Service Manual

Tektronix

GP1
GPIB Interface Module

070-9303-00

CE

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

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

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. 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 TG 2000 Signal Generation Platform. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

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.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

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

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.

Keep Product Surfaces Clean and Dry.

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:

WARNING
High Voltage

Protective Ground
(Earth) Terminal

CAUTION
Refer to Manual

Double
Insulated

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 mains 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

You have purchased this optional service manual for the GP1 GPIB Interface module. You can also purchase service manuals for the mainframe and other modules. Each module manual begins with a tab so that you can locate it after you add it to the mainframe manual binder.

About This Manual

This manual contains information for servicing the GP1 GPIB Interface module to a module level. The information is designed only for qualified service technicians. This manual is composed of the following sections:

- *Specifications* provides a basic product description followed by a specifications table.
- *Operating Information* describes how to set the mainframe GPIB address and how to take the GPIB interface module offline.
- *Performance Verification* contains procedures to verify that the module is functioning correctly.
- *Maintenance* contains procedures for safely handling, cleaning, and packaging the GPIB interface module.
- *Replaceable Parts* lists the part numbers for replacement parts that you can order for this module. The exploded view illustration helps you to identify parts.

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

Specifications

Specifications

Table 1–1 lists the GP1 Interface module Electromagnetic Compatibility (EMC) compliance specifications, FCC compliance, and standards conformance. Refer to the *TG 2000 Signal Generation Platform User Manual* for a list of mainframe environmental specifications.

Table 1–1: Certifications and compliances

Category	Standard
EMC Compliance	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility when it is used with the TG 2000 Signal Generation Platform. Refer to the EMC specification published for the stated product. May not meet the intent of the directive if used with other products.
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits
Standards Conformance	The GP1 Interface module conforms to the following standards: ANSI/IEEE Std. 488.1-1987 ANSI/IEEE Std. 488.2-1987

Operating Information

Operating Information

This section provides operating instructions for the GP1 GPIB Interface module. If you are not familiar with the basic operation of the mainframe, read the *Operating Basics* section of the *TG 2000 Signal Generation Platform User Manual* before proceeding.

Functional Overview

The GP1 Interface module provides communication between the TG 2000 Signal Generation Platform and GPIB controllers. You can use the GP1 Interface module to remotely control the TG 2000 Signal Generation Platform and download signals from other instruments or software (such as the SDP 2000) into the TG 2000 Signal Generation Platform.

Operating Procedures

The following procedures describe how to set the mainframe GPIB address and how to take the GP1 Interface module off line.

Setting the GPIB Address

To set the mainframe GPIB address, do the following steps:

1. Push the **Remote** button.
2. Touch **GPIB Setup** on the display.
3. Touch **Address**.
4. Assign a GPIB address number to the mainframe. GPIB addresses are in the range of 0 to 30. You enter the address value using one of two methods:
   - Use the front-panel keypad to enter the address.
   - Use the front-panel knob to scroll through the address values.
5. Touch **Quit** to set the mainframe GPIB address and close the GPIB setup screen.

Taking the GPIB Module Off-line

To take the GP1 Interface module off line, do the following steps:

1. Push the **Remote** button.
2. Touch **GPIB Setup** on the display.
3. Touch **Address**.
4. Assign GPIB address number 31 to the mainframe. You enter the address value using one of two methods:
   - Use the front-panel keypad to enter address 31.
   - Use the front-panel knob to select address 31.
5. Touch **Quit** to set the mainframe GPIB address and close the GPIB setup screen.

Performance Verification

Performance Verification

The procedure in this section verifies the functional operation of the GP1 GPIB Interface module. The functional test verifies that the TG 2000 Platform mainframe is communicating with an external GPIB controller.

Verification Interval

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

Test Equipment Required

Required equipment is shown in Table 3–1. Equipment suggestions are given in the example column. If you do not have the required equipment, you can return your instrument to a Tektronix service center for performance verification.

