User Manual

Tektronix
/

AWVG1
Wideband Video Generator

070-9051-01

C€

WARRANTY

Tektronix warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If a product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY TEKTRONIX IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Service Assurance

If you have not already purchased Service Assurance for this product, you may do so at any time during the product's warranty period. Service Assurance provides Repair Protection and Calibration Services to meet your needs.

Repair Protection extends priority repair services beyond the product's warranty period; you may purchase up to three years of Repair Protection.

Calibration Services provide annual calibration of your product, standards compliance and required audit documentation, recall assurance, and reminder notification of scheduled calibration. Coverage begins upon registration; you may purchase up to five years of Calibration Services.

Service Assurance Advantages

- Priced well below the cost of a single repair or calibration

- Avoid delays for service by eliminating the need for separate purchase authorizations from your company

- Eliminates unexpected service expenses

For Information and Ordering

For more information or to order Service Assurance, contact your Tektronix representative and provide the information below. Service Assurance may not be available in locations outside the United States of America.

Name	VISA or Master Card number and expiration
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

Table of Contents

Getting Started

Operating Basics

Syntax and Commands

Appendices

Glossary and Index

List of Figures

List of Tables

AWVG1 Wideband Video Generator User Manual

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.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

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.

Ground the Product. This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

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 AWVG1 Wideband Video Generator module.

About This Manual

This manual is composed of the following sections:

■ *Getting Started* provides a product description, incoming inspection procedure, and a standard and optional accessories list.

■ *Operating Basics* tells how to operate the module.

■ *Syntax and Commands* defines the syntax used in command descriptions, presents a list of all command subsystems, and presents detailed descriptions of all programming commands.

■ *Appendices* provide additional information including the specifications, hardware installation procedures, and reference material on zone plate signals.

Related Manuals

The following documents are also available:

■ The *AWVG1 Wideband 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 AWVG1 Generator module. This manual is a standard accessary to the TG 2000 Platform mainframe.

■ The *TG 2000 Signal Generation Platform Service Manual* describes how to service the mainframe to the module level and provides general information about servicing generator modules. This optional manual must be ordered separately.

■ A module user manual is included with each optional module. Contact your Tektronix representative for a list of generator and special function modules.

Contacting Tektronix

Product Support	For application-oriented questions about a Tektronix measurement product, call toll free in North America: 1-800-TEK-WIDE (1-800-835-9433 ext. 2400) 6:00 a.m. – 5:00 p.m. Pacific time
	Or, contact us by e-mail: tm_app_supp@tek.com
	For product support outside of North America, contact your local Tektronix distributor or sales office.
Service Support	Contact your local Tektronix distributor or sales office. Or, visit our web site for a listing of worldwide service locations.
	http://www.tek.com
For other information	In North America: 1-800-TEK-WIDE (1-800-835-9433) An operator will direct your call.
To write us	Tektronix, Inc. P.O. Box 1000 Wilsonville, OR 97070-1000

Getting Started

Getting Started

The AWVG1 Wideband Video Generator module is designed to be installed in the TG 2000 Signal Generation Platform.

The module generates wideband analog signals for use in television systems. This 30 MHz bandwidth generator is capable of 12-bit precision. The primary function of the module is to provide zone plate and sweep signals. Disks containing test signal libraries for these types of signals are provided with this manual.

See Figure 1–1 for a diagram of the module's internal structure.
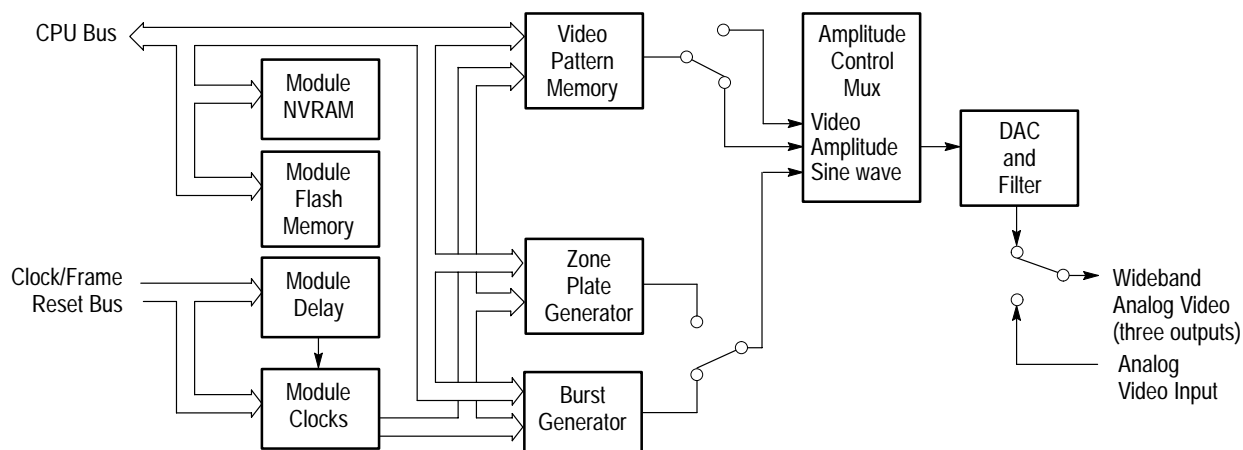
Figure 1–1: Simplified block diagram of the AWVG1 Generator module

The module is a single-channel generator, which outputs either the internally generated signal or an analog video signal from the rear-panel input on its three output connectors. The rear-panel input is provided for convenience of operation so that the output signal can be switched between the internally generated signal and the external signal, which can come from another source, such as the AVG1 Generator module. There is no loop-through of the external signal when the module output is disabled or when the power is off.

For internally generated signals, output signal data is obtained from either the signal memory or the zone plate generator. The basic signal contains luminance information only, so burst is generated and multiplexed in at the appropriate time.

The module's memory architecture is run-length encoded. This allows signals that have redundancy to occupy a smaller space, or conversely more complex

signals in the same space. For signals with no redundancy, there is enough memory for 30 unique lines of signal data.

This module provides the following signal types: line and field sweeps with frequency markers (fixed and variable), zone plates, multipulses, multibursts, and pulse and bars. Front panel control of sweep marker frequency and sweep start and stop frequencies is provided.

Accessories

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

Table 1–1: Standard and Optional Accessories

Accessory	Typo of Accessory	Part Number
AWVG1 Wideband Video Generator User Manual	Standard	070-9051-XX
T-10 Torx Tip	Standard	003-1604-XX
Screws (2 ea.)	Standard	211-0725-XX
Blank rear panel	Standard	333-4113-XX
AWVG1 Wideband Video Generator Service Manual	Optional	070-9302-XX

Configuration

This module does not require any configuration.

Functional Check

Perform the following procedure to determine if the module is operating correctly. For this procedure, you will need a television monitor to view the generator signals.

1. If the module is not installed in the TG 2000 mainframe, use the installation procedures in *Appendix D: Hardware Installation*.

2. Cycle instrument power. The mainframe runs a self test on all modules.

    To determine if the self test was successful, push the **Module** button and see if the AWVG1 module icon appears. If you have more than one AWVG1 Generator module installed, check the slot number on the display to be sure the module you are checking appears.

3. If necessary, install signal sets into the module using the procedure on page D–6. Be sure that you have the Bullseye signal installed.

4. Connect your monitor to the Output 1 BNC connector on the AWVG1 Generator module rear panel, and terminate the monitor's loop-through connector in 75 Ω.

5. Terminate the AWVG1 Generator module outputs 2 and 3 in 75 Ω. (This is necessary for the module self cal.)

6. Wait 20 minutes for the instrument to warm up.

7. 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.

    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. If the Self Cal fails, contact your Tektronix representative for assistance.

8. Push the **Modules** front-panel button and touch **AWVG1** on the display.

9. Select a signal set that is compatible with your monitor, and then touch the **Zoneplate** icon to select the Bullseye signal as the output signal. Selecting the signal automatically ensures that the module output is enabled.

10. Adjust your monitor to view the signal. Check that a circle signal appears, similar to the signal shown in Figure 1–2.
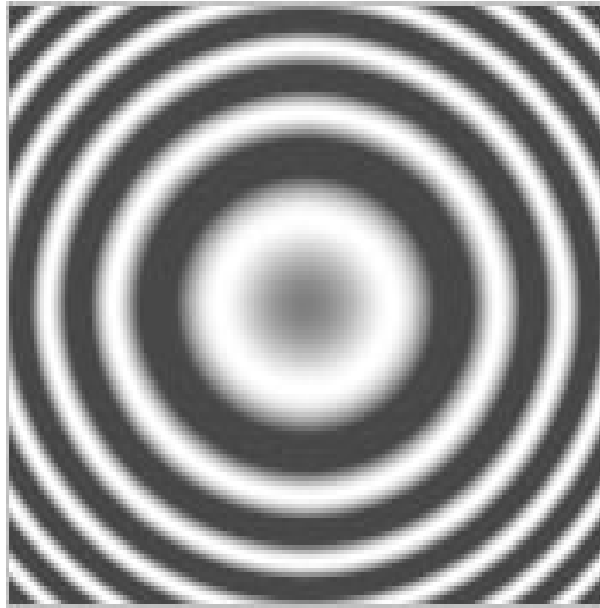
Figure 1–2: Bullseye signal as displayed on a television monitor

11. Move the output cable to each of the BNC output connectors to ensure that the signal appears correctly.

12. Move the output cable back to Output 1.

13. Select a different zone plate test signal and check that the displayed signal changes. You only need to do this on Output 1.

14. Check the AWVG1 External Input as follows:

    a. Using a 75 Ω coaxial cable, connect a television test signal from a source such as an AVG1 module, to the AWVG1 module External Input.

    b. Check the output of the AWVG1 module on the television monitor in pulse cross mode. Check that the signal is displayed correctly. Check that the appropriate burst for your video format is present in the signal.

This concludes the functional check.

Operating Basics

Functional Overview

This section provides an overview of the AWVG1 Generator module. If you are not familiar with the operation of the TG 2000 Signal Generation Platform, refer to the *TG 2000 Signal Generation Platform User Manual* before reading this section.

Figure 2–1 shows the module's menu structure.
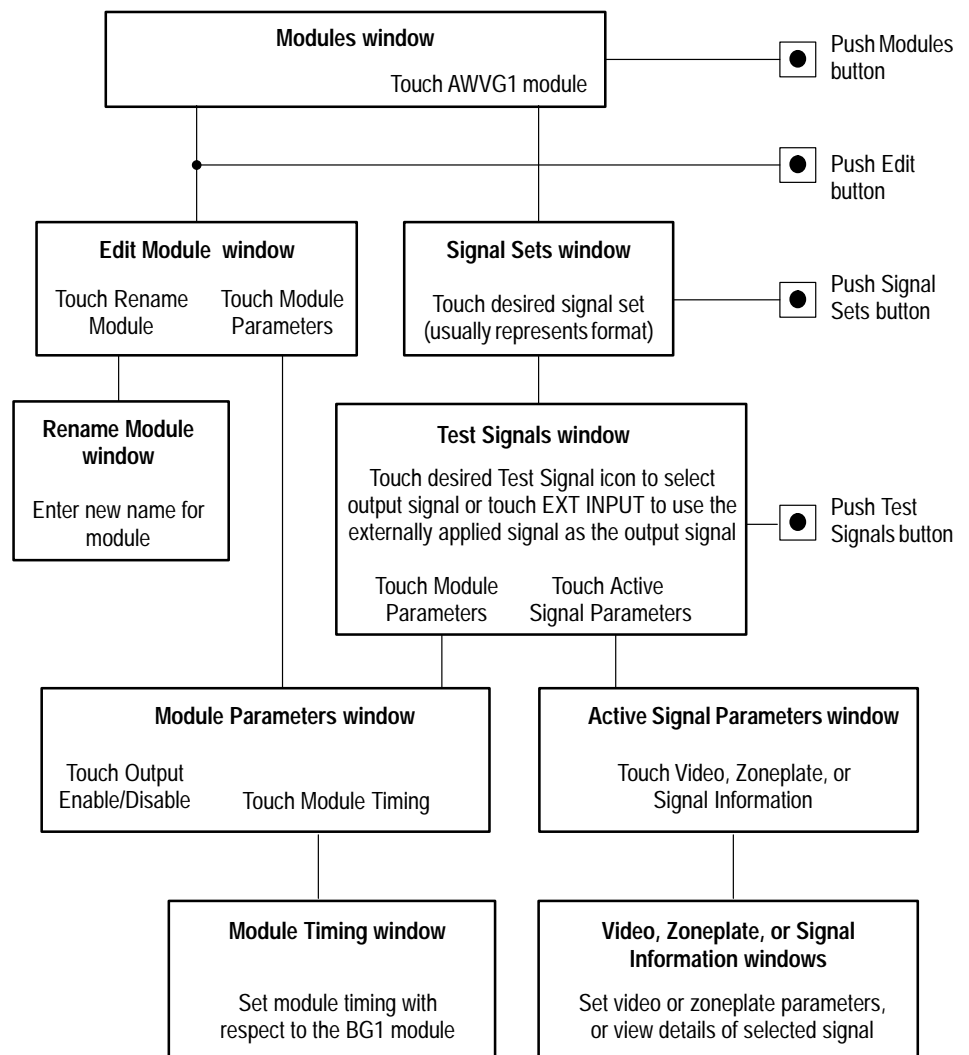
Figure 2–1: Basic menu structure for the module

Outputs

The three BNC output connectors for this module all supply the same output signal. For information on how to select the output signal, refer to *Select the Output Signal* on page 2–5.

