

User Manual



AVG1 Analog Video Generator 070-9048-03

This document applies to firmware version 2.0
and above.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Only qualified personnel should perform service procedures.

To avoid potential hazards, use this product only as specified.

Injury Precautions

Avoid Electric Overload. To avoid electric shock or fire hazard, do not apply a voltage to a terminal that is outside the range specified for that terminal.

Product Damage Precautions

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:



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



CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



DANGER
High Voltage



Protective Ground
(Earth) Terminal



ATTENTION
Refer to Manual



Double
Insulated

**Certifications and
Compliances**

Refer to the specifications section for a listing of certifications and compliances that apply to this product.

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, disconnect the main power by means of the power cord or, if provided, the power switch.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface

This manual documents the capabilities, specifications, operation, and installation of the AVG1 Generator module.

About This Manual

This manual is composed of the following sections:

- *Getting Started* provides a product description, incoming inspection procedure, and a standard and optional accessories list. It also provides procedures on how to install signal sets.
- *Operating Basics* describes the windowed menu interface and how to control the module through the interface in conjunction with the front panel.
- *Syntax and Commands* defines the syntax used in command descriptions, presents a list of all command subsystems, and presents detailed descriptions of all programming commands.
- *Appendices* provides additional information including the Specifications and hardware installation procedures.

Related Manuals

The following documents are also available:

- The *AVG1 Analog Video Generator Service Manual* describes how to service the AVG1 module. This optional manual must be ordered separately.
- The *TG 2000 Signal Generation Platform User Manual* describes how to use the TG 2000 Platform. It also contains information about SCPI commands, programming structure, and status and events for the platform. Some of this information applies to all generator modules, including the AVG1 Generator module. This manual is a standard accessory to the TG 2000 Platform mainframe.
- The *TG 2000 Signal Generation Platform Service Manual* describes how to service the mainframe to the module level and provides general information about servicing generator modules. This optional manual must be ordered separately.
- A module user manual is included with each optional module. Contact your Tektronix representative for a list of generator and special function modules.

Contacting Tektronix

Product Support	<p>For questions about using Tektronix measurement products, call toll free in North America: 1-800-833-9200 6:00 a.m. - 5:00 p.m. Pacific time</p> <p>Or contact us by e-mail: tm_app_supp@tek.com</p> <p>For product support outside of North America, contact your local Tektronix distributor or sales office.</p>
Service support	<p>Tektronix offers a range of services, including Extended Warranty Repair and Calibration services. Contact your local Tektronix distributor or sales office for details.</p> <p>For a listing of worldwide service centers, visit our web site.</p>
Toll-free Number	<p>In North America: 1-800-833-9200 An operator can direct your call.</p>
Postal Address	<p>Tektronix, Inc. Department or name (if known) P.O. Box 500 Beaverton, OR 97077 USA</p>
Web site	<p>www.tektronix.com</p>



Getting Started

Getting Started

The AVG1 Analog Video Generator module is designed to be installed in the TG 2000 Signal Generation Platform.

The module is a high accuracy, multiformat analog video test signal generator. The signal generation architecture is 12-bit, 27 MHz component with digital modulation for composite signals. This ensures high accuracy, distortion free signals within a 6 MHz video bandwidth.

This module provides three channel outputs and one trigger output. The trigger output can be used to trigger other video equipment or an oscilloscope.

The module can generate signals in these component and composite formats:

- NTSC
- PAL
- PAL-D
- PAL-M
- PAL-N
- SECAM
- GBR
- YC plus composite
- Y, B-Y, and R-Y

You can create other formats with the SDP2000 program. However, the output reconstruction filters are optimized for a 27 MHz sampling frequency.

To adjust the amplitude or time base offset parameters, follow the procedure for *Video Parameters* on page 2-11. Several amplitude parameters of the signal can be adjusted, such as luminance amplitude and chrominance gain.

The underlying time base used to generate signals can also be adjusted. When this parameter is adjusted, it adjusts every component of the active video signal, such as line length, subcarrier frequency if applicable, and rise time. The signal also becomes unframed; it has no phase relationship with the genlock input (AGL1 Generator module). Two modules with the same time base offset value are not necessarily framed together.

Accessories

Table lists standard and optional accessories for the module. Standard accessories are included with the module, and optional accessories are available for purchase to use with the module.

Table 1-1: Standard and Optional Accessories

Accessory	Typo of accessory	Part number
AVG1 Analog Video Generator User Manual	Standard	070-9048-XX
T-10 Torx Tip	Standard	003-1604-XX
Screws (2 ea.)	Standard	211-0725-XX
Blank rear panel	Standard	333-4113-XX
AVG1 Analog Video Generator Service Manual	Optional	070-9677-XX

Configuration

The module does not require any hardware configuration. However, you can configure the channel outputs. Refer to *Configure the Outputs* on page C-9 for instructions.

Functional Check

For this procedure, you will need a television monitor, a 75 Ω coaxial cable, and a 75 Ω termination.

To determine if the module is operating correctly, follow these steps:

1. If the module is not installed into the platform, use the installation procedures on page C-2.
2. Power on the platform. The platform runs a self test on all modules.
3. To determine if the self test was successful, push the **Module** button. Check the display for the icon that represents the module you are inspecting. If the module does not appear, refer to *Troubleshooting* in the *AVG1 Analog Video Generator Service Manual*.
4. If your module was ordered separately and you installed it in the platform, and you do not have another AVG1 Generator module already installed in the platform, install signal sets using the procedures on page C-6.
5. Wait 20 minutes for the instrument to warm up at nominal ambient temperature. (Signal amplitude and DC offset may vary slightly over a range of temperatures.)
6. Perform self calibration as follows:
 - a. Terminate the three rear-panel signal outputs.
 - b. Push the **Utilities** button and then touch **Module Self Cal**.

NOTE. *The original calibration file will be replaced by the new one.*

- c. Touch the Self Cal icon for the module you are testing
 - d. Touch **Start Cal**. The Self Cal takes 2 to 5 minutes depending on the module. An error message indicates a failed calibration. If the Self Cal fails, contact your Tektronix Representative for assistance.
 - e. When the Self Cal is successful, proceed to step 7.
7. Select a signal set and output signal that are compatible with your monitor. A composite signal is preferred because it tests more of the module's hardware.
8. Connect the rear-panel **Output 1** connector to the television monitor's input.
9. Configure the channel outputs for composite as follows:
 - a. Push the **Test Signals** front-panel button.
 - b. Touch **Module Parameters**.

- c. Touch **Output Config**.
 - d. Select **Composite All Channels**.
10. Adjust your monitor to view the signal. Check that the signal appears as expected. For example, if you selected a color bar signal output, check for a color bar signal on the monitor display.
 11. Move the output cable to each of the channel output connectors in turn to ensure that the appropriate signal appears.
 12. Move the cable back to **Output 1**.
 13. Select a different test signal in the same signal set and check that the displayed signal changes. You only need to do this on **Output 1**.



Operating Basics

Functional Overview

This section provides an overview of the AVG1 Generator module. If you are not familiar with the operation of the TG 2000 Signal Generation Platform, refer to the *TG 2000 Signal Generation Platform User Manual* before reading this section.

Figure 2-1 shows the module's menu structure.

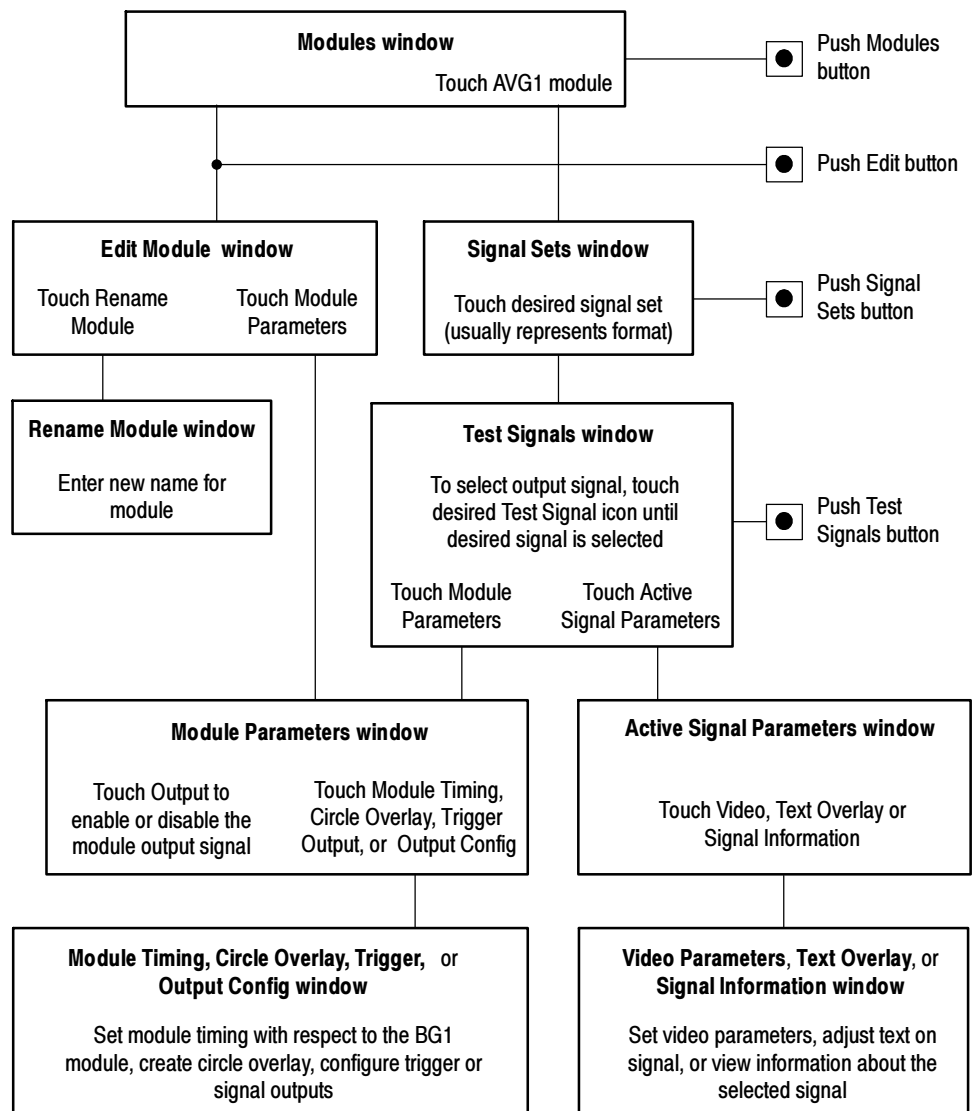


Figure 2-1: Menu structure for the AVG1 Generator module

Outputs This module has four BNC connectors on the rear panel: one Trigger Out and three channel outputs. The channel outputs can be configured as shown in Table 2-1. To configure the outputs, refer to *Configure the Outputs* on page C-9.

Table 2-1: AVG1 Output Configurations

Connector	GBR	Y, B-Y, R-Y	Hardware modulated	Software modulated
Channel 1	G	Y	Y or Composite	Composite 1
Channel 2	B	B-Y	C or Composite	Composite 2
Channel 3	R	R-Y	Composite	Composite 3

Modulated Signals There are two methods of signal generation for composite signals: hardware modulation and software modulation. Hardware modulated signals are preferred when the lowest amount of differential phase and differential gain is required. Hardware modulated signals use less memory than software modulated signals; and signal parameter adjustments are more complete and responsive.

Chroma quantization makes differential phase and differential gain measurements more difficult when using modulated ramp, modulated 5 step, and modulated 10 step signals. To minimize this effect, adjust the Chroma Gain Video Parameter to 102.0%. Refer to page 2-11.

Software modulated signals are preferred when three different signals are supplied by the module at one time. PAL is not supported in this mode, because of the 25 Hz offset.

Online Help Push the front-panel **HELP** button to display a help window. The help window describes the window you were using when you pushed HELP.

Operating Procedures

This section is organized into the following main topics:

- Power on the mainframe and select the module
- Select an output signal
- Active signal parameters
- Module parameters

Refer to Figure 2-1 on page 2-1 for information on how to access the appropriate windows for these procedures.

Equipment Hookup

No special test equipment is necessary for these procedures, but it will be helpful to view the signals on a monitor. To do this, connect the module's signal output to a television monitor, using a 75 Ω cable and a 75 Ω termination.

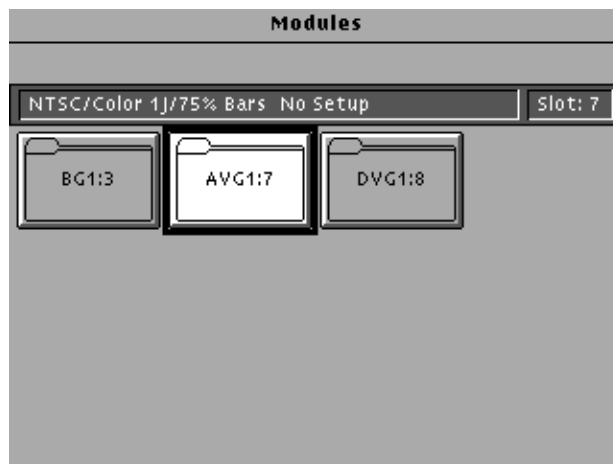
Power On and Select the Module

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, power on the mainframe and select the module by following these steps:

1. Set the rear-panel power switch to the **ON** position.
2. Press the front-panel **POWER** switch if necessary.
3. Wait for a few seconds as the mainframe executes confidence tests on the mainframe and modules. Check for any error messages that might appear.
4. When self tests are complete, the instrument displays icons representing each installed generator module. If an installed module is not represented, refer to *Troubleshooting* in the *AVG1 Analog Video Generator Service Manual*.

