Service Manual

Tektronix

BG1
Black Burst Generator

070-9304-00

This document supports firmware version 1.00
and above.

CE

Printed in the U.S.A.

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.

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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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Mechanical Parts List

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 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

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 that 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 BG1 Black Burst Generator 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 BG1 Black Burst Generator module to a module level. The information is designed only for qualified service technicians who have moderate experience in analog circuits, digital circuits, and television technology. This manual is composed of the following sections:

- *Specifications* provides product specifications tables.
- *Operating Information* provides basic operating information.
- *Theory of Operation* is an overview of the main components of the module.
- *Performance Verification* contains procedures necessary to verify that the module is meeting the requirements listed in the *Specifications.*
- *Adjustment Procedures* contains a procedure to adjust the black burst sync output level.
- *Maintenance* contains installation, removal and replacement, and trouble-shooting instructions.
- *Mechanical Parts list* contains the part numbers for replacement parts that you can order for this module. The exploded view illustration helps you to identify the 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 electrical specifications for the BG1 Generator module. Table 1–2 lists the Electromagnetic Compatibility (EMC) compliance specifications. For a list of environmental specifications, refer to the *TG 2000 Signal Generation Platform Service Manual*

Table 1–1: Electrical specifications

Characteristic	Performance requirement	Reference information
Black Burst Outputs		
Sync Amplitude Accuracy	± 2%	All rear panel outputs except clock output
Burst Amplitude Accuracy	± 5%	Relative to sync amplitude
SCH Phase Error		Phase error ≤ 5°
DC Offset	≤ ± 50 mV	
Return Loss/Output Impedance	≥ 36 dB to 6 MHz	75 Ω
Clock Output		
Amplitude	0.4 V p-p ± 0.1 V	Into 75 Ω, AC coupled, square wave
Return Loss/Output Impedance		≥ 15 dB 1 MHz to 100 MHz, 75 Ω
Frequency Range		10 MHz to 100 MHz
Frequency Accuracy	As displayed on front panel ± 1 ppm	When not Genlocked
Nonharmonic Spurs		≥ 45 dB below fundamental
Power Consumption		+5 Volts: 2.0 W typical –5 Volts: 1.1 W typical –2 Volts: 0.3 W typical +15 Volts: 0 W typical –15 Volts: 0 W typical Battery: 0 µA typical

Table 1–2: 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 BG1 Generator module conforms to the following standards: EBU N14 SMPTE RP 154

Operating Information

Operating Information

This section contains the following information:

- An overview of the menu structure
- Instructions for operating the BG1 Generator module

Menu Structure

You control the BG1 Generator module with the front-panel keys and the menu interface. Figure 2–1 shows the menu structure.

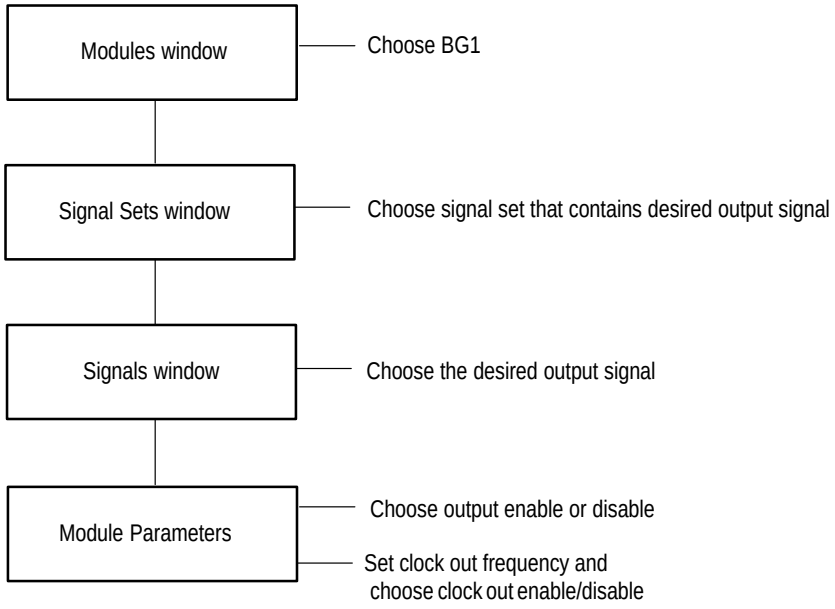


Figure 2–1: Menu structure

Rear-Panel Connectors

The rear panel of the BG1 Generator module has four BNC connectors that provide three sources of one black burst signal, and one clock out signal. You can select which black burst signal is generated for output, and you can set the clock out frequency (between 10 MHz and 100 MHz).

