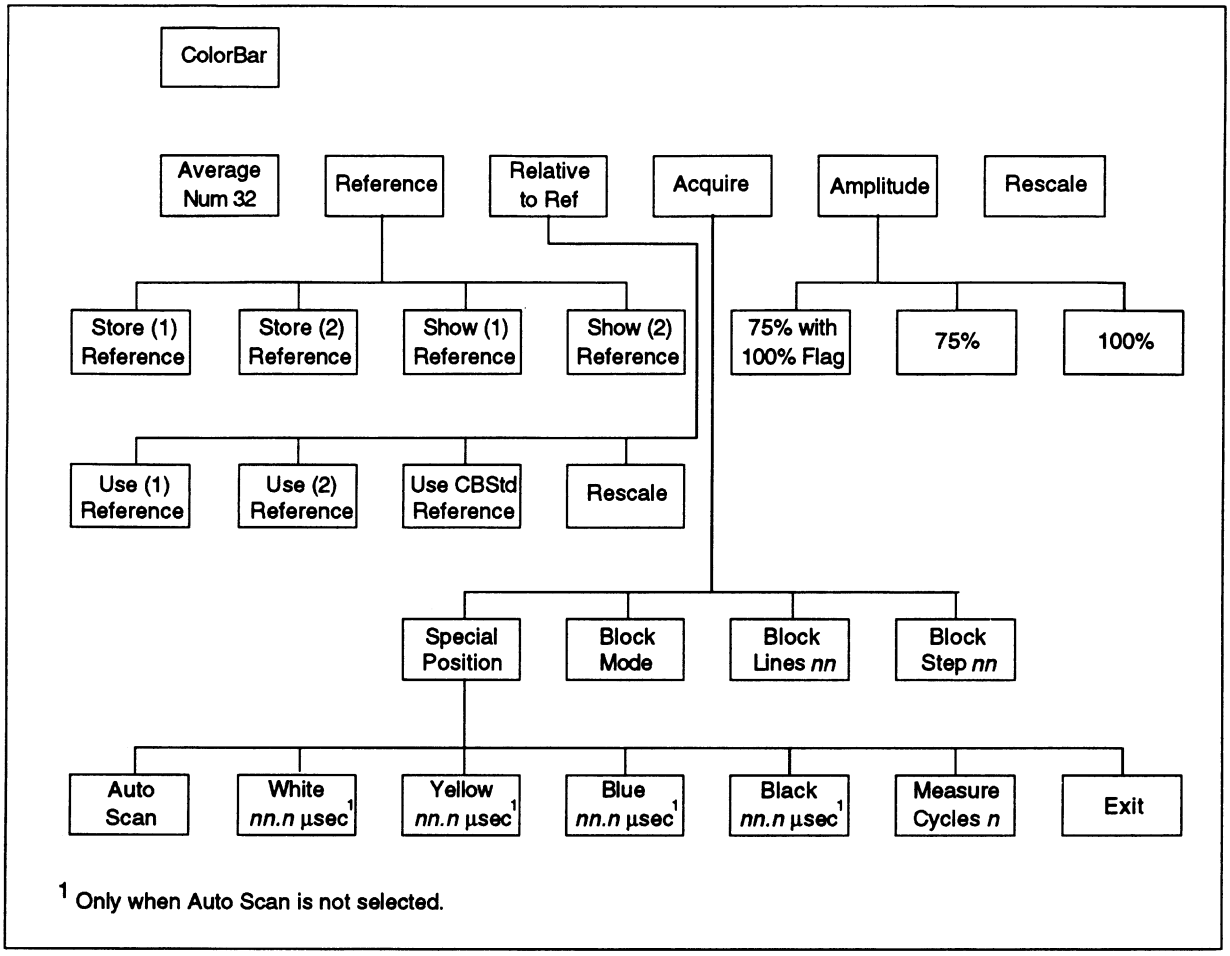


Figure 3-6. ColorBar menu tree.

ColorBar Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Reference	**Reference:** displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2), or show what is currently stored as user reference (1) or user reference (2).
Relative To Ref	**Relative To Ref:** displays the Relative to Reference submenu, which lets you subtract either of two stored reference values from the signal being measured. The displayed result is the difference between the measured signal and the reference value selected.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for defining measurement positions on the waveform.

Amplitude

Amplitude: provides softkeys to select 75% or 100% colorbars.

Rescale

Rescale: rescales the display graticule for the appropriate displayed resolution.

Reference Submenu

Store (1) Reference

Store (1) Reference: begins averaging up to 256 and stores current display values as user reference (1) when released.

Store (2) Reference

Store (2) Reference: begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Show (1) Reference

Show (1) Reference: displays the date and values of user reference (1).

Show (2) Reference

Show (2) Reference: displays the date and values of user reference (2).

Relative to Reference Submenu

Use (1) Reference

Use (1) Reference: selects user-defined Reference (1) to compare with the signal being measured.

Use (2) Reference

Use (2) Reference: selects user-defined Reference (2) to compare with the signal being measured.

Use CBStd Reference

Use CBStd Reference: selects the standard colorbar level for measurement.

Rescale

Rescale: rescales the display graticule for the appropriate displayed resolution.

Acquire Submenu

Special Position

Special Positon: provides softkeys than let you set the locations on the waveform where measurements are made.

Block Mode

Block Mode: enables Block mode. The block starts at the system line.

Block Lines *nn*

Block Lines: sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.

Block Step *nnn*

Block Step: sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Special Position Submenu

Auto Scan

Auto Scan: automatically scans and determines measurement locations. Deselecting Auto Scan displays softkeys for manually setting measurement locations.

White *nn.n* µsec

White: allows knob adjustment of white packet center position.

Yellow *nn.n* µsec

Yellow: allows knob adjustment of yellow packet center position.

Blue *nn.n* µsec

Blue: allows knob adjustment of blue packet center position.

Black *nn.n* µsec

Black: allows knob adjustment of black packet center position.

Measure Cycles *n*

Measure Cycles: selects the number of chrominance subcarrier cycles measured in each packet. Pressing the softkey and turning the knob changes the number of cycles.

Exit

Exit: exits the Special Position display and returns to the previous display.

Amplitude submenu

75% with 100% Flag

75% with 100% Flag: selects 75% colorbar with 100% white flag.

75%

75%: selects 75% colorbar.

100%

100%: selects 100% colorbar.

K FACTOR MEASUREMENT

The K_Factor measurement measures K-2T, K-5T, and Pulse-to-Bar ratio on Y, Pb, and Pr input signals.

Figure 3-7 shows a typical K_Factor measurement display. The display shows signals superimposed on K-2T, K-7T (Pb), and K-7T (Pr) graticules. Digital readouts also show the measured values of K-PB (as a percent of K_Factor) and HAD.

K_Factor displays indicators (large arrows) next to the readouts when the input signal exceeds preset limits. Arrow direction indicates above- or below-limit readings. You may set the K_Factor upper and lower limits in the current Component measurements ConfigFiles directory. See the section on configuration for more information.

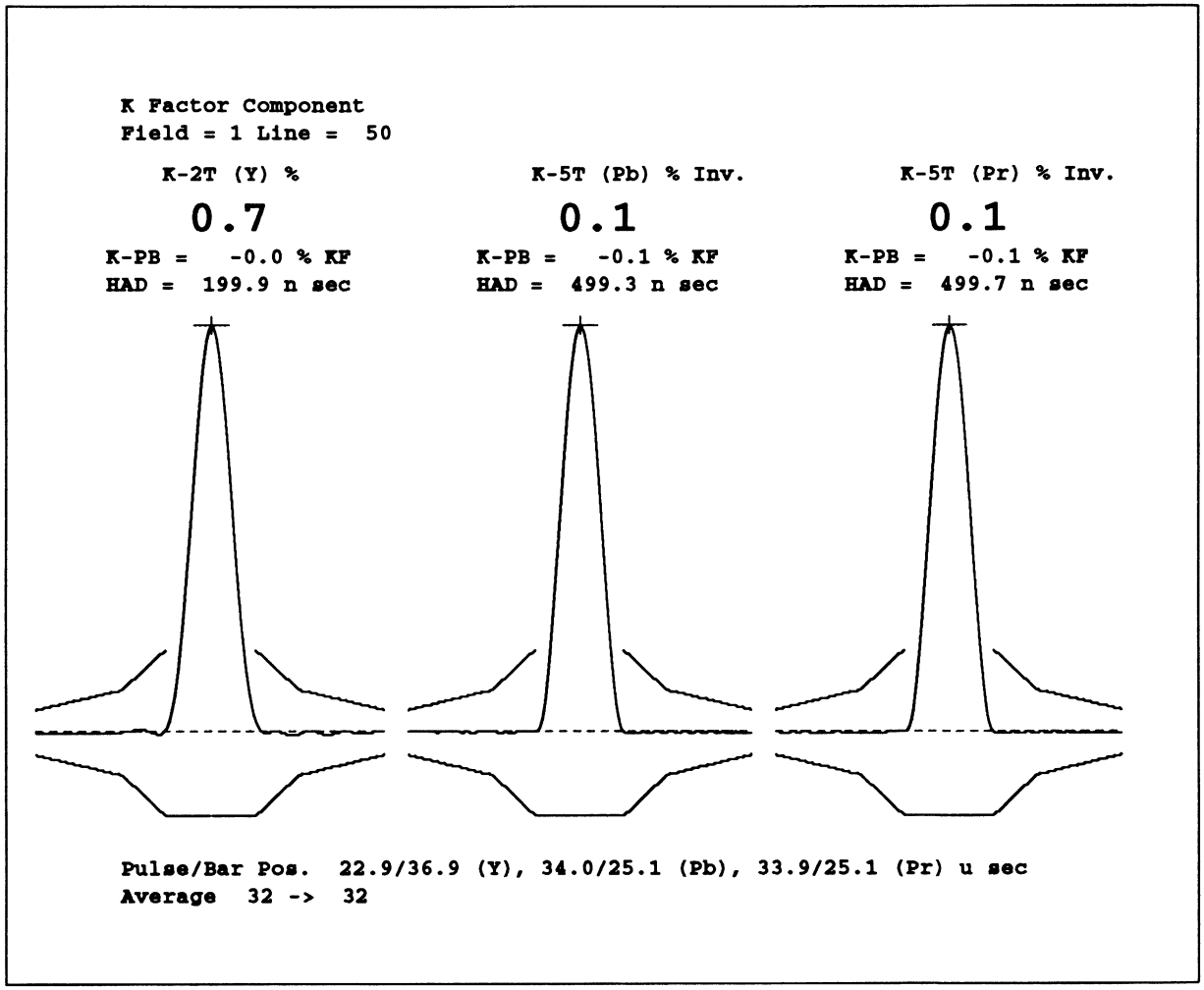


Figure 3-7. K Factor component measurement display.

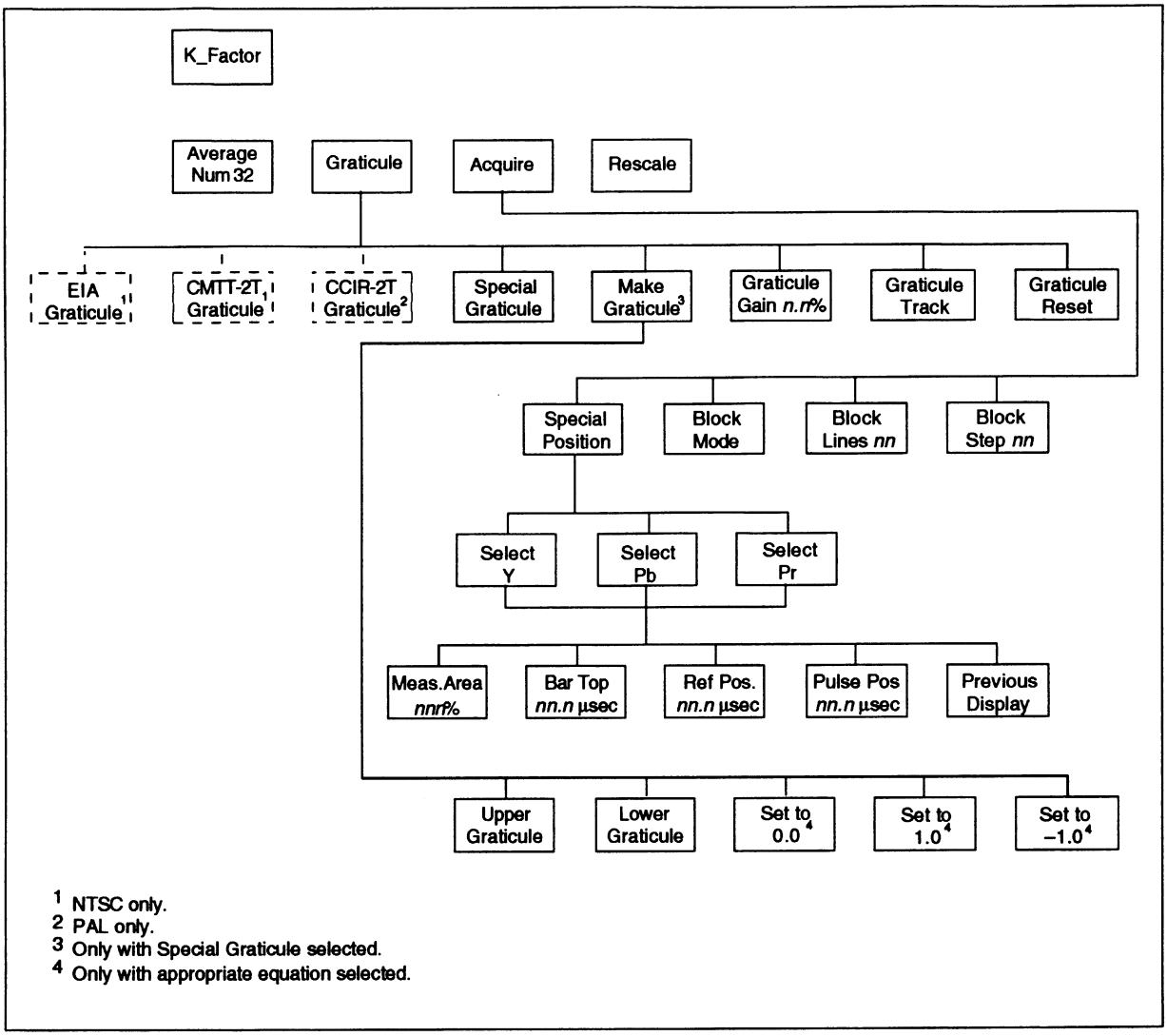


Figure 3-8. K Factor menu tree.

