

2000GEN

GENLOCK TIMING MODULE

Instruction Manual

SOFTWARE VERSION 1.0.0

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Contacting Grass Valley

Region	Voice	Fax	Address	Web Site
North America	(800) 547-8949 Support: 530-478-4148	Sales: (530) 478-3347 Support: (530) 478-3181	Grass Valley P.O. Box 599000 Nevada City, CA 95959-7900 USA	www.thomsongrassvalley.com
Pacific Operations	+852-2585-6688 Support: 852-2585-6579	+852-2802-2996		
U.K., Europe, Asia, Middle East	+44 1753 218 777	+44 1753 218 757		
France	+33 1 45 29 73 00			
Germany	+49 221 1791 234	+49 221 1791 235		

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Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Software updates, drivers, and patches can be downloaded.

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2000GEN Genlock Timing Module

Introduction

The 2000GEN Genlock Timing Module locks to reference black burst and provides clock and pulse timing references for the applicable modules in Kameleon Series frames.

Key features of the 2000GEN module include:

- Support for NTSC, PAL-B reference input signal,
- A low-jitter 27 MHz reference clock generator,
- A generated common reference pulse stream containing:
 - Reference field pulse,
 - Frame bit,
 - Color-frame bit,
 - AES 5 frame sequence bits,
- Differential LVDS (low voltage differential signaling) lines that distribute signals to each front module slot,
- Reference blackburst locked with burst lock PLL as default, and
- Remote control and monitoring support.

Installation

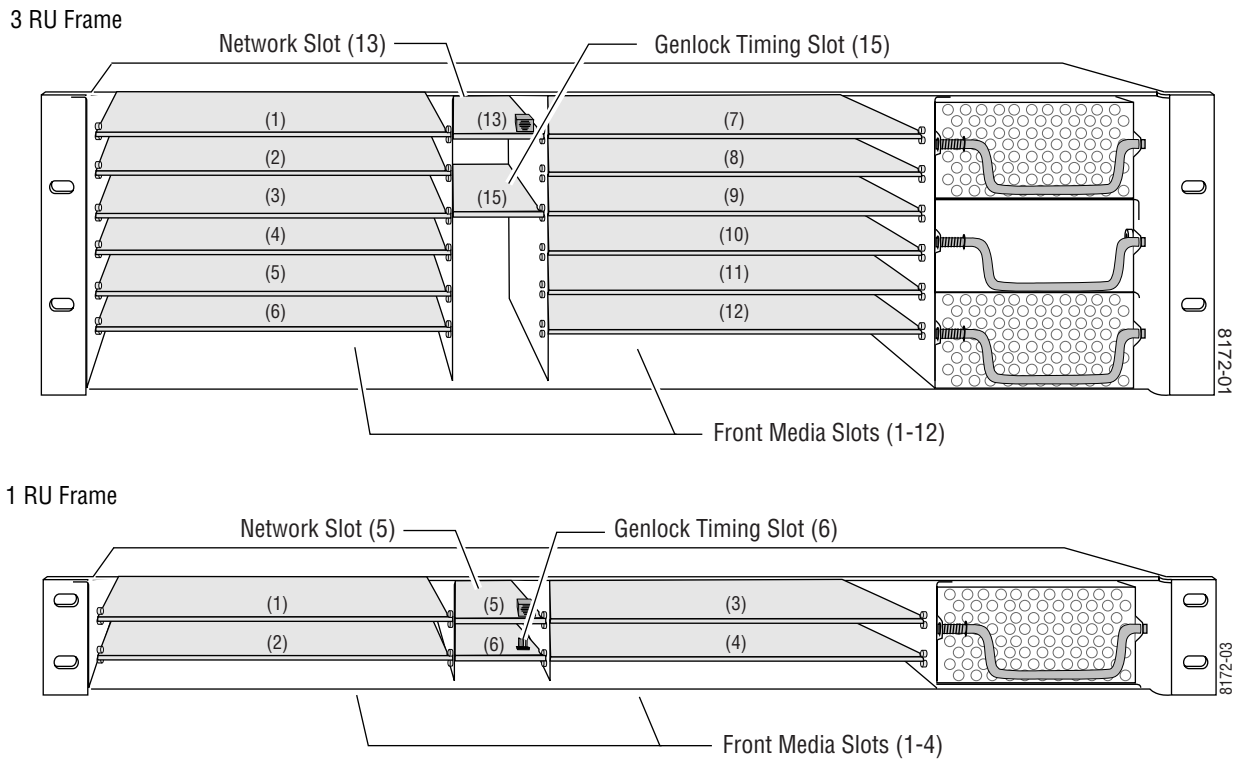
The 2000GEN module can be plugged in and removed from a Kameleon Series frame with power on. When power is applied to the module, LED indicators reflect the initialization process (see *Power Up* on page 8).

