AVTECH ELECTROSYSTEMS LTD.
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SINCE 1975

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INSTRUCTIONS

MODEL AVO-2W-PS-M PULSE GENERATOR

S.N.:

MODEL AVX-S3C LASER DIODE BIAS INSERTION UNIT

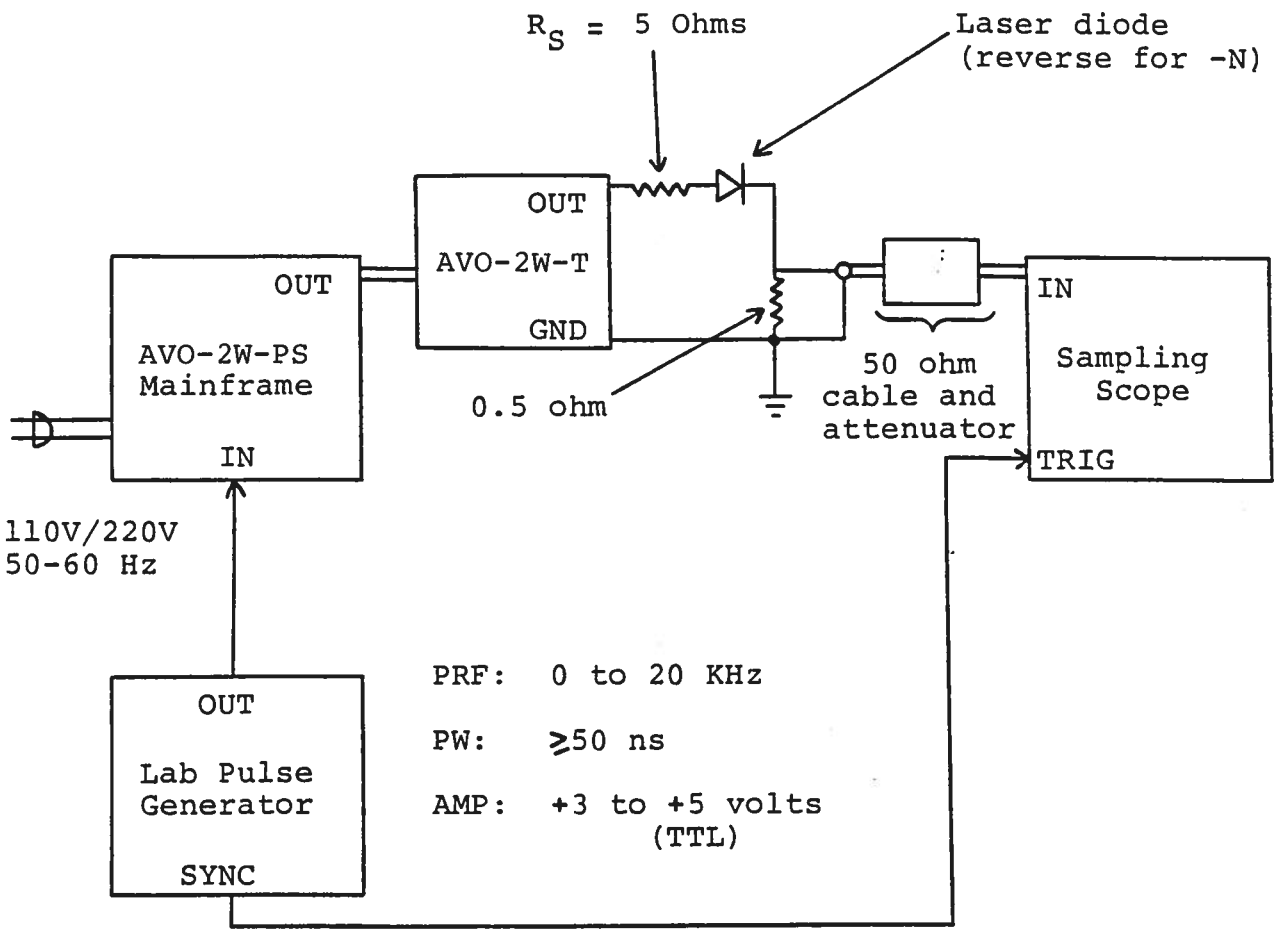
S.N.:

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 or liability assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

Fig. 1 PULSE GENERATOR TEST ARRANGEMENT

(WITHOUT THE AVX-S3C MODULE)