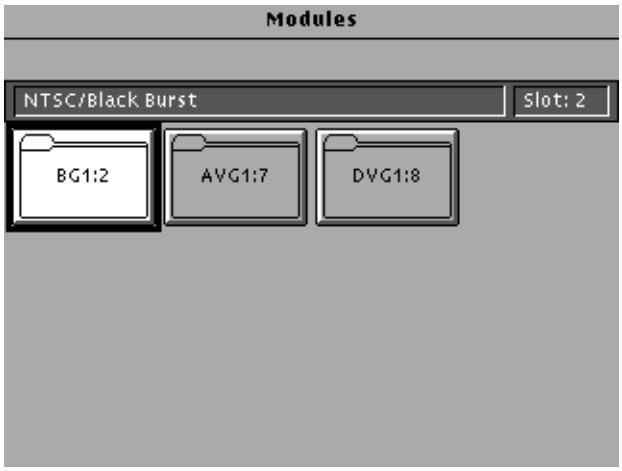
Operating Procedures

The operating procedures describe how to select a test signal and how to set module parameters for the BG1 Generator module.

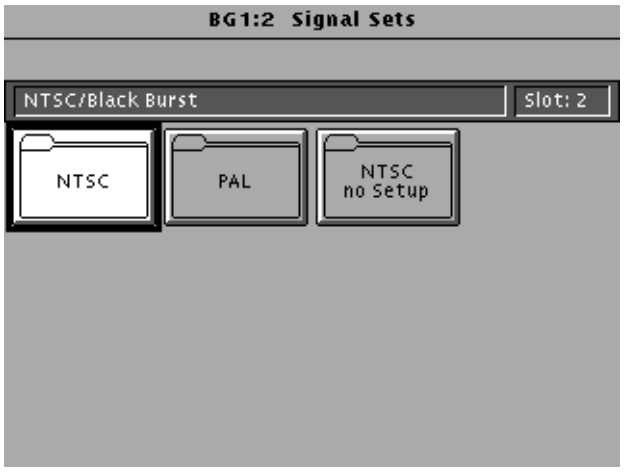
Selecting a Test Signal

To select a test signal for the BG1 Generator module outputs, do the following:

1. Push the **Modules** front-panel button to display the Modules window.
2. Touch the **BG1** icon on the display to go to the Signal Sets window for the BG1 Generator module.

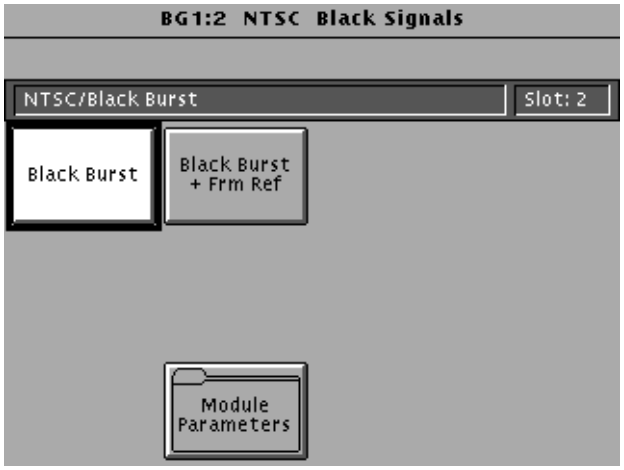


3. To activate a test signal, touch the signal set icon on the display.



4. Touch the test signal icon.

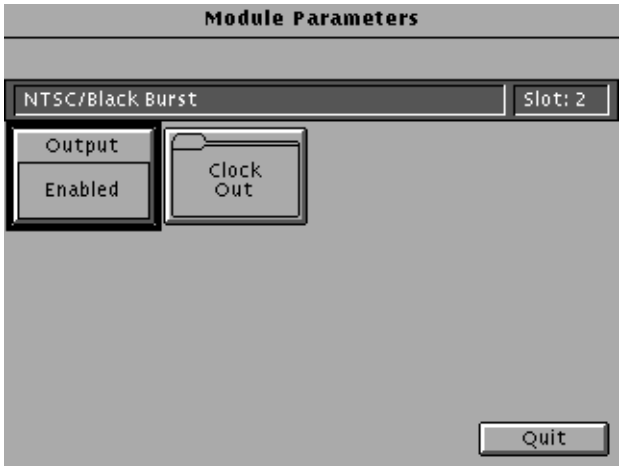
This figure shows the Signals window for the NTSC signal set. The selected signal is loaded and output on the three output connectors of the BG1 Generator module. The timing of the output is time zero of the selected video standard.



Enable/Disable Black Burst Outputs

The system clock and frame reset pulse resources used by the BG1 Generator module are released when you disable the black burst outputs.

