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INSTRUCTIONS

MODEL AVX-S3B-MI BIAS INSERTION UNIT

S.N.: 6606

### 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.

- 1) A general description of the AVX-S3B module is given in the enclosed data sheet.
- 2) The AVX-S3B module should be connected to the AVO-5-C mainframe via the supplied 24" RG174 cable. The diode current may be monitored by connecting the MI output port to the sampling scope via a 40 db attenuator. The output amplitude ( $V_{MI}$ , volts) and diode current ( $I_D$ , Amp) are related as follows:

$$I_D = 4 V_{MI}$$

- 3) The laser diode plugs directly into the socket on the side of the AVX-S3B module.
- 4) A forward DC bias may be applied to the laser diode by connecting a DC potential of 0 to +5 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. Note that the bias current must not exceed 100 mA.

Fig. 1

BIAS INSERTION UNIT TEST ARRANGEMENT

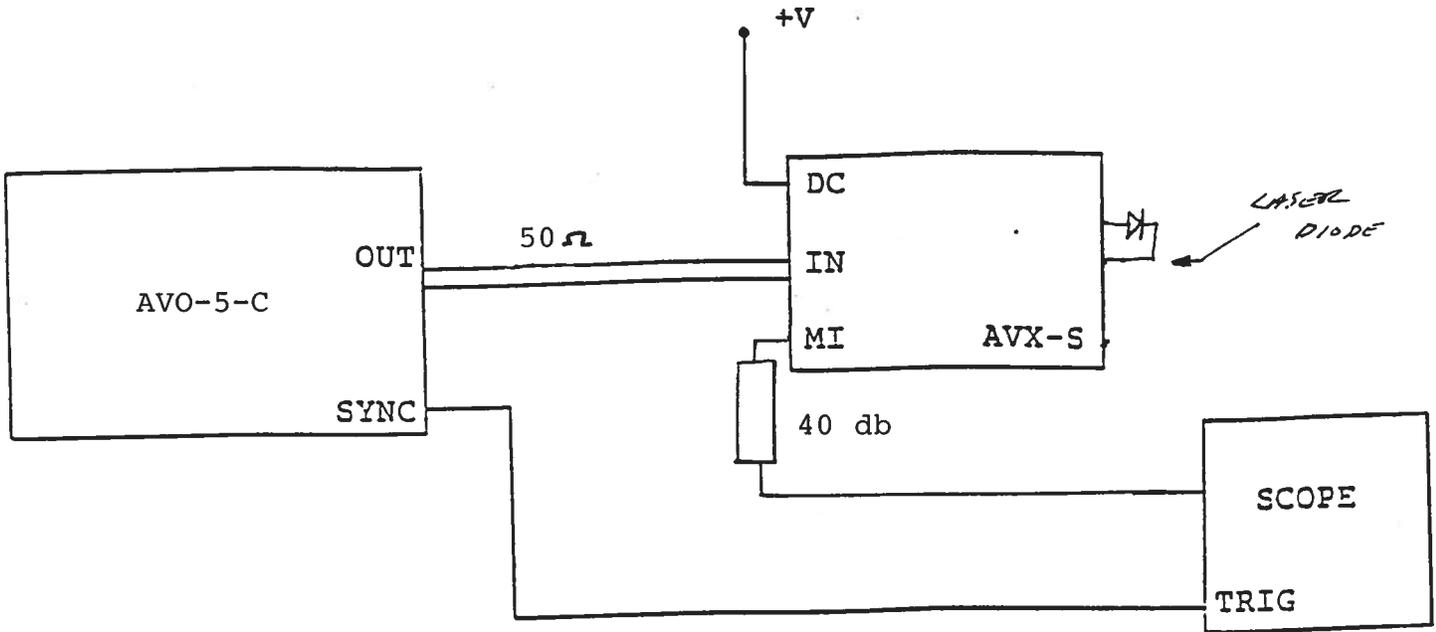
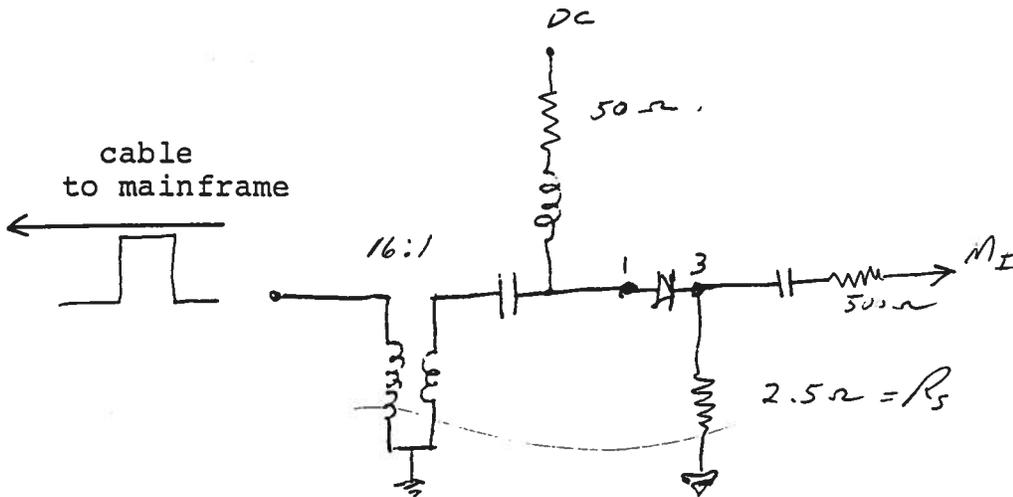
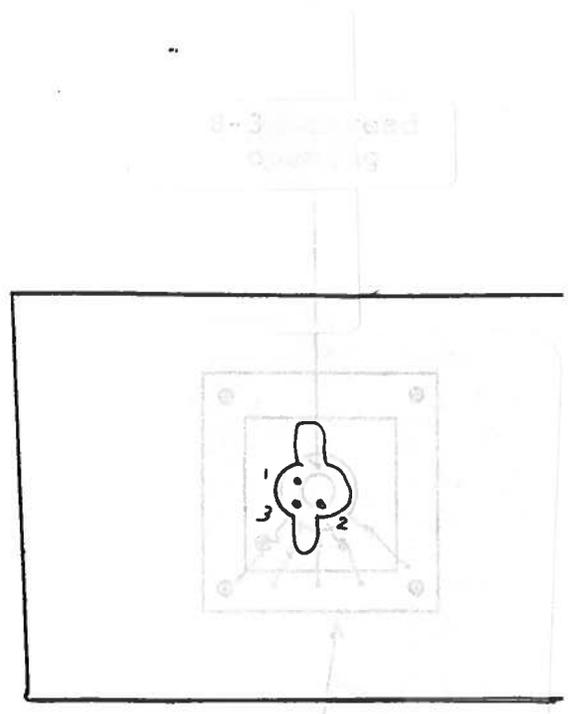
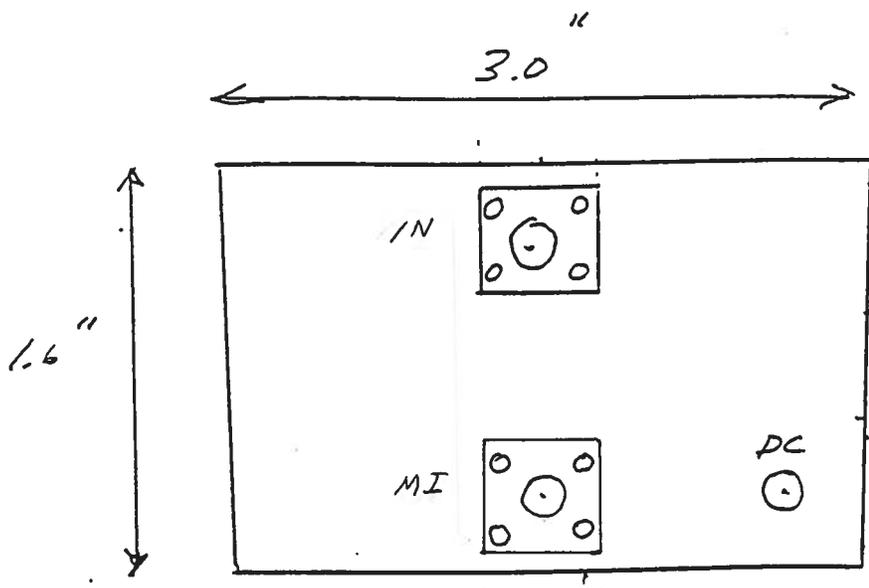


