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SINCE 1975

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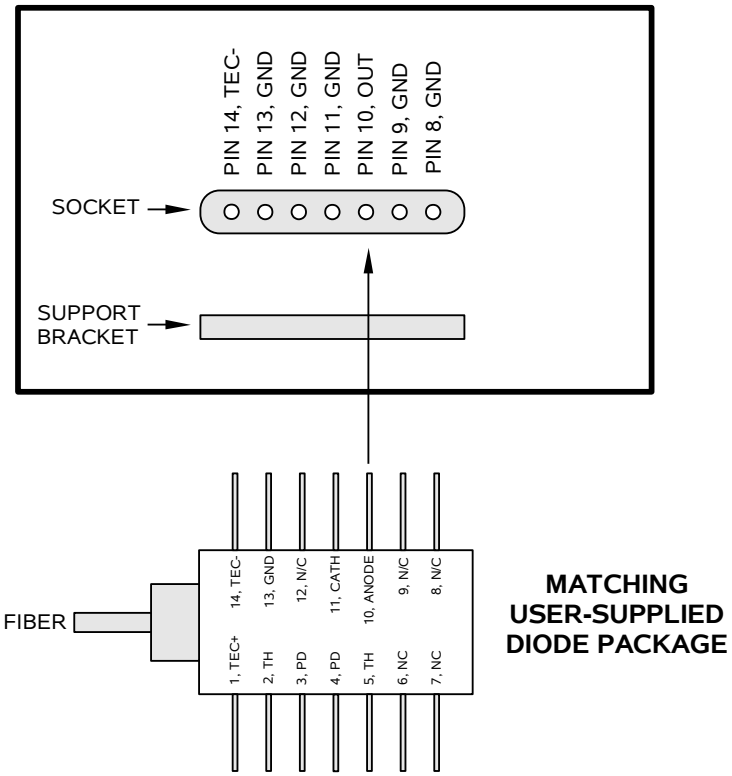
INSTRUCTIONS

MODEL AVX-S3C-P1B-T1B

PLUG-IN SOCKET OUTPUT MODULE

SERIAL NUMBER: _____

"P1B" SOCKET VIEW



MATCHING USER-SUPPLIED DIODE PACKAGE

WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been dissembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

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Manual Reference: /fileserver2/officefiles/instructword/avx-s/AVX-S3C-P1B-T1B,ed1.odt.
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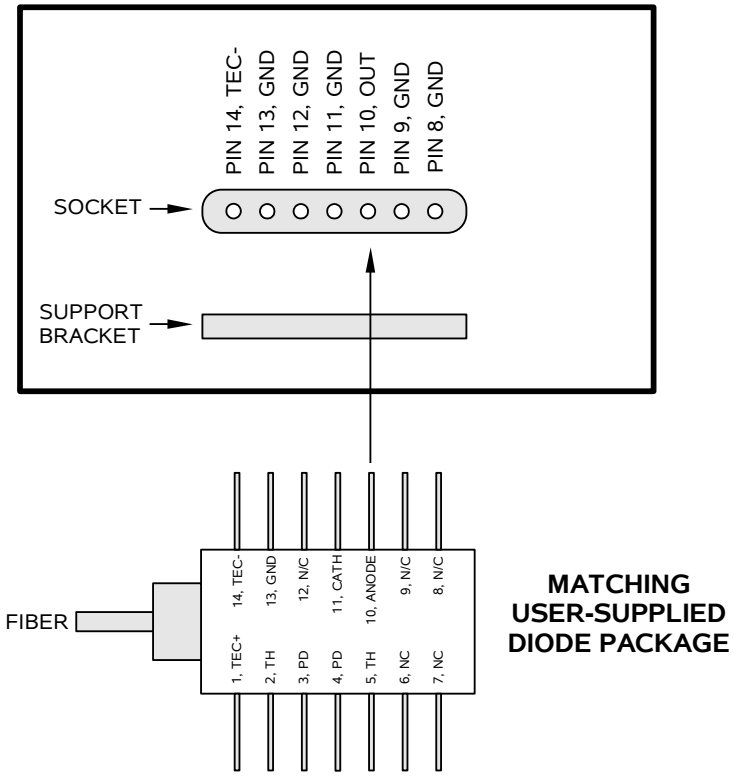
INTRODUCTION

The AVX-S series of bias insertion units is designed to combine a pulse signal with a DC bias, and supply the resulting signal to a laser diode, which is inserted into a high quality socket included on the mount. The bias insertion module includes the necessary networks to match the laser diode to the pulse source, as well as networks for applying DC bias to the diode.