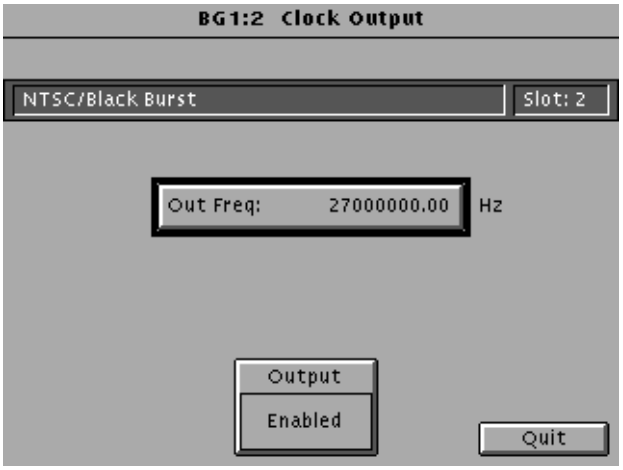
1. Touch the **Module Parameters** icon at the bottom of the Signals window. Changes you make through the Module Parameters window affect all of the signal sets within the BG1 Generator module.
2. In the Module Parameters window, touch **Output Enabled/Disabled** to enable or disable the black burst outputs.



Set Clock Out Frequency Enable/Disable Clock Out

You can set the clock frequency to any frequency between 10 MHz and 100 MHz. Setting the clock to a frequency other than 27 MHz uses one of the two available system DDS clock signals. This resource is released when you disable the clock.

1. Touch **Module Parameters** at the bottom of the Signals window. Changes you make through the Module Parameters window affect all of the signal sets within the BG1 Generator module.
2. Touch **Clock Out** on the Module Parameters window display to open the Clock Output window (shown in the following figure).



3. To set the clock frequency, touch **Out Freq:** on the display. Set the frequency using one of the following methods:
   - Rotate the navigation knob counterclockwise to decrease the frequency or clockwise to increase the frequency.
   - Enter a frequency value from the front-panel keypad and press the **u/M** key or the **Select** button. For example, enter 10 and press **u/M** to enter a frequency value of 10 MHz.
4. To enable or disable the clock, touch **Output Enabled/Disabled** on the display of the Clock Output window.

Theory of Operation

Theory of Operation

The BG1 is a multiple-format black burst generator supplied as a standard accessory with the mainframe. The module can output one of the six following black burst signals to the three rear-panel output connectors:

- NTSC with setup and no color frame reference
- NTSC with setup and color frame reference
- NTSC without setup
- NTSC without setup and with color frame reference
- PAL with color frame reference
- PAL without color frame reference

The Clock Out connector outputs one of the three available system clocks. The clock output is either the 27 MHz master clock or one of the two Direct Digital Synthesis (DDS) clocks that have a range of 10 MHz to 100 MHz. The BG1 can control the frequency of the two DDS clocks. Figure 3–1 shows the BG1 block diagram.

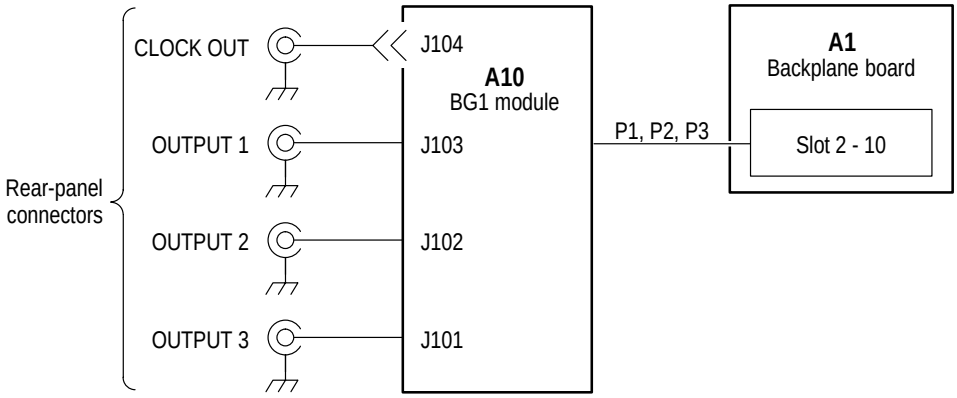


Figure 3–1: BG1 module block diagram

The timing of the BG1 outputs is time zero for reference timing. The BG1 output timing is fixed when operating on the internal reference.

***NOTE**. If the black burst or clock outputs are not required, the BG1 can be removed to provide a mainframe slot for another module.*

Performance Verification

Performance Verification

Perform the procedures in this section to verify the operation of the BG1 Generator module.You do not need to remove the covers from the mainframe.