Module Placement in the Frame

There are six cell locations in central control module section of the 3 RU frame to accommodate network and reference modules. The 2000GEN module plugs into Slot 15 (see Figure 1). The 1 RU frame has two central control module slots. Slot 6 is used for the 2000GEN module.

1. Install the module by inserting it into the appropriate slot of the frame.
2. Verify that the module connector seats properly against the midplane connector.
3. Press the module ejector tab to seat the module in the slot.

Figure 1. 2000GEN Module Frame Slots



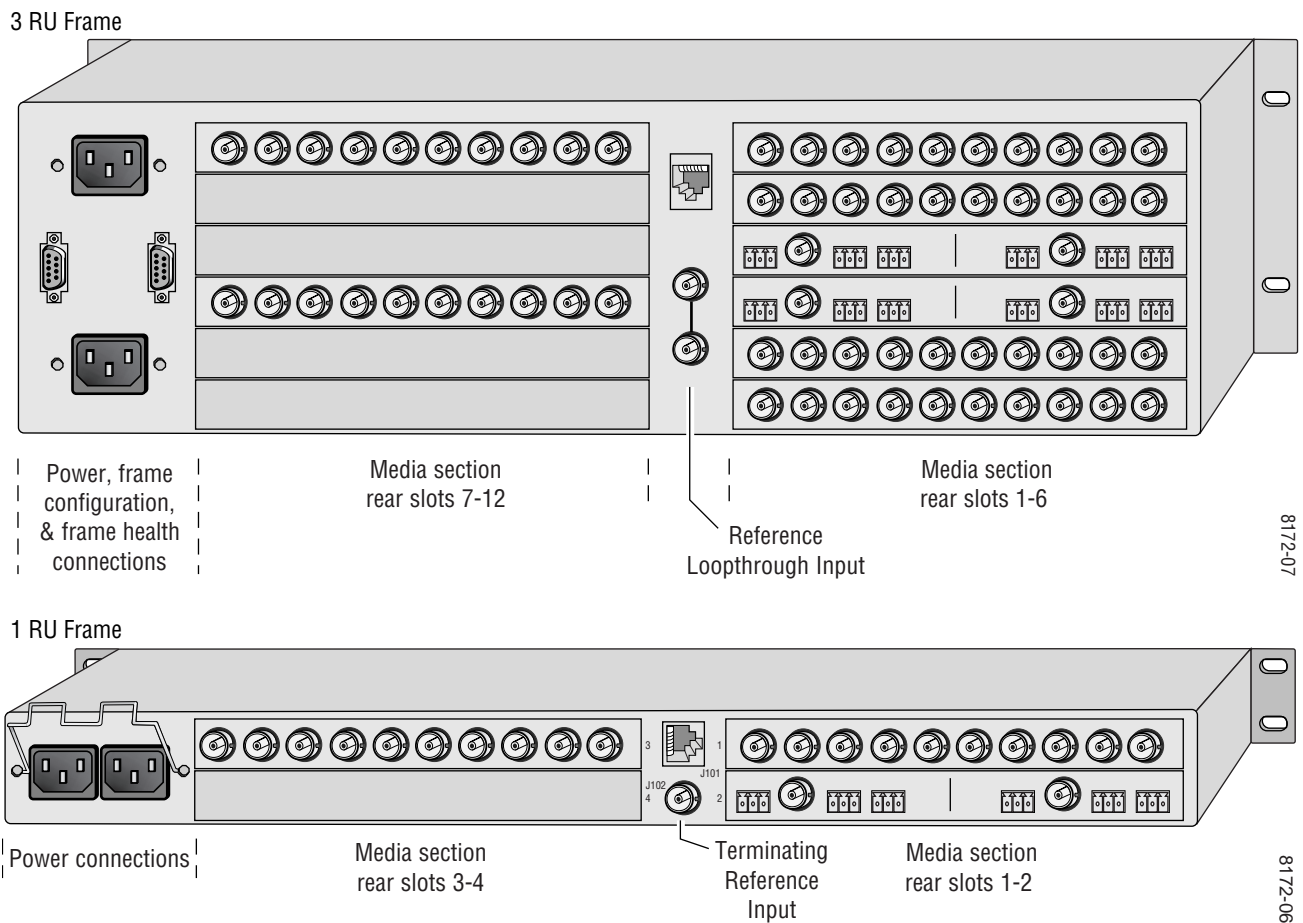
Cabling

Cabling to the 2000GEN module is done on the BNCs on the rear of the frame. Refer to [Figure 2](#) for a detailed illustration of the rear connections referenced below.

Reference Inputs

The 2000GEN will accept any of the video standards listed in the Input specifications in [Table 1 on page 17](#). Connect a video input to the Reference BNC. In the 3 RU frame, terminate the looping connector if the signal is not looped to other equipment.

