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SINCE 1975

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INSTRUCTIONS

MODEL AV-108B-3-C-EA-PN LASER DIODE DRIVER

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.

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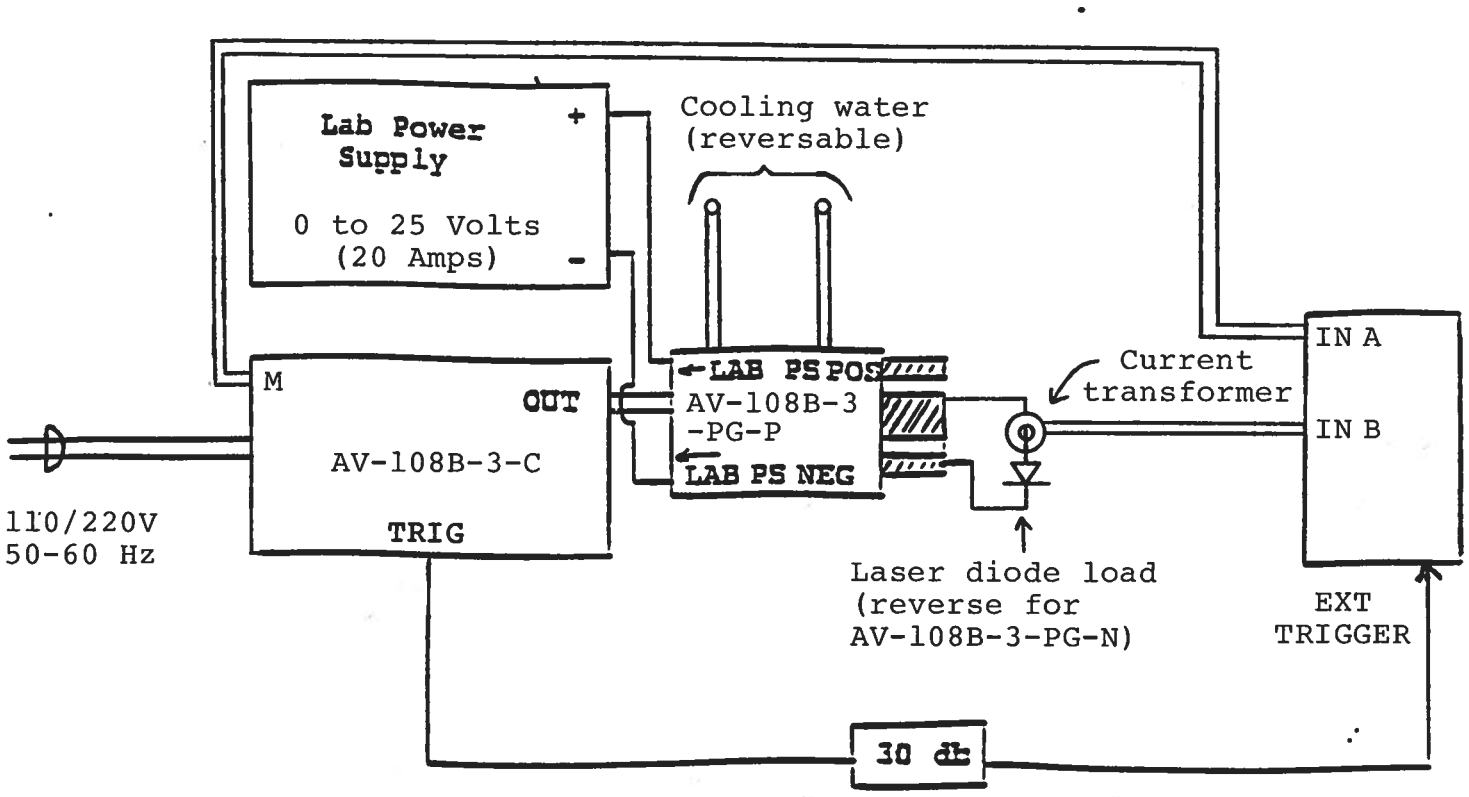
Fig. 1 PULSE GENERATOR TEST ARRANGEMENT