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 4–1. 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 4–1: Test equipment required for verification

Equipment	Purpose	Example
Video measurement set	Sync and burst amplitude, DC offset, and SCH phase errors	Tektronix VM700 Series Video Measurement Set
Spectrum analyzer	Clock output nonharmonic spurs and return loss	Tektronix 2712 Spectrum Analyzer
Test oscilloscope	Clock output amplitude	
Frequency counter	Clock output frequency	Tektronix CDC250 Counter
RF bridge, low frequency	Return loss	Wide Band Engineering A57TLSCR
Coaxial cable, 75 Ω	Return loss	Tektronix 012-0074-00
75 Ω female-female adapter	Return loss	Tektronix 103-0028-00
Coaxial cable, 50 Ω (2)	Clock output nonharmonic spurs	Tektronix
50 Ω female-to-75 Ω male adapter	Clock output nonharmonic spurs	Tektronix
Termination, 75Ω, end line	Sync and burst amplitude, DC offset, and SCH phase errors	Tektronix 011-0102-01
Termination, 75Ω, feed-through	Sync and burst amplitude, DC offset, and SCH phase errors	Tektronix 011-0003-00

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 20 minutes before performing any tests.

Verification Procedures

Check Sync Amplitude, Burst Amplitude, and DC Offset

You can perform this check in NTSC, NTSC no setup, or PAL. You can repeat the check in additional video standards if desired.

Test Equipment Required:

- Video measurement set (this procedure uses the Tektronix VM700A)
- Coaxial cable, 75 Ω high-quality, noise free; 1-meter length
- Termination, 75 Ω precision BNC

Procedure:

1. Select the signal set for your video standard as follows:
   a. Press the **Modules** button on the TG 2000 Platform mainframe.
   b. Touch **BG1:#** on the display (# is the slot number).
   c. Touch your video standard **(NTSC, NTSC no setup, or PAL)** on the display.
   d. Touch **Black Burst + Frm Ref** on the display.
2. Connect the equipment and set up the video measurement set as follows:
   a. Connect the 75 Ω cable from the OUTPUT 1 of the BG1 Generator module to the first CH A input of the video measurement set.
   b. Connect a 75 Ω termination to the other CH A connector of the video measurement set.
   c. On the video measurement set, select **Measure**.
   d. On the video measurement set, select **Video Standard**.
   e. On the video measurement set, select **H Timing**. Turn averaging on.

3. Check NTSC sync and burst amplitude and check DC offset:
   a. For NTSC, check that the sync amplitude is 40 IRE, ±0.8 IRE as displayed on the video measurement set.
   b. Check that the burst amplitude matches the sync amplitude, ±2 IRE.
   c. Select Waveform and Expand (vert)
   d. Check the blanking level for 0 mV, ±50 mV.
4. Check PAL sync and burst amplitude:
   a. Check that sync amplitude is 300 mV, ±6 mV as displayed on the video measurement set.
   b. Select Waveform and Expand (vert)
   c. Check that the burst amplitude matches the sync amplitude, ±15 mV.
   d. Check the blanking level for 0 mV, ±50 mV.
5. Repeat step 3 for outputs 2 and 3 on the BG1 Generator module, moving the 75 Ω cable to the corresponding output connector.

Check SCH Phase Error

You can perform this check in NTSC, NTSC no setup, or PAL. You can repeat the check in additional video standards if desired.

Test Equipment Required:

- Video measurement set
- Termination, 75 Ω precision BNC
- Coaxial cable, 75 Ω high-quality noise free; 1-meter length

Procedure:

1. Connect the equipment as follows:
   a. Connect the 75 Ω cable from the OUTPUT 1 of the BG1 Generator module to CH A input of the video measurement set.
   b. Connect a 75 Ω termination to the CH A connector of the video measurement set.
2. Select the signal set for your video standard as follows:
   a. Press the **Modules** button on the TG 2000 Platform mainframe.
   b. Touch **BG1:X** on the display (X is the slot number).

c. Touch **NTSC, NTSC no setup, or PAL** on the display.

d. Touch **Black Burst + Frm Ref** on the display.

3. Set the video standard on the video measurement set to match the selected signal set.

4. Check SCH phase measurement as follows:

a. Select **Measure** on the video measurement set.

b. Select **SCH Phase**.

c. Check that the SCH Phase error on the readout is < 5°.

5. Repeat step 4 for outputs 2 and 3 on the BG1 Generator module, moving the 75 Ω cable to the corresponding output connector.

Check Clock Output Amplitude

It does not matter which video standard you choose for this check.

Test Equipment Required:

- Test oscilloscope
- Coaxial cable, 75 Ω high-quality noise free; 1-meter length
- Termination, 75 Ω precision BNC, feed-through type

Procedure:

1. Connect the CLOCK OUT of the BG1 Generator module to the input of the test oscilloscope, using a 75 Ω cable with a feed-through 75 Ω termination.