K Factor Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Graticule	**Graticule:** displays softkeys to control the graticule gain and tracking of the current graticule, and to change from a standard to a user-created graticule.
Acquire	**Acquire:** provides softkeys for acquisition control (such as block mode acquisition pattern) or for determining a measurement position on the waveform.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Graticule Submenu

EIA Graticule	**EIA Graticule:** (NTSC only) selects the standard EIA graticule, using the current values of graticule gain and tracking. This is the default NTSC graticule.
CMTT-2T Graticule	**CMTT-2T Graticule:** (NTSC only) selects the standard CMTT (CCIR) graticule using the current graticule gain and tracking values.
CCIR-2T Graticule	**CCIR-2T Graticule:** (PAL only) selects the standard CCIR graticule using the current graticule gain and tracking values (this is the default graticule).
Special Graticule	**Special Graticule:** selects the special (user-defined) graticule.
Make Graticule	**Make Graticule:** (Only with Special Graticule selected) provides softkeys to define the upper and lower graticules of the special graticule.
Graticule Gain *n.n* %	**Graticule Gain:** enables Graticule Variable Gain mode. Turn the knob to adjust the gain within the 0.1 to 20.0 % range. Resolution is 0.1 %, and the default gain is 5.0%.
Graticule Track	**Graticule Track:** enables graticule tracking mode. When graticule tracking is enabled, the size of the graticule tracks the actual waveform.
Graticule Reset	**Graticule Reset:** disables graticule tracking mode and resets the graticule gain to 5.0%.

Acquire Submenu

Special Position	**Special Positon:** provides softkeys than let you set the locations on the waveform where measurements are made.
Block Mode	**Block Mode:** enables Block mode. The block starts at the system line.
Block Lines *nn*	**Block Lines:** sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.
Block Step *nnn*	**Block Step:** sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Special Position Submenu

Select Y	**Select Y:** displays the data or waveform for source A.
Select Pb	**Select Pb:** displays the data or waveform for source B.
Select Pr	**Select Pr:** displays the data or waveform for source C.

Select Y, Pb, Pr Submenus

Meas. Area *nnn %*	**Select Pr:** displays the data or waveform for source C.
Bar Top *nn.n %*	**Bar Top:** selects the signal's bar-level measurement location. Press the softkey and turn the knob to select the bar-level measurement location.
Ref Pos. *nn.n µsec*	**Ref Pos.:** selects the signal's bar-level reference location. Press the softkey and turn the knob to select the bar-level reference location. You may set the reference level to the base of the pulse by turning the knob fully CCW.
Pulse Pos *nn.n µsec*	**Pulse Pos:** displays the pulse-position cursor, which you can adjust by turning the knob. You must adjust the cursor only for an approximate center location; the VM700A firmware locates the cursor to the exact center of the pulse.
Previous Display	**Previous Display:** returns to the previous display.

Make Graticule Submenu

Upper Graticule	**Upper Graticule:** lets you define the upper graticule of the special graticule. Follow the displayed instructions to define the upper graticule.
Lower Graticule	**Lower Graticule:** lets you define the lower graticule of the special graticule. Follow the displayed instructions to define the lower graticule.
Set to 0.0	**Set to 0.0:** touching this soft key (displayed when you touch a graticule coefficient) sets the graticule coefficient to 0.0.
Set to 1.0	**Set to 1.0:** touching this soft key (displayed when you touch a graticule coefficient) sets the graticule coefficient to 1.0.
Set to -1.0	**Set to –1.0:** touching this soft key (displayed when you touch a graticule coefficient) sets the graticule coefficient to –1.0.

LEVELMETER MEASUREMENT

Figure 3-9 shows the typical LevelMeter display monitoring the peak-to-peak amplitude of a component signal. The display shows levels for Y, Pb, Pr, components and Y Sync. You can set the measurement for delta between two points in mV, delta between two points in percent referenced to a value, or absolute between one point and zero (ground) in either mV or percent.

The LevelMeter measurement displays indicators (large arrows) next to the readouts when the input signal exceeds preset limits. Arrow direction indicates above- or below-limit readings. You may set the LevelMeter upper and lower limits in the current Component measurements ConfigFiles directory. See the section on configuration for more information.

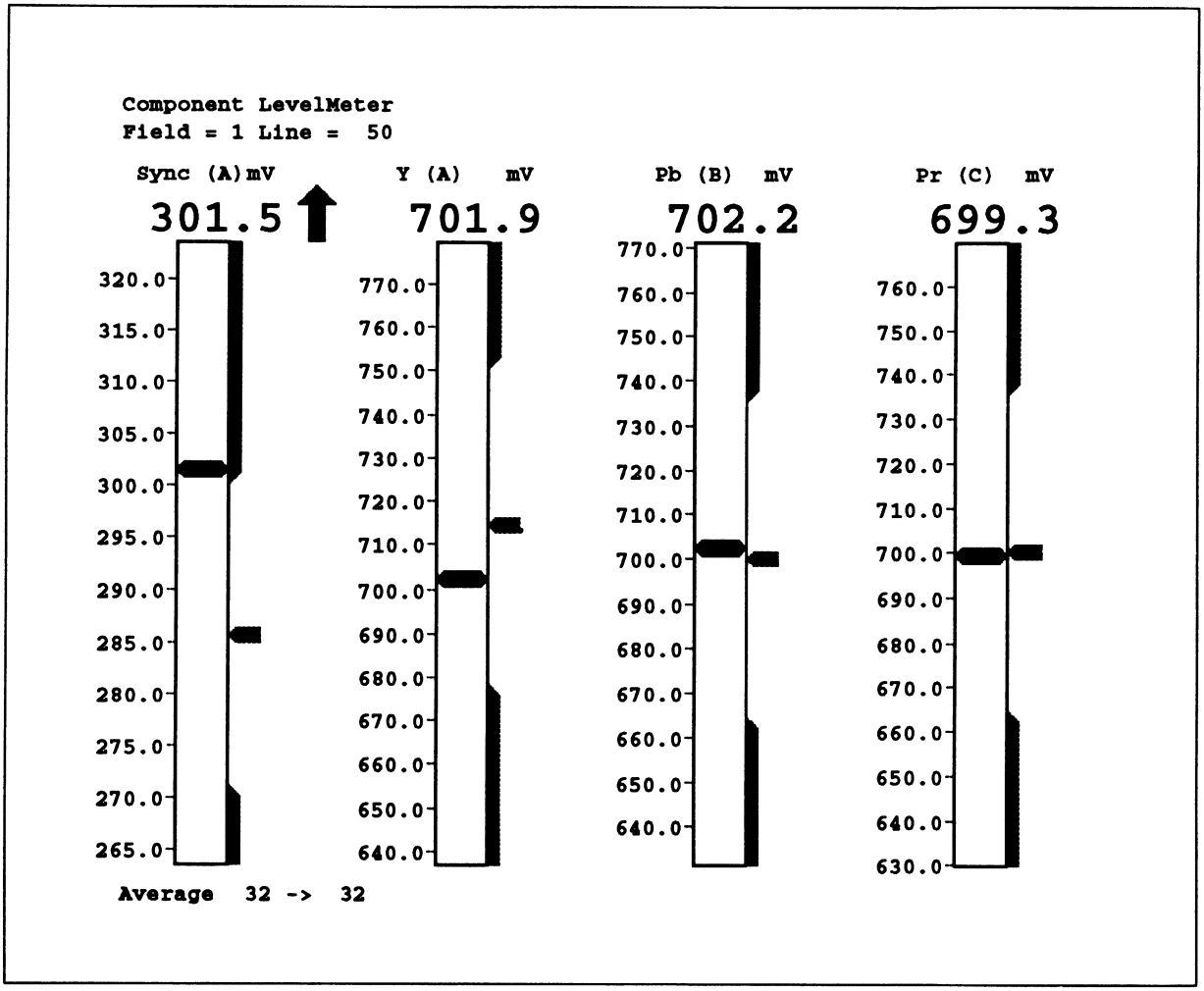


Figure 3-9. LevelMeter measurement display.

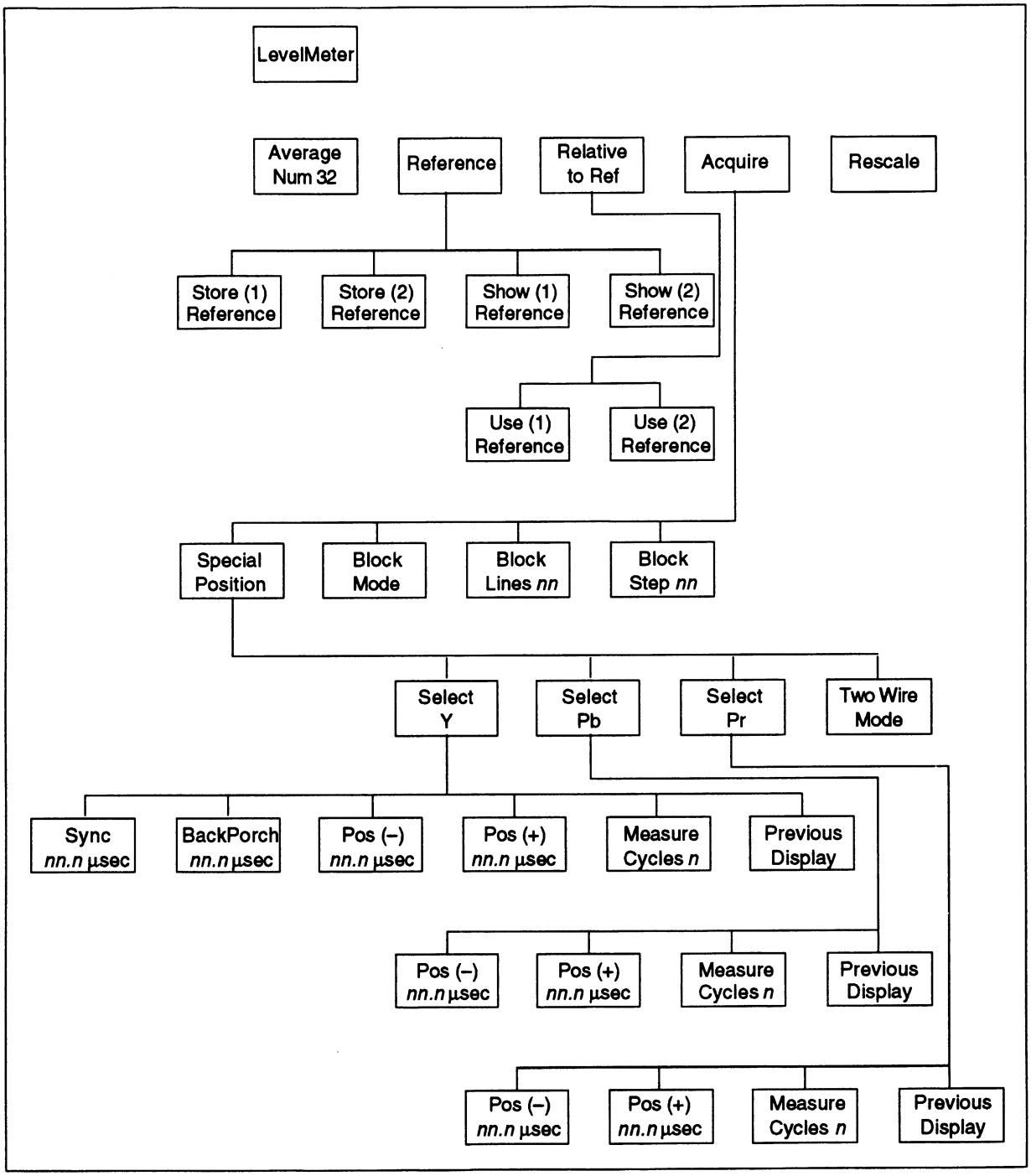


Figure 3-10. LevelMeter menu tree.

LevelMeter Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Reference	**Reference:** displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2), or show what is currently stored as user reference (1) or user reference (2).
Relative To Ref	**Relative To Ref:** displays the Relative to Reference submenu, which lets you subtract either of two stored reference values from the signal being measured. The displayed result is the difference between the measured signal and the reference value selected.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for frequency and block acquisition control.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Reference Submenu

Store (1) Reference	**Store (1) Reference:** begins averaging up to 256 and stores current display values as user reference (1) when released.
Store (2) Reference	**Store (2) Reference:** begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Show (1) Reference	**Show (1) Reference:** displays the date and values of user reference (1).
Show (2) Reference	**Show (2) Reference:** displays the date and values of user reference (2).

Relative to Reference Submenu

Use (1) Reference	**Use (1) Reference:** selects user-defined Reference (1) to compare with the signal being measured.
Use (2) Reference	**Use (2) Reference:** selects user-defined Reference (2) to compare with the signal being measured.

Acquire Submenu

Special Position	**Special Positon:** provides softkeys than let you set the locations on the waveform where measurements are made.
Block Mode	**Block Mode:** enables Block mode. The block starts at the system line.
Block Lines *nn*	**Block Lines:** sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.
Block Step *nnn*	**Block Step:** sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Special Position Submenu

Select Y	**Select Y:** displays the data or waveform for source A.
Select Pb	**Select Pb:** displays the data or waveform for source B.
Select Pr	**Select Pr:** displays the data or waveform for source C.
Two Wire Mode	**Two Wire Mode:** measures Pb and Pr on source B.

Select Y, Pb, Pr Submenu

Sync *nn.n* µsec	**Sync:** lets you use the knob to adjust the center position of the line sync when you press this softkey.
BackPorch *nn.n* µsec	**BackPorch:** lets you use the knob to adjust the center position of the back porch when you press this softkey.
Pos (–) *nn.n* µsec	**Pos (–):** lets you use the knob to adjust the center position of the minus peak packet when you press this softkey.
Pos (+) *nn.n* µsec	**Pos (+):** lets you use the knob to adjust the center position of the plus peak packet when you press this softkey.
Measure Cycles *n*	**Measure Cycles:** selects the number of chrominance subcarrier cycles measured in each packet. The displayed box shows the measurement area determined by the selected number of cycles. Select the softkey and turn the knob to change the number of cycles.
Previous Display	**Previous Display:** Exits and returns to the previous display.

LIGHTNING MEASUREMENT

You can think of the Lightning display as two XY displays sharing the same screen. Figure 3-11 shows a typical Lightning display. It consists of a single graph divided into two halves. The upper half plots the B-Y component along the x-axis, and the Y (luminance) component along the y-axis. The lower half plots the R-Y component along the x-axis, and inverted Y (i.e., an inverted luminance component) along the y-axis. Thus, increasing luminance plots upward in the upper half of the screen, and downward in the lower half.

