

VM700A
Option 40
Audio Measurement
OPERATOR'S MANUAL

*Please Check for
CHANGE INFORMATION
at the Rear of This Manual*

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OPERATORS 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



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



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.

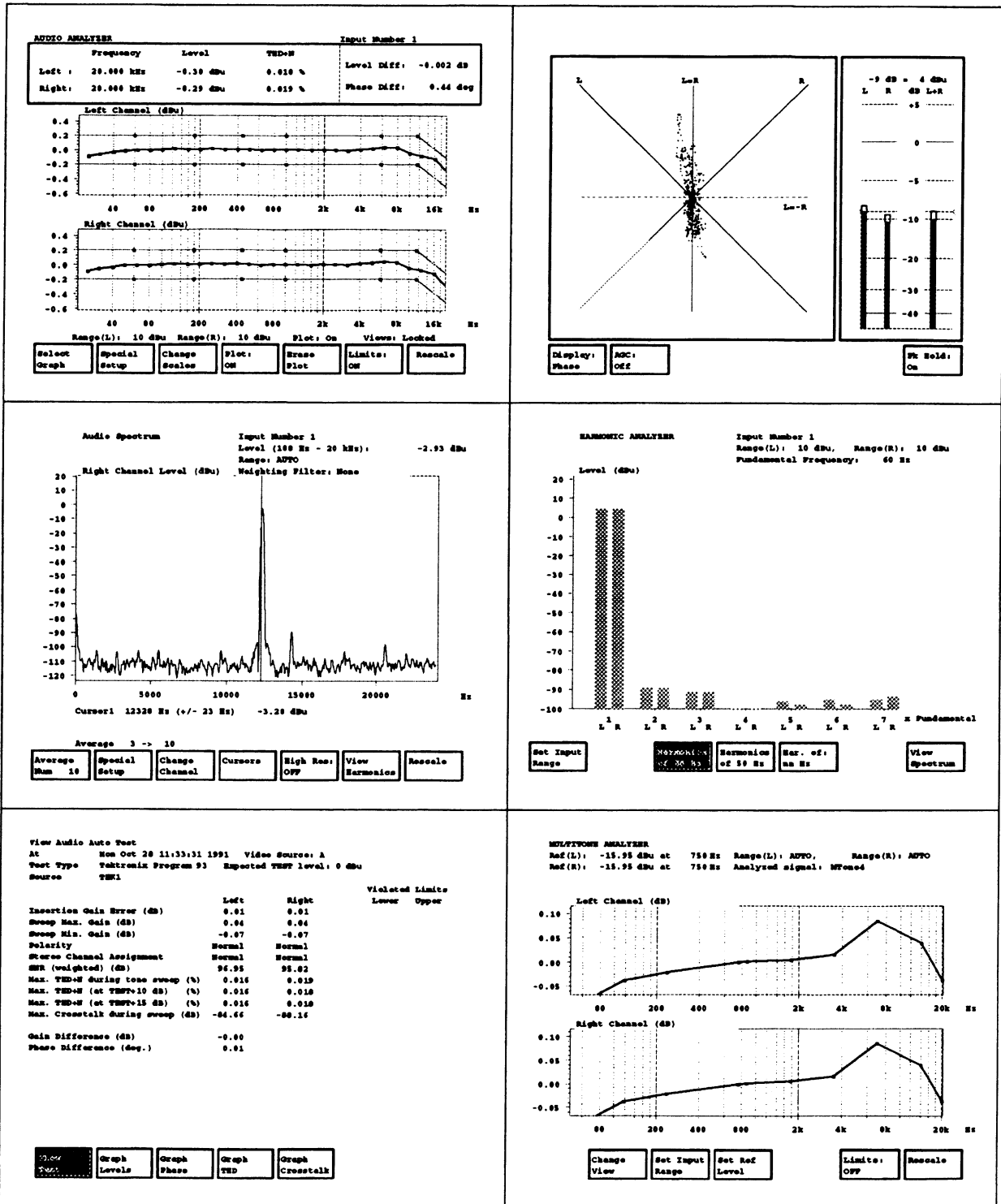
Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective-ground connection by way of the grounding conductor 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 40 Audio Measurements.

Section 1

INTRODUCTION

The VM700A audio option (Option 40) expands the power of the VM700A Video Measurement Set to include comprehensive audio measurement capabilities. VM700A audio option capabilities include:

- Automated and manual audio measurements
- Audio spectral analysis with harmonic analyzer
- Stereo monitoring
- Real-time display of audio parameters
- Multitone testing

The audio option also enables the VM700A to continuously monitor audio test lines for the presence of a test sequence designed for automated testing (the TEK sequence). The audio option tests to ANSI standard T1.502-1988, EIA/TIA-250-C, or CCITT Recommendation 0.33.

The audio results received via automatic monitoring can be included in the VM700A's Auto Mode video measurements display, with the time and date of the last sequence received. Timed reports and the logging of results can be performed automatically. Also, a file in the VM700A's Measurement Results directory is updated each time a sequence is received and measured.

This manual describes configuring and using the VM700A Option 40.

CONTENTS OF THIS MANUAL

This manual consists of the following sections:

Introduction — introduces the VM700A Option 40 by briefly describing the option's capabilities, then describes the organization of the manual.

Configuring the Audio Option — describes the Option 40 signal connections and discusses configuring the option to work with the VM700A.

Using the Audio Option — Discusses the Option 40 measurements and illustrates its data displays. Also provides general application information.

Remote Commands and Keywords — introduces the VM700A Option 40 remote commands and keywords and provides examples of their use.

Specifications — lists the performance specifications and limits for the Option 40.

Section 2

CONFIGURING THE AUDIO OPTION

INTRODUCTION

This section discusses configuring the Audio option and connecting it to an audio source.

CONFIGURING

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

1. Create your own Audio_Limit file (i.e., "NewLimits") and configure it with your limits.
2. Create your own Audio_Source file (i.e., "NewSource") and select "NewLimits" as the limits file to be used.
3. Configure the Source_Selection 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.

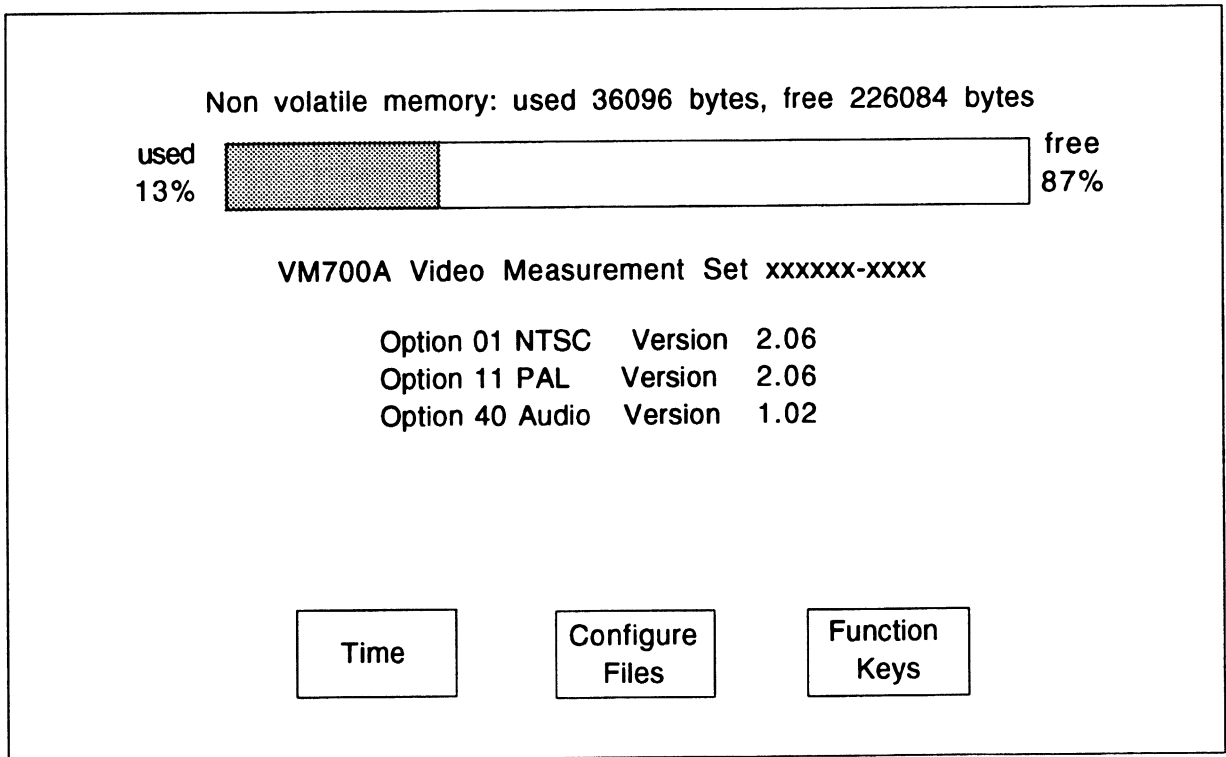


Figure 2-1. The Configure menu.

Configuring Procedure

Begin configuration of the Audio 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 audio configuration.

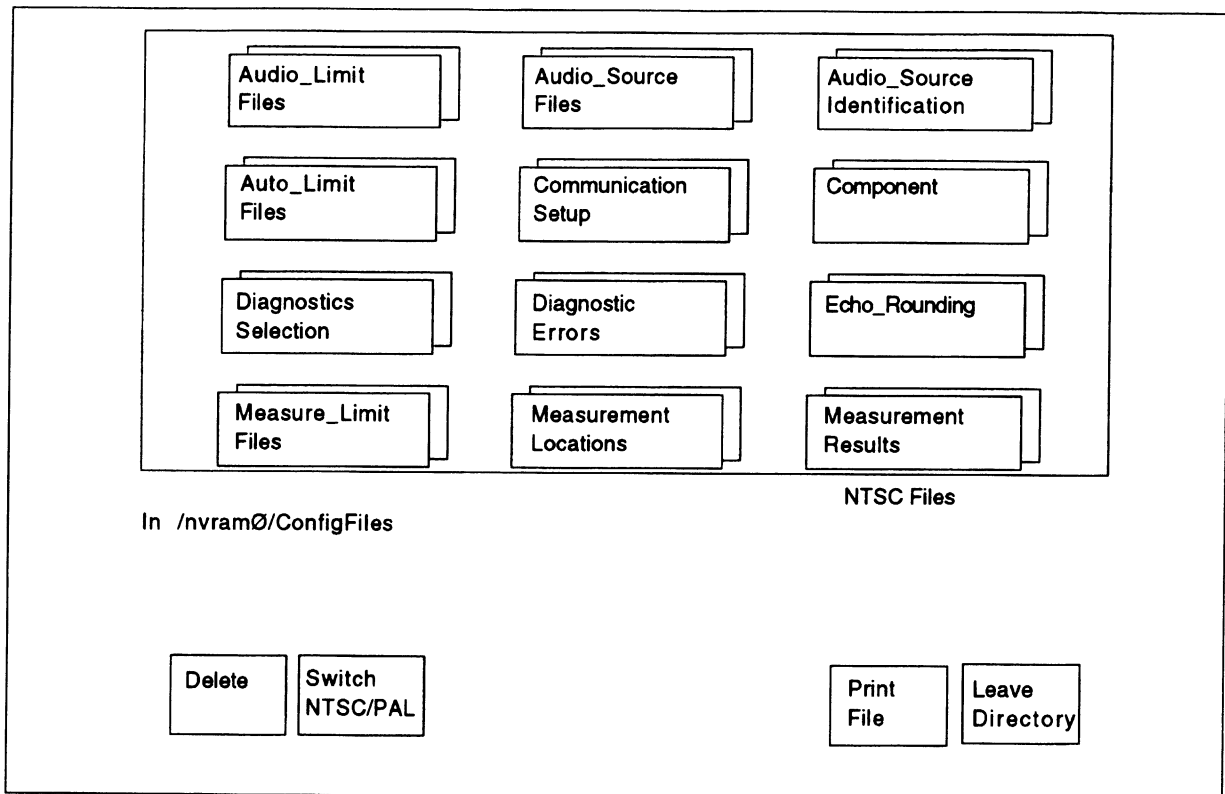


Figure 2-2. Configure menu choices.

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 Audio option.

Configuring the Audio Limit Files

Touch the Audio_Limit Files softkey to enter the Audio Limit Files directory. The screen displays a series of audio limit standard (or default) files and (if any have been created) user limit files. The file names appear in alphabetical order in the display, as shown in Figure 2-3. You may select and press a softkey to display the parameters in any file, but the parameters of the system default files cannot be modified.

If a default audio limits file is acceptable, the VM700A uses it (if it is the selected default file) for making measurements on the input audio signals. If you must modify the audio limits from the system defaults, use the procedures given in the following text.

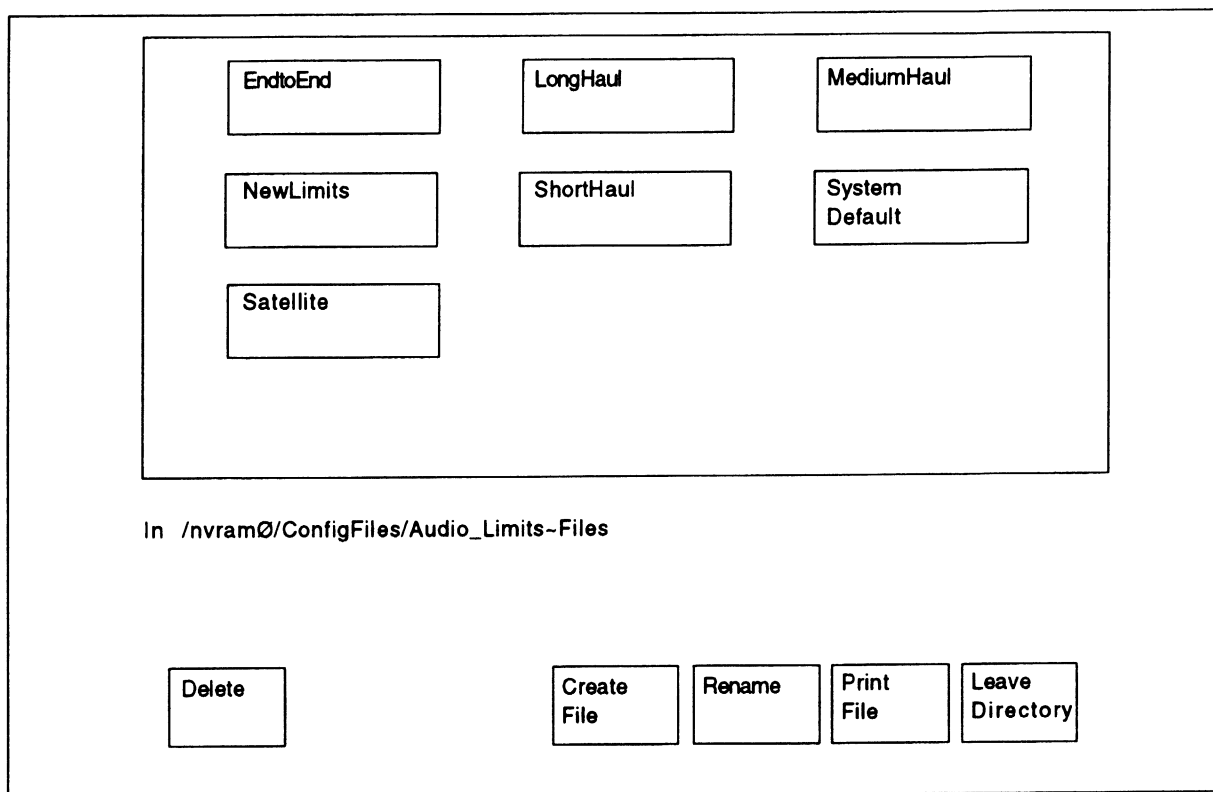


Figure 2-3. Audio Limit menu choices.