Input

The BNC input connector is compensated for 75 Ω. This input is provided so that you can use the output of another module (such as the AVG1 Generator module) as the output signal for the AWVG1 Generator module. To do this, you must select External Input as the AWVG1 Generator module output signal. For information on how to do this, refer to *Select the Output Signal* on page 2–5.

Online Help

Push the front-panel **HELP** button to display a help window. The help window describes the AWVG1 Generator module window you were using when you pushed HELP.

If a help window is longer than the display, you can scroll through the help text using the Navigation arrow keys. To exit the help window, touch **Quit**.

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

- Module parameters

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

Equipment Hookup

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

Power On and Select the Module

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

1. Set the rear-panel power switch to the **ON** position.

2. Press the front-panel **POWER** switch if necessary.

3. Wait for a few seconds as the mainframe executes confidence tests on the mainframe and modules. Check for any error messages that might appear.

4. When self tests are complete, the instrument displays icons representing the generator modules. If an installed module is not represented, refer to *Troubleshooting* in the *AWVG1 Wideband Video Generator Service Manual*.

NOTE. When the platform is shipped from the factory, the module is named AWVG1:X where X represents the slot number in which the module is installed. However, you can edit the module name by selecting the module and then pushing the Edit button. The TG 2000 Signal Generation Platform User Manual *provides more information.*

---

5. Since you have just powered on the mainframe, the Modules window (shown below) is displayed. To select the module at other times, push the front-panel **Modules** button to access this window.
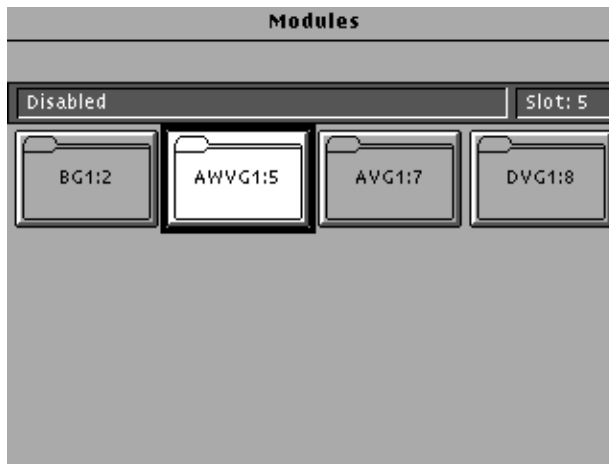
a. Touch the module icon on the display (or push the **Signal Sets** button if the desired icon is already highlighted). The installed signal sets for the module appear. Selections you make after this will pertain to the AWVG1 Generator module.

Select the Output Signal

You can select any of the AWVG1 Generator module signals that are loaded in your instrument to be the output signal, supplied on the three rear-panel outputs. To select the output signal, follow these steps:

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 D–6.
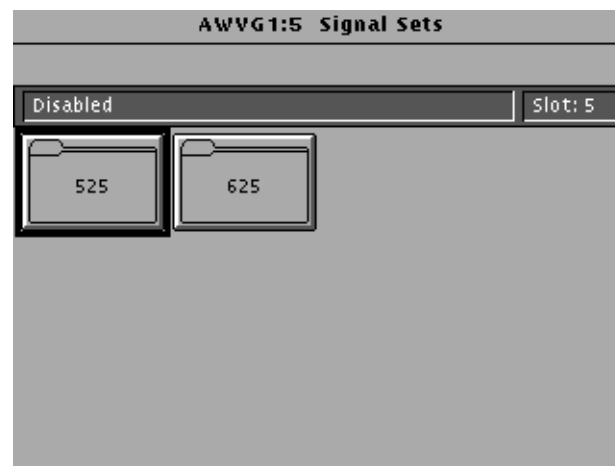
2. Touch the desired signal set on the display. The Test Signals window for the selected signal set appears. In the following example, 525 is selected.
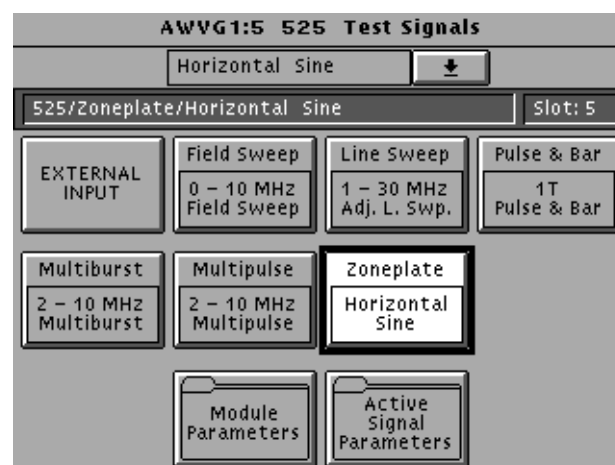
3. Each test signal icon in the Test Signals window represents one or more signals that the module can generate. In this example, the Zoneplate test signal icon is selected, and the Horizontal Sine signal is being generated.

4. To change to another zone plate signal, use one of the following methods:

   a. Touch the **Zone Plate** repeatedly to browse through all available signals.

   b. Touch the combo box below the window title (or rotate the Navigation knob) to display a list of all the signals for the selected icon, as shown in the following example. (_Horizontal Sine is a user-generated signal.)
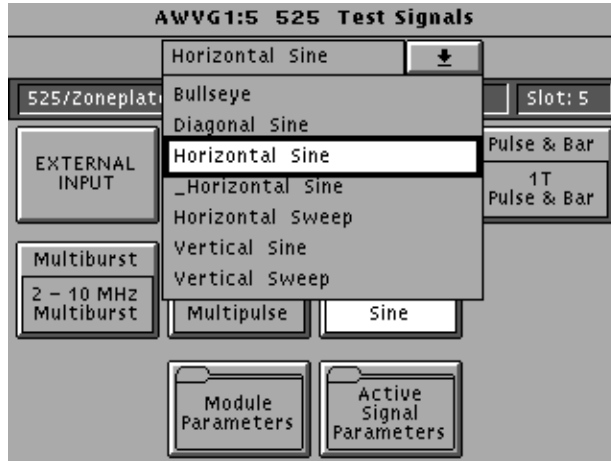
   c. To select a signal from the list, rotate the Navigation knob to move the cursor to that signal, and then press the front panel **Select** key. In the following example, the selected output signal is Horizontal Sine, but the cursor has been moved to Vertical Sine. Pressing the **Select** key will select Vertical Sine as the output signal.
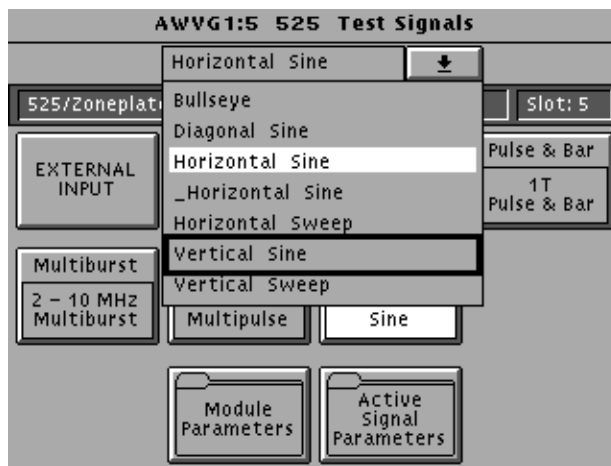
5. To change to a different signal type, such as Multiburst, touch the corresponding icon on the display. Then select the signal as shown in step 4.

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.

7. If you want to use the signal on the rear-panel input as the output signal, touch the **EXTERNAL INPUT** icon to highlight it. For example, you can connect a coaxial cable from the output of the AVG1 Generator module to the input of the AWVG1 Generator module, and then select EXTERNAL INPUT. This will supply the AVG1 Generator module signal as the output on the AWVG1 Generator module.

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 AWVG1 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.
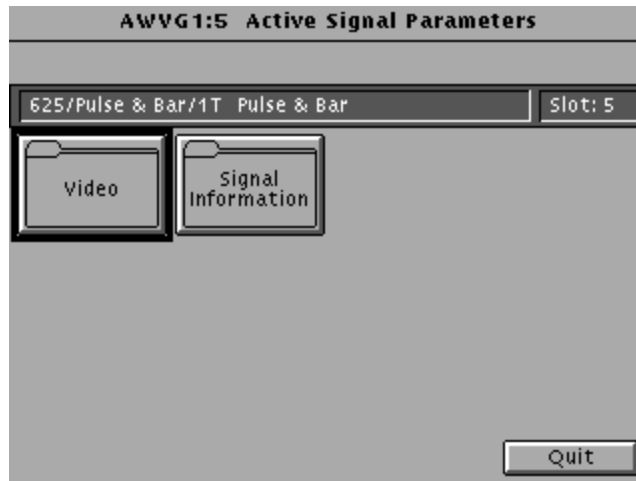
Signal Information   You can view detailed information about the selected signal.

1. In the Active Signal Parameters window, shown on page 2–8, touch **Signal Information**.

2. View the signal information, as shown in the following illustration.
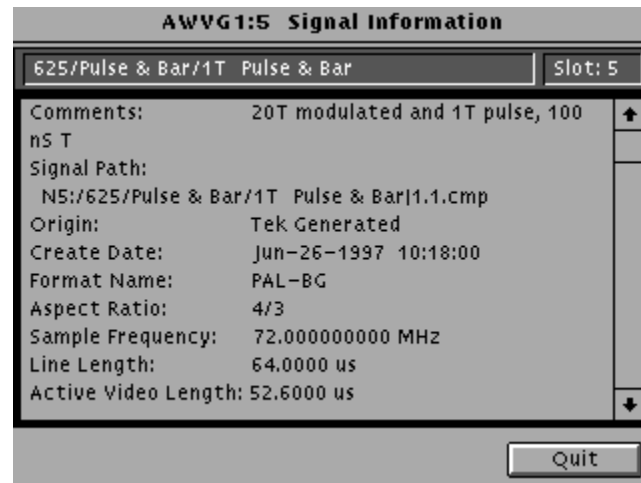
Video Parameters   By making and saving changes to the video parameters, you can create a new signal that is based on the selected signal. Changes you make affect only the new signal. To change the video parameters settings, perform the following steps:

1. Push the **Test Signals** button. In the Test Signals window, select the 1 – 30 MHz Adjustable Line Sweep signal. This signal has five frequency markers that you can adjust.
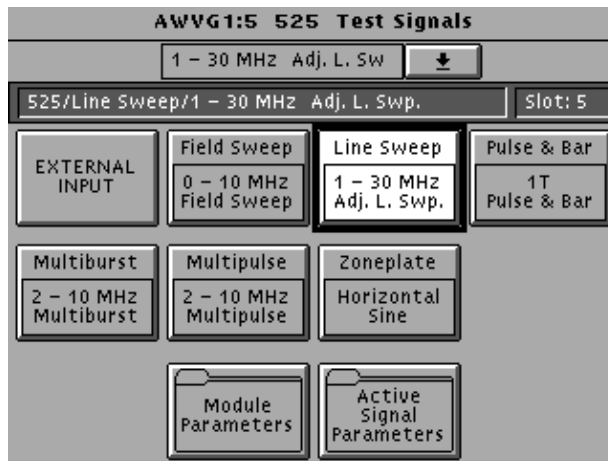
2. Touch **Active Signal Parameters** at the bottom of the window. The Active Signal Parameters window appears, as shown on page 2–8. Touch the **Video** icon.

