

User Manual



ENC1
Encoded Clock

071-0298-00

User Manual



ENC1 Encoded Clock

071-0298-00

This document supports firmware version 1.0 and above.



Copyright © Tektronix, Inc. All rights reserved.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

Printed in the U.S.A.

Tektronix, Inc., P.O. Box 1000, Wilsonville, OR 97070-1000

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

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

General Safety Summary	v
Service Safety Summary	vii
Preface	ix
About This Manual	ix
Related Manuals	ix
Contacting Tektronix	x
Getting Started	
Getting Started	1-1
Key Features	1-1
Accessories	1-2
Configuration	1-2
Installation	1-2
Functional Check	1-3
Operating Basics	
Functional Overview	2-1
Outputs	2-2
Online Help	2-2
Operating Procedures	2-3
Power On and Select the Module	2-3
Select the Clock Output Signal	2-4
Set User Clock	2-5
Set User Encoded Clock	2-6
Syntax	
Syntax	3-1
Programming Model	3-1
SCPI Commands and Queries	3-3
Functional Command Groups	3-5
Output	3-5
Source	3-6
:OUTPut Commands	3-7
Command Tree	3-7
:OUTPut:STATe(?)	3-8
:OUTPut:SOURce(?)	3-9
:SOURce Commands	3-11
Command Tree	3-11
:SOURce:FCLOCK2:CLOCK:FREQuency?	3-12
:SOURce:FCLOCK2:CLOCK:CFRatIo?	3-13
:SOURce:FCLOCK2:FRAMe:FREQuency?	3-14
:SOURce:FCLOCK2:FRAMe:CFRatIo?	3-15
:SOURce:ECLOCK:CLOCK:FREQuency(?)	3-16

:SOURce:ECLOCK:CLOCK:CFRatio(?)	3-17
:SOURce:ECLOCK:CLOCK:CFRatio:STEP(?)	3-18
:SOURce:ECLOCK:FRAME:FREQUENCY(?)	3-19
:SOURce:ECLOCK:FRAME:FREQUENCY:STEP(?)	3-20
:SOURce:ECLOCK:FRAME:CFRatio?	3-21
:SOURce:VCLOCK:FRAME:FREQUENCY(?)	3-22
:SOURce:VCLOCK:FRAME:FREQUENCY:STEP(?)	3-23

Appendices

Appendix A: Specifications	A-1
Certifications	A-2
Appendix B: SCPI Conformance Information	B-1
Appendix C: Installation	C-1
Preventing Component Damage	C-1
Module Installation	C-2
Module Removal	C-7
Appendix D: Performance Verification	D-1
Verification Interval	D-1
Required Equipment	D-1
Clock Output	D-2
Frame Output	D-2

Index

List of Figures

Figure 1–1: A sample instrument hookup	1–2
Figure 2–1: Basic menu structure for the ENC1 module	2–1
Figure 2–2: Clock Out window	2–4
Figure 2–3: Set User Clock window	2–5
Figure 2–4: Set User Encoded Clock window	2–6
Figure 3–1: Example of SCPI subsystem hierarchy tree	3–3
Figure C–1: TG 2000 Platform mainframe rear panel, showing slot numbering	C–2
Figure C–2: Top cover removal	C–3
Figure C–3: Rear panel removal	C–4
Figure C–4: Module flange	C–4
Figure C–5: Module Installation	C–5
Figure C–6: Top screw	C–6

List of Tables

Table 1–1: Standard and optional accessories	1–2
Table 1–2: Equipment required for Performance Verification	1–3
Table 3–1: :OUTPut commands	3–5
Table 3–2: :SOURce commands	3–6
Table A–1: Encoded Clock Output	A–1
Table A–2: Clock Output	A–1
Table A–3: Frame Output	A–2
Table A–4: Data Handling Characteristics	A–2
Table A–5: Power	A–2
Table A–6: Certifications and compliances	A–2
Table B–1: SCPI 1994.0 conformance information	B–1
Table C–1: Module slot assignments	C–2
Table D–1: Equipment required for Performance Verification	D–1

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

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 Fire or Personal Injury

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

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

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

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:



CAUTION
Refer to Manual



WARNING
High Voltage



Double
Insulated



Protective Ground
(Earth) Terminal



Not suitable for
connection to
the public telecom-
munications network

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.

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 ENC1 Encoded Clock module.

About This Manual

This manual is composed of the following sections:

- *Getting Started* provides a product description, standard and optional accessories list, and a functional check.
- *Operating Basics* describes the windowed menu interface and how to control the module through the interface in conjunction with the front-panel controls.
- *Syntax and Commands* defines the syntax used in command descriptions, presents a list of all command subsystems, and presents detailed descriptions of all programming commands.
- *Appendices* provides additional information including the electrical specifications, compliances, and hardware installation procedures.

Related Manuals

The following documents are also available:

- The *ENC1 Encoded Clock Module Service Manual* describes how to service the module. You must order this manual 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. 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. You must order this manual separately.
- A module user manual is included with each optional module. Contact your Tektronix representative for a list of generator and special function modules.

Contacting Tektronix

Product Support	<p>For 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</p> <p>Or, contact us by e-mail: tm_app_supp@tek.com</p> <p>For product support outside of North America, contact your local Tektronix distributor or sales office.</p>
Service Support	<p>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 ENC1 Encoded Clock module is an optional module that you can purchase for use in the TG 2000 Signal Generation Platform. The function of this module is to provide an encoded clock to genlock a Tektronix TSG1001 Programmable TV Generator.

This module provides three outputs: CLOCK, FRAME, and ENCODED CLOCK. The clock and frame outputs are similar to the BG1 Black Burst Generator module clock and frame outputs. These are provided for design and research and development applications.

The timing of the outputs is time zero for reference timing. The output timing cannot be delayed; the TSG1001 output is at nominally the same time as the BG1 Black Burst Generator module. Timing offset is available at the system level, using the AGL1 Analog Genlock module timing.

In either encoded or nonencoded clock mode, the ENC1 module can be a programmable clock source for the TSG1001. You can also use an ENC1 module to provide the genlock source for the TSG1001 and PSC1125.

You can install an ENC1 module in any version of TG 2000 Platform main-frame.

Key Features

- Full remote control via GPIB and serial ports
- Encoded clock output to drive a TSG1001 Generator encoded clock input (same function as the SPG1000 encoded clock output)
- Front-panel selection of 74.25/15 and 74.175/14.98501 (74.25/1.001) frequencies as listed in the specifications
- Front panel specification of other encoded clock frequencies and nonencoded clock frequencies with variable clock frequency adjustment.

Accessories

Table 1–1 lists the standard and optional accessories for the module. Standard accessories are included with the module, and optional accessories are available for purchase.

Table 1–1: Standard and optional accessories

Accessory	Type of accessory	Part number
ENC1 Encoded Clock User Manual	Standard	071-0298-XX
T-10 Torx Tip	Standard	003-1604-XX
Screws (2 ea)	Standard	211-0725-XX
Cable (BNO connector)	Standard	174-2355-01
ENC1 Encoded Clock Service Manual	Optional	071-0304-XX

Configuration

The module does not require any hardware configuration.