The blanking level, or "zero signal," is represented by a small rectangle in the center of the screen. A series of graticule boxes define the expected values for yellow, cyan, green, magenta, red and blue colorbars. The position of the boxes on the screen varies with the colorbar standard being used.

Colorbar signals with correct Y, B-Y and R-Y amplitude levels and relative timing display a series of dots that cluster in each of the graticule boxes. The line of dots forming the transition between the graticule boxes may be straight, or may exhibit a slightly curved, "S" shape, depending on the relative bandwidth of the luminance and color difference channels. Regardless of the shape of the transition, it will pass through the mid-point of an imaginary straight line between each pair of graticule boxes.

Amplitude errors result in a displacement of each cluster of dots outside the graticule boxes. Displacement along the vertical axis indicates luminance amplitude error; displacement along the horizontal axis indicates B-Y or R-Y amplitude error.

Relative timing differences between the Y and B-Y or R-Y signals are indicated by a pronounced bowing of the line of dots that make up the transition between boxes.

Additional information shown on the Lightning display includes the name of the selected measurement, the number of the field and line being measured, the colorbar standard and chrominance amplitude percentage (75% or 100%), and other information used to determine what kind of colorbar is present.

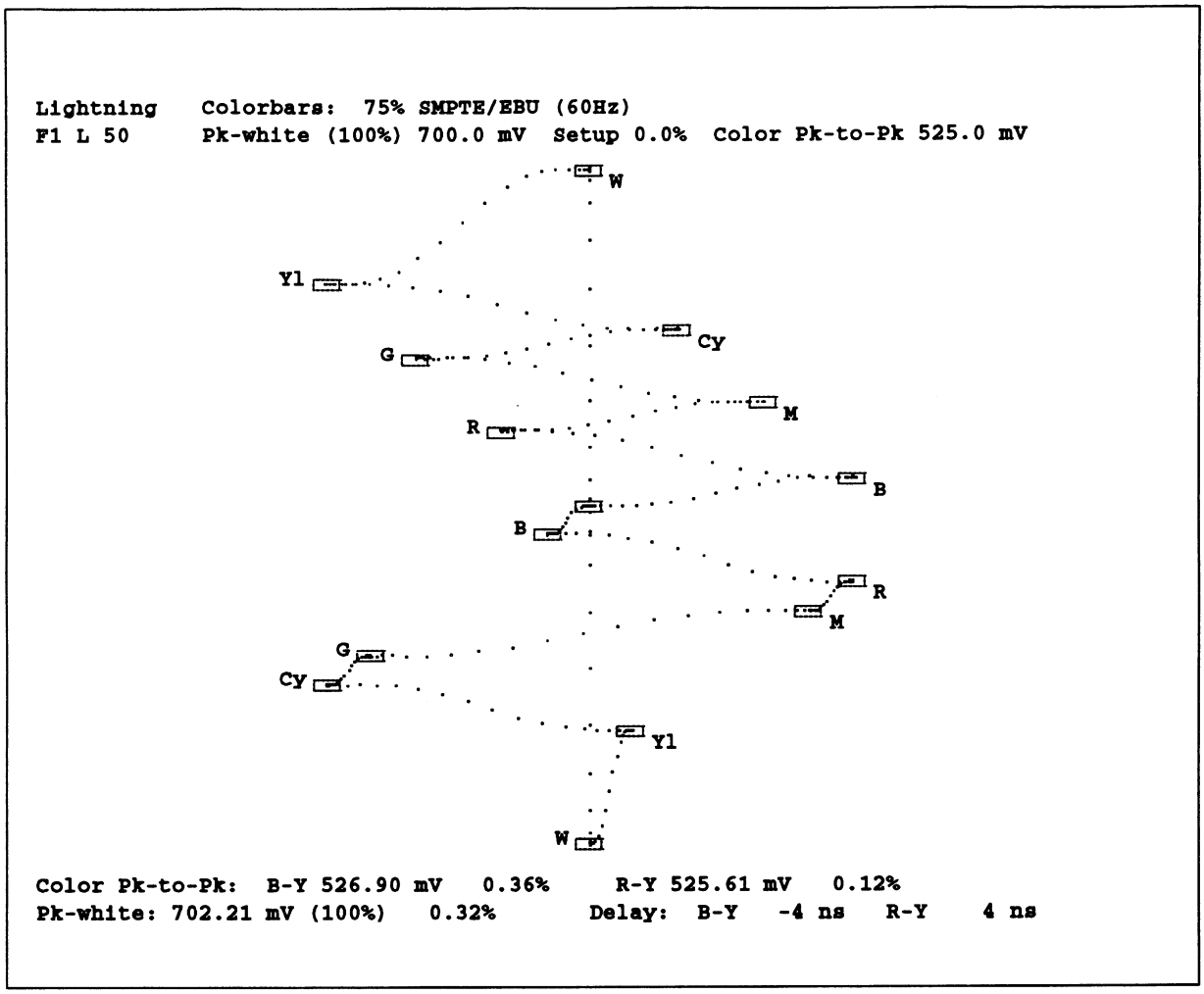


Figure 3-11. Lightning measurement display.

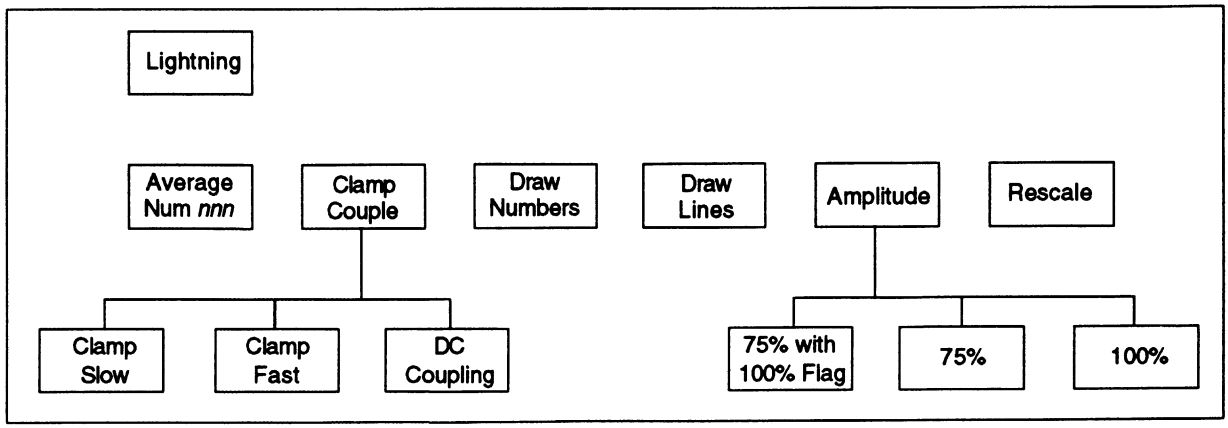


Figure 3-12. Lightning menu tree.

Lightning Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Clamp Couple	**Clamp Couple:** displays softkeys that you can use to adjust the Lightning measurement's clamping mode on all three channels.
Draw Numbers	**Draw Numbers:** displays the amplitude values in mV for the 6 color bars on each of the 3 channels, with an error percentage from the reference. The numbers are linked to the Lightning display by lines indicating the measured amplitude location.
Draw Lines	**Draw Lines:** When turned on, lightning display is shown by solid lines instead of dots.
Amplitude	**Amplitude:** displays softkeys that let you select 75% or 100% colorbars.
Rescale	**Rescale:** rescales the display graticule for an appropriate displayed resolution.

Clamp Couple Submenu

Clamp Slow	**Clamp Slow:** selects slow clamp speed. This speed allows hum effects to be visible, but is useful in coping with large DC offsets on an input signal.
Clamp Fast	**Clamp Fast:** selects fast clamp speed. This speed removes DC offset, hum, and bounce effects from the signal. This is the default clamp setting for the Lightning measurement.
DC Coupling	**DC Coupling:** selects DC coupling (no clamping).

Amplitude Submenu

75% with 100% Flag	**75% with 100% Flag:** selects 75% colorbar with 100% white flag.
75%	**75%:** selects 75% colorbar.
100%	**100%:** selects 100% colorbar.

LUMINANCE NONLINEARITY MEASUREMENT

Luminance NonLinearity measures luminance nonlinear distortion.

Figure 3-13 shows the Luminance NonLinearity display. The display stacks the nonlinear distortion measurements for the three component signals. For each signal, the display plots the step height of each packet as a percentage of the largest step-size packet. A digital readout of each packet's step size is also provided, as well as a peak-to-peak value showing the difference between the maximum and minimum step sizes.

Arrows on the display indicate an out-of-limits condition. Non-linear distortion limits for Y, Pb, and Pr components are set to default values. You may change these values in the current Component measurements ConfigFiles directory. See the section on configuration for more information.

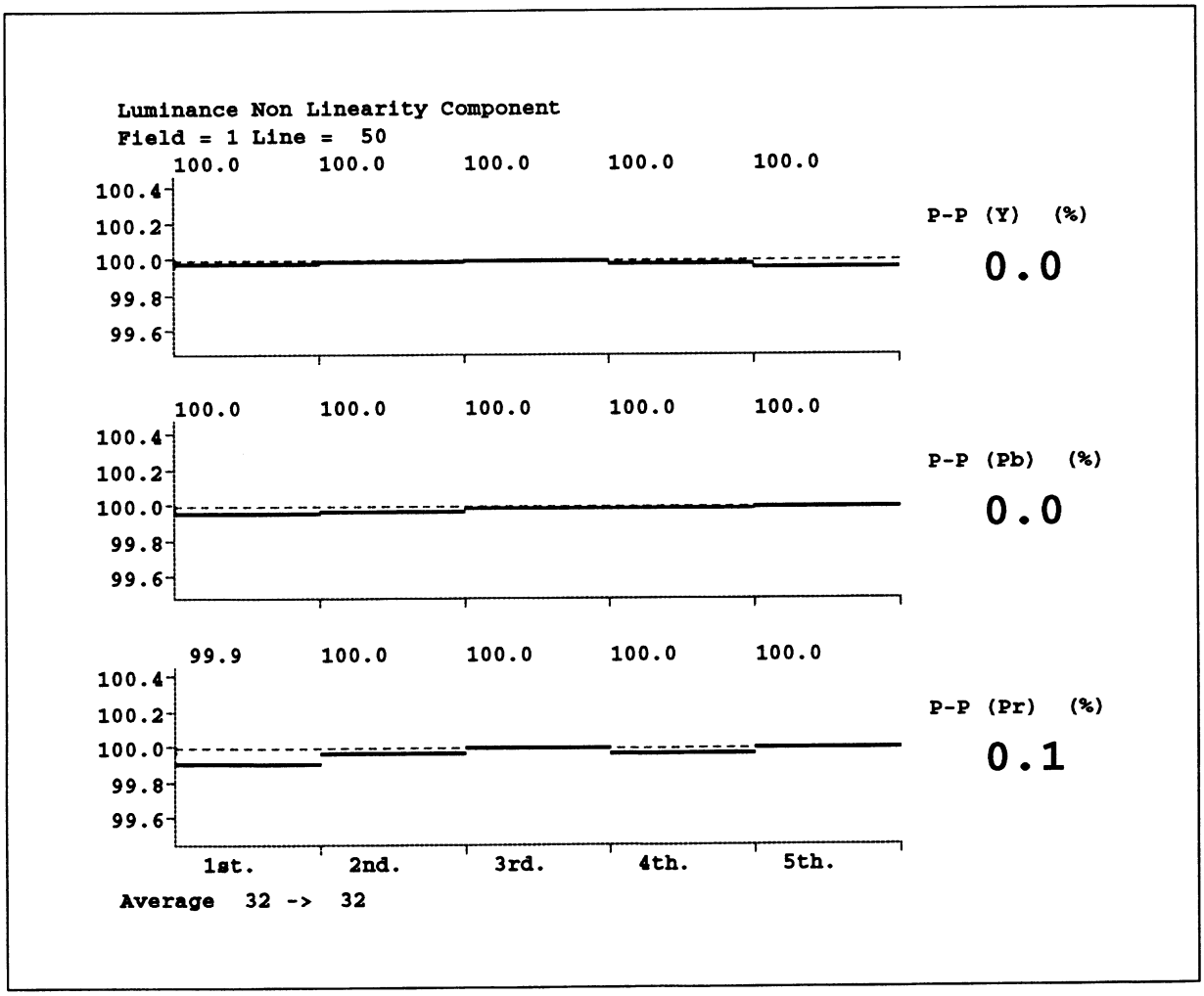


Figure 3-13. NonLinearity measurement display.

