



PSI-0404-11 DITHERLESS BIAS CONTROLLER

USER GUIDE

Rev D

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1 DOCUMENT SCOPE:

This document describes basic operation of the Photonic Systems, Inc. PSI-0404-11 Ditherless Modulator Bias Controller (MBC) board. This manual is intended to give the user enough information to place the controller into service using common electronic laboratory tools, instruments and practices. This product is sold as a modulator bias controller intended for use in applications where precise optical modulator control is required over time and temperature.

2 PRODUCT DESCRIPTION

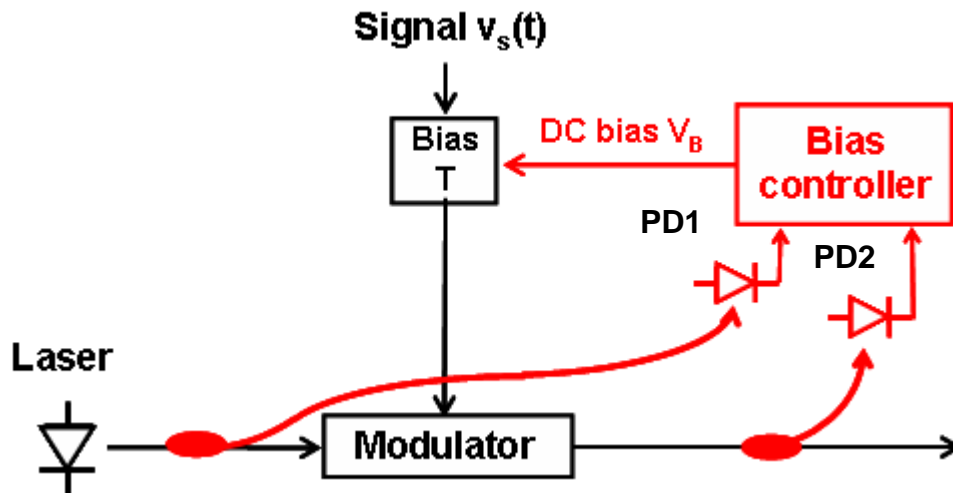
2.1 PSI-0404-11 Features

- Adjust to any bias voltage on the modulator transfer function
- Ditherless modulator bias control
- Compatible with most optical modulators
- Adjustable power ratio control range
- Local or remote adjustment of control ratio
- Local or remote reset
- Visual diagnostic indicators
- Wide operating temperature range: 0° to +50° C
- Small Size

2.2 Overview of PSI-0204-11 Bias Controller

The PSI-0404-11 modulator bias controller (MBC) offers a simple solution for precise control of electro-optical modulators. This controller accurately prevents bias point drift from any user defined point on the Mach-Zehnder transfer function based on holding a fixed power ratio of the optical input and output of the modulator under control. Through the use of integrated optical tap coupler/power monitor devices, the PSI-0404-11 monitors the ratio of DC optical power level at the modulator's input and output ports. Precise feedback control circuitry maintains a user-set ratio through automatic adjustment of the bias voltage applied to the modulator under control.

