

User Manual



DVG1 Digital Video Generator 070-9049-01

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Company	date or purchase order number
Address	Repair Protection (1,2, or 3 years)
City, State, Postal code	Calibration Services (1,2,3,4, or 5 years)
Country	Instrument model and serial number
Phone	Instrument purchase date

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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 DVG1 Generator module.

About This Manual

This manual is composed of the following sections:

- *Getting Started* contains product description, incoming inspection procedure, accessories list, and signal set installation procedure.
- *Operating Basics* tells how to control the DVG1 Generator module through the windowed menu interface in conjunction with the front panel.
- *Syntax and Commands* defines the syntax used in command descriptions, lists all command subsystems, and describes all programming commands.
- *Appendices* contain information such as specifications, hardware installation procedures, and configuration of the Option S1. Installation should be performed only by qualified service technicians.

Related Manuals

The following documents are also available:

- The *DVG1 Digital Video Generator Service Manual* describes how to service the 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 DVG1 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.
- The *TG 2000 Signal Generation Platform Service Manual* describes how to service the mainframe and all available generator modules to the module level. 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.

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Service Support	<p>Contact your local Tektronix distributor or sales office. Or, visit our web site for a listing of worldwide service locations.</p> <p>http://www.tek.com</p>
For other information	<p>In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.</p>
To write us	<p>Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000</p>



Getting Started

Getting Started

The DVG1 Digital Video Generator module is designed to be installed in the TG 2000 Signal Generation Platform.

The module is an 8-bit or 10-bit precision, digital video test signal generator for NTSC composite digital and for 525-line and 625-line component digital signals. The module contains the following features:

- Digital video test signals in serial and parallel form
- Three video outputs (two serial outputs and one parallel output)
- Trigger output, used to trigger an oscilloscope or other video equipment
- User-defined video signals that require clock rates up to 36 MHz
- Signal parameters adjustable in real time from the front panel
- EDH supported on serial outputs
- Overlay of circles or text on the video signal
- SDI Test Capabilities
- Embedded Audio

The module can generate video signals with 20-bit embedded digital audio with a sample rate of 48 kHz. Multiple user-selectable frequencies and amplitudes are available with channel and status independence.

The following audio frequencies are supported:

Silence	400 Hz	1500 Hz	4800 Hz
50 Hz	500 Hz	1600 Hz	6000 Hz
100 Hz	600 Hz	2000 Hz	8000 Hz
150 Hz	750 Hz	2400 Hz	9600 Hz
200 Hz	800 Hz	3000 Hz	12000 Hz
250 Hz	1000 Hz	3200 Hz	16000 Hz
300 Hz	1200 Hz	4000 Hz	

The amplitude or time base offset parameters can be adjusted using the procedure for *Video Parameters* on page 2–13. 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 1–1 lists the standard and optional accessories for the DVG1 Generator module.

Table 1–1: Standard and optional accessories

Standard	Type of Accessory	Part number
DVG1 Digital Video Generator User Manual	Standard	070-9049-XX
T-10 Torx Tip	Standard	003-1604-XX
Screws (2 ea)	Standard	211-0725-XX
Blank rear panel	Standard	333-4113-00
DVG1 Digital Video Generator Service Manual	Optional	070-9300-XX

Options

Option S1 provides additional SDI test capabilities, such as testing the limits of an SDI receiver and the integrity of an SDI transmission path. Additional capabilities are:

- **Variable Serial Output Amplitude.** The serial output amplitude is adjustable within a range of +15% to –90% of nominal in 1% increments.
- **Variable SDI Data Slew Rate.** The slew rate of the serial digital video signal is adjustable. At 800 mV amplitude, the adjustment allows rise times in the range of 820 ps to 7 ns.
- **SDI Jitter.** Calibrated Jitter can be added to the serial video output. The jitter waveform is sinusoidal, with variable amplitude and frequency. The jitter amplitude is variable from 0 to 15 nS. Jitter frequency is variable from 0.1 Hz to 10 MHz in 0.1 Hz increments.

Configuration

If Option S1 is installed at the factory, Output 1 is configured as standard and Output 2 is configured as SDI. You can change this configuration; refer to *Output Configuration* on page C-8 of this manual.

Functional Check

The following procedures determine if the module is operating correctly. There are separate procedures for modules with and without Option S1; use the appropriate procedure for your module. If you are not familiar with the operation of the module, it may be helpful to refer to Figure 2-1 on page 2-1 while performing these procedures.

Required Equipment

For this procedure, you will need a serial digital monitor capable of displaying an eye pattern. This procedure was created using the Tektronix WFM601i Serial Digital Monitor.

Modules Without Option S1

Use this procedure if you do not have Option S1 (SDI) installed in your module.

1. Install the module into the TG 2000 Platform mainframe using the installation procedures beginning on page C-2.
2. Power on the TG 2000 Signal Generation Platform. The platform runs a self test on all modules.
3. To determine if the self test was successful, push the **Modules** button. Check the display for the icon that represents the DVG1 Generator module that you are inspecting.
4. Install signal sets into the module using the procedures on page C-6. (If another DVG1 Generator module is already installed, you do not need to install signal sets.)
5. Wait 20 minutes for the instrument to warm up.
6. Push the **Modules** button and touch the **DVG1** icon on the display.
7. Select a signal set and a test signal.
8. Connect **Output 1** to the serial digital monitor.
9. Adjust the serial digital monitor to view the signal.
10. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.

Modules With Option S1

Use this procedure if you have Option S1 (SDI) installed in your module.

1. Install the module into the TG 2000 Platform mainframe using the installation procedures beginning on page C-2.
2. Power on the TG 2000 Signal Generation 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 DVG1 Generator module that you are inspecting.
4. Install signal sets into the module using the procedures on page C-6. (If another DVG1 Generator module is already installed, you do not need to install signal sets.)
5. Wait 20 minutes for the instrument to warm up.
6. Push the **Utilities** button, and then do the following:
 - a. Touch **Module Self Cal** on the display.
 - b. Touch the self-cal icon for the module you are testing.

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

- c. Touch **Start Cal** on the display. The Self Cal takes 2 to 5 minutes, depending on the module. An error message indicates a failed calibration; refer to *Troubleshooting* in the *DVG1 Digital Video Generator Service Manual*, or contact your Tektronix representative.

***NOTE.** For the following steps, the SDI output must be connected to Output 2.*

7. Connect **Output 2** to the serial digital monitor. Set the monitor to view an eye pattern.
8. Push the **Modules** button.
9. Select the DVG1 icon on the display.
10. Select a signal set and a test signal.
11. Touch **Module Parameters**.
12. Touch **SDI** and change the amplitude of the signal.
13. Check that the change in amplitude is shown on the monitor.
14. Touch **Reset** to return the amplitude to its original value.



Operating Basics

Functional Overview

This section provides an overview of the DVG1 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 menu structure for basic module operations.

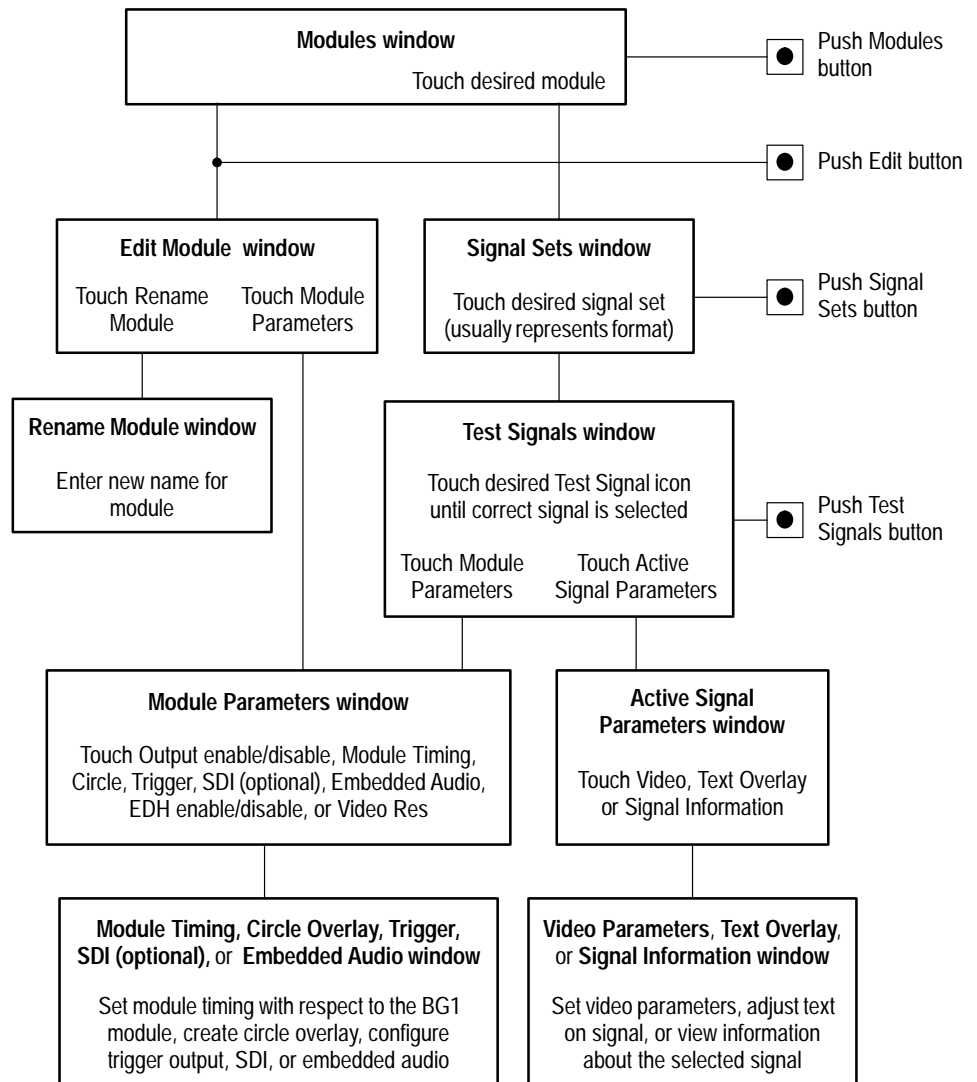


Figure 2–1: Menu structure for the DVG1 Generator module

Outputs The DVG1 Generator module has four outputs: two serial outputs, one parallel output, and one trigger output.

