



AVTECH ELECTROSYSTEMS LTD.
NANOSECOND WAVEFORM ELECTRONICS

□ P.O. BOX 265
OGDENSBURG, NY
U.S.A. 13669-0265
TEL: (315) 472-5270
FAX: (613) 226-2802

✕ BOX 5120 STN. F
OTTAWA, ONTARIO
CANADA K2C 3H4
TEL: (613) 226-5772
FAX: (613) 226-2802

INSTRUCTIONS

MODEL AVX-S3B-MI BIAS INSERTION UNIT

S.N.: 6550

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 disassembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation or liability assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

Notes:

- 1) Gently insert the anode lead of the OP-3 package into the 8-32 threaded opening of the AVX-53B unit and contact the pin socket which is located about 1 centimeter into the 8-32 opening. Push the anode lead into the socket until the 8-32 threads on the package contact the body of the AVX-53B unit. Then screw the package into the threads using finger force only. Note that the above operation is much easier if the anode lead is very straight.
- 2) The DC terminal of the bias insertion must either be shorted to ground (if a DC offset is not required) or a DC power supply must be applied. The laser diode will not function if the DC terminal is open circuited. Note that the DC current must not exceed ± 100 mA.
- 3) The MI port must be terminated into 50 Ohms. MI provides outputs as high as 0.25 of the input voltage pulse.
- 4) The diode current I_D (Amps) and the MI output voltage are related as follows (for $R_s = 2 \Omega$):

$$I_D \approx 0.5 M_I$$

- 5) The series resistance for the diode and the R_s should total 3 Ohms. The unit is shipped with R_s of 2 Ohms. This value may be changed (by soldering) if the diode resistance differs substantially from 1 Ohm. Use minimal heat when soldering and insure that resistor lead lengths are short (≤ 0.1 inch).