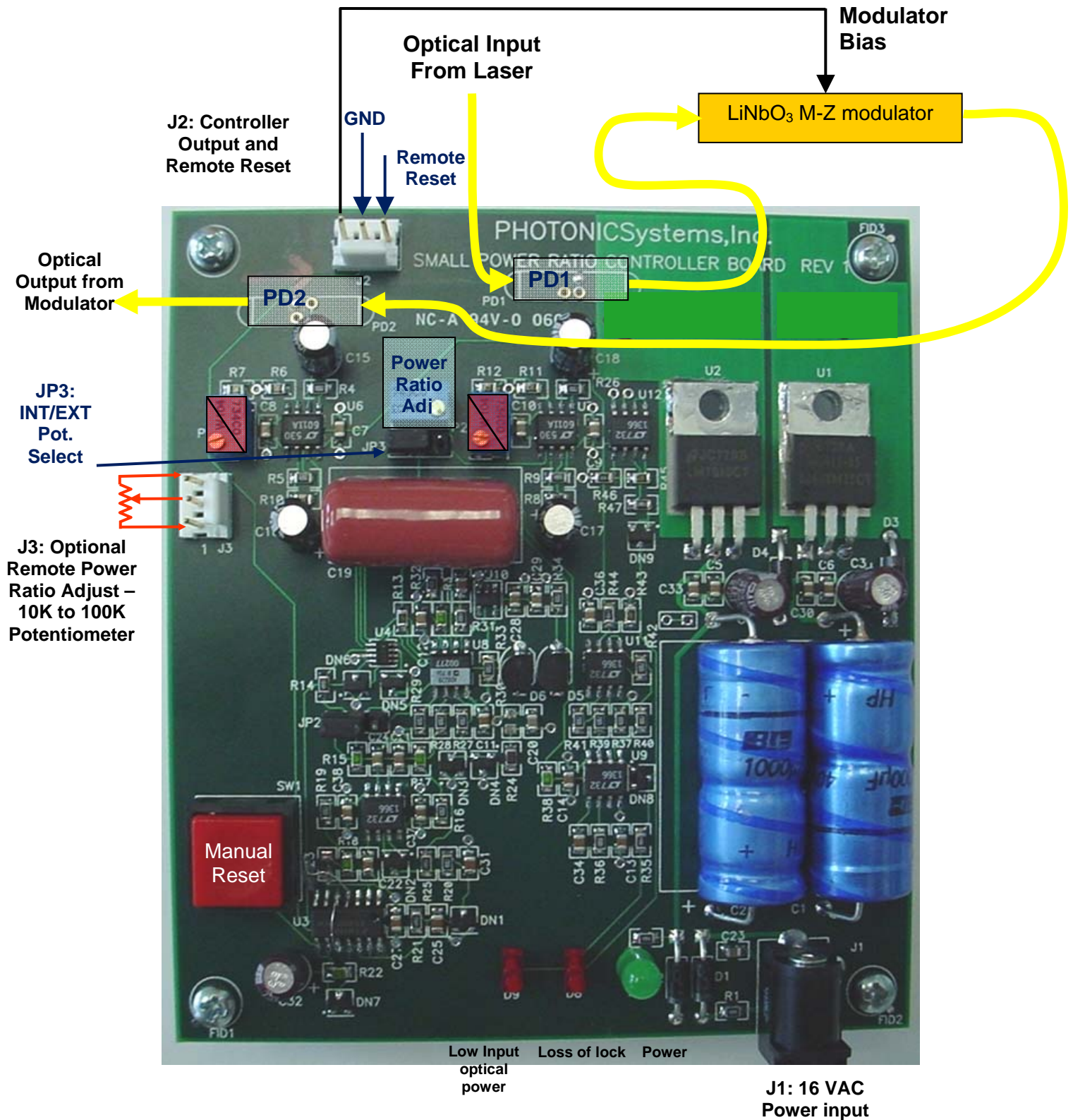
A basic system diagram is shown below:



Control of the optical modulator is simplified through use of the PSI-0404-11 in your system. This device is based on Photonic Systems experience in design of fiber optic systems and components. Intended for use in customized experiments with optical modulators, the bias controller offers users simple modulator control, speeding development time and allowing for greater concentration on other design issues.

2.3 Using the PSI-0404-11 Ditherless MBC

The PSI-0404-11 MBC is installed into a system as diagrammed in the figure below.



2.3.1 PSI-0404-11 Connections

The PSI-0404-11 is simple to use and has few required user connections. The controller is shipped from PSI with power monitor devices for use at both the input and output side of the modulator under control. These power monitors must be installed and connected to the modulator prior to powering the controller. Also required is a DC connection from the controller's output to the modulator bias input (or bias-T if applicable).

2.3.1.1 Installing the Power Monitor Devices

The power monitors supplied with the PSI-0404-11 must be installed by the user prior to operation of the controller. The power monitors are installed through simple insertion of the devices into the sockets at PD1 and PD2. These power monitors are selected based on the optical power levels required by the end application. The power monitors are selected based on customer supplied optical information (input power into the modulator and the optical output power out of the modulator) at the time of order.