Serial Outputs. Outputs 1 and 2 are serial signal outputs (BNC) and can be configured for either standard or SDI signal outputs if the option S1 is installed.

Parallel Output. Output 3 is a parallel signal output. The connector is a 25-pin connector with female contacts. The pin assignments for the parallel output are shown in Table 2-1.

Table 2-1: Parallel output connector pin assignments

Pin number	8-bit system mode	10-bit system mode
1	Clock	Clock
2	System ground A	System ground A
3	Data 7 (MSB)	Data 9 (MSB)
4	Data 6	Data 8
5	Data 5	Data 7
6	Data 4	Data 6
7	Data 3	Data 5
8	Data 2	Data 4
9	Data 1	Data 3
10	Data 0	Data 2
11		Data 1
12		Data 0
13	Cable shield	Cable shield
14	Clock return	Clock return
15	System ground B	System ground B
16	Data 7 return	Data 9 return
17	Data 6 return	Data 8 return
18	Data 5 return	Data 7 return
19	Data 4 return	Data 6 return
20	Data 3 return	Data 5 return
21	Data 2 return	Data 4 return
22	Data 1 return	Data 3 return
23	Data 0 return	Data 2 return
24		Data 1 return
25		Data 0 return

Trigger Output. The trigger output (BNC) can be used to trigger an oscilloscope or other video equipment.

For information on configuring the outputs, refer to page C-8.

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 the output signal
- Active signal parameters (with subheads in alphabetical order)
- Module parameters (with subheads in alphabetical order)

Refer to Figure 2-1 on page 2-1 for the menu structure.

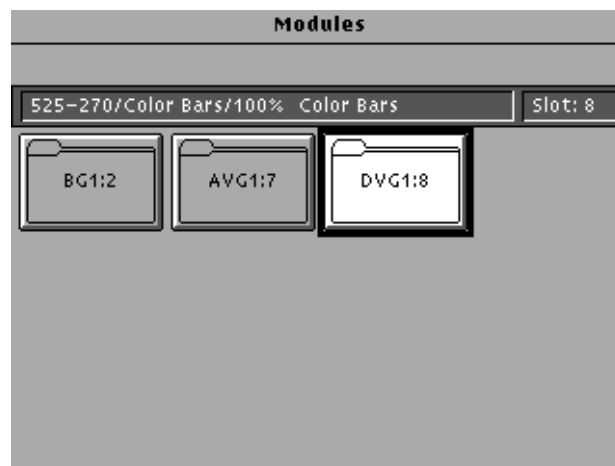
Power On and Select the Module

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 the generator modules. If an installed module is not represented, refer to *Troubleshooting* in the *DVG1 Digital Video Generator Service Manual*.

NOTE. The illustrations in these procedures show the factory default name (DVG1: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 platform, the Modules window is displayed. To open this window at other times, push the **Modules** button.

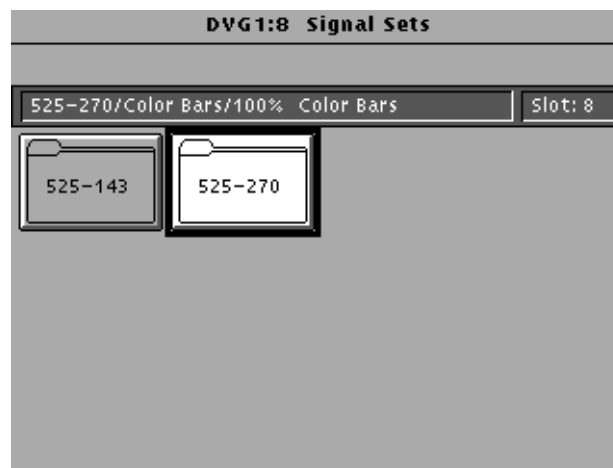


6. Touch the the module icon on the display (or push the **Signal Sets** button if the desired icon is already highlighted). The installed signal sets for the module appear. Selections you make after this will pertain to the DVG1 Generator module.

Select the Output Signal

The output signal is supplied on the two rear-panel serial outputs. To configure the outputs, refer to *Appendix C*. Use the following procedure to select the module's output test signal. You can select any of the DVG1 signals that are loaded in your instrument. You can also configure the outputs if you have the SDI option installed; refer to page C-8.

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, 525-270 is selected.



3. Each test signal icon in the Test Signals window represents one or more signals that the module can generate. In this example, the Color Bar test signal icon is selected, and the 100% Color Bars signal is being generated.
4. To change to another Color Bar signal, touch the **Color Bar** repeatedly to browse 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.

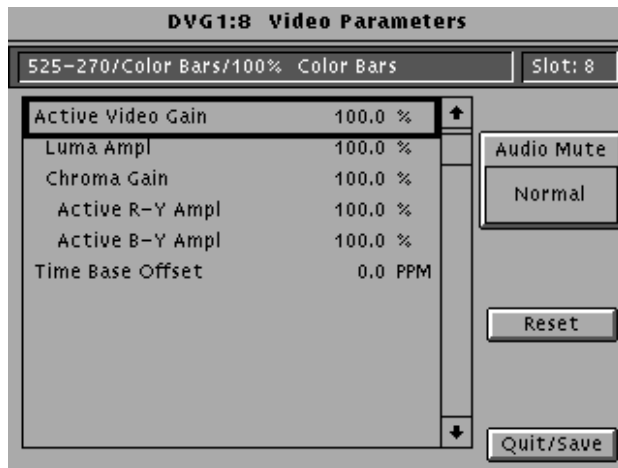
To enter the Active Signal Parameters window for the DVG1 Generator module, follow these steps:

1. Select the 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.



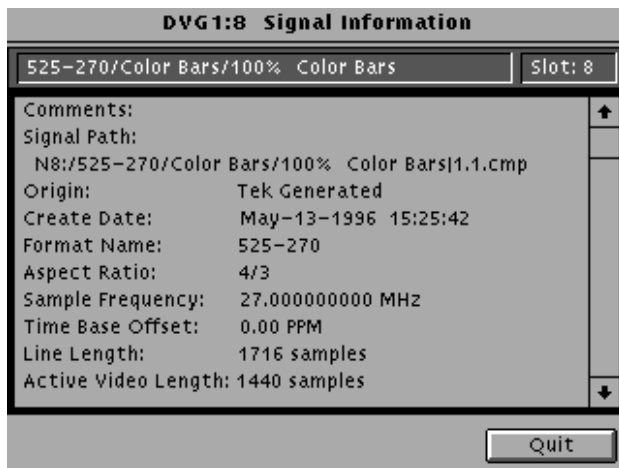
Audio Mute You can mute the selected signal.

1. In the Active Signal Parameters window, shown on page 2–9, touch **Video Parameters**.
2. In the Video Parameters window shown below, touch **Audio Mute** to toggle the audio of the selected signal between **Normal** and **Muted**. This leaves the audio data on, but all channels are muted (silence).
3. Touch **Quit/Save** to save your changes and exit.



Signal Information You can view detailed information about the selected signal.

1. In the Active Signal Parameters window, shown on page 2–9, touch **Signal Information**.
2. View the signal information, as shown in the following illustration.

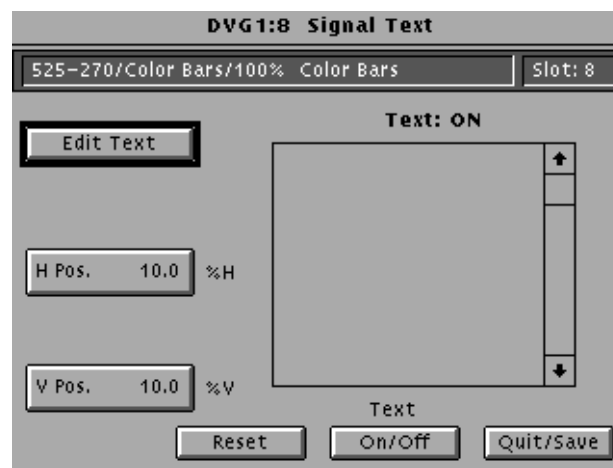


Text Overlay

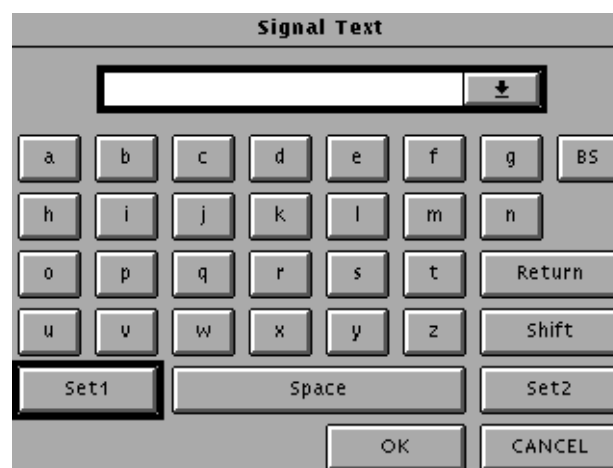
You can enter text that overlays your displayed test signal. When turning text on or off, you are turning text on or off for all test signals that have overlaid text. Touching **Reset** returns the text, horizontal and vertical to previously saved values.

To enter and position text, follow these steps:

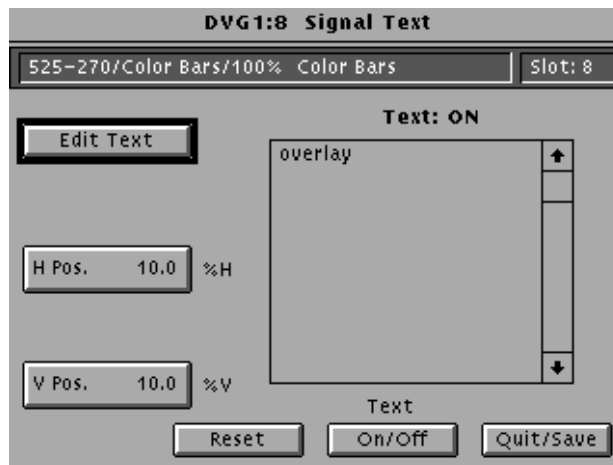
1. In the Active Signal Parameters window, shown on page 2–9, touch **Text Overlay** to enter the Signal Text window. The Signal Text window is shown in the following illustration.