To modify audio limit file parameters, you must do the following:

- Create a new 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 an Audio Limit 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, as shown in Figure 2-4.

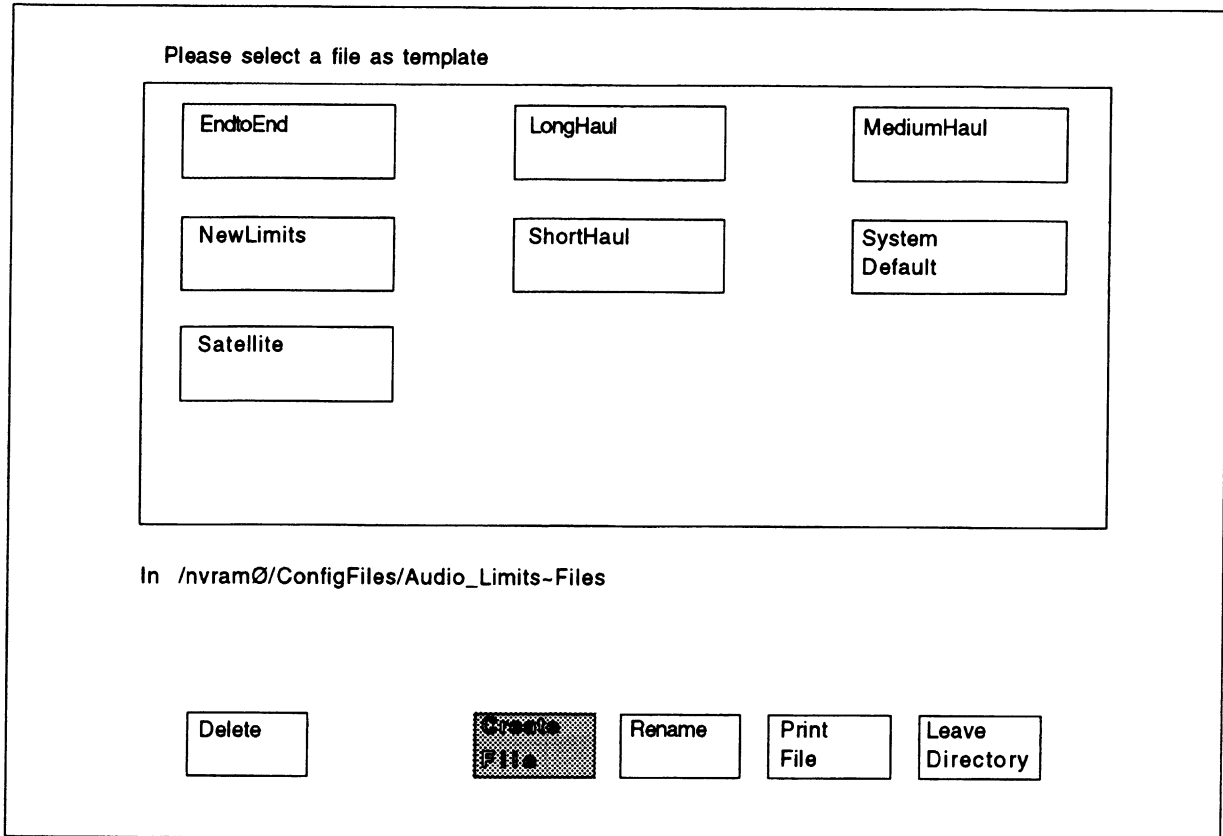


Figure 2-4. Selecting a file to use as a template.

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 audio limits from the file you selected as the template. You may modify the parameters in this file.

Editing an Audio Limit Text Parameter

Change any audio 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.

Editing an Audio Limit Graphic Element

The VM700A audio limit files contain graphical displays whose limits may be configured. These graphical displays include:

- Amplitude response vs. frequency characteristic — these limits are used in the Audio Analyzer and View Audio Autotest measurement displays.
- Crosstalk plus Noise — these limits are used in the View Audio Auto measurements display.
- Total harmonic distortion (THD+N) — these limits are used in the Audio Analyzer measurement display. There are three ranges to make selections for: limits for stimulus up to TEST +9 dB, stimulus from TEST +10 to TEST +14 dB, and stimulus greater than TEST +14 dB.
- Stereo phase difference — these limits are used in the Audio Analyzer and View Audio Autotest measurement displays.
- Stereo gain difference — these limits are used in the Audio Analyzer and View Audio Autotest measurement displays.
- Channel separation — these limits are used in the Audio Analyzer measurement display.

You may change the limit of any graphical element by touching it on the screen. The screen displays the parameter's upper and lower limits in tabular form at the bottom of the display. Modify these elements with the following procedure:

1. Touch the graphical element to display its upper and lower limit values.
2. Rotate the front panel knob to highlight the parameter you want to change.
3. You may change the value of the selected parameter in either of two ways: touch the parameter value and rotate the front-panel knob to raise or lower it, then press the Accept Input softkey, or; touch the graphical display of the parameter you want to change, then rotate the front-panel knob to raise or lower its value.

In either case the graphical display and values change to match your input.

4. Touch the Accept Input softkey to accept the changes.
5. Touch the Done softkey.
6. Rotate the front panel knob to move to other parameters in the file.
7. When you have completed the changes to your custom Audio Limits file, press the Update & Exit softkey.

Deleting a Modified Audio Limit File

You may delete a modified audio limit file with this procedure:

1. In the Audio_Limit 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 Audio Source Files

Touch the Audio_Source Files softkey to enter the Audio Source Files directory. The screen displays the audio 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 audio source file is acceptable, the VM700A will use this file as it performs audio measurements. If you must modify the audio source file, read the following paragraphs.

Editing the audio source file

To modify the Audio 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.

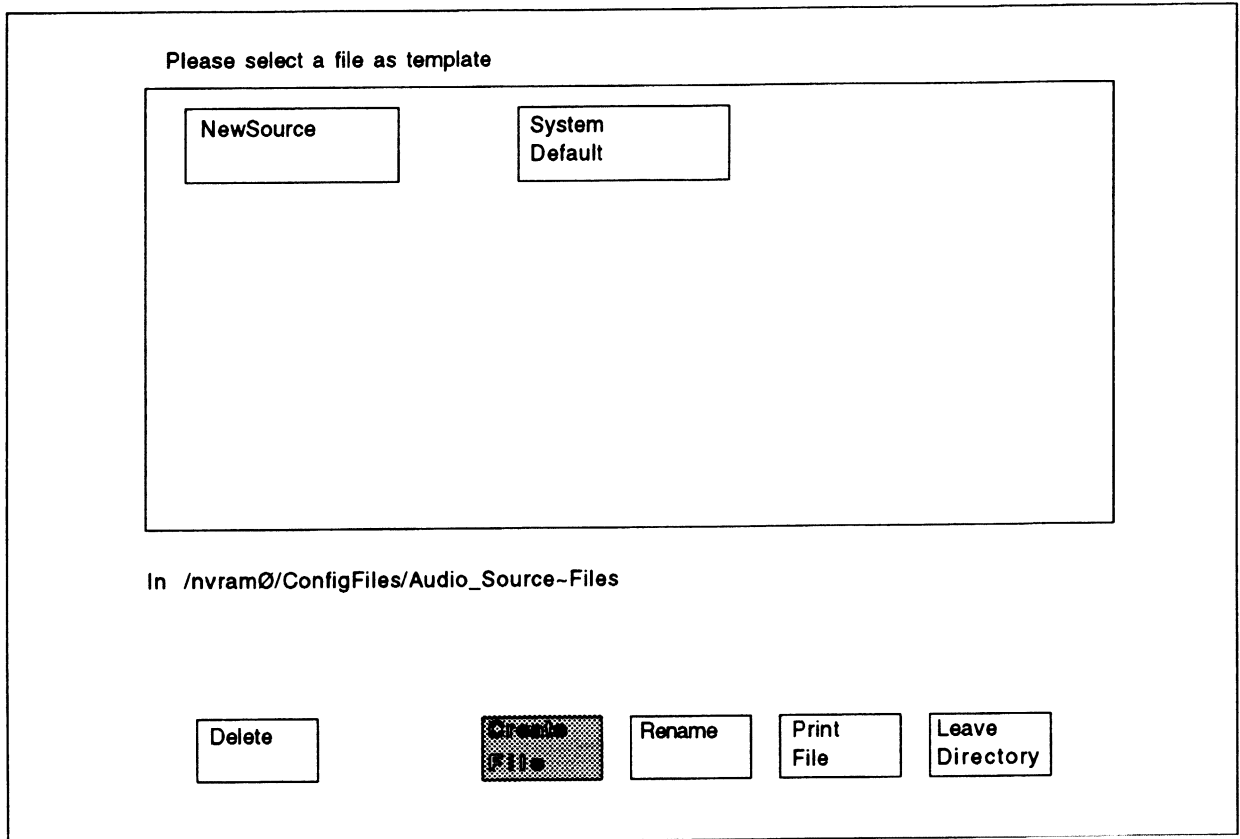


Figure 2-5. Selecting a file to use as a template.

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 audio source data from the file you selected as the template. You may modify the parameters in this file.

Changing the Audio Source Parameters

Change the Audio Source parameters using the following procedure:

1. Rotate the knob to highlight the line containing the parameter you want to change.
2. Select a parameter by touching it.
3. Rotate the knob to change the parameter or 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.

The parameters in the Audio Source file are:

| | |
|-----------------------------|---|
| Audio Limit File | Selects the Audio Limit file (in the Audio_Limit~Files directory) used by the VM700A. |
| Error Reporting | Enabled or disabled (the default). Enabling this selection adds the reported audio errors (for the specified audio source) to the video error report. |
| 0.33 Test Level | Sets the 0.33 test level. Choices are – 3 dBu, 0 dBu, or +6 dBu. |
| Lineup Level | Choices are – 10 dBu to +10 dBu (the default is 0 dBu). This selection sets the meter equivalency for the VU and dBu scales used in the Audio Monitor display. |
| External Termination | Selects the VM700A external termination. Choices are: 50, 75, 125, 150, 300, 600 Ω or 10 k Ω . |
| Lissajous Display | Selects the type of Lissajous display used in the Audio Monitor. Choices are X/Y (Oscilloscope) or Soundstage (the default). |
| Level Meter | Selects the meter ballistics for the bar-graph level meters in the Audio Monitor display. Choices are PPM: DIN 45406 (the default), PPM: NORDIC, PPM: TEK760 ¹ , or VU. |
| Dead Air Alarm | Choices are 15 or 30 seconds, or 1, 2, 5, 30, or 60 minutes, or disabled (the default). If enabled, this selection causes the VM700A to report an error if silence is encountered for more than the selected time. |
| Report in Audio | Choices are enabled or disabled (the default). If enabled, this selection causes the VM700A to display an audio report in Video Auto mode. |
| Audio Printout Title | Supplies the text for the title at the top of report printouts. You may select the audio printout title for editing by touching it, then entering the new title on the displayed keyboard. Press the Done softkey when you have finished editing the Audio Printout Title text. |

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

Configuring Source_Selection~Audio

The audio limit files used by the VM700A for audio measurements are configured in the Audio_Limit~Files directory and specified in the Audio_Source~Files directory. Likewise, the audio source files are configured in the Audio Source Files directory and specified in the Source_Selection~Audio directory.

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

Specifying an audio source file

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

1. Touch the **Source_Selection Audio** softkey.
2. Rotate the front panel knob to highlight the source for which you are specifying an audio source file (source A, B, or C).



The audio channel may be associated with one of three video inputs (Source A, B, or C). However, switching the VM700A from one video input to another during an audio measurement sequence can cause the most recent audio test data to be lost. To prevent data loss, configure the audio source files (in Source_Selection Audio) to be identical for all video inputs.

3. Touch the highlighted source file to select it.
4. Rotate the front panel knob to change the audio source file selection.
5. When you have selected an audio 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 audio 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 Audio directory and cancel any changes by asking you to touch the **No change & Exit** softkey again.*

CONNECTING TO A SOURCE

The VM700A Audio option is supplied with two male mini-XLR to female XLR adaptor cables wired as shown in Figure 2-6. The mini-XLR ends of these cables connect the Audio option to an appropriate audio signal source.

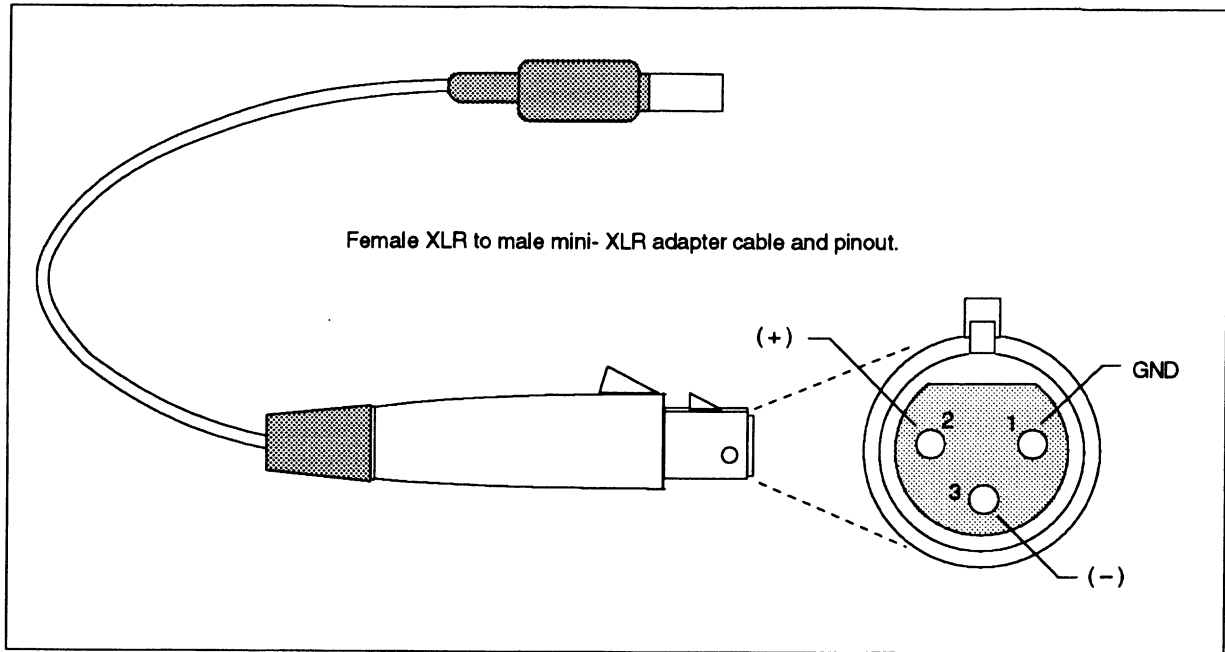


Figure 2-6. Cables and connectors supplied with the Audio option.

Input Connector Pin Assignments

Pin assignments for the Option 40 mini-XLR connectors are shown in Figure 2-7. These connectors are accessed at the VM 700A rear panel.

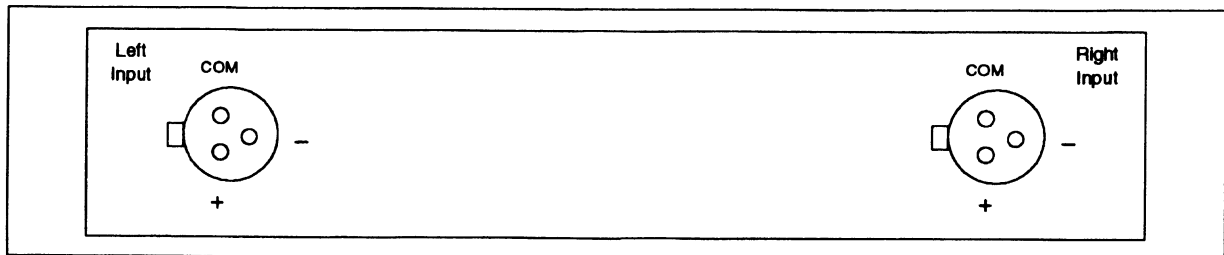


Figure 2-7. Option 40 Connectors and Pin Assignments.