Fig. 2

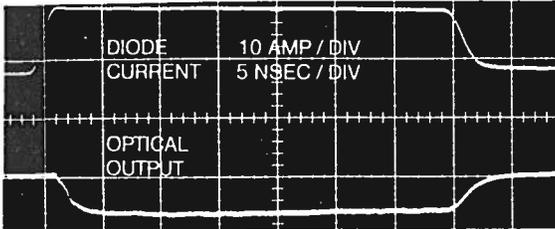
FUNCTIONAL EQUIVALENT CIRCUIT





$R_1 = \frac{10}{5} = 2 \text{ } \frac{1}{2}$

PAPER TAPES



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  $R_S$  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  $R_S$ . 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):

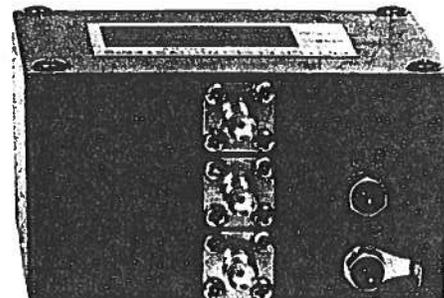
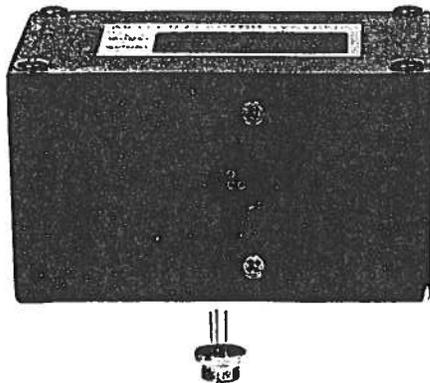
$$I_D = \frac{10V_{MI}}{R_S} \quad V_D = 10(V_{MV} - V_{MI})$$