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.**
6. Enter a value from the keypad or rotate the knob until the desired horizontal position is reached.
7. Touch **V Pos.**
8. Enter a value from the keypad or rotate the knob until the desired vertical position is reached.
9. If you want to return the text, horizontal and vertical to previously saved values, touch **Reset**.
10. Touch **Quit/Save**. A dialog box appears.
 - a. If you touch **Save**, the modified test signal is saved with an underscore added to the front of the name.
 - b. If you touch **Save As**, a text entry window is displayed. Enter a new name for the signal.

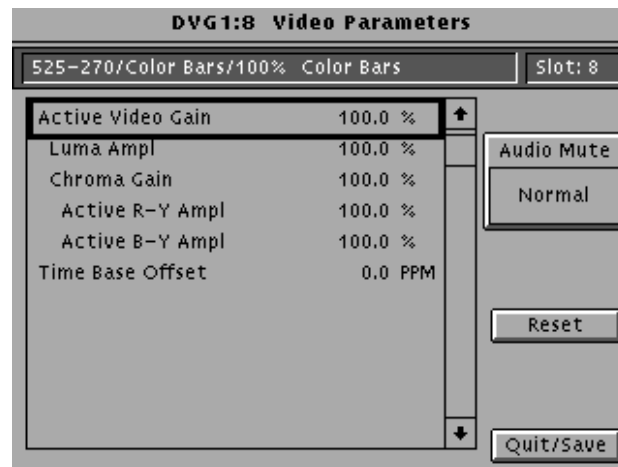
Video Parameters

You can adjust the signal parameters of the currently selected (active) test signal by modifying the parameters and then saving the signal with a new name. There are no factory defaults.

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 change the signal parameters, follow these steps:

1. In the Active Signal Parameters window, shown on page 2–9, touch **Video**.
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.



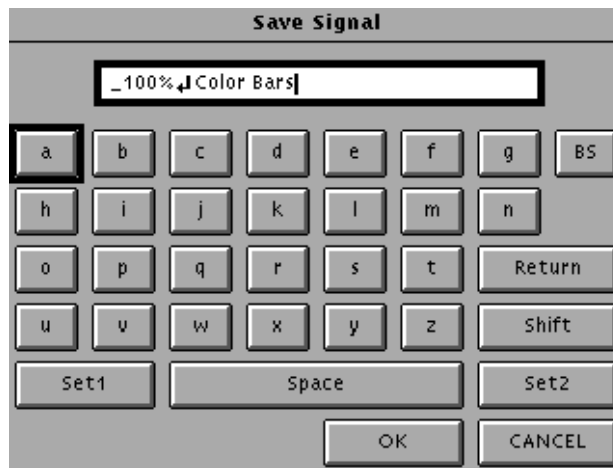
3. Enter a value using the knob or keypad.
4. If you want to reset all the parameters to their previously saved values, touch **Reset**.

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** to save and rename the test signal. 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.



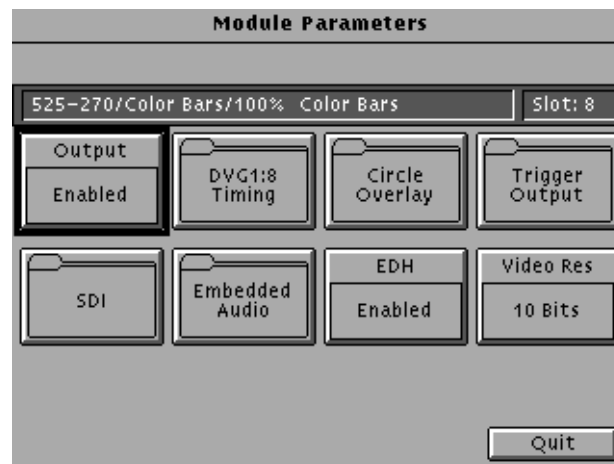
7. To use a different name, touch **OK**.
8. If you want a different name, do the following:
 - a. Delete the displayed name using the **BS** key, and then enter new text. (You cannot backspace over an underscore character.)
 - b. Touch **Set 1** or **Set 2** to provide additional sets of characters.
 - 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 DVG1 Generator module, follow these steps:

1. Select the DVG1 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 as follows:
 - a. Push the **Modules** button.
 - b. Ensure that the module is highlighted.
 - c. Push the **Edit** button.
 - d. Touch **Module Parameters**.

Circle Overlay

You can create a circle that is overlaid on the output test signal. The circle overlay parameters will affect all test signals from this module. Entered values are constant, regardless of which test signal or video standard you use.

To define a circle overlay, follow these steps:

1. In the Module Parameters window, shown on page 2–15, 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. Touch **H Pos** and rotate the Navigation knob to move the circle horizontally by a percentage of APH.

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

6. Touch **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. Touch **Quit** to exit the window.

Enable/Disable the Output Signal

If you disable the module output, it releases all system resources used by this module. To disable the module output, follow these steps:

1. Select the 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 2–15) appears.
4. Touch the **Output** icon to toggle the state of the module's output signal.
5. Touch **Quit** to exit.

Embedded Audio

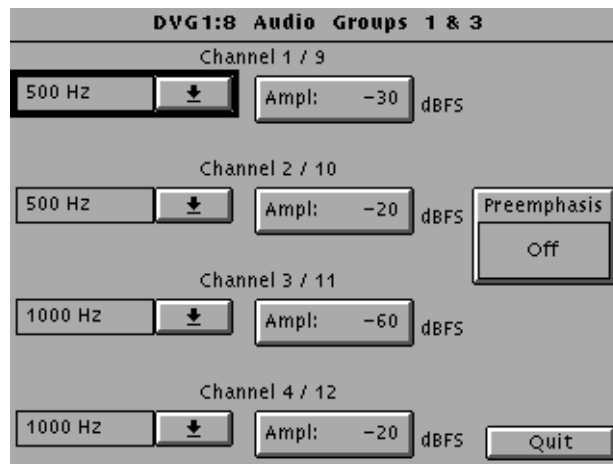
You can turn embedded audio on or off, select which channel groups to enable, and which of the enabled groups to send first. You can also adjust the frequency and amplitude of the embedded audio signal. Changes you make affect all signals for this module. To mute (silence) the audio on a signal-by-signal basis, refer to *Audio Mute* on page 2–10.

1. In the Module Parameters window, shown on page 2–15, touch **Embedded Audio** to enter the Embedded Audio window shown below.



2. To enable the embedded audio, perform the following steps:
 - a. Touch the **Audio** icon to turn on the embedded audio.
 - b. Touch the **Number of Groups Enabled** list box and use the navigation arrow to select the number of groups you want to enable (1 through 4). This is the number of groups that will be embedded in the signals. Composite video only has one group; component video has up to four.
 - c. Push the **Select** button.

- d. Touch the **Starting Group** list box and use the navigation arrow to select the group that will be sent first.
 - e. Push the **Select** button.
3. To configure the channel parameters, perform the following steps:
- a. Touch the icon corresponding to the group or groups that you want to configure. The Audio Group window will appear. The following illustration shows an audio group window for Audio Groups 1 & 3.



- b. Touch the list box corresponding to the set of channels for which you want to change the frequency. A list box appears for you to select the desired frequency.
- Channels in groups 1 and 3 and groups 2 and 4 are aliases of each other. For example, in this illustration, Channel 9 is an alias of channel 1.
- c. Select the desired frequency using the cursor keys and the **Select** button.
 - d. Perform steps b and c for each set of channels you want to adjust.
 - e. To change the amplitude, touch **Ampl:** next to the desired channel and enter a value using the keypad. Selections range from -60 to -20 decibels full scale (dBFS).

NOTE. *Preemphasis affects both groups within the group window.*

- f. To change the Preemphasis status bit in the embedded audio stream, touch the **Preemphasis** icon until the desired selection Off, CD, or CCITT) is displayed.

Error Detection Handling (EDH) Enable/Disable

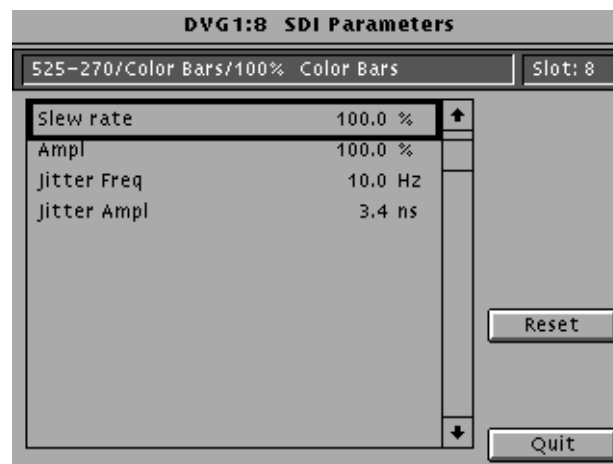
In the Module Parameters window, shown on page 2–15, touch the EDH icon to toggle the state of the error and detection handling feature on the serial outputs.

SDI Parameters (Option S1)

You can adjust slew rate, amplitude, jitter frequency, and jitter amplitude of the SDI option (when installed).

To adjust the SDI parameters, follow these steps:

1. In the Module Parameters window, shown on page 2–15, touch **SDI Parameters** to enter the **SDI Parameters** window, shown in the following illustration.



2. Select the parameter you want to adjust.
3. Rotate the **Navigation** knob until the desired value is reached, or enter a value using the keypad.
4. Touch **Reset** if you want to change all entries to their default values.
5. Touch **Quit**.

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 DVG1 Generator module.

1. In the Module Parameters window, shown on page 2–15, touch the module timing icon. 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 **Horizontal**. The default setting is 0.000 μ sec.
5. Rotate the navigation knob counterclockwise to advance the timing or clockwise to delay the timing. Increments are equal to a full cycle of the clock. You can also enter values from the keypad and push the **Select** button.