2. Set the CLOCK OUTPUT to 27 MHz as follows:

a. Press the **Modules** button on the TG 2000 Platform mainframe.

b. Touch **BG1:X** on the display (X is the slot number).

c. Touch any video standard on the display.

d. Touch **Module Parameters** on the display.

e. Touch **Clock Out** on the display.

f. Ensure that the displayed Out Freq: value is 27000000.00 Hz. (If it is not, then enter **27** followed by **μ/M** on the TG 2000 Platform mainframe keypad.)

g. Toggle the **Output** to **Enabled**.

3. Check that the peak-to-peak amplitude displayed on the scope is 400 mV, ± 100 mV.

Check Clock Output Frequency Accuracy

It does not matter which video standard you choose for this check.

Test Equipment Required:

- Frequency counter
- Coaxial cable, 75 Ω high-quality, noise free; 1-meter length

Procedure:

1. Connect the CLOCK OUTPUT of the BG1 Generator module to the input of the frequency counter, using a 75 Ω cable.

2. Set the CLOCK OUTPUT to 27 MHz as follows:

a. Press the **Modules** button on the TG 2000 Platform mainframe.

b. Touch **BG1:X** on the display (X is the slot number).

c. Touch any video standard on the display.

d. Touch **Module Parameters** on the display.

e. Touch **Clock Out** on the display.

f. Ensure that the displayed Out Freq: value is 27000000.00 Hz. (If it is not, then enter **27** followed by **μ/M** on the TG 2000 Platform mainframe keypad.)

g. Toggle the **Output** to **Enabled**.

h. Leave the menu displayed for use in further steps.

3. Check the frequency counter value for 27000000 Hz, ± 27 Hz.

4. Set the CLOCK OUTPUT to 10 MHz as follows:

a. Touch **Out Freq:** on the display.

b. Enter **10** followed by **μ/M** on the TG 2000 Platform mainframe keypad.

5. Check the frequency counter value for 10000000 Hz, ± 10 Hz.
6. Set the CLOCK OUTPUT to 100 MHz.
7. Check the frequency counter value for 100000000 Hz, ± 100 Hz.

Check Return Loss of Outputs 1, 2, and 3 and Clock Out

It does not matter which video standard you choose for this check.

***NOTE**. Perform the Return Loss Check only if you replace the clock board.*

Test Equipment Required:

- Spectrum analyzer (This procedure was prepared using a Tektronix 2712 Spectrum Analyzer.)
- RF bridge (A57TLSCR low frequency)
- Precision coaxial cables, two 50 Ω and one 75 Ω
- 75 Ω female-female adapter

Procedure: Check Return Loss from 100 KHz to 6 MHz

1. Make the following connections, as shown in Figure 4–1.
   a. Connect a precision 50Ω cable from the spectrum analyzer RF Input to the RF Output on the RF Bridge.
   b. Connect a precision 50Ω cable from the spectrum analyzer TG Output to the RF Input on the RF Bridge.
   c. Connect a 75 Ω female–female adapter to the RF bridge 75 Ω Test Port.

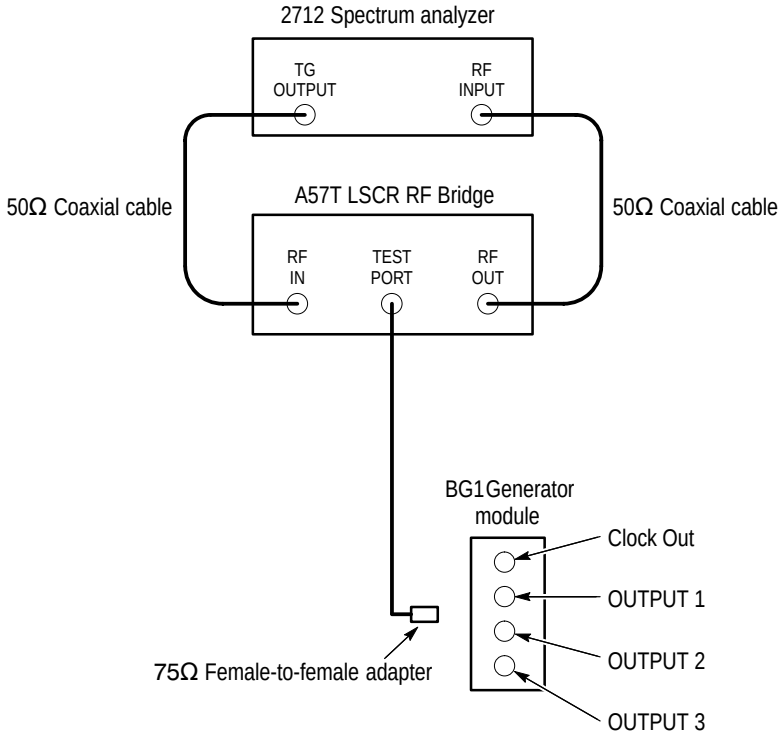


Figure 4–1: Equipment hookup for checking return loss

2. Select the following on the spectrum analyzer:

a. Select Demod/TG. Turn on the tracking generator and set the tracking generator fixed level to 0.00 dBm.

