SPECTRADYNAMICS, INC.

1 PPS PULSE DISTRIBUTION AMPLIFIER
PPS-2RM-B1
OPERATING MANUAL

SPECTRADYNAMICS, INC • 1849 Cherry St. Unit 2. • Louisville, CO 80027
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Description

The PPS-2RM-B1 Instrument is a 1 pulse-per-second (1 PPS) generator. The 1 PPS is generated from a sine-wave input signal. The input signal can be a 1 MHz, 5 MHz or 10 MHz signal.

The PPS-2RM-B1 contains two modules. Each module provides two outputs of 1 PPS. Each pulse-per-second output has a variable pulse width. The input frequency selection and pulse width selections are configured by DIP switch settings. The PPS output can be synchronized to an external event. The synchronization is good to +/- ½ of the input clock cycle. The outputs are designed to drive low impedance loads and long 50 or 75-ohm cables. The channel-to-channel delay differences are less than 1 ns. The instrument is available in a rack-mount 1U X 19” X 14“ enclosure.

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Safety and Preparation for Use

CAUTION!
Voltages capable of causing injury or death are present in this instrument. Use extreme caution whenever the instrument cover is removed.

Line Voltage
This instrument may be setup to operate on 100-120 or 220-240 VAC and a line frequency of 50 to 60 Hz. **The setup voltage for this PPS-2RM-B1 is specified on page 4.**

Fuse
A 0.50 Ampere 250V slow-blow fuse is used for 100-120 VAC operation.
A 0.25 Ampere 250V slow-blow fuse is used for 220-240 VAC operation.
Only replace fuses with the same type and specifications.

Line Cord
The instrument has a detachable, three wire power cord for connection to a grounded power source. The enclosure of the unit is directly connected to the outlet ground to protect against electrical shock. Always use an outlet with a protective ground and do not disable this safety mechanism.

Service
Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. Contact SDI for any questions or repairs.

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The Front Panel

AC Power The AC POWER LED will turn on when AC power is applied to unit and the unit is operating properly.

DC Power The DC POWER LED is on when DC power is applied to unit and the unit is operating properly.

Ref Input Reference frequency input. The signal level must be in the range of +3 dBm to + 13 dBm.

Ext. 1PPS One pulse per second synchronization input. The signal should conform to TTL specifications.

Enable Synchronization sequence is enabled when the switch in the up or Enable position. **Warning !!! After a synchronization event this switch should be returned to the off or down position to prevent accidental synchronization.**

Trigger When synchronization is enabled and a 1 PPS signal is present on the Ext. 1 PPS input the 1 PPS synchronization event is triggered by the push button. Only one synchronization will occur for each trigger.

Phase Selects the reference clock edge of the synchronization event. The 1 PPS will be synchronized to the next reference clock rising edge after the incoming synchronization PPS input when the switch is in the up position. When the switch is in the down position, the 1 PPS will be synchronized to the reference clock falling edge that occurred before the incoming synchronization PPS input. **Warning !!! Toggling the Phase switch will cause loss of synchronization.**

Output 1,2 One pulse per second outputs. These outputs provide a 2 volt peak-to-peak signal into a 50 ohm load.

PPS LED The LED will flash on the rising edge of the 1 PPS output signal from the 1 PPS generator module.

The Back Panel

AC POWER ENTRY MODULE
The PPS-2RM-B1 is configured to operate on:

- ❑ 100-120 VAC
- ❑ 220-240 VAC

DC POWER ENTRY MODULE
Optional Battery Backup Connector for +24 VDC Backup power source.

Battery Backup Module

Description

If your PPS-2RM-B1 includes the battery backup module, this module will allow the PPS-2RM-B1 instrument to be powered by a 24 VDC power source in case of loss of the main AC power. The switch from AC to DC supply operation is affected by a Schottky diode network and charge storage capacitors to ensure glitch free operation. The +24 VDC power source connector is located on the back panel of the instrument. The +24 VDC ground is not connected to the instrument case ground internally, however both ground connections are available at the DC power connector and may be connected together at this point.

DC Voltage

The +24 VDC may be used as backup power to prevent loss of signal during power outages. The DC power supply should be able to provide +24 VDC at 2A. For optimum performance the following specifications should be used for the power supply.

DC Supply	+24 VDC, 2 A
Line regulation	+/- 0.05% for a 10% line change
Load regulation	+/- 0.05% for a 50% load change
Output ripple	< 5mV peak-to-peak
DC Fuse	2.0 Ampere 250V slow-blow

Fuse

A 2.0 Ampere 250V slow-blow fuse is used for +24 VDC operation.
Replace fuses with the same type and specifications

Service

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. Contact SDI for any questions or repairs.

Operation

To operate the unit on DC power, locate the DC power entry connector on the rear panel and connect the power cable. When DC power is applied to the unit, the LED located on the front panel labeled DC POWER should light up. **Connection of the +24 VDC supply is optional**.

DC Connector

WARNING!
DO NOT APPLY AC VOLTAGE TO THIS UNIT THROUGH THE 6 PIN CONNECTOR ON THE REAR OF THE UNIT!
Failure to follow these directions will cause injury or death to personnel, cause irreparable damage to the instrument and void all warranties.