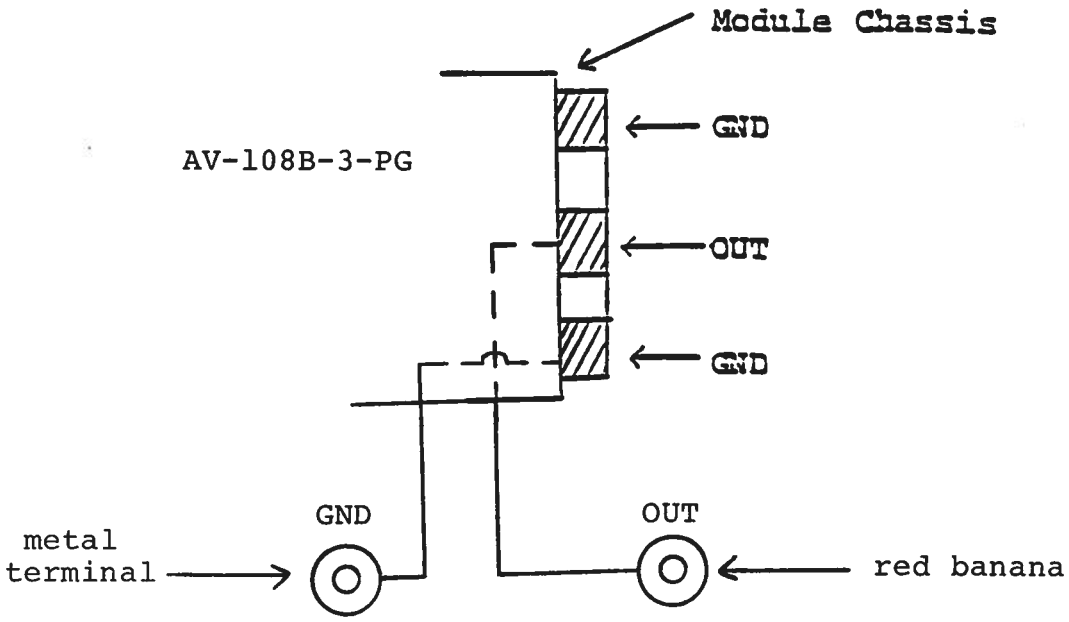
GENERAL OPERATING INSTRUCTIONS

1) The equipment should be connected in the general fashion shown above. If a positive output is required (i.e. the diode cathode is grounded), the PG-P module should be connected to the mainframe. If a negative output is required, then the PG-N module should be connected to the mainframe. The output modules are identified by a label which is located on the top panel.

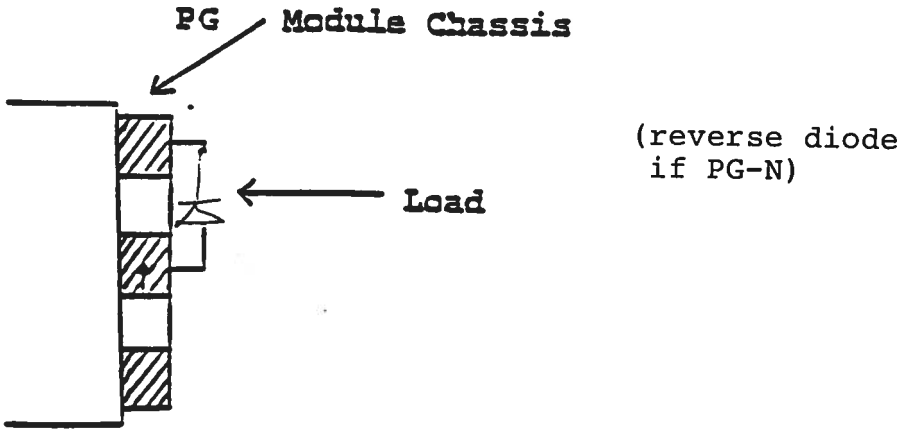
2) The user supplied lab power supply attaches to the -PG output module via the red and black SUPERCON connectors which are supplied. The positive terminal of the power supply is to be connected to the RED SUPERCON connector on the -PG module. The negative terminal on the lab power supply is to be connected to the BLACK SUPERCON connector on the -PG module. If the PG-P module is being used, the negative terminal of the power supply should be grounded. If the PG-N module is being used, the positive terminal of the power supply should be grounded. Note that if the incorrect power supply polarity is applied to the -PG module, a very loud audible alarm will sound and the unit will not trigger. Note also that the alarm will sound if the power supply voltage exceeds 25 Volts. Normally, the power supply should be set at 20 Volts. The lab power supply should be set to current limit so that <u>average</u> current supplied to the -PG module cannot exceed 20 Amperes (the AV-108B-3-C has a maximum duty cycle rating of 10%). Note that the peak output current of 200 Amperes is supplied by the very large energy storage capacitors (220,000 ufd) in the -PG module.

3) It is critically important that a cooling water supply be connected to the -PG module, particularly if operated at high peak currents and near the maximum duty cycle. It is recommended that the -PG module be connected to a tap water outlet. Without the water cooling, the unit will operate for several minutes (at the maximum duty cycle) and then a loud audible alarm will sound and the unit will cease to trigger. The alarm can be turned off by turning off the 60 Hz prime power or by reducing the duty cycle and allowing the unit to cool down. The water pipes protruding from the side of the -PG module have a male 1/4" NPT thread. A female 1/4" NPT to NSO 7 male adapter is installed on units shipped to Europe (1/4-19 male 13SP/ISO).

4) The output terminals of the pulse generator module consists of a short length of microstrip transmission line protruding from the module chassis. The OUT terminal is the center conductor which is bounded on both sides by the ground plane (see below). Note that the "OUT" red banana terminal is in parallel with the microstrip center conductor and so may also be used as the output terminal.



The load should be connected between the OUT and GND terminals using very short leads (≤ 10.0 cm). If the load cannot be placed directly on the output terminals of the -PG module, the AV-LZ lines should be used between the -PG module and the load (see AV-LZ data sheet). Take care to insure that during soldering the OUT conductor is not shorted to the chassis. Also, use minimal heat when soldering.