NOTE. *The illustrations in these procedures show the factory default name (AVG1:X where X represents the slot number in which the module is installed). However, because you can rename the module, your icons may display a different name. Refer to the TG 2000 Signal Generation Platform User Manual for information about editing the module name.*

5. Since you have just powered on the mainframe, the Modules window (shown below) is displayed. To select the module at other times, push the front-panel **Modules** button.



6. Touch the module icon on the display (or push the **Signal Sets** button if the desired icon is already highlighted). The installed signal sets for the module appear. Selections you make after this will pertain to the AVG1 Generator module.

Output Signal

The output signal is supplied on the two rear-panel serial outputs. To configure the outputs, refer to *Appendix C*.

Enable/Disable the Output Signal

If you disable the module output, it releases all system resources used by this module.

1. Select the AVG1 Generator module, if not already selected.
2. Push the **Test Signals** button.
3. Touch **Module Parameters** at the bottom of the screen. The Module Parameters window (shown on page 2-13) appears.
4. Touch the **Output** icon to toggle the state of the module's output signal.
5. Touch **Quit** to exit.

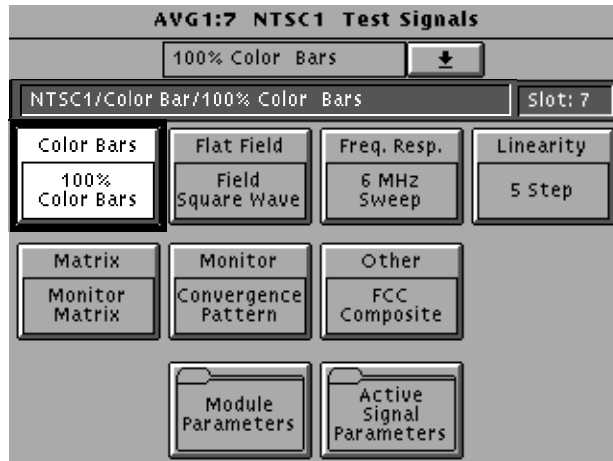
Select the Output Signal

Use the following procedure to select the module's output test signal. You can select any of the AVG1 signals that are loaded in your instrument.

1. Push the **Signal Sets** button to open the window shown below. Check that there is an icon for each installed signal set. If your signal sets are not installed, refer to *Signal Set Installation* on page C-6.



2. Touch the desired signal set on the display. The Test Signals window for the selected signal set appears. In the following example, NTSC is selected.



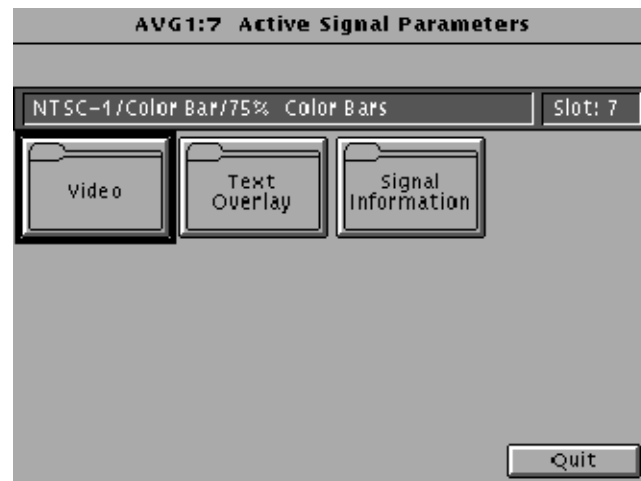
3. Each test signal icon in the Test Signals window represents one or more signals. In this example, the 100% Color Bars signal is being generated.
4. To change to another Color Bar signal, touch the **Color Bar** repeatedly to cycle through all available signals. You can also display the complete list of test signals available under a selected test-signal icon by touching the list box or by rotating the Navigation knob, and then select a signal by pressing the front-panel **Select** button.
5. To change to a different signal type, such as Linearity, touch the corresponding icon on the display. Then select the signal as shown in step 4.
6. To select the output signal using the List window, display the list of test signals by pushing the front-panel **List** button. Use the Navigation arrow keys to highlight the module and signal, and then push the **Select** button.

Active Signal Parameters

The following procedures discuss windows that are accessed through the Active Signal Parameters window, shown below. Changes that you make to parameters in any of these windows affect only the active signal.

To enter the Active Signal Parameters window for the AVG1 Generator module, follow these steps:

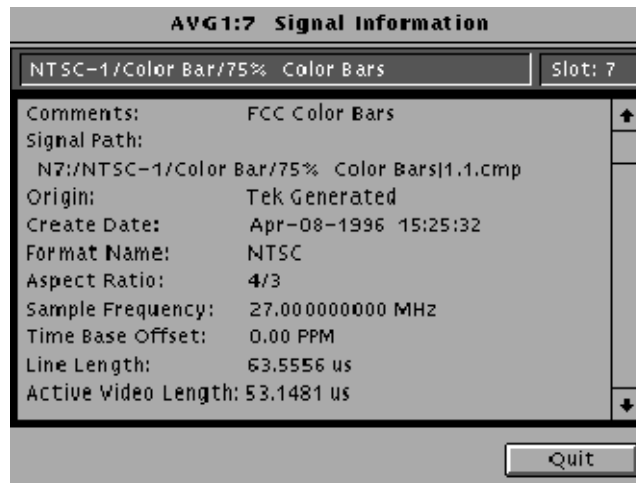
1. Select the AVG1 Generator module, if not already selected.
2. Push the **Test Signals** button.
3. Touch **Active Signal Parameters** at the bottom of the screen. The Active Signal Parameters window appears, as shown below.



Signal Information

You can view detailed information about the active signal.

1. In the Active Signal Parameters window shown on page 2-7, touch **Signal Information**.
2. View the signal information, as shown in the following illustration.

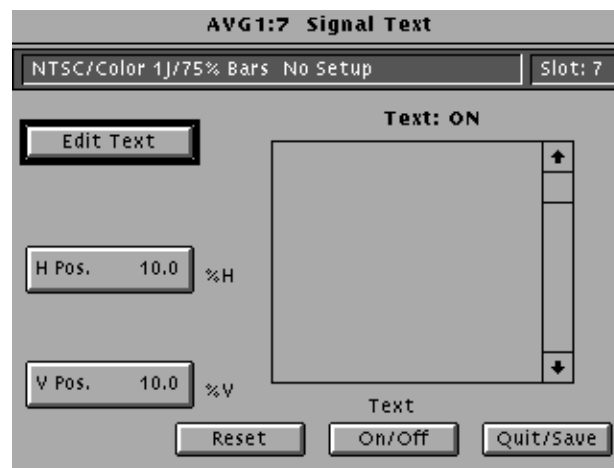


Text Overlay

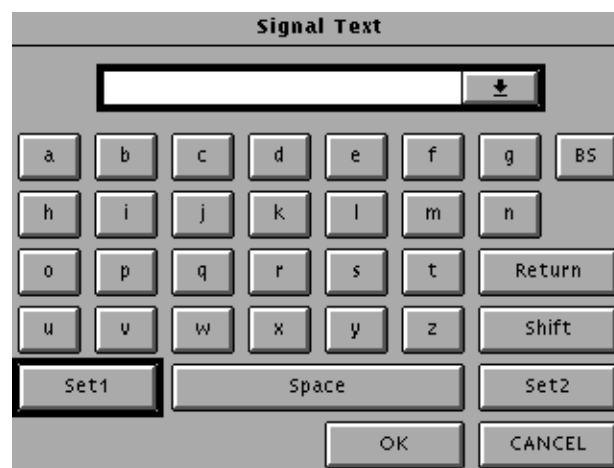
You can enter text that overlays your displayed test signal. When turning text on or off, you are turning text on or off for all test signals that have overlaid text. Touching **Reset** returns the text, horizontal and vertical to previously saved values.

To enter and position text, follow these steps:

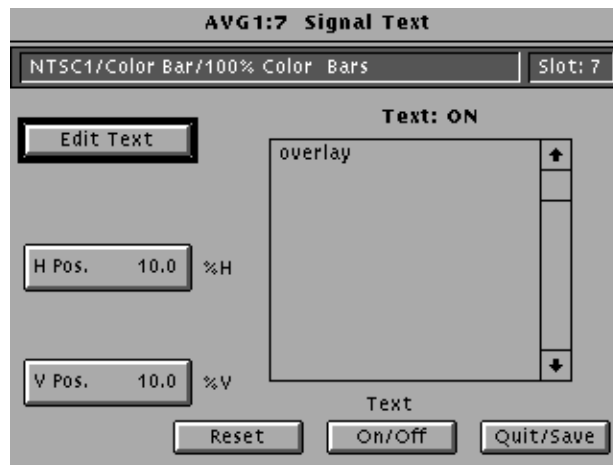
1. In the Active Signal Parameters window, shown on page 2-7, touch **Text Overlay** to enter the Signal Text window. The Signal Text window is shown in the following illustration.



2. Touch **Edit Text** to enter the text entry window as shown in the following illustration.



3. Enter text as follows:
 - a. Touch the desired letters on the display.
 - b. Touch **Return** if you want to enter a new line.
 - c. Touch the list box at the top of the window to see all the text entered.
 - d. Touch **OK** when text entry is complete. The Signal Text Overlay menu returns.
4. Touch **Text On/Off** to display the text on your monitor. The Signal Text Overlay menu lists the text you previously entered, as shown in the following illustration.



5. Touch **H Pos** and enter a value from the keypad, or rotate the knob until the desired horizontal position is reached.
6. Touch **V Pos** and enter a value from the keypad, or rotate the knob until the desired vertical position is reached.
7. If you want to reset the text, horizontal and vertical to previously saved values, touch **Reset**.
8. Touch **Quit/Save**. A dialog box appears; you can enter a new name for the test signal. If you touch **Save**, the original test signal is modified to include the overlaid text and an underscore is added to the front of the name. If you touch **Save As**, the platform displays a text entry window in which you can rename the signal.

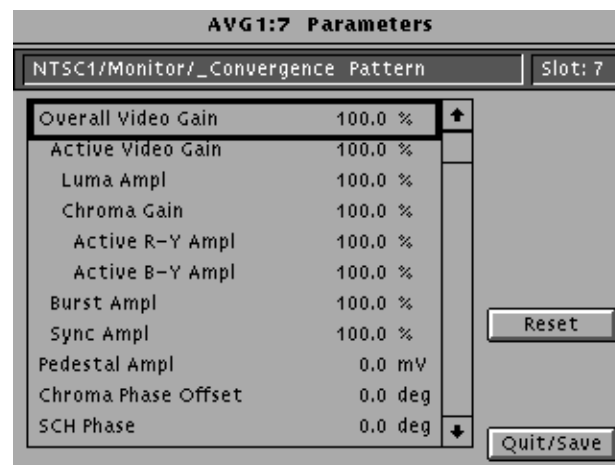
Video Parameters

You can adjust the signal parameters of the currently selected (active) test signal, and then rename and save a test signal. The original and the modified signal are both saved.

NOTE. To modify and save a Tektronix generated signal, you must rename it. When you rename and save a signal, both the original and the modified signals are saved.

To modify video parameters, follow these steps:

1. In the Active Signal Parameters window, shown on page 2-7, touch **Video Parameters**.
2. The Video Parameters window opens, as shown below. (Different signals may display a different list in this window.) Use the Navigation arrow keys to select the parameter you want to change. The Time Base Offset parameter is described on page 1-1.



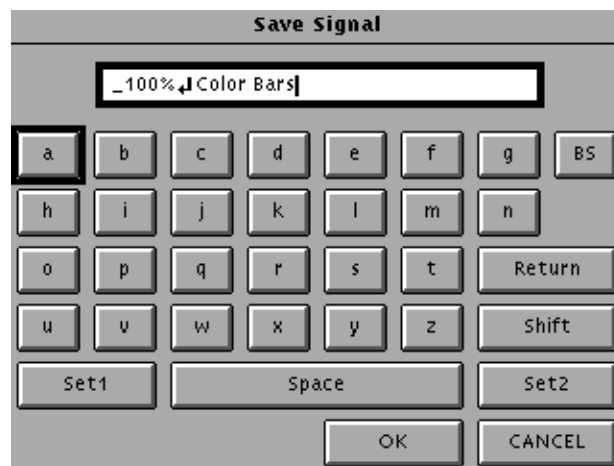
3. Enter a value using the knob or keypad, and then touch **Quit/Save**.
4. If you want to reset all the parameters to their previously saved values, touch **Reset**.

NOTE. If you change the value for Active Video Gain, the Luma Ampl, Chroma Gain, Active R-Y Ampl and Active B-Y Ampl values also change. If you change the value for Chroma Gain, the Active R-Y Ampl and Active B-Y Ampl values also change.

5. Press **Quit/Save**. A dialog box appears.

NOTE. If you modify any signal that was shipped on the factory disks, the platform adds an underscore to the front of the name.

6. Touch **Save As**. A text entry window appears, as shown in the following illustration. The platform suggests a new test signal name for you by adding an underscore to the front of the current name.