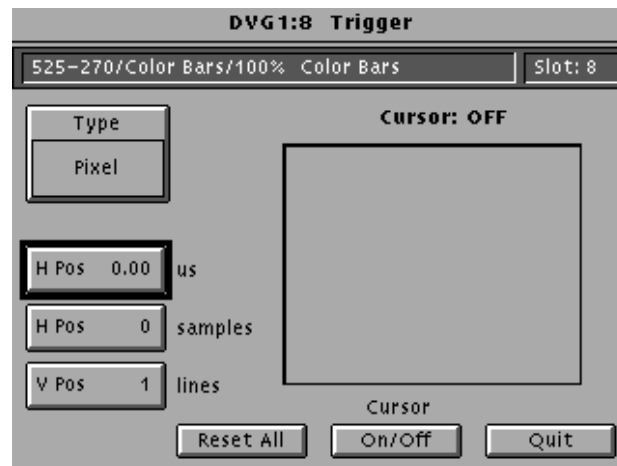
NOTE. When more than one line of advance or delay is entered, the Vertical Timing is advanced or delayed.

6. Touch **Reset All** if you want to return horizontal and vertical timing to the defaults. Touch **Quit** to exit the window.

Trigger Output

You can generate three types of Trigger signals to the rear panel BNC. To configure the Trigger output, do the following:

1. In the Module Parameters window, shown on page 2–15, touch **Trigger** to enter the Trigger window, shown below.



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

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.

Video Resolution In the Module Parameters window, shown on page 2–15, touch the **Video Res** icon to select 10 bit or 8-bit resolution.



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 DVG1 generator.

NOTE. *If a command fails, all the following commands on the line are ignored. However, if a valid command is followed by an invalid command, the valid command will be executed.*

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 used by this module are shared by several modules and will be accepted without a reported error.
2. Enable the module using the `:OUTPut:STATE ON` command. The output state of the module must be enabled before test signal parameters can be changed.

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 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.

Query Arguments

If you send a query with no argument, the response is the current value. You can also use **MINimum**, **MAXimum**, and **DEFault** as arguments for queries whose command form can use these arguments (refer to the command syntax for the specific command). Instead of returning the current value, queries using these arguments return the following information:

MINimum. Returns the minimum acceptable value.

MAXimum. Returns the maximum acceptable value.

DEFault. Returns the default value.

Argument Examples

The following examples demonstrate the effect of each of the arguments when used with a step value.

1. `:INSTRUMENT:SElect "DVG1:#"` selects the DVG1 Generator module indicated by the information you type in place of 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.
11. `:OUTPut:CIRClE:DIAMeter?` `MAXimum` queries the maximum circle diameter (not the current diameter). The query returns the value of 100 percent, which is the maximum circle diameter allowable.

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 DVG1 generator 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.

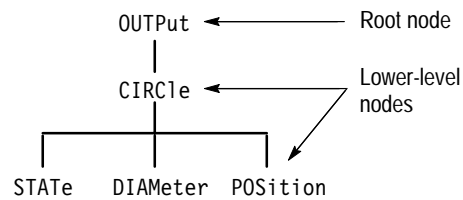


Figure 3–1: Example of SCPI subsystem hierarchy

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 SCPI commands, programming structure, and TG 2000 Signal Generation Platform 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:STATe(?)	Set or query module output
:OUTPut:CIRClE:STATe(?)	Set or query circle
:OUTPut:CIRClE:DIAMeter(?)	Set or query circle diameter
:OUTPut:CIRClE:POSItion:HORizontal(?)	Set or query circle horizontal position
:OUTPut:CIRClE:POSItion:VERTical(?)	Set or query circle vertical position
:OUTPut:CIRClE:RESet	Reset all circle parameters
:OUTput:EAUDio:STATe(?)	Set or query embedded audio
:OUTput:EAUDio:CHANnel16:AMPLitude(?)	Set or query channel audio amplitude
:OUTput:EAUDio:CHANnel16:FREQuency(?)	Set or query channel audio frequency
:OUTput:EAUDio:GROup4:PREemphasis(?)	Set or query channel audio preemphasis
:OUTput:EAUDio:NGROups(?)	Set or query channel audio state
:OUTput:EAUDio:SGROup(?)	Set or query the starting group for embedded audio
:OUTput:EDHinsertion:STATe(?)	Set or query error detection handler insertion state
:OUTPut:SERial:AMPLitude(?)	Set or query serial amplitude
:OUTPut:SERial:AMPLitude:STEP(?)	Set or query serial amplitude step size
:OUTPut:SERial:JITTer:AMPLitude(?)	Set or query serial jitter amplitude
:OUTPut:SERial:JITTer:AMPLitude:STEP(?)	Set or query serial jitter amplitude step size
:OUTPut:SERial:JITTer:FREQuency(?)	Set or query serial jitter frequency
:OUTPut:SERial:JITTer:FREQuency:STEP(?)	Set or query serial jitter frequency step size
:OUTPut:SERial:SRATE(?)	Set or query serial slew rate
:OUTPut:SERial:SRATE:STEP(?)	Set or query serial slew rate step size
:OUTPut:TEXT:STATe(?)	Set or query text
: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:RESet	Reset the text parameters
:OUTPut:TRIGger:TYPE(?)	Set or query trigger type
: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 trigger horizontal position step size
:OUTPut:TRIGger:POSItion:HORizontal:SAMPle(?)	Set or query trigger horizontal position in samples

Table 3-2: :OUTPut commands (cont.)

Command	Description
:OUTPut:TRIGger:POSition:HORizontal:SAMple:STEP(?)	Set or query trigger horizontal position sample step size
:OUTPut:TRIGger:POSition:VERTical(?)	Set or query trigger vertical position
:OUTPut:TRIGger:POSition:VERTical:STEP(?)	Set or query trigger vertical position step size
:OUTPut:TRIGger:RESet	Reset trigger parameters
:OUTPut:VRESolution(?)	Set or query the number of bits in the video signal

Sense

Use these commands to adjust the module 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 time delay step size
:SENSe:CORRection:MDELay:VERTical(?)	Set or query vertical time delay
:SENSe:CORRection:MDELay:VERTical:STEP(?)	Set or query vertical time delay step size

Source

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

Table 3-4: :SOURce commands

Command	Description
:SOURce:AUDio(?)	Set or query audio mute
: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

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

Command	Description
:SOURce:MVIDeo:CHROMa:AMPLitude:STEP(?)	Set or query channel chroma amplitude 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:RY(?)	Set or query channel RY component amplitude
:SOURce:MVIDeo:RY:STEP(?)	Set or query channel RY step size
: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



:OUTPut Commands

Use these commands to enable the actual output of the module. This subsystem also controls the embedded audio, EDH insertion, circle overlay, and module trigger.

***NOTE.** The module must be selected with the INSTRument:SElect command before using these commands.*

Command Tree

```
:OUTPut
  :STATe          <Boolean>
  :CIRClE
    :STATe        <Boolean>
    :DIAMeter     <numeric_value>
    :POSition
      :VERTical   <numeric_value>
      :HORizontal <numeric_value>
    :RESet
  :EAUDio
    :STATe        <Boolean>
    :CHANnel16
      :AMPLitude <numeric_value>
      :FREQuency <numeric_value>
    :GROup4
      :PREemphasis <argument>
    :NGROups      <numeric_value>
    :SGROup       <numeric_value>
  :EDHinsertion
    :STATe        <Boolean>
  :SERial
    :AMPLitude    <numeric_value>
    :STEP          <numeric_value>
    :JITTer
      :AMPLitude  <numeric_value>
      :STEP        <numeric_value>
      :FREQuency  <numeric_value>
      :STEP        <numeric_value>
    :SRATe        <numeric_value>
    :STEP         <numeric_value>
  :TEXT
    :STATe        <Boolean>
    :DATA         <string>
    :POSition
      :HORizontal <numeric_value>
      :VERTical   <numeric_value>
    :RESet
  :TRIGger
    :TYPE         <argument>
    :CURSor
      :STATe      <Boolean>
```



```
:POStion
  :VERTical      <numeric_value>
    :STEP        <numeric_value>
  :HORizontal    <numeric_value>
    :STEP        <numeric_value>
    :SAMPle      <numeric_value>
      :STEP      <numeric_value>
:RESet
:VRESolution    <numeric_value>
```

:OUTPut:CIRClE:STATe(?)

Use this command to set or query the display of the circle overlay on 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
-141 Invalid character data

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:CIRClE:DIAMeter(?)

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

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

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

Default Value 90

Errors and Events -200 Execution error
-120 Numeric data 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 unit is percent of average picture width.

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

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

Default Value 0

Errors and Events -200 Execution error
-120 Numeric data 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 unit is percent of average picture height.

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

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

Default Value 0

Errors and Events -200 Execution error
-120 Numeric data 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:RESet

Use this command to reset the parameters of the circle overlay. There are no arguments.

Syntax :OUTPut:CIRClE:RESet

Parameters	Command	Query response
	None	None

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies The DVG1 module must be enabled.

Examples Command: :OUTP:CIRC:RES

Related Commands :OUTPut:CIRClE

:OUTPut:EAUDio:STATe(?)

Use this command to set or query the embedded audio state.

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

Parameters

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

Default Value ON

Errors and Events -200 Execution error
-141 Invalid character data

Dependencies None

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

Related Commands None

:OUTPut:EAUDio:CHANnel16:AMPLitude(?)

Use this command to set or query the amplitude of a specific embedded audio channel. The unit is dBFS.

The number 16 in the command represents the channel number. You can use any channel number from 1 through 16.

Syntax :OUTPut:EAUDio:CHANnel[<n>]:AMPLitude <numeric_value>
 :OUTPut:EAUDio:CHANnel[<n>]:AMPLitude?

Parameters	Command	Query response
	<numeric_value> = <NRf> -60 ≤ <NRf> ≤ -20	<NR2>

Default Value -20

Errors and Events -200 Execution error
 -104 Data type error

Dependencies Channels 1 through 4 and 9 through 12 share values, and channels 5 through 8 and 13 through 16 share values.