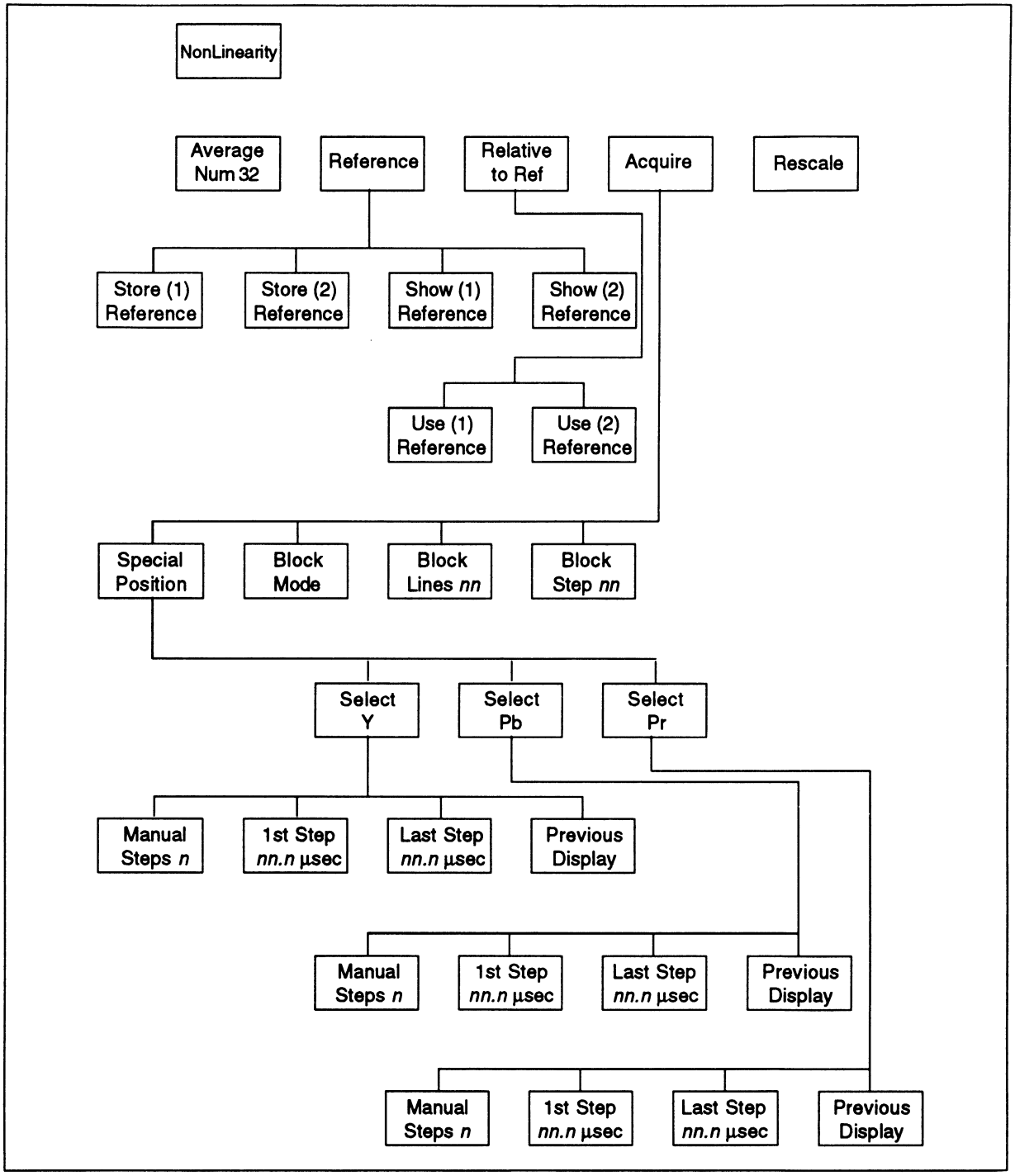


Figure 3-14. NonLinearity menu tree.

NonLinearity Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Reference	**Reference:** displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2), or show what is currently stored as user reference (1) or user reference (2).
Relative To Ref	**Relative To Ref:** displays the Relative to Reference submenu, which lets you subtract either of two stored reference values from the signal being measured. The displayed result is the difference between the measured signal and the reference value selected.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for frequency and block acquisition control.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Reference Submenu

Store (1) Reference	**Store (1) Reference:** begins averaging up to 256 and stores current display values as user reference (1) when released.
Store (2) Reference	**Store (2) Reference:** begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Show (1) Reference	**Show (1) Reference:** displays the date and values of user reference (1).
Show (2) Reference	**Show (2) Reference:** displays the date and values of user reference (2).

Relative to Reference Submenu

Use (1) Reference	**Use (1) Reference:** selects user-defined Reference (1) to compare with the signal being measured.
Use (2) Reference	**Use (2) Reference:** selects user-defined Reference (2) to compare with the signal being measured.

Touching the Special Position softkey shows the Special Position display (Figure 3-15), where you may specify locations on the waveform for measurements.

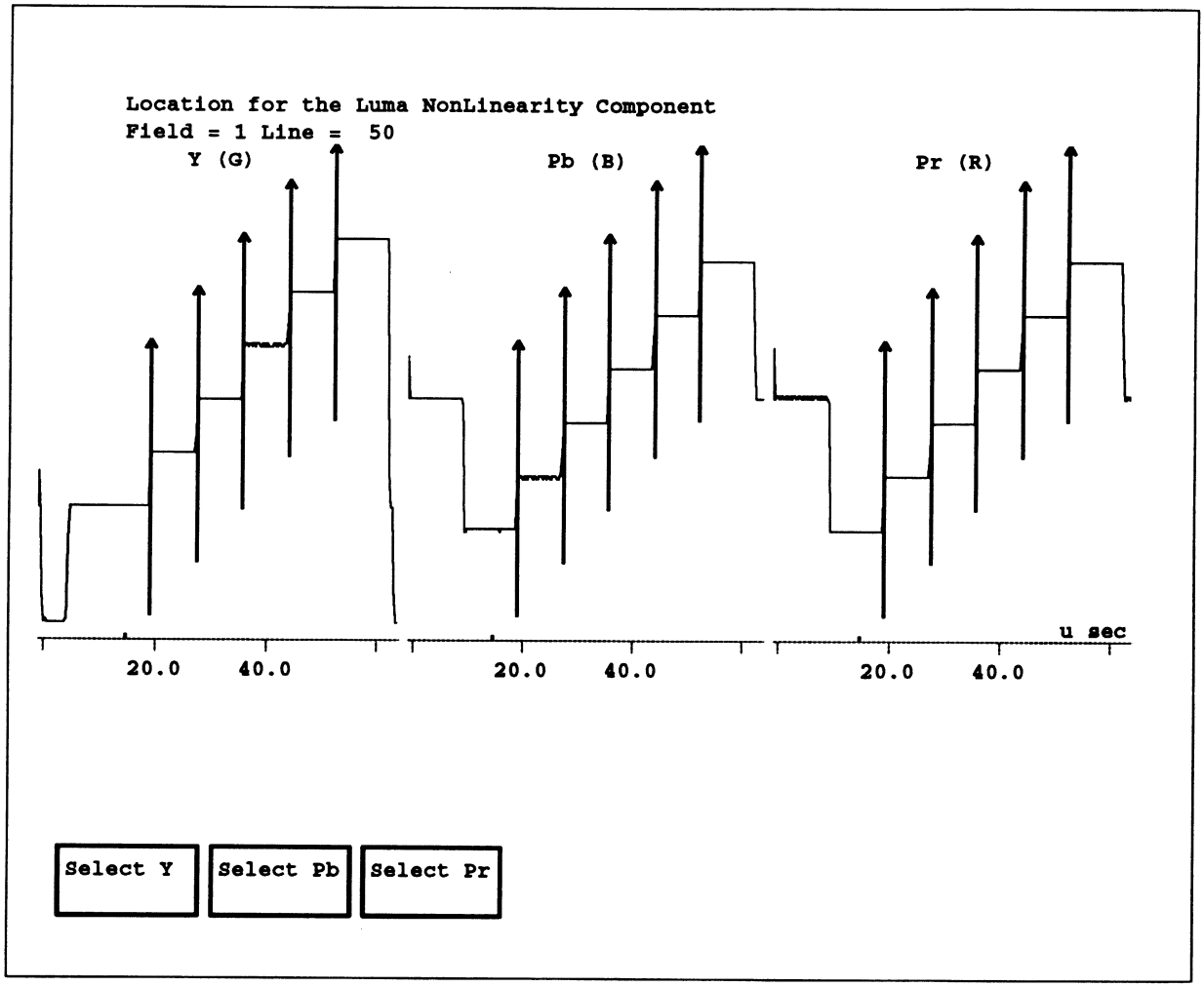


Figure 3-15. Luminance NonLinearity Special Position display.

Acquire Submenu

Special Position	**Special Positon:** provides softkeys than let you set the locations on the waveform where measurements are made.
Block Mode	**Block Mode:** enables Block mode. The block starts at the system line.
Block Lines *nn*	**Block Lines:** sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.
Block Step *nnn*	**Block Step:** sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Special Position Submenu

Select Y

Select Y: displays the data or waveform for source A.

Select Pb

Select Pb: displays the data or waveform for source B.

Select Pr

Select Pr: displays the data or waveform for source C.

Select Y, Pb, Pr Submenus

Manual Steps *n*

Manual Steps: Selects the number of luminance steps in the signal. You may adjust the number of luminance steps with the knob after touching this softkey.

1st Step *nn.n* µsec

1st Step: selects the position of the first luminance step edge of stair case. Touch the softkey and turn the knob to select the position of the first luminance step.

Last Step nn.n µsec

Last Step: selects the position of the last luminance step edge of stair case. Touch the softkey and turn the knob to select the position of the last luminance step.

Previous Display

Previous Display: leaves the display and returns to the previous display.

MULTIBURST MEASUREMENT

Component MultiBurst measures frequency response. The MultiBurst display stacks the three component input signals and plots each signal amplitude (in dB) as a function of its difference from the reference frequency. Figure 3-16 shows the Component Multiburst display.

Arrows on the display indicate an out-of-limits condition. The measurement limits for Y, Pb, and Pr multiburst flags and packets (in mV and dB, respectively) are set to default values. You may change these values in the current Component measurements ConfigFiles directory. See the section on configuration for more information.

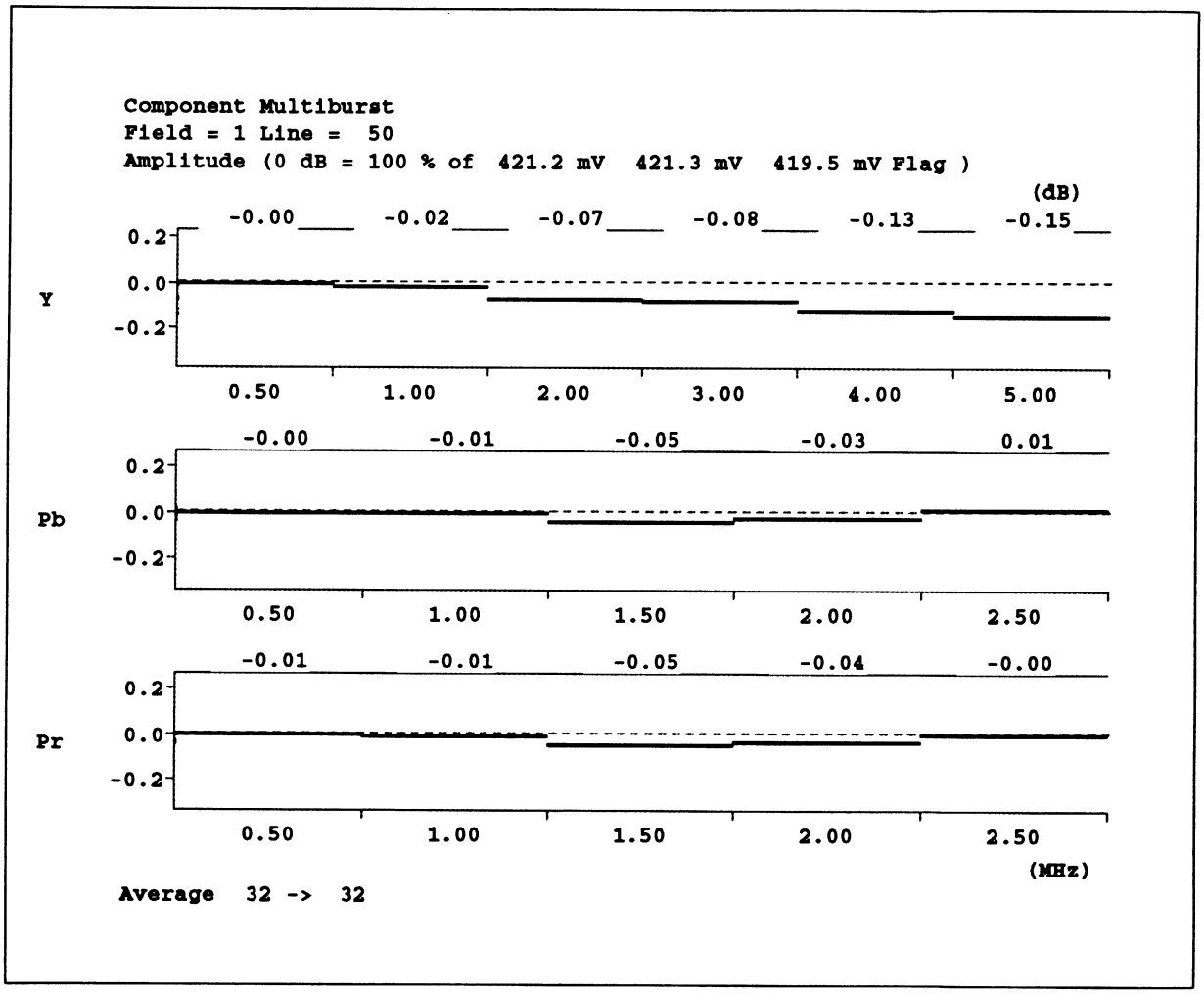


Figure 3-16. Multiburst measurement display.

Multiburst Display

Pressing the Menu button when the Multiburst measurement is running displays the Multiburst main menu. The Multiburst menu hierarchy is shown in Figure 3-17.

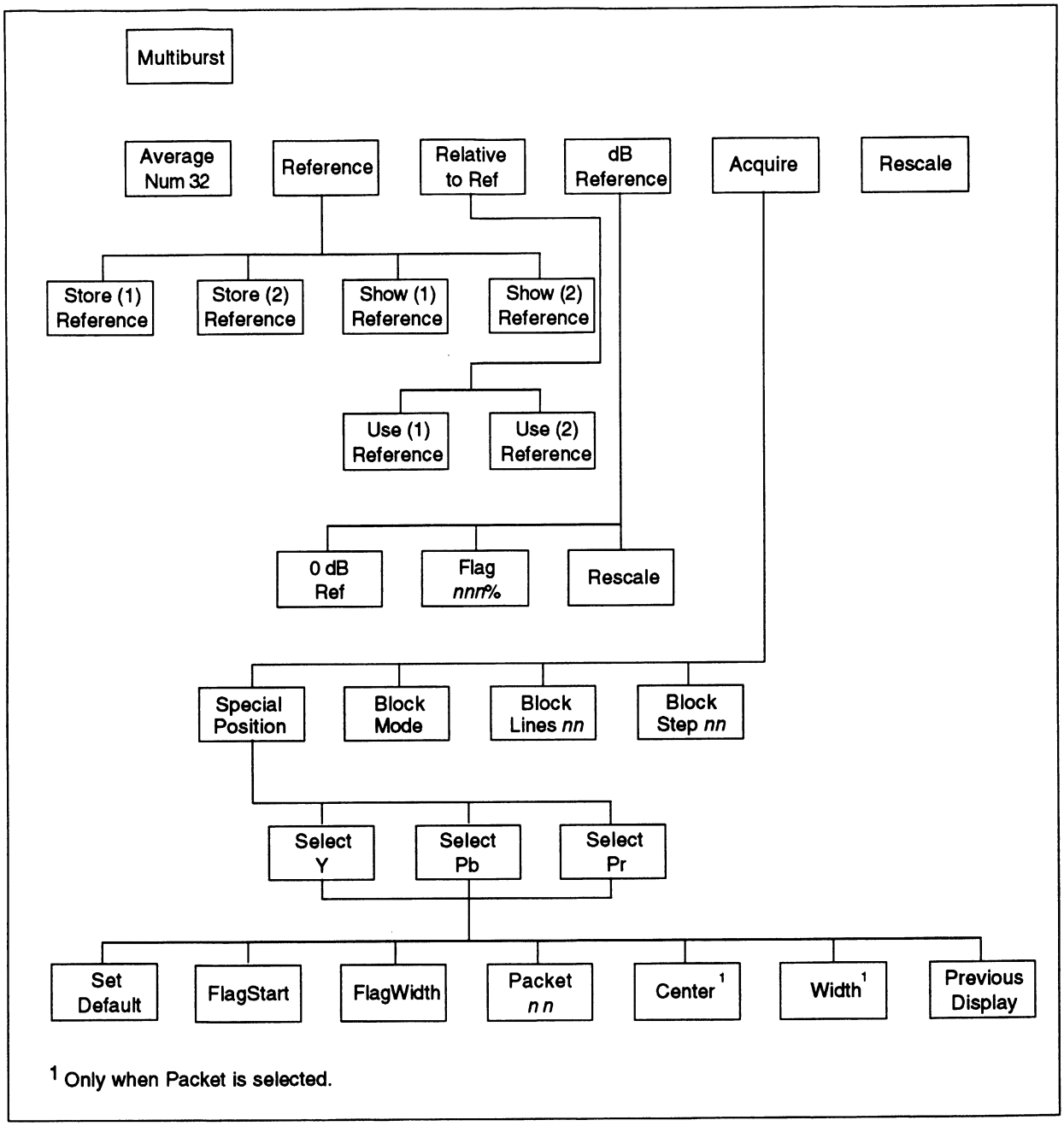


Figure 3-17. Multiburst menu tree.