Figure 2. 2000GEN Input Connectors



Power Up

The on-board LED indicators are illustrated in [Figure 3](#). Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

After initialization, the green on-board PWR LED should light to indicate correct power is present. Power can be measured at the indicated testpoints.

Set the jumper at J8 to **Remote** during configuration (LOCK OUT LED should be off). When remote configuration is complete, the jumper can be set to local to lock out any further changes but still allow remote monitoring of the module if desired.

Refer to [Table 1 on page 9](#) to see a complete list of possible operating conditions and the resulting indicator status.

Figure 3. LEDs and Configuration Switches

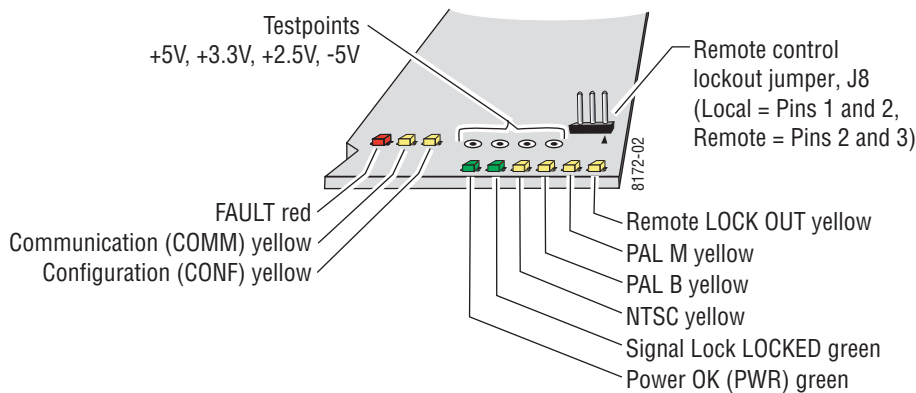


Table 1 describes the meaning of the various states for the LED indications on the front of the module (from left to right).