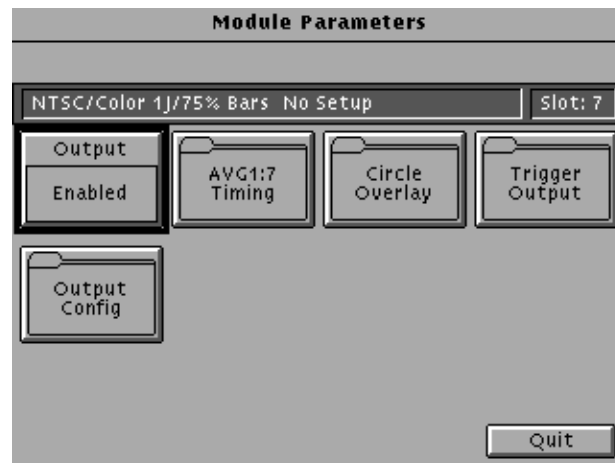
7. If you want to use the displayed name, touch **OK**.
8. To use a different name, do the following:
 - a. From the Text Entry window, delete the suggested name using the **BS** key, and then enter new text. (You cannot backspace over an underscore character.)
 - b. Touch **Set 1** or **Set 2** to provide additional sets of characters.
 - c. Touch **OK** when text is complete.
9. Touch **Quit/Save** to exit the window.

Module Parameters

The following procedures discuss windows that are accessed through the Module Parameters window, shown below. Changes that you make to parameters in any of these windows affect the entire module.

To enter the Module Parameters window for the AVG1 Generator module, follow these steps:

1. Select the AVG1 Generator module, if not already selected.
2. Push the **Test Signals** button.
3. Touch **Module Parameters** at the bottom of the screen. The Module Parameters window appears, as shown below.
4. Another way to access this window is to push the **Modules** button, ensure that the module is highlighted, push the **Edit** button, and then touch **Module Parameters**.

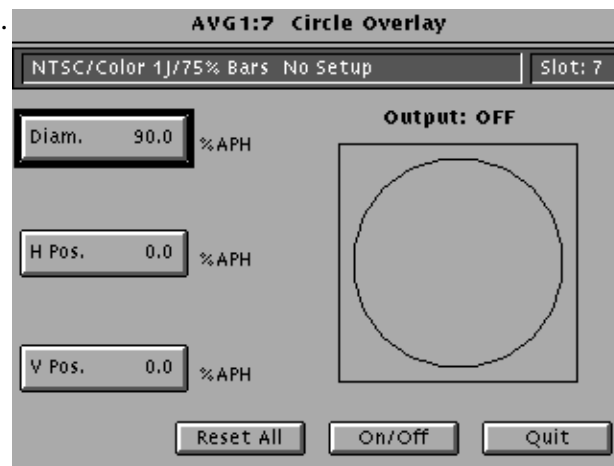


Circle Overlay

You can define a circle that is overlaid on the test signal output. The Circle Overlay parameters settings affect all test signals from this module. Entered values are constant, regardless of the test signal or video standard.

To define a circle overlay, follow these steps:

1. In the Module Parameters window, shown on page 2-13, touch **Circle Overlay** to enter the **Circle Overlay** window. The Circle Overlay window is shown in the following illustration.



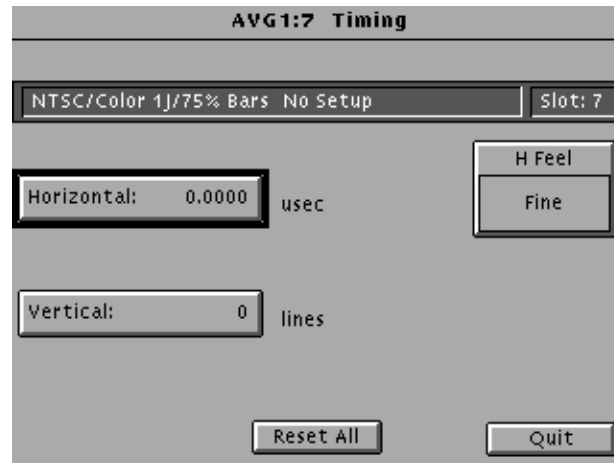
2. Touch **On/Off** to turn on the circle overlay.
3. Touch **Diam.**
4. Rotate the Navigation knob or enter a value from the keypad. Rotating the knob changes the diameter by percentages of Active Picture Height (APH).
5. Select **H Pos** and rotate the Navigation knob to move the circle horizontally by a percentage of APH.

NOTE. As you change the values using the knob, the circle is drawn in a quick draw mode. Once values stop changing, the overlay is redrawn in full resolution.

6. Select **V Pos** and rotate the knob to move the circle vertically by a percentage of APH.
7. If you want to reset the values, touch **Reset All**. This will set the diameter, horizontal, and vertical to 90%, 0, and 0 respectively.
8. Press **Quit** to exit the window.

Timing You can set the horizontal and vertical timing of this module with respect to the BG1 Generator module. Changes you make to timing affect all signals for the AVG1 Generator module.

1. In the Module Parameters window, shown on page 2-13, touch **Timing**. The timing window appears, as shown in the following illustration.



2. Touch **Vertical** on the display. The default setting is 0 lines
3. Rotate the navigation knob counterclockwise to advance the timing or clockwise to delay the timing. You can also enter values from the keypad and push the **Select** button.
4. Touch **H Feel** (horizontal resolution) to select **Coarse** resolution. Coarse increments are equal to a full cycle of the clock.
5. Touch **Horizontal**. The default is 0.000 μ sec.
6. Rotate the Navigation knob counterclockwise to advance the timing or clockwise to delay the timing. Set the timing close to the desired value.
7. Touch **H Feel** (horizontal resolution) to select **Fine** resolution. Fine resolution move in subclock cycle increments.
8. Rotate the Navigation knob counterclockwise to advance the timing or clockwise to delay the timing. Set the final value.
9. You can also select **Vertical** or **Horizontal** and enter values from the keypad.
10. If you want to reset the values, touch **Reset All**. This sets horizontal and vertical to 0.000 μ sec and 0 lines.
11. Press **Quit** to exit the window.

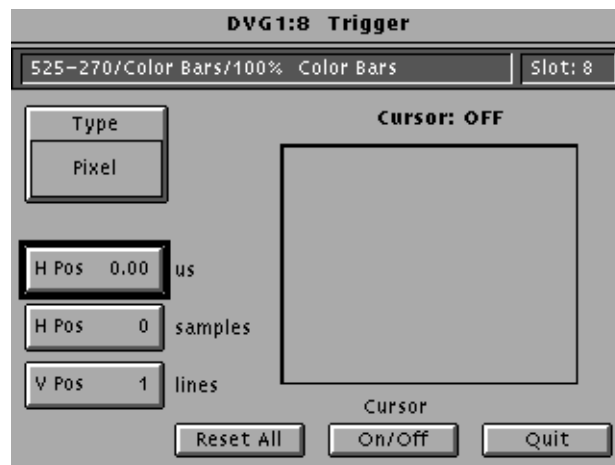
Trigger You can select one of the following types of Trigger signals to send to the rear panel Trigger BNC connector:

- Horizontal. One trigger pulse per line at the location entered.
- Vertical. One trigger pulse per color frame at beginning of the entered line.
- Pixel. One trigger pulse per color frame at the intersection of the horizontal and vertical trigger.

NOTE. Triggers are active throughout the line. However, cursors are only active during active video.

To select the trigger output, follow these steps:

1. In the Module Parameters window, shown on page 2-13, touch **Trigger** to enter the Trigger window, shown below.



2. Turn on the cursor by touching the **On/Off** on the display. A cursor provides line and pixel selection anywhere within the frame.
3. Touch **Type** on the display until the desired type of trigger is displayed:
 - Horizontal (one trigger pulse per line at location entered)
 - Vertical (one trigger pulse per color frame at beginning of line entered)
 - Pixel (one trigger pulse per color frame at intersection of horizontal and vertical trigger)
4. If the type is horizontal or pixel, touch **H Pos us** (to adjust horizontal position by time) or **H Pos samples** (to adjust horizontal position by

samples). Rotate the **Navigation** knob until the desired position is reached, or enter a value using the keypad and push enter.

5. If the type is vertical or pixel, touch **V Pos** and rotate the **Navigation** knob until the desired line is reached. You can also enter a value using the keypad.
6. Touch **Reset All** if you want to set all the parameters to the default settings (H Pos to zero and V Pos to 1).
7. Touch **Quit** to exit the window.



Syntax and Commands

Syntax

This section contains information on the Standard Commands for Programmable Instruments (SCPI) and the programming structure you can use to program your module.

Programming Model

Specific conditions must exist before programming commands will affect the test signal generated by a module.

Addressing Module Test Signals

The following two steps must be performed before the test module will respond to signal parameter commands.

1. Select the module to be addressed before executing any commands. Many of the commands are shared by several modules and will be accepted without a reported error.
2. Enable the module using the :OUTPut:STATe ON command. You must enable the output state of the module before you change the test signal parameters.

Command Arguments

Many commands will accept either string or numeric arguments. For example: a Boolean argument can either be “1” or “ON”.

Signal parameter commands that have a :STEP node can accept either a numeric value or they can accept a string argument that refers to the :STEP increment.

Signal parameter commands with a :STEP node will accept the following strings in addition to a numeric value:

UP. Use this argument to increase the parameter value one increment as defined by the :STEP value.

DOWN. Use this argument to decrease the parameter value one increment as defined by the :STEP value.

MINimum. Use this argument to set the parameter value to the minimum acceptable value.

MAXimum. Use this argument to set the parameter value to the maximum acceptable value.

DEFault. Use this argument to set the parameter value to the default value.

Argument Example

The following example demonstrates the effect of each argument used with a step value.

1. `:INSTrument:SELEct "AVG1:#"` selects the analog video generator module located in the slot number indicated by the “#” symbol.
2. `:OUTPut:STATe ON` enables the module and displays the loaded test signal.
3. `:OUTPut:CIRClE:STATe ON` displays a circle on the video display.

NOTE. `:OUTPut:CIRClE:DIAMeter` uses an argument that is the percent of picture height.

4. `:OUTPut:CIRClE:DIAMeter DEFault` sets the circle diameter to 90 percent of the screen height.
5. `:OUTPut:CIRClE:DIAMeter:STEP 10` sets the step increment to 10 percent.
6. `:OUTPut:CIRClE:DIAMeter DOWN` changes the circle diameter to 80 percent of the screen height.
7. `:OUTPut:CIRClE:DIAMeter 50` changes the circle diameter to 50 percent of the screen height.
8. `:OUTPut:CIRClE:DIAMeter MAXimum` changes the circle diameter to 100 percent of the screen height.
9. `:OUTPut:CIRClE:DIAMeter MINimum` changes the circle diameter to 0 percent of the screen height.
10. `:OUTPut:CIRClE:DIAMeter UP` changes the circle diameter to 10 percent of the screen height.

SCPI Commands and Queries

SCPI is a standard created by a consortium that provides guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer. This environment uses defined programming messages, instrument responses, and data format across all SCPI instruments, regardless of manufacturer. The AVG1 Generator module uses a command language based on the SCPI standard.

The SCPI language is based on a hierarchical or tree structure (see Figure 3-1) that represents a subsystem. The top level of the tree is the root node; it is followed by one or more lower-level nodes.

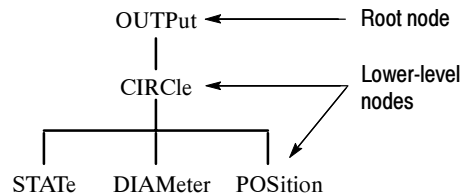


Figure 3-1: Example of a SCPI subsystem hierarchy tree

You can create commands and queries from these subsystem hierarchy trees. Commands specify actions for the instrument to perform. Queries return measurement data and information about parameter settings.

For more information on creating SCPI commands, programming structure, and status and events, refer to the *TG 2000 Signal Generation Platform User Manual*.

Functional Command Groups

This section describes the commands in general categories. Commands to the module are divided into the following groups:

- MMEMory (see *TG 2000 Signal Generation Platform User Manual*)
- OUTPut
- SENSE
- SOURce

Items followed by question marks are queries; items without question marks are commands. Some items in this section have a question mark in parentheses (?) in the command header section; this indicates that the item can be both a command and a query.

MMemory

Two MMEMory commands are listed here for your reference. You can use these to set and query the output test signal for the module. Detailed information for using these commands (as well as other commands that can be used with the entire platform) are located in the *TG 2000 Signal Generation Platform User Manual*.

Table 3-1: :MMEMory commands

Command	Description
:MMEMory:LOAD:SIGNal	Load a signal into a module and identify that signal as the active signal (output signal) for that module
:MMEMory:SIGNal:ACTive?	List the active signal (output signal) for a module

Output

Use these commands to select the output characteristics of the module.

Table 3-2: :OUTPut Commands

Command	Description
:OUTPut:CIRClE:DIAMeter(?)	Set or query circle diameter
:OUTPut:CIRClE:STATe(?)	Set or query circle
:OUTPut:CIRClE:POSition:HORizontal(?)	Set or query circle horizontal position
:OUTPut:CIRClE:POSition:VERTical(?)	Set or query circle vertical position
:OUTPut:CONFigure(?)	Set or query module configuration
:OUTPut:SIGNal(?)	Set or query output signal
:OUTPut:STATe(?)	Set or query module output
:OUTPut:TEXT:DATA(?)	Set or query current text string
:OUTPut:TEXT:POSition:HORizontal(?)	Set or query text horizontal position
:OUTPut:TEXT:POSition:VERTical(?)	Set or query text vertical position
:OUTPut:TEXT:STATe(?)	Set or query text
:OUTPut:TRIGger:TYPE(?)	Set or query trigger mode
:OUTPut:TRIGger:CURSor:STATe(?)	Set or query trigger cursor
:OUTPut:TRIGger:POSition:HORizontal(?)	Set or query trigger horizontal position
:OUTPut:TRIGger:POSition:HORizontal:STEP(?)	Set or query horizontal position step size
:OUTPut:TRIGger:POSition:VERTical(?)	Set or query trigger vertical position
:OUTPut:TRIGger:POSition:VERTical:STEP(?)	Set or query vertical position step size

Sense

Use these commands to adjust the signal timing.