PD1 monitors the modulator input power and is located in the top middle of the board as shown in the pictorial above.

PD2 monitors the modulator output power and is located in the top left section of the board as shown in the pictorial above.

2.3.1.2 Connecting the Bias Output

Connect the controller's bias output to the modulator through Pin 1 of connector J2. Pin 1 is the bias output; pin 2 provides a ground connection. Be sure to carry the ground connection to the modulator from this pin. Pin 3 of J2 provides a remote reset capability. If desired, this pin may be used to allow other equipment to reset the controller. Grounding this pin will affect a reset of the controller.

2.3.1.3 Setting the Control Power Ratio

The PSI-0404-11 maintains a set point on a modulator's transfer function through monitoring a desired ratio of modulator input to output optical power. The user may set this ratio in two ways. First, potentiometer P3, located in the top center of the board, may be set to obtain a desired power output for a known input power level and modulator insertion loss. In this case, jumper JP3 must be set to short positions 1 and 2. The controller is shipped with the jumper in this position.

The second method is to use an external 10K to 100K potentiometer connected to J3 as shown in the pictorial on page 6. In this case, jumper JP3 must be set to short pins 2 and 3.

2.3.1.4 Optional Connections and Controls

The PSI-0404-11 offers capability for remote control in applications where the controller is a component of a larger optical transmission system. As described in prior sections, the controller may be reset remotely through J2 and the controller power ratio may be set remotely through use of J3 and jumper JP3. Other optional connections include:

- Bias polarity inversion: Jumper JP2 may be set to change the polarity of the output bias. Normally, this jumper is set to short pins 1 and 2.

- Optical power monitor: J3 may also be used to monitor the optical power detected by PD1 and PD2. This will be presented as a voltage between 0.1 and 10 Volts at Pin 1 for PD2 and pin 3 for PD1.

2.3.2 User Interface

The PSI-0404-11 is simple to install and operate once installed. The user should only need to provide AC power to connector J1 once all optical connections are made and the desired power ratio is established.

2.3.2.1 Controller Reset

A reset function is provided with the controller to allow for an orderly re-start in the event a modulator drifts out of range or other unknown events occur. The controller employs an automatic reset function which should prevent an undesired latch-up situation. Automatic reset occurs when the controller output reaches ~ +13.5V or -13.5V. Manually, the reset may be made by depressing the red button (SW1). This function may also be accomplished remotely by providing a temporary ground to pin 3 of J2.

2.3.2.2 Indicator LEDs

Three indicator LED's are provided on the board. They are:

Power (green): normally on if the controller has power applied

Loss of Lock (red): normally off when the controller is operating in power range and holding control of a modulator

Low Input Optical Power (red): normally off if the controller has sufficient optical input power. The indicator turns on when the voltage at J3-1 is less than 50 mV.

2.3.2.3 Connector and Jumper Functions

Connector-Pin	Function
J1	16 VAC input
J2-1	Bias output
J2-2	Ground
J2-3	Remote reset (ground to reset)
J3-1	Remote ratio set (or PD2 monitor)
J3-2	Remote ratio set, variable
J3-3	Remote ratio set (or PD1 monitor)
JP2	Bias polarity
JP3	Ratio control set local/remote

Warranty

Photonic Systems, Inc. warrants the PSI-0404-11 modulator bias controller to be free of defects in materials and workmanship for 1 year from the date of delivery. Products must be returned to the manufacturer for service and/or repair at the buyer's shipping expense. The buyer must contact PSI and receive a valid return material authorization (RMA) number prior to returning any products.

The warranty is void if the unit has been subjected to abuse and/or attempts to alter and/or repair it without the prior written approval of Photonic Systems, Inc., or if the unit shows evidence of component tampering while the unit is in the buyer's possession.

Following the warranty period, charges for parts and labor will be as required to repair the unit. Prices for modifications, revisions and non-warranty parts and service, together with labor necessary, will be quoted upon request.

Except as expressly provided above, there is no warranty or guarantee of merchantability or fitness for a particular purpose or of any other kind, express or implied, with respect to the unit or parts furnished or the services performed by the manufacturer. In no event shall the manufacturer be liable for any consequential damages.