

9611B Switching and Distribution Unit

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User Guide

Revision B

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Revision	Date	Description
A	January 2012	First release.
B	June 2013	Gain specification change.

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

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Symbols

Symbol	Description
	This symbol means the following information is a note that gives you important information you use the 9611B.
	Caution - Refer to manual. Read all instructions in manual before using this product
	CE marking, attesting compliance to applicable European Directives
	Caution - risk of electrical shock
	Mains Power is ON
	Mains Power is OFF
	Earth terminal symbol: Used to indicate an earth ground connection to chassis.
	Chassis ground

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Introduction

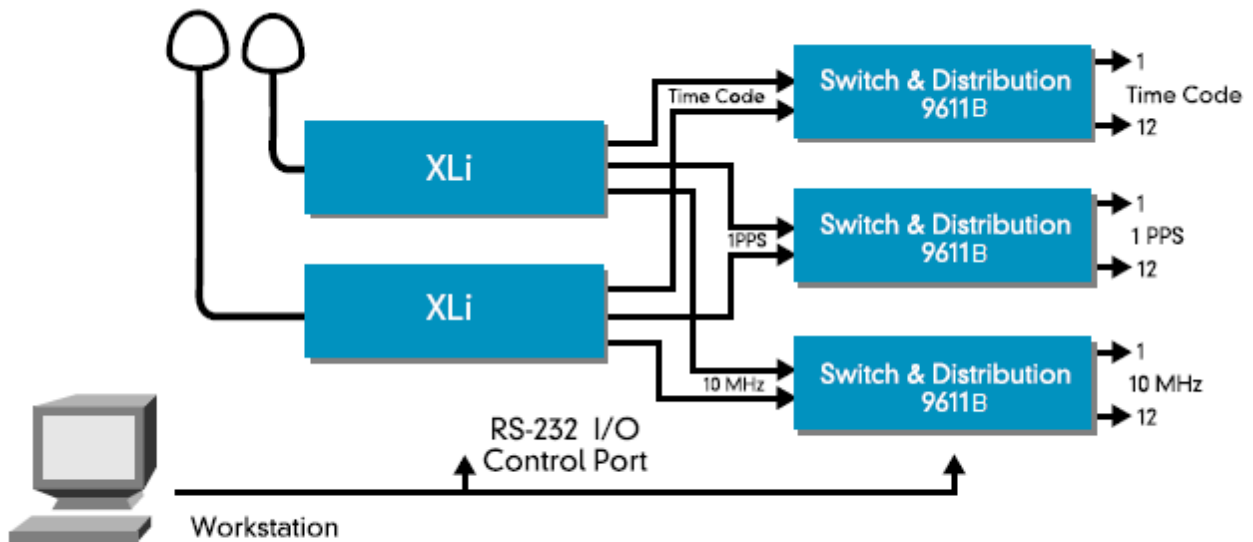
Symmetricom's® 9611B Switch & Distribution Unit is an intelligent switching, monitoring and distribution system, packaged in a 1U rack mount chassis. The unit includes a dual input A-B switch that provides redundant capability. The internal microprocessor can be set up to switch on a number of criteria (i.e., input signal voltage level and period between detected pulses).

The following figure shows a typical application of the 9611B. Output signals from two Symmetricom XLi Time and Frequency Systems are connected to respective A and B inputs of the 9611B instruments for distribution. One signal is designated as the primary signal and the other as the secondary signal. If the 9611B is in auto mode, and the primary signal to the 9611B fails, the auto-switching logic recognizes the failure, and switches to the secondary signal. The secondary signal is now connected to all twelve outputs.

To determine a failure condition, an adjustable threshold voltage or signal timing duration is provided to the 9611B auto-switching logic. This threshold voltage or signal timing duration is compared with the selected input signal to the 9611B. When the comparison triggers a fault condition, an alarm is triggered. The alarm is latched so as not to lose track of it. The alarm will stay latched until the fault condition has been removed, and the alarm reset has been activated.

As an alternative to the auto-switching mode, either input can be manually connected to the twelve outputs.

Figure 1: A Typical Application



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Installation

This section provides installation instructions for the 9611B Switching and Distribution Unit. Please review the installation warnings section that follows below.

Installation Instructions

Receiving Inspection

Upon receiving the 9611B, make a thorough inspection of the instrument and its accessories. Any damage or loss of equipment should be reported immediately to the responsible carrier. If no damage is found, installation can begin.

Rack Mounting Instructions

This unit is designed for mounting in a standard 19-inch (48.26 cm) rack.

Follow the rack manufacturer's instructions for mounting this unit while observing the following guidelines:

- **Elevated Operating Temperature:** If the unit is installed in a closed or multi-unit rack assembly, the ambient temperature of the rack environment may be greater than the unit's Maximum Operating Temperature of 50°C/122°F. Install the unit in an environment that is compatible with the unit's operating temperature range, which is 0 °C to 50 °C, or 32 °F to 122 °F.
- **Mechanical Loading:** Mount the equipment so as to avoid uneven mechanical loading that could cause hazardous conditions.
- **Circuit Overloading:** Observe the power ratings on the unit's nameplate and the additional load the unit may place on the supply circuit. Overloading the supply circuit may adversely affect the supply wiring and over-current protection.
- **Reliable Earthing:** Maintain reliable earthing (grounding) of rack mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

Making Connections

Where appropriate, connect the following cables to the 9611B:

- Inputs A and B
- Outputs 1 through 12
- Alarm inputs A and B
- Alarm Output
- AC power (Don't connect to the AC until turning on the instrument)

Connect a RS232 serial command line interface cable from the 9611B to the PC serial port, (this is a straight cable, not a null modem cable).

Turning System On

The 9611B can be operated directly with the default settings that it comes with from the factory. The factory default values have been set to distribute the most common suite of signals. A list of the factory default values follows this section. When using the 9611B in this mode, simply connect AC power after making the connections listed in the previous section. After the 9611B is powered up, press the ALARM button to clear any alarms.

To change the factory default values, and to take full advantage of the flexibility of the 9611B, a communications program such as Hyperterm is needed to communicate to the 9611B, via the RS232 serial port. The following procedure assumes the desire to run the 9611B with the provision to change the factory default values.

Note: When using XMODEM in Hyperterm, for best results, use the version of XMODEM that uses 128 byte blocks.

1. On the PC, run the serial port communication program (see the Command Line Interface section that follows).
2. Apply AC power (-01 option).
3. On the 9611B front panel, press the ALARM button to clear any alarms.
4. Follow the "How to Set Up the 9611B for Operation" instructions.

Default Values

Impedance = 50 ohms
Frequency = 1, 1 Hz to <10 Hz
Fault A: input = enabled, level low
Fault B: input = enabled, level low
voltage: 0.25 Volts is set
switch: Input A is selected
Gain setting jumper = 0dB gain, position A at the diamond, (pin 1 of the header)

Installation Warnings

Please review the following warnings before proceeding with the installation of the 9611B.

Chassis Grounding Screw

The chassis grounding screw (10-32 3/8") provides a secure contact for grounding the unit to a reliable earth ground.

Warning: Chassis Grounding Screw

Symmetricom recommends that the user connect the chassis grounding screw to a reliable earth ground.