3. The Video Parameters window appears. Select the parameter you want to change using the Navigation cursor keys. The example below shows Marker 3 selected.
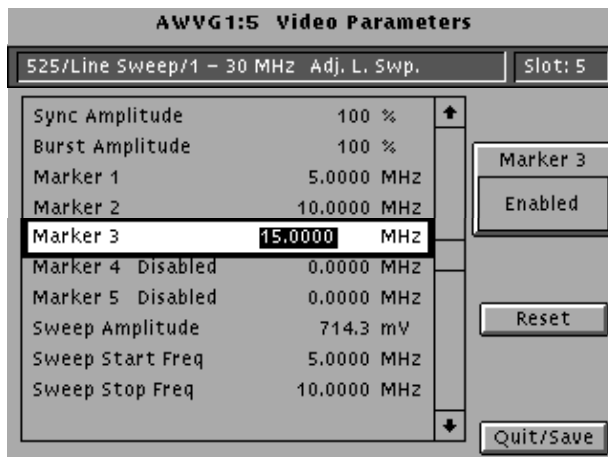
*NOTE. Changes to certain parameters cause changes to other parameters. To return all values to their state when the Video Parameters window was opened, touch **Reset** on the display.*

4. Enter a value using the Navigation knob or keypad. This will adjust the selected parameter for the currently selected test signal.

5. Sync Amplitude and Burst Amplitude must be set to 0% or 100%.

6. For horizontal sweep and field sweep signals, set the sweep parameters (Sweep Amplitude, Sweep Start Freq and Sweep Stop Freq).

7. Horizontal sweep signals can have adjustable markers. To change marker settings, use the Navigation cursor keys (up/down arrows) to move to the desired marker and press the **Select** key to select the marker. Use the knob or keypad to set the frequency. Touch the **Marker X** icon (X represents the number of the currently selected marker) to enable or disable the marker.

NOTE. When two or more markers overlap, only one marker will appear on the waveform; the others will be blanked.

8. Field sweep signals do not support adjustable markers. However, some field sweep signals have fixed markers. You can alter the marker frequencies by changing the sweep start and stop frequency. This is because the markers are at 1/6, 2/6, 3/6, 4/6, and 5/6 of the total sweep. For example, start with a field sweep signal that has a 0 to 30 MHz sweep and markers at 5, 10, 15, 20, and 25 MHz. If you change the sweep stop to 6 MHz, the markers will be at 1, 2, 3, 4, and 5 MHz.

9. When all desired parameters are set, touch **Quit/Save**. If you made changes, a popup menu asks you to select **Save As** or **Quit**.

10. Touch **Save As**. A text entry window appears, showing the current signal name preceded by an underscore. (All user-defined signals are preceded by an underscore, and you cannot delete it.)
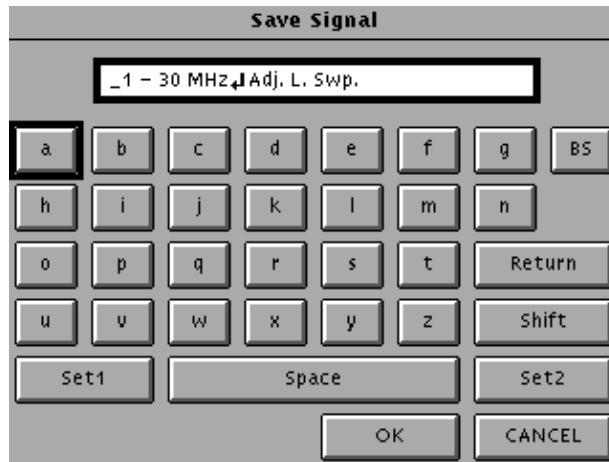
11. To save the signal under the displayed name, touch **OK**. To rename the signal, delete the displayed name using the backspace key **(BS)**.

12. Enter the new name. Touch **Set 1** or **Set 2** to display additional sets of characters. Touch **Shift** to display a lower case or upper case alphabet. In the following example, **Set 1** was used to enter an exclamation mark.
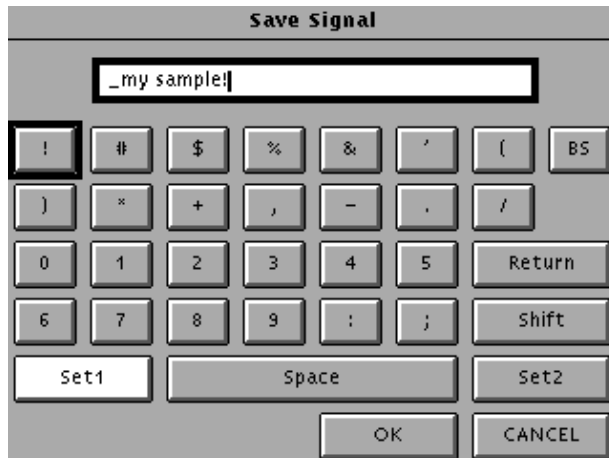
13. When you have entered the desired text, touch **OK.** Now you have a new signal defined by the parameters you set.

Zone Plate Test Signal   By making and saving changes to the zone plate parameters, you can create a new signal that is based on the selected signal. Changes you make affect only the new signal. For more information on Zone Plate Signals, refer to *Appendix C*.

NOTE. You can also define zone plate signals using the SDP2000 Signal Development Program (Version 2.0 and up). Refer to the SDP2000 online help.

To change the zone plate coefficients, perform the following steps:

1. Push the **Test Signals** button. In the Test Signals window, touch the Zone Plate icon to select the zone plate signal you want to modify. (This procedure uses the 625 Bullseye signal.)
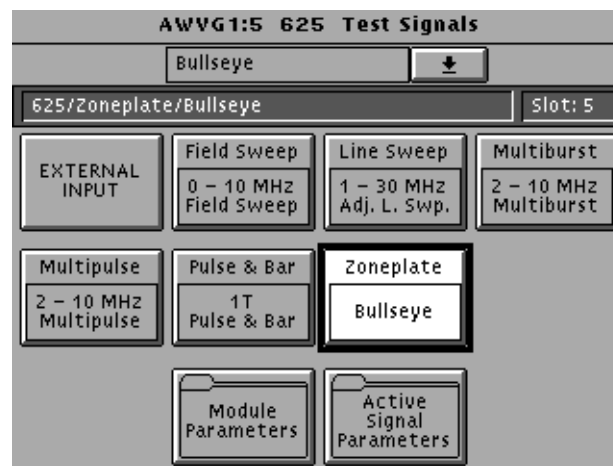
2. Touch the Active Signal Parameters icon at the bottom of the window. The Active Signal Parameters window appears, as shown on page 2–8.

3. Touch the **Zone Plate** icon. The Zone Plate Parameters window appears, as shown below.

```
          AWVG1:5  Zone Plate Parameters

 625/Zoneplate/Bullseye                    Slot: 5

  Circle Frequency    50.00      c/aph   ↑
    KX  (H freq)         -33.34 c/aph
    KX  2 (H sweep)       50.03 c/aph2       ┌─────────┐
    KXY (V ch H freq)      0.00 c/aph2       │ T Reset │
    KY  (V freq)         -25.00 c/aph        ├─────────┤
    KY  2 (V sweep)       50.00 c/aph2       │ Disabled│
  K  (phase)            0.00000 cyc          └─────────┘
  KXT (T ch H freq)        0.0 c/aph/s
  KYT (V ch V freq)        0.0 c/aph/s       ┌─────────┐
  KT  (T freq)          0.0000 c/s           │  Reset  │
  KT  2 (T sweep)         0.00 c/s2   ↓      └─────────┘

                                             ┌─────────┐
                                             │Quit/Save│
                                             └─────────┘
```
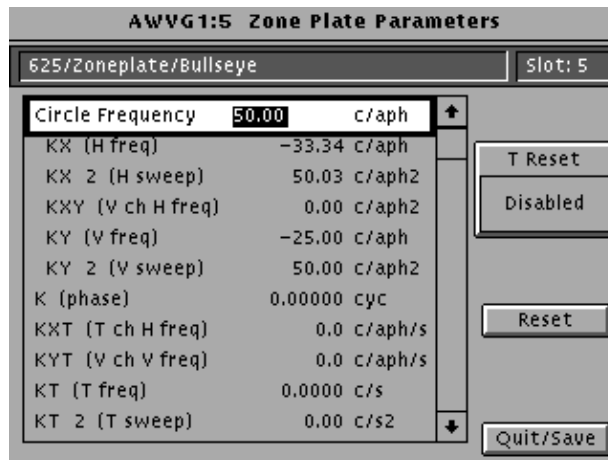
Because you selected a standard zone plate signal, a Pattern Control Parameter appears at the top of the list of parameters (Circle Frequency in this case). This parameter controls the basic pattern frequency by adjusting a set of dependent parameters, which are indented on the display. In this example, the Circle Frequency parameter has been selected by pressing the front-panel Select key.

4. Change parameters and save a new signal as follows:

    a. To see how the module informs you of a change to the Pattern Control Parameter, press the Navigation arrow to move the cursor down to **KX (H freq)**. Rotate the Navigation knob. A popup menu will warn you that the Pattern Control Parameter will become invalid. This means that the signal will change shape. Touch **OK** to continue.

    b. With the KX parameter still selected, press the **9** key on the keypad, followed by the **Enter** key to change the parameter value to 9 c/aph.

    c. If you touch **T Reset**, it will enable or disable the temporal movement of the zone plate signal you create.

    d. Touch **Quit/Save**. A dialog box will be displayed; touch **Save As** to name the new signal you have created. You will be using the same screen that was used on page 2–12. This will not modify the original Bullseye signal, but will create a new signal based on the Bullseye signal.

    e. After you name the new signal, you can see the new name displayed in the status bar. Note that there is no Pattern Control Parameter, and that there are no dependant (indented) parameters.

f. Go to the Test Signals window and select the **Bullseye** signal again. Go back to the zone plate Parameters window, and note that the Circle Frequency reappears, with the five dependent parameters.

g. Go back to the Test Signals window and select a different zone plate signal, such as H Sine. Now go to the zone plate Parameters window and note the dependent parameters for that signal.

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 AWVG1 Generator module, 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 appears, as shown below.
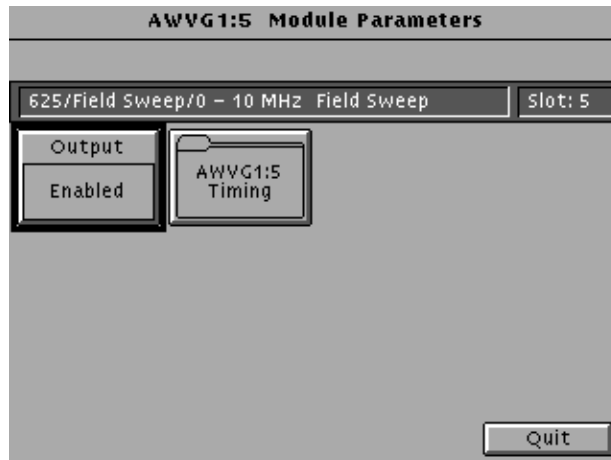
4. Another way to access this window is as follows:

    a. Push the **Modules** button.

    b. Ensure that the module is highlighted.

    c. Push the **Edit** button.

    d. Touch **Module Parameters**.