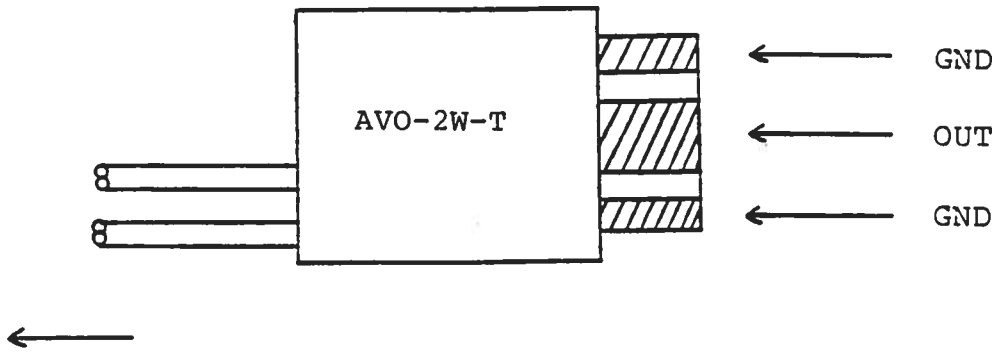
Notes:

1) The equipment should be connected in the general fashion shown above. Since the AVO unit provides an output pulse rise time as low as 1 ns a fast oscilloscope (preferably 200 MHz) should be used to display the waveform. If a sampling scope is used, a 30 dB (or greater) attenuator should be used to insure a peak input to the scope of less than 0.5 Volts.

2) The output pulse width is controlled by means of the front panel one turn PW control. The control should initially be set maximum clockwise and the pulse width adjusted using an oscilloscope.

3) The output pulse amplitude is controlled by means of the front panel one turn AMP control.

4) The AVO-2W-T module connects to the AVO mainframe via 2 parallel 24' RG174 coaxial cables. The cables may be shortened if required but at all times the 2 cables must be of equal length. The AVO-2W-T module transforms the AVO mainframe output to 60 Volts to 5.1 Ohm. The laser diode is connected in series with a current limiting resistor (R_S = 5.1 Ohm) between the GND and OUT terminals on the AVO-2W-T. 1/4 Watt carbon film or carbon composition resistors may be used but all leads must be as short as possible (< 0.1 inch). Solder leads directly to the GND and OUT terminals. CAUTION: Use moderate heat when soldering to the OUT terminal.


AVO-2W-T
GND
OUT
GND
To mainframe

5) The amplitude of the diode current is determined primarily by the setting of the rear panel AMP pot control, and to a lesser extent by the limiting resistor R_S and by the series resistance of the laser diode. The performance check results given in the following page were obtained using a 1N4736 diode to simulate a laser diode load. With this diode a peak current of 10 amperes was obtained with R_S = 5.1 Ohm and the pot set maximum clockwise.

6) Monitor output (option). The back panel monitor output port provides an output voltage to 50 Ohms which is twice the amplitude appearing at the AVO-2W-T output terminals. The diode load current can be computed as follows:

$$I_{DIODE} = \frac{0.5V_M - V_{DIODE}}{R_{SERIES}}$$

where V_M = M output port voltage to 50 Ohm

V_{DIODE} = voltage across the laser diode

R_{SERIES} = resistance placed in series between AVO-2W-T output and laser diode

7) DC offset (option). The desired DC offset voltage (0 to $\pm$6 Volts) is applied to the OS terminals on the AVO-2-T module. This voltage appears directly at the AVO-2-T output terminals and so with a diode series resistance of 5 Ohms this will yield a maximum DC diode current of about 1.0 amperes.