Fig. 1

BIAS INSERTION UNIT TEST ARRANGEMENT

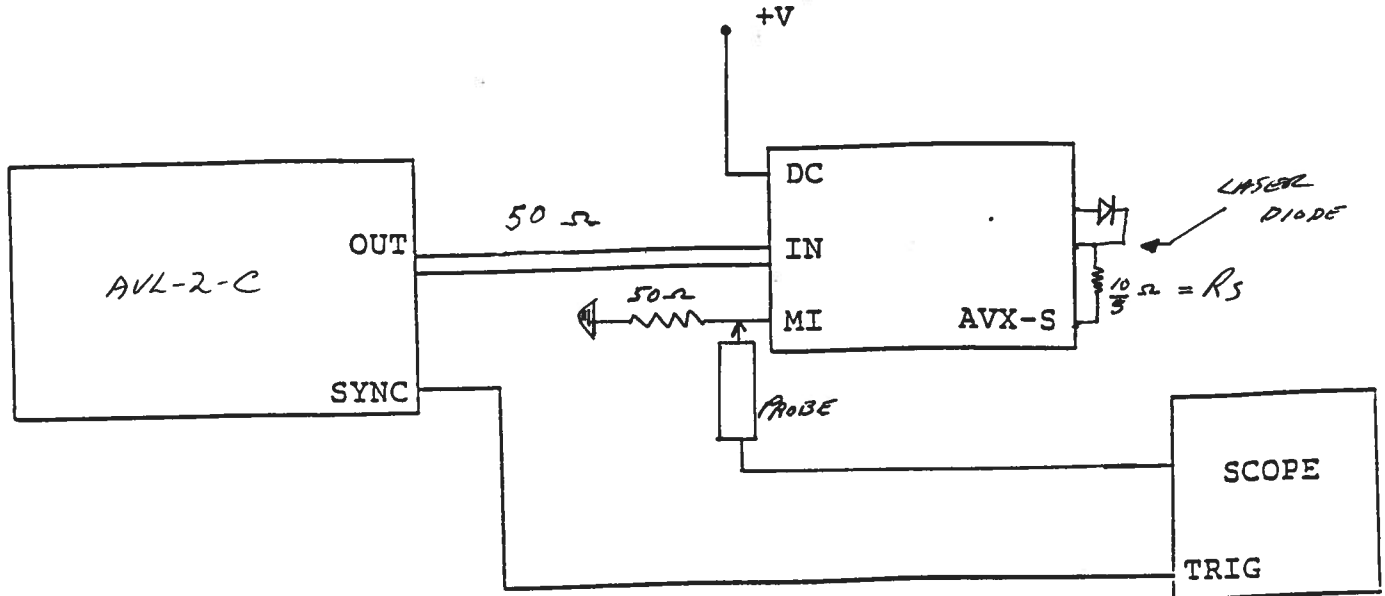
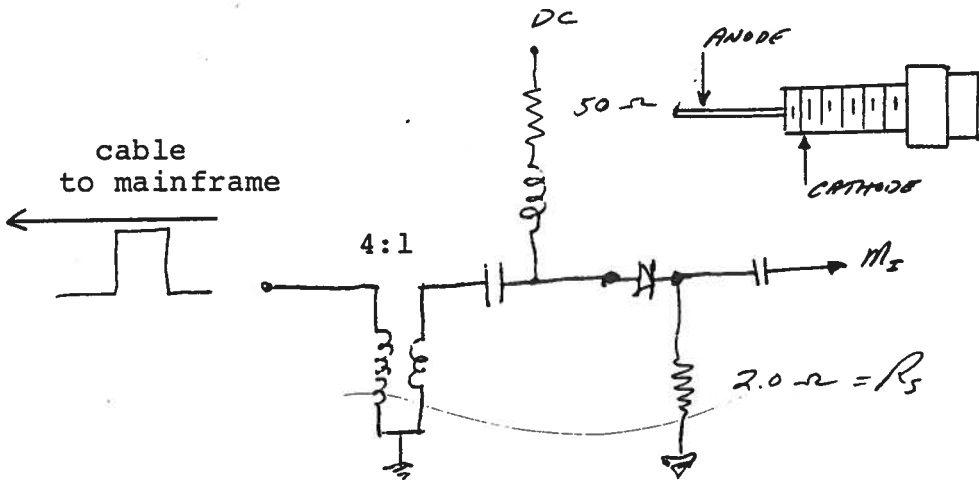
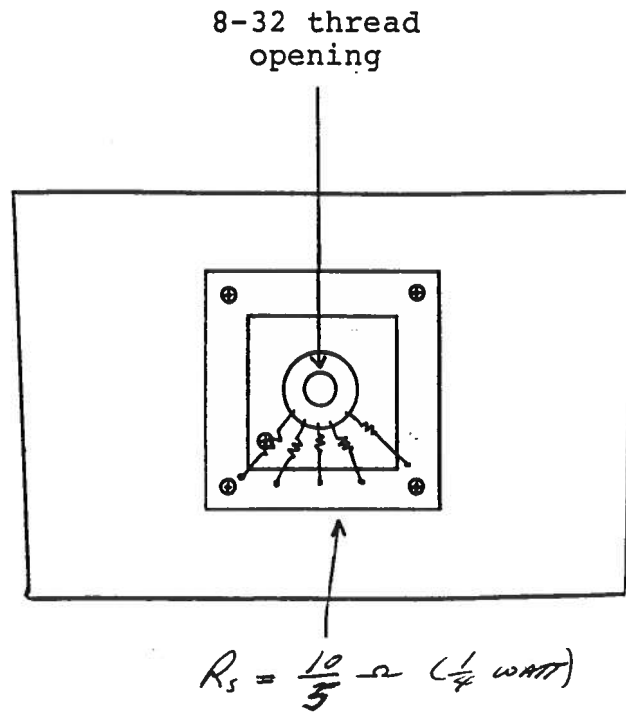
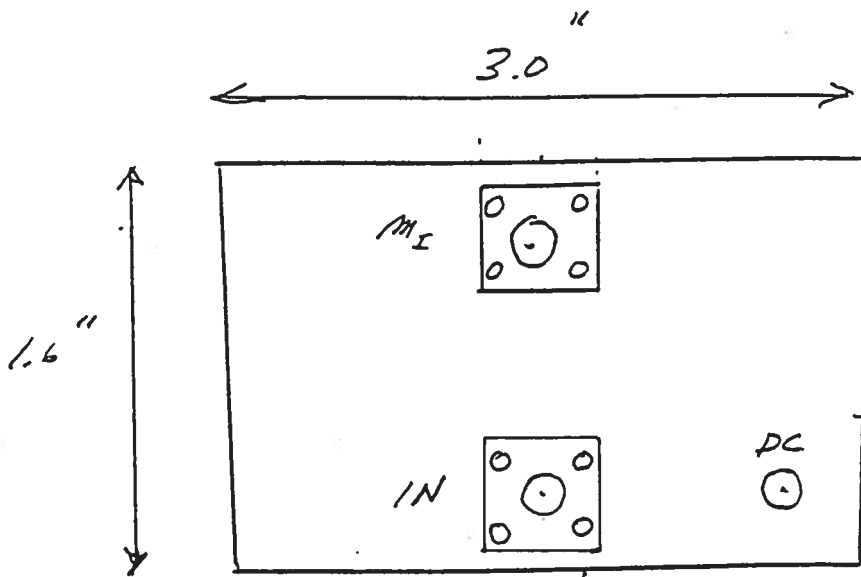