Multiburst Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Reference	**Reference:** displays the Reference submenu, which lets you store the current display as user reference (1) or user reference (2), or show what is currently stored as user reference (1) or user reference (2).
Relative To Ref	**Relative To Ref:** displays the Relative to Reference submenu, which lets you subtract either of two stored reference values from the signal being measured. The displayed result is the difference between the measured signal and the reference value selected.
dB Reference	**dB Reference:** select the position of the dB scale reference.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for frequency and block acquisition control.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Reference Submenu

Store (1) Reference	**Store (1) Reference:** begins averaging up to 256 and stores current display values as user reference (1) when released.
Store (2) Reference	**Store (2) Reference:** begins averaging up to 256 and stores current display values as user reference (2) when released.

NOTE

You can obtain the best reference by using a large averaging number.

Show (1) Reference	**Show (1) Reference:** displays the date and values of user reference (1).
Show (2) Reference	**Show (2) Reference:** displays the date and values of user reference (2).

Relative to Reference Submenu

Use (1) Reference	**Use (1) Reference:** selects user-defined Reference (1) to compare with the signal being measured.
Use (2) Reference	**Use (2) Reference:** selects user-defined Reference (2) to compare with the signal being measured.

dB Reference Submenu

0dB Ref	**0dB Ref:** selects the position of the 0 dB reference on the dB scale.
Flag *nnn* %	**Flag:** sets the dB scale reference for the percentage of the flag amplitude.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Acquire Submenu

Special Position	**Special Positon:** provides softkeys than let you set the locations on the waveform where measurements are made.
Block Mode	**Block Mode:** enables Block mode. The block starts at the system line.
Block Lines *nn*	**Block Lines:** sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.
Block Step *nnn*	**Block Step:** sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

Touching the Special Position softkey shows the Special Position display and its softkeys. This display, shown in Figure 3-18, presents the Y, Pb, and Pr input signals side by side. Touching a softkey displays the Y, Pb, or Pr waveform by itself on an expanded scale.

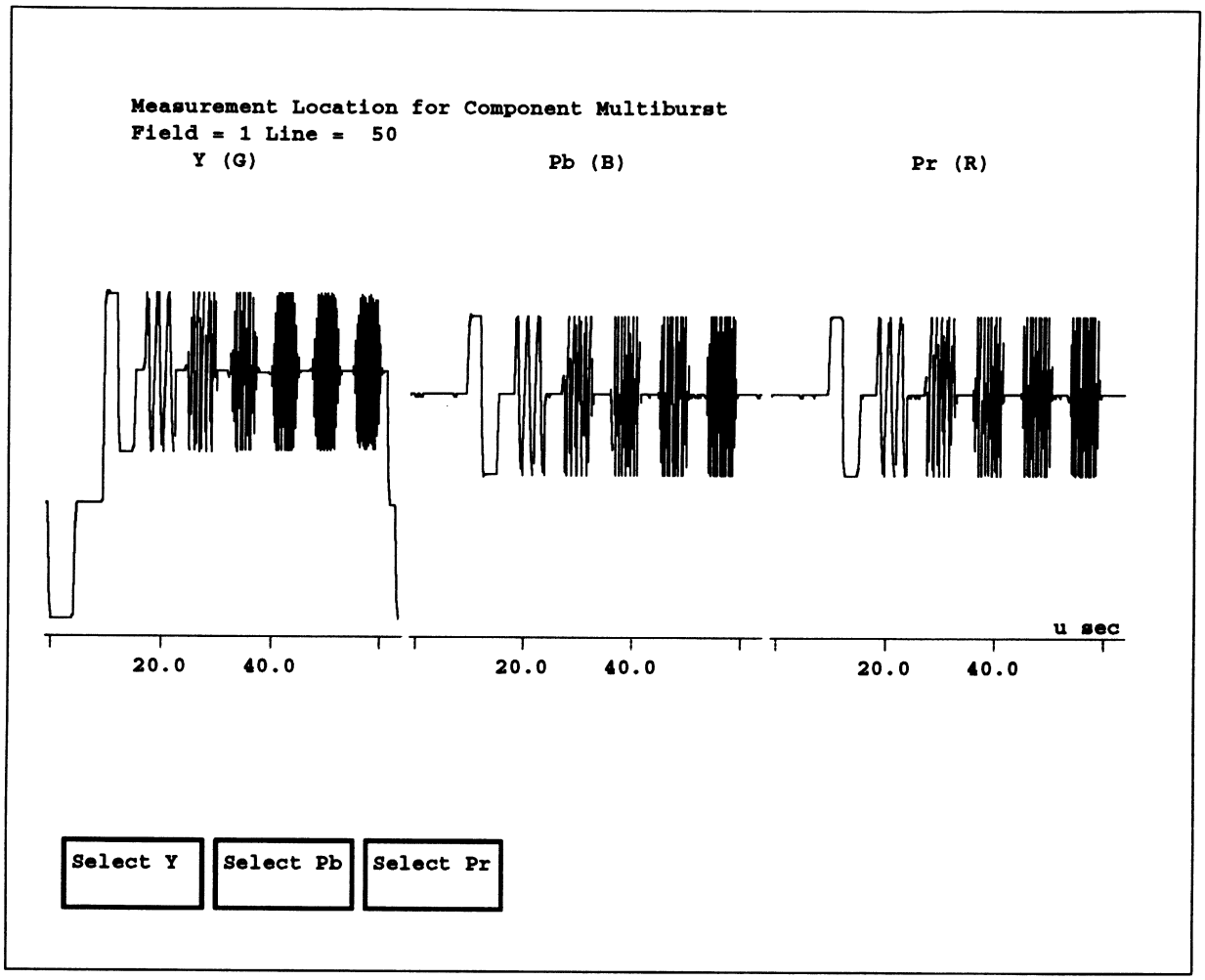


Figure 3-18. The MultiBurst Special Position display.

Special Position Submenu

Select Y	**Select Y:** displays the data or waveform for source A.
Select Pb	**Select Pb:** displays the data or waveform for source B.
Select Pr	**Select Pr:** displays the data or waveform for source C.

Select Y, Pb, Pr Submenus

Set Default	**Set Default:** resets each location's default numbers unless another key is selected. Otherwise only the location you select is changed.
FlagStart	**FlagStart:** selects the leading-edge location of the MultiBurst Flag.
FlagWidth	**FlagWidth:** selects the width of the MultiBurst Flag.
Packet *n n*	**Packet:** selects one of the six packets and, via two other softkeys, chooses the location and measurement area. Pressing the softkey displays cursors indicating location, width and frequency.
Center	**Center:** selects the center location of the packet (only when the Packet softkey is selected).
Width	**Width:** selects the measurement area of the packet (only when the Packet softkey is selected).
Previous Display	**Previous Display:** Leaves the Special Position display and returns to the previous display.

NOISE SPECTRUM MEASUREMENT

Noise Spectrum measures noise level and performs spectrum analysis.

Figure 3-19 shows the Noise Spectrum display. The display plots noise level in decibels (where 0 dB=714 mV p-p) vs. frequency (in MHz). A digital readout also displays the rms noise level of the entire bandwidth for each component. An arrow indicates the component being displayed. You may select one of the components for display by touching the Y Pb Pr Select softkey and touching the softkey for the component desired.

Arrows on the display indicate an out-of-limits condition. The measurement limits for Y, Pb, and Pr noise spectrum levels are set to default values. You may change these values in the current Component measurements ConfigFiles directory. See the section on configuration for more information.

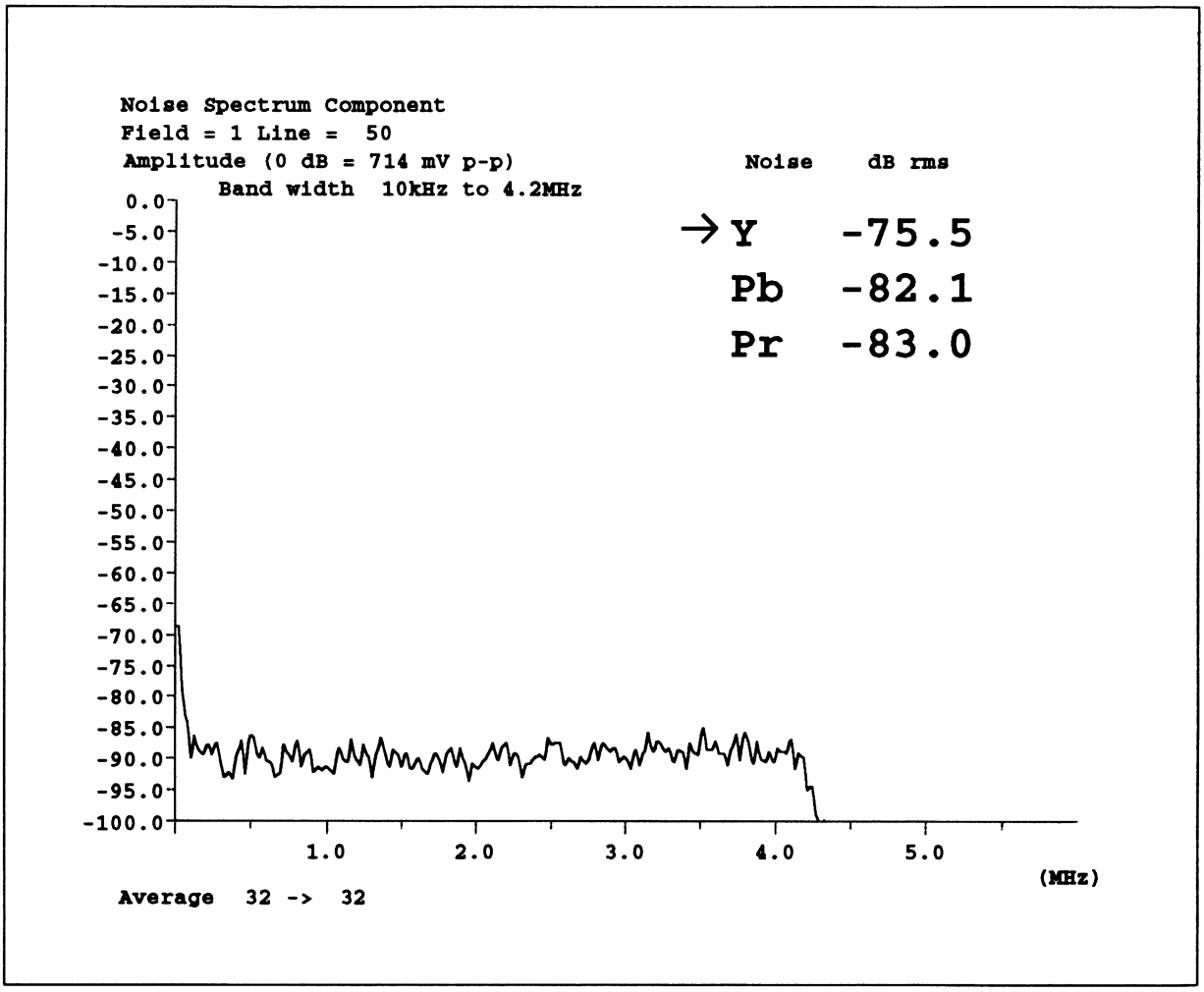


Figure 3-19. Noise measurement display.

Noise Display

Pressing the Menu button when the Noise measurement is running displays the Noise measurement main menu. The Noise measurement menu hierarchy is shown in Figure 3-20.