Table 3–1: Test equipment required for verification

Equipment	Purpose	Example
GPIB remote-controller device or a GPIB-equipped PC	Verify that the GPIB board receives and executes commands and returns responses to the requesting controller	Tektronix SDP2000 software running on a GPIB-equipped PC

Preparation

1. Install all modules into the mainframe if they are not already installed.
2. Power on the mainframe by setting both the rear-panel POWER switch and front-panel ON/STANDBY switch to on.
3. Allow the mainframe and modules to warm up for at least 5 minutes before performing any tests.

Functional Test

Do the following steps to verify that the GP1 GPIB Interface module is communicating with a remote controller. This procedure presumes that you have done the incoming inspection which is on page 1–2 of the *GP1 GPIB Interface Module User Manual*.

Setup

1. Connect a GPIB cable from the GP1 GPIB Interface module to a GPIB controller or a PC with an installed GPIB card.
2. Power on the TG 2000 Signal Generation Platform. Wait for the system to complete its power-up self tests.
3. Press the **Remote** button on the TG 2000 Platform mainframe.
4. If you have not done so already, set the TG 2000 Platform mainframe GPIB address and enable GPIB communications:
   a. Touch **GPIB Setup** on the display.
   b. Enter a valid GPIB address using the keypad or knob. A valid address is one that is not in use by any other equipment or controllers on your GPIB bus. Valid addresses are 0 through 30.
   c. Touch **Quit**.
   d. Touch the **Remote Port** icon on the display until it displays GPIB.
5. Set your remote GPIB controller or PC–based GPIB software to send to the GPIB address set for the TG 2000 Platform mainframe.

Procedure

Send the commands listed in Table 3–2 from your remote controller. Verify that the controller receives the correct response for each command.

Table 3–2: Functional test commands and responses

Command	Response
*idn?	TEKTRONIX,TG2000,0,0
:inst:cat?	CPU:0,CLOCK:1,XXX[1]
:inst:sel "AVG1:#" [2] or :inst:sel "DVG1:#" [2]	No response
:outp:stat OFF	No response
:outp:stat?	0
:outp:stat ON	No response
:outp:stat?	1

[1] XXX indicates one or more strings that identify each installed module and the slot in which it is installed. For example, DVG1:5 means that module DVG1 is installed in slot 5.

[2] # indicates the slot number in which the specified module is installed. Refer to note 2.

This completes the Functional test.

Maintenance

Maintenance

This section contains instructions and procedures for maintaining and servicing the GP1 GPIB Interface module.

Servicing Prerequisites

Follow these guidelines when maintaining or servicing the instrument.

- Only qualified service personnel may maintain or service this instrument.
- Before maintaining or servicing this instrument, read the *Service Safety Summary* and the *Operating Information* in this manual.

Electrostatic Damage Prevention

This instrument contains electrical components that are susceptible to damage from electrostatic discharge. Static voltages of 1 kV to 30 kV are common in unprotected environments.

CAUTION. *Static discharge can damage any semiconductor component in this instrument.*

Observe the following precautions to avoid static damage:

- Minimize handling of static-sensitive components.
- Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
- Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should only be performed at a static-free workstation by qualified personnel.
- Do not allow anything capable of generating or holding a static charge on the workstation surface.
- Keep the component leads shorted together whenever possible.
- Pick up components by the body, never by the leads.
- Do not slide the components over any surface.

- Do not handle components in areas that have a floor or work surface covering capable of generating a static charge.
- Use a soldering iron that is connected to earth ground.
- Use only special antistatic, suction-type or wick-type desoldering tools.

NOTE. *A 2% RMA flux content solder is recommended for making repairs in this instrument. Cleaning of rosin residue is not recommended. Most cleaning solvents tend to reactivate the rosin and spread it under components where it may cause corrosion under humid conditions. The rosin residue, if left alone, does not exhibit these corrosive properties.*

Inspection and Cleaning

Preventive maintenance consists of cleaning, visual inspection, and performance checking. The preventive maintenance schedule established for the instrument should be based on the environment in which it is operated and the amount of use. Under average conditions, scheduled preventive maintenance should be performed every 2000 hours of operation.