The AVX-S3C-P1B-T1B is specifically designed to accommodate butterfly-packaged laser diodes with the pinout illustrated below:

"P1B" SOCKET VIEW



SPECIFICATIONS

Model:	AVX-S3C-P1B-T1B
Peak diode current:	10 A
Max. input amplitude:	150 Volts
Pulse width:	4 – 50 ns
Rise time:	1 ns
Pulse PRF range:	DC - 20 kHz
Max. bias current:	100 mA
Max. bias voltage:	50 Volts
Input impedance:	25 Ohms
N (transformer ratio[1,2]):	+2
R_S + R_{DIODE}:	6.2 Ohms
IN connector:	SMA female (two)
Other connectors:	MI: SMA (female), DC bias: solder terminal
Diode socket:	See manual text
Dimensions:	H x W x D: 41 mm x 66 mm x 76 mm (1.6” x 2.6” x 3.0”)
Material:	Cast aluminum, blue enamel

1) The transformer reduces the input voltage by a factor of N (approx) and increases the current by a factor of N (approx). The load resistance (R_S+R_{DIODE}) must equal 50Ω / N^2 (approx).
2) A polarity inverting option is available. Add the suffix -INV to the model number to specify this option. “N” is a negative number when this option is installed.

GENERAL INFORMATION

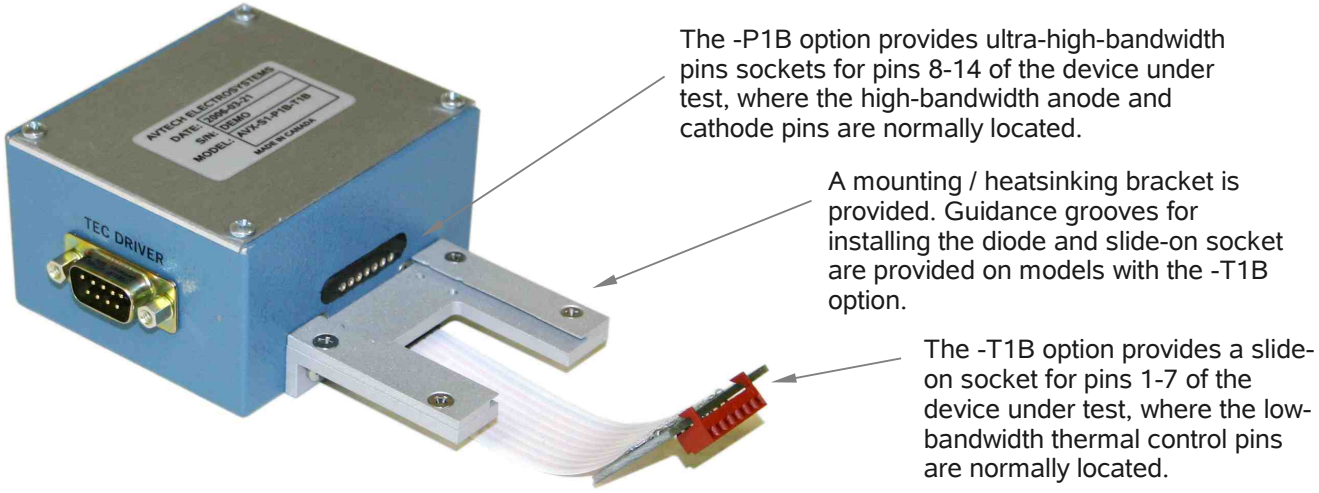
INSTALLING THE DEVICE UNDER TEST

The AVX-S3C-P1B-T1B has a “P1B” high-speed socket for pins 8-14 of the diode under test. If the “-T1B” option has been specified, a slide-on socket for pins 1-7 of the diode will also be present.

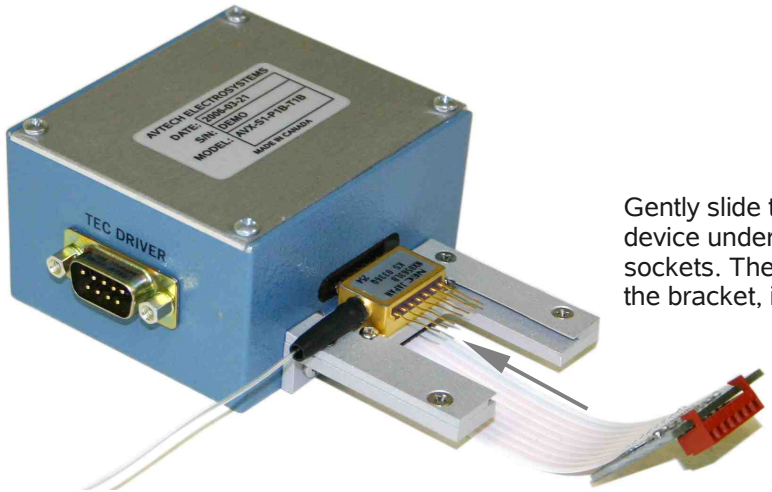
The “P1B” socket consists of seven high-bandwidth pin sockets. This socket arrangement will accept pins 8-14 of a standard butterfly package with 0.5 mm wide pins. A positive pulse will be applied to the diode anode (pin 10). Pins 8-9 and 11-13 will be grounded.