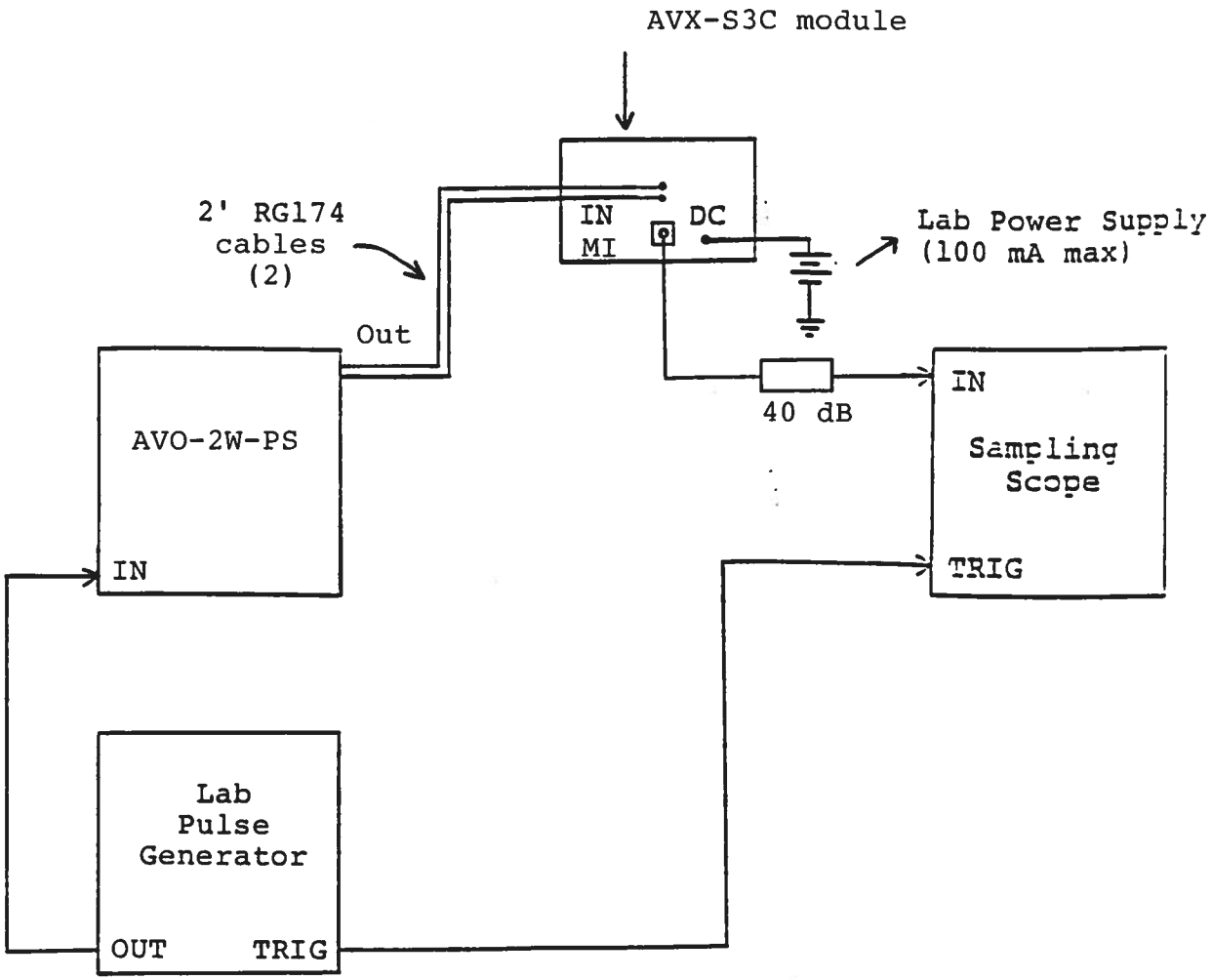
8) For additional assistance:

Tel: (613) 226-5772
Fax: (613) 226-2802

Fig. 2

PULSE GENERATOR TEST ARRANGEMENT

(AVX-S3C MODULE CONNECTED)



AMP: +2 to +5 Volts
PRF: 0 to 20 kHz
PW: $\geq$ 50 ns

1) A general description of the AVX-S3C module is given in the enclosed data sheet.

2) The AVX-S3C module should be connected to the AVO-2A-SMA mainframe via the supplied 24" RG174 cables (two) (after removing the AVO-2W-T module). 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:

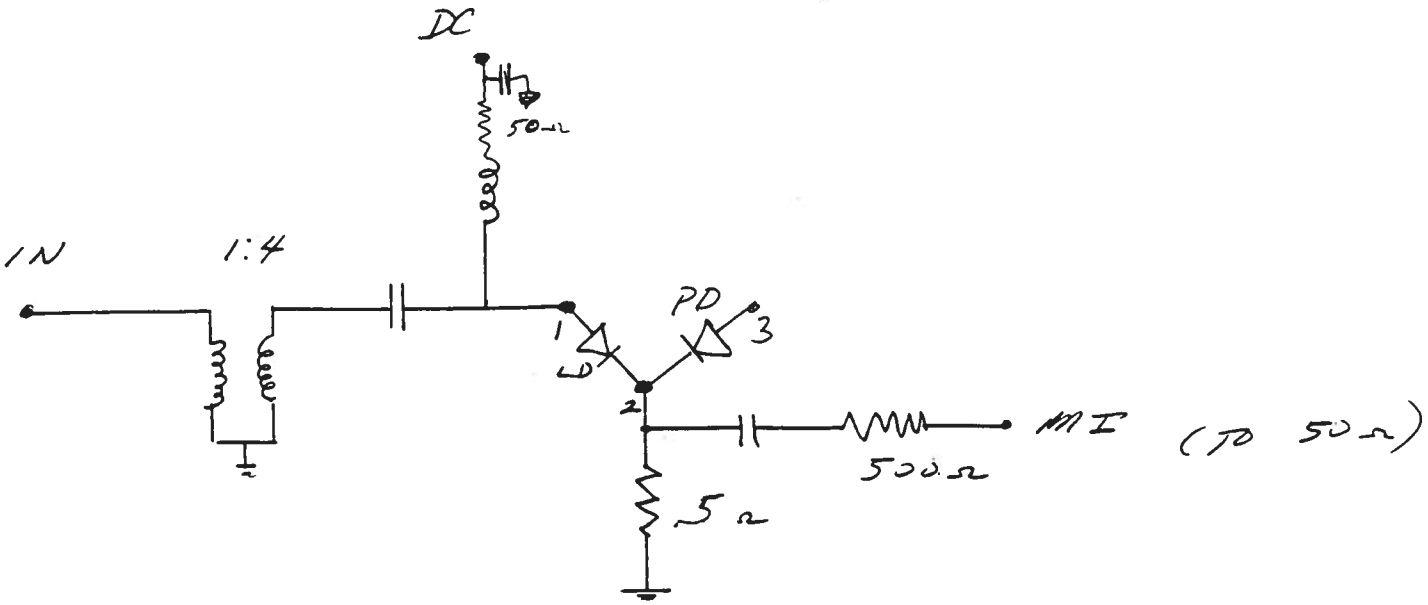
$$I_D = 2V_{MI}$$

3) The laser diode plugs directly into the socket on the side of the AVX-S3C module.

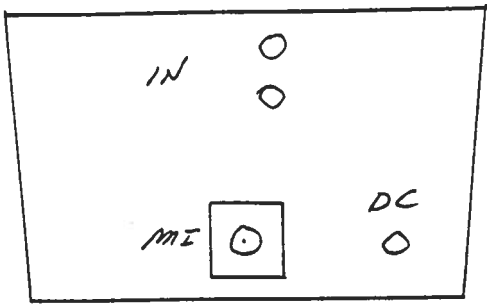
4) A forward DC bias may be applied to the laser diode by connecting a DC potential of 0 to +5 Volts to the DC solder terminal. The application of a small forward bias often yields a more ideal diode current waveform (as observed on the MI port). Note that the DC port must be shorted to ground if a bias is not applied.

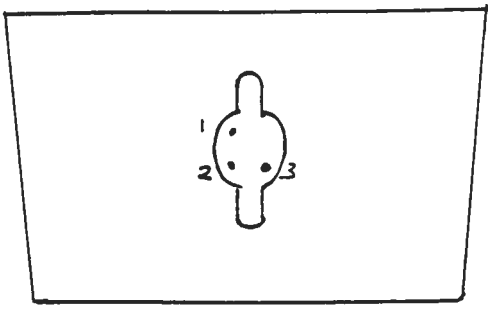
MX-53C

SN 7(47



FUNCTIONAL EQUIV CCT



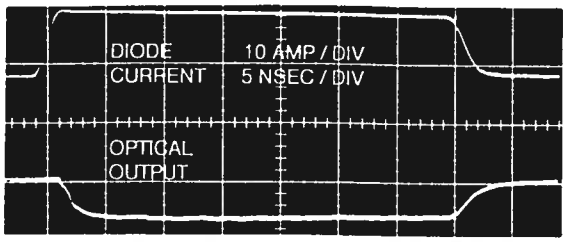


PACKAGE

AVTECH

AVX-S SERIES

LASER DIODE BIAS INSERTION UNITS



- 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

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:

-S1: $I_D = 0.2V_{MI}$ -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:

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

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):

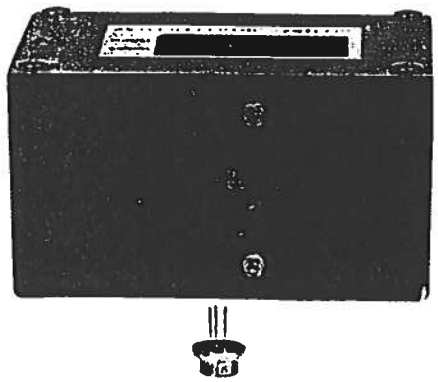
$$I_D = \frac{10\ V_{MI}}{R_S} \qquad V_D = 10\ (V_{MV} - V_{MI})$$