Table 1. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
FAULT (red)	Off	Module functioning properly
	On continuously	Module has detected internal fault
	Long flash	Selected reference signal missing
COMM (yellow)	Off	No activity on frame bus
	Long flash	Locate Module command received by the module from a remote control system
	Short flash	Activity present on the frame communication bus
CONF (yellow)	Off	Module is in normal operating mode
	On continuously	Module is initializing, changing operating modes or updating firmware
PWR (green)	Off	No power to module or module's DC/DC converter failed
	On continuously	Normal operation, module is powered
LOCKED (green)	Off	Signal phase unlocked
	On continuously	Signal phase locked
NTSC (yellow)	Off	NTSC mode not selected
	On continuously	NTSC mode selected
PAL -B (yellow)	Off	PAL-B mode not selected
	On continuously	PAL-B mode selected
PAL-M (yellow)	Off	PAL-M mode not selected (currently not used)
	On continuously	PAL-M mode selected (currently not used)
LOCK OUT (yellow)	Off	Jumper J8 is in the Remote position
	On continuously	Jumper J8 is in the Local position, remote module configuration is locked out, monitoring is still enabled

Remote Control and Monitoring

The 2000GEN has no on-board user configuration requirements. There is a jumper, J8 — LOCAL/REMOTE , on the front of the module (Figure 3 on page 8) for enabling or disabling remote control.

2000GEN control and monitoring can be performed remotely using the 2000NET interface (see Figure 4). This section describes the GUI access to the module configuration and monitoring functions. Refer to the *2000NET Network Interface Module Instruction Manual* for information on setting up and operating the Kameleon frame network.

Note The physical appearance of the menu displays shown in this manual represent the use of a particular platform, browser and version of 2000NET module software. They are provided for reference only. Displays will differ depending on the type of platform and browser you are using and the version of the 2000NET software installed in your system.

The 2000 modules can be addressed by clicking on a specific module icon in the frame status display or on a module name or slot number in the link list on the left.

Figure 4. 2000NET GUI

The Links section lists the frame and its current modules. The selected link's Status page is first displayed and the sub-list of links for the selection is opened. The sub-list allows you to select a particular information page for the selected device.

Content display section displays the information page for the selected frame or module (frame slot icons are also active links).

Refresh button for manual refresh of page

Online Manual Link

Media Module	Net Card	Media Module	Power Sled
Media Module		Media Module	
Media Module	Aux. Card	Media Module	Fan Sled
Media Module		Media Module	
Media Module		Media Module	
Empty		Media Module	Empty

Properties
 Vendor [Grass Valley Group](#) Software Version **3.1.0**
 Media Slots **13**

8046-13 r1

To navigate to one of the device's pages click on any of the device's sub-list of links. This will update the content display to the right.

Note To update status, HTML pages must be manually refreshed by clicking on the **Refresh** button. Changes made at the frame or from other browsers on the network will not be displayed until the page is refreshed.

Using the web browser's reload function will always return you to the Frame Status page. To refresh a particular page, always click on that page's **Refresh** button to the right of the page name.

The Online Manual Link will open a .PDF version of the appropriate instruction manual if you have set up an Online Manual Server as described in the 2000NET manual.

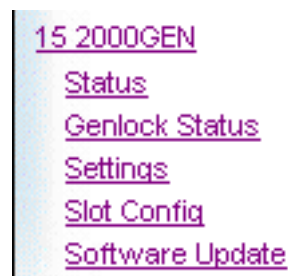
Module Links and Configuration Displays

The 2000 GUI provides the following links and displays for the 2000GEN module (Figure 5):

- Status display showing overall module status,
- Genlock Status display showing genlock status,
- Settings display for configuring the module parameters,
- Slot Config display showing slot identification and status reporting, and
- Software Update display.

The Module Configuration displays operate in the same manner for all remote controllable 2000 modules. Refer to the 2000NET manual for more information on these displays. Some functions listed may not be supported by a particular module. These will be indicated as not supported.