Table 3-3: :SENSe Commands

Command	Description
:SENSe:CORRection:MDELay:HORizontal(?)	Set or query horizontal time delay
:SENSe:CORRection:MDELay:HORizontal:STEP(?)	Set or query horizontal step size
:SENSe:CORRection:MDELay:VERTical(?)	Set or query vertical time delay
:SENSe:CORRection:MDELay:VERTical:STEP(?)	Set or query vertical step size

Source

Use these commands to define the signal parameters for the module.

Table 3-4: :SOURce Commands

Command	Description
:SOURce:MVIDeo:AMPLitude(?)	Set or query video signal amplitude
:SOURce:MVIDeo:AMPLitude:STEP(?)	Set or query video signal amplitude step size
:SOURce:MVIDeo:AVIDeo(?)	Set or query active video amplitude
:SOURce:MVIDeo:AVIDeo:STEP(?)	Set or query active video amplitude step size
:SOURce:MVIDeo:BURSt(?)	Set or query burst pulse amplitude
:SOURce:MVIDeo:BURSt:STEP(?)	Set or query burst pulse amplitude step size
:SOURce:MVIDeo:BY(?)	Set or query channel BY component amplitude
:SOURce:MVIDeo:BY:STEP(?)	Set or query channel BY step size
:SOURce:MVIDeo:CHRoma:AMPLitude(?)	Set or query channel chroma amplitude
:SOURce:MVIDeo:CHRoma:AMPLitude:STEP(?)	Set or query channel chroma amplitude step size
:SOURce:MVIDeo:CHRoma:PHASe(?)	Set or query channel chroma phase
:SOURce:MVIDeo:CHRoma:PHASe:STEP(?)	Set or query channel chroma phase step size
:SOURce:MVIDeo:LUMinance(?)	Set or query channel luminance amplitude
:SOURce:MVIDeo:LUMinance:STEP(?)	Set or query channel luminance amplitude step size
:SOURce:MVIDeo:PEDestal(?)	Set or query pedestal amplitude
:SOURce:MVIDeo:PEDestal:STEP(?)	Set or query pedestal amplitude step size
:SOURce:MVIDeo:RY(?)	Set or query channel RY component amplitude
:SOURce:MVIDeo:RY:STEP(?)	Set or query channel RY step size
:SOURce:MVIDeo:SCH:PHASe(?)	Set or query channel
:SOURce:MVIDeo:SCH:PHASe:STEP(?)	Set or query channel
:SOURce:MVIDeo:SUBCarrier:OFFSet(?)	Set or query channel
:SOURce:MVIDeo:SUBCarrier:OFFSet:STEP(?)	Set or query channel
:SOURce:MVIDeo:SYNC(?)	Set or query sync pulse amplitude
:SOURce:MVIDeo:SYNC:STEP(?)	Set or query sync pulse amplitude step size
:SOURce:MVIDeo:TIMEbase(?)	Set or query module time base
:SOURce:MVIDeo:TIMEbase:STEP(?)	Set or query module time base step size
:SOURce:VIDeo3:AMPLitude(?)	Set or query signal amplitude on channel 1, 2, or 3
:SOURce:VIDeo3:AMPLitude:STEP(?)	Set or query signal amplitude step size on channel 1, 2, or 3
:SOURce:VIDeo3:AVIDeo(?)	Set or query active video amplitude on channel 1, 2, or 3
:SOURce:VIDeo3:AVIDeo:STEP(?)	Set or query active video amplitude step size on channel 1, 2, or 3
:SOURce:VIDeo3:BURSt(?)	Set or query burst pulse amplitude on channel 1, 2, or 3

Table 3-4: :SOURce Commands (cont.)

Command	Description
:SOURce:VIDeo3:BURSt:STEP(?)	Set or query burst pulse amplitude step size on channel 1, 2, or 3
:SOURce:VIDeo3:PEDestal(?)	Set or query pedestal amplitude on channel 1, 2, or 3
:SOURce:VIDeo3:PEDestal:STEP(?)	Set or query pedestal amplitude step size on channel 1, 2, or 3
:SOURce:VIDeo3:SYNC(?)	Set or query sync pulse amplitude on channel 1, 2, or 3
:SOURce:VIDeo3:SYNC:STEP(?)	Set or query sync pulse amplitude step size on channel 1, 2, or 3

:OUTPut Commands

This subsystem enables the actual output of the module, the trigger output, and the display of the circle overlay.

NOTE. *The module must be selected with the INSTRument subsystem before using these commands.*

Command Tree

```
:OUTPut
  :CIRClE
    :DIAMeter          <numeric_value>
    :POSition
      :HORizontal      <numeric_value>
      :VERTical        <numeric_value>
    :STATe             <Boolean>
  :CONFigure          <argument>
  :STATe              <Boolean>
  :TEXT
    :DATA              <string>
    :POSition
      :HORizontal      <numeric_value>
      :VERTical        <numeric_value>
    :STATe             <Boolean>
  :TRIGger
    :CURSor
      :STATe           <Boolean>
    :POSition
      :HORizontal      <numeric_value>
      :STEP             <numeric_value>
      :VERTical        <numeric_value>
      :STEP             <numeric_value>
  :TYPE               <type>
```

:OUTPut:CIRClE:DIAMeter(?)

Use this command to set or query the diameter of the displayed circle. The argument is the percent of average picture height.

Syntax :OUTPut:CIRClE:DIAMeter <numeric_value>
:OUTPut:CIRClE:DIAMeter?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 90

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:CIRC:DIAM 75
Query: :OUTP:CIRC:DIAM?
Response: 75.0000

Related Commands :OUTPut:CIRClE:POSition:VERTical,
:OUTPut:CIRClE:POSition:HORizontal

:OUTPut:CIRClE:POSItion:HORizontal(?)

Use this command to set or query the horizontal position of the circle as it appears on the active signal. The argument is in terms of average picture width.

Syntax :OUTPut:CIRClE:POSItion:HORizontal <numeric_value>
:OUTPut:CIRClE:POSItion:HORizontal?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:CIRC:POS:HOR 35
Query: :OUTP:CIRC:POS:HOR?
Response: 35.0000

Related Commands :OUTPut:CIRClE:POSItion:VERTical

:OUTPut:CIRClE:POSItion:VERTical(?)

Use this command to set or query the vertical position of the circle as it appears on the active signal. The argument is in terms of average picture height.

Syntax :OUTPut:CIRClE:POSItion:VERTical <numeric_value>
:OUTPut:CIRClE:POSItion:VERTical?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:CIRC:POS:VERT 35
Query: :OUTP:CIRC:POS:VERT?
Response: 35.0000

Related Commands :OUTPut:CIRClE:POSItion:HORizontal

:OUTPut:CIRClE:STATe(?)

Use this command to set or query the display of the circle overlay onto the video signal.

NOTE. *The settings of the circle overlay are independent of signal activity.*

Syntax :OUTPut:CIRClE:STATe <Boolean>
:OUTPut:CIRClE:STATe?

Parameters

Command	Query response
<Boolean> = ON or 1, OFF or 0	1, 0

Default Value OFF

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :OUTP:CIRC:STAT 1
 Query: :OUTP:CIRC:STAT?
 Response: 1

Related Commands :OUTPut:CIRClE:POSition:VERTical,
:OUTPut:CIRClE:POSition:HORizontal

:OUTPut:CONFigure(?)

Use this command to set or query the output signal connections

Syntax :OUTPut:CONFigure <DEFault | YC | COMPOSITE>
:OUTPut:CONFigure?

Parameters	Command	Query response
	<enumeration> = DEFault	DEF
	YC	YC
	COMP	COMP

Default Value DEFault

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:CONF YC
Query: :OUTP:CONF?
Response: YC

Related Commands None

:OUTPut:STATe(?)

Use this command to set or query the state of the module's output signal.

Syntax :OUTPut:STATe <Boolean>
:OUTPut:STATe?

Parameters

Command	Query response
<Boolean> = ON or 1, OFF or 0	1, 0

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:STAT ON
Query: :OUTP:STAT?
Response: 1

Related Commands None

:OUTPut:TEXT:DATA(?)

Use this command to set or query the current string for the text mode. Text information is added to the active signal. To save text with a signal, the signal must be saved.

Syntax :OUTPut:TEXT:DATA <string>
:OUTPut:TEXT:DATA?

Parameters

Command	Query response
<string>	<string>

Default Value Value as saved in signal.

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTPut:TEXT:DATA "This is a test."
Query: :OUTPut:TEXT:DATA?
Response: "This is a test."

Related Commands :OUTPut:TEXT:POSition:VERTical
:OUTPut:TEXT:POSition:HORizontal

:OUTPut:TEXT:STATe(?)

Use this command to set or query the state of the text overlay.

Syntax :OUTPut:TEXT:STATe <Boolean>
:OUTPut:TEXT:STATe?

Parameters

Command	Query response
<Boolean> = ON or 1, OFF or 0	1, 0

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:TEXT:STAT 1
Query: :OUTP:TEXT:STAT?
Response: 1

Related Commands
:OUTPut:TEXT:POSition:VERTical
:OUTPut:TEXT:POSition:HORizontal
:OUTPut:TEXT:DATA

:OUTPut:TEXT:POSition:HORizontal(?)

Use this command to set or query the horizontal position of text in the video signal. The argument is in terms of average picture width.

Syntax :OUTPut:TEXT:POSition:HORizontal <numeric_value>
:OUTPut:TEXT:POSition:HORizontal?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value Value as saved in signal

Errors and Events -200 Execution error

Dependencies NOne

Examples
Command: :OUTP:TEXT:POS:HOR 35
Query: :OUTP:TEXT:POS:HOR?
Response: 35

Related Commands :OUTPut:TEXT:POSition:VERTical

:OUTPut:TEXT:POSition:VERTical(?)

Use this command to set or query the vertical position of text in the video signal. The argument is in terms of average picture height.

Syntax :OUTPut:TEXT:POSition:VERTical <numeric_value>
:OUTPut:TEXT:POSition:VERTical?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value Value as saved in signal

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:TEXT:POS:VERT 35
Query: :OUTP:TEXT:POS:VERT?
Response: 35

Related Commands :OUTPut:TEXT:POSition:HORizontal

:OUTPut:TRIGger:CURSor:STATe(?)

Use this command to set or query the cursor display. This command enables and disables the trigger display and does not affect the trigger signal.

Syntax :OUTPut:TRIGger:CURSor:STATe <Boolean>
:OUTPut:TRIGger:CURSor:STATe?

Parameters	Command	Query response
	<Boolean> = ON or 1, OFF or 0	1, 0

Default Value OFF

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:TRIG:CURS:STAT 1
Query: :OUTP:TRIG:CURS:STAT?
Response: 1

Related Commands None

:OUTPut:TRIGger:POSition:HORizontal(?)

Use this command to set or query the trigger position horizontally within the video signal. The argument is in microseconds.

NOTE. *There is interaction between the vertical and horizontal parameters since these parameters combine to resolve any overlap.*

Syntax :OUTPut:TRIGger:POSition:HORizontal <numeric_value>
:OUTPut:TRIGger:POSition:HORizontal?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>
DEF, UP, DOWN	

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :OUTP:TRIG:POS:HOR 32.5
 Query: :OUTP:TRIG:POS:HOR?
 Response: 32.5000

Related Commands :OUTPut:TRIGger:POSition:VERTical

:OUTPut:TRIGger:POSition:HORizontal:STEP(?)

Use this command to set or query the horizontal trigger position step increment used by the UP or DOWN commands.

Syntax :OUTPut:TRIGger:POSition:HORizontal:STEP <numeric_value>
:OUTPut:TRIGger:POSition:HORizontal:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:TRIG:POS:HOR:STEP 0.5
Query: :OUTP:TRIG:POS:HOR:STEP?
Response: 0.5000

Related Commands None

:OUTPut:TRIGger:POSition:VERTical(?)

Use this command to set or query the trigger position vertically within the video signal. The argument is in the number of lines.

NOTE. *There is interaction between the vertical and horizontal parameters since these parameters combine to resolve any overlap.*

Syntax :OUTPut:TRIGger:POSition:VERTical <numeric_value>
:OUTPut:TRIGger:POSition:VERTical?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>
UP, DOWN, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :OUTP:TRIG:POS:VERT 45
 Query: :OUTP:TRIG:POS:VERT?
 Response: 45.0000

Related Commands :OUTPut:TRIGger:POSition:HORizontal

:OUTPut:TRIGger:POSition:VERTical:STEP(?)

Use this command to set or query the vertical trigger position step increment used by the UP or DOWN commands.

Syntax :OUTPut:TRIGger:POSition:VERTical:STEP <numeric_value>
:OUTPut:TRIGger:POSition:VERTical:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:TRIG:POS:VERT:STEP 5
Query: :OUTP:TRIG:POS:VERT:STEP?
Response: 5.0000

Related Commands None

:OUTPut:TRIGger:TYPE(?)

Use this command to select or query the trigger and cursor display types. The selections affect the type of cursor displayed and the occurrence of the trigger output.

The cursor has three display types:

- PIXel: the cursor is displayed as crosshairs
- VERTical: the cursor is displayed as a horizontal line
- HORizontal: the cursor is displayed as a vertical line

Syntax :OUTPut:TRIGger:TYPE <type>
:OUTPut:TRIGger:TYPE?

Parameters

Command	Query response
<type> = PIXel VERTical HORizontal OFF	PIX VERT HOR OFF

Default Value PIX

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :OUTP:TRIG:TYPE PIXEL
 Query: :OUTP:TRIG:TYPE?
 Response: PIX

Related Commands None

:SENSe Commands

Use these commands to adjust the timing of the module in relation to the instrument. The adjustments can correct for operational line delays.