Examples Command: :OUTP:EAUD:CHAN1:AMPL 10
 Query: :OUTP:EAUD:CHAN1:AMPL?
 Response: 10.000

Related Commands :OUTPut:EAUDio:CHANnel16:FREQuency

:OUTPut:EAUDio:CHANnel16:FREQuency(?)

Use this command to set or query the frequency of a specific embedded audio channel. The unit is Hertz.

The number 16 in the command represents the channel number. You can use any channel number from 1 through 16.

Syntax :OUTPut:EAUDio:CHANnel [<n>]:FREQuency <numeric_value>
:OUTPut:EAUDio:CHANnel [<n>]:FREQuency?

Parameters

Command ¹	Query response
numeric_value = 0, 50, 100, 150, 200, 250, 300, 400, 500, 600, 750, 800, 1000, 1200, 1500, 1600, 2000, 2400, 3000, 3200, 4000, 4800, 6000, 8000, 9600, 12000, 16000	<NR2>

¹ Any nonstandard value entered will be rounded up to the next highest value.

Default Value 500

Errors and Events -200 Execution error
 -104 Data type error

Dependencies Values are shared between channels 1 to 4 and 9 to 12, and between channels 5 to 8 and 13 to 16.

Examples

Command: :OUTP:EAUD:CHAN1:FREQ 1000

Query: :OUTP:EAUD:CHAN1:FREQ?

Response: 1000.0000

Related Commands :OUTPut:EAUDio:CHANnel16:AMPLitude

:OUTPut:EAUDio:GR0up4:PREemphasis(?)

Use this command to set or query the preemphasis of a specific embedded audio group.

The 4 in the command represents the group number. You can use any group number from 1 through 4.

Syntax :OUTPut:EAUDio:GR0up4:PREemphasis <argument>
 :OUTPut:EAUDio:GR0up4:PREemphasis?

Parameters	Command	Query response
	<argument> = OFF	OFF
	CD	CD
	CCITt	CCIT

Default Value OFF

Errors and Events

-200	Execution error
-141	Invalid character data
-104	Unrecognized character data

Dependencies Preemphasis modes are shared between groups 1 and 3, and between groups 2 and 4.

Examples

Command:	:OUTP:EAUD:GR03:PRE CD
Query:	:OUTP:EAUD:GR03:PRE?
Response:	CD

Related Commands None

:OUTPut:EAUDio:NGRoups(?)

Use this command to set or query groups of embedded audio channels to the output signal. The number of groups is based on the video standard; the maximum number of groups is four.

Syntax :OUTPut:EAUDio:NGRoups <numeric_value>
:OUTPut:EAUDio:NGRoups?

Parameters

Command	Query response
$1 \leq \text{<numeric_value>} \leq 4$	<NR1>

Default Value 1

Errors and Events -200 Execution error

Dependencies None

Examples
 Command: :OUTP:EAUD:NGR 2
 Query: :OUTP:EAUD:NGR?
 Response: 2

Related Commands :OUTPut:EAUDio:SGRoup

:OUTPut:EAUDio:SGRoup(?)

Use this command to select the starting group for embedded audio. There are no units.

Syntax :OUTPut:EAUDio:SGRoup <numeric_value>
 :OUTPut:EAUDio:SGRoup?

Parameters	Command	Query response
	<NRf>	<NR1>

Default Value 1

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

Examples

Command: :OUTP:EAUD:SGR 2

Query: :OUTP:EAUD:SGR?

Response: 2

Related Commands :OUTPut:EAUDio:NGRoups

:OUTPut:EDHinsertion:STATe(?)

Use this command to set or query the Error Detection Handler insertion circuitry.

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

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

Default Value ON

Errors and Events -200 Execution error

Dependencies None

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

Related Commands None

:OUTPut:SERial:AMPLitude(?)

Use this command to set or query the output level of the serial video signal. The unit is percent of total amplitude.

Syntax :OUTPut:SERial:AMPLitude <numeric_value>
:OUTPut:SERial:AMPLitude?

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

Default Value 100

Errors and Events Execution error

Dependencies None

Examples
Command: :OUTP:SER:AMPL 75
Query: :OUTP:SER:AMPL?
Response: 75.0000

Related Commands :OUTPut:SERial:AMPLitude:STEP

:OUTPut:SERial:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value for the associated command. The unit is percent of total amplitude.

Syntax :OUTPut:SERial:AMPLitude:STEP <numeric_value>
:OUTPut:SERial:AMPLitude: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:SER:AMPL:STEP .5
 Query: :OUTP:SER:AMPL:STEP?
 Response: 0.5000

Related Commands :OUTPut:SERial:AMPLitude

:OUTPut:SERial:JITTer:AMPLitude(?)

Use this command to set or query the amplitude of the jitter signal to be applied to the stressed serial video signal. The unit is nanoseconds (ns).

Syntax :OUTPut:SERial:JITTer:AMPLitude <numeric_value>
 :OUTPut:SERial:JITTer:AMPLitude?

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

Default Value 0.0

Errors and Events -200 Execution error

Dependencies None

Examples

Command: :OUTP:SER:JITT:AMPL 2.5

Query: :OUTP:SER:JITT:AMPL?

Response: 2.5000

Related Commands :OUTPut:SERial:JITTer:AMPLitude:STEP

:OUTPut:SERial:JITTer:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value for the associated command. The unit is nanoseconds.

Syntax :OUTPut:SERial:JITTer:AMPLitude:STEP <numeric_value>
:OUTPut:SERial:JITTer:AMPLitude: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:SER:JITT:AMPL:STEP .01
 Query: :OUTP:SER:JITT:AMPL:STEP?
 Response: 0.0100

Related Commands :OUTPut:SERial:JITTer:AMPLitude

:OUTPut:SERial:JITTer:FREQuency(?)

Use this command to set or query the frequency of the jitter signal to be applied to the stressed serial video signal. The unit is in hertz.

Syntax :OUTPut:SERial:JITTer:FREQuency <numeric_value>
:OUTPut:SERial:JITTer:FREQuency?

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

Default Value 1000000.0

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:SER:JITT:FREQ 1000
Query: :OUTP:SER:JITT:FREQ?
Response: 1000.0000

Related Commands :OUTPut:SERial:JITTer:FREQuency:STEP

:OUTPut:SERial:JITTer:FREQuency:STEP(?)

Use this command to set or query the UP/DOWN step value for the associated command. The unit is hertz.

Syntax :OUTPut:SERial:JITTer:FREQuency:STEP <numeric_value>
:OUTPut:SERial:JITTer:FREQuency: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:SER:JITT:FREQ:STEP 100
 Query: :OUTP:SER:JITT:FREQ:STEP?
 Response: 100.0000

Related Commands :OUTPut:SERial:JITTer:FREQuency

:OUTPut:SERial:SRATe(?)

Use this command to set or query the slew rate of the serial video signal. The unit is percent of total signal amplitude.

Syntax :OUTPut:SERial:SRATe <numeric_value>
:OUTPut:SERial:SRATe?

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

Default Value 100

Errors and Events -200 Execution error

Dependencies None

Examples
Command: :OUTP:SER:SRAT 75
Query: :OUTP:SER:SRAT?
Response: 75.0000

Related Commands :OUTPut:SERial:SRATe:STEP

:OUTPut:SERial:SRATe:STEP(?)

Use this command to set or query the UP/DOWN step value for the associated command. The unit is percent of total amplitude.

Syntax :OUTPut:SERial:SRATe:STEP <numeric_value>
:OUTPut:SERial:SRATe: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: :OUTPut:SERial:SRATe:STEP 5
 Query: :OUTPut:SERial:SRATe:STEP?
 Response: 5.0000

Related Commands :OUTPut:SERial:SRATe

:OUTPut:STATe(?)

Use this command to set or query the state of the DVG1 generator output signal.

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

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

Default Value ON

Errors and Events None

Dependencies None

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

Related Commands None

:OUTPut:TEXT:STATe(?)

Use this command to set or query the text overlay on the video signal.

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:DATA(?)

Use this command to set or query the current string for the text mode. Text information is part of 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 Not applicable

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

:OUTPut:TEXT:POSition:HORizontal(?)

Use this command to set or query the horizontal position of text in the video signal. The unit is percentage 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 10

Errors and Events -200 Execution error

Dependencies None

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

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 unit is percentage of average picture height.

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

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

Default Value 10

Errors and Events -200 Execution error

Dependencies None

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

Related Commands :OUTPut:TEXT:POSition:HORizontal

:OUTPut:TEXT:RESet

Use this command to reset the parameters of the text overlay. There are no arguments.

Syntax :OUTPut:TEXT:RESet

Parameters

Command	Query response
None	None

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies The DVG1 module must be enabled.

Examples Command: :OUTP:TEXT:RES

Related Commands :OUTPut:TEXT

:OUTPut:TRIGger:CURSor:STATe(?)

Use this command to set or query the cursor display. The trigger output signal is not affected by this command.

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 unit is 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>
UP, DOWN, DEF	

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

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

Use this command to set or query the UP/DOWN step value for the associated command. The unit is microseconds.

Syntax :OUTPut:TRIGger:POSition:HORizontal:STEP <numeric_value>
:OUTPut:TRIGger:POSition:HORizontal: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: :OUTP:TRIG:POS:HOR:STEP 0.5
Query: :OUTP:TRIG:POS:HOR:STEP?
Response: 0.5000

Related Commands :OUTPut:TRIGger:POSition:HORizontal

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

Use this command to set or query the horizontal parameter of the trigger and its overlay. The unit is sample.

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

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

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

Examples
 Command: :OUTP:TRIG:POS:HOR:SAMP 120
 Query: :OUTP:TRIG:POS:HOR:SAMP?
 Response: 120

Related Commands :OUTPut:TRIGger

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

Use this command to set or query the UP/DOWN step value for the associated command. The unit is sample.