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 2–16) appears.

4. Touch the **Output** icon to toggle the state of the module's output signal.

5. Touch **Quit** to exit.

Timing

You can set the horizontal and vertical timing of the AWVG1 Generator module with respect to the BG1 Generator module, using the Module Parameters window. Changes you make to timing affect all signals for the AWVG1 Generator module. To set the timing, perform the following steps:

1. In the Module Parameters window, shown on page 2–16, touch the module timing icon. The Timing window appears.
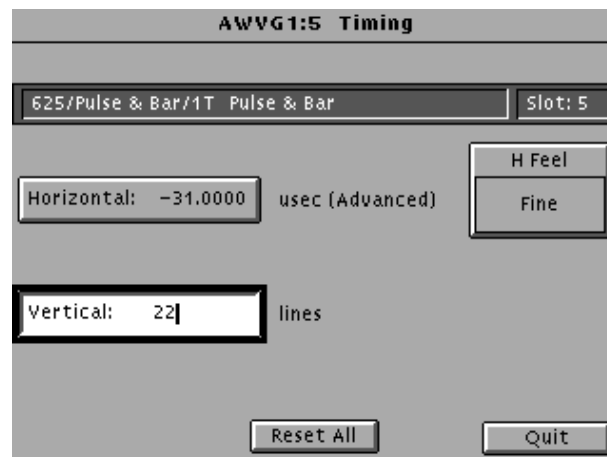
2. Set the horizontal timing of this module with respect to the BG1 Generator module as follows:

   a. Touch **H Feel** to select **Coarse**. (A front-panel knob increment is now equal to a full cycle of the sample clock, typically 72 MHz.) Rotate the navigation knob to select the approximate value; rotate counter-clockwise to advance the timing, or clockwise to delay the timing.

   b. Touch **H Feel** to select **Fine**. (Knob increments are now subclock cycles.) Rotate the knob to select the final value.

    c. To enter a specific value, use the keypad and then press the **Select** key. (The default is 0.000 μsec.)

3. Set the vertical timing of this module with respect to the BG1 Generator module by performing the following steps. (The default is 0 lines.)

    a. Touch **Vertical** on the display.

    b. Rotate the Navigation knob counter-clockwise to advance the timing or clockwise to delay the timing.

    c. To enter a specific value, use the keypad and then press the **Select** key.

NOTE. When you enter more than 1 line of horizontal advance or delay, the vertical timing is advanced or delayed.

4. If you want to set horizontal and vertical values to zero, touch **Reset All**.

5. When you have made all desired changes, touch **Quit** to exit the Timing window.

6. Touch **Quit** to exit the Module Parameters window. All changes are saved.

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 AWVG1 Wideband Video Generator module.

Programming Model

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

Addressing Module Test Signals

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

1. Select the module to be addressed before executing any commands. Many of the commands used by the TG 2000 Signal Generation Platform 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 that have a :STEP node can accept either a numeric value or they can accept a string argument that refers to the :STEP increment.

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

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

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

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

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

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

Argument Example   The following example demonstrates the effect of each of the arguments when used with a step value.

1. :INSTrument:SELect "AWVG1:#" selects the AWVG1 Generator module located in the slot number indicated by the "#" symbol.

2. :OUTPut:STATe ON enables the module and displays the loaded test signal.

3. :SOURce:ZONE:KX -5.98 sets the zone plate K_X parameter (horizontal frequency) to –5.98 cycles per active picture height (c/aph).

4. :SOURce:ZONE:KX2 8.5 sets the zone plate K_X^2 parameter (horizontal sweep) to 8.5 cycles per active picture height squared (c/aph^2).

5. :SOURce:ZONE:KXY 0 sets the zone plate K_{XY} parameter (vertical change in horizontal frequency) to 0.00 cycles per active picture height squared (c/aph^2).

6. :SOURce:ZONE:KY -4.50 sets the zone plate K_Y parameter (vertical frequency) to –4.50 cycles per active picture height (c/aph).

7. :SOURce:ZONE:KY2 8.99 sets the zone plate K_Y^2 parameter (vertical sweep) to 8.99 cycles per active picture height squared (c/aph^2).

8. :SOUR:MVID:MARK1 1000.0 sets the first frequency marker to 1 MHz.

9. :SOUR:MVID:MARK2 2000.0 sets the second frequency marker to 2 MHz.

10. :SOUR:MVID:MARK5 5000.0 sets the fifth frequency marker to 5 MHz.

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 TG 2000 Signal Generation Platform 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.
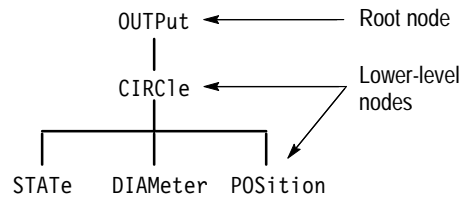
Figure 3–1: Example of SCPI subsystem hierarchy

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 about 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 module's commands in the following groups:

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

- OUTPut

- SENSe

- SOURce

Entries followed by questions marks are queries; those without question marks are commands. Entries followed by a question mark in parentheses (?) 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 (enabled or disabled)
:OUTPut:SOURce(?)	Set or query the source of the AWVG1 output signal (internal or external)

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 of the module with respect to the rest of the instrument
:SENSe:CORRection:MDELay:VERTical(?)	Set or query vertical time delay of the module with respect to the rest of the instrument

Source

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

Table 3–4: :SOURce commands

Command	Description
:SOURce:MVIDeo:SYNC(?)	Set or query the amplitude of the sync pulse
:SOURce:MVIDeo:BURST(?)	Set or query the color burst amplitude
:SOURce:SWEep:AMPLitude(?)	Set or query the sweep signal amplitude
:SOURce:SWEep:FREQuency:STARt(?)	Set or query the frequency of the sweep start
:SOURce:SWEep:Frequency:STOP(?)	Set or query the frequency of the sweep end point
:SOURce:SWEep:MARKer5:FREQuency(?)	Set or query the frequency of frequency markers 1 through 5
:SOURce:SWEep:MARKer5:STATe(?)	Set or query the state of frequency markers 1 through 5
:SOURce:ZONE:FREQuency(?)	Set or query the value of the zone plate frequency
:SOURce:ZONE:AMPLitude(?)	Set or query the value of the zone plate amplitude
:SOURce:ZONE:K(?)	Set or query the value of the K parameter
:SOURce:ZONE:KX(?)	Set or query the value of the KX parameter
:SOURce:ZONE:KX2(?)	Set or query the value of the KX2 parameter
:SOURce:ZONE:KXT(?)	Set or query the value of the KXT parameter
:SOURce:ZONE:KXY(?)	Set or query the value of the KXY parameter
:SOURce:ZONE:KY(?)	Set or query the value of the KY parameter
:SOURce:ZONE:KY2(?)	Set or query the value of the KY2 parameter
:SOURce:ZONE:KYT(?)	Set or query the value of the KYT parameter
:SOURce:ZONE:KT(?)	Set or query the value of the KT parameter
:SOURce:ZONE:KT2(?)	Set or query the value of the KT2 parameter
:SOURce:ZONE:TRESet:STATe(?)	Set or query the state of the T parameter

OUTPut Subsystem

The OUTPut subsystem enables the actual output of the AWVG1 Generator module. The OUTPut subsystem commands may release resources controlled by the signal manager or the clock manager.

NOTE. The module must be selected with the INSTrument subsystem prior to using these commands. For more information, refer to page 3–2.

A detailed description of the AWVG OUTPut commands follows the Command Tree.

Command Tree

```
:OUTPut
  :STATe      <Boolean>
  :SOURce     EXTernal | INTernal
```

:OUTPut:STATe(?)

Use this command to set or query the state of the AWVG1 Generator module.

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: ON

Related Commands None

:OUTPut:SOURce(?)

Use this command to set or query the source (internal or external) of the AWVG1 Generator module output signal.

Syntax   :OUTPut:SOURce<char>
:OUTPut:SOURce?

Parameters

Command	Query Response
<char> = EXTernal	EXT
INTernal	INT

Default Value   None

Errors and Events   None

Dependencies   None

Examples   Command: :OUTP:SOUR INT

Query: :OUTP:SOUR?

Response: INT

Related Commands   OUTPut:STATe, :MMEM:LOAD:SIGNal.
The :MMEM:LOAD:SIGNal command loads a signal to the module (output signal) and sets the OUTPut:SOURce to internal. See the *TG 2000 Signal Generation Platform User Manual* for detailed information about the :MMEM commands.

SENSe Subsystem

The SENSe subsystem commands adjust the timing of the module in relation to the rest of the TG 2000 Signal Generation Platform by correcting the module delay. The BG1 Generator module is the reference.

A detailed description of the AWVG SENSe commands follows the Command Tree.

Command Tree

```
:SENSe
  :CORRection
    :MDELay
      :VERTical  <numeric_value>
      :HORizontal  <numeric_value>
```

:SENSe:CORRection:MDELay:VERTical(?)

Use this command to set or query the vertical time delay of the module.

The query returns an integer value even if the command used a floating point value. Fractional parts are ignored.

Settings will be retained through power cycle.

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

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR1>

Default Value   1

Errors and Events   None

Dependencies   None

Examples

Command: :SENS:CORR:MDEL:VERT 12

Query: :SENS:CORR:MDEL:VERT?

Response: 12

Related Commands   :SENSe:CORRection:MDELay:HORizontal

:SENSe:CORRection:MDELay:HORizontal(?)

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

Argument units are in microseconds. Arguments that exceed the horizontal time value adjust the vertical delay to accommodate the requested delay.

Settings will be retained through the power cycle.

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

Parameters

Command	Query response
`<numeric_value> = <NRf>`	`<NR2>`

Default Value   0.00

Errors and Events   None

Dependencies   None

Examples
Command: `:SENS:CORR:MDEL:HOR 23.0`

Query: `:SENS:CORR:MDEL:HOR?`

Response: `23.0`

Related Commands   :SENSe:CORRection:MDELay:VERTical

SOURce Subsystem

The SOURce subsystem commands control the AWVG1 Generator module signal source. They can enable the sync and burst, as well as adjust the sweep and zone plate parameters. When a K factor command contains a 2, it signifies a squared parameter. For example, KX2 signifies KXX.

A description of the AWVG1 Generator module SOURce commands follows the Command Tree.

Command Tree

```
:SOURce
    :MVIDeo
        :SYNC                       <numeric_value>
        :BURSt                      <numeric_value>
    :SWEep
        :AMPLitude                  <numeric_value>
        :FREQuency:STARt            <numeric_value>
        :FREQuency:STOP             <numeric_value>
        :MARKer5:FREQuency          <numeric_value>
        :MARKer5:STATe              <Boolean>
    :ZONE
        :FREQuency                  <numeric_value>
        :AMPLitude                  <numeric_value>
        :K                          <numeric_value>
        :KX                         <numeric_value>
        :KX2                        <numeric_value>
        :KXT                        <numeric_value>
        :KXY                        <numeric_value>
        :KY                         <numeric_value>
        :KY2                        <numeric_value>
        :KYT                        <numeric_value>
        :KT                         <numeric_value>
        :KT2                        <numeric_value>
        :TRESet:STATe               <Boolean>
```

:SOURce:MVIDeo:SYNC(?)

Use this command to set or query the amplitude of the sync pulse. Units are percent.

Sync amplitude has only two values: 0.00 and 100.0 percent. Arguments greater than 0.00 will be adjusted to 100.0. Units are percent.

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

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   100.0

Errors and Events   None

Dependencies   None

Examples

Command: `:SOUR:MVID:SYNC 0`

Query: `:SOUR:MVID:SYNC?`

Response: `0.0`

Related Commands   None

:SOURce:MVIDeo:BURSt(?)

Use this command to set or query the amplitude of the burst pulse. Units are percent.

Burst level has only two values: 0.00 and 100.0 percent. Arguments greater than 0.00 will be adjusted to 100.0.