Installation

The module should be installed by qualified service personnel only. Refer to *Appendix C: Installation* for detailed instructions on how to install the module in the TG 2000 Platform mainframe.

An instrument hookup may include a Tektronix TSG1001 and PSC1125, connected as shown in Figure 1–1. The cable connecting the ENC1 module to the TSG1001 is provided with the ENC1 module. The two cables connecting the TSG1001 to the PSC1125 are supplied with the PSC1125.

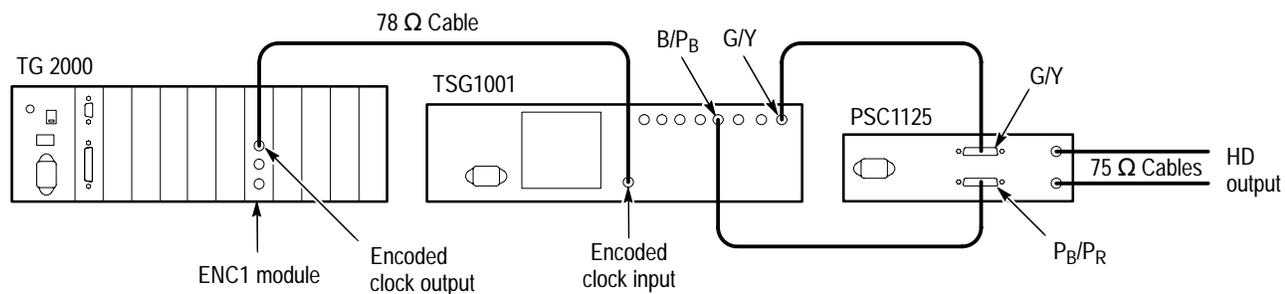


Figure 1–1: A sample instrument hookup

Functional Check

This procedure determines if the encoded clock is operating correctly, which is a good indicator of overall module operation. To check the instrument operation to specifications, proceed to the *Performance Verification Procedure* on page D–1.

If you are unfamiliar with the operation of the module, it may be helpful to refer to Figure 2–1 on page 2–1 while performing this procedure.

Required Equipment For this procedure, you will need a television monitor and a frequency counter or an oscilloscope.

Required Equipment Table 1–2 lists the equipment required for the *Functional Check*.

Table 1–2: Equipment required for Functional Check

Equipment	Example or Tektronix equivalent
Impedance Adapter	Tektronix AMT75
Tektronix BG1 Black Burst Generator module	Installed in the Tektronix TG 2000 Signal Generation Platform
High Precision Oscilloscope	Tektronix TDS784 Series Oscilloscope
1 meter low-loss precision 75 Ω coaxial cable	Tektronix part number 012-0159-00
Wide-band oscilloscope probe	Tektronix P6204 or P6245

Procedure: Check Encoded Clock Output

To check your module, follow these steps:

1. If the module is not installed in the TG 2000 Platform mainframe, install the module, using the installation procedures beginning on page C–2.
2. Use a precision BNC cable to connect the Frame rear-panel BNC to the AMT75. Connect the AMT75 to Channel 1 of the oscilloscope.
3. Set the oscilloscope for trigger on Channel 1, Edge trigger, and 0.2V level normal mode.
4. Set the trigger position to 20%, record length to 2500 with “Fit to screen” on.
5. Set the time per division to 10 ns.
6. Power on the TG 2000 Signal Generation Platform. The platform runs a self test on all modules.
7. To determine if the self test was successful, push the **Modules** button. Check the display for the icon that represents the ENC1 module.

8. Push the **Modules** button and touch the **ENC1** icon on the display.
9. Touch the **74.25M/15Hz** frame preset on the display.
10. Check for a frame pulse that is about 13.5 ns wide.
11. Connect the probe to Channel 2 and set the Vertical to 1 V per div.
12. Clip the probe ground to the clock BNC shell, and touch the probe tip to the male pin in the encoded clock BNC connector.
13. Check for a 74.25 MHz square wave that is about 800 mV to 1 V in amplitude with one missing positive pulse.
14. Touch the probe to the female socket in the ENCODED CLOCK BNC connector.
15. Check for a 74.25 MHz square wave that is about 800 mV to 1 V in amplitude with one missing negative pulse.

**Procedure: Check Clock
Frame Mux**

This procedure checks that the ENC1 Encoded Clock module can access all clock and frame resources. Since the clock and frame resources are assigned dynamically, a BG1 Black Burst Generator module is used to modify resource allocation to allow the ENC1 module to be assigned different resources. You must disable all other modules in the mainframe to allow the ENC1 module to access the clock distribution system. If this will disrupt service, skip this section.

1. Save the system setup as a preset.
2. Perform the following sequence on each module except the ENC1:
 - a. Push the **Modules** button and then touch the module icon on the display.
 - b. Push the **Modules** button again.
 - c. Push the **Edit** button.
 - d. Touch **Module Parameters** on the display.
 - e. Touch **Output** on the display until the message reads **Disabled**.
3. Push the **Modules** button and then select the ENC1 module icon on the display.
4. Touch **15Hz** on the display until the 74.25 MHz clock is selected.
5. Use the *Check Encoded Clock Output* procedure to check that the encoded clock is present and correct on the output.
6. Push the **Utilities** button and then touch **Frame Reset Clients** on the display.

7. Check that the ENC1 module is listed as a client of the left Frame resource. This verifies operation on Frame number 1.
8. Push the **Utilities** button, and then touch **Clock Clients** on the display.
9. Check that the ENC1 module is listed as a client of the left clock resource. This verifies operation on variable clock number 1.
10. Push the **Test Signals** button to return to the ENC1 selection window.
11. Touch **Disable Clock Out** to turn off the ENC1 module.
12. Push the **Modules** button and then touch the BG1 icon on the display.
13. Touch the **PAL Black Burst** on the display until PAL is selected. This uses frame number 1.
14. Touch **Module Parameters**, **Clock Out**, and then **New Clock** on the display.
15. Enter **54M** on the display. This assigns variable clock 1 to the BG1 Generator module at 54 MHz.
16. Push the **Modules** button and then touch the **ENC1** icon on the display.
17. Touch **15Hz frame** on the display until the 74.25 MHz clock is displayed.
18. Use the *Check Encoded Clock Output* procedure to check that the encoded clock is present and correct on the output.
19. Push the **Utilities** button, and then touch **Clock Clients** on the display.
20. Check that the ENC1 module is listed as a client of the right clock resource. This verifies operation on variable clock number 2.
21. Push the **Utilities** button and then touch **Frame Reset Clients** on the display.
22. Check that the ENC1 module is listed as a client of the right frame resource. This verifies operation on frame number 2.
23. Push the **Test Signals** button to return to the ENC1 selection window.
24. Touch **Set User Clock** at the bottom of the display.
25. Enter the number **27** on the keypad and then push **Enter**.
26. Use the *Check Encoded Clock Output* procedure to check for an untriggered scope due to the lack of frame pulse.
27. Move the coaxial cable from the FRAME BNC to the CLOCK BNC on the ENC1 module.