Section 3

USING THE AUDIO OPTION

This section describes using the four measurements of the Audio option: Audio Analyzer, Audio Monitor, Audio Spectrum, and View Audio Auto Test.

You may display the Audio option measurements by pressing the Measure button and touching the **Audio** softkey. Select an Audio option measurement by touching its softkey.

AUDIO ANALYZER

Figure 3-1 shows the Audio Analyzer display. The Audio Analyzer measures and displays two channels of audio signal. The display plots frequency on the x-axis and level in either volts or dBu (depending on your selection) on the y-axis. Audio signal input limits may be selected at configuration and enabled or disabled in the main Audio Analyzer menu (Limits: ON/OFF). When enabled, the selected limits are shown in the displays.

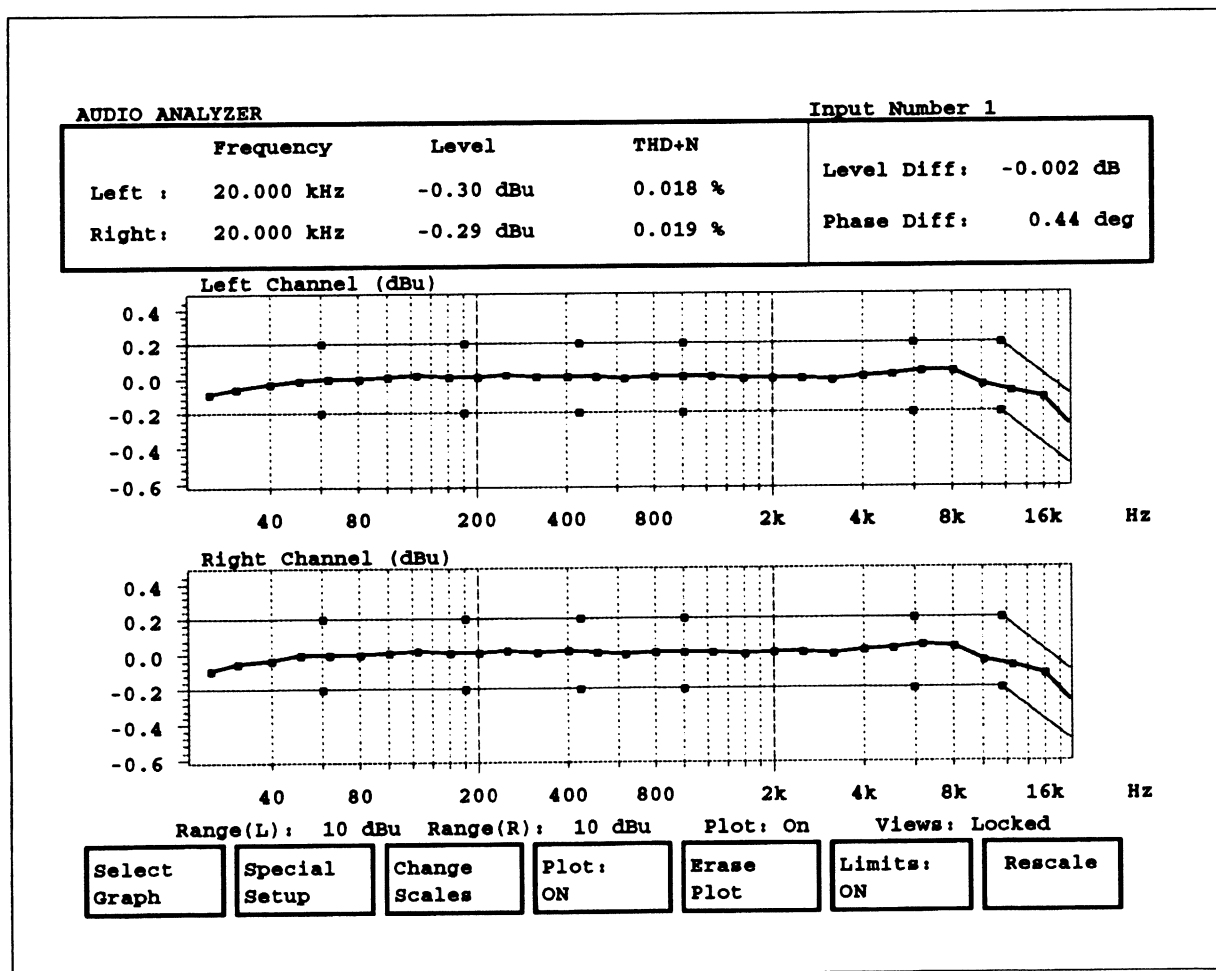


Figure 3-1. The Audio Analyzer display (O.33 test sequence).

Other features of the Audio Analyzer display include:

1. Linear or log frequency display.
2. Display scales for x- and y-axes may be moved or expanded about any point on the screen.
3. Left, right, difference, or left and right displays.
4. User adjustable point-plot-condition characteristics.

Numerical readouts in the upper part of the display provide the following:

- Frequency, level, and total harmonic distortion and noise information
- Input channel level differences
- Input channel phase differences

NOTE

If selected, the Audio Analyzer is active. If an input signal is not being received, the readouts will be indicating noise levels, not previously received signal levels.

The following paragraphs describe the Audio Analyzer's softkey functions. Figure 3-2 shows the Audio Analyzer menu structure.

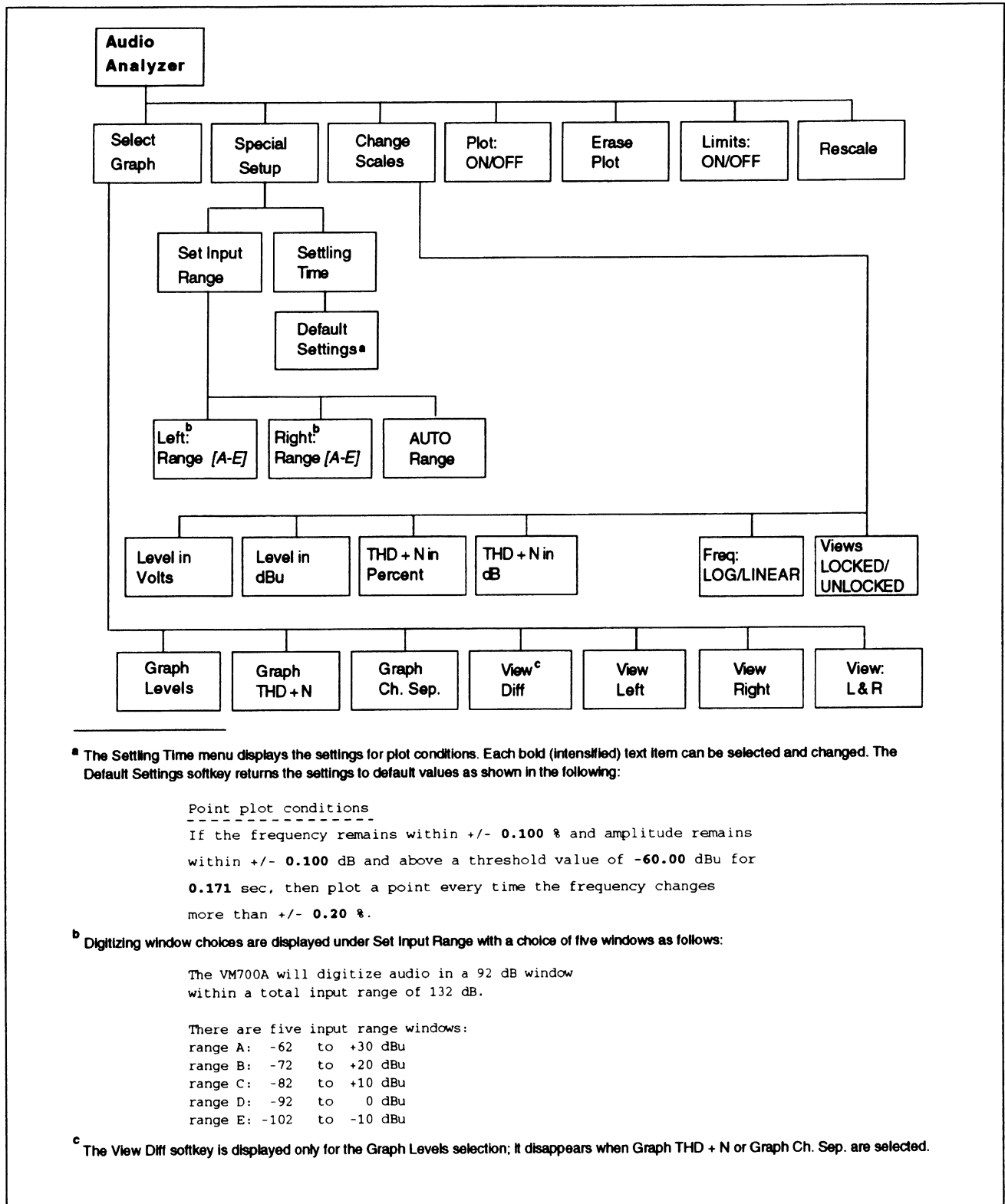


Figure 3-2. The Audio Analyzer menu tree.

Audio Analyzer Main Menu

Select
Graph

Select Graph selects the type of graphing used for the display.

Special
Setups

Special Setups accesses two other choices: Set Input Range and Settling Time

Change
Scales

Change Scales lets you change scales on the Level and THD + N displays and change the frequency scale between log and linear.

Plot:
ON/OFF

Plot ON/OFF enables or disables the plotting of an input signal. When the plot is disabled (OFF), the display retains any information previously plotted.

Erase
Plot

Erase Plot clears the plot in preparation for new data.

Limits:
ON/OFF

Limits ON displays the limits levels set up in the configure files and measures against those limits; **Limits OFF** turns off the limits levels.



When you disable the audio signal input limits, the audio input signal is not checked against the limits that may have been selected during configuration.

Rescale

Rescales the display to its default values.

SELECT GRAPH SUBMENU

Graph
Levels

Graph Levels mode measures and displays frequency, level, and phase differences.

NOTE

In Graph Levels mode, level difference limits are displayed in dB, but not in volts.

Graph
THD+N

Graph THD+N mode measures and displays frequency, level, THD+N, and phase differences.

Graph
Ch. Sep.

Graph Channel Separation mode measures THD + N only on the driven (higher level) channel. Graph Separation mode also let you view the incoming signal's level and phase differences.

View
Diff

View Diff displays the level difference between the left and right channels in dBu or volts and their phase difference in degrees. This selection is available only when you select the **Graph Levels** mode.

View
Left

View Left displays the left channel individually. The vertical scale of the display increases to fill the display area.

View
Right

View Right displays the right channel individually. The vertical scale of the display increases to fill the display area.

View
L & R

View L & R permits viewing both channels in the same display. The vertical scale of each channel is reduced to fit the two channels into the display area.

SPECIAL SETUPS SUBMENU

Set Input
Range

Set Input Range enables you to select the range window that most closely matches the amplitude range of the input signal. The VM700A digitizes an audio signal measured in a selectable 92 dB window over a total range of 132 dB.

The input ranges of the left and right channels may be configured independently with the **Left Range:** or **Right Range:** softkeys. In **Auto**, the range window is adjusted to find the best range for the applied signal level.

NOTE

Use care when selecting AUTO for setting the input range. If varying signals, such as voice, are applied to the Audio option, the attenuators constantly switch ranges as they attempt to select an appropriate measurement window for a constantly varying input signal.

Settling
Time

Settling Time displays the settling time configuration menu and directions for its use. The conditions that may be changed are frequency, amplitude, amplitude threshold value, threshold value dwell time, and percent frequency change. Press the **Default Settings** softkey to return the settings to default values.

CHANGE SCALES SUBMENU

Level in
Volts

Level in Volts sets the level readout and the vertical scale of the display to voltage units.

Level in
dBu

Level in dB sets the level readout and the vertical scale of the display to decibel units.

THD + N
in Percent

THD + N in Percent sets the total harmonic distortion plus noise readout in percentage.

THD + N
in dB

THD + N in dB sets the total harmonic distortion plus noise readout in decibel units.

Frequency:
LOG/LINEAR

Freq: LOG/LINEAR toggles between linear or logarithmic frequency display.

Views:
LOCKED/
UNLOCKED

Views: LOCKED/UNLOCKED allows you to unlock the left- and right-channel display scales for independent adjustment or lock them together for concurrent adjustment.

AUDIO MONITOR

The Audio Monitor measurement displays the audio levels and phase relationships of a two-channel audio signal. Figure 3-3 shows the Audio Monitor phase display.

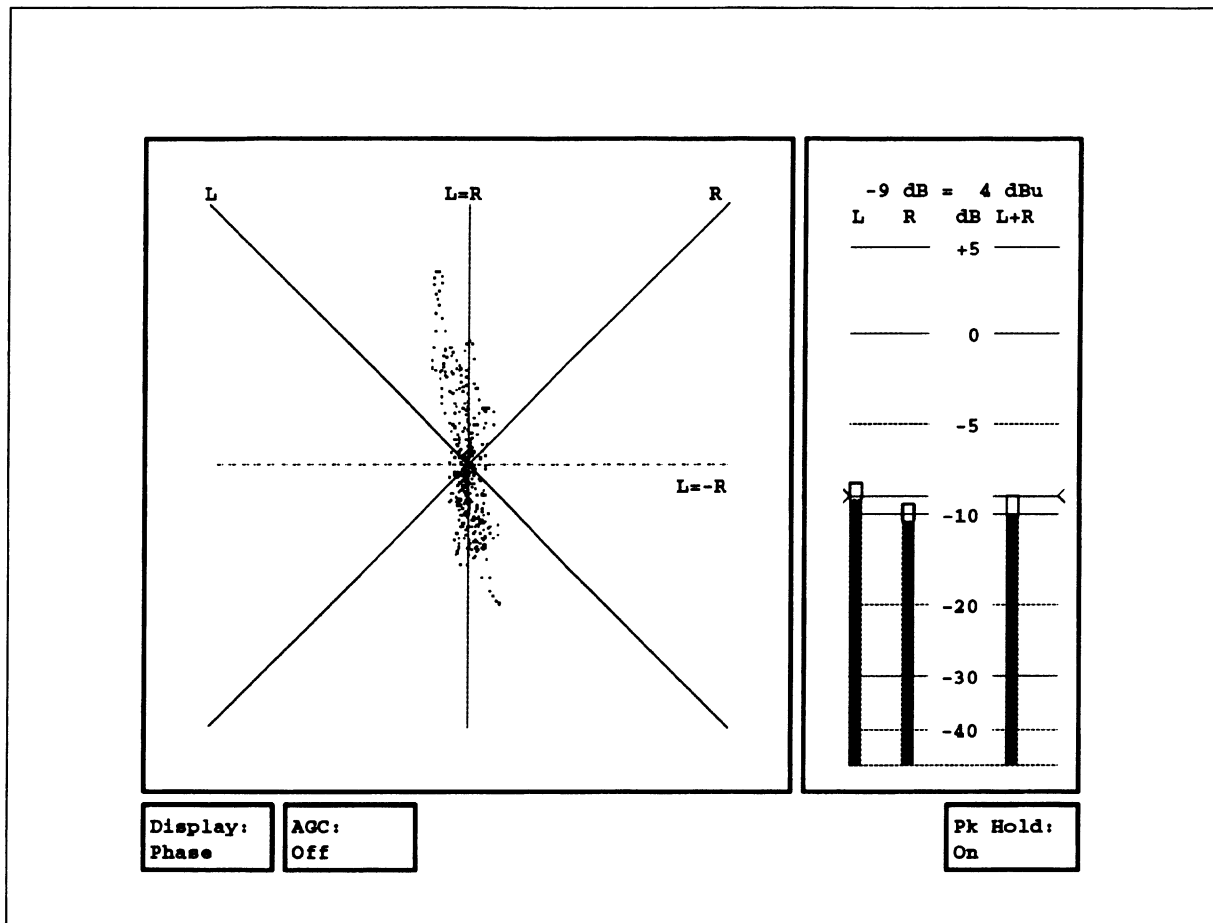


Figure 3-3. The Audio Monitor phase display (soundstage format).