The optional “T1B” socket consists of a low-bandwidth slide-on socket board for pins 1-7 of a butterfly package. A flexible cable connects the slide-on socket to the output module. A male DB-9 connector is provided on the output module, which provides access to the thermal control pins of the diode. DB-9 pin 2 connects to diode pin 2 (TH). DB-9 pin 3 connects to diode pin 5 (TH). DB-9 pin 4 connects to diode pin 1 (TEC+). DB-9 pin 5 connects to diode pin 14 (TEC-). The remaining DB-9 pins are unconnected. Pins 3, 4, 6, and 7 of the diode are grounded. Access to the photodiode, if present, is not provided. This option is designed for compatibility with Thorlabs temperature controllers and Lumics laser diodes. It may be suitable for others as well.

With no diode installed, the output module will look similar to this:



The diode is first installed by sliding pins 8-14 into the “P1B” pin sockets, as shown below:



Gently slide the high-bandwidth side of the device under test into the matching pin sockets. The device can be screwed down to the bracket, if desired.

If present, the T1B slide-on socket assembly can then be slid onto pins 1-7, as shown below:

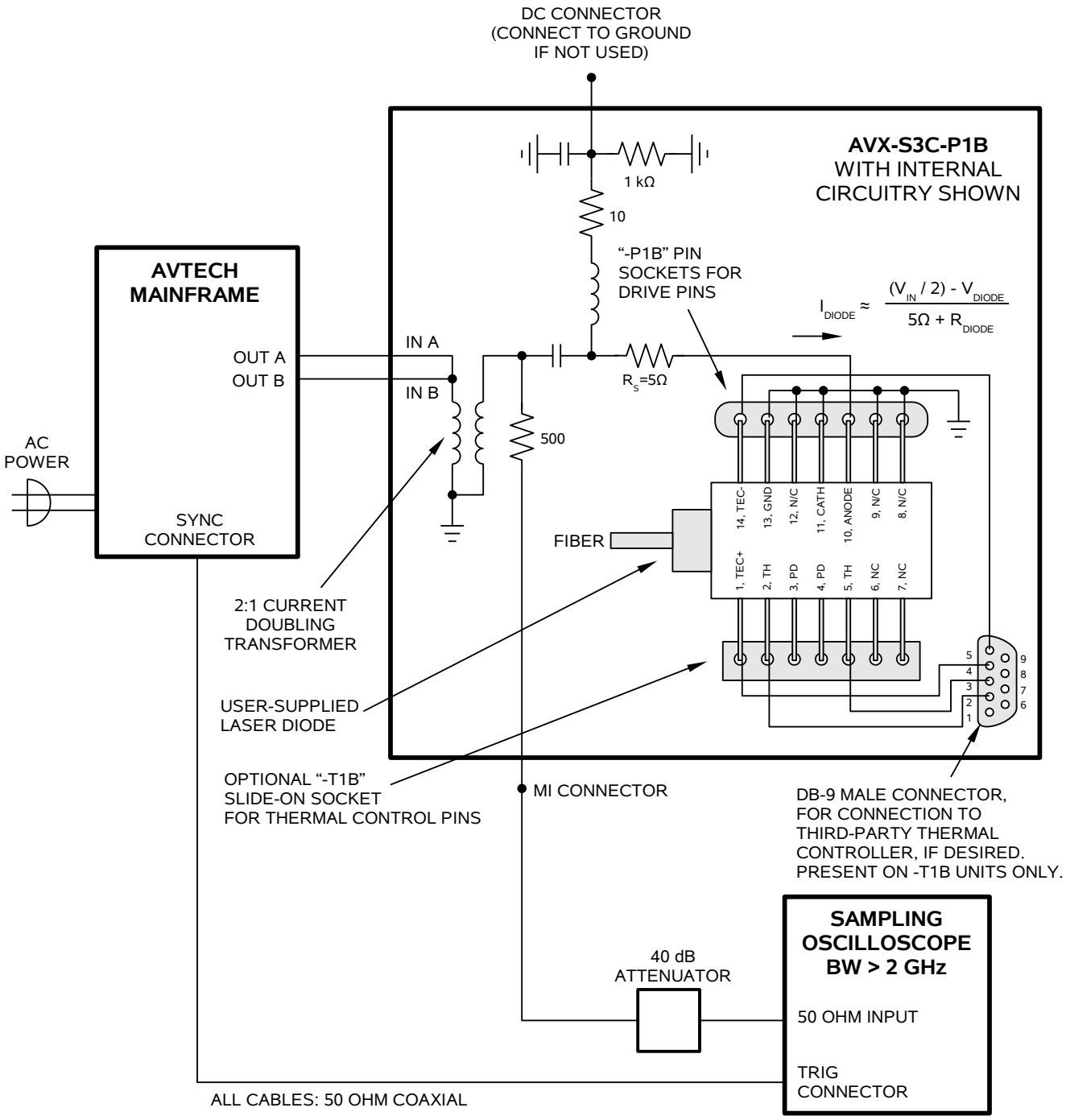
To optional third-party TEC controller.