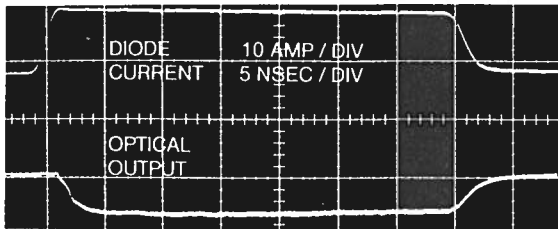
Fig. 2

FUNCTIONAL EQUIVALENT CIRCUIT





ZIPPER FILE



The AVX-S series of bias insertion units is designed for applying pulse or RF CW signals and DC bias to laser diodes which insert 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 or RF source as well as networks for applying DC bias to the diode. Optional outputs allow for monitoring of the laser diode current, voltage and a photo detector diode output. Readily available socket configurations (TO-18, TO-5, TO-3, OP-3) are shown on the following page. Note that the laser diodes are not supplied with the AVX-S series.

The AVX-S series includes 3 basic models namely the AVX-S1, AVX-S2 and the AVX-S3. The basic functional equivalent circuit for the three models are shown below. Model AVX-S1 is specifically designed for ultra high-speed, low current applications (rise times as low as 200 ps, bandwidths to 1 GHz, $I < 1.0$ ampere). Model AVX-S1 is employed in the AVO-9-C series of diode drivers. Model AVX-S2 is intended for application with rise times greater than 2 ns and currents above 1 ampere. Model AVX-S3 is specifically designed for use with the AVO-2 and AVO-5 series pulse generators (which provide currents in the range of 5 to 50 amperes).

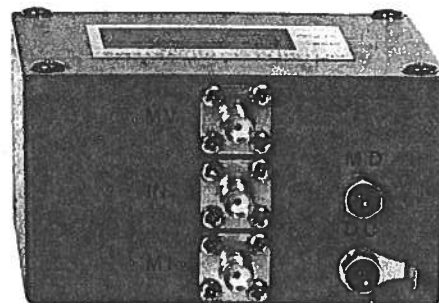
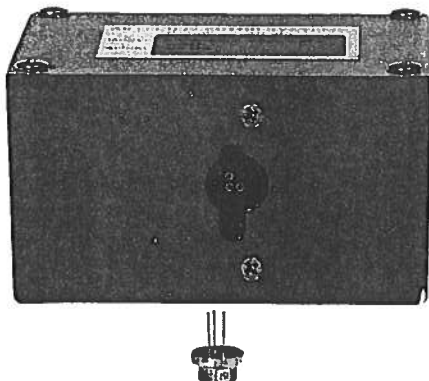
The input series blocking capacitor in Models AVX-S1 and AVX-S2 presents a low impedance to RF CW signals and to baseband pulses while the shunt indicator presents a high impedance to RF (or pulse) signals but an extremely low impedance to the DC bias. The resistor in series with the laser diode is selected to insure that the impedance at the IN port is 50 ohms. Normally a laser diode resistance of 3 ohms is assumed.