Avertissement: Châssis fondant la vis
Symmetricom recommande que le châssis soit relié à une terre fiable.

VAC Power Supply Input Connector

Connector: IEC 60320

Caution: VAC Power
The unit should only be plugged into a grounded receptacle.

Attention : VCA de puissance
L'unité devrait seulement être branchée à un réceptacle fondé.

Dangerous Voltages

Warning: Dangerous voltages are present which can cause electric shock that could result in severe injury or even death. Disconnect all power before servicing this unit.

Avertissement: Les tensions dangereuses sont le présent qui peut causer la décharge électrique qui pourrait avoir comme conséquence des dommages ou même la mort graves. Déconnectez toute la puissance avant d'entretenir cette unité.

Switching AC Power

Warning: Ensure that a disconnect device, such as a switch, with the appropriate voltage/current rating is provided when operating/installing the unit.

Avertissement: Assurez-vous qu'un dispositif de débranchement, tel qu'un commutateur, avec la tension appropriée/estimation courante est fourni en fonctionnant/installant l'unité.

Electrical Installations in Norway and Sweden

Electrical Installations in Norway and Sweden

For Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing - and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN60728-11).

Note: In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1.5 kV r.m.s. 50 Hz or 60 Hz for 1 minute.

För Elektriska Installationer I Norge Och Sverige

Utrustning som är ansluten till skyddande jordning av bygginstallationer genom nätuttaget samband eller genom annan utrustning med en anslutning till skyddande jordning-och en kabel distributionssystemet använder koaxialkabel, kan i vissa fall framkalla brandfara. Anslutning till en kabel distributionssystemet har därför tillhandahållas genom en anordning som elektrisk isolering under en viss frekvensområdet (galvaniskt isolator, se EN60728-11).

Anmärkning: i Norge, till följd av förordningen för installationer av kabel distributionssystem, och i Sverige, en galvaniskt isolator skall ge elektrisk isolering under 5 MHz. isolering skall tåla ett dielektriskt av 1,5 kV r.m.s. 50 Hz eller 60 Hz för 1 minut.

Basic Operation and Features

Basic Operation

The 9611B is a switched distribution unit designed to distribute RF Sine wave or either AM or digitally modulated time codes from either one of two inputs to all twelve outputs. A typical application of the 9611B would be where a primary signal is being distributed with a secondary signal connected as a backup in case of failure with the primary source.

The 9611B has two user interfaces: See "Front Panel Controls and Indicators " on page 33, and See "Command Line Interface" on page 35

Mode of Switching

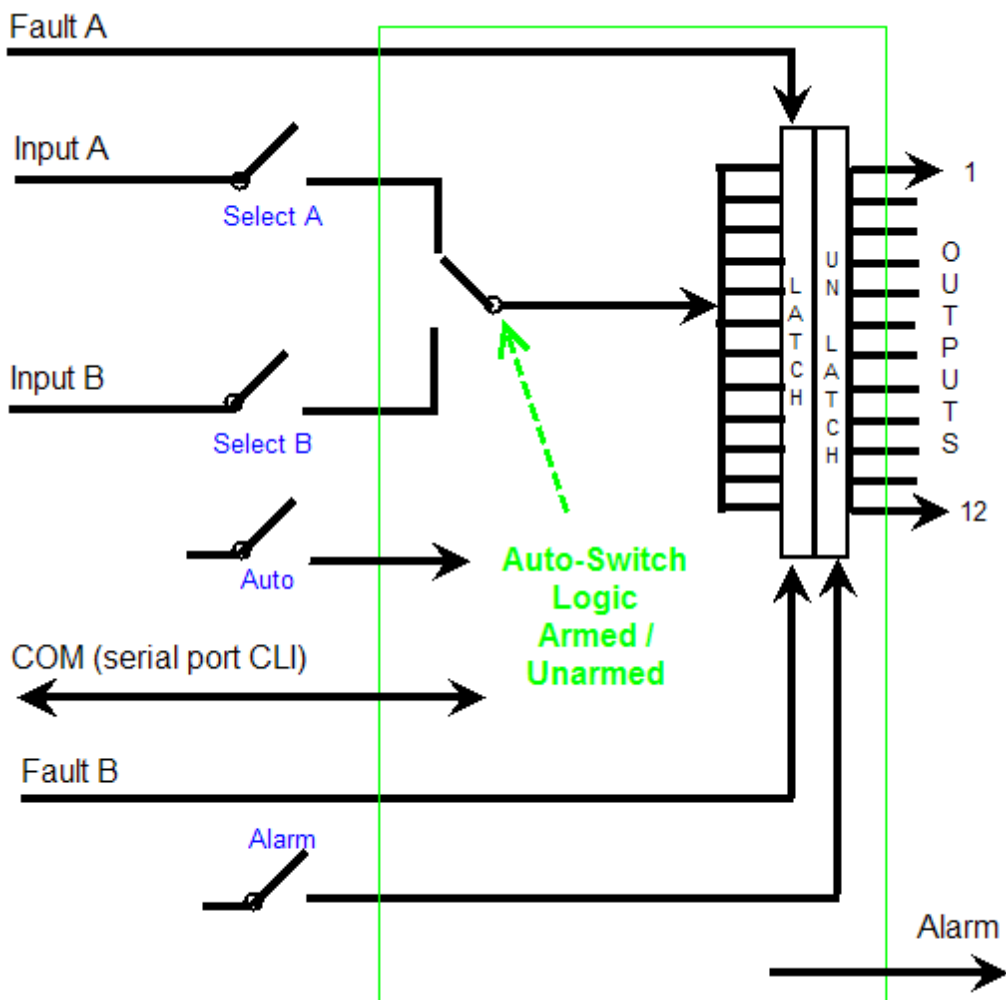
The 9611B provides for both **manual** and **auto** switching.

- **Manual:** In manual switching mode, selecting Input A or Input B will connect that input directly to the twelve outputs. Input A or Input B can be selected manually by pressing the corresponding front panel input button, or by sending the appropriate command on the serial port command line interface.
- **Auto:** To use auto-switching mode successfully, it is first necessary to set up the conditions of comparison. The conditions of comparison are set up over the command line interface. The 9611B allows for a voltage level, and a signal time duration comparison to be made with the selected input signal. Once the conditions of comparison are set up, the selected input can be "**Armed**". This can be done manually by pressing "Auto" button on the front panel, or by sending the appropriate command over the command line interface. The command is that either input signal A or signal B is to be armed.

Arming an input means that:

- It is the primary input connected to the twelve outputs.
- It is the input being monitored in auto-switching mode, and being compared to conditions of comparison previously set up. If the armed input fails the comparison conditions, the auto-switching logic switches from the Primary to the Secondary source. The alarm condition will be indicated by both the front panel and command line interfaces.

Simplified Block Diagram



In the simplified block diagram, the 9611B has:

- 2 selectable signal inputs (A and B)
- 2 Alarm inputs (A and B)
- 12 outputs (1-12)
- Alarm relay output
- Serial RS232 port command line interface (CLI)

In addition, to the inputs and outputs, there are two other front panel switches:

- Auto switch for arming the A/B signal input switch.
- Alarm switch for resetting the latched alarms.