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

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   100.0

Errors and Events   None

Dependencies   None

Examples   Command: `:SOUR:MVID:BURS 0`

Query: `:SOUR:MVID:BURS?`

Response: `0.0`

Related Commands   None

:SOURce:MVIDeo:SWEep:AMPLitude(?)

Use this command to set or query the amplitude of the sweep signal. Units are millivolts.

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

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   714.3

Errors and Events   None

Dependencies   The default value is based on the source file of the active signal.

Examples   Command: :SOUR:SWE:MVID:AMPL 90

Query: :SOUR:SWE:MVID:AMPL?

Response: 90.0000

Related Commands   None

:SOURce:SWEep:FREQuency:STARt(?)

Use this command to set or query the frequency of the sweep start point. Units are megahertz.

Syntax
```
:SOURce:SWEep:FREQuency:STARt <numeric_value>
:SOURce:SWEep:FREQuency:STARt?
```

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   0.0

Errors and Events   None

Dependencies   None

Examples

Command:	`:SOUR:SWE:FREQ:STAR 15`
Query:	`:SOUR:SWE:FREQ:STAR?`
Response:	`15.0000`

Related Commands   None

:SOURce:SWEep:FREQuency:STOP(?)

Use this command to set or query the frequency of the sweep end point. Units are megahertz.

Syntax :SOURce:SWEep:FREQuency:STOP <numeric_value>
:SOURce:SWEep:FREQuency:STOP?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value 10.00

Errors and Events None

Dependencies None

Examples Command: :SOUR:SWE:FREQ:STOP 23

Query: :SOUR:SWE:FREQ:STOP?

Response: 23.0000

Related Commands None

:SOURce:SWEep:MARKer5:FREQuency(?)

The 5 in the command represents the marker number. You can use this command to set or query the frequency of frequency markers 1 through 5. Units are megahertz.

Syntax
:SOURce:SWEep:MARKer5:FREQuency <numeric_value>
:SOURce:SWEEP:MARKer5:FREQuency?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   0.0

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:SWE:MARK3:FREQ 5.0

Query: :SOUR:SWE:MARK3:FREQ?

Response: 5.0000

Related Commands   None

:SOURce:SWEep:MARKer5:STATe(?)

The 5 in the command represents the marker number. You can use this command to enable or disable the display of frequency markers 1 through 5. You can use the query to determine the state of frequency markers 1 through 5.

Syntax
```
:SOURce:SWEep:MARKer5:STATe <Boolean>
:SOURce:SWEEP:MARKer5:STATe?
```

Parameters

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

Default Value None

Errors and Events None

Dependencies None

Examples

Command: `:SOUR:SWE:MARK4:STAT ON`

Query: `:SOUR:SWE:MARK4:STAT?`

Response: 1

Related Commands None

:SOURce:ZONE:FREQuency(?)

Use this command to set or query the zone plate frequency. For the H Sine and H Sweep signals, the units are megahertz. For other zone plate signals, the units are c/aph (cycles per average picture height).

Syntax
```
:SOURce:ZONE:FREQuency <numeric_value>
:SOURce:ZONE:FREQuency?
```

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples

Command: `:SOUR:ZONE:FREQuency 1.00`

Query: `:SOUR:ZONE:FREQuency?`

Response: `1.0`

Related Commands   None

:SOURce:ZONE:AMPLitude(?)

Use this command to set or query the zone plate amplitude. Units are millivolts.

Syntax
```
:SOURce:ZONE:AMPLitude <numeric_value>
:SOURce:ZONE:AMPLitude?
```

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable.

Errors and Events   None

Dependencies   The results of this command are based on the type of zone plate originally defined. Other K factors will automatically be adjusted with this command. If the dependent K factors are adjusted separately, then the original zone plate type no longer applies.

Examples
Command: `:SOUR:ZONE:AMPL 100`

Query: `:SOUR:ZONE:AMPL?`

Response: `100.0`

Related Commands   None

:SOURce:ZONE:K(?)

Use this command to set or query the zone plate K parameter. Units are cycles.

Syntax :SOURce:ZONE:K <numeric_value>
:SOURce:ZONE:K?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples Command: :SOUR:ZONE:K 0.4

Query: :SOUR:ZONE:K?

Response: 0.4

Related Commands None

:SOURce:ZONE:KX(?)

Use this command to set or query the zone plate KX parameter. Units are c/aph (cycles per average picture height).

Syntax
```
:SOURce:ZONE:KX <numeric_value>
:SOURce:ZONE:KX?
```

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples
Command: `:SOUR:ZONE:PAR:KX 98.6`

Query: `:SOUR:ZONE:PAR:KX?`

Response: `98.6`

Related Commands   :SOURce:ZONE:KX2

:SOURce:ZONE:KX2(?)

Use this command to set or query the zone plate KX2 parameter. Units are c/aph2 (cycles per active picture height squared).

Syntax :SOURce:ZONE:KX2 <numeric_value>
:SOURce:ZONE:KX2?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples Command: :SOUR:ZONE:PAR:KX2 −45

Query: :SOUR:ZONE:PAR:KX2?

Response: −45.0

Related Commands :SOURce:ZONE:KX

:SOURce:ZONE:KXT(?)

Use this command to set or query the zone plate KXT parameter. Units are c/aph/s (cycles per active picture height per second).

Syntax   :SOURce:ZONE:KXT <numeric_value>
:SOURce:ZONE:KXT?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:ZONE:PAR:KXT 0.0

Query: :SOUR:ZONE:PAR:KXT?

Response: 0.0

Related Commands   :SOURce:ZONE:TRESet

:SOURce:ZONE:KXY(?)

Use this command to set or query the zone plate KXY parameter. Units are c/aph2 (cycles per active picture height squared).

Syntax
```
:SOURce:ZONE:KXY <numeric_value>
:SOURce:ZONE:KXY?
```

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value　　Not applicable

Errors and Events　　None

Dependencies　　None

Examples

Command:　　`:SOUR:ZONE:PAR:KXY 0.02`

Query:　　`:SOUR:ZONE:PAR:KXY?`

Response:　　`0.02`

Related Commands　　None

:SOURce:ZONE:KY(?)

Use this command to set or query the zone plate KY parameter. Units are c/aph (cycles per average picture height).

Syntax   :SOURce:ZONE:KY <numeric_value>
:SOURce:ZONE:KY?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:ZONE:KY −75

Query: :SOUR:ZONE:KY?

Response: −75.0

Related Commands   :SOURce:ZONE:KY2

:SOURce:ZONE:KY2(?)

Use this command to set or query the zone plate KY2 parameter. Units are c/aph2 (cycles per active picture height squared).

Syntax   :SOURce:ZONE:KY2 <numeric_value>
:SOURce:ZONE:KY2?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:ZONE:KY2 -35

Query: :SOUR:ZONE:KY2?

Response: -35.0

Related Commands   :SOURce:ZONE:KY

:SOURce:ZONE:KYT(?)

Use this command to set or query the zone plate KYT parameter. Units are c/aph/s (cycles per active picture height per second).

Syntax   :SOURce:ZONE:KYT <numeric_value>
:SOURce:ZONE:KYT?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:ZONE:KYT 0.00

Query: :SOUR:ZONE:KYT?

Response: 0.00

Related Commands   :SOURce:ZONE:TRESet

:SOURce:ZONE:KT(?)

Use this command to set or query the zone plate KT parameter. Units are c/s (cycles per second).

Syntax :SOURce:ZONE:KT <numeric_value>
:SOURce:ZONE:KT?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples Command: :SOUR:ZONE:KT −0.1

Query: :SOUR:ZONE:KT?

Response: −0.1

Related Commands :SOURce:ZONE:KT2
:SOURce:ZONE:TRESet

:SOURce:ZONE:KT2(?)

Use this command to set or query the zone plate KT2 parameter. Units are c/s2 (cycles per second squared).

Syntax
:SOURce:ZONE:KT2 <numeric_value>
:SOURce:ZONE:KT2?

Parameters

Command	Query response
<numeric_value> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples

Command: :SOUR:ZONE:KT2 −0.24

Query: :SOUR:ZONE:KT2?

Response: −0.24

Related Commands   :SOURce:ZONE:KT
:SOURce:ZONE:TRESet

:SOURce:ZONE:TRESet:STATe(?)

Use this command to enable or disable the effect of the T parameters for the zone plate signal.

Syntax
:SOURce:ZONE:TRESet:STATe <Boolean>
:SOURce:ZONE:TRESet:STATe?

Parameters

Command	Query response
<Boolean> = <NRf>	<NR2>

Default Value   Not applicable

Errors and Events   None

Dependencies   None

Examples   Command: :SOUR:ZONE:TRES:STAT ON

Query: :SOUR:ZONE:TRES:STAT?

Response: 1

Related Commands   :SOURce:ZONE:KT
:SOURce:ZONE:KT2
:SOURce:ZONE:KXT
:SOURce:ZONE:KYT

Appendices

Appendix A: Specification

This section contains the specifications and certifications for the AWVG1 Wideband Video Generator module. All specifications listed here are guaranteed unless labeled "typical" in the Characteristics column. Typical specifications are provided for your convenience, but are not guaranteed.

Refer to the *TG 2000 Signal Generation Platform User Manual* for a list of environmental specifications.

Electrical Specifications

Table A–1: AWVG1 Generator module outputs

Characteristics	Description
Amplitude Errors	
Absolute Amplitude	$\leq \pm 1\%$ at 700 mV (outputs 2 and 3 relative to output 1)
Relative Amplitude	$\leq \pm 0.5\ \%$ (outputs 2 and 3 relative to output 1)
Delay Errors, typical	
Output to Output Delay	≤ 1 ns (outputs 1 and 3 relative to output 2)
Group Delay	≤ 3 ns to 20 MHz ≤ 5 ns to 30 MHz
SCH Phase Accuracy	$\leq \pm 1.25$ ns ($\pm 1.6°$ @ 3.58 MHz, and $\pm 2°$ @ 4.43 MHz)
Frequency Response	$\pm 1\%$ to 20 MHz $\pm 2\%$ to 28 MHz $\pm 3\%$ to 30 MHz
Pulse Ringing, typical	2T5 pulse $\leq 0.5\%$ peak 1T5 pulse $\leq 1.0\%$ peak T/2–5 pulse $\leq 1.0\%$ peak
Line Time Distortion	$\leq 0.5\%$ peak (measured with field square wave)
Field Time Distortion	$\leq 0.5\%$ peak (measured with field square wave)
K Factor 2T5 Pulse	$\leq 0.5\%$ peak
Pulse/Bar Ratio, typical	1:1 within 1.0% (measured with 2T pulse or T pulse)
DC Offset	≤ 10 mV
In-band Signal/Noise Ratio	≥ 60 dB to 6 MHz (unweighted, as measured on the VM700) No spurs above 55 dB, 6 to 30 MHz
Out-of-band Signal/Noise Ratio	≥ 50 dB from 30 MHz to 300 MHz

Table A–1: AWVG1 Generator module outputs (cont.)

Characteristics	Description
Synchronous noise, typical	≤ 2 mV peak
Return Loss/Output Impedance	≥ 35 dB to 30 MHz (75 Ω)

Table A–2: AWVG1 Generator module switcher input

Characteristics	Description
Amplitude Error	≤ ± 1% (output 1 relative to input)
Frequency Response	± 2% to 6 MHz (output 1 relative to input) ± 4% to 30 MHz (output 1 relative to input)
DC Offset	≤ 10 mV (output 1 relative to input)
Luminance Linearity Error	≤ 0.5%
Differential Gain	≤ 0.5%
Differential Phase	≤ 0.5°
In-band Signal/Noise Ratio	≥ 60 dB to 6 MHz (unweighted, as measured on the VM700) No spurs above 55 dB, 6 to 30 MHz
Out-of-band Signal/Noise Ratio	≥ 50 dB from 30 MHz to 300 MHz
Crosstalk to Output	
From External Source	≤ –60 dB to 6 MHz ≤ –40 dB to 30 MHz
From Internal Source	≤ –60 dB to 6 MHz ≤ –40 dB to 30 MHz
Input Impedance, typical	75 Ω
Input Return Loss	≥ 40 dB to 6 MHz ≥ 35 dB to 30 MHz
Power Consumption	+5 Volts: 8.25 Watts typical -5 Volts: 7.5 Watts typical -2 Volts: 1.2 Watts typical +15 Volts: 0.75 Watts typical -15 Volts: 0.45 Watts typical Battery: 30 μA typical

Certifications

Table A–3: Certifications and compliances

Category	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

Appendix B: SCPI Conformance Information

All commands in the AWVG1 Generator module are based on SCPI Version 1994.0. Table B–1 lists all commands supported by this module in the OUTPut, SENSe, and SOURce command groups. The columns at right show whether or not a command is defined in the SCPI 1994.0 Standard.