28. Check that both the clock and the encoded clock output have a 27 MHz signal preset.
29. Push the **Utilities** button and then select the **Clock Clients** button on the display.
30. Check that the ENC1 module is not listed as a client of either variable clock resource. This verifies operation of the fixed 27 MHz clock.
31. Recall the preset that you created in step 1.



Operating Basics

Functional Overview

This section provides an overview of the ENC1 Encoded Clock 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.

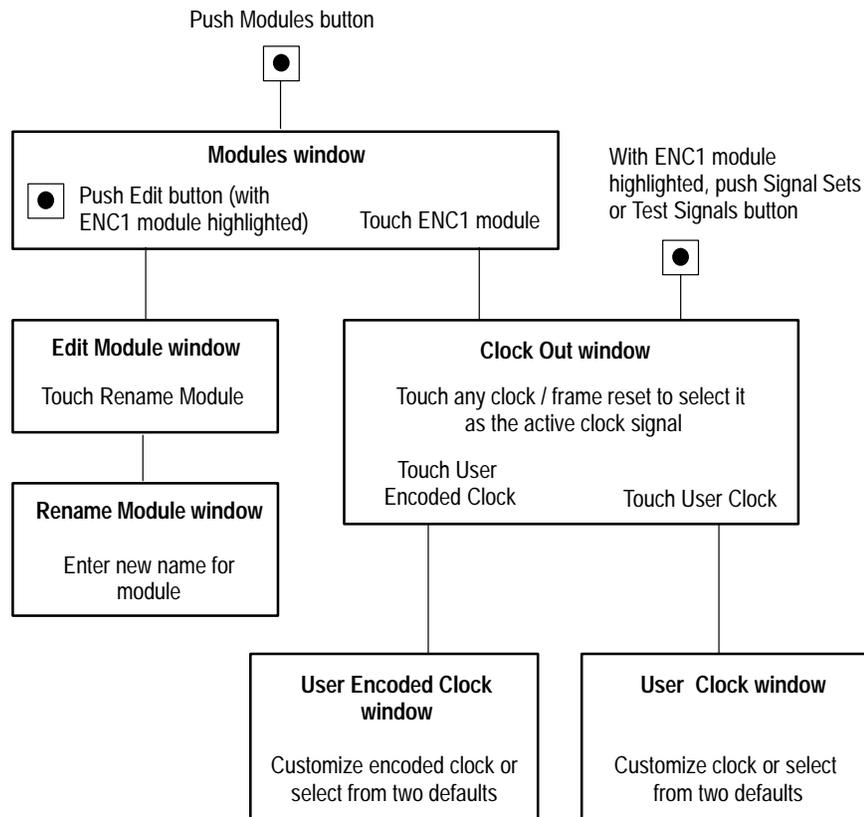


Figure 2–1: Basic menu structure for the ENC1 module

Outputs

The ENC1 module has three outputs; Clock, Frame, and Encoded Clock. Two of the outputs have standard BNC connectors. The third output is a BNO connector with a cable supplied as a standard accessory.

The Encoded Clock allows the TG 2000 Signal Generation Platform to function as the genlock source for the TSG1001 and the PSC1125.

The Clock and Frame outputs are provided for R&D and design applications. In either encoded or non-encoded clock mode, the TG 2000 Signal Generation Platform can be a flexible programmable clock source for the TSG1001.

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**.

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 tells you how to power on the mainframe and select the ENC1 module, select the module output, and set the user and user encoded clocks.

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

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 **On/Standby** switch if necessary.
3. Wait for a few seconds as the mainframe executes confidence tests on the mainframe and modules. Check for error messages.
4. When self tests are complete, check for an icon representing each installed generator module. Default module names include the slot number in which the module is installed. If an installed module is not represented, refer to *Troubleshooting* in the *TG 2000 Signal Generation Platform Service Manual*.
5. Since you have just powered on the mainframe, the Modules window is displayed. (To access this window at other times, push the front-panel **Modules** button.)

Touch the **ENC1** icon on the display (you can also push the **Signal Sets** or the **Test Signals** button if the ENC1 icon is already highlighted). The Clock Out window appears, as shown in Figure 2–2.

Select the Clock Output Signal

The ENC1 Encoded Clock module provides three outputs; a clock, a frame, and an encoded clock. To select the output signal, follow these steps:

1. Select the ENC1 module.
2. Push the **Signal Sets** button.
3. In the Clock output window (shown below) touch the desired output on the display. (In this example, a standard encoded clock is selected.)

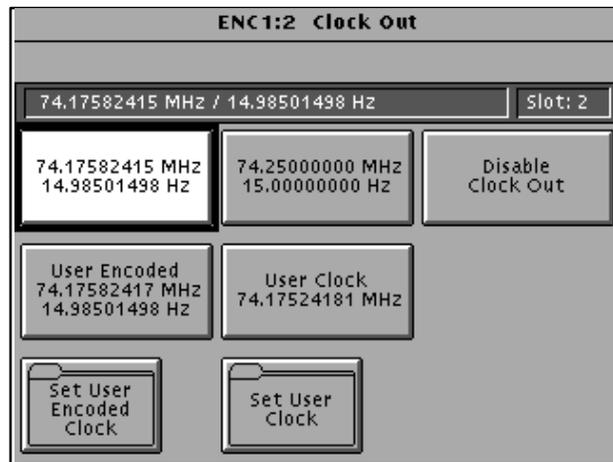


Figure 2-2: Clock Out window

Set User Clock

You can set a new unframed clock using the Set User Clock window. Setting a new unframed clock selects that clock as the output and disables the Frame output.

1. In the Clock Out window, touch **Set User Clock** (see Figure 2–2). The Set User Clock window opens (see Figure 2–3 on page 2–5).

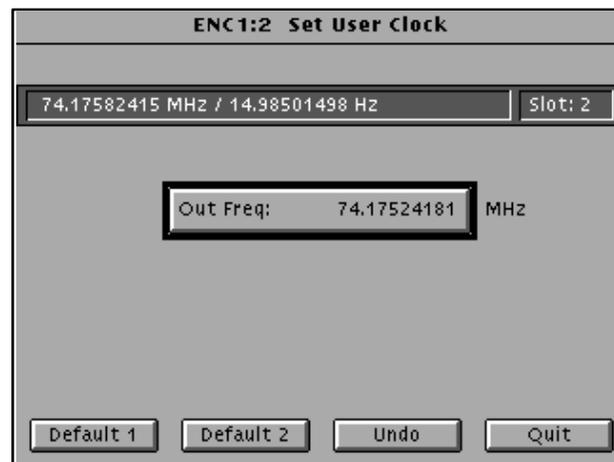


Figure 2–3: Set User Clock window

2. Define the new unframed clock using one of these methods:
 - Use the keypad or large knob to assign a value.
 - Touch **Default 1** or **Default 2** on the display to set the clock to either of these standard values.