The phase display plots audio input signals in a Lissajous phase display. This display may be configured to show the signals in either soundstage (the default) or X-Y (oscilloscope) format. The display also provides a bar graph of left channel, right channel, and left plus right channel sound levels. The scales of the bar graph display may be configured for Nordic PPM or DIN 45406 dB, or VU units. For information on configuring the phase display, see section Section 2, *Configuring the Audio Option*.

The VM700A Configuration directory allows you to configure these Audio Monitor functions:

Level meter scales: DIN 45406 or Nordic ppm dB or VU

Equivalent dBu setting for 0 dB scale readout

Type of Lissajous display: soundstage or x/y (oscilloscope)

For information on configuring the Audio Monitor display, see section 2, *Configuring the Audio Option*.

Audio Monitor Phase Display Menu

Display:
Phase

Display: Phase switches the display to a format that shows the two input signal waveforms in voltage and time.

AGC:
OFF/ON

AGC: OFF/ON adjusts the gain of the displayed signal to better reveal its shape and pattern of low-level signal when On.

Pk Hold:
ON/OFF

Pk Hold: ON/OFF retains peak signal levels for a few seconds when on the peak hold function is on.

Audio Monitor Time Display

The Audio Monitor time display (see Figure 3-4) plots the left and right channel signal voltage levels on the y-axis and time on the x-axis.

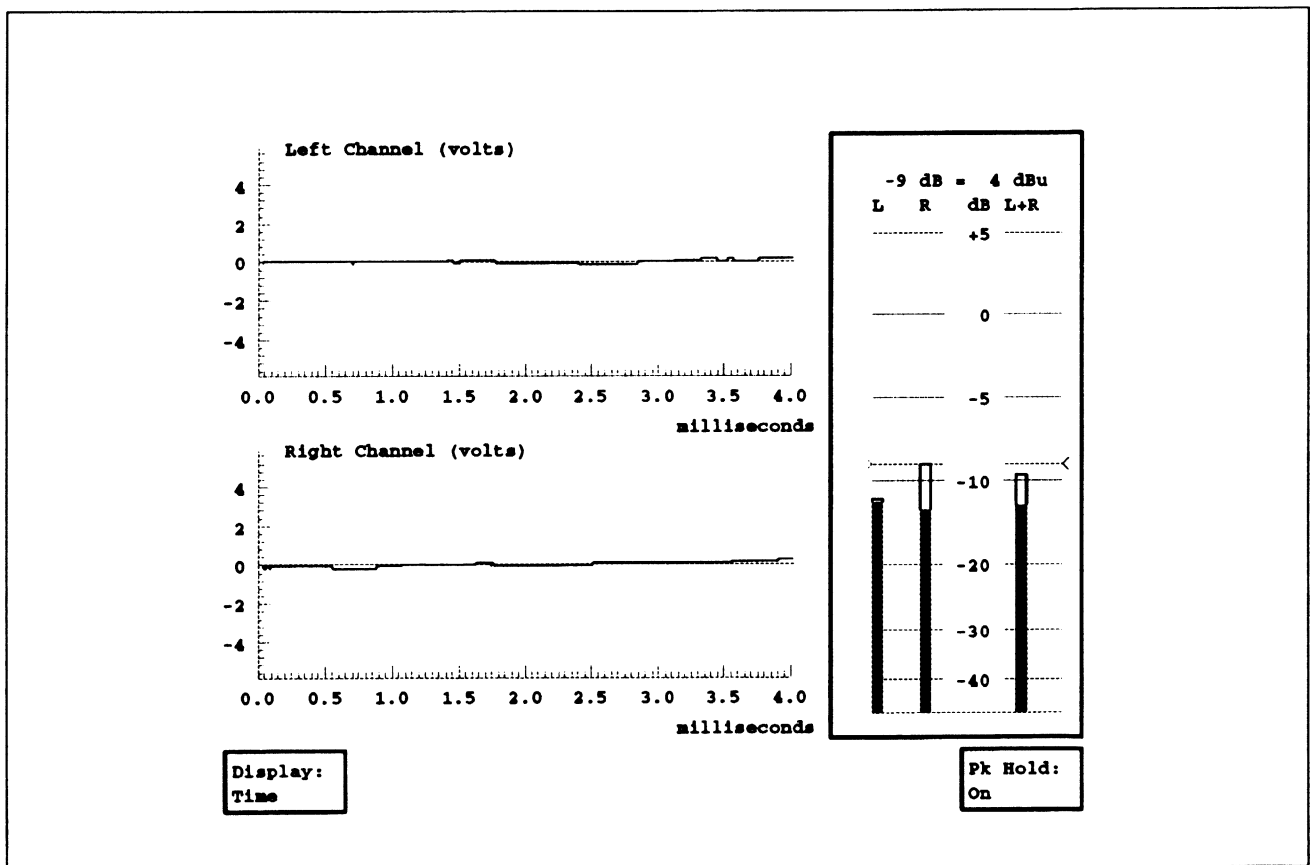


Figure 3-4. The Audio Monitor time display.

Audio Monitor Time Display Menu

Display:
Time

Display : Time switches the display to a format that shows a Lissajous display of the phase relationship between the two channel signals.

Pk Hold:
ON/OFF

Pk Hold: ON/OFF enables or disables the bar graph peak hold function. This function retains peak signal levels for a few seconds when on.

AUDIO SPECTRUM

The Audio Spectrum measurement measures and displays an audio signal on a frequency and level scale.

Figure 3-5 shows the Audio Spectrum display. Note that this illustration is a screen capture of the third acquisition in a 10 acquisition average display.

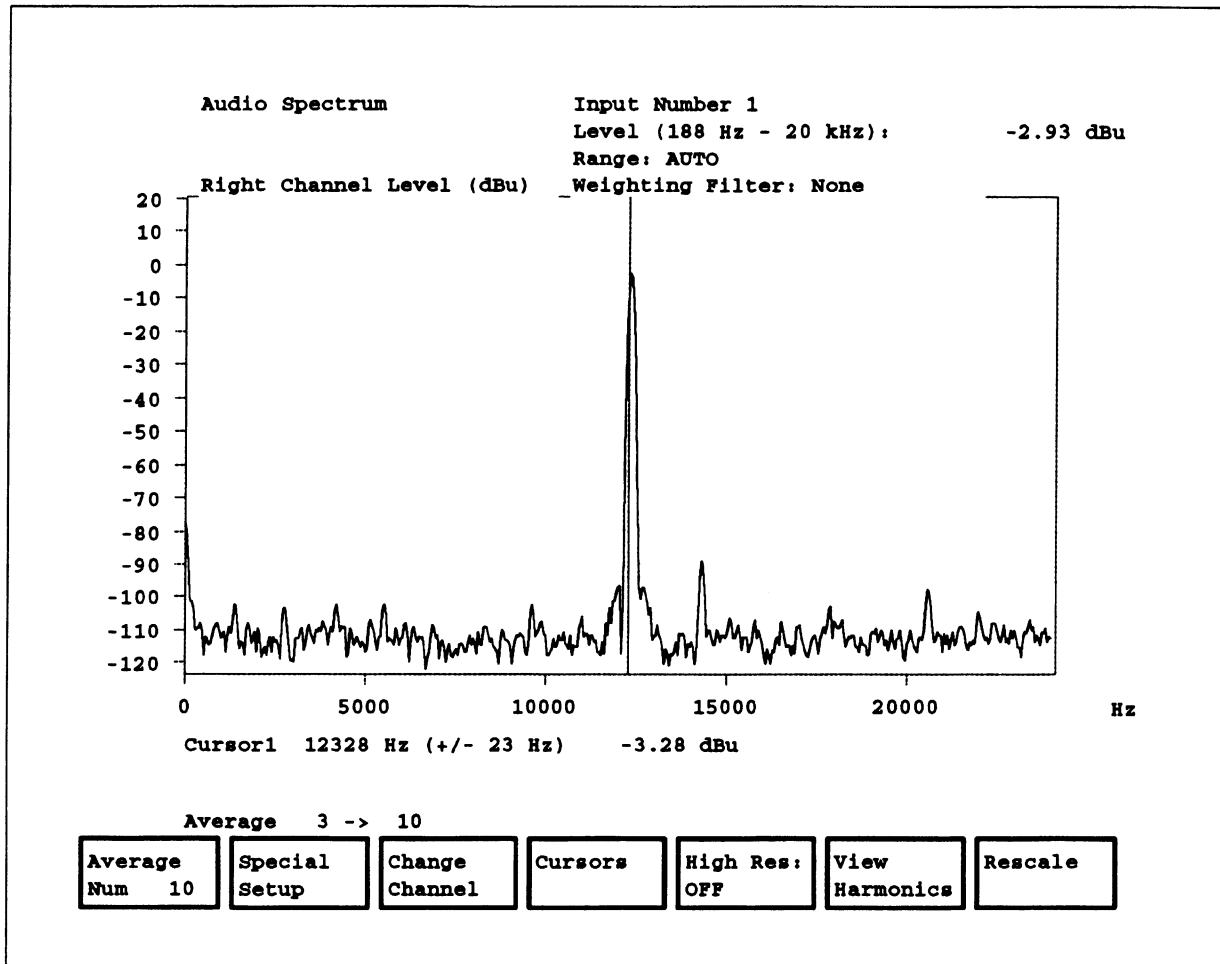


Figure 3-5. The Audio Spectrum display.

This display plots frequency on the x-axis and signal level in dBu on the y-axis. You may configure the audio input signal level with the **Set Input Range** softkey (see the Set Input Range explanation for more information).

Figure 3-6 shows the menu tree for the Audio Spectrum measurement functions.

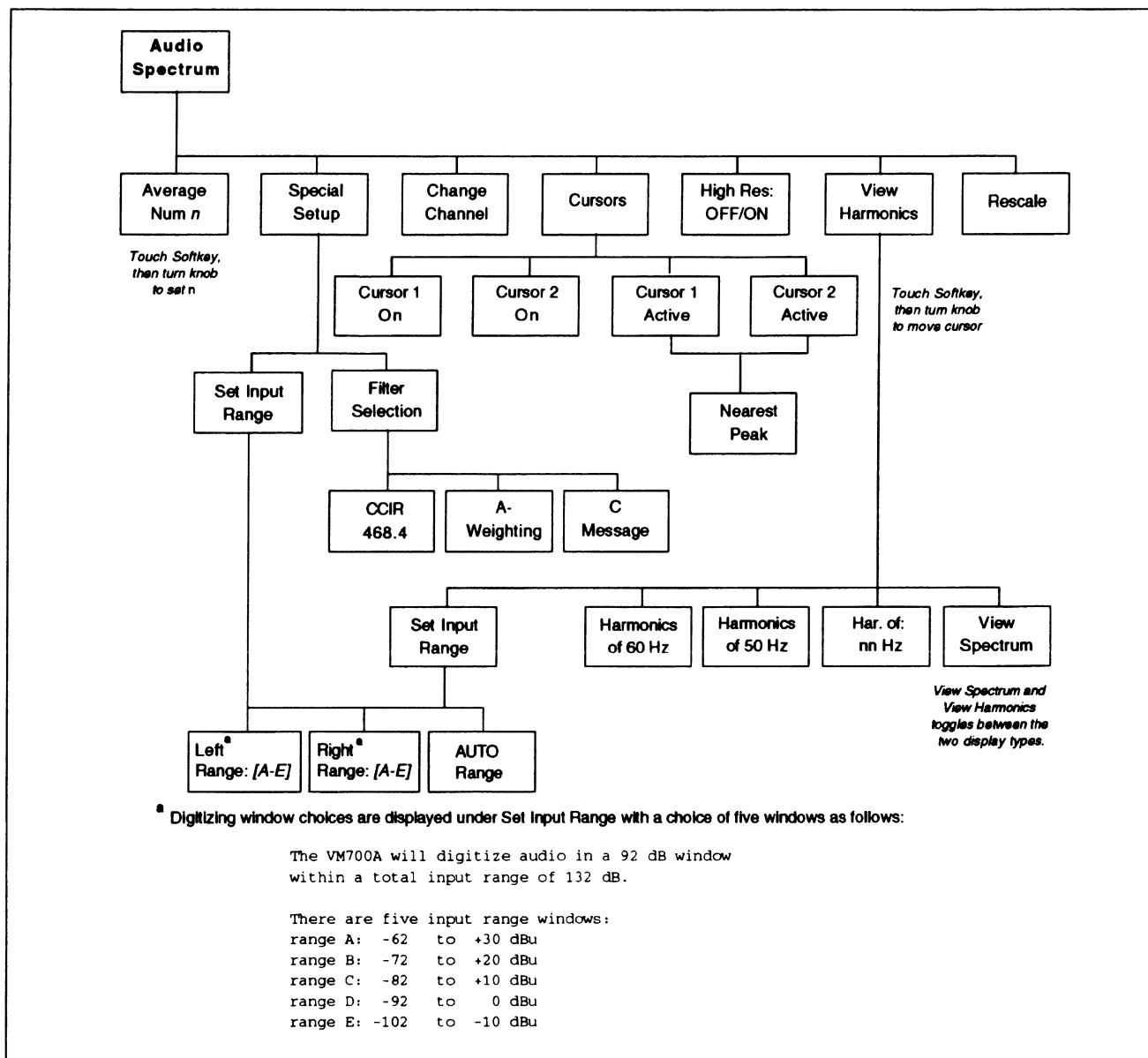


Figure 3-6. Audio Spectrum menu tree.

Audio Spectrum Main Menu

Average
Num

Average Num specifies the time constant to be used for averaging. The Average Num range is 1-256; the default value is 10. To change the Average Num value, touch the **Average Num** softkey to highlight it, rotate the knob until the selected time constant appears, then press the Average Num softkey again.

Special
Setup

Special Setup accesses the two measurement setup softkeys: **Set Input Range** and **Filter Select**.

Change
Channel

Change Channel switches the display between the left and right input channels. To change the the displayed input channel, touch the **Change Channel** softkey to highlight it, then touch the softkey for the desired display channel. After selecting the input channel, you may press the Menu button twice to redisplay the Audio Spectrum measurement softkeys.



The VM700A can display distorted or incorrect signal information if the input range window is not matched to the input signal. When the input range window and the input signal are not matched, the VM700A clips the input signal to the range of the window and displays the clipped signal

Cursors

Cursors places two cursors on the display and lets you position them to mark display features. The numerical display shows the peak-to-peak signal level at each cursor's frequency location, and the level difference between them. When both cursors are turned on, the numerical display also shows the noise area between the cursors. The cursor submenu permits positioning and selection of the cursors.

High Res :
OFF/ON

High Res: OFF/ON selects view resolution. When high resolution mode is off (the default), the VM700A displays 24 kHz of the selected channel's audio spectrum. When high resolution mode is on, the VM700A displays a 3 kHz window of the 24 kHz display (see Figure 3-7). The position of the window in the 24 kHz spectrum can be adjusted by rotating the control knob.

NOTE

Filter selection is not available in High Res mode.

View
Harmonics

View Harmonics brings up the Harmonic Analyzer measurement display. Touching this softkey displays the harmonics of a selected frequency in the 35 Hz to 10 kHz range (see Figure 3-8). The View Harmonics menu choices permits selection of the harmonic type to be displayed.

The Harmonic Analyzer displays the selected fundamental frequency and six harmonics in a bar-graph level (dBU) display.

The Harmonic Analyzer is a useful tool for locating frequency contamination caused by signals with fundamental frequencies in the 35 Hz to 10 kHz range.