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

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

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

Examples
Command: :OUTP:TRIG:POS:HOR:SAMP:STEP 12
Query: :OUTP:TRIG:POS:HOR:SAMP:STEP?
Response: 12

Related Commands :OUTPut:TRIGger:POSition:HORizontal:SAMPle

:OUTPut:TRIGger:POSition:VERTical(?)

Use this command to set or query the trigger position vertically within the video signal. The unit is 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

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

Use this command to set or query the UP/DOWN step value for the associated command. The unit is number of lines.

Syntax :OUTPut:TRIGger:POSition:VERTical:STEP <numeric_value>
:OUTPut:TRIGger:POSition:VERTical: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: :OUTP:TRIG:POS:VERT:STEP 5
Query: :OUTP:TRIG:POS:VERT:STEP?
Response: 5.0000

Related Commands :OUTPut:TRIGger:POSition:VERTical

:OUTPut:TRIGger:RESet

Use this command to reset the parameters of the trigger and its overlay. There are no arguments.

Syntax :OUTPut:TRIGger:RESet

Parameters

Command	Query response
None	None

Default Value Not applicable

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

Examples Command: :OUTP:TRIG:RES

Related Commands :OUTPut:TRIGger

: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.

There are four trigger types:

- **PIXel**: a trigger occurs where the horizontal and vertical lines cross
- **VERTical**: a trigger occurs at the horizontal line (1 pulse per frame)
- **HORizontal**: a trigger occurs at the vertical line (1 pulse per line)
- **OFF**: no trigger output

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
-141 Invalid character data

Dependencies None

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

Related Commands None

:OUTPut:VRESolution(?)

Use this command to set or query the number of bits in the video signal.

Syntax :OUTPut:VRESolution <numeric_value>
:OUTPut:VRESolution?

Parameters

Command	Query response
<numeric_value> = <NRf> <= 8 or > 8	8 or 10

Default Value 10

Errors and Events -200 Execution error

Dependencies Maximum number of bits = 10

Examples
 Command: :OUTP:VRES 8
 Query: :OUTP:VRES?
 Response: 8

Related Commands None

:SENSe Commands

Use these commands to adjust the timing of the module in relation to the instrument. The adjustments set the module delay.

Command Tree

```
:SENSe
  :CORRection
  :MDElay
    :VERTical      <numeric_value>
      :STEP        <numeric_value>
    :HORizontal   <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.

The unit is 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:VERTical
:SENSe:CORRection:MDELay:HORizontal:STEP

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

Use this command to set or query the UP/DOWN step value for the associated command. The unit is 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 :SENSe:CORRection:MDELay:HORizontal

: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 integer lines with 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 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

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

Use this command to set or query the UP/DOWN step value of the associated command.

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

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

Default Value 1.0

Errors and Events -200 Execution error

Dependencies

Examples Command: :SENS:CORR:MDEL:VERT:STEP 2

Query: :SENS:CORR:MDEL:VERT:STEP?

Response: 2.0000

Related Commands :SENSe:CORRection:MDElay:VERTical



:SOURce Commands

Use the **SOURce** commands to control the signal source for the module. These commands display the signal name and enable the adjustment of many parameters.

Command Tree