For information on other command groups that this module may support, refer to the *TG 2000 Signal Generation Platform User Manual*.

Table B–1: SCPI 1994.0 conformance information

Command				Defined in SCPI	Not defined in SCPI
OUTPut	STATe(?)			✔	
	SOURce(?)				✔
SENSe	CORRection	MDELay	VERTical(?)		✔
			HORizontal(?)		✔
SOURce	MVIDeo	SYNC(?)			✔
		BURSt(?)			✔
	SWEep	AMPLitude(?)			✔
		FREQuency	STARt(?)		✔
		FREQuency	STOP(?)		✔
		MARKer5	FREQuency(?)		✔
		MARKer5	STATe(?)		✔
	ZONE	FREQuency(?)			✔
		AMPLitude(?)			✔
		K(?)			✔
		KX(?)			✔
		KX2(?)			✔
		KXT(?)			✔
		KXY(?)			✔
		KY(?)			✔
		KY2(?)			✔
		KYT(?)			✔
		KT(?)			✔
		KT2(?)			✔
		TRESet(?)			✔

Appendix C: Zone Plates

This appendix provides reference information about zone plate patterns. Refer to the *Operating Basics* section of the manual for instructions on using the AWVG1 Generator module to generate zone plate signals.

Zone Plate Patterns

Zone plate video test patterns are called zone plates because the classical circular pattern looks like an optical zone plate (which uses the principles of Fresnel diffraction to focus and intensify light). However, the name has been applied to a variety of stationary and moving monochrome test patterns.

Figure C–1 shows two enlarged optical zone plates. The white areas are transparent and the black areas are opaque. The precise spacing of the rings focuses and intensifies light that passes through the plate.
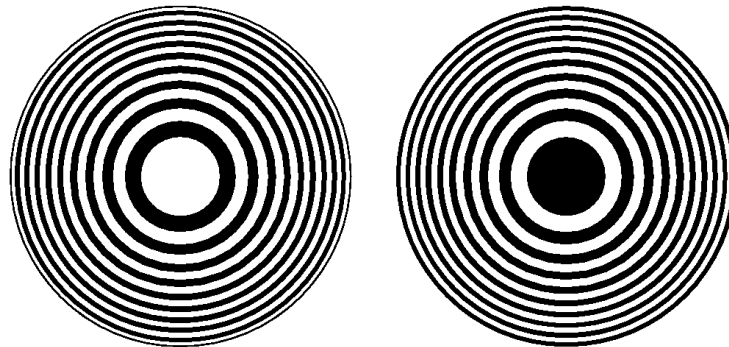
Figure C–1: Optical zone plates (enlarged)

Zone plate patterns are made up of sinusoidal variations in luminance, with the peaks of the sine waves resulting in white areas on the video screen and the wave troughs shown as gray or black.

The cycles can occur in all three of the video dimensions: horizontally (along each line of the picture), vertically (down the video frame), and temporally (with time). The three dimensions are often referred to as X, Y, and T, respectively.

The luminance of any point in the picture (physically on the screen and in time) is determined by the value of sine at that particular point; the value of sine

follows from the phase of the cycle at that point. By the definition of a zone plate, the phase of any point is determined by the following equation:

$$\Phi_{xyt} = k_\Phi + k_X(x) + k_Y(y) + k_T(t)$$
$$+ k_{XT}(xt) + k_{YT}(yt) + k_{XY}(xy)$$
$$+ \frac{1}{2}k_{X^2}(x^2) + \frac{1}{2}k_{Y^2}(y^2) + \frac{1}{2}k_{T^2}(t^2)$$

where x, y, and t are the coordinates of the point in question and k_Φ, k_X, k_Y, k_T, k_{XT}, k_{YT}, k_{XY}, k_{X^2}, k_{Y^2}, and k_{T^2} are constants.

Zone Plate Parameters

You define zone-plate patterns in the AWVG1 Generator module using coefficients of ten parameters that correspond to the constants in the preceding equation. Although the possibilities are virtually endless, most common zone plates are defined with only one or two parameters, with the coefficients of the remaining parameters kept at zero.

The zone-plate parameters are discussed in the order that they appear in the zone plate Parameters window. The adjustment range of most of the coefficients depends on the characteristics (sample frequency and lines per field) of the active video standard.

Pattern Control Parameter

TG 200 display: Circle Frequency
Diag. Frequency
Horz. Frequency
H. Sweep Frequency
Vert. Frequency
V. Sweep Frequency

Each standard zone plate signal has a pattern control parameter. The AWVG1 Generator module generates six standard zone plate signals; circle frequency, diagonal frequency, horizontal frequency, horizontal sweep frequency, vertical frequency, and vertical sweep frequency. The standard zone plate signals are discussed in more detail on page C–9.

In the Zone Plate Parameters window, the pattern control parameter appears at the top of the list, followed by dependent (indented) parameters. The pattern control parameter controls the basic pattern frequency by adjusting the dependent parameters. If you adjust one of the dependent parameters individually, the pattern control parameter will become invalid. In Figure C–2, the zone plate Parameters window shows the 625 Bullseye signal (selected through the Test

Signals window). In this example, circle frequency is the pattern control parameter, and the dependent parameters are: K_X, K_X^2, K_{XY}, K_Y, and K_Y^2.
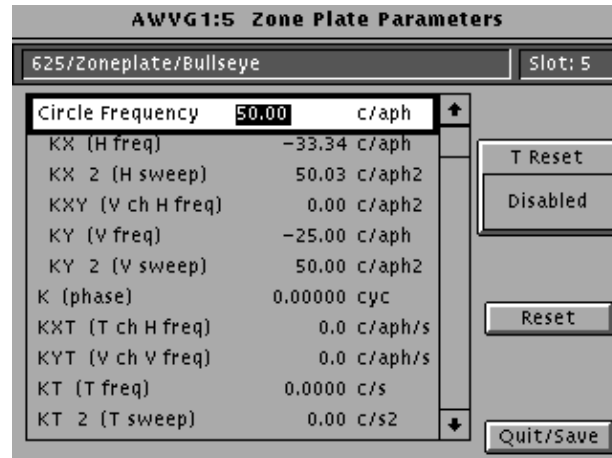

Figure C–2: Zone plate Parameters window

K_X Parameter

TG 2000 display: KX (H freq)
Units: c/aph (cycles per average picture height)

K_X denotes the initial constant horizontal frequency of the pattern. To see the effects of changing this coefficient, set a waveform monitor to view the video lines. The units are cycles per active picture height. The number of cycles in a line depends on the width-to-height aspect ratio of the active video standard. For example, $K_X = 9.0$ results in approximately 12 cycles per line in a standard with a 4:3 aspect ratio; the same setting yields about 16 cycles per line when the ratio is 16:9.

To estimate the equivalent absolute frequency of the sine wave (to convert from c/aph to c/s, or Hz), use the formula

$$f_{eq} \cong K_X \times R_{l:av} \times R_{aspect} \times N_{lines} \times f_{frame}$$

where

R_{aspect} is the aspect ratio (width ÷ height),
N_{lines} is the number of lines per frame,
f_{frame} is the frame rate, and
$R_{l:av}$ is the ratio of line length to the length of the active video.

The maximum frequency is (±) half of the active video standard's sampling frequency. In standards that use a 72.0 MHz clock, for example, the maximum value of K_X will correspond to a sine frequency of 36.0 MHz.

The Horizontal Sine zone plate signal is a K_X-only zone plate (see Figure C–3).
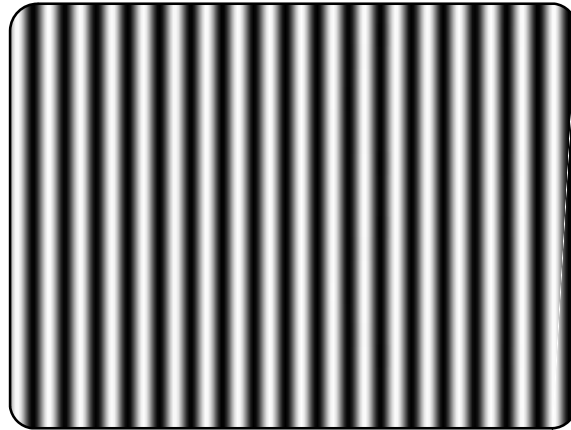
Figure C–3: A KX-only zone plate

$K_X{}^2$ Parameter

TG 2000 display: KX 2 (H sweep)

Units: c/aph^2 (cycles per active picture height squared)

This parameter sets the increase (or decrease) in the horizontal frequency as a function of position along the video line. When $K_X{}^2$ alone is applied, the result resembles a common sweep test signal. Again, use a waveform monitor to look at (all) the video lines to see the effects of $K_X{}^2$. When K_X is 0.0, setting $K_X{}^2$ to 9 will result in the line waveform changing from DC to 9 c/aph in the width equal to one active picture height.

As with K_X, the ending frequency depends on the aspect ratio of the active video standard. For example, in a 16:9 standard with a K_X of –9.0, a $K_X{}^2$ coefficient of 9.0 causes the waveform to increase to DC in one aph. The frequency increases to approximately 7.0 c/aph by the end of the line.

Use this formula to calculate K_X and $K_X{}^2$ terms for a sweep with the DC point at mid-screen:

$$K_X = \left(-\tfrac{1}{2}R_{aspect}\right) \times K_{X^2}$$

where R_{aspect} is the aspect ratio (width/height) of the active video standard.

The Horizontal Sweep zone plate signal is a $K_X{}^2$-only zone plate (see Figure C–4).
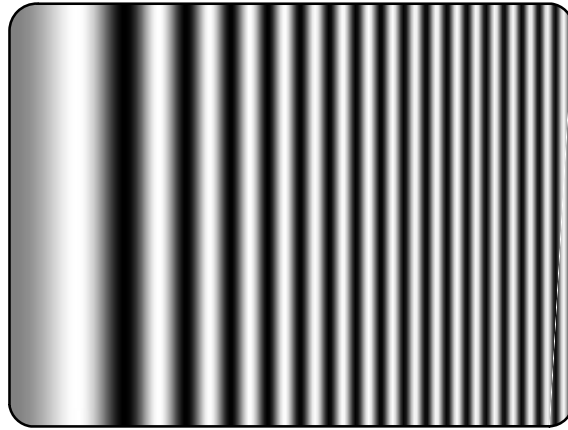
Figure C–4: A K_X^2-only zone plate

K_{XY} Parameter

TG 2000 display: KXY (V ch H freq)
Units: c/aph^2

K_{XY} sets the change in horizontal frequency as a function of the vertical position in the video frame. To see the effects of this parameter, set the waveform monitor to view one selected line only. Then, with K_{XY} set to approximately 25 (all other coefficients left at 0.0), look at line waveforms from top to bottom of the frame. The horizontal frequency increases slightly on each succeeding line, reaching 25 c/aph on the last line of active video. The result can be thought of as a vertically arranged sweep signal.

The Field Sweep zone plate signal is a K_{XY}-only zone plate.

K_Y Parameter

TG 2000 display: KY (V Freq)
Units: c/aph

K_Y sets the initial vertical frequency of the pattern (it is analogous to K_X rotated 90° clockwise). To see the effects of this parameter, set it to a low number and adjust a waveform monitor to view one or two fields of the AWVG1 Generator module output. The variation in the DC voltage level from line to line will give the field waveform the appearance of a sampled sine wave, especially at a K_Y of around 5 to 10 c/aph (the sinusoid can become difficult to discern at higher frequencies). Note that in the Y (vertical) parameters, the c/aph units translate directly into visible cycles down the frame.