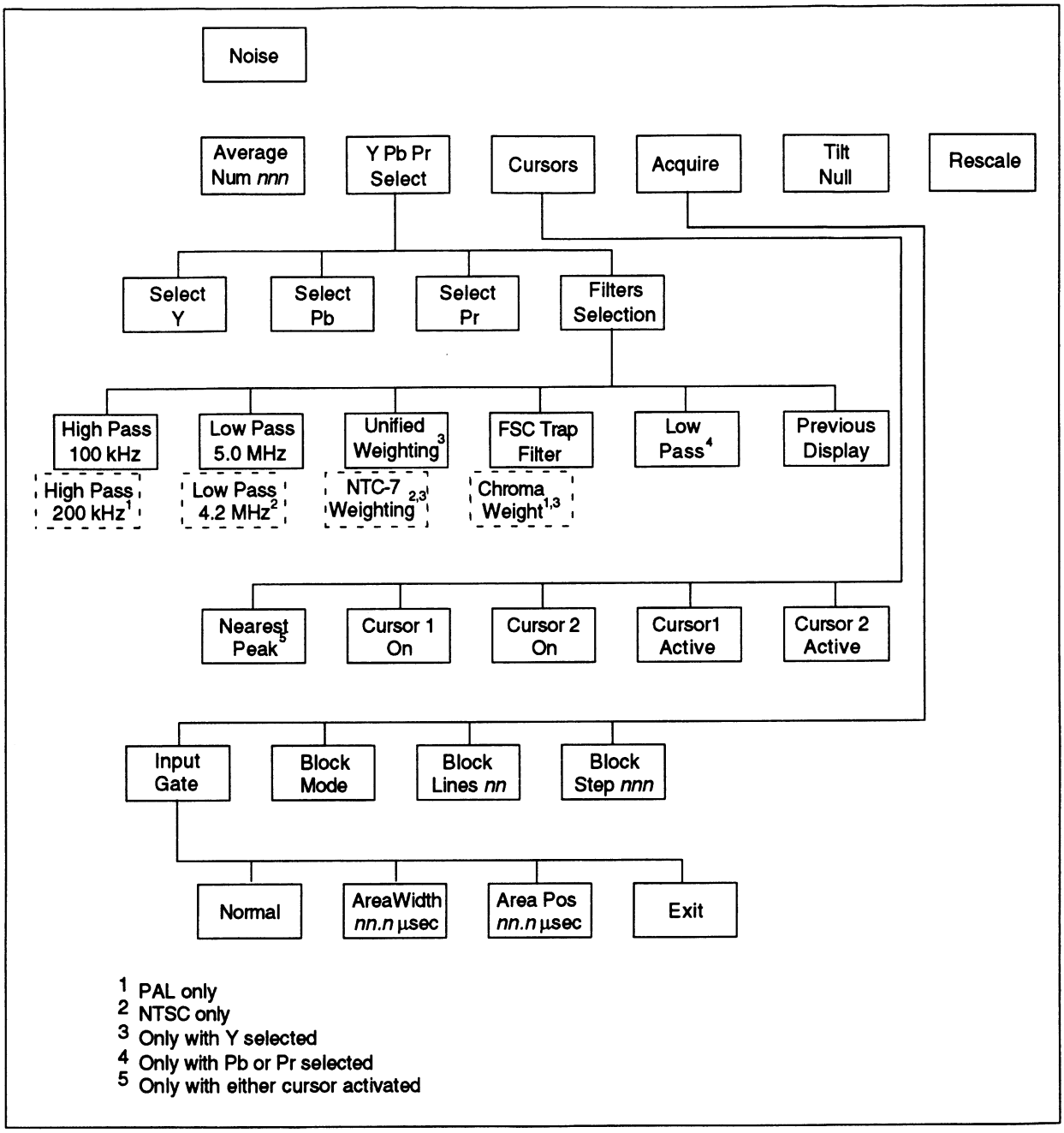


Figure 3-20. Noise menu tree.

Noise Measurement Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Y Pb Pr Select	**Y Pb Pr Select:** displays softkeys for display and filters selection.
Cursors	**Cursors:** provides softkeys to display and activate the two noise spectrum cursors. Readouts for the cursors give the peak-to-peak dB value at the frequency location of the cursors and the noise level in dB (rms) between the cursors.
Acquire	**Acquire:** displays the Acquire submenu, which provides softkeys for frequency and block acquisition control.
Tilt Null	**Tilt Null:** automatically compensates for tilt (horizontal sag) to enable measuring the noise spectrum on a ramp signal. Note: the noise floor may be slightly higher because the auto-gain increase is limited by the larger peak-to-peak amplitude of the signal.
Rescale	**Rescale:** rescales the display graticule for the appropriate displayed resolution.

Y Pb Pr Select Submenu

Select Y	**Select Y:** displays the data or wavaform of source A.
Select Pb	**Select Pb:** displays the data or wavaform of source B.
Select Pr	**Select Pr:** displays the data or wavaform of source C.
Filters Selection	**Filters Selection:** provides softkeys to select one or more noise filters for the selected source.

Filters Selection Submenu

High Pass 100 kHz	**High Pass 100 kHz:** selects the 100 kHz high pass filter. Signal information below 100 kHz is removed.
High Pass 200 kHz	**High Pass 200 kHz:** (PAL only) selects the 200 kHz high pass filter. Signal information below 200 kHz is removed.
Low Pass 4.2 MHz	**Low Pass 4.2 MHz:** (NTSC only) selects the 4.2 MHz low pass filter. Signal information above 4.2 MHz is removed.
Low Pass 5.0 MHz	**Low Pass 5.0 MHz:** Selects the 5 MHz low pass filter. Signal information above 5 MHz is removed.
Unified Weighting	**Unified Weighting:** (only with Y selected) selects the standard CCIR unified weighting filter.
NTC-7 Weighting	**NTC-7 Weighting:** (NTSC only) selects the standard NTC-7 weighting filter.

Chroma Weighting

Chroma Weighting: (PAL only) filters the signal to display approximately 3 to 6 MHz.

FSC Trap Filter

FSC (Frequency at Subcarrier)Trap Filter: Selects the subcarrier trap filter.

Low Pass

Low Pass: (only with Pb or Pr selected) selects one of the 0.5 to 4.5 MHz low-pass filters (in 0.5 MHz increments). To change the frequency, select and hold the softkey, turn the knob to locate the new frequency, and release the softkey.

Previous Display

Previous Display: Exits and returns to the previous display.

Cursors Submenu

Nearest Peak

Nearest Peak: positions the active cursor on the nearest peak of the Noise Spectrum display.

Cursor 1 On

Cursor 1 On: displays noise cursor 1. The cursor appears in the position it was in the last time the cursor was active.

Cursor 2 On

Cursor 2 On: displays noise cursor 2. The cursor appears in the position it was in the last time the cursor was active.

Cursor 1 Active

Cursor 1 Active: enables the knob to move noise cursor 1. Also displays the Nearest Peak softkey.

Cursor 2 Active

Cursor 2 Active: enables the knob to move noise cursor 2. Also displays the Nearest Peak softkey.

Acquire Submenu

InputGate

InputGate: provides softkeys to control the width and position of the signal area used for the Noise Spectrum measurement.

Block Mode

Block Mode: enables Block mode. The block starts at the system line.

Block Lines *nn*

Block Lines: sets the number of lines to average for the measurement. The default number of block lines to average is 3. The range is 2 to 32 lines, but the actual number of lines measured may be smaller if the last line of the block exceeds the current field.

Block Step *nnn*

Block Step: sets the number of lines to step in the block. The default number of lines to step is 2; the range is 2 to end of the field.

InputGate Submenu

Normal	**Normal:** restores the AreaWidth and Area Position softkeys to their default values.
AreaWidth *nn.n* µsec	**AreaWidth:** controls the width of the signal area used for the Noise Spectrum measurement. (Note: low frequency characteristics and frequency resolution may be changed depending on the area width selected.)
Area Pos *nn.n* µsec	**Area Pos.:** controls the position of the signal area used for the Noise Spectrum measurement.
Exit	**Exit:** Leaves the InputGate menu and returns to the Noise Spectrum display.

OVERLAY MEASUREMENT

The Overlay measurement displays component Y, Pb, and Pr inputs in superimposed or stacked format (user selectable). The display plots signal level in mV against time in µsec. This measurement provides two cursors for locating waveform features, a selection that aligns or offsets the superimposed signals, and the ability to isolate any one of the three inputs for individual display. Figure 3-21 shows the Overlay measurement display and Figure 3-22 shows its menu structure.

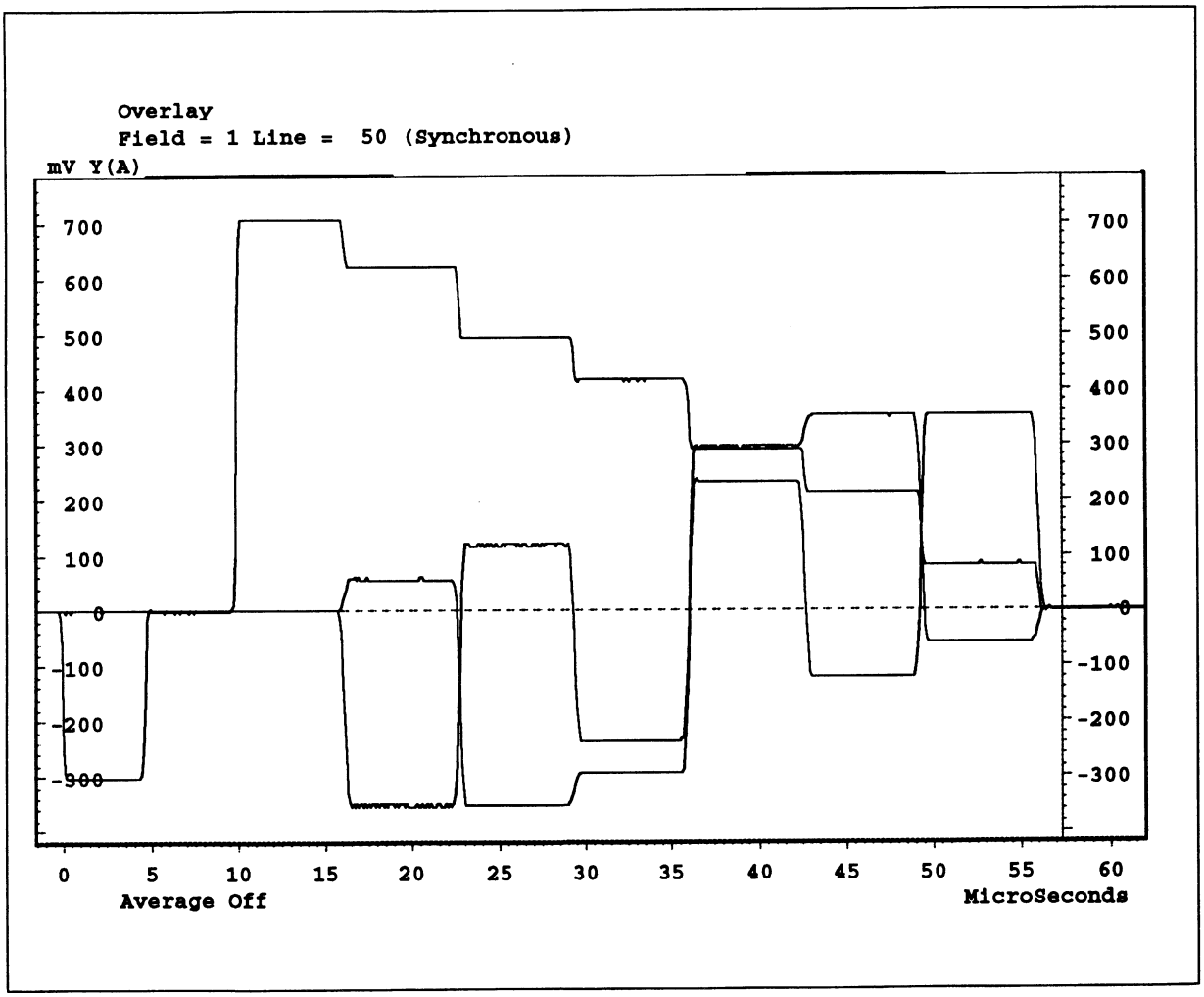


Figure 3-21. Overlay measurement display (Overlay Channels mode).

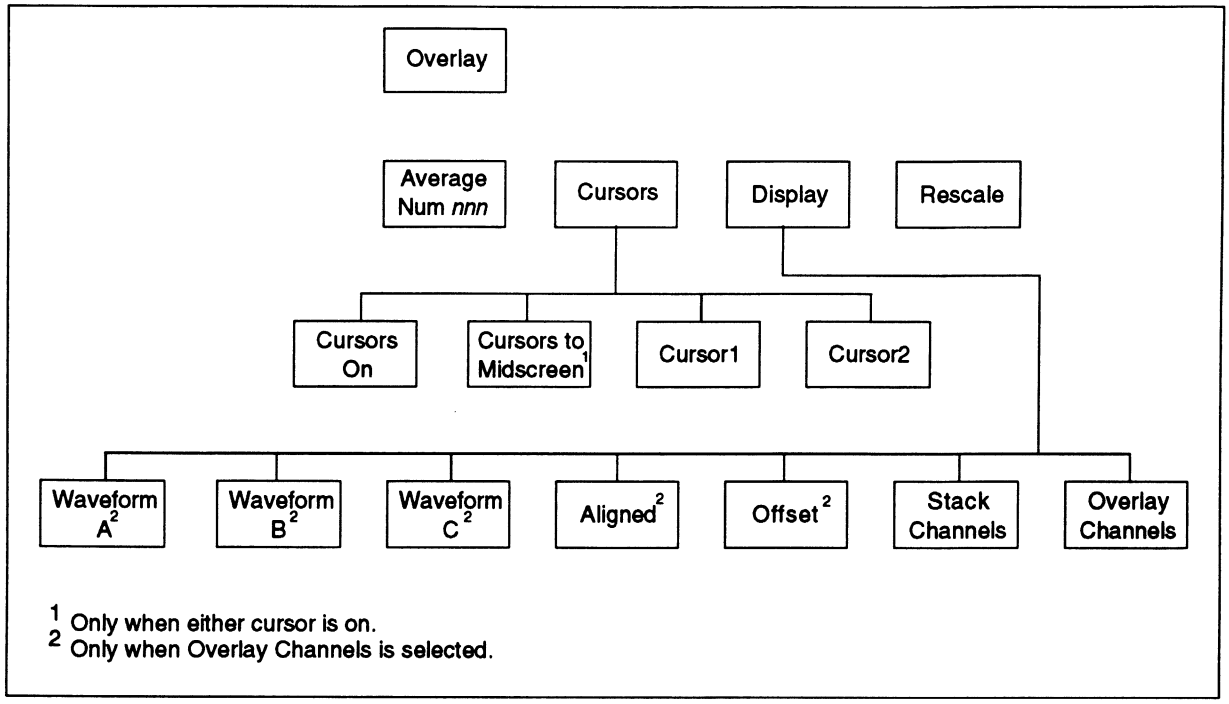


Figure 3-22. Overlay menu tree.

Overlay Main Menu

Average Num *nnn*

Average Num: specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.

Cursors

Cursors: displays softkeys that let you adjust horizontal cursors for timing measurements.

Display

Display: displays softkeys that let you reorganize the display and adjust channel vertical attributes separately or together.

Rescale

Rescale: rescales the display graticule for an appropriate displayed resolution.

Display Submenu

Waveform A	**Waveform A:** displays the waveform on channel A when you touch the softkey.
Waveform B	**Waveform B:** displays the waveform on channel B when you touch the softkey.
Waveform C	**Waveform C:** displays the waveform on channel C when you touch the softkey.
Aligned	**Aligned:** touching this softkey aligns and locks together the vertical displays for the three waveforms. Turning the knob moves or expands the vertical scale for the display.
Offset	**Offset:** touching this softkey offsets Pb and Pr from the Y display by 350 mV. Turning the knob moves or expands the vertical scale for the display.
Stack Channels	**Stack Channels:** touch this softkey to stack channel input displays(i.e., one above the other).
Overlay Channels	**Overlay Channels:** touch this softkey to superimpose channel input displays(i.e., one on top of the other).