```
:SOURce:
  :AUDio                <Boolean>
  :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>
  :LUMinance            <numeric_value>
    :STEP               <numeric_value>
  :RY                   <numeric_value>
    :STEP               <numeric_value>
  :SYNC                 <numeric_value>
    :STEP               <numeric_value>
  :TIMEbase             <numeric_value>
    :STEP               <numeric_value>
```

:SOURce:AUDio(?)

Use this command to enable or disable the embedded audio mute for a signal. The module has a command to control the overall audio, but each signal also has a Boolean flag that can mute the audio. If the module audio is enabled, the loaded signal can use the audio or be in mute. If the module audio is disabled, the :SOURce:AUDio command has no effect.

Syntax :SOURce:AUDio <Boolean>
:SOURce:AUDio?

Parameters

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

Default Value 1

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

Examples
 Command: :SOUR:AUD OFF
 Query: :SOUR:AUD?
 Response: 0

Related Commands :OUTPut:EAUDio:STATe

:SOURce:MVIDeo:AMPLitude(?)

Use this command to set or query the amplitude of the entire video signal. The unit is 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:MVIDeo:AMPLitude:STEP

:SOURce:MVIDeo:AMPLitude:STEP(?)

Use this command to set or query the UP/DOWN step value of the entire video signal. The unit is 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 None

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

Related Commands :SOURce:MVIDeo:AMPLitude

:SOURce:MVIDeo:AVIDeo(?)

Use this command to set or query the amplitude of the active video portion of the video signal. The unit is percent.

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

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

Default Value 100

Errors and Events -200 Execution error

Dependencies There is interaction with other parameters that address amplitudes.

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

Related Commands :SOURce:MVIDeo:AVIDeo:STEP

: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. The unit is percent.

Syntax :SOURce:MVIDeo:AVIDeo:STEP <numeric_value>
:SOURce:MVIDeo:AVIDeo: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:AVID:STEP 5
 Query: :SOUR:MVID:AVID:STEP?
 Response: 5.0000

Related Commands :SOURce:MVIDeo:AVIDeo

:SOURce:MVIDeo:BURSt(?)

Use this command to set or query the amplitude of the burst pulse portion of the video signal. The unit is 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 is affected by :SOUR:MVID:AVID and :SOUR:MVID:CHR:AMPL.

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

Related Commands :SOURce:MVIDeo:BURSt:STEP

: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. The unit is percent.

Syntax :SOURce:MVIDeo:BURSt:STEP <numeric_value>
:SOURce:MVIDeo:BURSt: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:BURS:STEP 10
 Query: :SOUR:MVID:BURS:STEP?
 Response: 10.0000

Related Commands :SOURce:MVIDeo:BURSt:

:SOURce:MVIDeo:BY(?)

Use this command to set or query the amplitude of the BY component of an HW-modulated component video signal. The unit is percent.

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

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 :SOUR:MVID:AVID and :SOUR:MVID:CHR:AMPL.

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

:SOURce:MVIDeo:BY:STEP(?)

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

Syntax :SOURce:MVIDeo:BY:STEP <numeric_value>
:SOURce:MVIDeo:BY: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:BY:STEP 5
 Query: :SOUR:MVID:BY:STEP?
 Response: 5.0000

Related Commands :SOURce:MVIDeo:BY

:SOURce:MVIDeo:CHROMa:AMPLitude(?)

Use this command to set or query the amplitude of the chroma portion of an HW-modulated component video signal. The unit is percent.

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

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 :SOUR:MVID:AVID. (This affects :RY and :BY.)

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

Related Commands :SOURce:MVIDeo:CHROMa:AMPLitude:STEP

: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 component video signal. The unit is 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 :SOURce:MVIDeo:CHRoma:AMPLitude

:SOURce:MVIDeo:LUMinance(?)

Use this command to set or query the amplitude of the luminance portion of an HW-modulated component video signal. The unit is 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 :SOUR:MVID:AVID.

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

Related Commands :SOURce:MVIDeo:LUMinance:STEP

:SOURce:MVIDeo:LUMinance:STEP(?)

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

Syntax :SOURce:MVIDeo:LUMinance:STEP <numeric_value>
:SOURce:MVIDeo:LUMinance: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:LUM:STEP 5
 Query: :SOUR:MVID:LUM:STEP?
 Response: 5.0000

Related Commands :SOURce:MVIDeo:LUMinance

:SOURce:MVIDeo:RY(?)

Use this command to set or query the amplitude of the RY component of an HW-modulated component video signal. The unit is 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 is affected by :SOUR:MVID:AVID 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

:SOURce:MVIDeo:RY:STEP(?)

Use this command to set or query the UP/DOWN step value of the RY component of an HW-modulated component video signal. The unit is percent.

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 :SOURce:MVIDeo:RY

:SOURce:MVIDeo:SYNC(?)

Use this command to set or query the amplitude of the sync pulse portion of the video signal. The unit is 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 0

Errors and Events -200 Execution error

Dependencies Amplitude is affected by SOUR:MVID:AMPL.

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

Related Commands :SOURce:MVIDeo:SYNC:STEP

: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. The unit is percent.

Syntax :SOURce:MVIDeo:SYNC:STEP <numeric_value>
:SOURce:MVIDeo:SYNC: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:SYNC:STEP 10
 Query: :SOUR:MVID:SYNC:STEP?
 Response: 10.0000

Related Commands :SOURce:MVIDeo:SYNC

: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 DVG1 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>	<NR2>
	MIN, MAX, DEF	

Default Value 1

Errors and Events -200 Execution error

Dependencies DVG1 module must be enabled.

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

Related Commands :SOURce:MVIDeo:TIMEbase



Appendices

Appendix A: Specifications

This section contains the specifications for the DVG1 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 valid only 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 Service Manual*.

Table A–1: Electrical specifications

Characteristics	Description
Encoding Format, typical	Positive binary linear PCM
Maximum Clock Frequency	36 MHz + 1%
Resolution	10 bit; 8 bit also supported
Output Timing Offset Adjustment Range, typical	Added to genlock offset timing, offsets relative to internal clock and frame reset. Adjustable to any point in the video frame.
Parallel Connector, typical	25-pin D-type, female contacts
Pinout	Parallel, 11 balanced signal pairs: 10 data, 1 clock
Output Logic Levels	10K ECL compatible
Receiver Termination	110 Ω \pm 10 Ω
Serial Connector	BNC connector
Signal Amplitude	800 mV \pm 10% into 75 Ω load
Data Rate, typical	143, 270, and 360 Mbs
Overshoot	\leq 10%. Measured at 20% and 80% points; shall not differ by more than 0.5 ns
Rise and Fall Times	0.4 ns to 1.5 ns, into DC termination
DC Offset (AC coupled)	0 V \pm 0.5 V
Jitter	\leq \pm 0.25 ns peak-to-peak, for all jitter frequencies above 10 Hz
Jitter, typical	Typically \leq 20 ps RMS
Return Loss/Output Impedance, typical	\geq 15 dB, 5 MHz to 360 MHz. 75 Ω , AC coupled

Table A-1: Electrical specifications (cont.)

Characteristics	Description
SDI Test Parameters, typical	± 2% at 800 mV, self calibrated after warmup and outputs terminated with 75Ω
SDI Test Parameters:	
Output Amplitude Range	-90% to +15% in 1% increments relative to 800 mV
Output Amplitude Accuracy	± 2% @ 800 mv, self calibrated after warmup and outputs terminated with 75 Ω
Variable SDI Data Slew Rate	
Range	At 800 mV amplitude, slew rate adjustment allows rise times in the range 820 ps to 7 ns (measured from 20% to 80%)