The heart of the 9611B is the auto-switch logic. This logic monitors the conditions above, including the command line interface. Depending on the conditions, the auto-switch logic switches the A/B signal input accordingly, and drives the CLI and front panel LEDs.

Only one signal input A or B can be connected to all 12 outputs at any time. The front panel LEDs and CLI show which of the two signal inputs are connected to the outputs.

As there are many inputs, fault lines, and auto-switch changeover conditions, the auto-switch logic is rather complex. To learn more about the operations and features of the 9611B, see the following:

- CLI to interact with the 9611B auto-switch logic
- Operations and features
- Simple task examples

Basic Features

This section shows the layout of the front and rear panel controls and the basic features integrated in the 9611B instrument.









Front Panel

Figure 2: Front Panel



Table 1: LED Function

* See Autoswitch Interface section for a full description of autoswitch indicators and functions

LED label	Green (solid)	Green (slow flash)	Red (solid)	Red (slow flash)	Red (fast flash)	Amber (solid)	Amber (slow flash)	Off
								
Power	Power Available	n/a	n/a	n/a	n/a	n/a		Power Unavailable
Input A	Input A signal detected, Input B selected.	Input A signal detected, Input A selected.	Input A signal not detected	Input A signal not detected, but it is selected.	n/a	Input A is NOT selected, it had a fault, which is now gone. Press Input A, or ALARM to return Input A to green.	Input A IS selected, it had a fault, which is now gone. Press Input A, or ALARM to return Input A to green.	See 1 below
AUTO		Autoswitch Input A, or Input B ARMED	Fault detected	n/a	n/a	AUTO button selected but no input is ARMABLE	n/a	No input ARMED at this time. If both inputs are green, Press AUTO to arm the input that is flashing green.
Input B	Input B signal detected, Input A selected.	Input B signal detected, Input B selected.	Input B signal not detected	Input B signal not detected, but it is selected.	n/a	Input B is NOT selected, it had a fault, which is now gone. Press Input B, or ALARM to return Input B to green.	Input B IS selected, it had a fault, which is now gone. Press Input B, or ALARM to return Input B to green.	See 1 below
ALARM		n/a		n/a	Fault identified	n/a	n/a	See 1 below
Output 1-12	Signal detected on output	n/a	Fault detected on output.	n/a	n/a	Output had a fault which is now gone. Press ALARM to return this to green.		See 1 below

Note 1: If the power LED is green and all of the other LEDs are OFF, the 9611B is in the bootloader mode. Also, see the **reset** command.

Table 2: Front Panel Pushbuttons

Pushbutton Action	Result
Press INPUT A (left button)	Selects INPUT A
Press AUTO (center button)	Autoswitch mode*
Press INPUT B (right button)	Selects INPUT B
Press ALARM	Unlatches the alarm state, turns off the red alarm LED and toggles the alarm relay contacts. If an ALARM continues to exist, the ALARM is reset after the appropriate timeout interval.
Press and hold ALARM for 10 seconds	Resets product configuration to its factory default settings.

* See Autoswitch Interface section for a full description of autoswitch indicators and functions

Rear Panel

Figure 3: Rear Panel



Table 3: Table of Rear Connectors

Connector Name	Purpose	# of Connections	Connector Type
Power	AC power input	1	IEC 320
Alarm Relay	Three terminal relay contacts, NO, COM, and NC for alarm conditions.	1	Screw Terminal
COM	Provide for a serial command line interface	1	DB-9 (Female)
Alarm Input	Input for an external source alarm circuit	2	BNC (Female)
Signal Input	Input for the RF and digital signals	2	BNC (Female)
Signal Output	Output for the RF and digital signals	12	BNC (Female)
Ground	Chassis ground connection	1	Screw post

Two Analog / Digital Inputs

Inputs A and B are rear mounted 50Ω BNC connectors. They terminate the input signal in either 50Ω or 1kΩ loads. These loads are selectable through the Command Line Interface.

Twelve Analog / Digital Outputs

Outputs 1 through 12 are rear mounted 50Ω BNC connectors. They are 50Ω fixed outputs. These outputs distribute analog and digital signal outputs.

Auto-Switching Capability

When in Auto-switching mode, if an external or internal fault is detected, the unit will automatically switch all outputs from the user selected Primary input to the Secondary input. The unit latches in the Secondary state with alarms activated until the user clears the alarm condition via either the Front Panel, or Command Line Interface. Input A or Input B may be selected as the Primary Input by activating the Auto button with the desired input selected. The Front panel autoswitch LEDs indicates the state of the autoswitch. The three front panel LEDs, Input A, AUTO, and Input B can be used to view the 9611B autoswitch status.

In general, both Input A and Input B need to have valid signals applied to them for the Autoswitch to be activated. For example, if Input A is valid and Input B is not valid, if Input A then becomes faulty, switching to Input B makes no sense.

The proper autoswitch condition is therefore to have two valid inputs. One of the inputs is designated as the primary. The primary is switched to the twelve outputs. If the Input B is valid, then the auto-switch can be activated, arming Input A. Arming means that both inputs are valid, and if the primary signal fails, the secondary signal will be switched to the twelve outputs.

Armed LED condition

The 9611B can be seen to be armed when the Input A, AUTO and Input B front panel LED are green. Also, the AUTO LED and one of the two input LEDs should be flashing slowly, and the other input LED is solid green.

In this condition:

- The flashing green LED is the primary, connected to the twelve outputs.
- The solid green LED is the secondary that will be switched to the output if the primary input fails.
- The flashing AUTO LED shows that the 9611B is armed and ready to switch if need be.

When the autoswitch is armed, it behaves according to the following table:




Table 4: Auto-Switch Behavior

Primary Input Signal	Primary External Fault	Secondary Input Signal	Secondary External Fault	Armed	Action	Alarm	Comments
Selected and Detected	Disabled or Not Asserted	Detected	Disabled or Not Asserted	Yes	None	No	This is the autoswitch's normal, armed, starting state.
Selected and Detected	(ignore)	Not Detected	(ignore)	Yes	Disarm	Yes	The primary input signal is detected but the secondary's input signal is not detected. Disarm because autoswitching is no longer possible.
Selected and Detected	(ignore)	(ignore)	Enabled and Asserted	Yes	Disarm	Yes	The primary input signal is detected but the secondary external fault signal is enabled and asserted. Disarm because autoswitching is no longer possible.
Selected and Detected	Enabled and Asserted	Detected	Disabled or Not Asserted	Yes	Automatically switch	Yes	The primary input signal is detected but the primary external fault is enabled and asserted. Perform an autoswitch due to external fault.
Selected and Not Detected	(ignore)	Detected	Disabled or Not Asserted	Yes	Automatically switch	Yes	The primary input is not detected. Perform an autoswitch due to signal fault.




LED display after Primary signal failure

To help in understanding normal autoswitch operation, here is an example. In the following table, the initial conditions are that Input B is the primary signal, Input A is the secondary signal and the autoswitch is armed.




Input B selected and autoswitch armed

Input A	AUTO	Input B
 Solid green	 Flashing green	 Flashing green
Input A is valid and is the secondary signal.	AUTO is armed.	Input B is valid and selected as the primary signal.