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

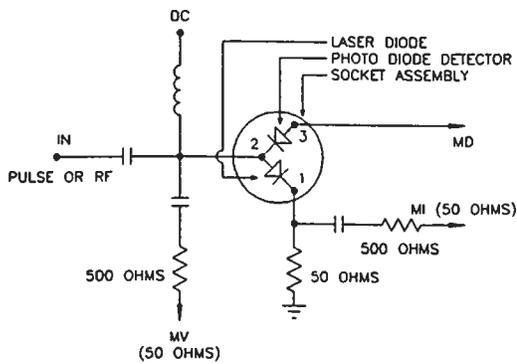
When ordering members of the AVX-S family, the customer must specify the basic model number (eg. AVX-S1) and the following additional information.

- a) 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.
- b) Desired options (eg. -MI, -MV, -MD).

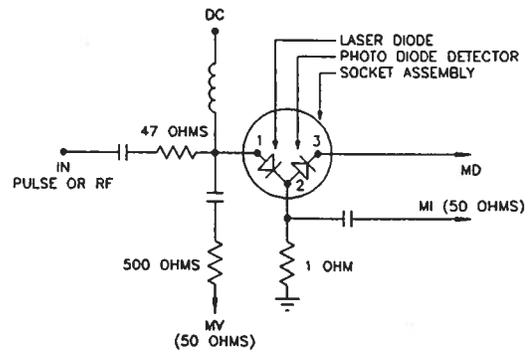
Contact Avtech for your special requirements.



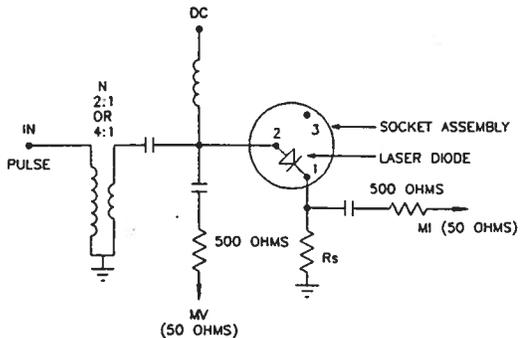
| Model:                  | AVX-S1                                     | AVX-S2       | AVX-S3A     | AVX-S3B   | AVX-S3C     | AVX-S3D    |
|-------------------------|--|--------------|-------------|-----------|-------------|------------|
| Peak diode current:     | 400 mA                                     | 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          |
| R <sub>s</sub> (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  |              |             |           |             |            |



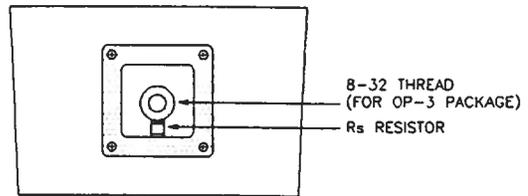
AVX-S1 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S2 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S3 FUNCTIONAL EQUIVALENT CIRCUIT

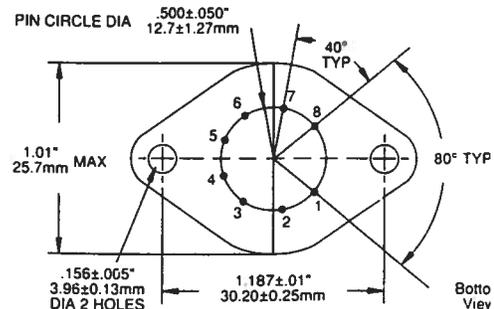
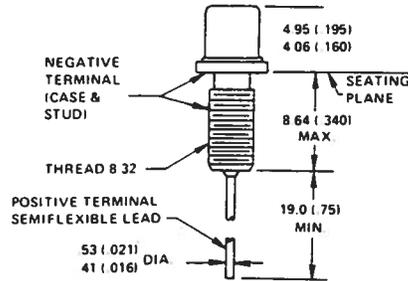
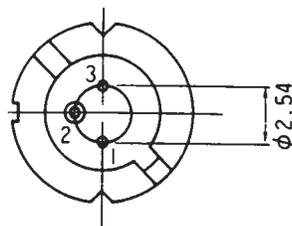
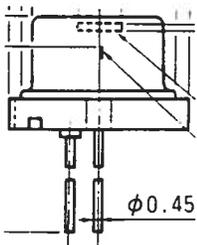


AVX-S3 INPUT ASSEMBLY (FOR OP-3 PACKAGE)

TO-18

OP-3

TO-3 8 PIN



TYPICAL PACKAGES

Bottom View

03.30.93