The optional diode current monitor (M_I) provides an output waveform (to 50 ohms) which is an attenuated replica of the laser diode current. The output amplitude (V_{MI} , volts) and diode current (I_D , Amps) are related as follows:

$$\text{-S1: } I_D = 0.2V_{MI} \quad \text{-S2: } I_D = V_{MI}$$

The optional diode voltage monitor (MV) provides an output waveform that may be related to the voltage across the laser diode (V_D , volts) as follows:

$$\text{-S1: } V_D = 10(V_{MV} - V_{MI}) \quad \text{-S2: } V_D = 10V_{MV}$$



- Socket mounting of laser diodes
- Peak currents from 100 mA to 48 Amps
- Pulse widths from 0.4 to 200 ns
- Rise times from 0.2 to 2.0 ns
- Pulse or CW RF
- Diode current and voltage monitor options

Model AVX-S3 is available in four different versions (AVX-S3A, AVX-S3B, AVX-S3C and AVX-S3D) all of which include a matching transformer which effectively boosts the laser diode current beyond that provided by the pulse source.

Model AVX-S3A is designed to match 50 ohm pulse generators such as Model AVO-2-C to 12 ohm loads with peak currents of 5 amperes. Consequently, the resistor R_G in the equivalent circuit for this model is 10 ohm. This resistor is accessible in all AVX-S3 models and may be changed by the user (by desoldering). The series resistance of the laser diode and the resistor R_S must equal the pulse generator source impedance divided by N^2 . Consequently, if the series resistance of the laser diode is relatively high, it then may be necessary to reduce the value of R_G . Model AVX-S3B is designed to match 50 ohm pulse generators such as Model AVO-5-C to 3 ohms and will provide peak diode currents up to 28 amperes. Model AVX-S3C is designed to match Models AVO-2W-C and AVO-2-C (25 ohm source impedance) to load resistance of about 5 ohms and will provide peak diode currents as high as 10 amperes. Model AVX-S3D is designed for use with Model AVO-5B-C and will provide up to 48 amperes of diode current.

Two optional SMA output connectors provide attenuated coincident replicas of the diode current (-MI option) and diode voltage (-MV option) as per the following relationships (Amps, Volts):

$$I_D = \frac{10 V_{MI}}{R_S} \quad V_D = 10(V_{MV} - V_{MI})$$

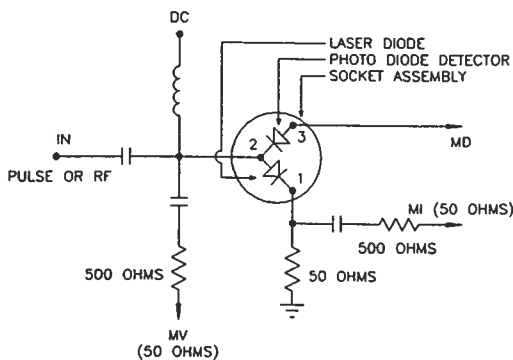
All AVX-S3 units include two foot long input cables with SMA male connectors.

When ordering members of the AVX-S family, the customer must specify the basic model number (eg. AVX-S1) and the following additional information.

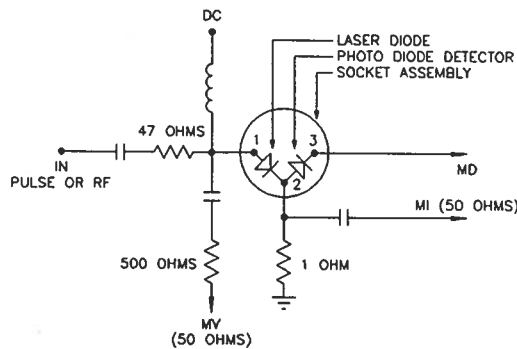
- Diode package type (eg. TO-18) and the required pin connections (eg. anode, cathode, ground etc). See the following page for readily available package mounting. Contact Avtech for special or different packages.
- Desired options (eg. -MI, -MV, -MD).