Input B signal fails




Input A	AUTO	Input B
 Flashing green	 Solid red	 Solid red
Input A has been switched to the outputs and is shown as selected.	AUTO is no longer valid. No signal is armed.	Input B signal has failed.

Press the ALARM button




Input A	AUTO	Input B
 Flashing green	 Solid amber	 Solid red
Input A has been switched to the outputs.	AUTO is still no longer valid as Input B is still failed.	Input B is failed

This condition will remain until Input B is restored as a valid signal.




Input B is now restored as a valid signal

Input A	AUTO	Input B
 Flashing green	 Off	 Solid amber
Input A has been switched to the outputs.	AUTO is valid when the valid signal on Input B is acknowledged.	Input B is restored, it was failed but it is now valid.

Press the Input B button to acknowledge the signal on it is valid

Input A	AUTO	Input B
 Solid green	 Off	 Flashing green
Input A has been switched to the secondary signal.	AUTO is valid when the AUTO button is pressed.	Input B is valid and selected as the primary signal.

Press the AUTO button

Input A	AUTO	Input B
 Solid green	 Flashing green	 Flashing green
Input A is valid and is the secondary signal.	AUTO is armed on Input B the primary signal.	Input B is valid and selected as the primary signal.

Fault Detection

The 9611B provides intelligent fault detection for all signals based on user settings that define the input signals.

Time duration

The frequency command is used to set the duration in which a signal can be anticipated to be present. If the signal is not present in that time duration, an ALARM is triggered. See "Command Line Interface" on page 35

Voltage level

The voltage command is used to set the level at which a signal can be regarded as being present. See "Command Line Interface" on page 35

Note: It is anticipated that the majority of failure modes will result in a total loss of signal. The signal will be present or not. Therefore the default 0.25 volt setting is sufficient for the majority of applications. It is recommended therefore to not change the default setting unless the signal failure mode is something other than a total loss of signal.

External input faults register an alarm condition in the system no later than 250ms after a TTL Logic 0 is present at either external alarm input (Alarm A or Alarm B).

Timecode Switching and Distribution Capability

The 9611B will switch and distribute all digital and RF signals within a bandwidth of 50Hz and 10MHz and a voltage level of 3Vpp for RF or +5Vp for digital signals.

1PPS Through 10MPPS Switching and Distribution Capability

The 9611B is designed and tested to switch and distribute all digital time signals from 1PPS through 10MPPS.

RF Switching and Distribution Capability

The 9611B is designed and tested to switch and distribute all RF signals from 100Hz through 10MHz with less than 200ps of additive Jitter.

Serial Remote Management

The 9611B includes a standard RS-232 serial interface on the rear panel using a standard DB-9 type connector for the Command Line Interface (CLI). See "Command Line Interface" on page 35

Two Alarm Inputs

Two external alarm inputs (Alarm A and Alarm B) are accessed via the rear panel through 50Ω BNC connectors. These alarm signals are TTL inputs with a TTL High representing Normal Operation and a TTL Low representing an Input Fault from Source A or Source B. All external input faults will be logically equivalent to the system as an internal input fault.



Note: fault condition on either fault input may be logic high or logic low as is established by the CLI.

One Alarm Output Via Relay Contact Closure

The 9611B has one set of relay contacts for an alarm output. This output consists of a 3 terminal push-in connection on the rear panel, with Normally Closed (NC), Common (COM) and Normally Open (NO) terminals respectively. Normal operation will be transmitted to the user by continuity between the NC and COM contacts, and an open circuit between the NO and COM terminals. All fault conditions will be signified by an open between the NC and COM terminals, and continuity between the NO and COM terminals.



Warning: the relay contacts are rated 10VDC at 1amp. Do not connect high Voltages to this relay

Field Upgrade

The 9611B has the capability to upgrade firmware from Symmetricom through the 9611B serial port (downloaded from the web <http://www.symmetricom.com/support/online-support/> on the user's PC).

Field Jumper Configuration



Note: The chassis interior is considered to be a SERVICE ACCESS AREA. Only trained operators should remove the Chassis Cover. Hazardous Voltages may exist inside the chassis.

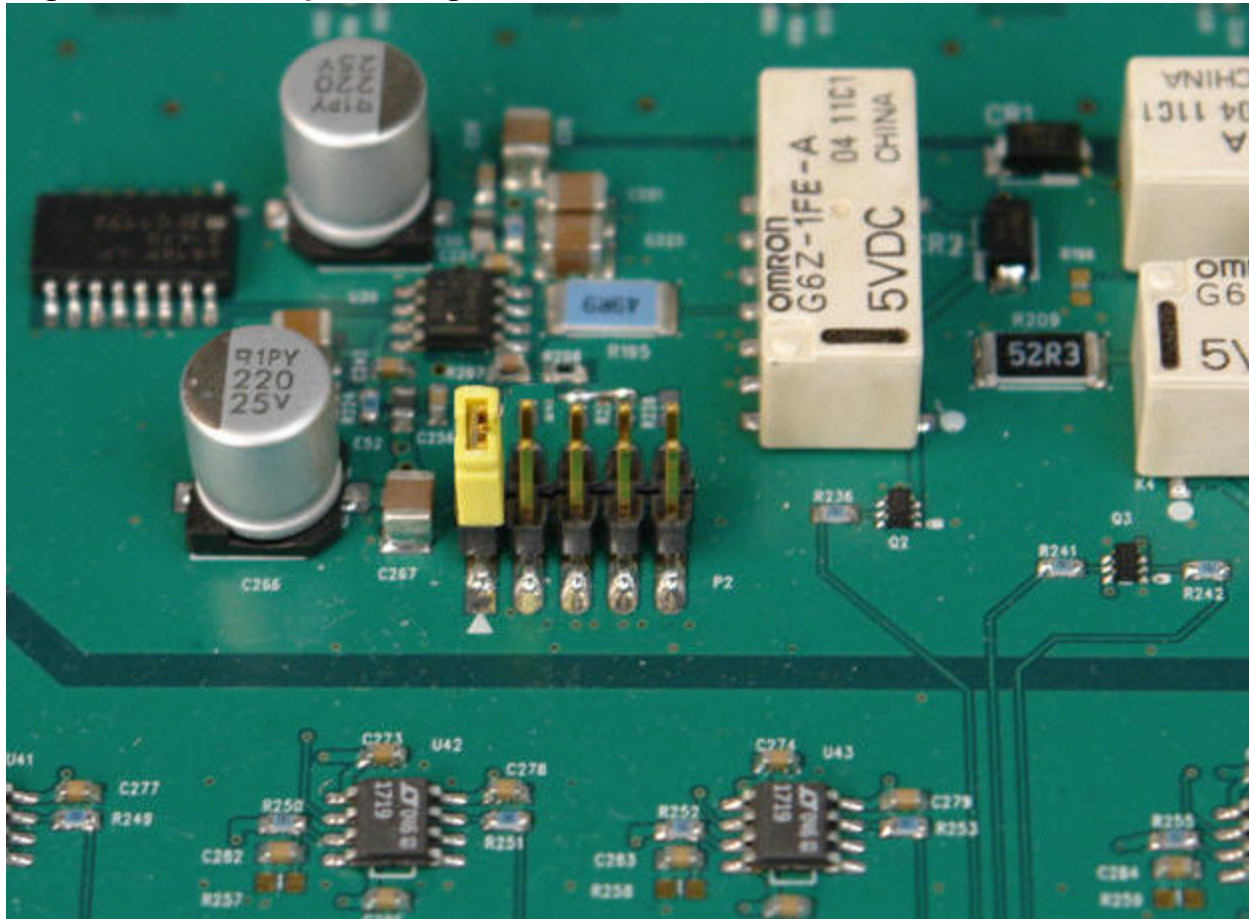


Note: the area inside the chassis also includes ESD sensitive components. Use standard ESD practices to avoid damaging components.