Command Tree

```
:SENSe
  :CORRection
    :MDELaY
      :HORizontal <numeric_value>
        :STEP <numeric_value>
      :VERTical <numeric_value>
        :STEP <numeric_value>
```

:SENSe:CORRection:MDELay:HORizontal(?)

Use this command to set or query the horizontal timing delay of the module with respect to the rest of the instrument.

Argument units are microseconds. If the argument exceeds the horizontal time value, then the vertical delay is adjusted to accommodate the requested delay.

Settings are saved through power cycles.

Syntax :SENSe:CORRection:MDELay:HORizontal <numeric_value>
:SENSe:CORRection:MDELay:HORizontal?

Parameters	Command	Query response
	<numeric_value> = <NRf> UP, DOWN, DEF	<NR2>

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SENS:CORR:MDEL:HOR 23.0
Query: :SENS:CORR:MDEL:HOR?
Response: 23.0000

Related Commands :SENSe:CORRection:MDELay:HORizontal

:SENSe:CORRection:MDELay:HORizontal:STEP(?)

Use this command to set or query the step increment used by the UP or DOWN commands. Argument units are microseconds.

Syntax :SENSe:CORRection:MDELay:HORizontal:STEP <numeric_value>
:SENSe:CORRection:MDELay:HORizontal:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0000

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :SENS:CORR:MDEL:HOR:STEP 5
 Query: :SENS:CORR:MDEL:HOR:STEP?
 Response: 5.0000

Related Commands None

:SENSe:CORRection:MDELay:VERTical(?)

Use this command to set or query the vertical time delay of the module. The argument can be a floating point value that is translated into an integer number of lines plus a horizontal offset.

The query returns an integer value even if the command used a floating point argument. (The fractional parts are used to adjust the HORizontal offset.)

Settings are saved through power cycles.

Syntax :SENSe:CORRection:MDELay:VERTical <numeric_value>
:SENSe:CORRection:MDELay:VERTical?

Parameters	Command	Query response
	<numeric_value> = <NRf> UP, DOWN, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SENS:CORR:MDEL:VERT 12
Query: :SENS:CORR:MDEL:VERT?
Response: 12.0000

Related Commands :SENSe:CORRection:MDELay:HORizontal

:SENSe:CORRection:MDELay:VERTical:STEP(?)

Use this command to set or query the step increment used by the UP or DOWN commands.

Syntax :SENSe:CORRection:MDELay:VERTical:STEP <numeric_value>
:SENSe:CORRection:MDELay:VERTical:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :SENS:CORR:MDEL:VERT:STEP 2
 Query: :SENS:CORR:MDEL:VERT:STEP?
 Response: 2.0000

Related Commands None

:SOURce Commands

Use the SOURce subsystem to control the module's signal. These commands allow you to adjust many parameters.

NOTE. *The VIDEO node uses the numeral 3 as a suffix to accommodate the selection of different channels the module.*

Command Tree

:SOURce	
:MVIDeo	
:AMPLitude	<numeric_value>
:STEP	<numeric_value>
:AVIDeo	<numeric_value>
:STEP	<numeric_value>
:BURSt	<numeric_value>
:STEP	<numeric_value>
:BY	<numeric_value>
:STEP	<numeric_value>
:CHRoma	
:AMPLitude	<numeric_value>
:STEP	<numeric_value>
:PHASe	<numeric_value>
:STEP	<numeric_value>
:LUMinance	<numeric_value>
:STEP	<numeric_value>
:PEDestal	<numeric_value>
:STEP	<numeric_value>
:RY	<numeric_value>
:STEP	<numeric_value>
:SCH	
:PHASe	<numeric_value>
:STEP	<numeric_value>
:SUBCarrier	
:OFFSet	<numeric_value>
:STEP	<numeric_value>
:SYNC	<numeric_value>
:STEP	<numeric_value>
:TIMEbase	<numeric_value>
:STEP	<numeric_value>
:VIDeo3	
:AMPLitude	<numeric_value>
:STEP	<numeric_value>
:AVIDeo	<numeric_value>
:STEP	<numeric_value>
:BURSt	<numeric_value>
:STEP	<numeric_value>
:PEDestal	<numeric_value>
:STEP	<numeric_value>
:SYNC	<numeric_value>
:STEP	<numeric_value>

:SOURce:MVIDeo:AMPLitude(?)

Use this command to set or query the amplitude of the entire video signal. Units are percent.

NOTE. Changing this parameter affects all nodes below this one.

Syntax :SOURce:MVIDeo:AMPLitude <numeric_value>
:SOURce:MVIDeo:AMPLitude?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100.0

Errors and Events -200 Execution error

Dependencies There is interaction with settings of subnode parameters that address amplitudes.

Examples
 Command: :SOUR:MVID:AMPL 90
 Query: :SOUR:MVID:AMPL?
 Response: 90.0000

Related Commands :SOURce:VIDeo3:AMPLitude

:SOURce:MVIDeo:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value of the entire video signal. Units are percent.

Syntax :SOURce:MVIDeo:AMPLitude:STEP <numeric_value>
:SOURce:MVIDeo:AMPLitude:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies There is interaction with settings of subnode parameters that address amplitudes.

Examples
Command: :SOUR:MVID:AMPL:STEP 10
Query: :SOUR:MVID:AMPL:STEP?
Response: 10.0000

Related Commands None

:SOURce:MVIDeo:AVIDeo(?)

Use this command to set or query the amplitude of the active video portion of the video signal. Use the :SOUR:VID3:AVID command to adjust the active video amplitude for each channel separately, when applicable. Units are percent.

Syntax :SOURce:MVIDeo:AVIDeo <numeric_value>
:SOURce:MVIDeo:AVIDeo?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude for each channel is affected by the related command.

Examples
Command: :SOUR:MVID:AVID 20
Query: :SOUR:MVID:AVID?
Response: 20.0000

Related Commands :SOURce:VIDeo3:AVIDeo

:SOURCE:MVIDEO:AVIDEO:STEP(?)

Use this command to set or query the UP/DOWN step value of the active video portion of the video signal. Units are percent.

Syntax :SOURCE:MVIDEO:AVIDEO:STEP <numeric_value>
:SOURCE:MVIDEO:AVIDEO:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:AVID:STEP 5
Query: :SOUR:MVID:AVID:STEP?
Response: 5.0000

Related Commands None

:SOURce:MVIDeo:BURSt(?)

Use this command to set or query the amplitude of the burst pulse portion of the video signal. This command sets the burst pulse amplitude on all channels at the same time. Units are percent.

Syntax :SOURce:MVIDeo:BURSt <numeric_value>
:SOURce:MVIDeo:BURSt?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude for each channel also affected by the related command.

Examples
Command: :SOUR:MVID:BURS 0
Query: :SOUR:MVID:BURS?
Response: 0.0000

Related Commands :SOURce:VIDeo3:BURSt

:SOURCE:MVIDEO:BURSt:STEP(?)

Use this command to set or query the UP/DOWN step value of the burst pulse portion of the video signal. Units are percent.

Syntax :SOURCE:MVIDEO:BURSt:STEP <numeric_value>
:SOURCE:MVIDEO:BURSt:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:BURSt:STEP 10
Query: :SOUR:MVID:BURSt:STEP?
Response: 10.0000

Related Commands None

:SOURce:MVIDeo:BY(?)

Use this command to set or query the amplitude of the BY component of a hardware modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:BY <numeric_value>
:SOURce:MVIDeo:BY?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude affected by the related commands.

Examples
Command: :SOUR:MVID:BY 2
Query: :SOUR:MVID:BY?
Response: 2.0000

Related Commands :SOURce:MVIDeo:RY,
:SOURce:MVIDeo:CHRoma:AMPLitude

:SOURce:MVIDeo:BY:STEP(?)

Use this command to set or query the UP/DOWN step value of the BY component of an HW-modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:BY:STEP <numeric_value>
:SOURce:MVIDeo:BY:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:BY:STEP 5
Query: :SOUR:MVID:BY:STEP?
Response: 5.0000

Related Commands None

:SOURce:MVIDeo :CHRoMa:AMPLitude(?)

Use this command to set or query the amplitude of the chroma portion of an HW-modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:CHRoMa:AMPLitude <numeric_value>
:SOURce:MVIDeo:CHRoMa:AMPLitude?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude is affected by :SOUR:MVID:AMPL which also affects :RY and :BY.

Examples
Command: :SOUR:MVID:CHR:AMPL 90
Query: :SOUR:MVID:CHR:AMPL?
Response: 90.0000

Related Commands None

:SOURce:MVIDeo :CHROMa:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value of the chroma portion of an HW-modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:CHROMa:AMPLitude:STEP <numeric_value>
:SOURce:MVIDeo:CHROMa:AMPLitude:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:CHR:AMPL:STEP 5
Query: :SOUR:MVID:CHR:AMPL:STEP?
Response: 5.0000

Related Commands None

:SOURce:MVIDeo:CHROMa:PHASe(?)

Use this command to set or query the phase of the chrominance portion of an HW-modulated composite video signal. Units are degrees.

Syntax :SOURce:MVIDeo:CHROMa:PHASe <numeric_value>
:SOURce:MVIDeo:CHROMa:PHASe?

Parameters	Command	Query response
	<numeric_value> = <NRf> UP, DOWN, DEF	<NR2>

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:CHR:PHAS 5
Query: :SOUR:MVID:CHR:PHAS?
Response: 5.0000

Related Commands None

:SOURCE:MVIDEO:CHROMA:PHASE:STEP(?)

Use this command to set or query the UP/DOWN step value of the chrominance phase portion of an HW-modulated composite video signal. Units are degrees.

Syntax :SOURCE:MVIDEO:CHROMA:PHASE:STEP <numeric_value>
:SOURCE:MVIDEO:CHROMA:PHASE:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:CHR:PHAS:STEP 5
Query: :SOUR:MVID:CHR:PHAS:STEP?
Response: 5.0000

Related Commands None

:SOURce:MVIDeo:LUMinance(?)

Use this command to set or query the amplitude of the luminance portion of an HW-modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:LUMinance <numeric_value>
:SOURce:MVIDeo:LUMinance?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, UP, DOWN, DEF	

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude is affected by the related command.

Examples
Command: :SOUR:MVID:LUM 95
Query: :SOUR:MVID:LUM?
Response: 95.0000

Related Commands :SOUR:MVID:AMPL.

:SOURce:MVIDeo:LUMinance:STEP(?)

Use this command to set or query the UP/DOWN step value of the luminance portion of an HW-modulated composite video signal. The argument is percent of luminance.

Syntax :SOURce:MVIDeo:LUMinance:STEP <numeric_value>
:SOURce:MVIDeo:LUMinance:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:LUM:STEP 5
Query: :SOUR:MVID:LUM:STEP?
Response: 5.0000

Related Commands None

:SOURce:MVIDeo:PEDestal(?)

Use this command to set or query the amplitude of the pedestal portion of the video signal. Use the :SOUR:VID3:PED command to adjust the pedestal amplitude for each channel separately, when applicable. Units are millivolts.

Syntax :SOURce:MVIDeo:PEDestal <numeric_value>
:SOURce:MVIDeo:PEDestal?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 0

Errors and Events -200 Execution error

Dependencies Amplitude for each channel may also be affected by the related command.

Examples
Command: :SOUR:MVID:PED 5
Query: :SOUR:MVID:PED?
Response: 5.0000

Related Commands :SOURce:VIDeo3:PEDestal

:SOURce:MVIDeo:PEDestal:STEP(?)

Use this command to set or query the UP/DOWN step value of the pedestal portion of the video signal. Units are millivolts.

Syntax :SOURce:MVIDeo:PEDestal:STEP <numeric_value>
:SOURce:MVIDeo:PEDestal:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:PED:STEP 5
Query: :SOUR:MVID:PED:STEP?
Response: 5.0000

Related Commands :SOURce:VIDeo3:PEDestal

:SOURce:MVIDeo:RY(?)

Use this command to set or query the amplitude of the RY component of an HW-modulated composite video signal. Units are percent.

Syntax :SOURce:MVIDeo:RY <numeric_value>
:SOURce:MVIDeo:RY?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, UP, DOWN, DEF	

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude affected by :SOUR:MVID:AMPL and :SOUR:MVID:CHR:AMPL

Examples
 Command: :SOUR:MVID:RY 80
 Query: :SOUR:MVID:RY?
 Response: 80.0000

Related Commands :SOURce:MVIDeo:BY,
:SOURce:MVIDeo:CHRoMa:AMPLitude

:SOURce:MVIDeo:RY:STEP(?)

Use this command to set or query the UP/DOWN step value of the RY component of an HW-modulated composite video signal. Units are degrees.

Syntax :SOURce:MVIDeo:RY:STEP <numeric_value>
:SOURce:MVIDeo:RY:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:RY:STEP 2
Query: :SOUR:MVID:RY:STEP?
Response: 2.0000

Related Commands None

:SOURce:MVIDeo:SCH:PHASe(?)

Use the command to set or query the subcarrier to horizontal phase. Units are degrees.

Syntax :SOURce:MVIDeo:SCH:PHASe <numeric_value>
:SOURce:MVIDeo:SCH:PHASe?

Parameters	Command	Query response
	<numeric_value> = <NRf> UP, DOWN, DEF	<NR2>

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:SCH 10
Query: :SOUR:MVID:SCH:PHAS?
Response: 10.0000

Related Commands None

:SOURce:MVIDeo:SCH:PHASe:STEP(?)

Use this command to set or query the UP/DOWN step value of the subcarrier to horizontal phase. Units are degrees.

