

### Description

The Pamux® B6 is an addressable analog brain board that can control up to 16 input and output points in distributed I/O applications. The B6 is designed for use with Opto 22 mounting racks, including the PB4AH (four points of analog I/O), PB8AH (eight points), and PB16AH (16 points).

Up to 32 B6 brain boards may be linked on a single Pamux bus to control up to 512 points of analog I/O. Each B6 requires 5 VDC  $\pm$ 0.1 V @ 0.5 A (plus an additional 0.5 A if a terminator board is installed).

The B6 includes an on-board microprocessor that continually scans all I/O points on the mounting rack, performs necessary conversions, and then updates dual-port RAM. The host computer transfers data along the Pamux bus by reading from or writing to the dual-port RAM.

This document illustrates how to install the B6 analog I/O

brain board on a compatible mounting rack. It discusses all B6 configuration issues, including how to set jumpers for the address, watchdog, and reset line. It also explains how to install a terminator board when a B6 station is at the end of a Pamux system.

Opto 22 form #726, the *Pamux User's Guide*, contains complete information about the Pamux system and can be downloaded free from our Web site at [www.opto22.com](http://www.opto22.com).

The B6 brain board measures 6.40 by 4.75 inches. It includes a 50-pin female connector to attach to an analog I/O mounting rack. At the top of the brain board are two 50-pin male header connectors used to link the brain board to the Pamux bus. For the last brain board on a Pamux bus, one of these connectors holds the terminator board.

NOTE: If you have older B6 brain boards, you may notice that the latest version looks different. Functionally it is the same as previous versions; the difference in appearance is because we now use surface-mount technology to produce the boards.

Part Number	Description
B6	16-Channel Analog Brain Pamux

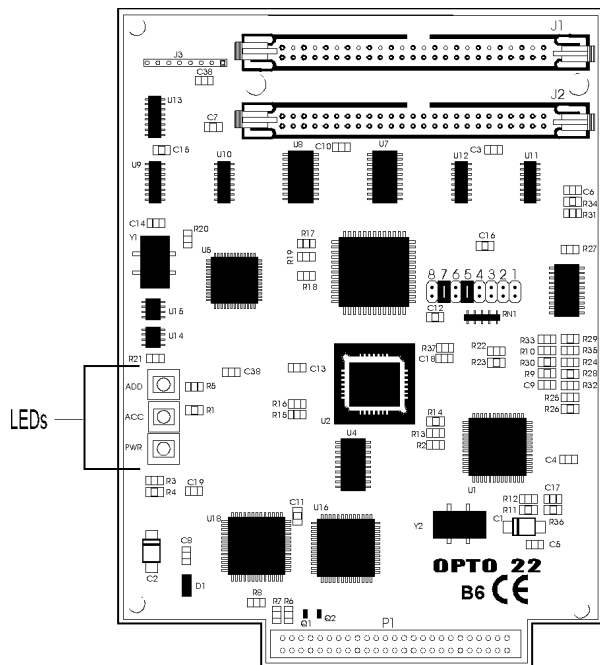


Figure 1: B6 Brain Board

### LED Indicators

The B6 brain board includes the following LEDs:

- **ADD**—The Address LED is on whenever the brain board is addressed (read from or written to) on the Pamux bus. It is off otherwise. For each operation, the LED stays on for about 250 milliseconds, so if the bus is very active the LED may appear constantly on.
- **ACC**—The Access LED is on whenever access has been granted to the dual-port RAM. It remains on until access is released. (See Chapter 4 of the *Pamux User's Guide* for details on getting and releasing access.)
- **PWR**—The Power LED is on whenever power is connected to the board. It is off otherwise. It does not indicate whether voltage is within specifications.

## Detailed Drawing and Dimensions

Figure 2 shows the B6 and its dimensions.