General Care

Protect this module from adverse weather conditions. The instrument is not waterproof.

CAUTION. *To avoid damage to this instrument, do not expose it to sprays, liquids, or solvents.*

To avoid damage to the module circuit board, do not flex the circuit board if you remove the board from its mounting shield. The circuit board can be damaged by flexing. The shield provides necessary structural support to the circuit board.

Cleaning

The instrument should be cleaned often enough to prevent dust or dirt from accumulating. Dirt acts as a thermal insulating blanket that prevents effective heat dissipation, and can provide high-resistance electrical leakage paths between conductors or components in a humid environment.

Clean the exterior of the instrument by removing dust with a lint-free cloth. Use care to avoid scratching the touch screen. A small, soft-bristled brush is useful to remove dust from around the selector buttons and connectors.

For further cleaning, use a soft cloth or paper towel dampened with water. You can use a 75% isopropyl alcohol solution for more efficient cleaning.

CAUTION. *To avoid damage to the surface of this instrument, do not use abrasive or chemical cleaning agents.*

If you must clean the interior of the instrument, allow the interior to thoroughly dry before reassembling and applying power to the instrument.

Visual Inspection

After cleaning, carefully check the instrument for defective connections, damaged parts, and improperly seated transistors or integrated circuits. The remedy for most visible defects is obvious; however, if heat-damaged parts are discovered, determine the cause of overheating before replacing the damaged part.

Periodic checks of the transistors and integrated circuits are not recommended. The best measure of performance is the actual operation of the component in the circuit.

Performance Verification

Instrument performance should be checked after each 2000 hours of operation or every 12 months. This will help to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. A performance verification procedure is included in this manual.

Repackaging Instructions

Use the following instructions to prepare your module for shipment to a Tektronix, Inc., service center:

1. Attach a tag to the instrument showing: the owner, complete address and phone number of someone at your firm who can be contacted, the instrument serial number, and a description of the required service.
2. Package the instrument in the original packaging materials. If the original packaging materials are not available, follow these directions:
   a. Obtain a carton of corrugated cardboard having inside dimensions six or more inches greater than the dimensions of the instrument. Use a shipping carton that has a test strength of at least 250 pounds (113.5 kg).
   b. Place the instrument in its carrying pouch or surround the instrument with a protective bag.
   c. Pack dunnage or urethane foam between the instrument and the carton. If using Styrofoam kernels, overfill the box and compress the kernels by closing the lid. There should be three inches of tightly packed cushioning on all sides of the instrument.
3. Seal the carton with shipping tape, industrial stapler, or both.

Mechanical Parts List

Mechanical Parts List

This section contains a list of the replaceable modules for the GP1 GPIB Interface module. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

Module Servicing

Modules can be serviced by selecting one of the following three options. Contact your local Tektronix service center or representative for repair assistance.

Module Exchange. In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-TEK-WIDE.

Module Repair and Return. You may ship your module to us for repair, after which we will return it to you.

New Modules. You may purchase replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

The following table describes each column in the parts list.

Parts list column descriptions

Column	Column name	Description
1	Figure & Index Number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
7	Mfr. Code	This indicates the code of the actual manufacturer of the part.
8	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations

Abbreviations conform to American National Standard ANSI Y1.1–1972.