WARNING!
DO NOT REVERSE THE POLARITY OF THE SUPPLY VOLTAGE!
Reversing the polarity of the power supply will cause damage to the unit and void all warranties.

WARNING!
The chassis of the instrument is internally connected to DC ground.

The +24 VDC connector is wired as follows:
Pin 1 +V (Internal supply voltage for monitoring purpose **do not use !**)
Pin 2 GND (Internal supply voltage for monitoring purpose **do not use !)**
Pin 3 -V (Internal supply voltage for monitoring purpose **do not use !)**
Pin 4 24 VDC GND return
Pin 5 +24 VDC power
Pin 6 Chassis GND /Earth GND

Reference Frequency

Reference Frequency Configuration

The PPS-2RM-B1 pulse generator can be configured to operate on 1 MHz, 5 MHz or 10 MHz references. The default configuration for the unit is 5 MHz. To change the reference frequency the unit must be unplugged from the power source. Do not remove the bottom cover of the unit. Remove the top cover of the instrument and there will be a closed bracket that contains the distribution module(s). Remove the eight Phillips screws and four hex nuts from the bracket cover. Lift open the cover and locate the DIP switch labeled S5 on the module(s) that needs configuration. Change the DIP switch settings to select the new reference frequency. The DIP switch settings are summarized below.

DIP SW 7	DIP SW 8	Reference Frequency
ON	ON	10 MHz
OFF	**ON**	**5 MHz**
ON	OFF	1 MHz
OFF	OFF	RESERVED

Pulse Delay Settings

The PPS-2RM-B1 pulse generator can be configured for different pulse widths. The default configuration for the unit is 51.2 us pulse-width. To change the pulse-width selection the unit must be unplugged from the power source. Do not remove the bottom cover of the unit. Remove the top cover of the instrument and there will be a closed bracket that contains the distribution module(s). Remove the eight Phillips screws and four hex nuts from the bracket cover. Lift open the cover and locate the DIP switch labeled S5 on the module(s) that needs configuration. The pulse width of the generator is a multiple of the clock period and can be set according to the table below.

DIP SW 4	DIP SW 5	DIP SW6	1 MHz pw	5 MHz pw	10 MHz pw
OFF	OFF	OFF	4.096 ms	819.2 μs	409.6 μs
ON	OFF	OFF	2.048 ms	409.6 μs	204.8 μs
OFF	**OFF**	**ON**	**256 μs**	**51.2 μs**	**25.6 μs**
ON	OFF	ON	64 μs	12.8 μs	6.4 μs
OFF	ON	ON	16 μs	3.2 μs	1.6 μs
ON	ON	ON	4 μs	0.8 μs	0.4 μs

Operation

This unit is designed to operate only with the specified AC voltage on page 4 and +24 VDC. For conversion to a different voltage of operation contact SpectraDynamics, Inc.

To operate the unit, locate the AC power entry module on the rear of the enclosure and/or the DC connector and connect the power cord(s). Plug the unit into an appropriate power outlet. The LED on the front panel labeled AC will turn on when you apply the AC voltage. If you also apply the DC voltage the LED labeled DC on the front panel should light up. Attach a cable with a reference clock to the input on the front panel labeled **Ref. Input** on the PPS generator. The unit will start producing one pulse per second signals at each of the output ports. A green LED on the front panel, in the block labeled PPS 1 OUTPUTS, will flash on the rising edge of each pulse.

To synchronize the output pulses to an external event, connect the external reference pulse cable to the input labeled **Ext. 1PPS** on the front panel. Enable the synchronization sequence by moving the **Enable** switch to the up position. The **Trigger** button will arm the synchronization sequence to occur on the next rising edge at the **Ext. 1PPS** input. Only one synchronization event occurs per push of the **Trigger** button.

The 1 PPS will be synchronized to the reference clock rising edge after the incoming synchronization PPS input when the switch labeled **Phase** is in the up position. When the **Phase** switch is in the down position, the 1 PPS will be synchronized to the reference clock falling edge that occurred before the incoming synchronization PPS input. It is important to turn off the synchronization enable switch by moving it to the down position to disable further inadvertent synchronization events.

Warranty

The PPS-2RM-B1 is warranted to be free of defects under normal operating conditions, as specified, for one year from date of original shipment from SpectraDynamics, Inc (SDI). SDI's obligation and liability under this warranty is expressly limited to repairing or replacing, at SDI's option, any product not meeting the said specifications. This warranty shall be in effect for one (1) year from the date a PPS-2RM-B1 is sold by SDI. SDI makes no other warranty, express or implied, and makes no warranty of the fitness for any particular purpose. SDI's obligation under this warranty shall not include any transportation charges or costs of installation or any liability for direct, indirect, or consequential damages or delay. Any improper use, operation beyond capacity, substitution of parts not approved by SDI, or any alteration or repair by others in such manner as in SDI's reasonable judgement affects the product materially and adversely shall void this warranty. No employee or representative of SDI is authorized to change this warranty in any way or grant any other warranty.

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