Rescale

Rescale returns the display scaling to its default values.

SPECIAL SETUP SUBMENU

Set Input
Range

Set Input Range enables you to select the range window that most closely matches the amplitude range of the input signal. The VM700A digitizes an audio signal measured in a selectable 92 dB window over a total range of 132 dB.

The input ranges of the left and right channels may be configured independently with the **Left Range:** or **Right Range:** softkeys. In **Auto**, the range window is adjusted to find the best range for the applied signal level.

NOTE

Use care when selecting AUTO for setting the input range. If varying signals, such as voice, are applied to the Audio option, the attenuators constantly switch ranges as they attempt to select an appropriate measurement window for a constantly varying input signal.

Filter
Select

Filter Select chooses CCIR 468.4, A-Weighting, or C Message filter characteristics for viewing the displayed audio signal. Filters are not available in High Res mode.

NOTE

Filtering is automatically disabled when the Audio Spectrum Analyzer is set to High Res: ON mode. You must reselect the desired filter after returning the spectrum analyzer to High Res: OFF mode.

CURSORS SUBMENU

Cursor 1
On

Cursor 1 On turns on the first (solid line) cursor.

Cursor 2
On

Cursor 2 On turns on the second (dotted line) cursor.

Cursor n
Active

Cursor n Active activate either cursor. Once activated, a cursor may be positioned on the display by rotating the knob. Cursor 1 may not be positioned to the right of cursor 2, nor may cursor 2 be positioned to the left of cursor 1.

Nearest
Peak

Nearest Peak positions the active cursor on the nearest signal peak while showing the frequency and signal level of the peak on the numerical display. This feature does not seek the highest peak.

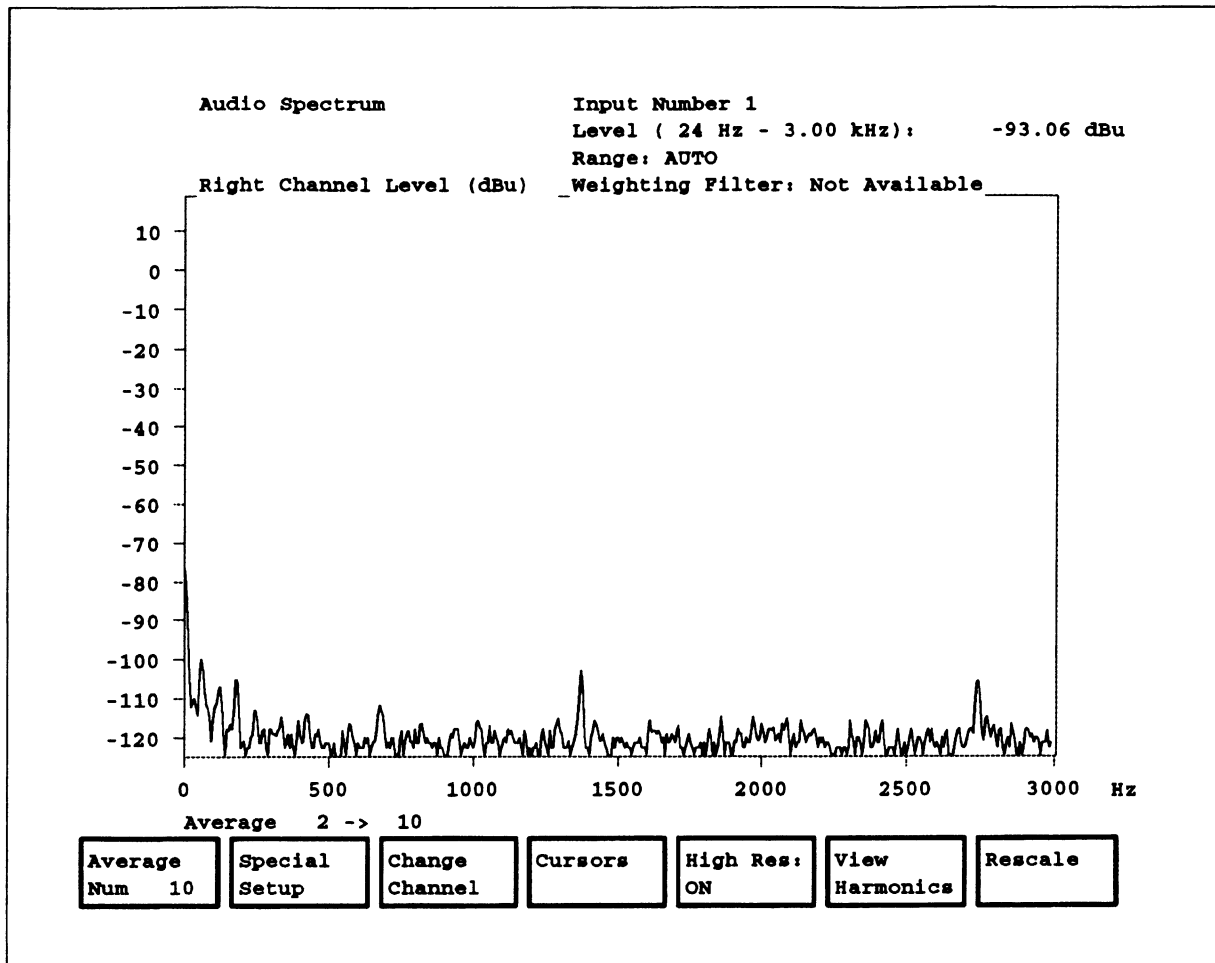


Figure 3-7. Audio spectrum display in High Res mode.

VIEW HARMONICS SUBMENU

Har. of:
nn Hz

Har. of nn Hz permits setting the Harmonic Analyzer fundamental frequency to any frequency in the range (press the **Har. of:** softkey and turn the knob to the desired frequency). You can view seven levels of harmonics from 20 Hz to 20 kHz.

Harmonics of
50 Hz

Harmonics of 50 Hz select the 50 Hz fundamental frequencies for display. These selection and the Harmonics of 60 Hz choice can help you locate power source frequency contamination.

Harmonics of
60 Hz

Harmonics of 60 Hz select the 60 Hz fundamental frequencies for display. These selection and the Harmonics of 50 Hz choice can help you locate power source frequency contamination.

Set Input Range

Set Input Range enables you to select the range window that most closely matches the amplitude range of the input signal. The VM700A digitizes an audio signal measured in a selectable 92 dB window over a total range of 132 dB.

The input ranges of the left and right channels may be configured independently with the **Left Range:** or **Right Range:** softkeys. In **Auto**, the range window is adjusted to find the best range for the applied signal level.

NOTE

Use care when selecting AUTO for setting the input range. If varying signals, such as voice, are applied to the Audio option, the attenuators constantly switch ranges as they attempt to select an appropriate measurement window for a constantly varying input signal.

View Spectrum

View Spectrum toggles the display back to the View Spectrum application.

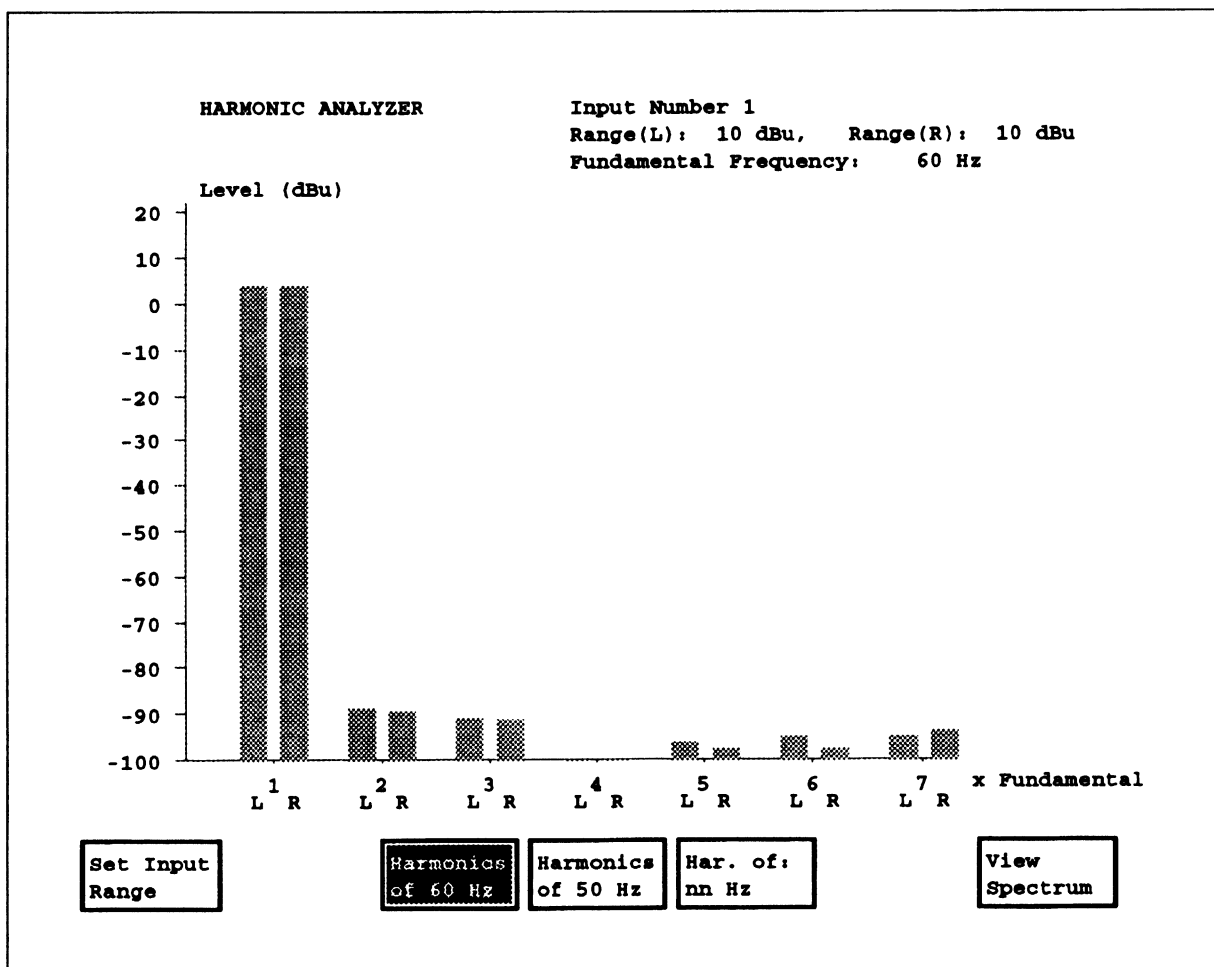


Figure 3-8. The Harmonic Analyzer display showing 60 Hz and its harmonics.

VIEW AUDIO AUTO TEST

The View Audio Auto Test measurement detects, captures, and displays Tek/ANSI and CCITT Recommendation O.33 automatic audio measurements on the currently selected audio channel.

NOTE

The Audio option's processor circuitry runs independently of the VM700A's video sections. This means that audio measurements may be captured for later display even while video capture and display operations are in progress.

However, when the VM700A is running an Audio option application, it cannot simultaneously monitor the automatic test sequences.

Similar to the Audio Analyzer display, the View Audio Auto Test measurement lets you capture an extremely detailed view of the automatic audio measurements. The information shown on the display varies with the type of test being received.

The menu tree for the View Audio Auto Test measurement functions is show in Figure 3-9.

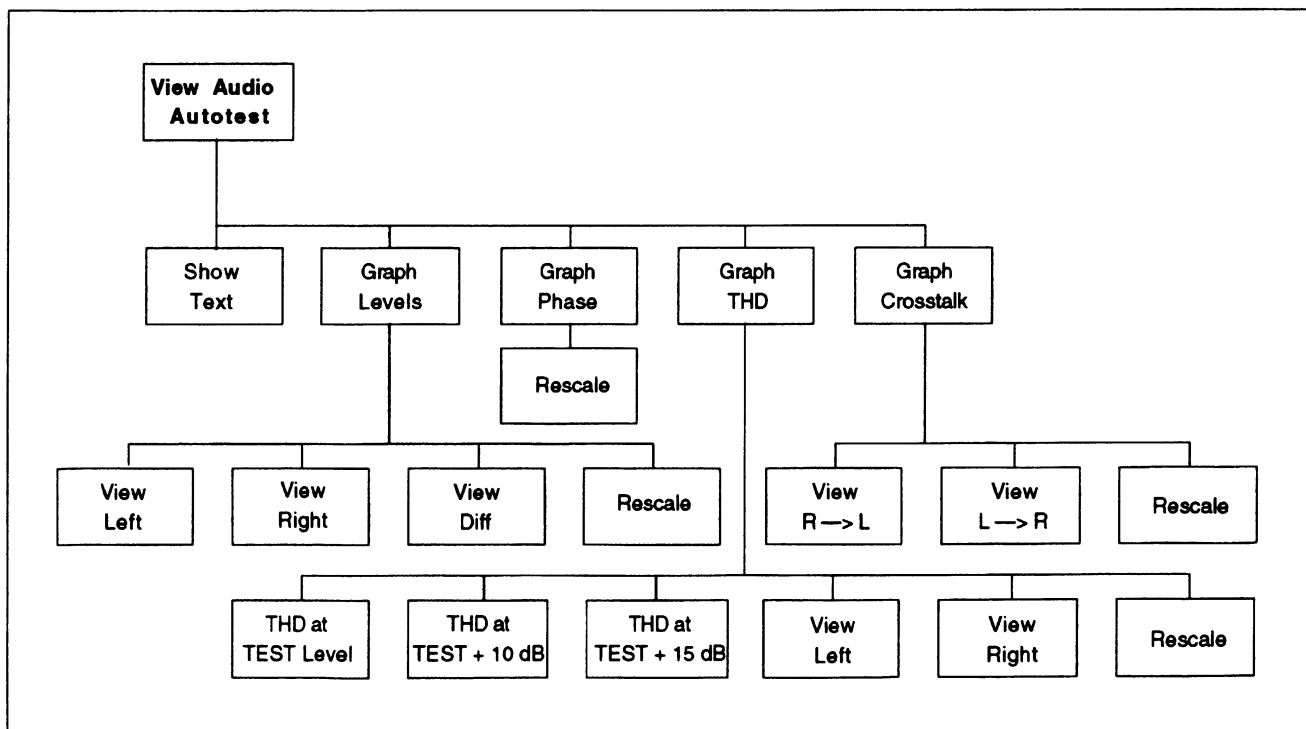


Figure 3-9. View Audio Auto Test menu tree.