Range, typical	Slew rate is adjustable from 5% to 125% of nominal in 1% steps. Rise and fall times are dependant on slew rate and amplitude.
SDI Jitter	Calibrated jitter may be added to the serial video output. The jitter waveform is sinusoidal, with variable amplitude and frequency.
Intrinsic Jitter	≤ ± 400 ps peak-to-peak, for jitter frequencies above 10 Hz
Intrinsic Jitter, typical	Typically ≤ 20 ps RMS
Amplitude Range	0 to 15 ns range, ± 10% at 2 ns
Frequency	0.1 Hz to 10 MHz
Trigger Output, typical	
Amplitude	TTL compatible if unterminated
Rise Time	≤ 10 ns
Output Impedance	75 Ω
Power Consumption	+5 Volts: 5.75 W typical -5 Volts: 4.25 W typical -2 Volts: 0.6 W typical +15 Volts: 0 W typical -15 Volts: 0.75 W 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 DVG1 Generator module conforms to the following standards:

- EBU Tech. 3267: ITU-R BT.601 and BT. 656
- SMPTE 125M, 244M, 259M, 267M, 272M, RP 165, and RP 178

Appendix B: SCPI Conformance Information

All commands in the DVG1 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 or not a command is defined in the SCPI 1994.0 Standard.

Table B-1: SCPI conformance information

Command				Defined in SCPI 1994.0	
				Yes	No
OUTPut	AUDio(?)				✓
	CIRClE	DIAMeter(?)			✓
		STATe(?)			✓
	POSition	HORizontal(?)			✓
		VERTical(?)			✓
	RESet				✓
EAUDio	CHANnel<n>	AMPLitude(?)			✓
		FREQuency(?)			✓
	GRoup<n>	PREEmphasis(?)			✓
	NGRoups(?)				✓
	SGRoup(?)				✓
	STATe(?)				✓
EDHinsertion	STATe(?)				✓
SERial	AMPLitude(?)				✓
		STEP(?)			✓
	JITTer	AMPLitude(?)			✓
		STEP(?)			✓
		FREQuency(?)			✓
		STEP(?)			✓
	SRATe(?)				✓
	SRATe	STEP(?)			✓
	STATe(?)			✓	
TEXT	DATA(?)				✓
	POSition	HORizontal(?)			✓
		VERTical(?)			✓
	RESet				✓
	STATe(?)				✓

Table B-1: SCPI conformance information (cont.)

Command				Yes	No
OUTPut	TRIGger	TYPE(?)			✓
		CURSor	STATe(?)		✓
		POSition	HORizontal(?)		✓
			STEP(?)		✓
			SAMPle(?)		✓
			STEP(?)		✓
			VERTical(?)		✓
			STEP(?)		✓
		RESet			✓
		VRESolution(?)			✓
SENSe	CORRection	MDELay	HORizontal(?)		✓
			STEP(?)		✓
			VERTical(?)		✓
			STEP(?)		✓
SOURce	MVIDeo	AMPLitude(?)			✓
			STEP(?)		✓
		AVIDeo(?)			✓
			STEP(?)		✓
		BURSt(?)			✓
			STEP(?)		✓
		BY(?)			✓
			STEP(?)		✓
		CHRoMa	AMPLitude(?)		✓
			STEP(?)		✓
		LUMinance(?)			✓
			STEP(?)		✓
		RY(?)			✓
			STEP(?)		✓
		SYNC(?)			✓
			STEP(?)		✓
		TIMEbase(?)			✓
			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 covers module installation, output configuration, switch settings, 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. Unplug the power cord.
2. Select the slot you will use to install the module. Table C-1 lists the slot restrictions. Figure C-1 shows a sample configuration with slot numbers. If you need to remove a module to make space for your new module, follow the *Module Removal* procedure on page C-10.

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

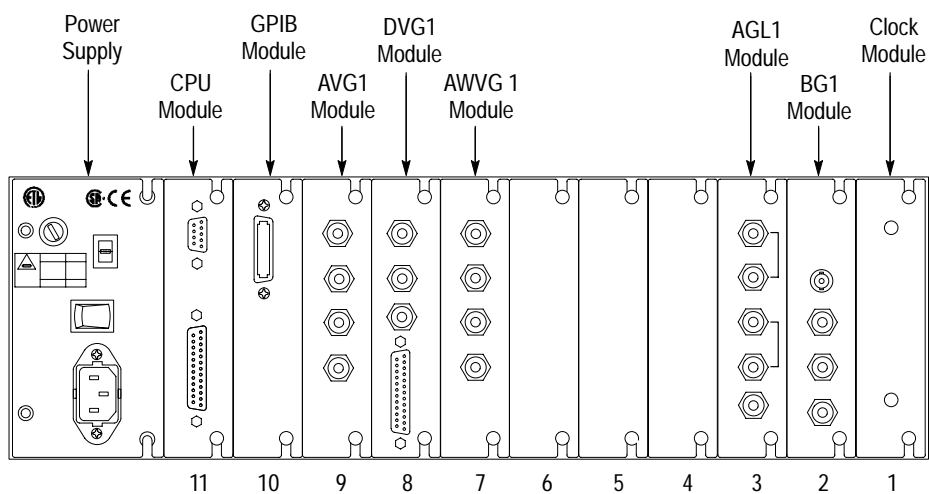


Figure C-1: Rear panel slot numbering



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.

3. Referring to Figure C-2, remove or loosen all screws to remove the top cover.

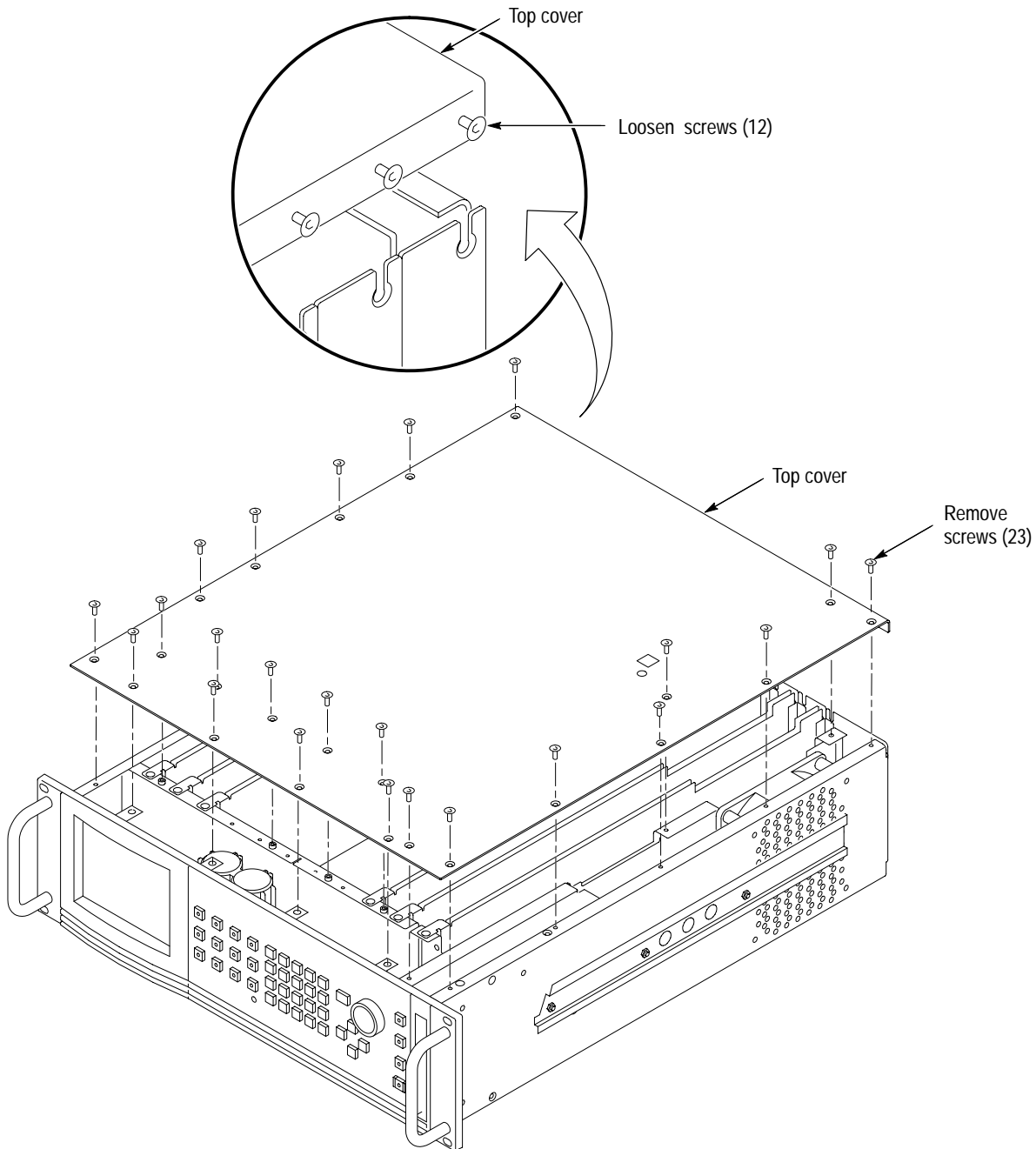


Figure C-2: Top cover removal

4. 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.

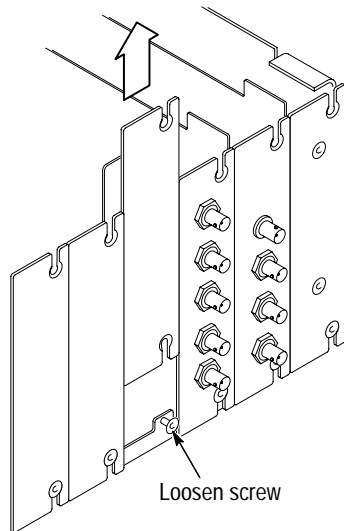


Figure C-3: Rear panel removal

5. 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.

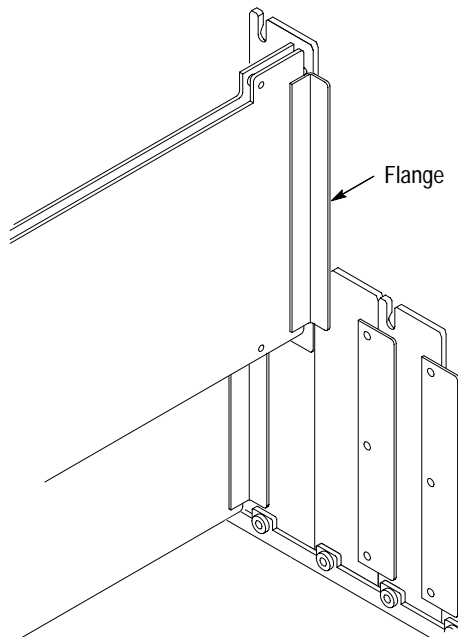


Figure C-4: Module flange

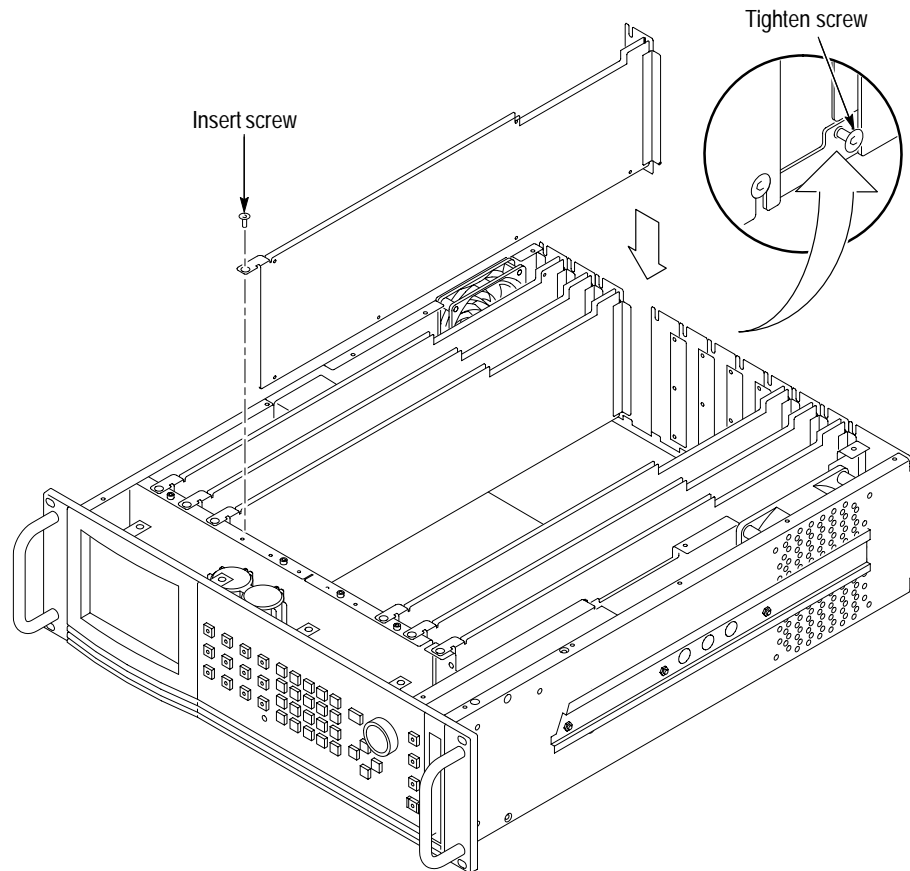


Figure C-5: Module installation

6. Ensure that the connectors on the Backplane 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 might bend a pin that could damage the module, mainframe, or both when power is applied.

7. Press down evenly on the module until it is firmly in place.
8. Insert and tighten the top screw, which is supplied with your module, as shown in Figure C-6.
9. Tighten the rear-panel screw.

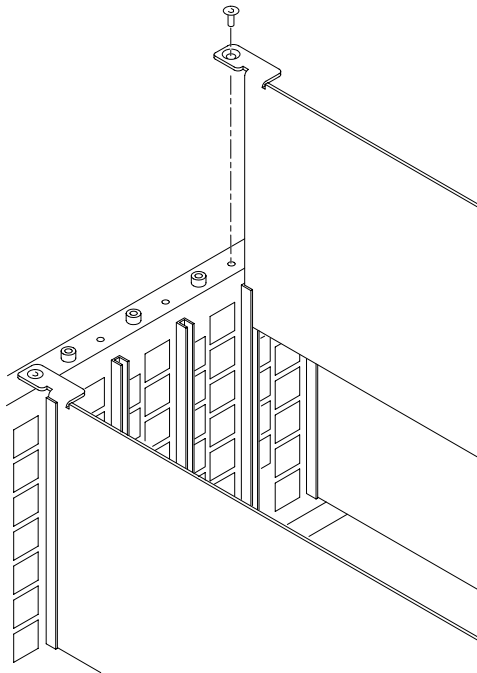


Figure C-6: Top screw

10. Replace the top cover.
11. Insert and tighten all top cover screws.
12. Plug in the instrument power cord.
13. Power on the mainframe by setting the rear-panel power switch to ON and pressing the front-panel power switch.
14. Wait for the instrument to perform self tests.

Signal Set Installation

If this module was installed in the TG 2000 Platform mainframe at the factory, signal sets are already installed. If a generator module is ordered separately, you must install signal sets when installing the module. If you need to install signal sets, use one of the two following procedures. 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 a disk to the default destination, follow 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 browse ring 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 sets will not load.*

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

Installing Signals to a Nondefault Destination. To install signal sets from a disk to a nondefault 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 browse ring to the .DNL you want to load and push the **Select** key.
6. Move the browse ring to a particular test signal and push the **Select** key.
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 sets 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 chose a destination that is one level above the source. Push the **Select** button.
11. Touch **Start Load**. A pop-up menu tells you when the transfer is complete.

Output Configuration

You can configure the serial outputs for SDI or standard operation. You can also configure the Trigger output for one of three types of signals.

If you ordered the TG 2000 Signal Generation Platform with the SDI Option S1, the DVG1 Generator module is shipped from the factory with Output 1 as the standard output and Output 2 as SDI. This configuration is shown at the top of Figure C-7. If your platform does not include Option S1, it is configured with both outputs as standard as shown in the middle of Figure C-7.

You can reconfigure the DVG1 Generator module outputs to suit your needs; refer to Figure C-7. If you reconfigure the outputs, be sure to change the settings of switch S1 to match. Refer to *Switch Settings* on page C-9.

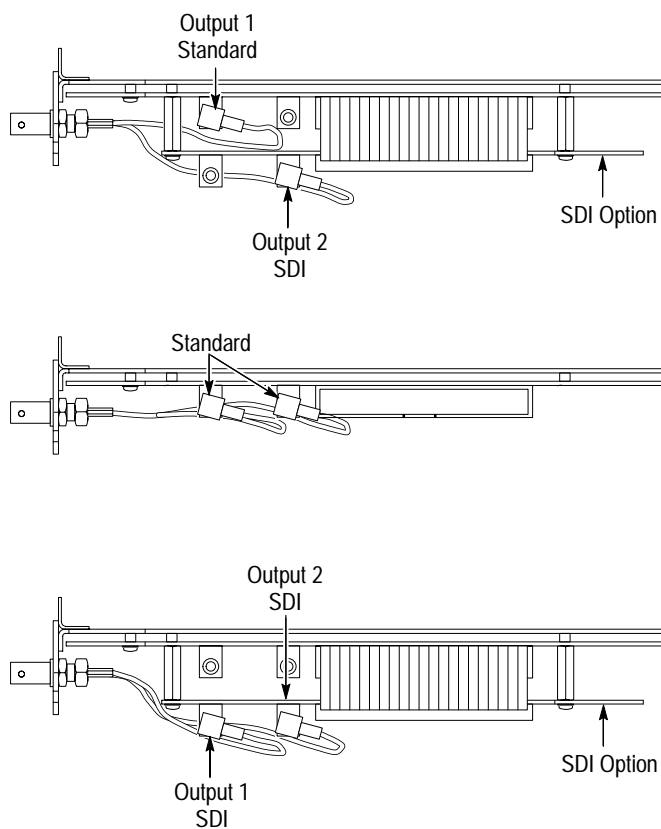


Figure C-7: Output configurations

Switch Settings

The default settings for switch S1 are:

- For platforms with no option S1 installed, position 4 open (1) and all other positions closed (0).
- For platforms with option S1 installed (connected to output 2), positions 4 and two are open (1), and positions 3 and 1 are closed (0).

You should change the Switch S1 settings if you reconfigure the outputs. Refer to Table C–2 for the settings.

Table C–2: S1 switch settings

Criteria	Switch position	Set condition to:
Output 1 connected to option S1	1	Open (1)
Output 1 not connected to option S1		Closed (0)
Output 2 connected to option S1	2	Open (1)
Output 2 not connected to option S1		Closed (0)
Always	3	Closed (0)
Enable option S1 (if present)	4	Open (1)
Disable option S1		Closed (0)

Signal Backup and Module Removal

Before removing a generator module, you should save the signal sets to a disk. The DVG1 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 **DVG1**. Use the cursor arrows to select the DVG1 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 performed Instrument Backup (page C-9).*

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 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.

Component Video

A video signal made up of the individual component parts to reproduce a color picture.

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 monitor to produce a picture.

Icon

A graphic symbol that represents a selection on a display screen.

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.

NTSC

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

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 and edge shaping 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

A set of industry standard test signals provided by Tektronix on disks.

Termination

In order to accurately send a signal through a transmission line, there must be an impedance at the end which 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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