Syntax :SOURce:MVIDeo:SCH:PHASe:STEP <numeric_value>
:SOURce:MVIDeo:SCH:PHASe:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOURce:MVIDeo:SCH:PHASe:STEP 2
Query: :SOURce:MVIDeo:SCH:PHASe:STEP?
Response: Response: 2.0000

Related Commands None

:SOURce:MVIDeo:SUBCarrier:OFFSet(?)

Use this command to set or query the frequency change of the subcarrier of a hardware modulated composite video signal. Units are degrees.

Syntax :SOURce:MVIDeo:SUBCarrier:OFFSet <numeric_value>
:SOURce:MVIDeo:SUBCarrier:OFFSet?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, UP, DOWN, DEF	

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :SOUR:MVID:SUBC:OFFS 0
 Query: :SOUR:MVID:SUBC:OFFS?
 Response: 0.0000

Related Commands None

:SOURce:MVIDeo:SUBCarrier:OFFSet:STEP(?)

Use this command to set or query the UP/DOWN step value of the subcarrier frequency change of an HW-modulated composite video signal. Units are degrees.

Syntax :SOURce:MVIDeo:SUBCarrier:OFFSet:STEP <numeric_value>
:SOURce:MVIDeo:SUBCarrier:OFFSet:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf>	<NR2>
	MIN, MAX, DEF	

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:SUBC:OFFS:STEP 100
Query: :SOUR:MVID:SUBC:OFFS:STEP?
Response: 100.0000

Related Commands None

:SOURce:MVIDeo:SYNC(?)

Use this command to set or query the amplitude of the sync pulse portion of the video signal. Use this command to set the sync pulse amplitude on all channels at the same time. Units are percent.

Syntax :SOURce:MVIDeo:SYNC <numeric_value>
:SOURce:MVIDeo:SYNC?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude on each channel is also affected by the related command.

Examples
Command: :SOUR:MVID:SYNC 50
Query: :SOUR:MVID:SYNC?
Response: 50.0000

Related Commands :SOURce:VIDeo3:SYNC

:SOURce:MVIDeo:SYNC:STEP(?)

Use this command to set or query the UP/DOWN step value of the sync pulse portion of the video signal. Units are percent.

Syntax :SOURce:MVIDeo:SYNC:STEP <numeric_value>
:SOURce:MVIDeo:SYNC:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:MVID:SYNC:STEP 10
Query: :SOUR:MVID:SYNC:STEP?
Response: 10.0000

Related Commands None

:SOURce:MVIDeo:TIMEbase(?)

Use this command to set or query the underlying timebase of the module. The units are PPM.

If the first argument is zero, an optional argument of FRAME or NOFRame will enable or disable the frame reset for the signal. The default is NOFRame.

If the first argument is a nonzero value, it will override an optional argument of FRAME, defaulting to NOFRame.

Syntax :SOURce:MVIDeo:TIMEbase <numeric_value> [, <frame>]
:SOURce:MVIDeo:TIMEbase?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>, NOFR
<frame> = NOFRame FRAMe	<NR2>, FRAM

Default Value 0

Errors and Events -200 Execution error

Dependencies AVG1 module must be enabled.

Examples
Command: :SOUR:MVID:TIME 20
Query: :SOUR:MVID:TIME?
Response: 20,NOFR

Related Commands :SOURce:MVIDeo

:SOURce:MVIDeo:TIMEbase:STEP(?)

Use this command to change the UP/DOWN step value for the associated command. The units are PPM.

Syntax :SOURce:MVIDeo:TIMEbase:STEP <numeric_value>
:SOURce:MVIDeo:TIMEbase?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1

Errors and Events -200 Execution error

Dependencies AVG1 module must be enabled.

Examples
Command: :SOUR:MVID:TIME:STEP 2
Query: :SOUR:MVID:TIME:STEP?
Response: 2.0

Related Commands :SOURce:MVIDeo:TIMEbase

:SOURce:VIDeo3:AMPLitude(?)

Use this command to set or query the amplitude of the entire video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Changing this parameter affects all nodes below this one. Units are percent.

Syntax :SOURce:VIDeo3:AMPLitude <numeric_value>
:SOURce:VIDeo3:AMPLitude?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>
MIN, MAX, UP, DOWN, DEF	

Default Value 100.0

Errors and Events -200 Execution error

Dependencies There is interaction with settings of subnode parameters that address amplitudes.

Examples
 Command: :SOUR:VID:AMPL 90
 Query: :SOUR:VID:AMPL?
 Response: 90.0000

Related Commands :SOURce:MVIDeo:AMPLitude

:SOURce:VIDeo3:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value of the entire video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Units are percent.

Syntax :SOURce:VIDeo3:AMPLitude:STEP <numeric_value>
:SOURce:VIDeo3:AMPLitude:STEP?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:VID:AMPL:STEP 5
Query: :SOUR:VID:AMPL:STEP?
Response: 5.0000

Related Commands None

:SOURce:VIDeo3:AVIDeo(?)

Use this command to set or query the amplitude of the active video portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

This command controls the active video amplitude for each channel separately, when applicable. Units are percent.

Syntax :SOURce:VIDeo3:AVIDeo <numeric_value>
:SOURce:VIDeo3:AVIDeo?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude is also affected by :SOUR:VID:MVID.

Examples
Command: :SOUR:VID3:AVID 20
Query: :SOUR:VID3:AVID?
Response: 20.0000

Related Commands :SOURce:MVIDeo:AVIDeo

:SOURce:VIDeo3:AVIDeo:STEP(?)

Use this command to set or query the UP/DOWN step value of the active video portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Units are percent.

Syntax :SOURce:VIDeo3:AVIDeo:STEP <numeric_value>
:SOURce:VIDeo3:AVIDeo:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:VID3:AVID:STEP 5
Query: :SOUR:VID3:AVID:STEP?
Response: 5.0000

Related Commands None

:SOURce:VIDeo3:BURSt(?)

Use this command to set or query the amplitude of the burst pulse portion of composite video signals on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

This command is used to control each channel separately, when applicable. Units are percent.

Syntax :SOURce:VIDeo3:BURSt <numeric_value>
:SOURce:VIDeo3:BURSt?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude is also affected by :SOUR:MVID:BURS.

Examples
Command: :SOUR:VID:BURS 0
Query: :SOUR:VID:BURS?
Response: 0.0000

Related Commands None

:SOURce:VIDeo3:BURSt:STEP(?)

Use this command to set or query the UP/DOWN step value of the amplitude of the burst pulse portion of composite video signals on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Units are percent.

Syntax :SOURce:VIDeo3:BURSt:STEP <numeric_value>
:SOURce:VIDeo3:BURSt:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:VID:BURS:STEP 5
Query: :SOUR:VID:BURS:STEP?
Response: 5.0000

Related Commands None

:SOURce:VIDeo3:PEDestal(?)

Use this command to set or query the amplitude of the pedestal portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

This command controls the pedestal amplitude for each channel separately, when applicable. Units are millivolts.

Syntax :SOURce:VIDeo3:PEDestal <numeric_value>
:SOURce:VIDeo3:PEDestal?

Parameters

Command	Query response
<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 0

Errors and Events -200 Execution error

Dependencies Amplitude is also affected by the affected command.

Examples
Command: :SOUR:VID1:PED 5
Query: :SOUR:VID1:PED?
Response: 5.0000

Related Commands :SOURce:MVIDeo:PEDestal

:SOURce:VIDeo3:PEDestal:STEP(?)

Use this command to set or query the UP/DOWN step value of the amplitude of the pedestal portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Units are millivolts.

Syntax :SOURce:VIDeo3:PEDestal:STEP <numeric_value>
:SOURce:VIDeo3:PEDestal:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:VID1:PED:STEP 5
Query: :SOUR:VID1:PED:STEP?
Response: 5.0000

Related Commands None

:SOURce:VIDeo3:SYNC(?)

Use this command to set or query the amplitude of the sync pulse portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Sync amplitude must be set for each channel, when applicable. Units are percent.

Syntax :SOURce:VIDeo3:SYNC <numeric_value>
:SOURce:VIDeo3:SYNC?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, UP, DOWN, DEF	<NR2>

Default Value 100

Errors and Events -200 Execution error

Dependencies Amplitude is also affected by :SOUR:MVID:SYNC.

Examples
Command: :SOUR:VID2:SYNC 90
Query: :SOUR:VID2:SYNC?
Response: 90.0000

Related Commands :SOURce:MVIDeo:SYNC:STEP

:SOURce:VIDeo3:SYNC:STEP(?)

Use this command to set or query the UP/DOWN step value of the amplitude of the sync pulse portion of the video signal on the specified channel. The 3 the command represents the channel. You can specify channel 1, 2, or 3. If you do not specify a channel the command, the instrument assumes channel 1.

Units are percent.

Syntax :SOURce:VIDeo3:SYNC:STEP <numeric_value>
:SOURce:VIDeo3:SYNC:STEP?

Parameters	Command	Query response
	<numeric_value> = <NRf> MIN, MAX, DEF	<NR2>

Default Value 1.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :SOUR:VID2:SYNC:STEP 5
Query: :SOUR:VID2:SYNC:STEP?
Response: 5.0000

Related Commands None



Appendices

Appendix A: Specifications

This section contains the specifications for the AVG1 Generator module. Table A-1 lists the electrical specifications, and Table A-2 lists the EMC compliance specifications. All specifications are guaranteed unless labeled “typical.” Typical specifications are provided for your convenience, but are not guaranteed.

Specifications are only valid when the module is installed in a TG 2000 Platform mainframe.

For a list of environmental specifications, refer to the *TG 2000 Signal Generation Platform User Manual*.

Table A- 1: Electrical specifications

Characteristics	Description
Maximum Clock Frequency	≤ 30 MHz
Amplitude Errors (Excluding Y/C in Y/C/Composite mode)	
Luminance and Component Channels	≤ 0.5 % at 700 mV amplitude. Absolute, self calibrated after warm up and outputs terminated in 75 Ω.
Component Channel-to-Channel Gain Match	≤ 0.5 % at 700 mV amplitude. Relative to channel 1.
Chroma/Luma Gain Error	≤ 0.5 % at 700 mV amplitude. Relative to 100 kHz.
Pedestal Amplitude Error	≤ 1 % at 1 V amplitude
Y/C Composite Mode Gain Match	
Y Level Accuracy	± 1% at 700 mV amplitude
Y/C Match	± 2% at 700 mV amplitude
Delay Errors	
Chroma/Luma Delay, typical	≤ 2.5 ns on a composite output
Channel-to-Channel Delay	≤ 1 ns. Channels 2 and 3 relative to channel 1.
Group Delay, typical	≤ 3 ns to 6 MHz
SCH Phase Error, typical	≤ ± 1.25 ns (± 1.6° at 3.58 MHz and ± 2° at 4.43 MHz)

Table A-1: Electrical specifications (cont.)

Characteristics	Description
Frequency Response	Flat within 0.5% peak from 0.1 MHz to 6 MHz at 700 mV amplitude. Typically $\leq 0.1\%$ to 6 MHz and $\leq 5\%$ to 8 MHz at 700 mV amplitude
Short Time Distortion	$\leq 1\%$ peak. Measured with 2T bar.
Line Time Distortion	$\leq 0.5\%$ peak. Measured with field square wave, pedestal off.
Field Time Distortion	$\leq 0.5\%$ peak. Measured with field square wave, pedestal off.
2T5 Pulse Ringing	$\leq 1\%$ peak
2T5 Pulse Ringing, typical	$\leq 0.5\%$
K Factor 2T5 Pulse	$\leq 0.5\%$ peak
Pulse/Bar Ratio, typical	1:1 within 0.5%, with 2T5 pulse and bar signal
DC Offset	≤ 10 mV
Luminance Linearity Error	$\leq 0.5\%$
Chroma/Luminance Intermodulation	$\leq 0.5\%$
Dynamic Gain Error (10% to 90% APL)	$\leq 0.5\%$. Measured using 5-step ramp while varying APL 10% to 90%.
Differential Gain	
Hardware Modulated Signals	$\leq 0.1\%$
Software Modulated Signals, typical	$\leq 0.5\%$
Differential Phase	
	$\leq 0.5^\circ$ Typically $\leq 0.1^\circ$ on hardware modulated signals, and $\leq 0.2^\circ$ on software modulated signals
In-band Signal/Noise Ratio (S/N B020000 and above) (H/W version 2.2 and later)	
Quiet Line Slot 9 or 10 Slots 2-8	≥ 71 dB to 6 MHz, unweighted ≥ 73 dB to 6 MHz, unweighted (75 dB typical, HW modulated signals) (77 dB typical, SW modulated signals)
Full Amplitude Ramp	≥ 63 dB to 6 MHz, unweighted (65 dB typical)
In-band Signal/Noise Ratio (S/N B019999 and below) (H/W version 2.1 and earlier)	
Quiet Line	≥ 67 dB to 6 MHz, unweighted
Full Amplitude Ramp	≥ 60 dB to 6 MHz, unweighted

Table A- 1: Electrical specifications (cont.)