If you want to return to the previous value, touch **Undo**.

3. Touch **Quit** to exit the window with the new clock setting in place.

Set User Encoded Clock

You can define a new frame-encoded clock using the Set User Encoded Clock window.

1. In the Clock Out window, touch **Set User Encoded Clock** (see Figure 2–2 on page 2–4). The Set User Encoded Clock window opens (see Figure 2–4). This window includes two informational fields:
 - 27 MHz Clks/Frm. Displays the integer count of 27 MHz clock cycles needed to generate the frame. Frames are always based on the fixed 27 MHz clock.
 - Clock. Displays a valid encoded clock frequency. Encoded clocks must have an integer number of cycles per color frame. The clock is derived from the frame rate multiplied by the clocks per frame. The frequency is limited to the range allowed by the TSG1001.

NOTE. Frames are disabled for 1 second after you change the Frame or User Clks/Frm parameter. For variable clock operation, use nonencoded clocks.

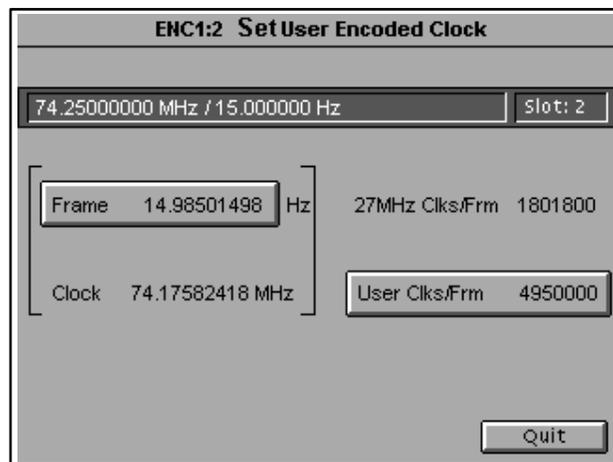


Figure 2–4: Set User Encoded Clock window

2. Use the following fields to define the new clock. Use the touch screen or the directional arrows to select fields. For numeric fields, use either the keypad or the knob to enter the desired value.
 - Frame. Use this field to set the frame rate of the encoded clock signal.
 - User Clks/Frm. Use this field to set the number of user clock cycles per frame.
 - Default 1 or Default 2. Select a default if you want to set the clock and frame to standard frequencies.
 - Undo. Select Undo if you want to restore the previous values.
 - Quit. Select Quit to save the changes you made and exit the window.



Syntax and Commands

Syntax

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

Programming Model

Programming commands address specific modules and must conform to the proper syntax to achieve the desired result.

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. Some of the commands used by this module may be shared by other 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 arguments used with a step value.

1. `:INSTRument:SElect "ENC1:#"` selects the ENC1 module located in the slot number indicated by the “#” symbol.
2. `:OUTPut:STATe ON` enables the module and displays the loaded test signal.
3. `:SOUR:VCLO:FREQ 10000000.00` sets the value of the frame frequency of the user-defined clock to 10000000 hertz.
4. `:SOUR:VCLO:FREQ:STEP 0.534` sets the step value of the frame frequency of the user-defined clock to 0.534 hertz.

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 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.

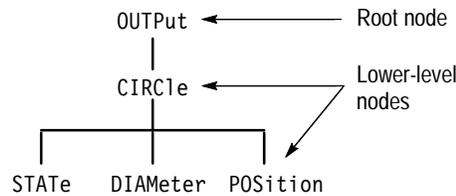


Figure 3–1: Example of SCPI subsystem hierarchy tree

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

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

Functional Command Groups

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

- OUTPut
- 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.

Output

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

Table 3-1: :OUTPut commands

Command	Description
:OUTPut:STATe(?)	Set or query module output.
:OUTPut:SOURce(?)	Set or query the source of the output signal.

Source

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

Table 3-2: :SOURce commands

Command	Description
:SOURce:FCLOCK2:CLOCK:FREQUENCY?	Set or query clock frequency.
:SOURce:FCLOCK2:CLOCK:CFRatio?	Query value of user clock per frame ratio.
:SOURce:FCLOCK:FRAME:FREQUENCY?	Query frame frequency.
:SOURce:FCLOCK:FRAME:CFRatio?	Query value of the 27 MHz clock per frame ratio.
:SOURce:ECLOCK:CLOCK:FREQUENCY?	Query value of the user-defined encoded clock frequency.
:SOURce:ECLOCK:CLOCK:CFRatio(?)	Set or query value of the user-defined clock to frame ratio.
:SOURce:ECLOCK:CLOCK:CFRatio:STEP(?)	Set or query step value of the user-defined clock to frame ratio.
:SOURce:ECLOCK:FRAME:FREQUENCY(?)	Set or query value of frame frequency of the user-defined encoded clock.
:SOURce:ECLOCK:FRAME:FREQUENCY:STEP(?)	Set or query step value of frame frequency of the user-defined encoded clock.
:SOURce:ECLOCK:FRAME:CFRatio?	Query value of the 27 MHz clock to frame ratio.
:SOURce:VCLOCK:FREQUENCY(?)	Set or query value of the frame frequency of the user-defined clock.
:SOURce:VCLOCK:FREQUENCY:STEP(?)	Set or query value of the frame frequency of the user-defined clock.

:OUTPut Commands

Use these commands to enable the actual output of the module. These commands do not release any 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.*

Command Tree

```
:OUTPut
  :STATe(?) <Boolean>
  :SOURce(?) FCLOCK2 | ELOCK | VLOCK
```

:OUTPut:STATE(?)

Use this command to set or query the state of the output clock signal for the ENC1 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 If clock resources are reused during OFF state, there may not be clocks available when you return the state to ON.

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

Related Commands None

:OUTPut:SOURce(?)

Use this command to set or query the source of the output signal. The fixed clocks of FCLOck1 and 2 are predetermined values of 74.25 by 15.0000, and 74.17582418 by 14.9801498. ECLOck is a user-defined encoded clock. VCLOck is an unencoded clock (no frame).

Syntax :OUTPut:SOURce FCLOck2 | ECLOck | VCLOck:OUTPut:SOURce
:OUTPut:SOURce?

Parameters	Command	Query response
	<Char> = FCLOck1	FCLO1
	<Char> = FCLOck2	FCLO2
	<Char> = ECLOck	ECLO
	<Char> = VCLOck	VCLO

Default Value ON

Errors and Events None

Dependencies None

Examples
 Command: :OUTP:SOUR ECLO
 Query: :OUTP:SOUR?
 Response: ECLO

Related Commands :OUTPut:STATE

:SOURce Commands

The SOURce subsystem commands control the ENC1 module clock signal source.

The four ENC1 module outputs are referred to in this section as:

- FCLOCK1 and FCLOCK2. Fixed encoded clocks.
- ECLOCK. User-defined encoded clock.
- VCLOCK. User-defined clock, not encoded; “variable clock.”

The SOURce commands can enable the clock output and set and query the frequency of the user-defined clocks.