Figure 5. 2000GEN Display Links



Status Display

Use This Link

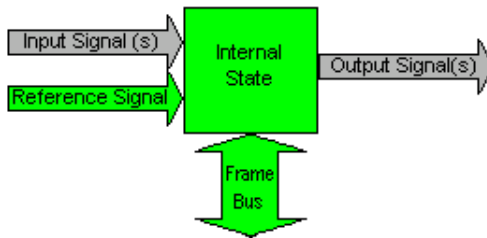
- [15 2000GEN](#)
- [Status](#)
- [Genlock Status](#)
- [Settings](#)
- [Slot Config](#)
- [Software Update](#)

The Status display (Figure 6) shows status of the input and output signal status and module properties (part and serial number, and software, hardware and firmware version).

Figure 6. 2000GEN Status Display

Status

Model: [2000GEN](#) Description: [GenLock Module](#)
Frame Location: [Bay 9](#) , Slot: [15](#)
Input Signal Name: [2000GEN](#)
Slot Status: [PASSED](#)



Properties

Hardware Revision [00A](#) Serial Number [UR02213052](#)
Software Version [1.0.1A](#) Part Number [671-6433-00A](#)
Firmware Version [0](#)

Genlock Status Display

Use This Link

- [15 2000GEN](#)
- [Status](#)
- [Genlock Status](#)
- [Settings](#)
- [Slot Config](#)
- [Software Update](#)

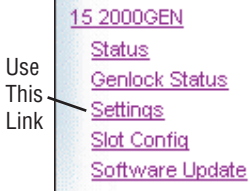
The Genlock Status display (Figure 7) shows the genlock standard selected and lock status of the reference input and color and AES frame.

Figure 7. Genlock Status Display

Genlock Status

Model: [2000GEN](#) Description: [GenLock Module](#)
Frame Location: [Bay 9](#) , Slot: [15](#)
Genlock: [Enable](#)
Standard Select: [PAL-B](#)
Reference Input: [Present/Locked](#)
Color Frame: [Locked](#)
AES Frame: [Locked](#)