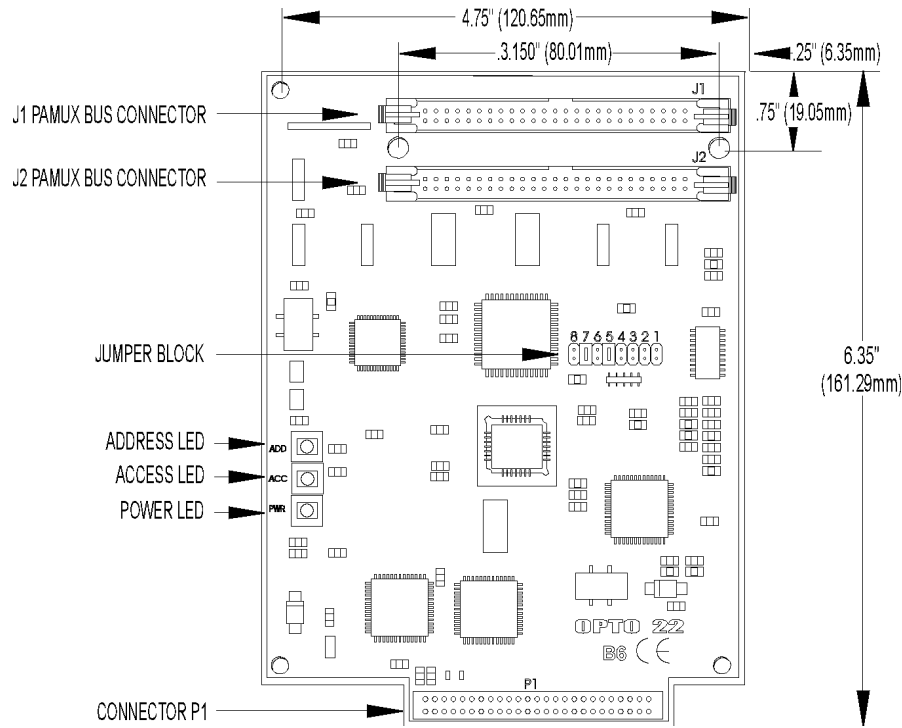


Figure 2: Dimensions of the B6 Brain Board

## Installing the B6 on a Mounting Rack

Three I/O mounting racks are available for the Pamux B6 brain board:

- PB4AH—4 channels of single-point standard analog I/O
- PB8AH—8 channels of single-point standard analog I/O
- PB16AH—16 channels of single-point standard analog I/O

Each mounting rack accommodates any combination of analog input and output modules and connects to the Pamux B6 brain board via a 50-pin header connection. The mounting rack includes a fuse for the 5-volt power line.

Figures 3 through 5 show the mounting dimensions of these racks with the B6 brain board installed.