Cursors Submenu

Cursors On	**Cursors On:** displays the cursors.
Cursors to Midscreen	**Cursors to Midscreen:** moves the selected cursor to midscreen.
Cursor1	**Cursor1:** enables knob turns to adjust Cursor 1.
Cursor2	**Cursor2:** enables knob turns to adjust Cursor 2.

PARADE MEASUREMENT

The Parade measurement displays component Y, Pb, and Pr inputs side by side on the VM700A screen. The Parade display plots signal level in mV against time in µsec. This measurement provides two cursors for locating waveform features, and the cursors may be positioned to specific voltage features on the display (see Figure 3-23). Figure 3-24 shows the Parade menu hierarchy..

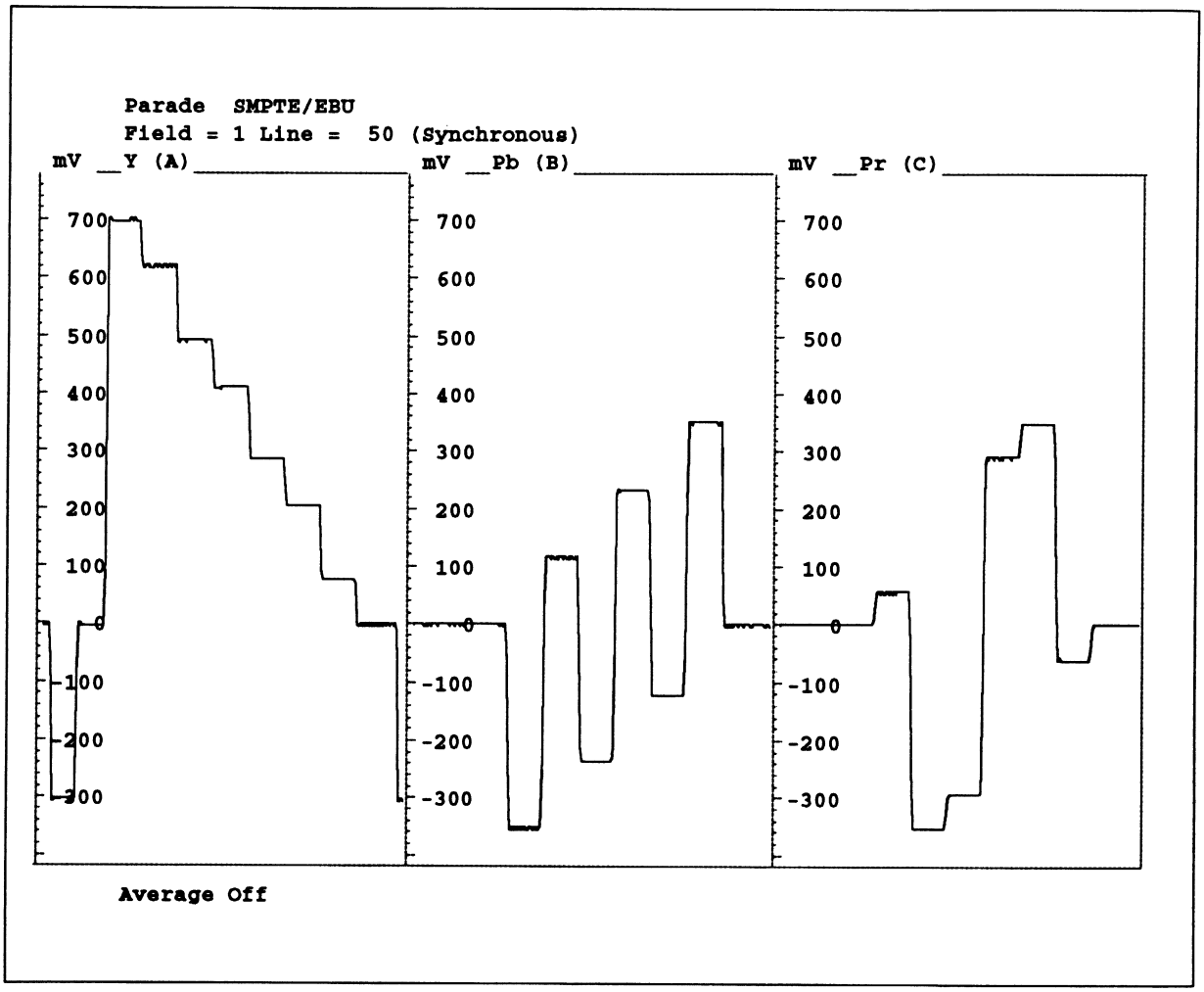


Figure 3-23. Parade measurement display.

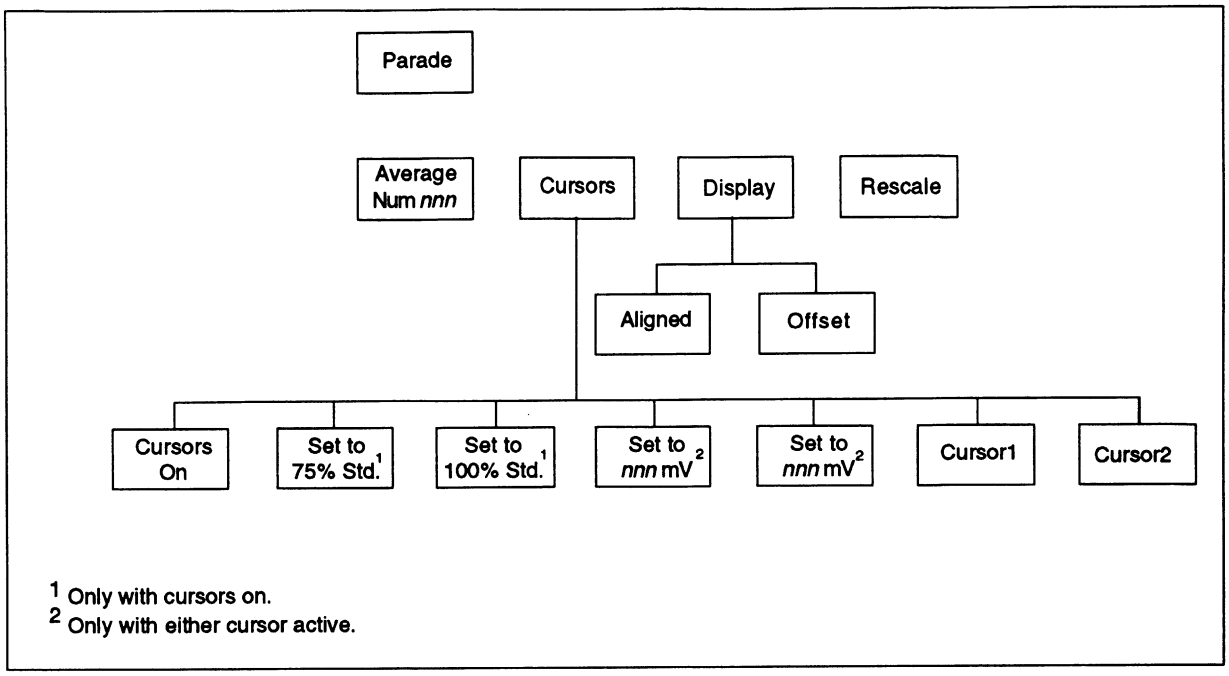


Figure 3-24. Parade menu tree.

Parade Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Cursors	**Cursors:** displays softkeys that let you adjust horizontal cursors to make timing measurements.
Display	**Display:** displays softkeys that let you reorganize the display and adjust the channel vertical attributes separately or together.
Rescale	**Rescale:** rescales the display graticule for an appropriate displayed resolution.

Cursors Submenu

Cursors On	**Cursors On:** displays the cursors.
Set to 75% Std.	**Set to 75% Std.:** places Cursor 1 on the lowest and Cursor 2 on the highest amplitude of the 75% colorbar in the currently-defined standard for all three channels.
Set to 100% Std.	**Set to 100% Std.:** places Cursor 1 on the lowest and Cursor 2 on the highest amplitude of the 100% colorbar in the currently-defined standard for all three channels.
Set to *nnn* mV	**Set to *nnn* mV:** moves the selected cursor to the amplitude specified by the softkey. To change the preset amplitude, select and hold the softkey to be changed, turn the knob until the new amplitude is displayed, and release the softkey.
Cursor1	**Cursor1:** assigns knob turns to cursor 1 adjustments. Touch the display to select the channel that cursors are active on.
Cursor2	**Cursor2:** assigns knob turns to cursor 2 adjustments. Touch the display to select the channel that cursors are active on.

Display Submenu

Aligned	**Aligned:** touching this softkey aligns and locks together the vertical displays for the three waveforms. Turning the knob moves or expands the vertical scale for the display.
Offset	**Offset:** touching this softkey offsets Pb and Pr from the Y display by 350 mV. Turning the knob moves or expands the vertical scale for the display.

VECTOR MEASUREMENT

The component Vector measurement is an X-Y display of the Pb and Pr components (see Figure 3-25). Figure 3-26 shows the Vector menu hierarchy.

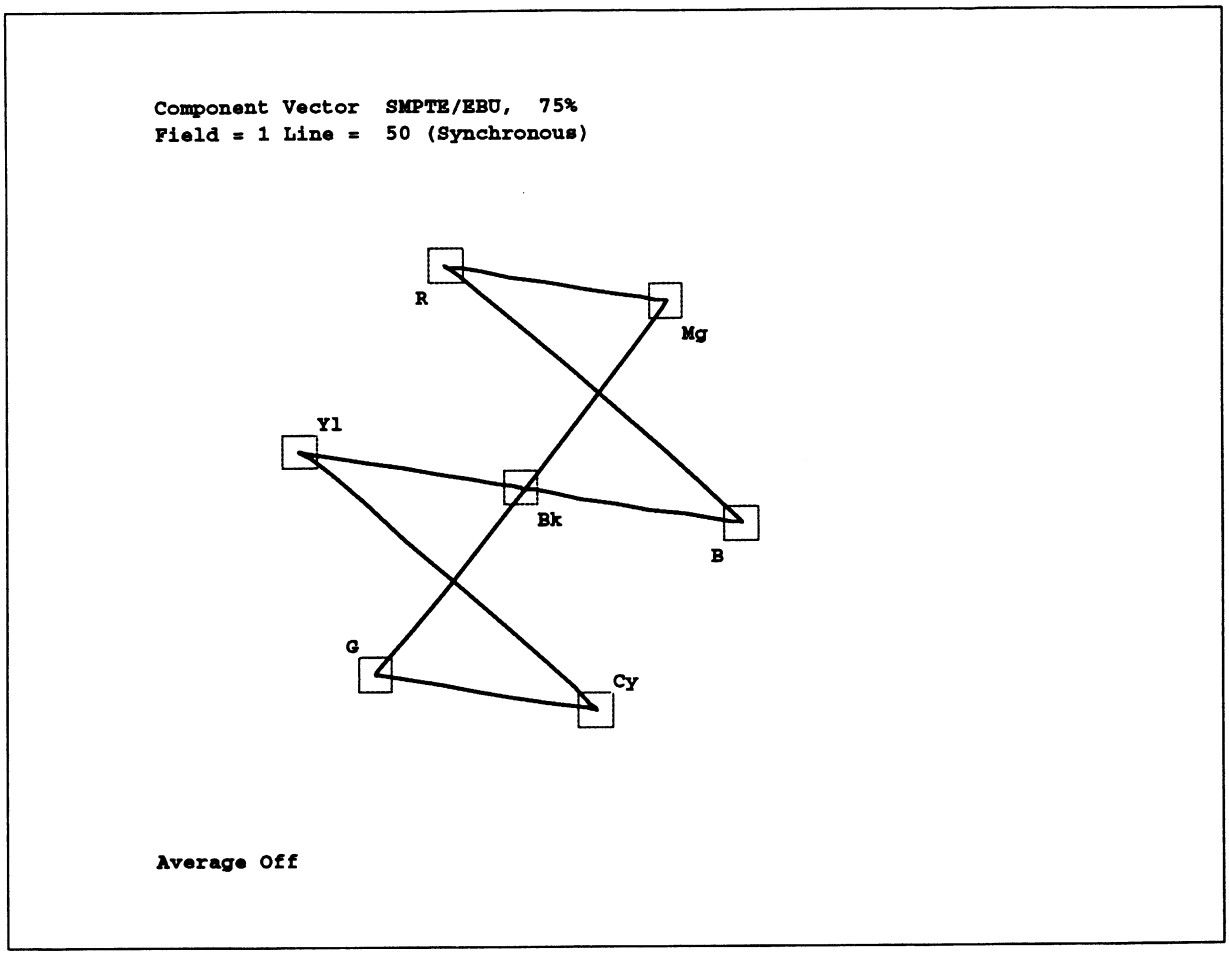


Figure 3-25. Vector measurement display.

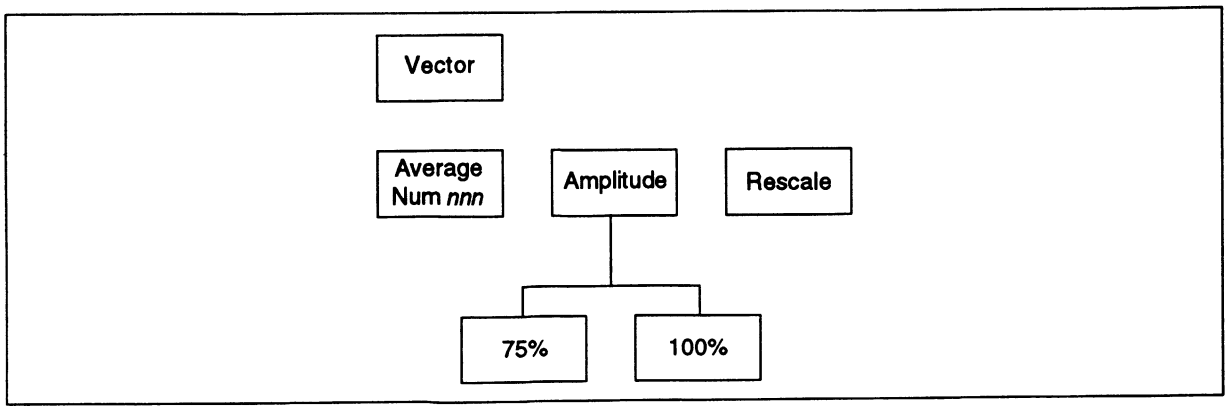


Figure 3-26. Vector menu tree.