Settings Display

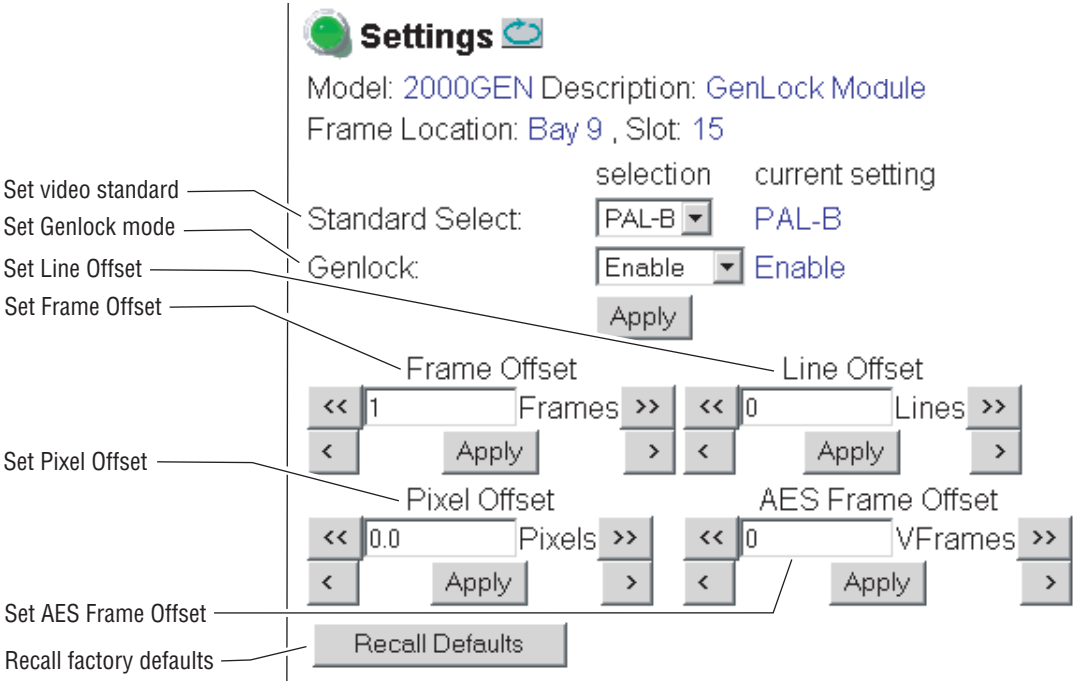


The Settings display (Figure 8) provides controls for selecting the video standard, the genlock mode and for making adjustments to the input timing stream from the external reference.

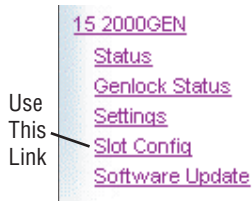
The following configuration parameters are provided for the module:

- Use **Standard Select** to choose the video standard as either **NTSC** or **PAL-B**. The input video standard is not auto-sensing.
- Set the **Genlock** control to lock the module to the external reference connected to the reference BNC, **Enable** or **Free Run** (not locked to external reference).
- Set the **Frame Offset** to shift the input timing stream by frames in reference to the input signal color framing (NTSC = 0–1, PAL-B = 0–3, Default = 0).
- Set the **Line Offset** to shift the input timing stream by lines up to one full frame (NTSC = 0–524, PAL-B = 0–624, Default = 0).
- Set the **Pixel Offset** to shift the input timing stream by pixels up to one full line (NTSC = 0–857.5, PAL-B = 0–863.5, Default = 0).
- Set the **AES Frame Offset** to shift the AES marker in the timing stream by VFrames for NTSC only (NTSC = 0–4, Default = 0). PAL-B is not adjustable (always 0).
- Select **Recall Defaults** to recall preset factory defaults for the selected standard.

Figure 8. 2000GEN Settings Display



Slot Configuration



The Slot Config display (Figure 9) allows you to do the following:

- Activate/deactivate the module locator function,
- Type a specific name for the module and the input signal, and
- Report and enable/disable SNMP reporting for the slot.

Locate Module

When enabled, the **Locate Module** function blinks the yellow COMM and CONF LEDs three times on, then a long off period, to make the module easy to locate in the frame.

Slot Identification

In the **Slot Identification** Name and Input Signal Name fields, you can type an identifying name for the module and a name to identify the input signal. The assigned names are stored on the 2000GEN module and travel with the module if it is moved to another frame.

Figure 9. 2000GEN Slot Config Screen

Slot Config

Model: 2000GEN Description: GenLock Module
Frame Location: Bay 9 QA 2000 Frame , Slot: 15

Locate Module
 Flash Off

Slot Identification
 Name:
 Input Signal Name:

Slot Memory
 Restore upon Install

Hardware Switch Controls
 Module Status Reporting: Enabled Asynchronous Status Reporting: Enabled

Slot SNMP Trap Reports

	Slot Fault	Module Removed	Signal Loss	Reference Loss
Enabled	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Trap Severity	Alarm	Warning	Warning	Warning

Callouts on the left side of the screen:

- Use This Link (points to Slot Config in the menu)
- Enable/disable module locator function (points to Locate Module)
- Name the module slot (points to Name field)
- Name the input signal (points to Input Signal Name field)
- Check box to restore saved config when new module installed (points to Restore upon Install)
- Learn module configuration to this slot (points to Learn Module Config button)
- Read-only status of 2000NET module hardware settings necessary for enabling SNMP Trap Reports (points to Hardware Switch Controls)
- Enable/disable specific SNMP reports for the slot (points to Slot SNMP Trap Reports table)
- Read-only severity level assigned to each event (points to Trap Severity row in the table)

Slot Memory

The slot configuration for each media module is automatically saved periodically (once an hour) to the 2000NET module in that frame. You may also select the **Learn Module Config** button at any time to save the current configuration for this slot. The configuration is saved on the 2000NET module. If the 2000NET module is removed or powered down, the stored configurations are not saved.