A trained operator may change the 9611B input to output gain by changing jumpers that are located inside the 9611B chassis SERVICE ACCESS AREA.

To avoid damage, turn the instrument off when changing the jumper setting. Use standard ESD practices to avoid damaging components.

Figure 4: Field Jumper Configuration



The RF gain can be adjusted with the P2 jumper field settings shown above in its default setting.

On the 9611B printed circuit board is a jumper field header with an associated label. The label shows positions of A B C D E, with A positioned at the diamond (pin 1) on the header.

Figure 5: Lowest gain

(0dB) Gain shown, is position A - this is pin 1

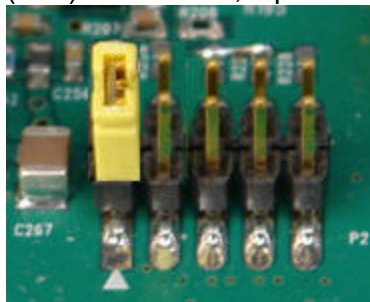


Figure 6: Medium gain

(+1.0dB) is position B - this is pin 2

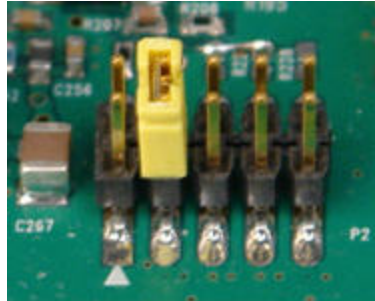
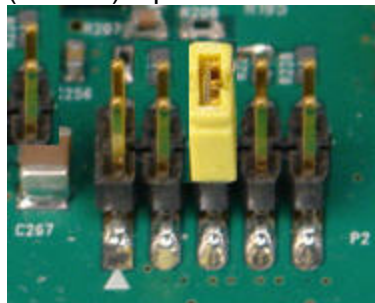


Figure 7: Highest gain

(+2.0dB) is position C - this is pin 3



User Interfaces

The 9611B is controlled via two user interfaces:

- Front panel controls and indicators
- Command line interface (CLI) over a RS232 serial port connection

Front Panel Controls and Indicators

This section describes operation of the manual controls on the front panel of the 9611B Switching and Distribution Unit.



The power indicator is a green LED that indicates that AC power is applied and turned on.

The two input LEDs A and B are either green, amber or red:

- Green
 - Solid indicates that the channel signal is valid and present
 - Flashing indicates that the channel signal is valid, present and armed
- Amber shows that a fault was registered but is now corrected
- Red to indicate that the channel signal has failed

The single AUTO LED is either green, amber, red or off:

- Green
 - Solid indicates that an input channel signal is valid for arming
 - Flashing indicates that the flashing input channel is armed
- Amber shows that a fault was registered but is now corrected
- Red to indicate that the armed channel signal has failed
- Off indicates no input ARMED at this time

The single ALARM is either green or red:

- Green shows that there are no faults registered
- Flashing red shows that a fault has been registered

When any alarm (A, B or 1-12) is set, the Alarm indicator turns from green (normal) to red (alarm). Once the failure is remedied, the alarm can be deactivated by pressing the Alarm pushbutton, or issuing a command over the CLI. If the alarm is cleared, all alarm indicators, return to the normal green color.

The twelve output LED's numbered one through twelve are either green, amber or red:

- Green indicates that the output signal is valid and present
- Amber shows that a fault was registered but is now corrected
- Red to indicate that the channel signal has failed



Note: When the unit is powered down in an alarm condition, then re-powered with the condition fixed, the alarm is still reported. This is normal operation. The unit will “remember” status at power down and report it when the power is restored.

Summary of Front Panel LED conditions

LED Label	GREEN	RED	AMBER	OFF
POWER	Power available	(not used)	(not used)	Power unavailable
INPUT A	INPUT A signal detected and selected*	INPUT A signal not detected*	INPUT A signal detected but not selected*	(not used)
AUTO	Auto-switch armed*	Auto-switch tripped*	Auto-switch is armable* (no fault conditions)	Auto-switch is not armable due to fault conditions*
INPUT B	INPUT B signal detected and selected*	INPUT B signal not detected*	INPUT B signal detected but not selected*	(not used)
OUTPUT 1-12	Output signal detected	Output signal not detected	Output signal was failed but now restored. Press ALARM button.	(not used)
ALARM	No alarms are detected	Alarm conditions detected	(not used)	(not used)

* See Auto-switch Interface section for a full description of auto-switch indicators and functions.

Summary of Front Panel Pushbutton Actions

Pushbutton Action	Result
Press INPUT A (left button)	Selects INPUT A
Press AUTO (center button)	Auto-switch mode*
Press INPUT B (right button)	Selects INPUT B
Press ALARM	If there are no current alarm conditions, unlatches the alarm state, turns off the red alarm LED and toggles the alarm relay contacts.
Press and hold ALARM for 10 seconds	Resets product configuration to its factory default settings.

* See Auto-switch Interface section for a full description of auto-switch indicators and functions.

Command Line Interface

The 9611B instrument has a Command Line Interface that may be accessed through the 9611B serial port. Communication between the instrument is accomplished by running a communications program on a PC or similar device. The PC serial port is connected to the 9611B via a straight serial cable (non null modem cable). See "Serial Port Connections" on page 37 for more information.

Use the following parameter values when configuring the communications program installed on the PC.

Table 5: Serial Port Parameters

Parameter	Value
Baud	115.2k
Data	8
Parity	None or N
Stop bits	1
Flow control	none

Note: After either the power cycle, or RESET, the user must not send any characters to the 9611B until the 9611B has completed its BOOT sequence. Otherwise, the 9611B will be placed into a mode where all front panel LEDs are turned OFF and the unit will be in the firmware upgrade mode.

When the serial communications link is established, the following display appears on the PC monitor:

```
*****  
Welcome to the 9611B local CLI  
Press 'h' or '?' for the menu  
*****
```

Pressing either 'h' or '?' returns the list of commands in the following screen:

```
*****
**                               welcome to the 9611B Local CLI                               **
**                                                                           **
**                               Press 'h' or '?' for menu.                               **
**                                                                           **
*****

[OK 1900-01-01 00:00:01]>> h
impedance    - Get/Set Channel Impedance.
frequency    - Get or Set Input Frequency
fInput       - Config. fault inputs.
config       - Display current configuration.
voltage      - Set/Get reference voltage.
version      - Display system version info.
faults       - Display/clear (latched) faults.
switch       - Control input switching.
time         - Set system clock.
password     - Set/Clear system password.
factory      - Enter factory/test mode.
reset        - Reboot the DSP.
logout       - Exit the CLI.
h            - This help, or help on a specific command
?           - This help, or help on a specific command
```

In general, commands have the following behavior:

- The CLI will recognize abbreviated versions of the commands that are three characters or longer. For example "swi" will be recognized as "switch."
- Commands and arguments are case insensitive.
- Commands receiving improper arguments will emit an error message.