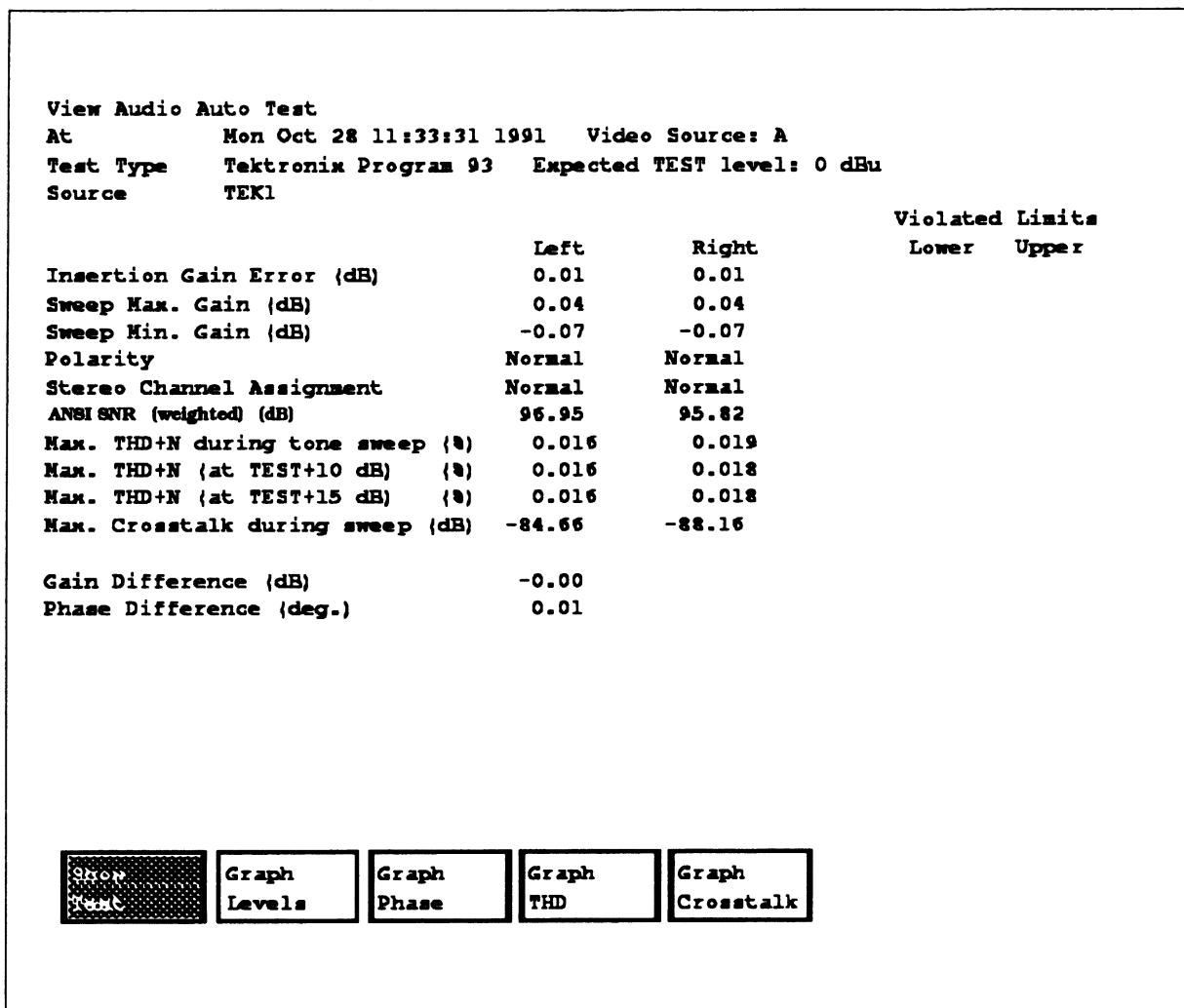


Figure 3-10. The View Audio Auto Test text screen display.

The Show Text display of the View Audio Auto Test shows the results of the current test. Figure 3-10 shows the View Audio Auto Test screen display for Tektronix Program 93. The display is different for each Auto Test as different measurements are made.

The numbers shown include the program number, measurement number, measurement date and time, and measurement status. The measurement status shows one of three types of messages: "No Test Received", "OK", or an error message. If the measurement status is OK, the display shows the test sequence (Tek or O.33 Recommendation) sent, the program number of the test, and a test-source identifier.

The expected test levels for O.33 Recommendation test sequences are set at configuration (these should match the test levels sent by the signal generator). For Tek test sequences, however, the Audio Option ignores the audio levels set at configuration. Instead, the Audio Option gets its expected test level information from the received test sequence's preamble.

NOTE

The Audio option normally receives the test sequence preamble on the left channel. If left and right channel inputs are reversed, the Audio option views the test and indicates the signal reversal by displaying "Swapped" rather than "Normal" Stereo Channel Assignment.

The Show Text Display

The information in the show text display changes to show the actual measurements made on received automatic test sequences. The following measurements are those included in Tektronix Program 93. Other test programs will display the measurements done during their sequences. Configuration options for audio limits (accessible in the Configure Files directory) can be set to provide alarms that trigger on audio limit data. These configurable audio limits include: signal-to-noise ratio, insertion gain, gain differential, total harmonic distortion, and inter-channel crosstalk. For information on configuring View Audio Auto Test see section 2, *Configuring the Audio Option*.

TEK TEST: 93

| | |
|-----------------------------|---|
| Insertion Gain Error | Measures input audio signal level and compares it with the correct signal value. |
| Sweep Max. Gain | Measures the difference between actual and expected gain frequency sweep, and displays maximum or minimum deviations. |
| Sweep Min. Gain | |

NOTE

*If either the Sweep Max gain or the Sweep Min gain exception limits are exceeded, both will be flagged with a double ** and the message "Limits Exceeded" in the View Audio Auto Test Screen display. The values displayed will be the max and min sweep gain values, but they may not be the limits that were exceeded during the sweep. The amplitude and frequency exceptions are displayed graphically in other View Audio Auto Test screens. The logging information sent to the serial port also includes the actual value and frequencies of all limit exceptions that occur during the tests.*

| | |
|--------------------------------------|--|
| Polarity | Checks the polarity of the polarity portion of the test signal to determine if the signal is normal or reversed. |
| Stereo Channel Assignment | Normal or Swapped, depending on which channel receives the test sequence preamble. The left channel normally receives the test sequence preamble. |
| ANSI SNR (weighted) | Measures the CCIR quasi-peak weighted signal-to-noise ratio. |
| Max. THD+N during tone sweep | The maximum total harmonic distortion plus noise (in percent) during the THD at TEST Level sweep portion of the test sequence. |
| Max. THD + N (at TEST+10dB) | The maximum total harmonic distortion plus noise (in percent) during the THD at TEST Level + 10 dB sweep portion of the test sequence. |
| Max. THD + N (at TEST +15 dB) | The maximum total harmonic distortion plus noise (in percent) during the THD at TEST Level + 15 dB sweep portion of the test sequence. |
| Max. Crosstalk during sweep | Measures the maximum channel-to-channel crosstalk (in dB) during the crosstalk portion of the test sequence. |
| Gain Difference | Measures the maximum gain difference (in dB) between left and right channels over the test frequency sweep. |
| Phase Difference | Measures the maximum phase difference (in degrees) between left and right channels over the test frequency sweep. The phase difference is referenced to the left channel, so the phase difference reading may be negative or positive. |

Graphical Display of Audio Auto Test Signals

You can display graphs of the left and right channel frequency sweeps showing differential gain and differential phase over the frequency sweep, the THD + N of each channel (for those test sequences having a THD + N sweep signal) and Crosstalk between channels (again only for those test sequences have a crosstalk sweep test). A typical View Audio Auto Test screen (see Figure 3-11) graphs the signal phase and frequency for left and right audio channels. The softkey menu choices determine the type of display shown.

The upper and lower test limits are shown in the View Audio Auto Test graphic displays as lighter lines above and below the received signal (see Figure 3-11 for a sample display). As described earlier, these limits are set either at configuration (for O.33 Recommendation sequences) or are contained in the received sequence's preamble (in Tek sequences). The default lower test limit is a mirror of the upper test limits. You may configure the elements of the View Audio Auto Test function in the VM700A's Configure Files directory. For information on configuring View Audio Auto Test, see Section 2, *Configuring the Audio Option*.

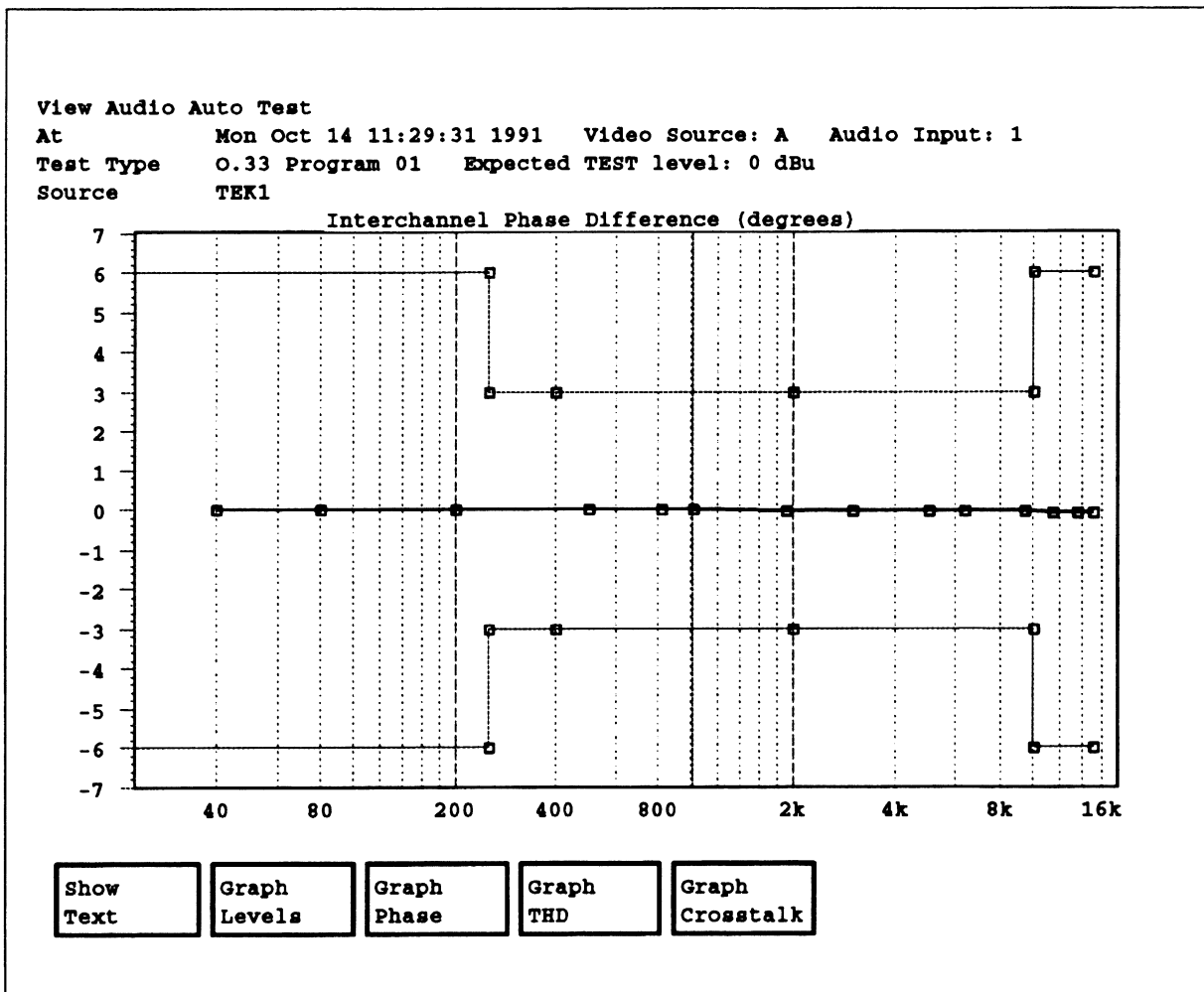


Figure 3-11. Typical View Audio Auto Test graph phase display showing upper and lower test limits (faint lines).

View Audio Auto Test Menu

Show
Text

Show Text displays the tabular text display of the measurements and results obtained during a test run.

Graph
Levels

Graph Levels plots the left channel, right channel, and difference levels from the tone sweep.

Graph
Phase

Graph Phase plots inter-channel phase difference.

Graph
THD

Graph THD plots total harmonic distortion and noise vs. frequency for test sequences that include a THD test sweep signal.

Graph
Crosstalk

Graph Crosstalk plots crosstalk and noise vs. frequency for test sequences that include a crosstalk test sweep signal.

GRAPH LEVELS SUBMENU

View
Left

View Left display the left channel level test results.

View
Right

View Right displays the right channel level test results.

View
Diff

View Difference graphs the level difference between the left and right channels in dBu or volts.

Rescale

Rescale restores the default scaling for the display.

GRAPH PHASE SUBMENU

Rescale

Rescale restores the default scaling for the display.

GRAPH THD SUBMENU

THD at
TEST Level

THD at TEST Level graphs the results of the THD at TEST Level portion of a test sequence containing a THD sweep test signal.

THD at TEST
+ 10 dB

THD at TEST + 10 dB graphs the results of the THD at TEST + 10 dB Level portion of a test sequence containing a THD sweep test signal.

THD at TEST
+15 dB

THD at TEST +15 dB graphs the results of the THD at TEST + 15 dB Level portion of a test sequence containing a THD sweep test signal.

View
Left

View Left display the left channel test results.

View
Right

View Right displays the right channel test results.

Rescale

Rescale restores the default scaling for the display.

GRAPH CROSSTALK SUBMENU

View
R → L

View R → L plots the crosstalk from the right channel into the left channel for test sequences that include a crosstalk test sweep signal.

View
L → R

View L → R plots the crosstalk from the left channel into the right channel for test sequences that include a crosstalk test sweep signal.

Rescale

Rescale restores the default scaling for the display.

MULTITONE ANALYZER

Most audio tests consist of measuring a sine-wave audio tone, then stepping the frequency and repeating the test. The process continues until measured level vs. frequency graphs can be assembled and displayed. Each audio test typically takes several seconds.

The technique is accurate, and where time is not an issue, is the best way to perform an audio test. But when only a few seconds are available to perform a complete measurement, or for adjusting a processing device or nulling distortion, near-real-time updates of measurement data are necessary.

The VM700A Audio option Multitone Analyzer addresses this problem. Instead of measuring a single-frequency sinewave, the Multitone Analyzer measures a test signal consisting of sine waves at several frequencies. From the received multitone signal, the Multitone Analyzer produces level vs. frequency or distortion plus noise graphs.

NOTE

The maximum amplitude of an individual tone in a multitone signal is lower than it would be if it was the only tone sent. This lowered signal to noise ratio affects the ability to accurately measure high signal-to-noise levels.

The Audio option Multitone Analyzer provides three types of graphical display:

1. **View Levels** — displays received signal level vs frequency on a near-real time basis.
2. **View Difference** — displays interchannel gain and phase differences for the stereo pair.
3. **View Distortion and Noise** — displays the remaining spectrum after energy is removed at frequencies near the multitones (this display contains only noise and distortion products).

Figure 3-12 shows the Multitone Analyzer level vs. frequency display.