### Installation (continued)

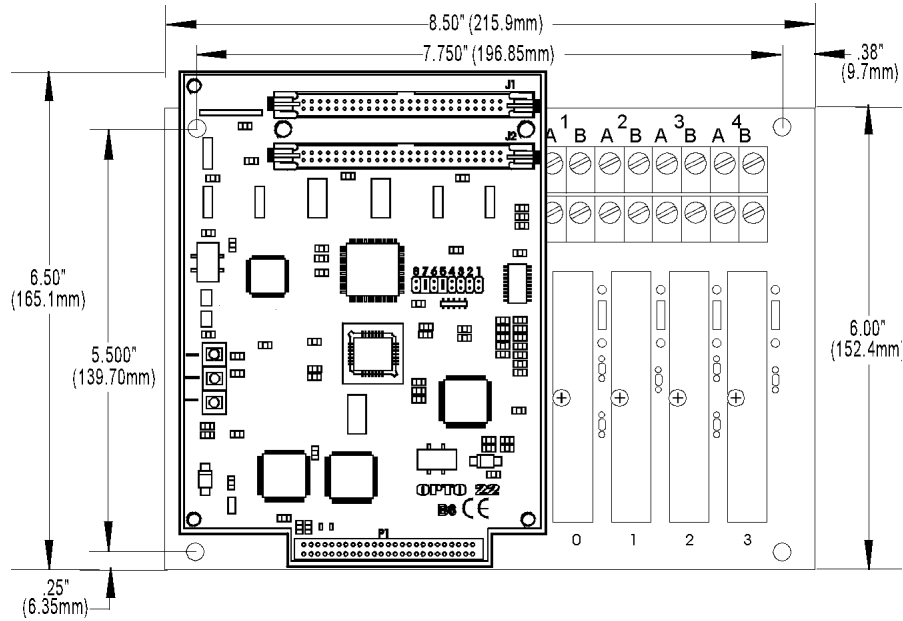


Figure 3: Mounting Dimensions of the PB4AH with a B6 Installed

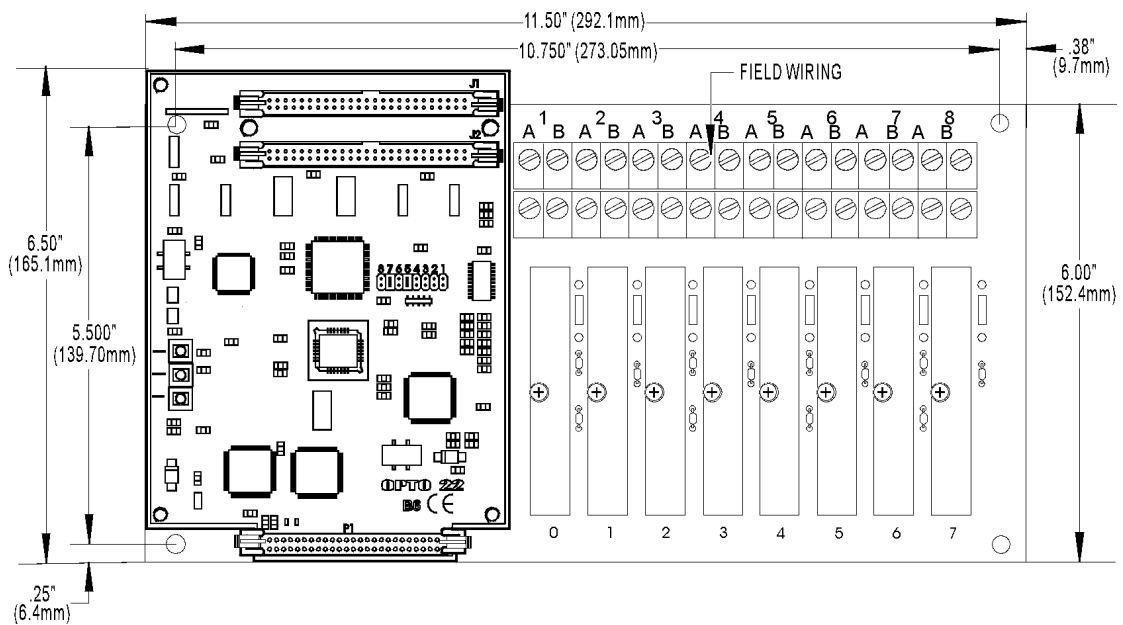


Figure 4: Mounting Dimensions of the PB8AH with a B6 Installed

### Installation (continued)

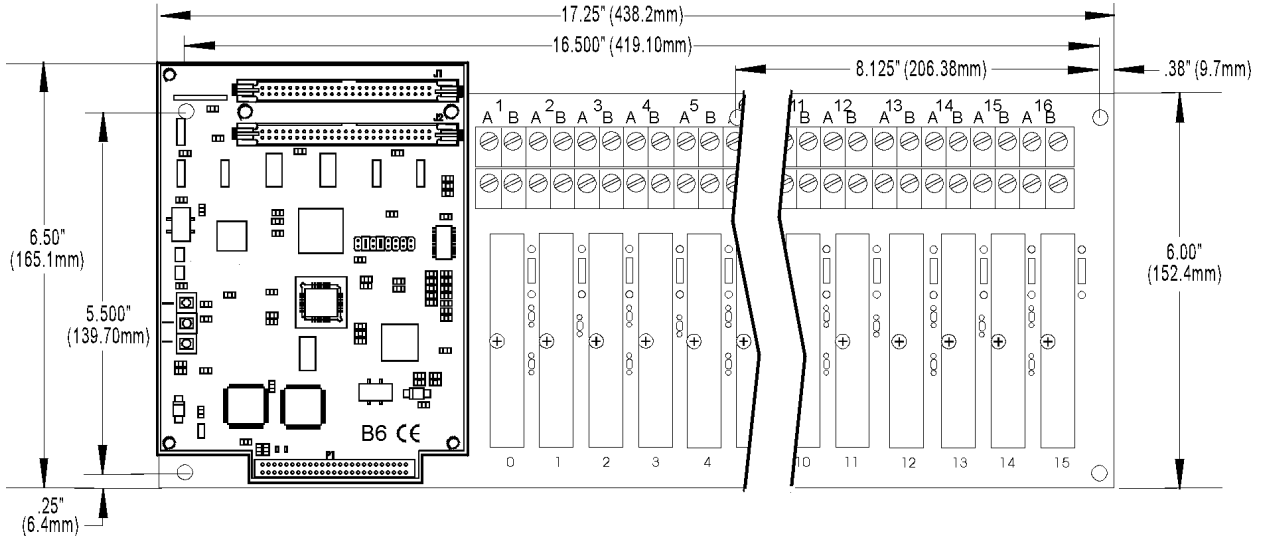


Figure 5: Mounting Dimensions of the PB16AH with a B6 Installed

Figure 6 shows the vertical dimensions of the B6 mounted on any rack.

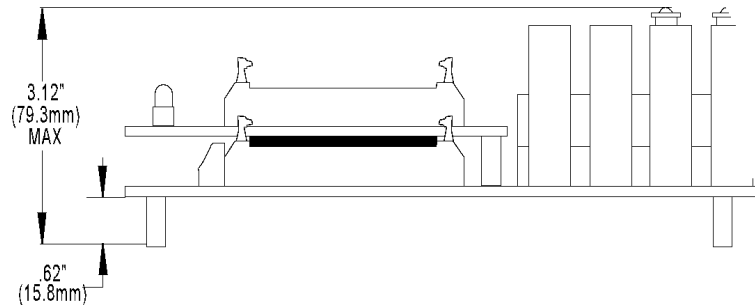


Figure 6: Vertical Dimensions of the B6 Mounted on a Rack

### Setting the Jumpers

The B6 includes eight jumpers. Jumpers 1 through 5 set the address, jumper 6 is disabled, jumper 7 sets the reset line polarity, and jumper 8 sets the watchdog functionality.

Jumpers 1–5 are described on this page; jumpers 6–8 are described on the following page.

#### Jumpers 1–5 (Address)

These jumpers configure the **base** address of the B6. The brain board can control 16 points of analog I/O. Data is passed to and from the host computer using one address register and one data register. Each B6 thus requires two consecutive addresses.

Refer to Figure 7 at right to determine how to set the **base** address of the B6.

Note that each Pamux station on a bus must have a unique address.

#### Jumper 6

Jumper 6 has been disabled and has no effect.

#### Jumper 7 (Reset)

One of the control lines on the Pamux bus is the reset line. This line is used to clear all analog outputs on a B6 station to zero scale, then to set all I/O positions on the B6 to be configured as inputs. Note that the reset is not intended to be used to shut off outputs upon a system communication error.

Jumper 7 determines the polarity of the reset line, either active high or active low, as shown in Table 1. In general, it does not matter which polarity you select as long as you are consistent throughout your Pamux system.