When the **Restore upon Install** box has been checked, the current configuration saved to this slot is saved as slot memory. When the current module is removed and another module of the same type is installed, the configuration saved to the 2000NET module will be downloaded to the new module. The box must be checked before the current module with the saved configuration is removed.

Hardware Switch Controls

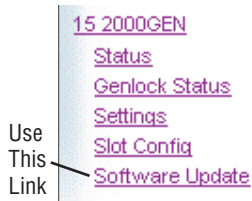
This section is a read-only status report of 2000NET module switch settings for Module Status Reporting and Asynchronous Status Reporting. These functions must be enabled on the 2000NET module for the following Slot SNMP Trap Reports to function.

Slot SNMP Trap Reports

This section is displayed only when the SNMP Agent software has been installed on the 2000NET module (refer to the *2000NET Instruction Manual* for installation instructions). Slot SNMP traps can be enabled only when the hardware switches for Module Fault reporting and Asynchronous Status reporting are in enabled on the 2000NET module (dipswitch S1 segment 7 and dipswitch S2 segment 1).

The enabled SNMP traps will be reported to any SNMP manager that is identified as an SNMP Report Destination in 2000NET configuration. Trap severity is read-only hard-coded information that is interpreted and responded to by the SNMP Manager software configuration.

Software Update Display



The Software Update display (Figure 10) allows you to download new software versions for the module. Refer to the 2000NET manual and the Grass Valley web site at <http://www.thomsongrassvalley.com> for complete details on software downloading and new software versions.

Figure 10. 2000GEN Software Update Display

Software Update

Model: [2000GEN](#) Description: [GenLock Module](#)
Frame Location: [Bay 9 QA 2000 Frame](#) , Slot: [15](#)
Software Version: [1.0.1A](#) Firmware Version: [1](#)
[Last Module Download Failed](#)
[Password Invalid](#)

	selection	current setting
FTP Server Address:	<input type="text" value="10.16.4.103"/>	10.16.4.103
File Path:	<input type="text" value="Enter Filename Here"/>	Enter Filename Here
FTP UserName:	<input type="text" value="Modular"/>	Modular
FTP Password:	<input type="password"/>	
	<input type="button" value="Apply"/>	

Specifications

Table 1. 2000GEN Specifications

Parameter	Value
Input	
Connector type	75 Ω BNC
Input impedance	High impedance to meet return loss with terminating frame assembly
Signal type	NTSC, PAL-B standard complying blackburst video
Return loss	> 40 dB up to 10 MHz
Equalization	None
CMRR	None
Hum rejection	> 40 dB on a maximum of 1 V p-p of 60 Hz hum
Input Locking Conditions	
Input signal minimum S/N ratio	> 40 dB
Signal level	300 mV p-p \pm 6 dB of sync tip portion
SCH error range	\pm 45 degrees for NTSC and PAL-B
Timebase error range	\pm 15 ppm over temperature range
AES framing detection	Meets SMPTE 318 standard
Clock Output	
Signal type	27 MHz 50%, \pm 10% duty cycle clock
Output impedance	100 Ω differential internal bus
Signal type	LVDS (Low voltage differential signal)
Rise/fall time	500–1500 ps between 20–80%
Jitter	< 200 ps p-p with > 60 dB input S/N ratio
Timing Pulse Output	
Signal type	TTL internal bus
Output polarity	Positive logic
Rise/fall time	1–5 ns between 20–80%
Jitter	< 2 ns
S/H timing to clock	10 ns setup/10 ns hold time, \pm 2 ns tolerance
Modes of Operation	
Locking modes	Genlock enable or free run (remote menu selection)
Input signal select modes	NTSC, PAL-B
Delay	Full video color frame in clock (37 ns) steps in three ranges: field/line/clock
Power	
Input power maximum	< 5 W
Environmental	
Frame temperature range	0 to 40 $^{\circ}$ C
Operating humidity range	10–90% non condensing
Non-operating temperature	-10 to 70 $^{\circ}$ C

Service

The 2000GEN modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. For service other than changing the on-board fuse, circuit modules should not be serviced in the field unless otherwise directed by Customer Service.