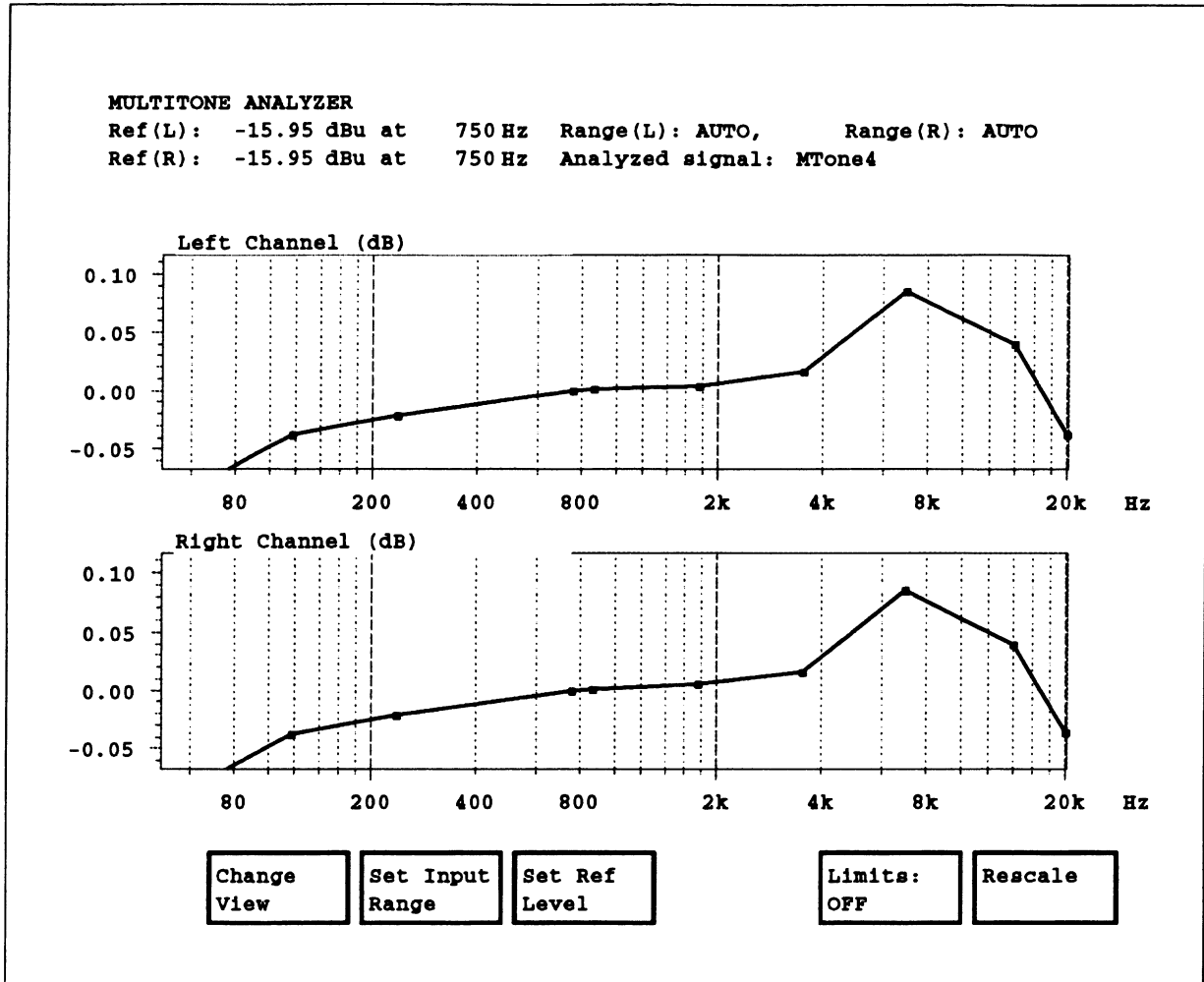


Figure 3-12. The Multitone Analyzer's level vs. frequency display in View Levels mode.

Data above the graphical display shows the following information:

- Level (in dBu) of the reference signal used
- Reference signal frequency
- Left- and right-channel input range selected
- The name of the multitone input signal

The Multitone Analyzer's menu hierarchy is shown in Figure 3-13.

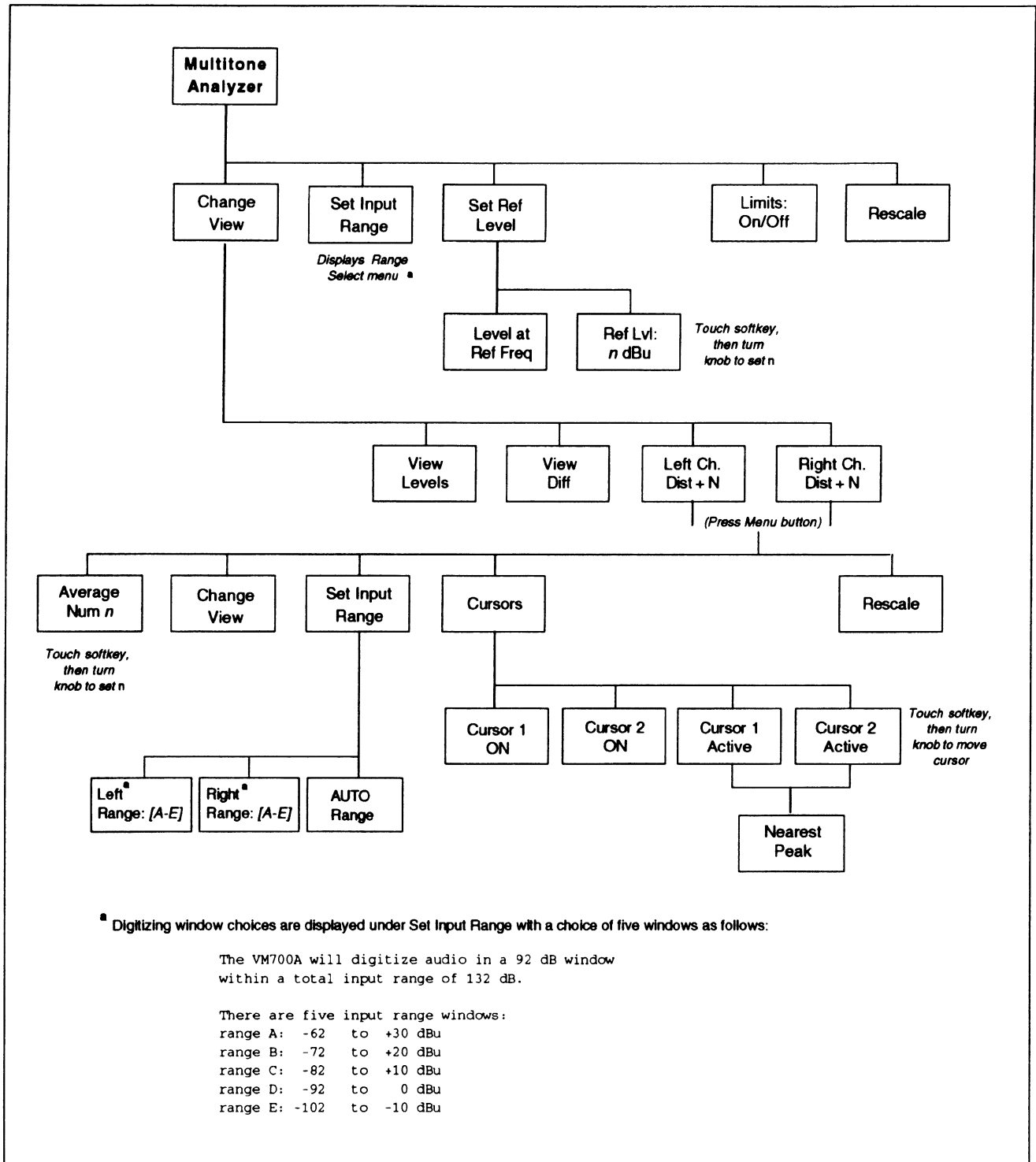


Figure 3-13. Multitone Analyzer's menu tree.

Multitone Analyzer Main Menu

Change
View

Change View displays four softkey selections that let you change the display to view input signal levels (the default mode), view differences between left and right inputs, and view left or right channel distortion and noise components of the signal (see Figure 3-14).

Set Input
Range

Set Input Range enables you to select the range window that most closely matches the amplitude range of the input signal. The VM700A digitizes an audio signal measured in a selectable 92 dB window over a total range of 132 dB.

The input ranges of the left and right channels may be configured independently with the **Left Range:** or **Right Range:** softkeys. In **Auto**, the range window is adjusted to find the best range for the applied signal level.

NOTE

Use care when selecting AUTO for setting the input range. If varying signals, such as voice, are applied to the Audio option, the attenuators constantly switch ranges as they attempt to select an appropriate measurement window for a constantly varying input signal.

Set Ref
Level

Set Ref Level selects the signal reference level menu with two softkey selections: **Level at Ref Freq** (the default) and **Ref Lvl: *n* dBu**.

Level at Ref Freq shows the signal level at the reference frequency listed.

Ref Lvl: *n* dBu lets you set the reference level, in dBu, by rotating the knob. The softkey legend displays the level you set.

Limits:
ON/OFF

Limits: ON/OFF enables or disables the Multitone signal input limits. The limits are set in the configuration files during setup of the VM700A Option 40 for operation.



When you disable the audio signal input limits, the audio input signal is not checked against the limits that may have been selected during configuration.

Rescale

Rescale readjusts the vertical scale to make all of the plot visible on the display.

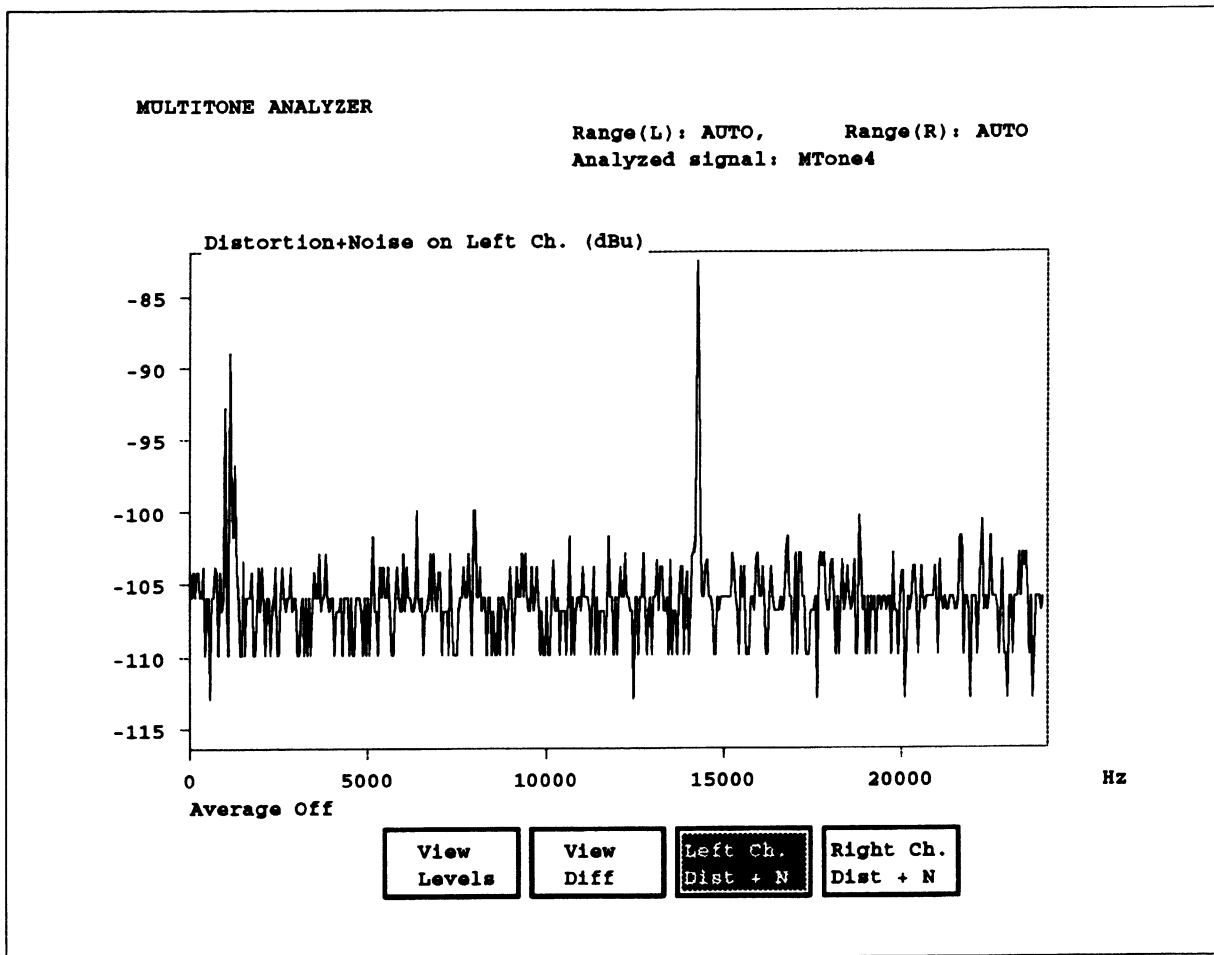


Figure 3-14. The Multitone Analyzer's distortion plus noise components vs frequency display.

CHANGE VIEW SUBMENU

View Levels

View Levels displays a graph of the channel signal levels.

View Diff

View Diff displays a graph of the difference between the two channel signals.

Left Ch. Dist + N

Left Ch. Dist + N display a new graph of the signal distortion + noise in the left channel (see Figure 3-14). Pressing the Menu front panel button access a new set of softkey menu choices.

Right Ch. Dist + N

Right Ch. Dist + N display a new graph of the signal distortion + noise in the right channel. Pressing the Menu front panel button access a new set of softkey menu choices.

LEFT CHANNEL AND RIGHT CHANNEL DISTORTION + NOISE SUBMENU

The following softkey choices are accessed by pressing the Menu button with the Left or Right Channel Distortion + Noise displays active.

Average
Num

Average Num specifies the time constant to be used for averaging. The Average Num range is 1-256; the default value is 10. To change the Average Num value, touch the **Average Num** softkey to highlight it, rotate the knob until the selected time constant appears, then press the **Average Num** softkey again.

Change
View

Change View provides the same choices as show in the previous change view submenu.

Set Input
Range

Set Input Range provides the same set input menu as previously described for setting the input signal range window.

Cursors

Cursors places two cursors on the display and lets you position them to mark display features. The numerical display shows frequency and level at each cursor's location. When both cursors are turned on, the numerical display also shows the noise area between the cursors.

Rescale

Rescale readjusts the vertical scale to make all of the plot visible on the display.

CURSORS SUBMENU

Cursor 1
On

Cursor 1 On turns on the first (solid line) cursor

Cursor 2
On

Cursor 2 On turns on the second (dotted line) cursor (see Figure 3-15).

Cursor *n*
Active

Cursor *n* Active activate either cursor. Once activated, a cursor may be positioned on the display by rotating the knob. Cursor 1 may not be positioned to the right of cursor 2, nor may cursor 2 be positioned to the left of cursor 1. The **Nearest Peak** softkey is available with either cursor active.

Nearest
Peak

Nearest Peak positions the active cursor on the nearest signal peak while showing the frequency and signal level of the peak on the numerical display. The cursors does not go to the highest peak.

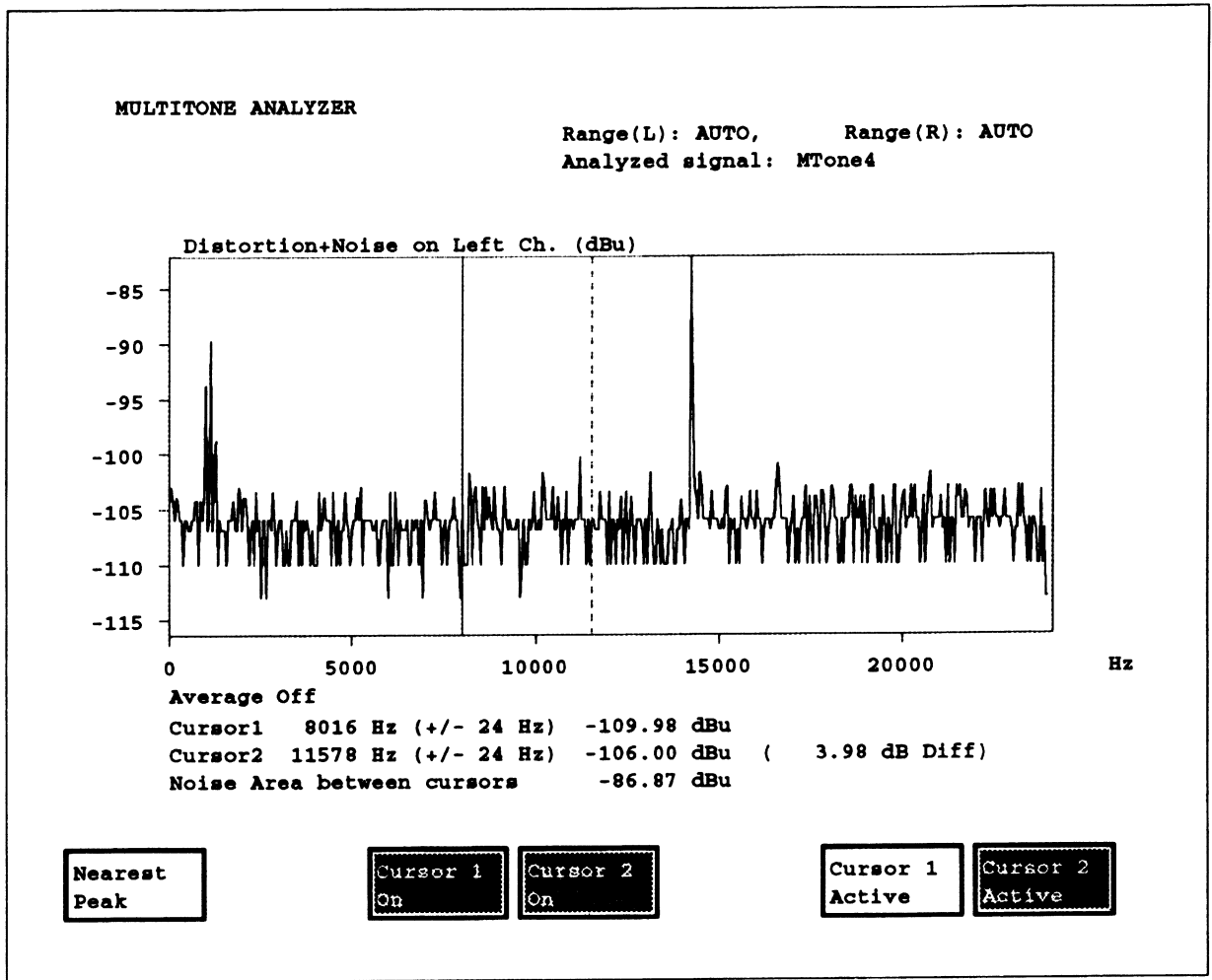


Figure 3-15. Multitone Analyzer's cursor display with both cursors active.