Gently slide the low-bandwidth slide-on socket onto the matching pins of the device under test. The slide-on socket is connected to the output module using a short length of flexible ribbon cable. The thermoelectric cooler and thermistor pins are made accessible to the user through the “TEC DRIVER” DB-9 connector, which will mate to cables from common third-party TEC controllers.

(The SMA connectors which connect to the cabling from the mainframe are on the module side opposite the pin socket. They are not visible in these photos.)

NORMAL TEST ARRANGEMENT

To fully test the instrument, and for normal operation, the output module must be connected as shown below. The basic functional equivalent circuit of the output module is shown.



THERMAL CONTROL (-T1B UNITS)

Models with the "-T1B" option include a DB-9 male connector that will mate to third-party temperature controllers. These third-party controller provide a means of controlling the thermoelectric cooler that is typically present in butterfly-packaged laser

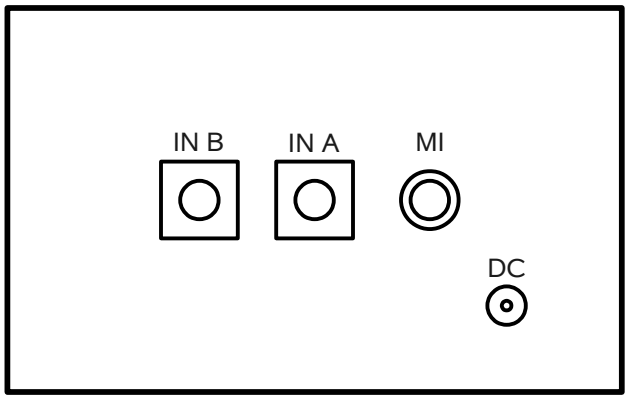
diodes, if desired. The need for cooling is dependent on the user's application. Cooling is generally recommended by device manufacturers.

SIGNAL CONNECTORS ON THE OUTPUT MODULE

The IN A and IN B connectors must be connected to the OUT A and OUT B connectors on the pulser mainframe. The connectors are interchangeable.

An oscilloscope may be used to monitor the MI output. A forward DC bias may be applied to the laser diode by connecting a DC potential of 0 to +10 Volts to the DC solder terminal. The application of a small forward bias often yields a more ideal diode current waveform (as observed on the MI port).

⚠ Note that the DC port must be shorted to ground if a bias is not applied. Waveform distortions will occur otherwise.



AVX-S3C OUTPUT MODULE, CONNECTOR VIEW

AMPLITUDE CONTROL

When using the output module with an Avtech pulser mainframe (such as the AVO-9W-B-P), the pulse current through the diode load is given by:

$$I_{DIODE} = ((V_{SET} \div 2) - V_{DIODE}) \div (5\Omega + R_{DIODE})$$

where V_{SET} is the amplitude setting on the mainframe, V_{DIODE} is the forward voltage drop across the diode, and R_{DIODE} is the resistor internal to the laser diode (ideally 0 - 2Ω*). The 5Ω resistance is built into the AVX-S3C output module.

As an example, the AVO-9W-B-P can deliver up to 125V to the output module, which is halved by the current-doubling transformer to 62V, approximately. If $5\Omega + R_{DIODE} = 6.2\Omega$, approximately, then the maximum available output current is 62V / 6.2Ω = 10 Amps.

* The total effective characteristic impedance (Z_0) of the two parallel coaxial cables connecting the mainframe to the output module is 50Ω / 2 = 25Ω. The current-doubling (N=2) transformer lowers the characteristic impedance to 25Ω / N^2 = 6.2Ω. Thus, for best results, 5Ω + R_{DIODE} = 6.2Ω, for a proper transmission line impedance match.

Standard AVX-S3C-P1B-T1B models require a positive pulse (V_{SET} > 0) on the input, in order to forward bias the device anode.

-INV OPTION

Models with the -INV option have a polarity inverting transformer on the input. This is useful if the user has a pulse generator that generates negative amplitudes only. (The standard AVX-S3C-P1B-T1B requires a positive pulse for normal operation.)

COMPATIBLE PULSE GENERATORS

The AVX-S3C-P1B-T1B is primarily intended for use with the Avtech AVO-9W-B series of laser diode drivers.