Contact Avtech for your special requirements.

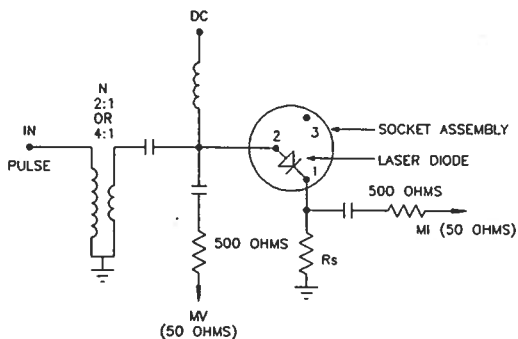
Model:	AVX-S1	AVX-S2	AVX-S3A	AVX-S3B	AVX-S3C	AVX-S3D
Peak diode current:	400 mA	2 Amps	5 Amps	28 Amps	10 Amps	48 Amps
Max. input amplitude:	20 volts	100 volts	150 volts	350 volts	150 volts	150 volts
Pulse width (ns):	0.4 - 200	1 - 1000	2 - 100	2 - 100	2 - 100	5 - 500
Rise time (ns):	0.2	0.5	0.5	1.0	0.5	2.0
Pulse PRF range:	DC - 0.5 GHz	DC - 100 MHz	DC - 10 MHz	DC-10 MHz	DC - 10 MHz	DC - 1 MHz
CW frequency range:	10 MHz - 1.0 GHz	1 - 200 MHz	-	-	-	-
Max. bias current:	100 mA	100 mA	100 mA	100 mA	100 mA	100 mA
Max. bias voltage:	50 volts	50 volts	50 volts	50 volts	50 volts	50 volts
Input impedance:	50 ohms	50 ohms	50 ohms	50 ohms	25 ohms	12 ohms
N:	-	-	2	4	2	4
Rs (ohms):	-	-	10	3	5	0.7
IN connector:	SMA					
Monitor connector:	SMA					
Bias connector:	Solder pin					
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					
Mounting:	Any					



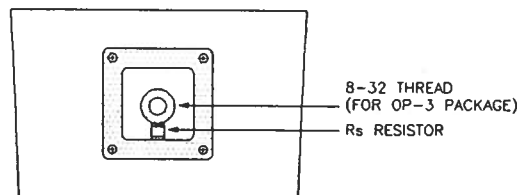
AVX-S1 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S2 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S3 FUNCTIONAL EQUIVALENT CIRCUIT

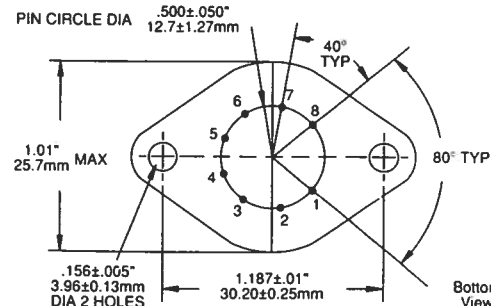
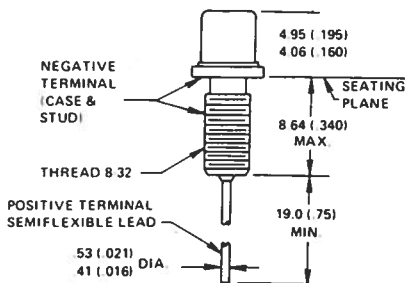
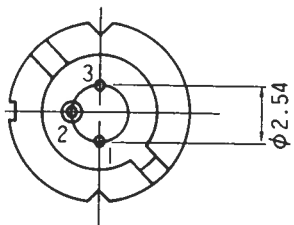
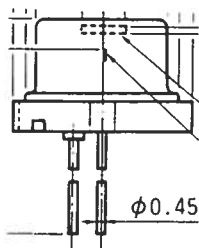


AVX-S3 INPUT ASSEMBLY (FOR OP-3 PACKAGE)

TO-18

OP-3

TO-3 8 PIN



TYPICAL PACKAGES

02.08.93