Power-up Diagnostics Failure

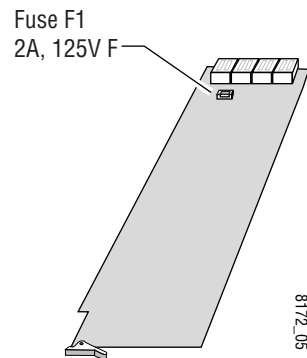
If the module has not passed self-diagnostics, do not attempt to troubleshoot. Return the unit to Grass Valley (see [Module Repair](#)).

Troubleshooting

If your module is not operating correctly, proceed as follows:

- Check frame and module power. If power is not present, check the fuse on the module as illustrated in [Figure 11](#).
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.

Figure 11. Location of Module Fuse



Module Repair

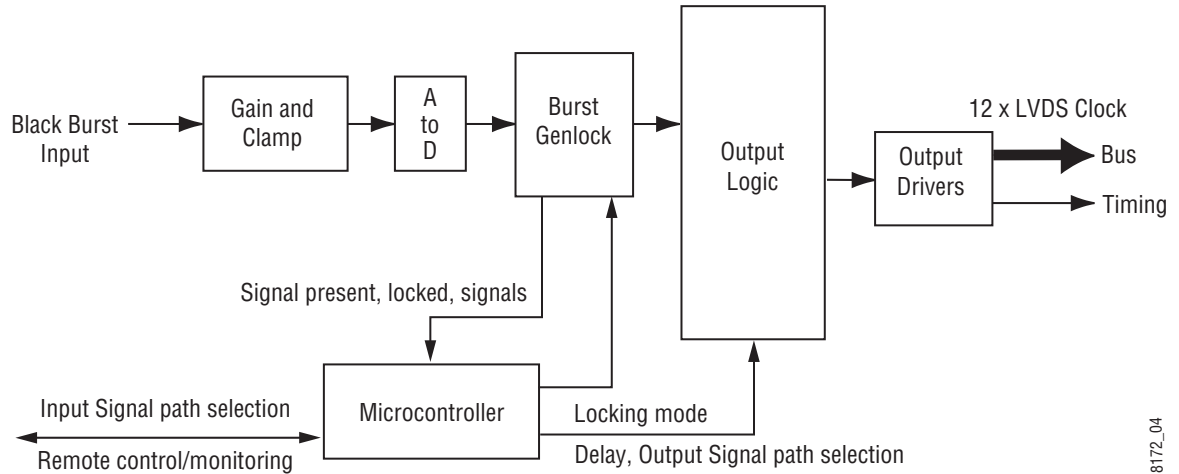
If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

Refer to [Contacting Grass Valley](#) at the front of this document for the Grass Valley Customer Service Information number.

Functional Description

A block diagram of the 2000GEN is shown in [Figure 12](#).

Figure 12. 2000GEN Block Diagram



8172_04

Inputs and Outputs

The module input accepts a PAL-B or NTSC black-burst signal from the Reference In BNC on the rear of the Kameleon frame. The reference signal is first processed in a clamp and gain circuit. It is then digitized and locked in a Burst Genlock circuit before entering output logic processing. Output phase adjustments of up to one color frame can be made to the timing signal through the remote monitoring GUI.

The module outputs a low-jitter 27 MHz reference clock which is distributed through differential LVDS (low voltage differential signal) lines to each front module slot. It also generates a common reference pulse timing stream containing a reference field pulse, frame bit, color-frame bit and AES 5 sequence bits for distribution throughout the frame.

Microcontroller

The primary purpose of the microcontroller section is to provide remote control and monitoring capability for the 2000GEN.

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