Figure 3-26. Vector menu tree.

Vector Main Menu

Average Num *nnn*	**Average Num:** specifies the weighting factor to be used for averaging. The Average Num range is 1 to 256. The default value is 32. To change the Average Num value, press the Average Num softkey to highlight it, rotate the knob until the desired weighting factor appears, then press the Average Num softkey again.
Amplitude	**Amplitude:** displays softkeys that let you select 75% or 100% colorbars.
Rescale	**Rescale:** rescales the display graticule for an appropriate displayed resolution.

Amplitude Submenu

75%	**75%:** selects 75% colorbar.
100%	**100%:** selects 100% colorbar.

Section 4
REMOTE COMMANDS AND KEYWORDS

INTRODUCTION

Like other VM700A video functions, remote control of Component measurement functions is performed via the serial (RS-232C) ports on the VM700A rear panel. Using the remote control functions requires that you connect a terminal or computer to the VM700A via the RS-232C port with a correctly wired interconnect cable. If you use a computer, you will also need a suitable VM700A terminal program such as the Tektronix application VMT. VMT offers a choice of either menu selection or command-line entry of VM700A remote commands.

For information about configuring the VM700A serial ports for remote operation, see the *VM700A Operator's Manual.*

Capabilities available while operating the VM700A from a remote location include:

- Make a specific manual measurement or Auto mode series of measurements
- Execute and interrupt a function (Function Key)
- Temporarily change the configuration of a channel: limit files, selected measurement files, and measurement location files; printer type and port for each type of output (**Copy**, **Report**, **Log**); specify an "End of File" character for printer output

The remote commands used to access the Component measurement functions are the same as those used for other VM700A functions. The command arguments are listed and described below. The information in this section assumes that you are familiar with manual operation of the VM700A and understand the principles of remote VM700A operation. For information on working with VM700A remote control commands, see the *VM700A Programmer's Reference Manual*. The Programmer's manual also discusses the VM700A's RS-232C port requirements in detail and shows typical cable wiring configurations.

NOTE

Rather than being a complete discussion, the following material is an abbreviated explanation of the remote commands. It assumes that you understand the principles of remote VM700A operation and have access to the VM700A Programmer's Reference Manual.

COMMAND FORMAT

The VM700A remote control commands use this form:

command [*argument(s)*]

The *command* is the actual command name. Literal command input is shown in **boldface** type. Variable values are shown in *italic*. Optional arguments are enclosed with [ ]. A discussion of command usage and arguments follows the command header.

Note that **VM700>** is a prompt (which you can change), not an input.

COMPONENT MEASUREMENT REMOTE COMMANDS

The following VM700A remote commands can be used with Component Measurements.

execute *application*

The **execute** command starts the specified VM700A application. An application is one of the executable files (with exceptions noted below) found in the **Instrument~Operations**, **VM700~Diagnostics**, **Video~Measurements**, or **Audio~Measurements** directories in the **Executable~ Files** directory. Selecting an operational mode application, such as Vector, is equivalent to pressing the front panel button: the LED on the selected button is lit. Selecting a measurement or diagnostic application is equivalent to touching the desired softkey.

Example:

```
VM700A> execute Bowtie
```

You may run these Component measurement applications under remote control. Be sure to use the same capitalization and tildes (~) as shown:

Bowtie
Component~Channel_Delay
Component~ColorBar
Component~K_Factor
Component~LevelMeter
Component~Multiburst
Component~Noise
Component~NonLinearity
Component~Vector
Lightning
Overlay
Parade

get *keyword* [*channel-letter*]

The **get** command returns the configuration file value specified by *keyword* on the channel specified by *channel_letter*. The keywords available are listed in the following section. The channel_letters available are **A**, **B**, or **C**.

Example:

```
VM700A> get EBWT A
```

The above example returns the Bowtie interchannel delay, in ns, for channel A.

getresults

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

Example:

```
VM700A> getresults
Results in file: Lightning
```

hardkey *button_name*

The **hardkey** command indicates the press and release of the specified front panel button, *button_name*. **hardkey** is equivalent to entering **hardpress** and **hardrelease**; however, in general **hardkey** should be used instead of these commands.

Example:

```
VM700A> hardkey Menu
```

Front panel button names are listed in Table 4-1.

Table 4-1
Front Panel Button Names

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

NOTE

The Configure, Function, and Measure buttons cannot be selected via remote.

set *keyword* [*channel_letter*] *value1* [*value2 ...*]

The **set** command defines the configuration values to be used during the remote session. The keywords available to use with **set** are listed in Tables 4-1, 4-2, and 4-3. The channel_letter can be **A**, **B**, or **C**. The configuration values changed with **set** remain in effect until they are restored to their original (pre-remote) values with the **restoreconfig** command, or power to the instrument is switched off and back on. Note that the system line and other global variables can be changed with **set** but are not restored with **restoreconfig**.

Example:

```
VM700A> set ELPW A -1.5 1.5
```

The above example changes the NTSC lightning peak white amplitude error limits for channel A from their previous values to –1.5 to 1.5 percent.

show *filename*

The **show** command returns the contents of the specified filename. The default path is the Measurement~Results directory, but other files can be specified with a full pathname or a path relative to the Measurement~Results directory.

Example:

```
VM700A> show /nvram0/ConfigFiles/Source_Selection~Video
       Video NTSC Video Source File Name     PAL Video Source File Name
-------------------------------------------------------------------------
Source A: NTSC System~Default                System~Default
Source B: PAL  System~Default                System~Default
Source C: NTSC System~Default                System~Default
Timed Events: System~Default
```

softkey *softkey_name*

The **softkey** command indicates the press and release of a specified softkey, such as Cursors. **softkey** is equivalent to entering **softpress** and **softrelease**; however, in general **softkey** should be used instead of these commands.

Example:

```
VM700A> softkey Select_Graph
```

With a few exceptions, the general rule for forming a *softkey_name* is to take the spelling and capitalization from the softkey name on the display, omit the variable part and join the words with _ (underscore). For example, the *softkey_name* for the **Noise 15.03 dB** softkey is Noise_dB, and for **1H Display** it is H_Display.

For softkeys that perform toggle operations (such as on/off), the softkey name is followed by a colon (:). For example, Plot: ON or Freq: LINEAR. The softkey displays the current status of the toggle. The convention for naming toggle keys is to use the function name, with appropriate capitalization, up to (but not including) the colon.

"GET" AND "SET" KEYWORDS

This section documents the Component measurement keywords used with the **get** and **set** commands (see Tables 4-2 and 4-3). For each **get/set** keyword, it gives the syntax of the **set** command and the **get** result, a description of what the keyword does and the upper and lower limits of its range. Some keywords return only one value (F1), some return 2 values (F1 and F2), and other return 3 values (F1, F2, and F3).

For information on working with VM700A remote control commands, see the *VM700A Programmer's Reference Manual.*

Table 4-2
Keywords for "get" and "set" NTSC Component

Keyword	Description	Range			
EBC1 EBC8	Pb CB color #1 (mV) Pb CB color #8 (mV)	F1, F2:	float	-500.0	500.0
EBHA	Pb K-Factor Pulse HAD	F1:	integer	2	8
EBKB	Pb K-PB Factor (%)	F1, F2:	float	0.0	99.9
EBKF	Pb K Factor (%)	F1, F2:	float	0.0	99.9
EBM1 to EBM9	Pb MB Packet #1 (dB) Pb MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
EBMB	Pb Multiburst Packets	F1:	integer	3	9
EBMF	Pb Multiburst flag (mV)	F1, F2:	float	0.0	999.9
EBNL	Pb Non-Linearity (%)	F1, F2:	float	0.0	50.0
EBNO	Pb Noise Level (dB rms)	F1, F2:	float	-100.0	0.0
EBPP	Pb P-P Amplitude (mV) (3 values)	F1, F2, F3:	float	0.0	999.9
EBRD	Pb to Pr Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
EBWL	Bowtie field and line	F1, F2:	integer	1 2	10 262
EBWT	Bowtie interchannel delay (ns)	F1, F2:	float	–100.0	100.0
EBYD	Pb to Y Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
ECSD	Colorbar standard	F1:	GBR 700 (system default) GBR 700 Setup GBR 714 GBR 714 Setup YPbPr SMPTE/EBU YPbPr 714 Betacam Setup YPbPr 714 Betacam YPbPr 700 MII Setup		
ELCP	Lightning color pk-pk ampl error (%)	F1, F2:	float	–10.00	10.00
ELPW	Lightning pk-white ampl error (%)	F1, F2:	float	–10.00	10.00
EMKL	Marker field and line	F1, F2:	integer	1 2	10 262
EPRI	Probe Input	F1:		no	yes
ERCI	Stored Reference Channel Independent	F1:		no	yes
ERHA	Pr K-Factor Pulse HAD	F1:	integer	2	8
ERKB	Pr K-PB Factor (%)	F1, F2:	float	-50.0	50.0
ERKF	Pr K Factor (%)	F1, F2:	float	0.0	99.9
ERM1 to ERM9	Pr MB Packet #1 (dB) Pr MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
ERMB	Pr Multiburst Packets	F1:	integer	3	9
ERMF	Pr Multiburst flag (mV)	F1, F2:	float	0.0	999.9

Table 4-2 (cont)

ERNL	Pr Non-Linearity (%)	F1, F2:	float	0.0	50.0
ERNO	Pr Noise Level (dB rms)	F1, F2:	float	-100	0.0
ERPP	Pr P-P Amplitude (mV) (3 values)	F1, F2, F3:	float	0.0	999.9
ERYD	Pr to Y Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
ETNM	T (nsec)	F1:	integer	50	150
EYC1 to EYC8	Y CB color #1 (mV) Y CB color #8 (mV)	F1, F2:	float	-500.0	500.0
EYHA	Y K-Factor Pulse HAD	F1:	integer	2	8
EYKB	Y K-PB Factor (%)	F1, F2:	float	-50.0	50.0
EYKF	Y K Factor (%)	F1, F2:	float	0.0	99.9
EYM1 to EYM9	Y MB Packet #1 (dB) Y MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
EYMB	Y Multiburst Packets	F1:	integer	3	9
EYMF	Y Multiburst flag (mV)	F1, F2:	float	0.0	999.9
EYNL	Y Non-Linearity (%)	F1, F2:	float	0.0	50.0
EYNO	Y Noise Level (dB rms)	F1, F2:	float	-100.0	0.0
EYPA	Y Peak Amplitude (mV) (3 values)	F1, F2, F3:	float	500.0	2000.0
EYSA	Y Sync Amplitude (mV) (3 values)	F1, F2, F3:	float	100.0	999.9

Table 4-3
Keywords for "get" and "set" PAL Component

Keyword	Description	Range			
FBC1 to FBC8	Pb CB color #1 (mV) to Pb CB color #8 (mV)	F1, F2:	float	-500.0	500.0
FBHA	Pb K-Factor Pulse HAD	F1:	integer	2	8
FBKB	Pb K-PB Factor (%)	F1, F2:	float	-50.0	50.0
FBKF	Pb K Factor (%)	F1,F2:	float	0.0	99.9
FBM1 to FBM9	Pb MB Packet #1 (dB) to Pb MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
FBMB	Pb Multiburst Packets	F1:	integer	3	9
FBMF	Pb Multiburst Flag (mV)	F1, F2:	float	0.0	999.9
FBNL	Pb Non-Linearity (%)	F1, F2:	float	0.0	50.0
FBNO	Pb Noise Level (dB rms)	F1, F2:	float	-100	0.0
FBPP	Pb P-P Amplitude (mV) (3 values)	F1, F2, F3:	float	0.0	999.9
FBRD	Pb to Pr Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
FBWL	Bowtie line	F1:	integer	1	625

Table 4-3 (cont)

FBWT	Bowtie interchannel delay (ns)		float	-100.0	100.0
FBYD	Pb to Y Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
FCSD	Colourbar standard	F1:	GBR YPbPr SMPTE/EBU		
FLCP	Lightning color pk-pk ampl error (%)	F1, F2:	float	-10.00	10.00
FLPW	Lightning pk-white ampl error (%)	F1, F2:	float	-10.00	10.00
FMKL	Marker field and line	F1:	integer	1	625
FPRI	Probe Input	F1:		no	yes
FRC1 to FRC8	Pb CB color #1 (mV) to Pb CB color #8 (mV)	F1, F2:	float	-500.0	500.0
FRCI	Stored Reference Channel Independent	F1:		no	yes
FRHA	Pr K-Factor Pulse HAD	F1:	integer	2	8
FRKB	Pr K-PB Factor (%)	F1, F2:	float	0.0	50.0
FRKF	Pr K Factor (%)	F1, F2:	float	0.0	99.9
FRM1 to FRM9	Pr MB Packet #1 (dB) to Pr MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
FRMB	Pr Multiburst Packets	F1:	integer	3	9
FRMF	Pr Multiburst Flag (mV)	F1, F2:	float	0.0	999.9
FRNL	Pr Non-Linearity (%)	F1, F2:	float	0.0	50.0
FRNO	Pr Noise Level (dB rms)	F1, F2:	float	-100	0.0
FRPP	Pr P-P Amplitude (mV) (3 values)	F1, F2, F3:	float	0.0	999.9
FRYD	Pr to Y Delay (nsec) (3 values)	F1, F2, F3:	float	-400.0	400.0
FTNM	T (nsec)	F1:	integer	50	150
FYC1 to FYC8	Y CB color #1 (mV) to Y CB color #8 (mV)	F1, F2:	float	-500.0	500.0
FYHA	Y K-Factor Pulse HAD	F1:	integer	2	8
FYKB	Y K-PB Factor (%)	F1, F2:	float	-50.0	50.0
FYKF	Y K Factor (%)	F1, F2:	float	0.0	99.9
FYM1 to FYM9	Y MB Packet #1 (dB) to Y MB Packet #9 (dB)	F1, F2:	float	-40.0	40.0
FYMB	Y Multiburst Packets	F1:	integer	3	9
FYMF	Y Multiburst Flag (mV)	F1, F2:	float	0.0	999.9
FYNL	Y Non-Linearity (%)	F1, F2:	float	0.0	50.0
FYNO	Y Noise Level (dB rms)	F1, F2:	float	-100.0	0.0
FYPA	Y Peak Amplitude (mV) (3 values)	F1, F2, F3:	float	500.0	2000.0
FYSA	Y Sync Amplitude (mV) (3 values)	F1, F2, F3:	float	100.0	999.9

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