Mfr. Code to Manufacturer Cross Index

The table titled *Manufacturers Cross Index* shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, State, Zip Code
0KB01	STAUFFER SUPPLY CO	810 SE SHERMAN	PORTLAND, OR 97214–4657
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077–0001
TK1547	MOORE ELECTRONICS INC	19500 SW 90TH CT PO BOX 1030	TUALATIN, OR 97062
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND RD NE	SALEM, OR 97303
01536	TEXTRON INC	1818 CHRISTINA ST	ROCKFORD, IL 61108

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
–1	211–0725–00			2	SCREW,MACHINE:6–32 X 0.375,FLH TORX	01536	ORDER BY DESCR
–2	337–3936–00			1	SHIELD,ELEC:ALUMINUM,GP1	TK1943	337–3936–00
–3	211–0408–00			2	SCR,ASSEM WSHR:4–40 X 0.250,PNH,T–10 TORX	0KB01	211–0408–00
–4	671–3352–00			1	CIRCUIT BD ASSY:GP1 OPT	80009	671–3352–00
–5	174–1366–00			1	CA ASSY,SP:RIBBON	TK1547	ORDER BY DESCR
–6	333–4181–00			1	REAR PANEL:REAR PANEL,ALUM,GP1	TK1943	333–4181–00
–7	129–0887–00			2	SPACER,POST:0.531 L X M3.5 X 0.6 INT THD ONE END	80009	129–0887–00
					STANDARD ACCESSORIES		
	070–9297–XX			1	MANUAL,TECH:USER,GP1 GPIB INTERFACE	80009	070–9297–XX
					OPTIONAL ACCESSORIES		
	070–9303–XX			1	MANUAL,TECH:SERVICE,GP1 GPIB INTERFACE	80009	070–9303–XX

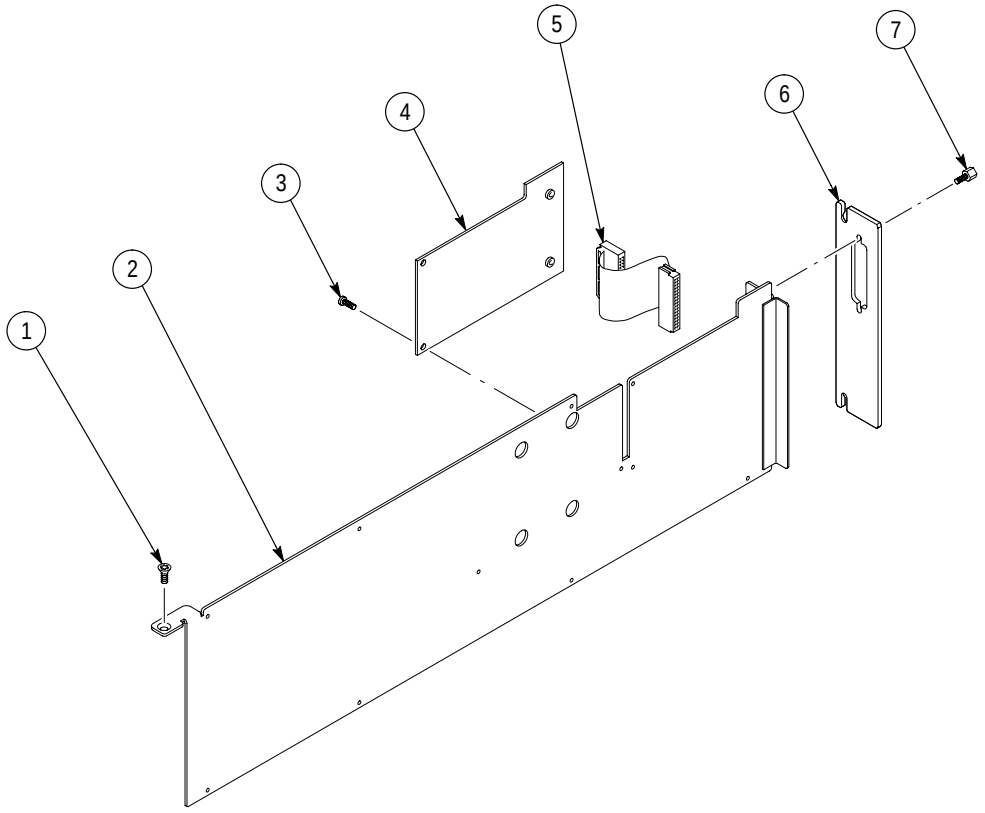

Figure 5–1: Exploded view