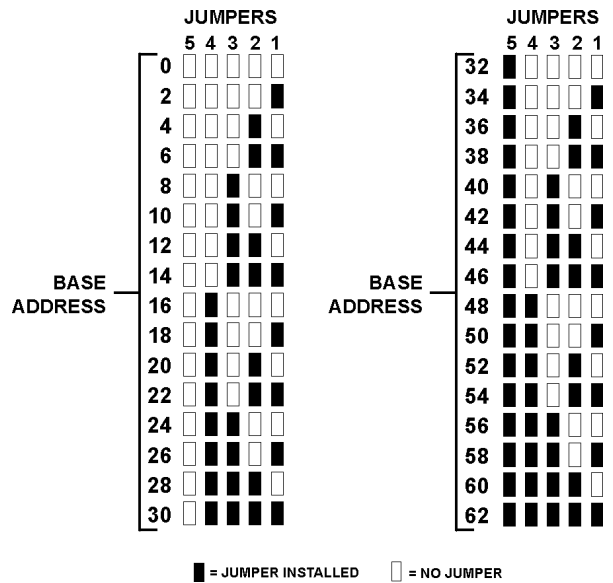


Figure 7: Address Jumpers

Table 1: Reset Jumpers

Reset Level	Jumper 7
Active High	In
Active Low	Out

## Jumpers (continued)

### Jumper 8 (Watchdog)

A watchdog timer shuts down a process when the host computer goes offline. The watchdog function of the B6 can be enabled or disabled with jumper 8. Since the B6 watchdog function is also under software control, the jumper must be removed **and** the watchdog register must be written to for the watchdog to be enabled.

Table 2 shows how jumper 8 affects the watchdog. For information on software configuration of the watchdog, see Chapter 3 of the *Pamux User's Guide*.

Table 2: Watchdog Jumper

Watchdog	Jumper 8
Disabled	In
Enabled	Out

## Terminating a B6 Station

For stations on a Pamux bus to operate correctly, both ends of the bus must be terminated. The host computer and the last Pamux station on the bus are the only devices that should be terminated. Note that if you are using an Opto 22 Pamux adapter card, the host computer is automatically terminated, since termination resistors are built into the card.

To terminate a B6 station, plug a Pamux bus terminator board (TERM1 or TERM2) into either connector on the brain board. TERM1 is used with standard ribbon cable. TERM2 is used with ribbon cable that has a ground plane. See the *Pamux User's Guide* for more information.

When the terminator board is installed correctly, its component side faces away from the brain board components and its red wire connects to the +5V terminal on the rack. Figure 8 illustrates the proper installation of the terminator board.

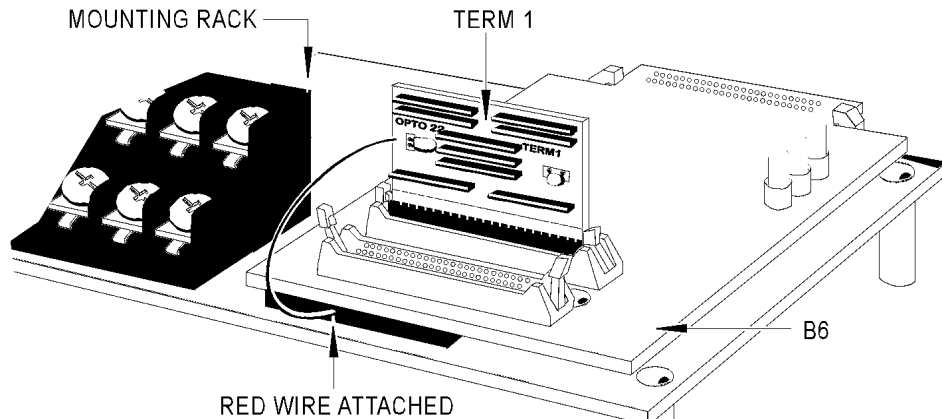


Figure 8: Terminator Board Installed on a B6-Compatible Mounting Rack

## Products

Opto 22 produces a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications.

## SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.



SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

## SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.



## M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit [nvio.opto22.com](http://nvio.opto22.com) for more information.

## Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.



## Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

## Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

## Opto 22 Web Sites

- [www.opto22.com](http://www.opto22.com)
- [nvio.opto22.com](http://nvio.opto22.com)
- [www.internetio.com](http://www.internetio.com) (live Internet I/O demo)

## Other Resources

- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.



## About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.