Section 4

REMOTE COMMANDS AND KEYWORDS

INTRODUCTION

Like the VM700A video functions, remote control of the Audio option 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 Programmer's Reference Manual*. The Programmer's Reference manual discusses the VM700A's RS-232C port requirements in detail and shows typical cable wiring configurations.

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 Audio option functions are the same as those used for other VM700A functions. The command arguments for the Audio option 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 Operator's Manual*.

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.

AUDIO REMOTE COMMANDS

The following VM700A remote commands can be used with the Audio option.

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 Audio~Analyzer
```

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

```
Audio~Analyzer  
Audio~Monitor  
Audio~Spectrum  
Calibrate~AudioBoard  
Identify~Audio_Hardware  
View_Audio~Auto_Test
```

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 BSNR A
```

The above example returns the signal-to-noise ratio limits 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: Audio~Monitor
```


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 BING A -0.5 0.5
```

The above example changes changes the limits for channel A insertion gain to from their previous values to -0.5 to 0.5.

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~Audio
The default file for audio sources
Channel A Audio Source:    xmiter
Channel B Audio Source:    switcher
Channel C Audio Source:    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. For example, the softkey command to toggle the plot on or off in the Audio Analyzer measurement function looks like this:

```
VM700A> softkey Plot
```

NOTE

For the Audio Monitor measurement functions of Audio option Version 1.02 and earlier, you must type the softkey names for the toggle keys in lowercase.

“GET” AND “SET” KEYWORDS

The following sections documents the audio keywords used with the **get** and **set** commands. For each **get/set** keyword letter-group, it gives the syntax of the **set** command and the **get** result and an explanation of what the keywords in the letter-group do. This is followed by an alphabetized table of keywords in the group and their meaning.

“A” Group Keywords: Audio Configuration

“A” keywords report on or set the values of Audio option Configuration parameters. These keywords can be used only on a VM700A equipped with Option 40.

Get commands used with the “A” keywords have the form:

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

Set commands used with “A” group keywords have the form

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

where *<argument>* is the text to which the setting associated with the keyword is to be set. Table 4-2 lists the keywords in the “A” group and their meanings.

Table 4-2
“A” Keywords: Audio Configuration

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

Table 4-3
“B” Keywords: Audio Limit Files

| Keyword | Description | Keyword | Description |
|---------|---|---------|--|
| BARF | Amplitude Response Frequency breaks | BHHF | Total above TEST+14 dB Frequency breaks |
| BARL | Amplitude Response Lower limit | BHHL | Total above TEST+14 dB Upper limit |
| BARU | Amplitude Response Upper limit | BHHU | Total above TEST+14 dB Upper limit |
| BCEF | Compander error (fall) | BHLF | THD+N up to TEST+9 dB Frequency breaks |
| BCER | Compander error (rise) | BHLL | Total up to TEST+9 dB Upper limit |
| BCSF | Channel separation Frequency breaks | BHLU | Total up to TEST+9 dB Upper limit |
| BCSL | Channel separation Lower limit | BHMF | Total TEST+10 to TEST+14 dB Frequency breaks |
| BCSU | Channel separation Upper limit | BHML | Total TEST+10 to TEST+14 dB Upper limit |
| BCTF | Crosstalk plus noise Frequency breaks | BHMU | Total TEST+10 to TEST+14 dB Upper limit |
| BCTL | Crosstalk plus noise Upper Limit | BING | Insertion gain |
| BCTU | Crosstalk plus noise Upper Limit | BSNR | Signal to noise ratio |
| BGDF | Stereo gain difference Frequency breaks | BSPF | Stereo phase difference Frequency breaks |
| BGDL | Stereo gain difference Lower limit | BSPL | Stereo phase difference Lower limit |
| BGDU | Stereo gain difference Upper limit | BSPU | Stereo phase difference Upper limit |

“B” Group: Audio Limit Files

“B” keywords report on or set the measurement limits for Audio Auto mode measurements. These keywords can only be used on a VM700A equipped with Option 40 (Audio).

Get commands used with the “B” keywords have the form:

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

Set commands used with “B” group keywords have the form

```
set <keyword> <channel-letter> <arg1>...[<argn>]
```

where <arg1>...[<argn>] are text strings, separated by spaces, that define the limits associated with the keyword. Table 4-3 lists the keywords in the “B” group and their meanings.

“W” Group: Audio Source Selection

“W” keywords report on or set the active video source selection files.

Get commands used with the “W” keywords have the form:

```
get <keyword>
```

Set commands used with the “W” keywords have the form

```
set <keyword> <file-name>
```

Table 4-4 lists the “W” group keywords and their meanings.

Table 4-4
“W” Keywords: Audio Source Selection

| Keyword | Description | Keyword | Description |
|---------|----------------------------|---------|----------------------------|
| WACA | Source A Audio Config File | WACC | Source C Audio Config File |
| WACB | Source B Audio Config File | | |

Section 5 SPECIFICATIONS

AUTOMATIC AUDIO TEST SPECIFICATIONS

**Table 5-1
O.33 Automatic Audio Test Measurement Specifications**

| Measurement ^a | Range | Accuracy (Includes Flatness) |
|--|---|---------------------------------|
| Insertion Gain Error ^b | ± 6 dB | ± 0.2 dB |
| Sweep Gain (Min and Max) | 12 dB | ± 0.1 dB |
| THD + N (at 1020 Hz) | ≤ 0.03% to 70% | ± 10% ± 1 digit |
| 2nd Harmonic (at 60 Hz) | ≤ 0.03% to 70% | ± 10% ± 1 digit |
| 3rd Harmonic (at 60 Hz) | ≤ 0.03% to 70% | ± 10% ± 1 digit |
| Crosstalk (into channel) ^c Test Level: +6 dBu 0 dBu - 6 dBu | ≤ - 66 dB to 0 dB ≤ - 60 dB to 0 dB ≤ - 54 dB to 0 dB | ± 1 dB |
| SNR (unweighted) ^d Test Level: +6 dBu 0 dBu - 6 dBu | 10 dB to ≥ 76 dB 10 dB to ≥ 70 dB 10 dB to ≥ 64 dB | ± 1 dB |
| SNR (weighted) ^{d,e} Test Level: +6 dBu 0 dBu - 6 dBu | 10 dB to ≥ 76 dB 10 dB to ≥ 70 dB 10 dB to ≥ 64 dB | ± 2 dB |
| Max Compandor Error (rise/fall) | ± 6 dB | ± 0.2 dB |
| Gain Difference | 12 dB | ± 0.2 dB |
| Phase Difference | 0 – 180° | ±1° |

^a Assumes insertion gain is within ± 6 dB.

^b The measurement range specification assumes that the input level is within ± 6 dB of the O.33 test level in the audio configuration. The actual O.33 test level range is -6 dBu to + 14 dBu.

^c The value for other test levels can be calculated from the formula (- 60 - Test Level).

^d Measured with Quasi-Peak response as per CCIR 468-4 recommendation. The measurement range can be determined from the formula (70 + Test Level).

^e Weighting filter as per CCIR 468-4 recommendation.

Table 5-2
Tek Test Automatic Audio Test Measurement Specifications

| Measurement ^a | Range | Accuracy (Includes Flatness) |
|---|--|---------------------------------|
| Insertion Gain Error ^b | ± 6 dB | ± 0.2 dB |
| Sweep Gain (Min and Max) | 12 dB | ± 0.1 dB |
| THD + N | ≤ 0.03% to 70% | ± 10% ± 1 digit |
| Crosstalk (into channel) ^b Test Level: +6 dBu 0 dBu -6 dBu | ≤ -66 dB to 0 dB ≤ -60 dB to 0 dB ≤ -54 dB to 0dB | ± 1 dB |
| SNR (weighted) ^c Test Level: +6 dBu 0 dBu -6 dBu | 10 dB to ≥ 90 dB 10 dB to ≥ 90 dB 10 dB to ≥ 84 dB | ± 2 dB |
| Max Compondor Error (rise/fall) | ± 6 dB | ± 0.2 dB |
| Gain Difference | 12 dB | ± 0.2 dB |
| Phase Difference | 0 to 180° | ± 1° |

^a Assumes insertion gain is within ± 6 dB.

^b The measurement range specification assumes that the input level is within ± 6 dB of the 0.33 test level in the audio configuration. The actual 0.33 test level range is -6 dBu to + 14 dBu.

^c Weighting filter is a 15 kHz brickwall low-pass filter.

Table 5-3
Miscellaneous Specifications

| Description | Specification |
|------------------------------|--|
| Channel separation/crosstalk | > 100 dB ^a , 20 Hz to 20 KHz |
| Input connectors | 2 miniature XLR (Switchcraft TY3F), require Switchcraft TA3M miniature XLR plug. Two mini-XLR to XLR female adaptors and two mini-XLR male plugs are supplied. |
| Input impedance | 50 kΩ, balanced, differential |

^a Noise limited, source impedance for both channels ≤ 600 Ω.

AUDIO ANALYZER SPECIFICATIONS

Table 5-4
Frequency and Noise Specifications

| Measurement | Specification | Comments |
|--|--|---|
| Level | | |
| Max. Allowable Input | + 30 dBu (24.5 V rms) | |
| Resolution | 0.1 dB | |
| Frequency | | |
| Range | 20 Hz to 20 kHz | |
| Accuracy | ± 1 Hz for input ≥ -60 dBu | |
| Resolution | ± 1 Hz for input ≥ -60 dBu | |
| Phase Difference | | |
| Minimum input level for specified accuracy | -40 dBu | |
| Phase measurement error | $\pm 1^\circ$ for inputs at 40 Hz to 20 kHz $\pm 2^\circ$ for inputs at 40 Hz to 20 kHz | |
| Total harmonic distortion & noise (THD+N) | | |
| Measurement bandwidth | 33 Hz to 22 kHz | |
| Input level | ≥ -20 dBu | |
| Residual THD+N | $\leq 0.03\%$ | |
| Maximum measurement | 70.0% | |
| Accuracy | $\pm 10\%$ of reading ± 1 digit for harmonics | |
| Channel Separation | | |
| Measurement Window | | Measurement is taken in the undriven channel. The measurement window follows the driven channel signal frequency. |
| 20 Hz to 350 Hz | ± 24 Hz | |
| >350 Hz | ± 96 Hz | |
| Measurement Filter | Constant bandwidth | |
| Plot Mode | | |
| Minimum frequency change | ± 2 Hz | |
| Minimum dwell time | 1 s for input frequencies < 500 Hz, 500 ms for input frequencies \geq 500 Hz | |

Table 5-5
Accuracy and Flatness Specifications

| Frequency Range | Level Range ^a | Accuracy (includes flatness) | Flatness |
|-----------------|--|--|--|
| 20 – 40 Hz | ≥ – 20 dBu – 20 dBu to – 50 dBu – 50 dBu to – 60 dBu – 60 dBu to – 70 dBu | + 0.3 / – 0.2 dB + 0.4 / – 0.3 dB + 0.6 / – 0.5 dB ± 1.0 dB | + 0.1 / – 0.2 dB + 0.1 / – 0.2 dB + 0.1 / – 0.2 dB + 0.1 / – 0.2 dB |
| 40 Hz – 20 kHz | ≥ – 20 dBu – 20 dBu to – 50 dBu – 50 dBu to – 60 dBu – 60 dBu to – 70 dBu | ± 0.2 dB ± 0.3 dB ± 0.5 dB ± 1.0 dB | ± 0.1 dB ± 0.1 dB ± 0.1 dB ± 0.1 dB |

^a Level difference between channels is ±0.2 dB.

AUDIO SPECTRUM SPECIFICATIONS

Table 5-6
General Audio Spectrum Specifications

| Description | Specification | |
|---|---|--|
| | Normal Res Mode | High Res Mode |
| Display bandwidth | DC to 24 kHz | Any 3 kHz within the display bandwidth. |
| Frequency resolution | 47 Hz | 6 Hz |
| Cursor readout accuracy | Frequency: ± 24 Hz Amplitude: + 0.5 / – 1.0 dB | ± 3 Hz |
| Frequency range for noise level measurement | 188 Hz to 20 kHz | Selected 3 kHz window within the range of 24 Hz to 24 kHz. |
| Signal/Noise ratio | > 85 dB (at full scale) > 70 dB (for inputs > – 20 dBu with appropriate range selection) | |

Table 5-7
Audio Spectrum Level Measurement Specifications

| Frequency Range | Level Range | Accuracy | Flatness |
|-----------------|--------------------|----------|----------|
| 188 Hz – 20 kHz | ≥ -20 dBu | ± 0.2 dB | ± 0.1 dB |
| | -20 dBu to -50 dBu | ± 0.3 dB | ± 0.1 dB |
| | -50 dBu to -60 dBu | ± 0.5 dB | ± 0.1 dB |
| | -60 dBu to -70 dBu | ± 1.0 dB | ± 0.1 dB |

Table 5-8
Harmonic Analyzer Measurement Specifications

| Description | Specification | Comments |
|----------------------------------|-----------------------|---|
| Highest Fundamental Frequency | 9999 Hz | Harmonics up to the 20 kHz measurement bandwidth are displayed. |
| Measurement Update Rate | 6 readings per second | |
| View Harmonic Measurement Window | ±24 Hz | All signal energy within the view window is measured. |

MULTITONE ANALYZER SPECIFICATIONS

Table 5-9
Multitone Analyzer Measurement Specifications

| Description | Specification | Comments |
|--|--|----------|
| Level of Individual Tones Relative to Multitone RMS Level Multitone 1 Multitone 2 Multitone 3 Multitone 4 | -19.9 dB -18.9 dB -13.8 dB -15.9 dB | |
| Reference Frequency for Multitone Recognition Multitone 1 Multitone 2 Multitone 3 Multitone 4 | 422 Hz 562 Hz 656 Hz 750 Hz | |
| Minimum Amplitude of Reference Tone for Multitone Recognition Input Range Window A B C D E AUTO RANGE | -10 dBu -20 dBu -30 dBu -40 dBu -50 dBu -50 dBu | |
| Minimum Multitone Recognition Time (first time) | 1 second | |
| Measurement Update Rate After Recognition | 5 readings per second. | |
| Maximum Frequency Error for Multitone Recognition | Within $\pm 10\%$ of reference frequency. | |
| Level Measurement Accuracy | Same as Audio Analyzer. | |
| Frequency Measurement Accuracy | Same as Audio Analyzer. | |

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**Please
Remove
Sheet
From
Manual
At
Perforation**

Please fold sheet exactly in half and tape at bottom of sheet



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