Examples

1. To find the current value of impedance

At the prompt, enter **impedance**

The following is returned: impedance = 50 ohms

2. To find the default and valid values of impedance

At the prompt, enter **impedance ?**

The following is returned:

```
impedance [<50|1000>] <CR> // Default: 50 Ohms
```

This shows that:

- Parameters for impedance can be either 50 ohms, or 1000 ohms, [<50|1000>]
- The default value of impedance is 50 ohms.

3. To change the value of impedance;

Enter **impedance 1000**

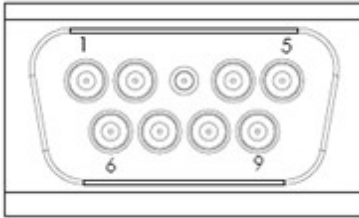
To verify, enter **impedance**

The following is returned:

```
impedance = 1000 ohms
```

Serial Port Connections

The serial port connector is a standard DB 9 pin, female RS-232 connector as shown below.



Pinouts for the serial port connector

Pin#	Signal Name	Type	Signal Function
2	Serial data out		
3	Serial data in		
5		PWR	Ground connection to board

Tasks

The following tasks show methods by using the front panel and the command line interfaces. In many cases the task cannot be performed by the front panel interface, in which case a "Not applicable" designator is given.

See also:

- see "Front Panel Controls and Indicators " on page 33
- see "Command Line Interface" on page 35

For the command line interface entries below, it is assumed in the following tasks that you are presently in the command line interface menu.

```
*****
**                               welcome to the 9611B Local CLI                               **
**                               **                                                         **
**                               Press 'h' or '?' for menu.                               **
**                               **                                                         **
*****

[OK 1900-01-01 00:00:01]>> h
 impedance      - Get/Set Channel Impedance.
 frequency      - Get or Set Input Frequency
 fInput         - Config. fault inputs.
 config         - Display current configuration.
 voltage        - Set/Get reference voltage.
 version        - Display system version info.
 faults         - Display/clear (latched) faults.
 switch        - Control input switching.
 time          - Set system clock.
 password       - Set/Clear system password.
 factory       - Enter factory/test mode.
 reset         - Reboot the DSP.
 logout        - Exit the CLI.
 h             - This help, or help on a specific command
 ?            - This help, or help on a specific command
```

How to Get or Set the Input Impedance

The choices here are 50 Ω and 1000 Ω.

Front Panel	Command Line Interface
Not applicable	To set impedance value enter: impedance [<50 1000>] <CR> To get impedance value enter: impedance <CR>

How to Get or Set the Input Comparator Duration

Front Panel	Command Line Interface
Not applicable	<p>To set frequency value enter: frequency [<1-15>] <CR> // Input signal frequency, where:</p> <ul style="list-style-type: none">1 = 1, 1 Hz to < 10 Hz2 = 2, 10 Hz to < 100 Hz3 = 3, 100 Hz to < 1 kHz4 = 4, 1 kHz to < 10 kHz5 = 5, 10 kHz to < 100 kHz6 = 6, 100 kHz and above7 = 7, Digital IRIG A8 = 8, Digital IRIG B9 = 9, Digital IRIG D10 = 10, Digital IRIG E11 = 11, Digital IRIG G12 = 12, Digital IRIG H13 = 13, AM IRIG - 100 Hz carrier14 = 14, AM IRIG - 1 kHz carrier15 = 15, AM IRIG - 10 kHz carrier <p>To get frequency value enter: frequency</p>

How to Configure Fault Inputs

Front Panel	Command Line Interface
Not applicable	<p>To set input fault parameters enter: finput <A B> <disable [enable <low high>]> <CR></p> <p>To set a fault input such as Input B to be enabled and high, use this example: finput B enable high</p> <p>To get input fault parameters enter: finput <CR> Returns for example: Fault A: input = enabled, level = low Fault B: input = enabled, level = low</p> <p>Note: fault X input=enable, level = high means that a TTL level=high (or open circuit) on the input indicates a fault</p> <p>fault X input=enable, level=low means that a TTL level = low on the input indicates a fault</p> <p>To view the command syntax: Enter finput ? Syntax error. Usage: finput <A B> <disable [enable <low high>]> <CR> // Configure fault inputs</p>

How to Display Current Configuration

Front Panel	Command Line Interface
Not applicable	<p>To display the current configuration, enter: config <CR></p> <p>Returns for example: Impedance = 50 ohms Frequency = 1, 1 Hz to < 10 Hz Fault A: input = enabled, level = high Fault B: input = enabled, level = high</p>

How to Get or Set the Input Comparator Voltage

Front Panel	Command Line Interface
Not applicable	<p>To set voltage value enter: voltage [<value, 0 - 5V>] <CR></p> <p>To get voltage value enter: voltage <CR></p> <p>Example to set the voltage for 1.5 volts: Enter voltage 1.5 <CR></p> <p>Example, to get current voltage setting: Enter voltage <CR> Signal detection reference is 1.5 volts</p>

How Display the System Version Information

Front Panel	Command Line Interface
Not applicable	<p>This is read only and cannot be changed through the CLI.</p> <p>To get version value enter: version <CR></p> <p>Example read out: Micro-controller Firmware: <ul style="list-style-type: none"> • Hydra/9611b DSP V01.01.RC4 • Sep 26 2011, 11:07:05 FPGA Firmware: <ul style="list-style-type: none"> • Hydra/9611b FPGA 404 • V18.7.RC4 • 02/11/2011 </p>

How to Display/Clear (Latched) Faults

Front Panel	Command Line Interface
<p>Not applicable to view faults.</p> <p>Press Alarm button to clear faults</p>	<p>To view existing faults enter: faults <CR></p> <p>To clear faults enter: faults [clear] <CR></p>

How to Control Input Switching

Use this to select Input A, Input B or Automatic selection.