b. Set the Span/Div to 1 MHz and the Resolution Bandwidth to 3 kHz.

c. Set the Reference Level to the first major division down from the top of the analyzer display.

d. Set the Vertical Scale to 10 dB.

3. Adjust the spectrum analyzer External Attenuation Amplifier as follows:

a. Disconnect either of the cables connected from the spectrum analyzer to the RF Bridge.

b. Set the spectrum analyzer frequency to 5 MHz.

c. Turn on and set the Marker to 6 MHz.

d. Reconnect the cable to the RF Bridge

e. Note the Reference Level Readout value.

f. Adjust the External Attenuation Amplitude (on the Input menu if using the 2712 Spectrum Analyzer) by the value in step e. The Reference Level Readout should now be 0.00 dBm.

4. Verify bridge function as follows:

a. Connect the precision, high-frequency termination to the 75 Ω Test Port on the RF Bridge.

b. Check that the frequency response from 0 MHz to 6 MHz is ≥ 40 dBm.

c. Return the spectrum analyzer frequency marker to 6 MHz if it was moved.

d. Remove the precision high-frequency terminator from the RF Bridge.

5. Turn off all BG1 Generator module outputs as follows:

a. Press the **Modules** button on the TG 2000 Platform mainframe.

b. Touch **BG1:X** on the display (X is the slot number).

c. Touch any video standard on the display.

d. Touch **Module Parameters** on the display.

e. Toggle the **Output** to **Disabled**.

f. Touch **Clock Out** on the display.

g. Toggle the **Output** to **Disabled**.

h. Touch **Quit** on the display.

6. Connect the Test Port of the RF Bridge to the OUTPUT 1 connector on the BG1 Generator module, using a female-to-female 75 Ω adapter.

7. Check that the Reference Level readout on the spectrum analyzer is ≤ –36 dBm.

8. Repeat steps 6 and 7 for outputs 2 and 3 on the BG1 Generator module.

9. Repeat steps 6 and 7 for the clock module, checking that the Reference Level readout on the spectrum analyzer is ≤ –15 dB.

10. Remove all cables from the BG1 Generator module.

Check Clock Output Nonharmonic Spurs

It does not matter which video standard you choose for this check.

Test Equipment Required:

- Spectrum analyzer
- 50 Ω female-to-75 Ω male minimum loss adapter
- Two coaxial cables, 50 Ω

Procedure: Check System Clock Output

1. Connect the 50 Ω female-to-75 Ω male minimum loss adapter to the CLOCK OUT on the BG1 Generator module.
2. Connect the CLOCK OUT on the BG1 Generator module to the RF Input of the spectrum analyzer, using a 50 Ω cable.
3. Set the CLOCK OUT signal to 27 MHz as follows:
   a. Press the **Modules** button on the TG 2000 Platform mainframe.
   b. Touch **BG1:X** on the display (X is the slot number).
   c. Touch any video standard on the display.
   d. Touch **Module Parameters** on the display.
   e. Touch **Clock Out** on the display.
   f. Enter **27** followed by **μ/M** on the TG 2000 Platform mainframe keypad.
   g. Toggle the **Output** to **Enabled**.
4. Initialize the spectrum analyzer, select Display, and set the following parameters:

Acquisition mode	Peak
Center Frequency	27 MHz
Span / Div	2.4 MHz
Video Filter	ON
Resolution bandwidth	300 kHz

   a. Set the peak of the signal to the top of the screen.
   b. Press Peak Find.
   c. Display a line at 45 dB below the signal.
   d. Turn storage B on.
   e. Set center frequency to 13.5 MHz.

f. Set MAX HOLD ON and make sure that there is no signal above the line.

g. Set MAX HOLD OFF.

h. Repeat steps e. through g. for each of the following center frequency settings:

40.5 MHz
67.5 MHz
94.5 MHz

This completes the Performance Verification Procedure

Adjustment Procedures

Adjustment Procedures

The procedures in this section should return the BG1 Black Burst Generator module to operate within specifications.

If, after you have performed the following adjustment procedures, the BG1 Generator module does not meet or exceed specifications as determined by the performance verification, repair is necessary. Contact your Tektronix Service Center.