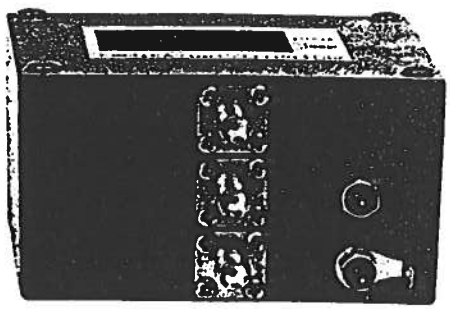
All AVX-S3 units include two foot long input cables with SMA male connectors.

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

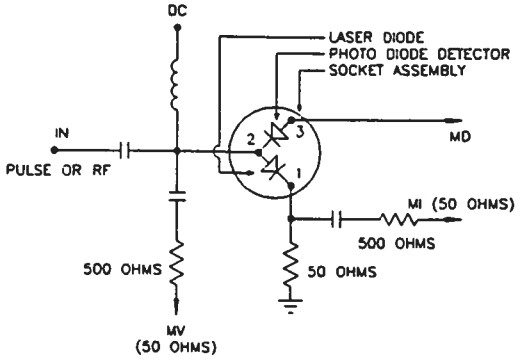
a) Diode package type (eg. TO-18) and the required pin connections (eg. anode, cathode, ground etc). See the following page for readily available package mounting. Contact Avtech for special or different packages.
b) Desired options (eg. -MI, -MV, -MD).

Contact Avtech for your special requirements.

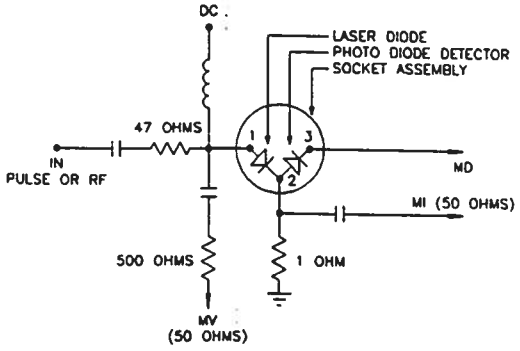




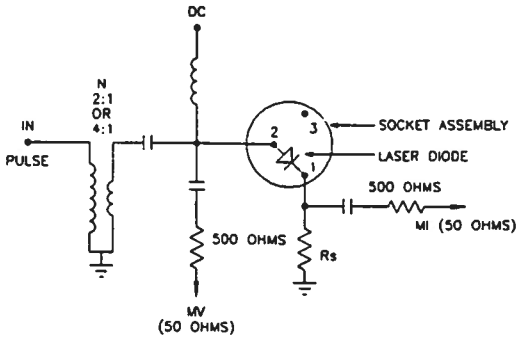
Model:	AVX-S1	AVX-S2	AVX-S3A	AVX-S3B	AVX-S3C	AVX-S3D
Peak diode current:	400 mA	2 Amps	5 Amps	28 Amps	10 Amps	48 Amps
Max. input amplitude:	20 volts	100 volts	150 volts	350 volts	150 volts	150 volts
Pulse width (ns):	0.4 - 200	1 - 1000	2 - 100	2 - 100	2 - 100	5 - 500
Rise time (ns):	0.2	0.5	0.5	1.0	0.5	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_S (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					



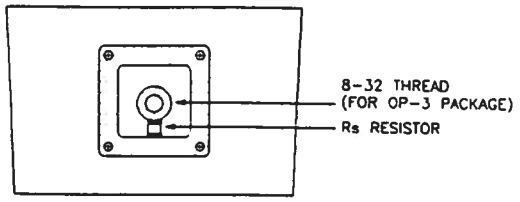
AVX-S1 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S2 FUNCTIONAL EQUIVALENT CIRCUIT