Characteristics	Description
Out-of-band Signal/Noise Ratio	SNR to 100 MHz, 54 dB RMS relative to 700 mV on quiet line
Out-of-band Signal/Noise Ratio, typical	≥ 50 dB max spur, 6 MHz to 50 MHz ≥ 45 dB max spur, 50 MHz to 100 MHz
Crosstalk (channel to channel)	≤ -60 dB to 6 MHz. From any one channel to any other one channel.
Glitches (synchronous noise)	
Shallow ramp signal	≤ 2 mV peak
Shallow ramp signal, typical	≤ 1 mV peak on full DAC range shallow ramp (0.1 mV per bit)
Standard signal, typical	≤ 2 mV peak
Pedestal Gate, typical	≤ 1 mV peak on pedestal levels > 5 mV; ≤ 5 mV on pedestal levels ≤ 5 mV
Return Loss/Output Impedance	≥ 40 dB to 6 MHz, 75 Ω
Output Timing Offset Adjustment Range	Added to genlock offset timing, offsets relative to internal clock and frame reset. Adjustable to any point in the video frame.
Trigger Output	
Amplitude	TTL compatible if unterminated.
Rise Time, typical	≤ 10 ns
Output Impedance	75 Ω
Trigger Range	Adjustable to any point in the video frame
Power Consumption	+5 Volts: 5.5 Watts typical -5 Volts: 5 Watts typical -2 Volts: 0.6 Watts typical +15 Volts: 0.75 Watts typical -15 Volts: 0.75 Watts typical Battery: 30 μA maximum

Certifications

Table A-2: Certifications and compliances

Characteristics	Description
EMC Compliance	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility when it is used with the product(s) stated in the specifications table. Refer to the EMC specification published for the stated products. May not meet the intent of the directive if used with other products.
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits

Standards Conformance

The AVG1 conforms to the following standards:

- EBU N10, ITU-R BT.624
- SMPTE 170M.

Appendix B: SCPI Conformance Information

All commands in the AVG1 Generator module are based on SCPI Version 1994.0. Table B-1 lists all commands supported by the generator. The columns at right show whether a command is defined in the SCPI 1994.0 standard or not.

Table B- 1: SCPI Conformance Information

Command				Defined in SCPI 1994.0	Not Defined In SCPI 1994.0
OUTPut	CIRClE	DIAMeter(?)		✓	
		STATe(?)		✓	
	POSition	HORizontal(?)		✓	
		VERTical(?)		✓	
CONFigure(?)			✓		
STATe(?)			✓		
TEXT	DATA(?)			✓	
	POSition	HORizontal(?)		✓	
		VERTical(?)		✓	
	STATe(?)			✓	
TRIGger	TYPE(?)			✓	
	CURSor	STATe(?)		✓	
	POSition	HORizontal(?)		✓	
		HORizontal	STEP(?)		✓
	VERTical(?)		✓		
	VERTical	STEP(?)		✓	
SENSe	CORRection	MDELay	HORizontal(?)		✓
			HORizontal	STEP(?)	
		VERTical(?)		✓	
		VERTical	STEP(?)		✓

Table B-1: SCPI Conformance Information (cont.)

Command			Defined in SCPI 1994.0	Not Defined In SCPI 1994.0
SOURce	MVIDeo	AMPLitude(?)		✓
		STEP(?)		✓
		AVIDeo(?)		✓
		STEP(?)		✓
		BURSt(?)		✓
		STEP(?)		✓
		BY(?)		✓
		STEP(?)		✓
		CHRoma	AMPLitude(?)	✓
			STEP(?)	✓
			PHASe(?)	✓
			STEP(?)	✓
		LUMinance(?)		✓
		STEP(?)		✓
		PEDestal(?)		✓
		STEP(?)		✓
		RY(?)		✓
		STEP(?)		✓
		SCH	PHASe(?)	✓
			STEP(?)	✓
		SUBCarrier	OFFSet(?)	✓
			STEP(?)	✓
		SYNC(?)		✓
		STEP(?)		✓
		TIMEbase(?)		✓
		STEP(?)		✓

Table B- 1: SCPI Conformance Information (cont.)

Command			Defined in SCPI 1994.0	Not Defined In SCPI 1994.0
SOURce	VIDeo<n>	AMPLitude(?)		✓
		STEP(?)		✓
		AVIDeo(?)		✓
		STEP(?)		✓
		BURSt(?)		✓
		STEP(?)		✓
		PEDestal(?)		✓
		STEP(?)		✓
		SYNC(?)		✓
		STEP(?)		✓

WARNING

The following servicing instructions are for use only by qualified personnel. To avoid injury, do not perform any servicing other than that stated in the operating instructions unless you are qualified to do so. Refer to all safety summaries before performing any service.



Appendix C: Installation

This section contains instructions for installing the module into the TG 2000 Platform mainframe. Listed below are the major topics in this section.

- Preventing component damage
- Module installation (including signal set installation)
- Signal backup and module removal

Preventing Component Damage



CAUTION. *Electrostatic discharge (ESD) can damage components on this module and mainframe. To prevent ESD or other component damage, follow the steps below when installing, removing, or handling modules:*

1. Wear a grounded antistatic wrist strap to discharge the static voltage from your body while installing or removing modules from the TG 2000 Platform mainframe.
2. Transport and store modules in a static-protected bag or container.
3. Do not slide the module over any surface.
4. Handle modules as little as possible.
5. Do not touch module components or connector pins.
6. Do not use any devices capable of generating or holding a static charge in the work area where you remove, install, or handle modules.
7. Avoid handling modules in areas that have a floor or work-surface covering capable of generating a static charge.
8. Do not remove the module circuit board assembly from the shield. The shield provides important support and protection for the surface-mount components.

Module Installation

A T-10 torx tip screwdriver is the only tool you need to install the module. A T-10 torx tip is supplied with the module.

Hardware Installation

To install the module into the TG 2000 Platform mainframe, perform these steps:

1. Set the TG 2000 Platform mainframe rear-panel power switch to off.
2. Unplug the power cord.
3. Select the slot you will use to install the module. Table 2-1 lists the slot restrictions. Figure C-1 shows a sample configuration with slot numbers.

Table C-1: Module slot assignments

Module	Slots in which the module can be installed
AGL1 Genlock module	Slot 2 or 3
AVG1 Generator module	Slots 2 through 10
AWVG1 Generator module	Slots 2 through 10
BG1 Generator module	Slot 2 through 10
Clock module	Slot 1
CPU module	Slot 11
DVG1 Generator module	Slots 2 through 10
GP1 GPIB Interface module	Slot 10

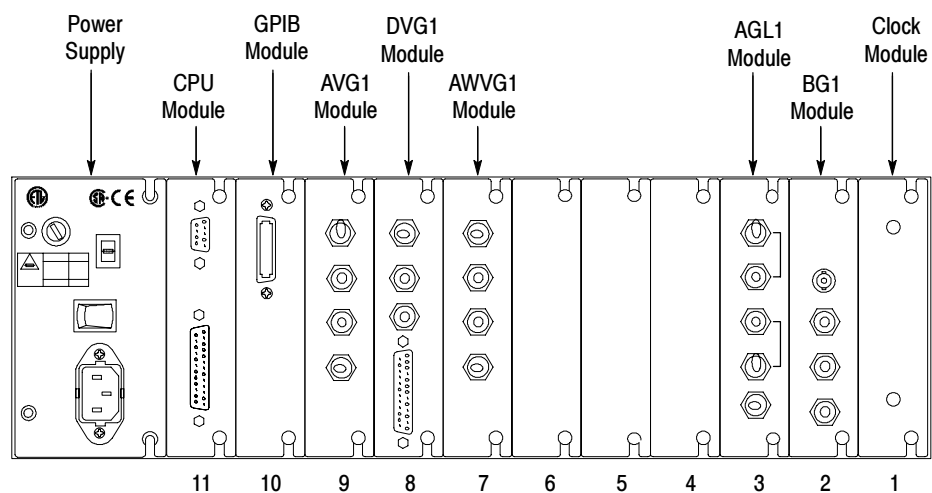


Figure C-1: TG 2000 Platform mainframe rear panel, showing slot numbering



WARNING. To avoid a shock hazard, always remove the power cord before removing the top cover. Failure to remove the power cord can result in serious injury or death.

4. Refer to Figure C-2 and remove or loosen all screws to remove the top cover.

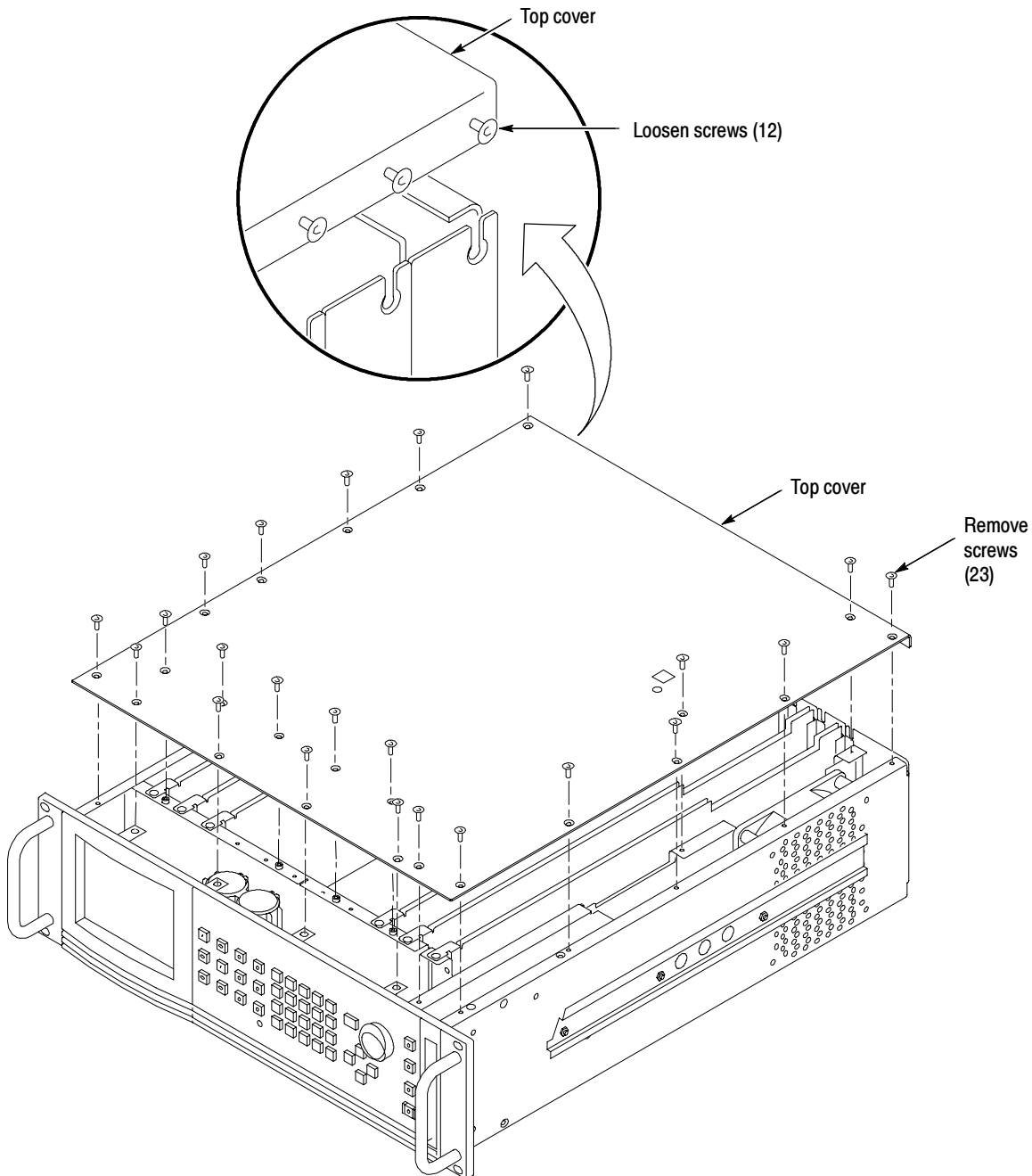


Figure C-2: Top cover removal

5. Remove the appropriate rear panel as shown in Figure C-3. Loosen, but do not remove the bottom screw. You will use it later to secure the module.

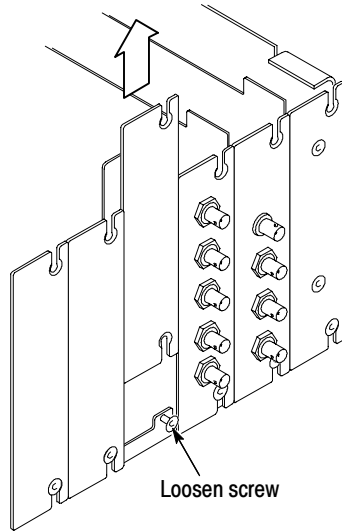


Figure C-3: Rear panel removal

6. While ensuring correct alignment of the module flange as shown in Figure C-4, lower the module into the desired slot as shown in Figure C-5.