WARNING. *Dangerous electric-shock hazards exist inside the system unit. To prevent electrical shock, remove all jewelry before beginning any of the adjustment procedures.*

Equipment Required

Table 5–1: Equipment list for adjustments

Equipment	Specifications	Example or part number
Video measurement set	Measure sync level	Tektronix VM700A
75 Ω coaxial cable	BNC connectors; 1-meter length	Tektronix Part Number 012-0074-00
75 Ω termination	Precision BNC. Use to terminate second input on VM700A.	Tektronix Part Number 011-0102-01

Preparation

1. Connect the TG 2000 Platform mainframe to the appropriate AC mains power and switch on the rear-panel power switch.
2. Press the On/Standby button on the front panel. At power on, the instrument runs self tests to check all functions of all mainframe components. If the display is working and no errors appear on the display, the mainframe passed its self tests.

   The installed modules also run self tests at power on. To determine if they passed their tests, press the **Status** key and check that no module has a "Failed power up" status.
3. Wait 20 minutes for the mainframe and modules to warm up.

Adjustment Procedure

NOTE. *Perform the preceding* Preparation *procedure before making any adjustments.*

The following procedure adjusts the black burst sync level output.

Adjust Sync Level

Test Equipment Required:

- VM700A
- Termination, 75 Ω precision BNC. Tektronix 011-0102-01, or equivalent.
- Coaxial cable, 75 Ω high-quality, noise free; 1-meter length. Tektronix 012-0074-00.

Procedure:

1. Connect a 75Ω coaxial cable from OUTPUT 1 of the BG1 Generator module to the first VM700A CHAN A input.
2. Connect the 75Ω termination to the other CHAN A input connector of the VM700A.
1. Select the signal set for your video standard as follows:
   a. Press the **Modules** button on the TG 2000 Platform mainframe.
   b. Touch **BG1** on the display.

c. Touch your video standard **(NTSC, NTSC no setup, or PAL)**.

d. Touch **Black Burst**.

e. Touch **Module Parameters**.

f. Touch **Output** to toggle to **Output Enable**.

2. Set up the VM700A as follows:

a. Press **Measure**.

b. Rotate the knob to display the **Video Standard** menu item.

c. Select **Video Standard**.

d. Press **Waveform**.

e. Press the **Move/Expand** button to select **Move**.

f. Press the arrow button to select the vertical arrow.

g. Use the knob to move the bottom of the negative pulse to the center of the screen.

h. Press the **Move/Expand** button to select **Expand**.

i. Rotate the knob to expand the display to get an accurate reading.

j. If the bottom of the sync pulse moves off the display, repeat steps e through i to move the signal back to the center of the display and magnify.

3. Check the negative pulse for a reading of 40 ±0.1 IRE. If the pulse is not within the correct reading, adjust the DAC gain pot on the BG1 Generator module for a sync level of 40 ±0.1 IRE.

If adjusting the gain pot cannot bring the negative pulse to 40 ±0.1 IRE, contact your nearest Tektronix, Inc. Service Center.

Maintenance

Maintenance

This section contains instructions and procedures for maintaining and servicing the BG1 Generator module.

Preparation

Follow these instructions when maintaining or servicing the instrument.

Servicing Prerequisites

- 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, performance checking, and, if needed, readjustment. 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 instrument 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 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 and Readjustments

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. Performance verification and adjustment procedures are included in this manual.

Repackaging Instructions

Use the following instructions to prepare your instrument 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 BG1 Generator 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
01536	TEXTRON INC	1818 CHRISTINA ST	ROCKFORD, IL 61108
0GZV8	HUBER & SUHNER INC	ONE ALLEN MARTIN DRIVE	ESSEX, VT 05451
0KB01	STAUFFER SUPPLY CO	810 SE SHERMAN	PORTLAND, OR 97214–4657
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD PO BOX 76500	COLD SPRINGS, KY 41076
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077–0001
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND RD NE	SALEM, OR 97303
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK HWY SUITE 2	VANCOUVER, WA 98661