Front Panel	Command Line Interface
<p>To select Input A Press Input A button</p> <p>To select Input B Press Input B button</p> <p>To arm the selected input: Press the Auto button</p>	<p>To select input A enter: switch [<[A B]>]<CR> // Set switch position.</p> <p>To select input B enter: switch [<[A B]>] [<auto>] <CR> // Set switch position. and auto switching. Note: either switch A or switch B have to be designated when using the auto parameter.</p> <p>To read which input is selected enter: switch <CR></p>

How to Get or Set the System Clock

Front Panel	Command Line Interface
<p>Not applicable</p>	<p>To set system clock. enter: time [<dd> <Mmm> <yyyy> <hh:mm:ss>] <CR></p> <p>To read the time enter: time <CR></p> <p>Example returned time: Tue Jan 10 07:59:59 2012</p>

How to Get, Set or Clear the System Password

Front Panel	Command Line Interface
<p>To disable the password, press the ALARM button down for at least ten seconds.</p>	<p>To set the system password enter: password <Set Clear> [<string[a-z A-Z 0-9]>] <CR></p> <p>// set/clear system pwd // System password must be between 1 and 8 characters long.</p> <p>For example enter: password set symm</p> <p>password updated (is read back)</p> <p>For example enter: password clear</p> <p>Password has been cleared. WARNING: THIS SYSTEM IS NOW UNSECURE.</p>

How to Enter Factory/Test Mode

Front Panel	Command Line Interface
<p>Not applicable</p>	<p>To enter factory/test enter: factory <CR></p> <hr/> <p>Note: This is not the same password as set by the user. This command is for the Symmetricom Service department only.</p> <hr/> <p>Returned text: "factory: Enter password or 'q' to quit"</p> <p>The password is used by the factory to conduct system testing. Contact customer assistance to learn more.</p>

How to Reboot the DSP Software

Use this command to reboot the digital signal processor (DSP) and to upgrade system software.

Front Panel	Command Line Interface
Not applicable	<p>Reboot the DSP.</p> <p>reset</p> <pre>[OK 2011-10-05 15:08:00]>> Booting application in 5 seconds. Uploading FPGA. Press any key to halt boot. FPGA upload success. Press any key to halt boot. ***** Welcome to the 9611B Local CLI Press 'h' or '?' for menu. *****</pre>

Also see "How to Upgrade Software" on page 46

How to Logout

Front Panel	Command Line Interface
Not applicable	<p>To exit the command line interface enter.</p> <p>logout <CR></p> <p>Example response: Logging out...good bye.</p> <hr/> <p>Note: When a password has been set, the re-entry will require the password.</p> <hr/> <p>If a password has not been set, the response back is: Can't Logout. No password has been set.</p>

How to View the Help Menu

Use this to display the Help menu

Front Panel	Command Line Interface
Not applicable	To get the help listing, enter h <CR>
	Example h <CR> returns:
	<pre> ***** ** welcome to the 9611B Local CLI ** ** ** ** Press 'h' or '?' for menu. ** ** ** ***** [OK 1900-01-01 00:00:01]>> h impedance - Get/Set Channel Impedance. frequency - Get or Set Input Frequency fInput - Config. fault inputs. config - Display current configuration. voltage - Set/Get reference voltage. version - Display system version info. faults - Display/clear (latched) faults. switch - Control input switching. time - Set system clock. password - Set/Clear System password. factory - Enter factory/test mode. reset - Reboot the DSP. logout - Exit the CLI. h - This help, or help on a specific command ? - This help, or help on a specific command </pre>

How to View the Help on a Specific Command

Front Panel	Command Line Interface
Not applicable	To access Help menu enter: ? <CR>
	Example password ? <CR> returns:
	<pre> password <Set Clear> [<string[a-z A-Z 0-9]>] <CR> // set/clear system pwd // System password must be between 1 and 8 characters long </pre>

How to Set Up the 9611B for Operation

Use the following procedure containing the individual commands detailed above from the command line interface:

1. **impedance** [<50|1000>] (set the value of impedance to either 50Ω or 1000Ω).
2. **frequency** [<1-15>] (set the value of frequency/time duration between valid signals).
3. **voltage** [<1-5>] (set the reference threshold for inputs A and B)
4. **switch A** (select input A).
5. **finput** <A> <disable|[enable <low|high>]> (set enable and high/low logic for input A).
6. **switch B** (select input B).
7. **finput** <disable|[enable <low|high>]> (set enable and high/low logic for input B).
8. **switch A** (select input A).
9. **switch A auto** (set input A as armed).

How to Upgrade Software

The 9611B has a single partition into which the FPGA program image can be loaded. For the DSP program image, there is a choice of two partitions into which the image can be loaded, partition A or partition B. It is important to realize that the DSP and FPGA images are created as a matched pair. It is therefore most important to upgrade both the FPGA and DSP images at the same time. The upgraded version of the FPGA image should be loaded into the single FPGA partition. The “**upgfpga**” command installs the FPGA image into the single FPGA partition, overwriting the prior image.

The upgraded version of the DSP image should be loaded into either DSP partition A or DSP partition B. An argument to the “**upgdsp**” command selects whether the DSP image is written to the A or B partition. The “**setpart**” command tells the 9611B which DSP image to use at boot time: A or B. The idea of the A and B partitions is to provide a place for the last known working DSP image and another for an upgrade image.

When the 9611B is received, the factory image will be in partition A. The first upgrade should therefore be loaded into B. The 2nd upgrade into A, and so forth. The **setpart** command will also need to be set to the same partition the DSP image was loaded into.

Whenever the DSP starts, it loads its program image into RAM from either flash partition A or B, depending on the current position of an internal pointer. The system then boots up from the selected partition. Next, the system loads the FPGA with an image that resides in the single FPGA partition.

When upgrading the firmware, the customer uses the **9611B Boot loader CLI** to install new FPGA and DSP images separately as follows.

9611B Bootloader CLI

Use the following two procedures to upgrade the DSP and the FPGA program images. These operations cannot be achieved using the front panel controls. Use the command line interface for the

following procedure.

1. In the main user interface, enter **reset** <CR>

Display shows the following:

" Press any key to halt boot."

2. Press any key, to bring up the following display

```
*****  
** Welcome to the 9611B Bootloader CLI **  
** **  
** Press 'h' or '?' for menu. **  
*****
```

3. Press the "h" key to bring up the following display:

```
*****  
** Welcome to the 9611B Bootloader CLI **  
** **  
** Press 'h' or '?' for menu. **  
*****
```

```
boot          - Boot application, (A, B, or active).  
setpart       - Set the active boot partition (A or B).  
getpart       - Get the current active boot partition.  
reset         - Reset/reboot the system.  
upgdsp        - DSP software upgrade (A or B).  
upgfpga       - FPGA firmware upgrade.  
version       - Display bootloader version info.  
logout        - Exit the CLI.  
h             - This help, or help on a specific command  
?            - This help, or help on a specific command
```

How to Upgrade FPGA Program Image

Loading the FPGA program image is straightforward as there is only a single partition in which to load the program image.

1. In the 9611B Bootloader CLI menu, enter **upgfpga** <CR>
2. Navigate to the location of the FPGA file and load it.

Note: Xmodem capabilities are required to upgrading both the FPGA and the DSP code. Xmodem is included in the hyperterm software, but it might not be included in other software.

How to Upgrade DSP Program Image

The flash memory in the 9611B has two partitions for the DSP program image, partitions A and B. The DSP software can be loaded into whichever partition is selected as active. This means that there can be two versions of DSP software resident in memory. One example of where this might be useful, would be if a newly installed DSP upgrade is found to be faulty, the other partition containing the original DSP software can be made active, and the original software can then be loaded. It is important to remember that the DSP and FPGA images are created as a matched pair. It is therefore most important to upgrade both the FPGA and DSP images at the same time. Because of this flexibility, the DSP software upgrade procedure is more complex and additional steps should be taken to avoid errors.

DSP Upgrade Procedure

In the following example, the DSP code for partition B is to be updated.