NOTE. *The module must be selected with the INSTRUMENT subsystem prior to using these commands.*

Command Tree

```
:SOURce
  :FCLOCK2
  :CLOCK
    :FREQUENCY?
    :CFRATIO?
  :FRAME
    :FREQUENCY?
    :CFRATIO?
:ECLOCK
  :CLOCK
    :FREQUENCY?
    :CFRATIO(?) <numeric-value>
    :STEP(?) <numeric-value>
  :FRAME
    :FREQUENCY(?)<numeric-value>
    :STEP(?) <numeric-value>
    :CFRATIO?
:VCLOCK
  :FREQUENCY(?)<numeric-value>
  :STEP(?) <numeric-value>
```

:SOURce:FCLOCK2:CLOCK:FREQUENCY?

Use this command to query the clock frequency. The 2 in the query represents the fixed encoded clock number. You can use this query to find the frequency of clock 1 or 2. The response is in hertz, to show the resolution of the clock frequency.

Syntax :SOURce:FCLOCK2:CLOCK:FREQUENCY?

Parameters	Command	Query response
	None	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Query: :SOUR:FCLOCK1:CLOCK:FREQ?
Response: 74250000.0

Related Commands

:SOURce:FCLOCK2:CLOCK:CFRatio?

Use this command to query the value of the user clocks per frame ratio. The 2 in the query represents the fixed encoded clock number. You can use this query to find the ratio of clock 1 or 2.

Syntax :SOURce:FCLOCK2:CLOCK:CFRatio?

Parameters

Command	Query response
None	<NR1>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
 Query: :SOUR:FCLO1:CLOC:CFR?
 Response: 4950000

Related Commands

:SOURce:FCLOCK2:FRAME:FREQUENCY?

Use this command to query the value of the frame frequency. The 2 in the query represents the fixed encoded clock number. You can use this query to find the frame frequency for clock 1 or 2. The response is in hertz.

Syntax :SOURce:FCLOCK:FRAME:FREQUENCY?

Parameters	Command	Query response
	None	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Query: :SOUR:FCLOCK1:FRAME:FREQ?
Response: 15.00000000

Related Commands

:SOURce:FCLOCK2:FRAME:CFRatio?

Use this command to query the value of the 27 MHz clocks per frame ratio. The 2 in the query represents the fixed encoded clock number. You can use this query to find the clock per frame ratio for clock 1 or 2.

Syntax :SOURce:FCLOCK:FRAME:CFRatio?

Parameters	Command	Query response
	None	<NR1>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
 Query: :SOUR:FCLOCK1:FRAME:CFR?
 Response: 1801800

Related Commands

:SOURce:ECLOCK:CLOCK:FREQUENCY?

Use this command to query the value of the user-defined clock frequency. The response is in hertz. You can control this value by setting frame frequency and user clocks per frame.

Syntax :SOURce:ECLOCK:CLOCK:FREQUENCY?

Parameters	Command	Query response
	None	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Query: :SOUR:ECLO:CLOC:FREQ?
Response: 74175824.18

Related Commands :SOURce:ECLOCK:CLOCK:CFRatio
SOURce:ECLOCK:FRAME:FREQUENCY

:SOURce:ECLOCK:CLOCK:CFRatio(?)

Use this command to set or query the value of the user-defined clock to frame ratio.

Syntax :SOURce:ECLOCK:CLOCK:CFRatio <numeric_value>
:SOURce:ECLOCK:CLOCK:CFRatio?

Parameters	Command	Query response
	<Numeric_value> = <NRf>	<NR1>

Default Value Not applicable

Errors and Events None

Dependencies Affects the value queried with :SOURce:ECLOCK:CLOCK:FREQuency?

Examples

Command: SOUR:ECLO:CLOC:CFR 4950000

Query: :SOUR:ECLO:CLOC:CFR?

Response: 4950000

Related Commands :SOURce:ECLOCK:CLOCK:FREQuency?

:SOURce:ECLOCK:CLOCK:CFRatio:STEP(?)

Use this command to set or query the step value of the user-defined clock to frame ratio. This value is not retained in nonvolatile memory.

Syntax :SOURce:ECLOCK:CLOCK:CFRatio:STEP <numeric_value>
:SOURce:ECLOCK:CLOCK:CFRatio:STEP?

Parameters	Command	Query response
	<Numeric_value> = <NRf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Command: SOUR:ECLO:CLOCK:CFR:STEP 5
Query: :SOUR:ECLO:CLOC:CFR:STEP?
Response: 5

Related Commands :SOURce:ECLOCK:CLOCK:CFRatio

:SOURce:ECLOCK:FRAME:FREQUENCY(?)

Use this command to set or query the value of the frame frequency of the user-encoded clock. The response is in hertz.

Syntax :SOURce:FCLOCK:FRAME:FREQUENCY <numeric_value>
:SOURce:FCLOCK:FRAME:FREQUENCY?

Parameters	Command	Query response
	<numeric_value> = <Nrf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies Affects the query of :SOURce:ECLOCK:FRAME:CFRATIO?
and :SOURce:ECLOCK:CLOCK:FREQUENCY?

Examples

Command: :SOUR:ECLO:FRAM:FREQ 14.98501498

Query: :SOUR:ECLO:FRAM:FREQ?

Response: 14.98501498

Related Commands :SOURce:ECLOCK:FRAME:CFRATIO?
:SOURce:ECLOCK:CLOCK:FREQUENCY?

:SOURce:ECLOCK:FRAME:FREQUENCY:STEP(?)

Use this command to set or query the value of the frame frequency of the encoded clock. The response is in hertz. This value is not retained in non-volatile memory.

Syntax :SOURce:ECLOCK:FRAME:FREQUENCY:STEP <numeric_value>
:SOURce:ECLOCK:FRAME:FREQUENCY:STEP?

Parameters	Command	Query response
	<numeric_value> = <Nrf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Command: :SOUR:ECLO:FRAM:FREQ:STEP 0.534
Query: :SOUR:ECLO:FRAM:FREQ:STEP?
Response: 0.534

Related Commands :SOURce:ECLOCK:FRAME:FREQUENCY

:SOURce:ECLOCK:FRAME:CFRatio?

Use this command to query the value of the 27 MHz clock-to-frame ratio.

Syntax :SOURce:ECLOCK:FRAME:CFRatio?

Parameters	Command	Query response
	None	<NR1>

Default Value Not applicable

Errors and Events None

Dependencies Affected by :SOURce:ECLOCK:FRAME:FREQuency

Examples Query: :SOUR:ECLO:FRAM:CFR?

Response: 1801800

Related Commands :SOURce:ECLOCK:FRAME:FREQuency?

:SOURce:VCLOCK:FREQuency(?)

Use this command to set or query the value of the frame frequency of the user-defined clock. The response is in hertz.

Syntax :SOURce:VCLOCK:FREQuency <numeric_value>
:SOURce:VCLOCK:FREQuency?