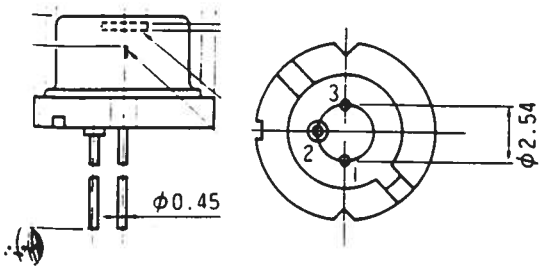


AVX-S3 FUNCTIONAL EQUIVALENT CIRCUIT

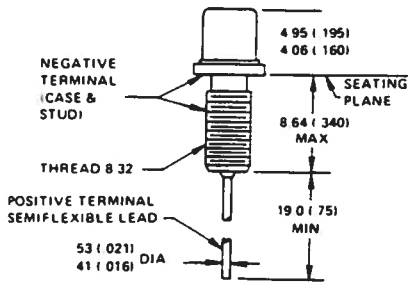


AVX-S3 INPUT ASSEMBLY (FOR OP-3 PACKAGE)

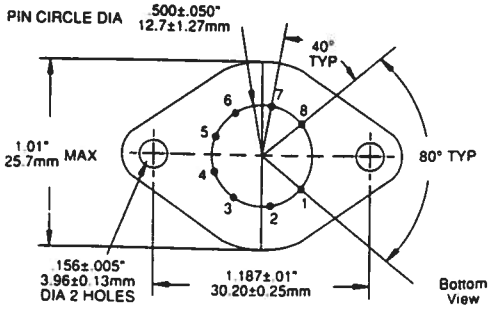
TO-18



OP-3



TO-3 8 PIN



TYPICAL PACKAGES

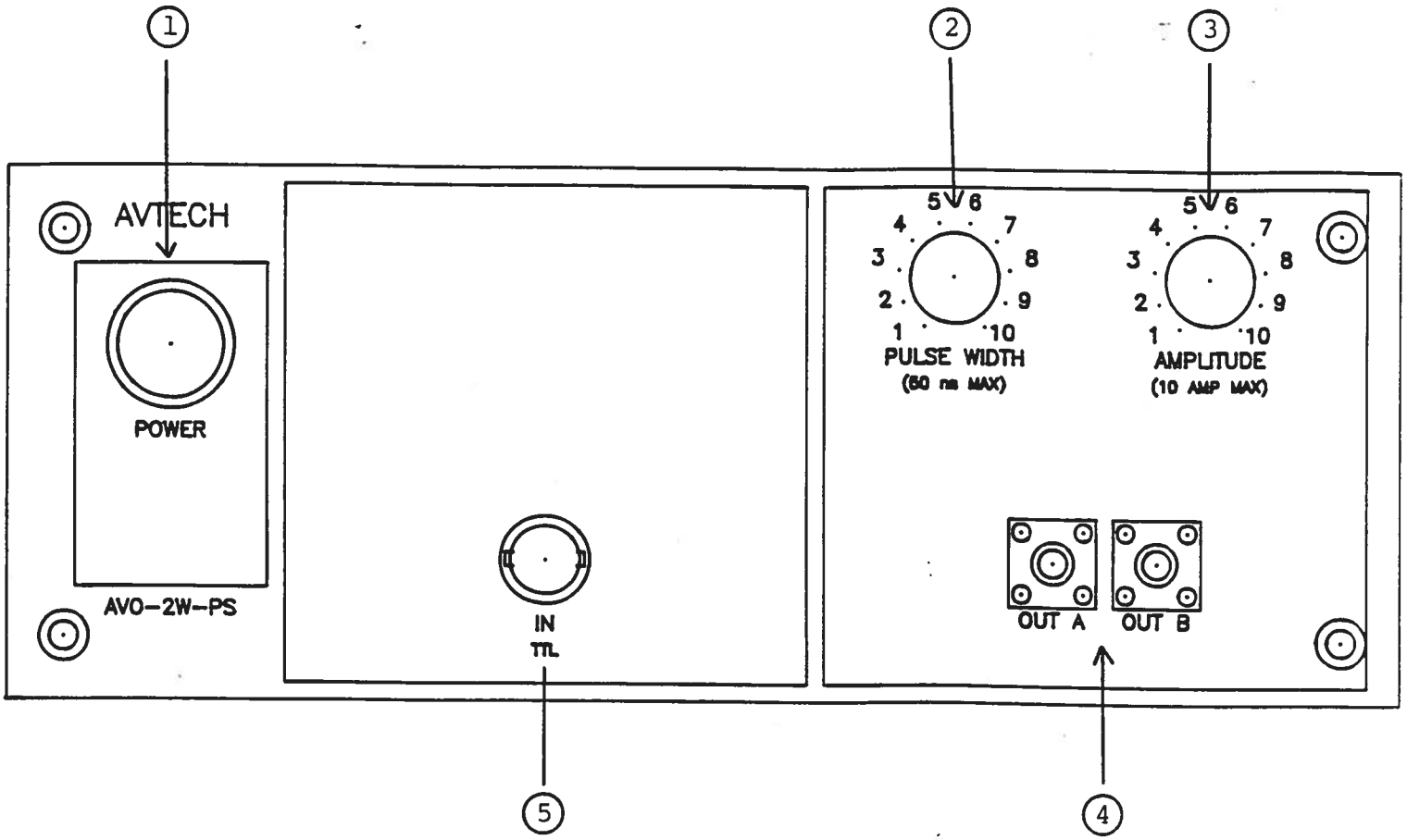


Fig. 3 FRONT PANEL CONTROLS

(1) ON-OFF Switch. Applies basic prime power to all stages.

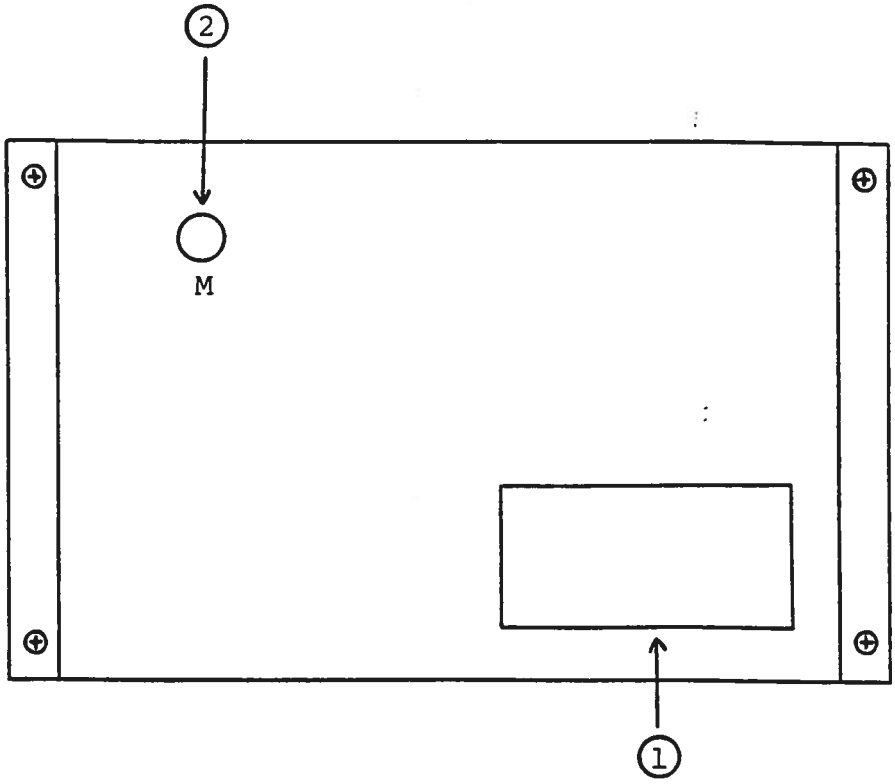
(2) PW Control. A one turn control which varies the output pulse width from 0 to 50 ns.

(3) AMP Control. The output pulse amplitude is controlled by means of the one turn potentiometer (AMP).

(4) OUT Connectors. Two SMA connectors for two miniature coaxial cables connected to the AVO-2W-T module.

(5) IN. The external trigger signal is applied at this input.

Fig. 4 BACK PANEL CONTROLS



(1) FUSED CONNECTOR, VOLTAGE SELECTOR. The detachable power cord is connected at this point. In addition, the removable cord is adjusted to select the desired input operating voltage. The unit also contains the main power fuse.

(2) Monitor output (option). The back panel monitor output port provides an output voltage to 50 Ohms which is twice the amplitude appearing at the AVO-2W-T output terminals. The diode load current can be computed as follows:

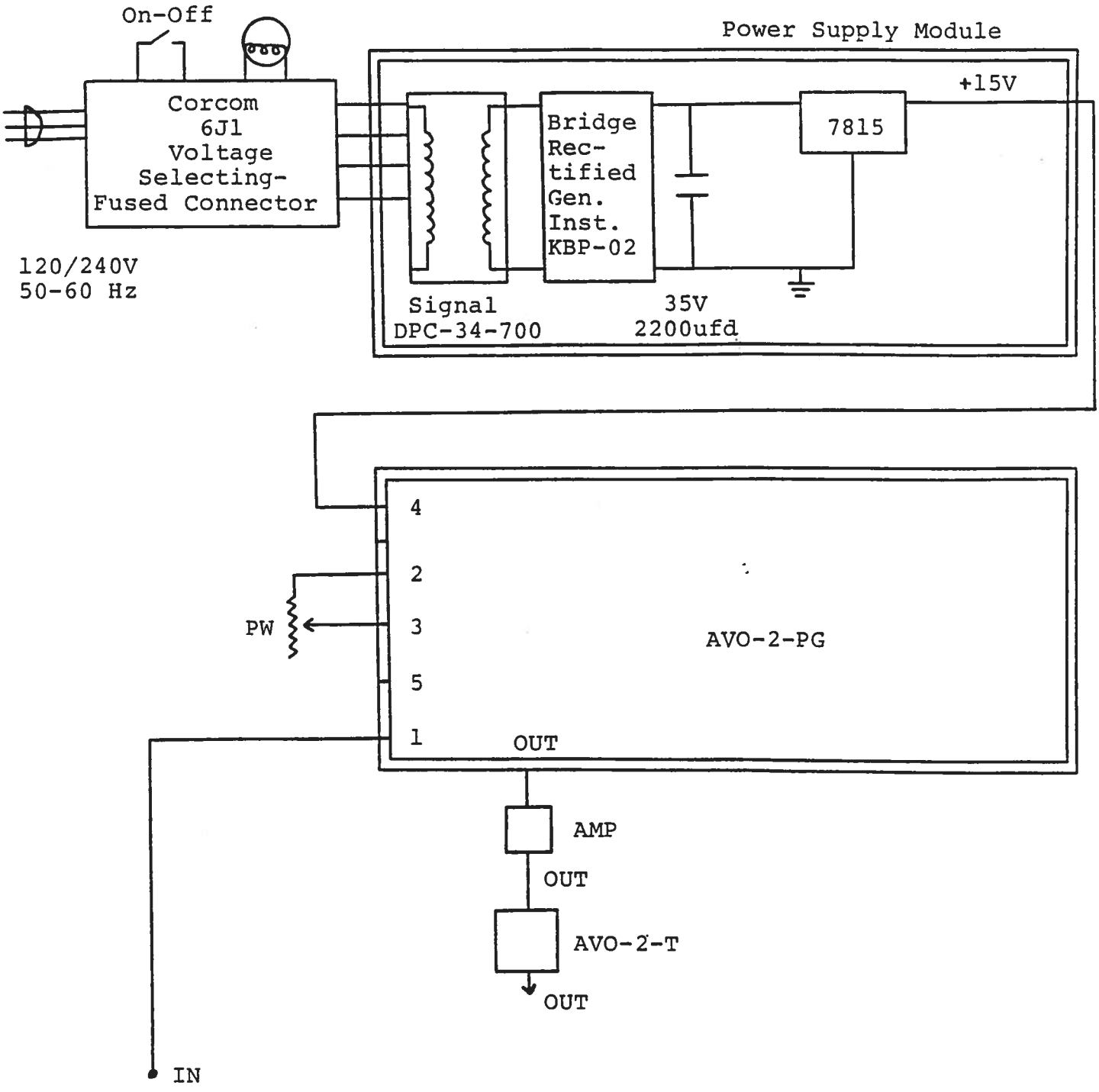
$$I_{DIODE} = \frac{0.5V_M - V_{DIODE}}{R_{SERIES}}$$

where V_M = M output port voltage to 50 Ohm

V_{DIODE} = voltage across the laser diode

R_{SERIES} = resistance placed in series between AVO-2W-T output and laser diode

Fig. 5 SYSTEM BLOCK DIAGRAM



SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVO-2-PS consists of a pulse generator module (AVO-2-PG) and a power supply board which supplies +15 Volts (600 mA max) to the pulse generator module. In the event that the unit malfunctions, remove the instrument cover by removing the four Phillips screws on the back of the unit. The top cover may then be slid off. Measure the voltage at the +15V pin of the PG module. If this voltage is substantially less than +15 Volts, unsolder the line connecting the power supply and PG modules and connect 50 Ohm 10 W load to the PS output. The voltage across this load should be about +15 V DC. If this voltage is substantially less than 15 Volts the PS module is defective and should be repaired or replaced. If the voltage across the resistor is near 15 Volts, then the PG module should be replaced or repaired. The sealed PG module must be returned to Avtech for repair (or replacement).

Oct. 25/94

-OS

Disk: AVO, AVO-1, AVO-2

Name: 2WPSMAVX.INS