1. While the pre-upgraded 9611B is running, use the **version** command to query the CLI for the version IDs of the DSP and FPGA images.
2. Get the old firmware bundle for that pair from the Web or the CD that came with the 9611B. Call it version 1. This will be needed for restoration should the upgrade fail.
3. Get the version 2 upgrade bundle.
4. Bring up the 9611B bootloader CLI and use the **getpart** command to query which partition the product is currently booting. For this example, we'll say that version 1 is in partition A.
5. Use **upgdsp B** command to install the version 2 DSP image into the B partition. The expected file name will be in the form "9611b_DSP_A_verX.img."
6. Use the **upgfpga** command to install the version 2 FPGA image.
7. Use **setpart B** to change the position of the pointer to the B partition.
8. Reboot the unit and check for normal operation.

If the upgrade fails:

1. Bring up the 9611B bootloader CLI.
2. Use the **upgfpga** command to install the version 1 FPGA image.
3. Use **setpart A** to change the position of the pointer back to the A partition.
4. Reboot the unit and check for normal operation.

Note : Xmodem capabilities are required to upgrading both the FPGA and the DSP code. Xmodem is included in the hyperterm software, but it might not be included in other software.

Warning: The DSP code will be erased immediately after the enter key is pressed. There is no escape sequence once the upgrading process is started. If the partition becomes corrupt, the 9611B will hang trying to boot, press any key to enter the bootloader and program the partition.

Specifications

Standards

CE

Emissions	EN 55022
Immunity	EN 55024
Safety	EN 60950-1

UL

UL60950-1

FCC

Part 15 Subpart B, Class A

Electrical Signals

Signal Inputs

Connector (2): 50Ω BNC Female

RF

Frequency	100Hz - 10MHz
Level	0 to 1Vrms (Do not exceed 15dBm)
Impedance	50Ω or 1kΩ
Isolation A to B	>85dB

Pulse/DC IRIG time code

Frequency	1PPS to 10MPPS
Level	0-6VP-P
DutyCycle	0 to 100%
Impedance	50Ω or 1kΩ

AM IRIG timecode

Frequency	1PPS to 10MPPS
-----------	----------------

Specifications

Level	0-6Vp-p
Modulation Frequency	Up to 1MHz
Code Format	Any IRIG Format, IEEE 1344, NASA 36, 2137, XR3
Impedance	50Ω or 1kΩ

Outputs

Connector (12): 50Ω BNC Female

RF

Frequency	100Hz to 10MHz
Level	1V rms (15dBm max)
Gain	Jumper selectable 0dB, +1.0dB, + 2.0dB
Harmonic	<-40dBc
Non-Harmonic	<-80dBc
Load Impedance	50Ω
Isolation	>80dB

Additive Phase Noise

Measured at 10 MHz, +10 dBm input level

1Hz	-125dBc
10Hz	-135dBc
100Hz	-135dBc
1kHz	-145dBc
10kHz	-155dBc

Pulse/DC IRIG

Frequency	1PPS - 10MPPS
Level	5V peak
Rise Time	<20ns
Fall Time	<20ns
Jitter	<200ps rms
Skew	<+/-2ns output to output
Load impedance	50Ω

AM IRIG Timecode

Frequency	1PPS to 10MPPS
Level	0-6Vp-p
Modulation Frequency	Up to 1MHz
Code Format	Any IRIG Format, IEEE 1344, NASA 36, 2137, XR3
Load Impedance	50Ω

Alarm Input

Normal State	2.2 to 5.0 V (TTL High) Configured via CLI. Can be High or Low
Alarm State	<0.8 V (TTL Low)
Connectors	BNC
Qty	2 (1 for A input & 1 for B input)
Enable/Disable	Configured via CLI. Default is disabled

Status

- Senses signal presence on all inputs and outputs
- Green/Red LEDs on front panel
- Relay contact close on rear panel
- RS-232 interface for monitor and control

EMC

The system has been tested and passed the following Electromagnetic Compatibility Standards that are required for CE Mark.

Radiated Emissions, 30 MHz – 1 GHz	EN55022, Class A
Conducted Emissions, 150 kHz – 30 MHz	EN55022, Class A
Immunity Characteristics	EN55024, Class A
Electrostatic Discharge	EN61000-4-2
Radiated RF Immunity	EN61000-4-3
Electrical Fast Transient / Burst	EN61000-4-4
Surge Immunity	EN61000-4-5
Conducted RF Immunity	EN61000-4-6
Power Frequency H-Field Immunity	EN61000-4-8
Voltage Dips and Interruptions	EN61000-4-11
AC Harmonic Emissions	EN61000-3-2
AC Short and Long Term Flicker	EN61000-3-3

FCC Certification

The system has been tested and passed the following FCC Part 15 emissions requirements for Class A performance.

Radiated Emissions	30 MHz – 1 GHz
Conducted Emissions	150 kHz – 30 MHz

FCC Class A Radiated and Conducted Emissions (see following notes).



Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can

radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

Restriction of Hazardous Substances (RoHS)

2002/95/EEC Restriction of Hazardous Substances in Electrical and Electronic Equipment
Contains lead in solder per Annex exemption 7 for telecommunications infrastructure equipment.

Environmental Specifications

Operating Temperature	0 C to +50 C
Storage Temperature	-40 C to +70 C
Humidity	
Operating	10% to 90% non-condensing
Non-operating	5% to 95%
Altitude	
Operating	0 to 5,000 feet

Ordinary protection

This unit is for indoor use only. It is not sealed to prevent moisture from entering the enclosure.

Pollution Degree

2 per EN60950-1

Installation (Over-Voltage)

Category II for transient over-voltages per EN 60950-1

Mechanical

Chassis

- 1U, 19 inch rack mount



Note: Use four (4) 10--32 machine screws to secure front mounting flanges to rack.

Front Panel



- 1 each, power LED labeled POWER (Green)
- 3 each, autoswitch LED, labeled INPUT A, AUTO and INPUT B (Tri-color: Green, Red, Amber)
- 12 each, output signal LEDs, labeled 1 through 12 (Tri-color: Green, Red, Amber)
- 1 each, alarm LED, labeled ALARM (Red)
- 3 each, momentary-contact autoswitch pushbuttons, 1 ea. under the INPUT A, AUTO and INPUT B LEDs
- 1 each, momentary-contact alarm-clearing pushbutton under the ALARM LED

Rear Panel



- Rear Panel
- 2 each, input signal BNC connectors, labeled INPUT A and INPUT B
- 2 each, TTL alarm input BNC connectors, labeled ALARM A and ALARM B
- 1 each, AC power connector
- 1 each, earth ground screw terminal

-
- 1 each, Female DB9 Standard Serial CLI Port, labeled COM
 - 1 each, 3-pin Form C alarm connector, labeled N. O., COMMON and N. C., and collectively labeled ALARM (push-in terminals). Note: the terminals' labels should match the position of the contacts when the relay is in its energized (no alarm) state.

Dimensions

- Height: 1.725"
- Width: 16.98"
- Depth: 15.0"
- Weight 7lbs

Power Supply

The AC power supply has been selected so that no fans are required for continuous operation in the specified temperature range.

AC Power Supply

Power requirements: 100 - 240V, 50/60 Hz, 20W

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