Parameters	Command	Query response
	<numeric_value> = <Nrf>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples
Command: :SOUR:VCLOCK:FREQ 10000000.00
Query: :SOUR:VCLOCK:FREQ?
Response: 10000000.00

Related Commands :SOURce:VCLOCK:FREQuency:STEP?

:SOURce:VCLOCK:FREQUENCY:STEP(?)

Use this command to set or query the step value of the frame frequency of the user-defined clock. The response is in hertz.

Syntax :SOURce:VCLOCK:FREQUENCY:STEP <numeric_value>
:SOURce:VCLOCK:FREQUENCY:STEP?

Parameters	Command	Query response
	<numeric_value> = <Nr<f>	<NR2>

Default Value Not applicable

Errors and Events None

Dependencies None

Examples

Command: :SOUR:VCLOCK:FREQ:STEP 0.534

Query: :SOUR:VCLOCK:FREQ:STEP?

Response: 0.534

Related Commands :SOURce:VCLOCK:FREQUENCY



Appendices

Appendix A: Specifications

Tables A-1 through A-5 list the electrical specifications for the ENC1 Encoded Clock module, and Table A-6 lists the EMC compliance specifications. 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 properly installed in a TG 2000 Signal Generation Platform, and only after a warm-up period of 20 minutes.

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

Table A-1: Encoded Clock Output

Characteristics	Description
Connector	Twin-ax BNO connector. Maximum recommended cable length 10 meters.
Signal Amplitude	Differential ECL.
Encoded Mode Frequencies	69.0 MHz – 78.0 MHz. Presets for 74.25 MHz Clock at 15 Hz Color Frame and 74.17582418 MHz Clock at 14.98501499 Hz Color Frame.
Unencoded Mode Frequencies	10.0 MHz – 100.0 MHz.
Impedance	78 Ω differential.

Table A-2: Clock Output

Characteristics	Description
Connector	BNC connector.
Signal Amplitude	0.4 V _{p-p} \pm 0.1 V. Into 75 Ω , AC-coupled square wave.
Clock Output Frequencies	10.0 MHz – 100.0 MHz.
Impedance	75 Ω .
Return Loss	\geq 15 dB 1 MHz to 100 MHz.

Table A-3: Frame Output

Characteristics	Description
Connector	BNC connector.
Signal Amplitude	0.4 V _{p-p} ± 0.1 V. Into 75 Ω, AC-coupled square wave.
Frame Rates	1.609 Hz to 1000 Hz.
Impedance	75 Ω single-ended.
Return Loss	>15 dB from 300 KHz to 100 MHz.

Table A-4: Data Handling Characteristics

Characteristics	Description
Nonvolatile Memory Retention Time, typical	≥ 10 years.

Table A-5: Power

Characteristics	Description
Power	All power is derived from the TG 2000 Platform mainframe.
Power Consumption, typical	+5 Volts: 2.0 W -5 Volts: 1.1 W -2 Volts: 0.3 W +15 Volts: 0 W -15 Volts: 0 W Battery: 0 μA

Certifications

Table A-6: 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

Appendix B: SCPI Conformance Information

All commands in the ENC1 module are based on SCPI Version 1994.0. Table B-1 lists all commands supported by the module. The columns at right show whether or not a command is defined in the SCPI 1994.0 Standard.

Table B-1: SCPI 1994.0 conformance information

Command	Defined in SCPI	Not defined In SCPI
OUTPut STATE(?)	✓	
SOURce(?)		✓
SOURce FCLOCK2 CLOCK FREQuency?		✓
CFRatio?		✓
FRAMe FREQuency?		✓
CFRatio?		✓
ECOCK CLOCK FREQuency?		✓
CFRatio? STEP(?)		✓
FRAMe FREQuency? STEP(?)		✓
CFRatio?		✓
VCLOCK FREQuency? STEP(?)		✓

WARNING

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

Appendix C: Installation

This section contains instructions for installing the module into the TG 2000 Platform mainframe.

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.

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 C-1 lists the slot restrictions. Figure C-1 shows a sample configuration with slot numbers.

Table C-1: Module slot assignments

Module	Slots in which the module can be installed
AGL1 Genlock module	Slot 2 or 3
AVG1 Generator module	Slots 2 through 10
AWVG1 Generator module	Slots 2 through 10
BG1 Generator module	Slot 2 through 10
Clock module	Slot 1
CPU module	Slot 11
DVG1 Generator module	Slots 2 through 10
ENC1 Encoded Clock module	Slots 2 through 10
GP1 GPIB Interface module	Slot 10