The Vertical Sine zone plate signal is a K_Y-only zone plate (see Figure C–5).

Figure C–5: A K$_Y$-only zone plate

K$_Y$^{2} Parameter

TG 2000 display: KY 2 (V sweep)
Units: c/aph^2

This parameter sets the increase (or decrease) in vertical frequency down the frame. (K$_Y$^{2} compares to K$_X$^{2} as K$_Y$ compares to K$_X$.) To see the effect of K$_Y$^{2}, view the field on a waveform monitor. With KY set to 0.0, a K$_Y$^{2} coefficient of 10 results in the apparent vertical sine wave changing from DC to 10 c/aph from the top of the picture to the bottom.

To center the DC point at mid-screen, set K$_Y$^{2} to –2 times K$_Y$.

The Vertical Sweep zone plate signal is a K$_Y$^{2}-only zone plate (see Figure C–6).

Figure C–6: A KY2-only zone plate

K_Φ Parameter	TG 2000 display:	K (phase)
	Units:	cyc (cycle)
	Range:	–0.5 to 0.5 (default = 0.00000)

$K_\varnothing$ is the initial phase of the pattern; it cannot create a pattern by itself. To see the effects of this adjustment, first set the K_X coefficient to approximately 0.75 and set a waveform monitor to view the line waveform. Then adjust $K_\varnothing$. The sine wave will begin on each line at the selected point in the cycle. Note that 0.25 cycle corresponds to a phase of 90 degrees (or $\pi/2$ radians); recall that the sine of 90° is 1.0 and the sine of –90° is –1.0. When $K_\varnothing = 0.25$, the pattern will begin in the upper left corner of the screen as white; when $K_\varnothing = -0.25$, the beginning will be black.

| K_{XT} Parameter | TG 2000 display: | KXT (T ch H freq) |
| | Units: | c/aph/s (c/aph per second) |

The K_{XT} parameter controls the change in horizontal sine frequency over time. Setting K_{XT} to 1.0, for example, will cause the horizontal frequency to increase by one c/aph each second. If K_X is 0.0, then the frequency will be 10 c/aph after ten seconds, 20 c/aph after twenty seconds, and so forth. The frequency will increase until it reaches the maximum for the active video standard; the phase of the signal will then flip by 180° (the sine wave will become negative) and the frequency will increase through DC, when the cycle will begin again.

| K_{YT} Parameter | TG 2000 display: | KYT (T ch V freq) |
| | Units: | c/aph/s |

The K_{YT} parameter controls the change in vertical sine frequency over time. Setting K_{YT} to 1.0, for example, will cause the vertical frequency to increase by one c/aph each second. If K_Y is initially 0.0, then the frequency will be 10 c/aph after ten seconds, 20 c/aph after twenty seconds, and so forth. The frequency will increase until it reaches the maximum for the active video standard; the phase of the signal will then flip by 180° (the frequency will become negative) and the frequency will increase through DC in a repetitive cycle.

| K_T Parameter | TG 2000 display: | KT (T freq) |
| | Units: | c/s (cycles per second) |

The K_T parameter, if used alone, does not create a pattern. Instead the entire screen cycles (sinusoidally) between white and black. The effect is similar on either line or field display of a waveform monitor.

Typically, a small K_T coefficient is set to add apparent motion to a standard circle, sine wave, or sweep pattern. To see the picture effects of this parameter, select any of the standard zone plates and vary K_T. The K_T coefficient can be positive or negative; the sign will determine the direction of the pattern's motion.

K$_T$2 Parameter

TG 2000 display:	KT 2 (T sweep)
Units:	c/s^2 (cycles per second per second)

This parameter sets the change in temporal frequency over time. If K$_T$ is initially 0.0, setting K$_T$2 to 1.0 results in an apparent K$_T$ of 10.0 after ten seconds, 20.0 after twenty seconds, and so forth. The temporal frequency increases to maximum, returns to 0.0, and repeats the cycle as long as the value of K$_T$2 remains greater than zero.

T Reset

T Reset enables or disables the temporal movement of the zone plate.

Combining Parameters

The 45° Diagonal Sine pattern is generated with equal coefficients for K$_X$ and K$_Y$. In this special case, the diagonal frequency is $\sqrt{2}$ times the vertical and horizontal frequencies.

The Circle is probably the best known zone plate pattern (see Figure C–7). Circular patterns are useful for their predictable color effects in composite (PAL and NTSC) systems and aliasing effects in digital systems. The stationary pattern is the result of non-zero coefficients of K$_X$, K$_{X^2}$, K$_Y$, and K$_{Y^2}$. The apparent motion is created with a small K$_T$. You can use the Circle Frequency parameter to create a circle, or you can follow these rules to create new, centered circular zone plate patterns.

$$K_{X^2} = K_{Y^2}$$

$$K_Y = -\frac{1}{2}K_{Y^2}$$

$$K_X = R_{aspect} \times K_Y$$

where R_{aspect} is the aspect ratio (width/height) of the active video standard.
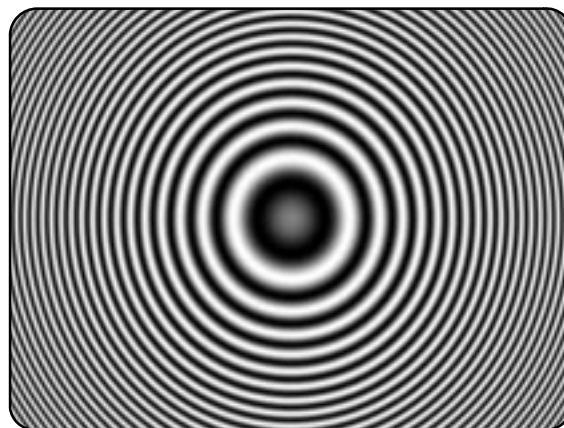
Figure C–7: A Circular zone plate

Standard Zone Plate Signals

The following standard zoneplate signals are generated by the AWVG1 Generator module:

Circle (Bullseye)

The circle frequency is actually the equivalent of the maximum vertical sinusoid frequency at the very top and bottom of the screen (see the discussion of the K_Y^2 parameter earlier in this section). Adjusting the circle frequency has the simple effect of increasing or decreasing the maximum frequency at the outer edges of the pattern. However, this adjustment actually changes the coefficients of five of the ten zone plate parameters in order to keep the pattern round and centered on the screen.

Diagonal Sine

The diagonal frequency is $\sqrt{2}$ times the vertical and horizontal frequencies (c/aph). Adjusting the diagonal sine frequency changes both the K_X and K_Y coefficients.

Horizontal Sine

The horizontal frequency reported on the display is the real time frequency of the sine wave that causes the vertical bar pattern. The maximum frequency is half of the clock frequency used by the generator for the active video standard (for example, 72.0 MHz/2 = 36.0 MHz).

Horizontal Sweep

For horizontal sweep frequencies up to half of the video standard's sampling frequency, f_s, the displayed value is the maximum (or swept to) frequency of the sine wave. For numbers greater than $f_s/2$, dividing the displayed value by the sampling frequency will give the number of complete DC–($f_s/2$)–DC cycles per line. For example, in a standard with sampling frequency of 72.0 MHz, a horizontal sweep frequency of 144 MHz will result in approximately two complete frequency sweeps across the picture.

Vertical Sine

The vertical frequency is actually the K_Y coefficient. The maximum frequency (c/aph) corresponds to the number of active video lines in a field of the active video standard. For example, when a 525/59.94/1:1 standard, which has 484 active lines per field, is output, K_Y can be any value between –484 and 484.

Vertical Sweep

The vertical sweep frequency is actually the K_Y^2 coefficient. For numbers greater than maximum, dividing the displayed value by that maximum will give twice the number of complete DC-max-DC sweeps per field (sweeps = $(K_Y^2/K_Y)/2$). For example, in a standard with 484 lines per field, a vertical sweep frequency of 968 c/aph^2 would result in one complete frequency sweep down the picture.

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 D: Installation

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

■ Preventing component damage

■ Module installation (including signal set installation)

■ Signal backup and module removal

Preventing Component Damage

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

1. Wear a grounded antistatic wrist strap to discharge the static voltage from your body while installing or removing modules from the TG 2000 Platform mainframe.

2. Transport and store modules in a static-protected bag or container.

3. Do not slide the module over any surface.

4. Handle modules as little as possible.

5. Do not touch module components or connector pins.

6. Do not use any devices capable of generating or holding a static charge in the work area where you remove, install, or handle modules.

7. Avoid handling modules in areas that have a floor or work-surface covering capable of generating a static charge.

8. Do not remove the module circuit board assembly from the shield. The shield provides important support and protection for the surface-mount components.

Module Installation

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

Hardware Installation

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

1. Set the TG 2000 Platform mainframe rear-panel power switch to off.

2. Unplug the power cord.

3. Select the slot you will use to install the module. Table D–1 lists the slot restrictions. Figure D–1 shows a sample configuration with slot numbers.

Table D–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
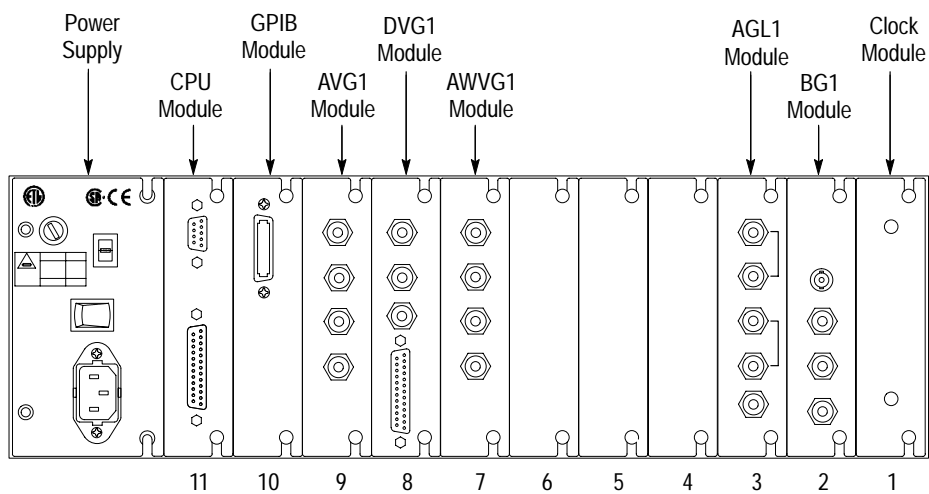
Figure D–1: TG 2000 Platform mainframe rear panel, showing slot numbering