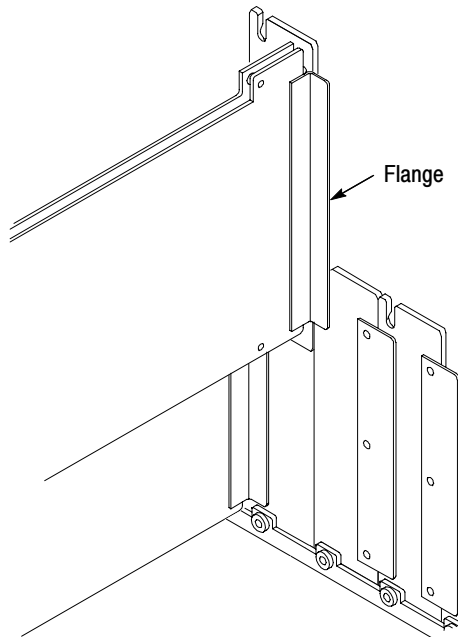


Figure C-4: Module flange

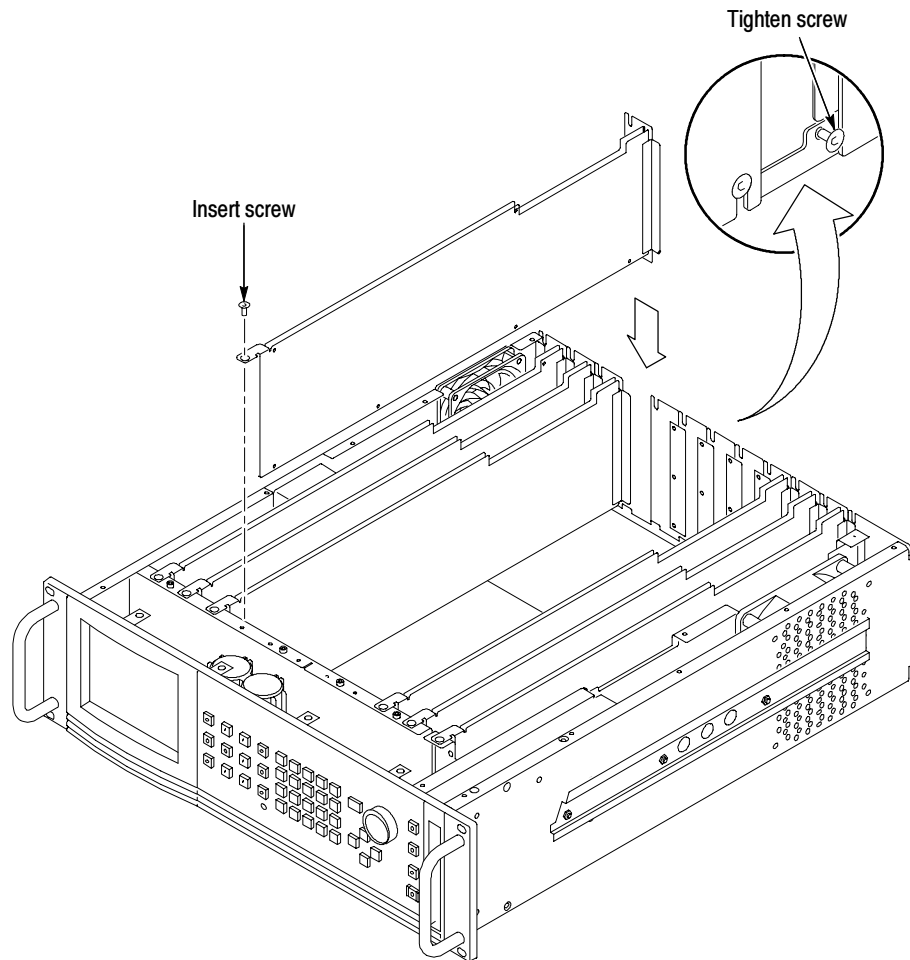


Figure C-5: Module Installation

7. Ensure that the connectors on the mother board and the module exactly match before seating the module.



CAUTION. *The connectors must exactly match before you attempt to press the module firmly in place. If the connectors do not match you could bend a pin that could damage the module, mainframe, or both when power is applied.*

8. Press down evenly on the module until it is firmly in place.
9. Refer to Figure C-6 and insert and tighten the top screw, which comes with your module, and tighten the rear panel screw.

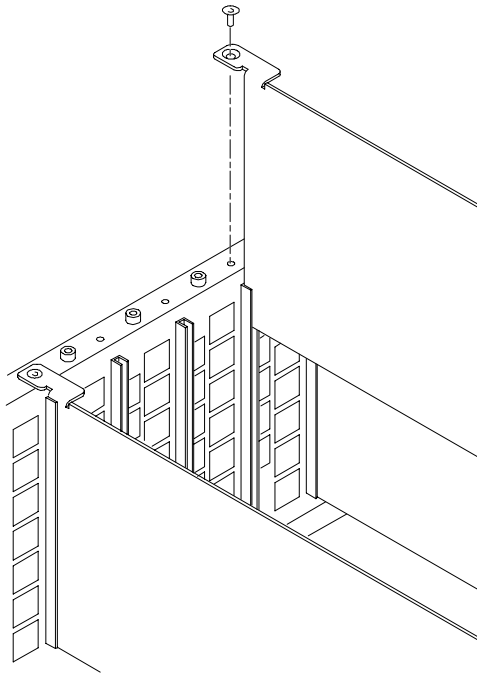


Figure C-6: Top screw

10. Reinstall the top cover and insert and tighten all top cover screws.
11. Plug in the instrument power cord. Power on the mainframe by setting the rear-panel power switch to ON and pressing the front-panel power switch. Wait for the instrument to perform self tests.
12. If you previously moved or removed a module and backed up the signal sets, you can reinstall them now, using the *Signal Set Installation* procedure.

Signal Set Installation

If this module was installed in the TG 2000 Platform mainframe at the factory, signal sets are already installed. If you ordered this generator module separately, you must install signal sets after installing the module. (If you have another AVG1 Generator module already installed in the platform, the new module you install can share its signal sets, and you do not need to install them again.)

To install signal sets, use either of the two following procedures: *Installing Signals to the Default Destination* or *Installing Signals to a Non-default Destination*. To replace signal sets, refer to the *TG 2000 Signal Generation Platform User Manual*.

Installing Signals to the Default Destination. To install signal sets from the disk to the default destination, perform these steps:

1. Insert the test signal disk into the TG 2000 Platform mainframe disk drive.
2. Push the **DISK** button.
3. Touch **Add Signals** when the Disk menu appears.
4. Touch **Select Source**.
5. Move the cursor to the .DNL you want to load and push the **Select** button.
6. Select all of the signal sets at the module level and push the **Select** button.
7. Touch **Quit/Load**. The previous menu appears.
8. Touch **Quit/Load** again. The Add Signals window reappears, showing the module as the selected destination.

NOTE. *The Add Signals window shows the amount of Kbytes selected (Total Tagged) and the amount available on the module. If the tagged total is greater than the amount available, the signal set will not load.*

9. Touch **Start Load**. The signal sets are automatically loaded into the module. A popup menu tells you when the transfer is complete.

Installing Signals to a Non-default Destination. To install signal sets from the floppy disk to a non-default destination, perform these steps:

1. Insert the test signal disk into the TG 2000 Platform mainframe disk drive.
2. Push the **DISK** button.
3. Touch **Add Signals** when the Disk menu appears.
4. Touch **Select Source**.
5. Move the cursor to the .DNL you want to load and push the **Select** button.
6. Move the browse ring to a particular test signal and push the **Select** button.
7. Touch **Quit/Load**. The previous menu appears.
8. Touch **Quit/Load** again. The Add Signals window reappears.

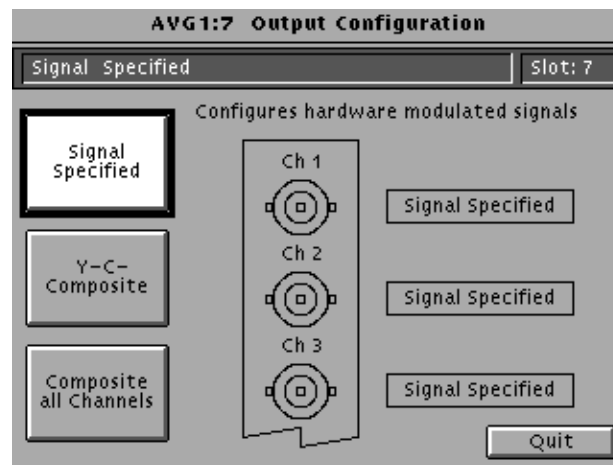
NOTE. *The Add Signals window shows the amount of Kbytes selected (Total Tagged) and the amount available on the module. If the tagged total is greater than the amount available, the signal set will not load.*

- 9.** Touch **Select Destination**.
- 10.** Move the cursor to the signal's field and place the cursor where you want the test signal to be installed. Be sure to choose a destination that is one level above the source. Push the **Select** button.
- 11.** Touch **Start Load**. A popup menu tells you when the transfer is complete.

Configure Video Outputs

This module has three channel outputs on the rear panel. When you configure the three output channels, it only affects hardware modulated composite signals. To configure the channels, select one of the following:

- **Signal Specified** permits the SDP2000 to configure the channel outputs.
- **Y-C Composite** specifies that Ch 1 outputs Y, Ch 2 outputs C, and Ch 3 outputs a composite signal.
- **Composite all Channels** specifies a composite signal on all three outputs.



Signal Backup and Module Removal

Before removing a generator module, you should save the signal sets to a disk. The AVG1 Generator module will lose its signal memory 30 seconds after you remove it from the platform.

Required Equipment You will need a blank, DOS formatted 3.5 inch disk.

Signal Backup Save the signal sets as follows:

1. Insert a DOS formatted disk into the platform's disk drive.
2. Push the **Disk** button and touch **Save Signals to Disk**.
3. Touch **Select Source** and select the **AVG1**. Use the cursor arrows to select the AVG1 module in the signals column.
4. Select **Quit/Save**.
5. Touch **Select Destination** and choose **A:**. If desired, create a new directory for the signals by selecting **New Dir** and entering a DOS compatible name.
6. Create a new file by touching **New File**.
7. Select **Quit/Save** to complete the transfer of signal sets to the disk.
8. Touch **Start Save**. Saving signals to disk may take several minutes depending on the number and size of test signals.

Module Removal To remove the module, follow these steps:

1. Turn off the platform by pressing the front-panel **On/Standby** switch and switching the rear panel power switch to off.
2. Unplug the power cord.



WARNING. To avoid a shock hazard always unplug the power cord before removing the top cover. Failure to unplug the power cord can result in serious injury or death.

3. Remove all top-cover screws and remove the top cover. See Figure C-2 on page C-3.
4. Remove the appropriate rear panel as shown in Figure C-3 on page C-4. Loosen, but do not remove the bottom screw. You will use it later to secure the rear panel.
5. Refer to Figure C-6 on page C-6 and remove the top screw.



CAUTION. *The module will lose its signal memory 30 seconds after you remove it from the TG 2000 Platform mainframe. Before removing the module, be sure you have backed up the signals.*

6. Remove the module. To leave the slot empty, proceed to step 8 of this procedure.
7. To install a module in the empty slot, proceed to *Module Installation* on page C-2.
8. To ensure proper cooling and adherence to EMI shielding requirements, install a blank panel to cover any empty slots in the rear panel. A spare blank panel is included in the TG 2000 Platform mainframe accessories kit.
9. Tighten the screws on the blank rear panel.
10. Reinstall the top cover and insert and tighten all top cover screws.



Glossary and Index

Glossary

APH

Active Picture Height.

Black Burst

Also called “color black,” black burst is a composite video signal consisting of all horizontal and vertical synchronization information and burst. Typically used as the house reference synchronization signal in television facilities.

Burst

A small reference packet of the subcarrier sine wave sent on every line of composite video. Since the carrier is suppressed, this phase and frequency reference is required for synchronous demodulation of the color difference signals in the receiver.

B-Y

One of the color difference signals used in the NTSC and PAL systems, obtained by subtracting luminance (Y) from the blue camera signal (B).

Chrominance

Chrominance refers to the color information in a television picture. Chrominance can be further broken down into two properties of color: hue and saturation.

Chrominance Signal

The high-frequency portion of the video signal, obtained by quadrature amplitude modulation of a 4.43 MHz (PAL) or 3.58 MHz (NTSC) subcarrier with R-Y and B-Y information.

Composite Video

A single video signal containing all of the necessary information to reproduce a color picture. Created by adding quadrature amplitude modulated U and V to the luminance signal.

Frame

A frame (sometimes called a “picture”) contains all the information required for a complete picture. For interlaced scan systems, there are two fields in a frame.

GBR

Green, Blue and Red. The three primary colors used in color television’s additive color reproduction system. These are the three color components generated by the camera and used by the picture monitor to produce a picture.

Hardware Modulation

When signals are hardware modulated, digital data from the C_B and C_R channels are quadrature modulated at the subcarrier frequency and added to the luminance (Y) channel. This method is used for NTSC signals in cases where the best nonlinearity specifications are required. The hardware modulator is also used to create YC composite signals (SVHS or Hi-8).

Luminance

The signal which represents brightness, or the amount of light in the picture. This is the only signal required for black and white pictures, and for color systems it is obtained as a weighted sum ($Y = 0.3R + 0.59G + 0.11B$) of the R, G, and B signals.

Modulated

When referring to television test signals, this term implies that chrominance information is present. (For example, a modulated ramp has subcarrier on each step.)

Modulation

A process which allows information to be moved around in the frequency domain in order to facilitate transmission or frequency-domain multiplexing. See Hardware and Software modulation for details.

NTSC

National Television System Committee. The organization that developed the television standard currently in use in the United States, Canada and Japan. Now generally used to refer to that standard.

PAL

Phase Alternate Line. Refers to one of the television systems used in Europe and many other parts of the world. The phase of one of the color difference signals alternates from line to line to help cancel out phase errors.

Quick Draw Mode

Enables an overlay to draw faster while you are changing values. Full resolution is invoked once values stop changing.

R-Y

One of the color difference signals used in the NTSC and PAL systems, obtained by subtracting luminance (Y) from the red camera signal (R).

SCPI

Standard Commands for Programmable Instruments. SCPI is a standard that provides guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer.

Signal Set

An arbitrary group of signals.

Soft key

An item on the display that changes state or initiates an action when you touch it on screen. You use soft keys to select test signals or enter a file name.

Software Modulation

When signals are software modulated, the data is directly stored in each channel of fast access memory, in which case the AVG1 can output three different composite signals. With software modulated signals, the subcarrier is directly defined when the signal data is created.

Termination

In order to accurately send a signal through a transmission line, there must be an impedance at the end that matches the impedance of the source and of the line itself. Amplitude errors and reflections will otherwise result. Video is a 75 Ω system, so a 75 Ω terminator must be put at the end of the signal path.

Y

Abbreviation for luminance.

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