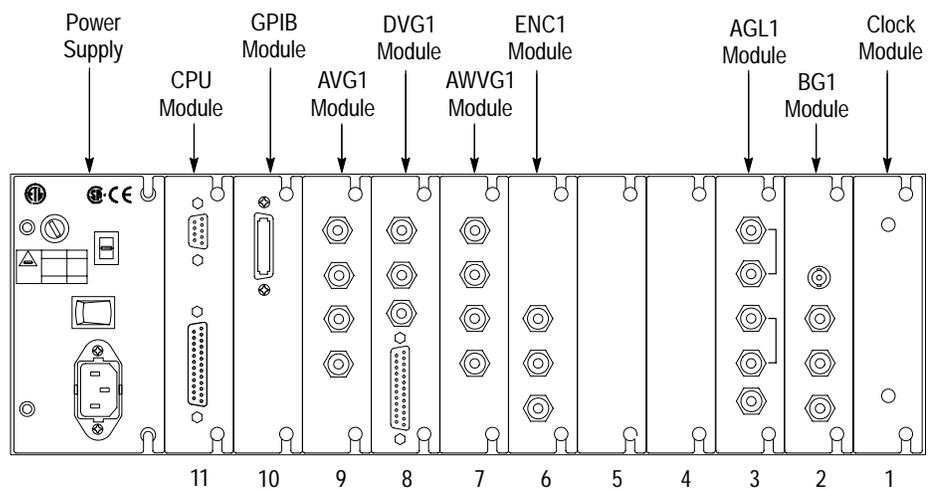


Figure C-1: TG 2000 Platform mainframe rear panel, showing slot numbering



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

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

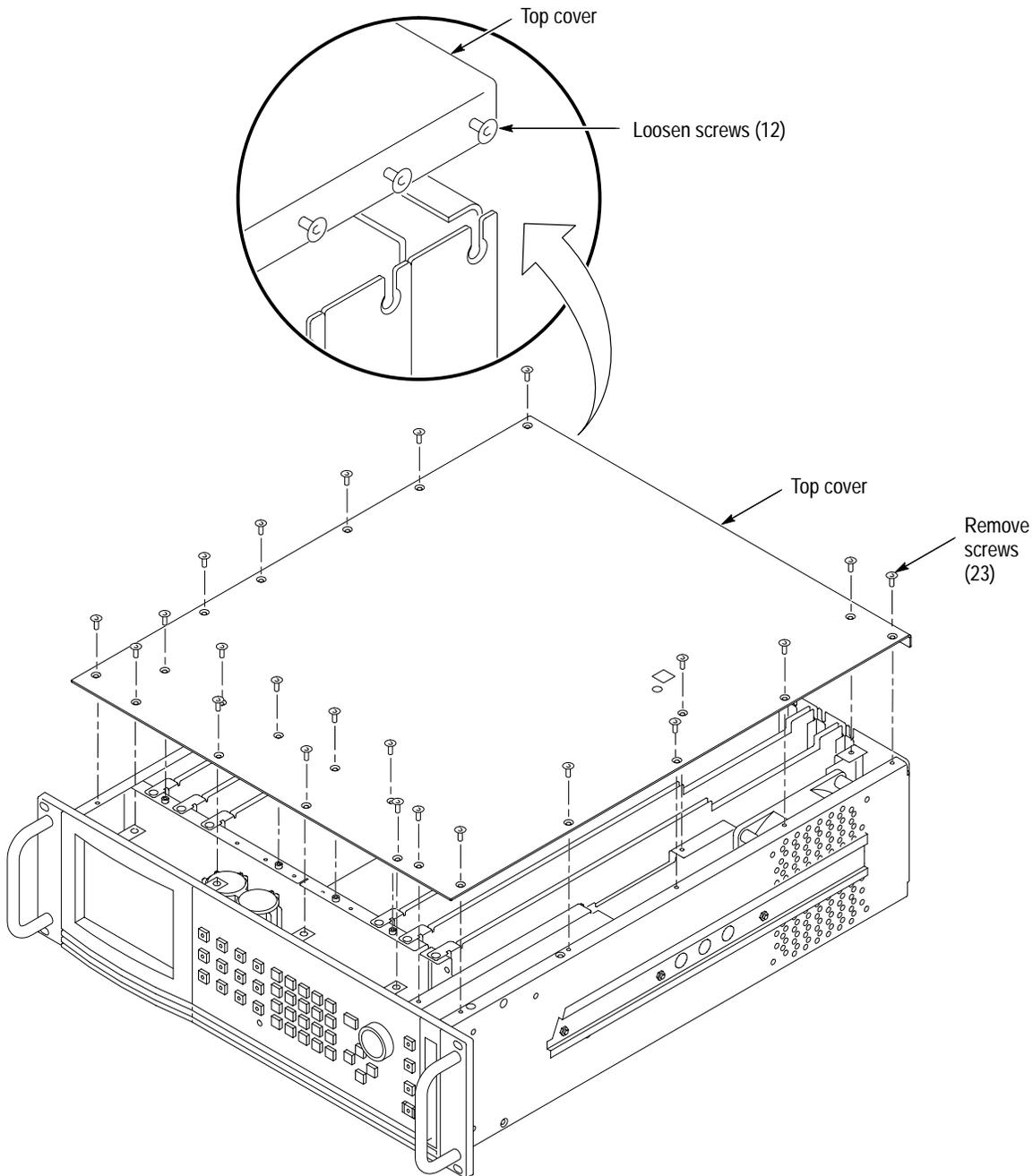


Figure C-2: Top cover removal

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

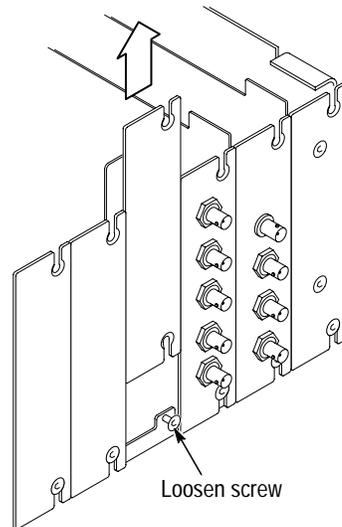


Figure C-3: Rear panel removal

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

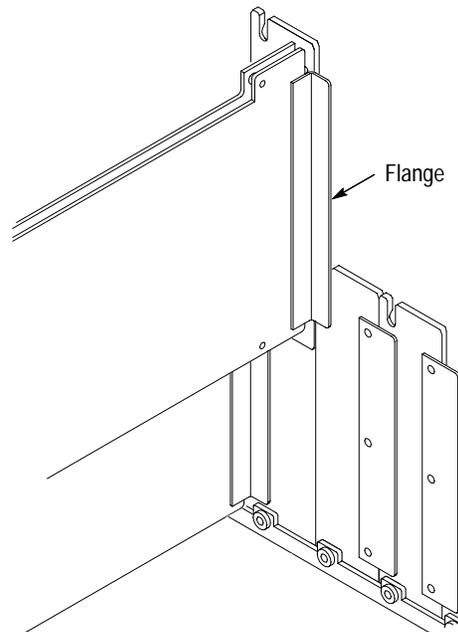


Figure C-4: Module flange

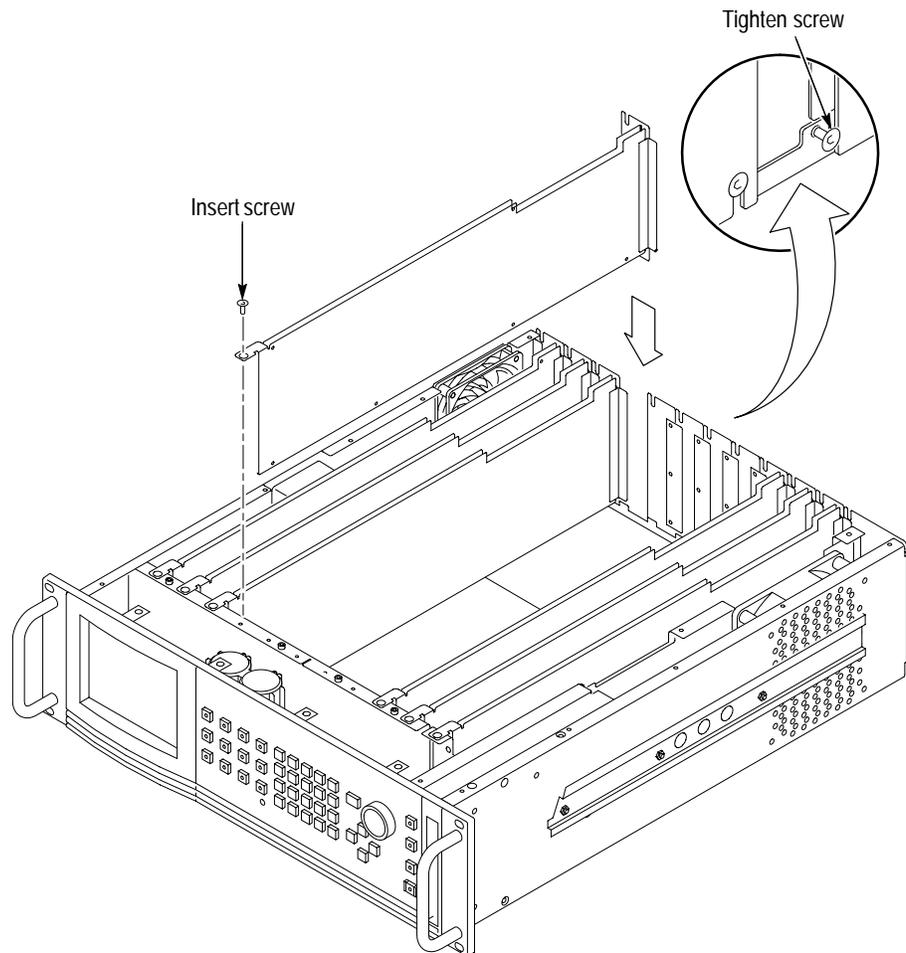


Figure C-5: Module Installation

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



CAUTION. To prevent damage, 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.