AWVG1 Wideband Video Generator User Manual

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

4. Refer to Figure D–2 and remove or loosen all screws to remove the top cover.
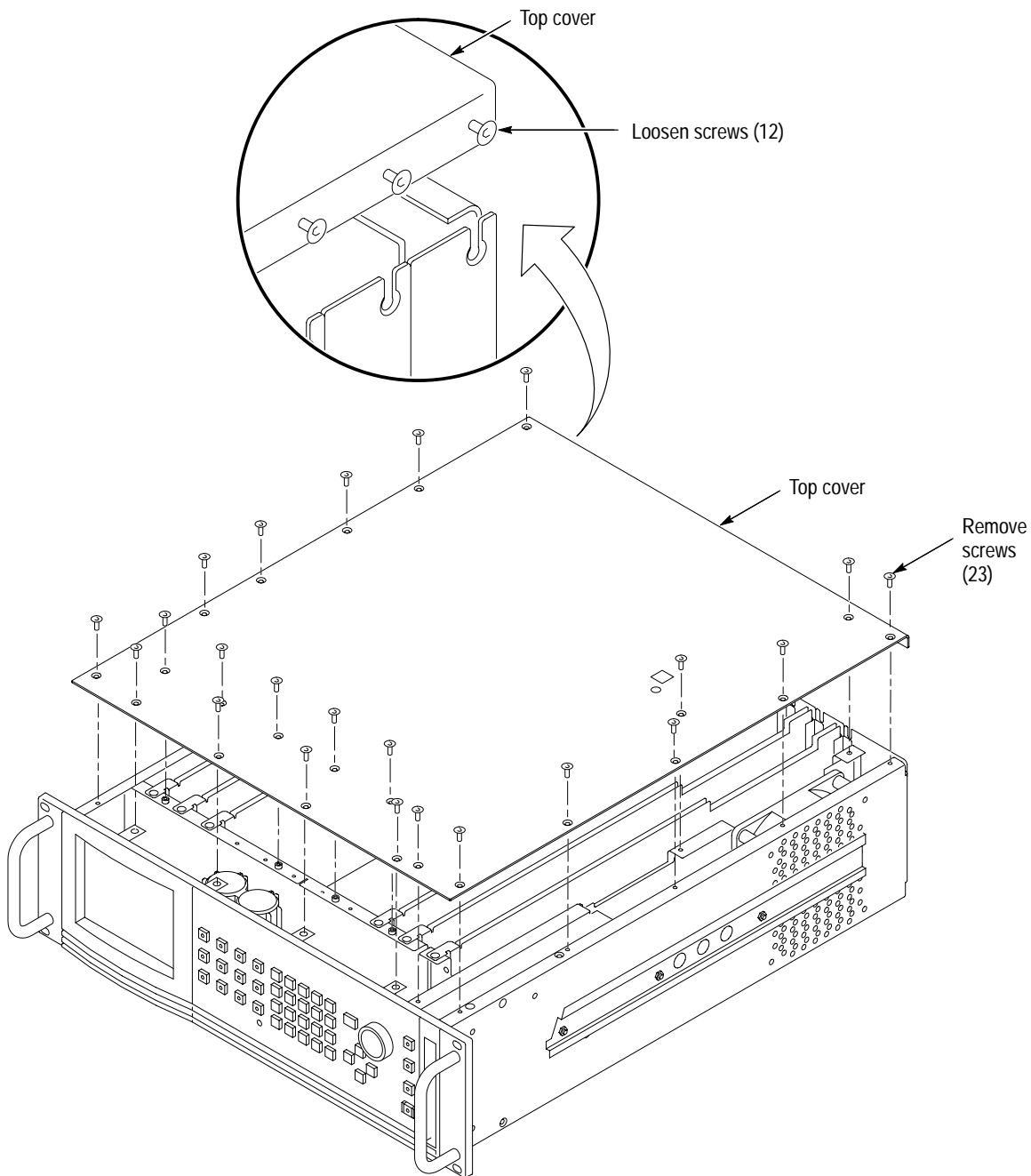
Figure D–2: Top cover removal

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

Loosen screw
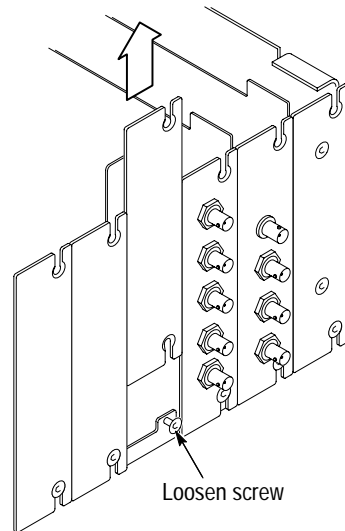
Figure D–3: Rear panel removal

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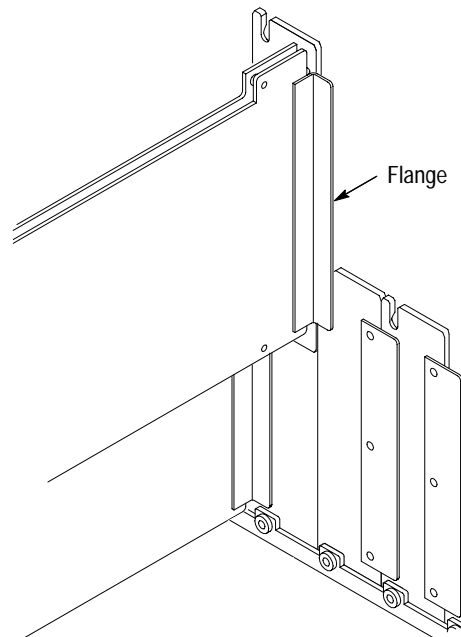
Flange

Figure D–4: Module flange
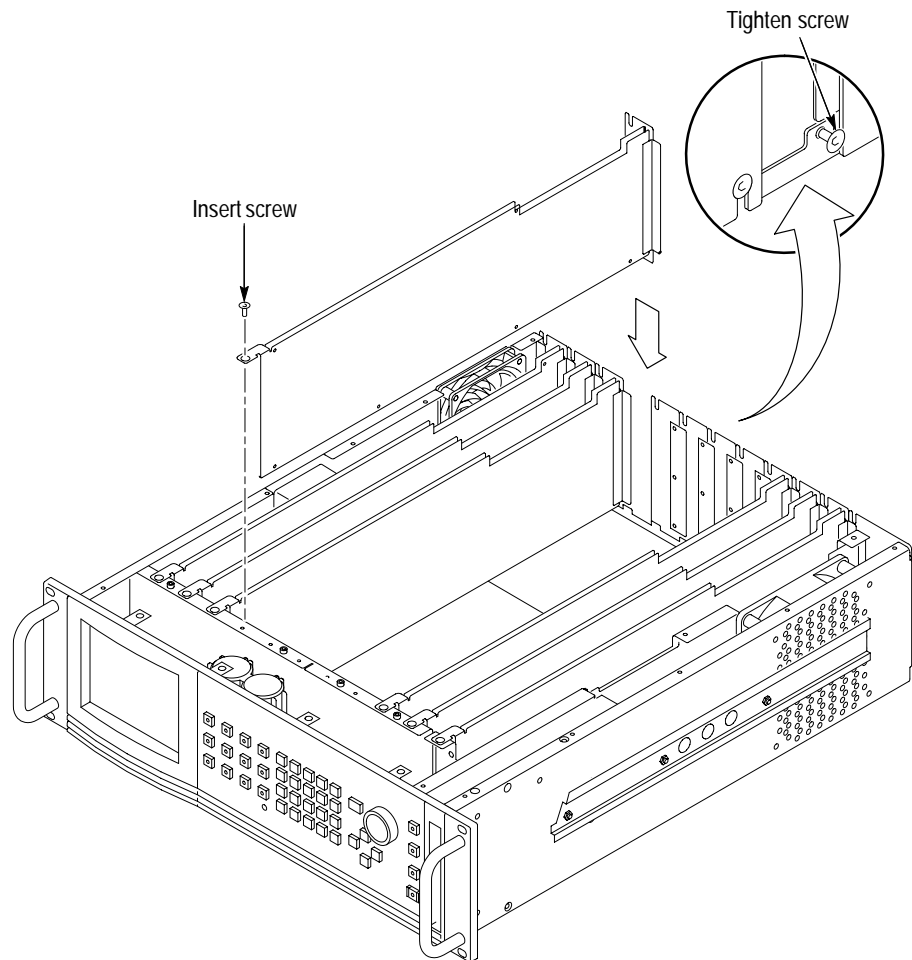
Figure D–5: Module installation

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

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

8. Press down evenly on the module until it is firmly in place.

9. Refer to Figure D–6 and insert and tighten the top screw, which comes with your module, and tighten the rear panel screw.
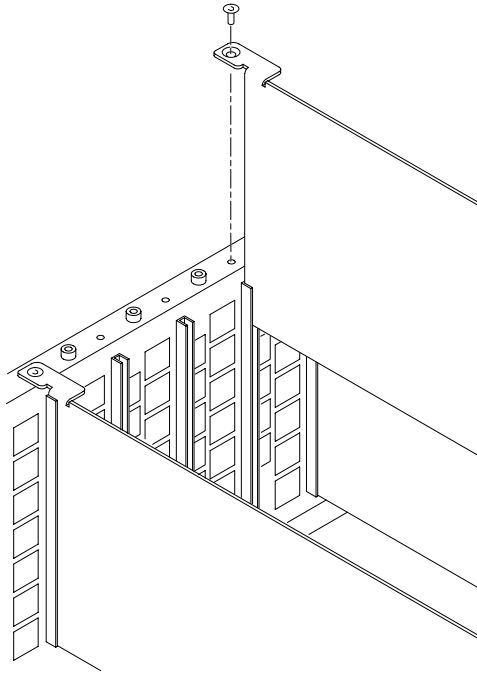
Figure D–6: Top screw

10. Reinstall the top cover and insert and tighten all top cover screws.

11. Plug in the instrument power cord. Power on the mainframe by setting the rear-panel power switch to ON and pressing the front-panel power switch. Wait for the instrument to perform self tests.

12. If you previously moved or removed a module and backed up the signal sets, you can reinstall them now, using the *Signal Set Installation* procedure.

Signal Set Installation   If this module was installed in the TG 2000 Platform mainframe at the factory, signal sets are already installed. If you ordered this generator module separately, you must install signal sets after installing the module. (If you have another AWVG1 Generator module already installed in the platform, the new module you install can share its signal sets, and you do not need to install them again.)

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

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

1. Insert the test signal disk into the TG 2000 Platform mainframe disk drive.

2. Push the **DISK** button.

3. Touch **Add Signals** when the Disk menu appears.

4. Touch **Select Source**.

5. Move the cursor to the .DNL you want to load and push the **Select** button.

6. Select all of the signal sets at the module level and push the **Select** button.

7. Touch **Quit/Load**. The previous menu appears.

8. Touch **Quit/Load** again. The Add Signals window reappears, showing the module as the selected destination.

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

---

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

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

1. Insert the test signal disk into the TG 2000 Platform mainframe disk drive.

2. Push the **DISK** button.

3. Touch **Add Signals** when the Disk menu appears.

4. Touch **Select Source**.

5. Move the cursor to the .DNL you want to load and push the **Select** button.

6. Move the browse ring to a particular test signal and push the **Select** button.

7. Touch **Quit/Load**. The previous menu appears.

8. Touch **Quit/Load** again. The Add Signals window reappears.

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

9. Touch **Select Destination**.

10. Move the cursor to the signal's field and place the cursor where you want the test signal to be installed. Be sure to choose a destination that is one level above the source. Push the **Select** button.

11. Touch **Start Load**. A popup menu tells you when the transfer is complete.

Signal Backup and Module Removal

Before removing a generator module, you should save the signal sets to a disk. The AWVG1 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 **AWVG1**. Use the cursor arrows to select the AWVG1 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 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 D–2 on page D–3.

4. Remove the appropriate rear panel as shown in Figure D–3 on page D–4. Loosen, but do not remove the bottom screw. You will use it later to secure the rear panel.

5. Refer to Figure D–6 on page D–6 and remove the top screw.

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

6. Remove the module. To leave the slot empty, proceed to step 9 of this procedure.

7. To install a module in the empty slot, proceed to *Module Installation* on page D–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.

11. Plug in the instrument power cord.

Glossary and Index

Glossary

APH
Active Picture Height.

Black Burst
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. Also called "color black."

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

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

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

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

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

Frame
Contains all the information required for a complete picture. For interlaced scan systems, there are two fields in a frame.

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

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

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

Modulated
> Implies that chrominance information is present in a television signal. (For example, a modulated ramp has subcarrier on each step.)

Modulation
> A process which allows information to be moved around in the frequency domain in order to facilitate transmission or frequency-domain multiplexing.

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. A standard that provides guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer.

Signal Set
> An arbitrary group of signals.

Temporal
> Of or relating to time, as distinguished from space.

Termination
> The impedance at the end of a transmission line that that matches the impedance of the source and of the line itself. Signal amplitude errors and reflections will result if appropriate termination is not applied. Since video is a 75 Ω system, a 75 Ω terminator must be placed at the end of the signal path.

Y
> Abbreviation for luminance.

Zone Plate Signal
> A signal composed of vertical and/or horizontal patterns that may be dynamic (temporally changing or swept in frequency). Used for testing complex processing technologies.

Index