Replaceable parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
7–1–1	211–0408–00			8	SCR,ASSEM WSHR:4–40 X 0.250,PNH,STL,ZINC,T–10 TORX	0KB01	211–0408–00
–2	211–0725–00			2	SCREW,MACHINE:6–32 X 0.375,FLH TORX	01536	ORDER BY DESCR
–3	671–3590–00			1	CKT BD ASSY:BLACK BURST	80009	671–3590–00
–4	337–4063–01			1	SHIELD:BLACK BURST,ALUM	80009	337–4063–01
–5	174–3420–00			1	CA ASSY,RF:COAX,RFD,75 OHM,BNC,REAR MT	TK2469	174–3420–00
–6	131–0265–00			3	CONN,RF JACK:SMB,PCB,MALE,RTANG,50 OHM	0GZV8	85SMB–50–0–1
–7	333–4171–00			1	REAR PANEL:REAR BLACK BURST PANEL,ALUM	TK1943	333–4171–00
–8	210–1039–00			3	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	0KB01	1224–02–00–0541C
–9	220–0497–00			3	NUT,PLAIN,HEX:0.5–28 X 0.562 HEX,BRS CD PL	73743	ORDER BY DESCR
					STANDARD ACCESSORIES		
	070–9298–XX			1	MANUAL,TECH:USER,BPG1 BLACK BURST GENERATOR	80009	070–9298–XX
					OPTIONAL ACCESSORIES		
	070–9304–XX			1	MANUAL,TECH:SERVICE,BPG1 BLACK BURST GENERATOR	80009	070–9304–XX

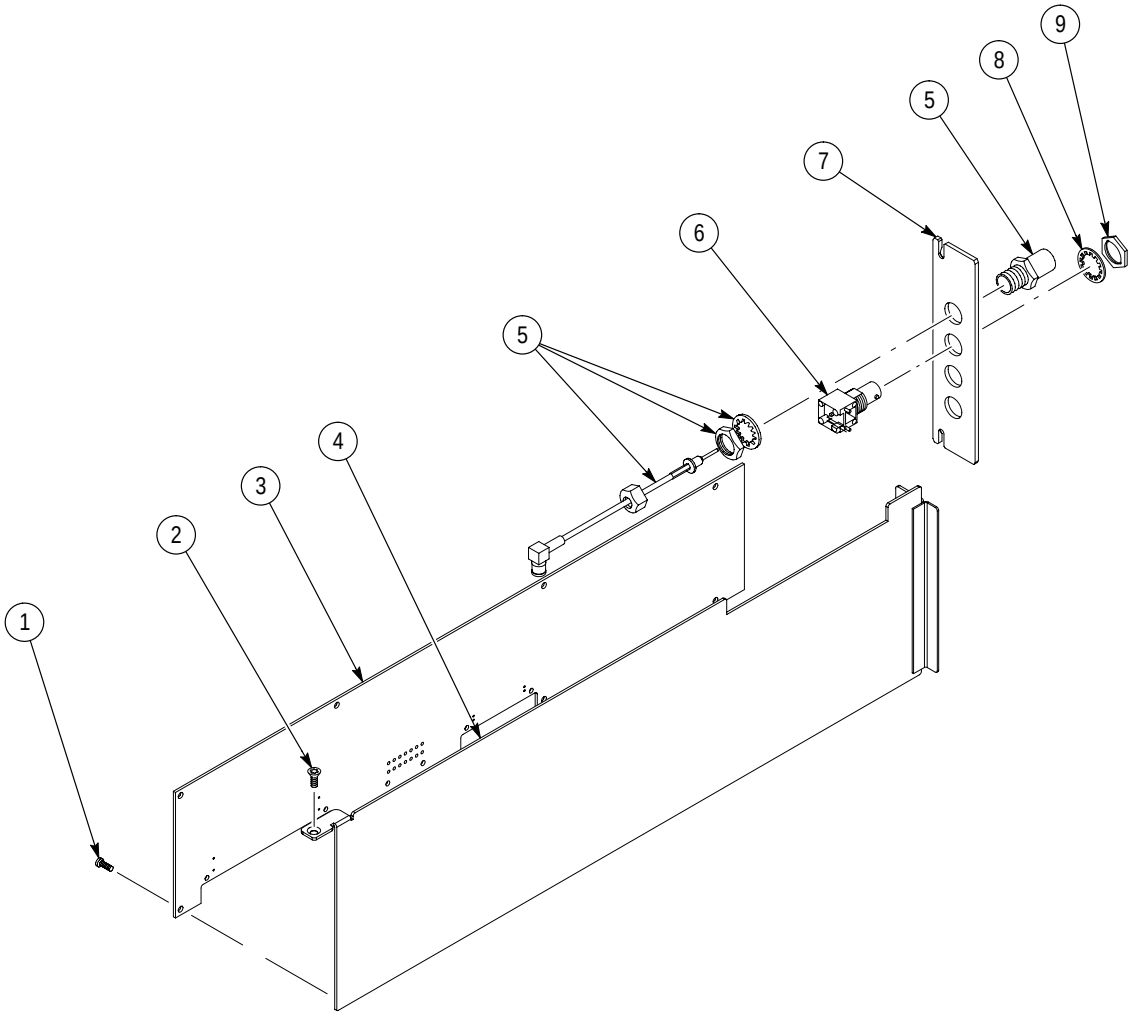


Figure 7–1: Exploded view