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

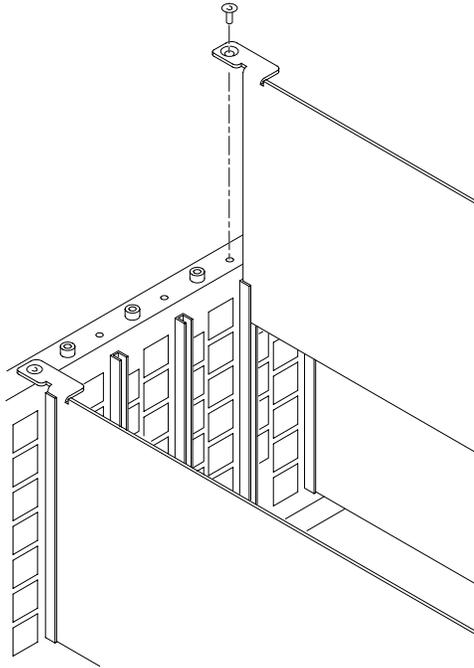


Figure C-6: Top screw

- 11.** Replace the top cover.
- 12.** Insert and tighten all top cover screws.
- 13.** 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.
- 14.** Wait for the instrument to perform self tests.
- 15.** Check that all modules are in the desired state (enabled/disabled).

The default state for the new ENC1 module is disabled. When you select an output signal for this module (page 2–4), the platform will automatically enable the module.

- 16.** Save instrument presets with the new instrument configuration as follows:
 - a.** Push the **Presets** button.
 - b.** Touch **Presets** on the display.
 - c.** Select the desired preset from the list at the left side of the window.
 - d.** Touch **Save To** to save the current settings to the selected preset. The previous contents of the preset are lost.

Module Removal

Before removing any of the generator modules that allow you to load signals, such as the AVG1 Generator module and the DVG1 Generator module, you should save the signal sets to a disk. Refer to the module user manual for instructions on backing up the signal sets. However, you do not need to back up the ENC1 module signals because they are not lost when the module is removed from the platform.

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.
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, refer to *Module Installation* on page C-2.
8. To ensure proper cooling and EMI shielding, 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.

Appendix D: Performance Verification

Perform the following procedure to verify that your ENC1 module is meeting the requirements listed in the *Specifications* section. You do not need to remove the covers from the mainframe.

If, after performing this procedure, you determine that the module is not meeting specifications, refer to *Troubleshooting* in the *ENC1 Encoded Clock Module Service Manual* or contact your Tektronix representative.



WARNING. *Dangerous electric shock hazards exist inside the mainframe. Only qualified service personnel should perform these procedures.*

Verification Interval

To ensure correct instrument operation, verification procedures should be performed once a year. Before performing any verification procedures, complete all relevant maintenance procedures outlined in the *Maintenance* section of this manual.

Required Equipment

Test Equipment

Table D-1 lists the equipment required for the *Performance Verification* procedure.

Table D-1: Equipment required for Performance Verification

Equipment	Example or Tektronix equivalent
Impedance Adapter	Tektronix AMT75
High Precision Oscilloscope	TDS784 Series Oscilloscope
1 meter low-loss precision 75 Ω coaxial cable	Tektronix part number 012-0159-00
Wide-band oscilloscope probe	Tektronix P6204 or P6245

Clock Output

Use the following procedure to verify the clock output specifications (see page A-1):

1. Use the precision coaxial cable to connect the Clock Output of the ENC1 module to the AMT75. Connect the AMT75 to the Ch 1 input on the oscilloscope.
2. Set the oscilloscope to 0.1 V / div vertical and 10 ns / div horizontal.
3. Set the ENC1 module User Clock to 27.000 MHz.
4. Set the oscilloscope trigger to Ch 1, edge trigger, 0 volt level, normal mode.
5. Use the H Bar cursors to measure the amplitude by putting one cursor at average of top and bottom levels.
6. Check that the signal is a clean square wave, balanced around 0 V. Check that the signal amplitude measures between 0.32 and 0.48 volts.

Frame Output

Use the following procedure to verify the frame output specifications (see page A-2):

1. Use the precision coaxial cable to connect the Clock Output of the ENC1 module to the AMT75. Connect the AMT75 to the Ch 1 input on the oscilloscope.
2. Set the oscilloscope to 0.1 V / div vertical and 10 ns / div horizontal.
3. From the TG 2000 Platform mainframe front panel, set the ENC1 module output to 74.25 MHz clock at 15 Hz frame.
4. Set the oscilloscope trigger to Ch 1, edge trigger, 0.2 volt level, normal mode.
5. Use the H Bar cursors to measure the amplitude by putting one cursor at average of top and bottom levels.
6. Check that the signal is a clean positive pulse with the low level at ground. Check that the signal amplitude measures between 0.32 and 0.48 volts.



Index

Index

A

Accessories
 optional, 1–2
 standard, 1–2

C

Clock output, 2–4
Command groups, 3–5
Commands
 arguments, 3–1
 rules for forming, 3–1
 syntax, 3–1
Configuration, 1–2

E

Electrical specifications, A–1

F

Functional check, 1–3
Functional overview, 2–1

H

Hierarchy Tree, 3–3

I

Inspection, Functional Check, 1–3
Installation, C–1

M

Menu structure, 2–1
Module removal, C–7
Modules window, 2–3

O

Online help, 2–2
Operating procedures, 2–3
Optional accessories, 1–2
Output commands, 3–5, 3–7

Output signal, 2–4
Output timing, 1–1
Outputs, 2–2

P

Performance Verification procedure, D–1
Power on procedure, 2–3
Presets, save to, C–6

R

Rear-panel connectors, 2–2
Removing a module, C–7
Rules, command forming, 3–1

S

Save, settings to existing preset, C–6
Saving signal sets, when removing other modules, C–7
SCPI, subsystem hierarchy tree, 3–3
SCPI commands
 output, 3–5, 3–7
 queries syntax, 3–3
 source, 3–6, 3–11
SCPI conformance, B–1
Select output signal, 2–4
Select the module, 2–3
Signal set installation, 1–2
Signal sets window, 2–4
Source commands, 3–6, 3–11
Specifications, A–1
 SCPI conformance, B–1
Standard accessories, 1–2
Syntax, command, 3–1

T

Time zero, 1–1
Timing, output, 1–1

W

Window
 Modules, 2–3
 Signal Sets, 2–4