5) The current waveform through the diode load may be monitored using a current transformer (available from PEARSON ELECTRONICS or ION PHYSICS INC.) or by using the rear panel monitor output (M). (See paragraph 16).

6) When the PW MODE switch is in the INT position, the output pulse width is controlled by the 3 position range switch and a ten turn fine control. CAUTION: When setting the pulse width it is critically important that the duty cycle be less than 10% (see 10). (See (11) for PW control when the PW MODE switch is in the EXT position).

7) The output amplitude is controlled by the front panel ten turn amplitude control (before applying power to the AV-108B-C unit this control should be set fully counterclockwise). To voltage control the amplitude, set the rear panel AMP switch in the EXT position and apply 0 to +5 VDC to the "A" BNC connector.

8) The TRIG output channel provides TTL level signals. To avoid overdriving the TRIG input channel of some scopes, a 30 dB attenuator should be placed at the input to the scope trigger channel. The TRIG output precedes the main output when the front panel ADVANCE-DELAY switch is in the ADVANCE position. The TRIG output lags the main output when the switch is in the DELAY position.

9) To obtain a stable output display the PW and PRF controls on the front panel should be set mid-range. The front panel INT-EXT-MAN-MOD switch should be in the INT position. The DELAY controls and the scope triggering controls are then adjusted to obtain a stable output. The scope may then be used to set the desired PRF by rotating the PRF controls. CAUTION: Take exceptional care to insure that the duty cycle does not exceed 10% (see 10 below).

10) CAUTION: The AV-108B-3-C may be damaged if operated at duty cycles exceeding 10%. For example, if the PRF is set at 1 kHz (i.e. a period of 1 ms), the pulse width must not exceed 100 us. Therefore, take extreme care when setting the pulse width and PRF controls to insure that the duty cycle is less than 10% since damage due to excess duty cycle operation is not covered by the warranty.

11) An external clock may be used to control the output PRF of the unit by setting the front panel TRIG toggle switch in the EXT position and applying a 50 ns (or wider) TTL level pulse to the TRIG BNC connector input. For operation in this mode, the scope time base must also be triggered by the external clock rather than from the TRIG output. When triggered externally, the output pulse width is controlled by the front panel PW controls provided the MODE A-B switch is in the A position. The MODE A-B switch is accessed by removing the top cover (by removing the four Phillips screws on the top panel and sliding the top cover back and off). When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width. The unit is shipped with the switch in the A position.

12) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.

13) The DELAY control controls the relative delay between the reference output pulse provided at the TRIG output and the main output. This delay is variable over the range of 1.0 us to 1 ms. The TRIG output precedes the main output when the ADVANCE-DELAY switch is in the ADVANCE position and lags when the switch is in the DELAY position.

	MIN	MAX
Range 1	1.0 us	10 us
Range 2	10 us	100 us
Range 3	100 us	1 ms

14) The AV-108B-3-C is designed to supply up to 200 Amperes peak to a maximum load voltage of 20 Volts. Factory tests are conducted with 3 series silicon high current diodes capable of dissipating at least 400 Watts. Higher load resistance values may be used but the load voltage must be limited to 20 Volts or less. Note that the unit will cease to operate as a constant current source if the load voltage exceeds 20 Volts.

15) OVERLOAD ALARMS. Model AV-108B-3-C includes a high voltage protection circuit which sounds a loud audible alarm and activates the overload LED if the applied DC voltage exceeds 25 VDC or if a reversed polarity power supply is connected. The output stages of the unit will not trigger while the alarm is sounding. The unit also includes a temperature limit circuit which sounds an audible alarm and activates the overload LED if the temperature of the output stage switching elements exceeds $+50^{0}$C. To silence the alarm, do the following:

1) If the applied voltage was too high, then reduce the power supply voltage

2) If the power supply polarity was incorrect, then reverse the polarity

3) If the output module has overheated (due to poor cooling or high duty cycle operation) then reduce the duty cycle to allow more rapid cooling

4) To quiet the alarm immediately, simply turn off the 60 Hz prime power

16) The rear panel monitor output BNC (M) provides an output voltage (to 50 Ohms or higher) which is linearly proportional to the current flowing through the output terminals (5 Volts = 100 Amps). The pulse width (and general wave shape) at M is a replica of the load current.

17) CURRENT LIMIT CONTROLS. The P1 and P4 ten turn trim pots (on the -PG module) may be used to limit the peak output current to less than 200 Amps. Rotating P1 CCW will cause the peak output current to be less than 200 Amps when the AMP control is set at max CW. The AMP control will still be active (basically linear) over its full range of rotation. Rotating P4 CCW will cause the output to abruptly limit at less than 200 Amps. The control will be initially linear and then at the limiting point will become inactive. At the time of shipping, both P1 and P4 were set to provide linear, 200 Ampere operation. CAUTION: The P2, P3 and P5 controls are for factory adjustment only. The warranty may become invalid if these 3 controls are adjusted.

18) The unit can be converted from 110 to 220V 50-60 Hz operation by adjusting the voltage selector card in the rear panel fused voltage selector cable connector assembly.

19) If application assistance is required:

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

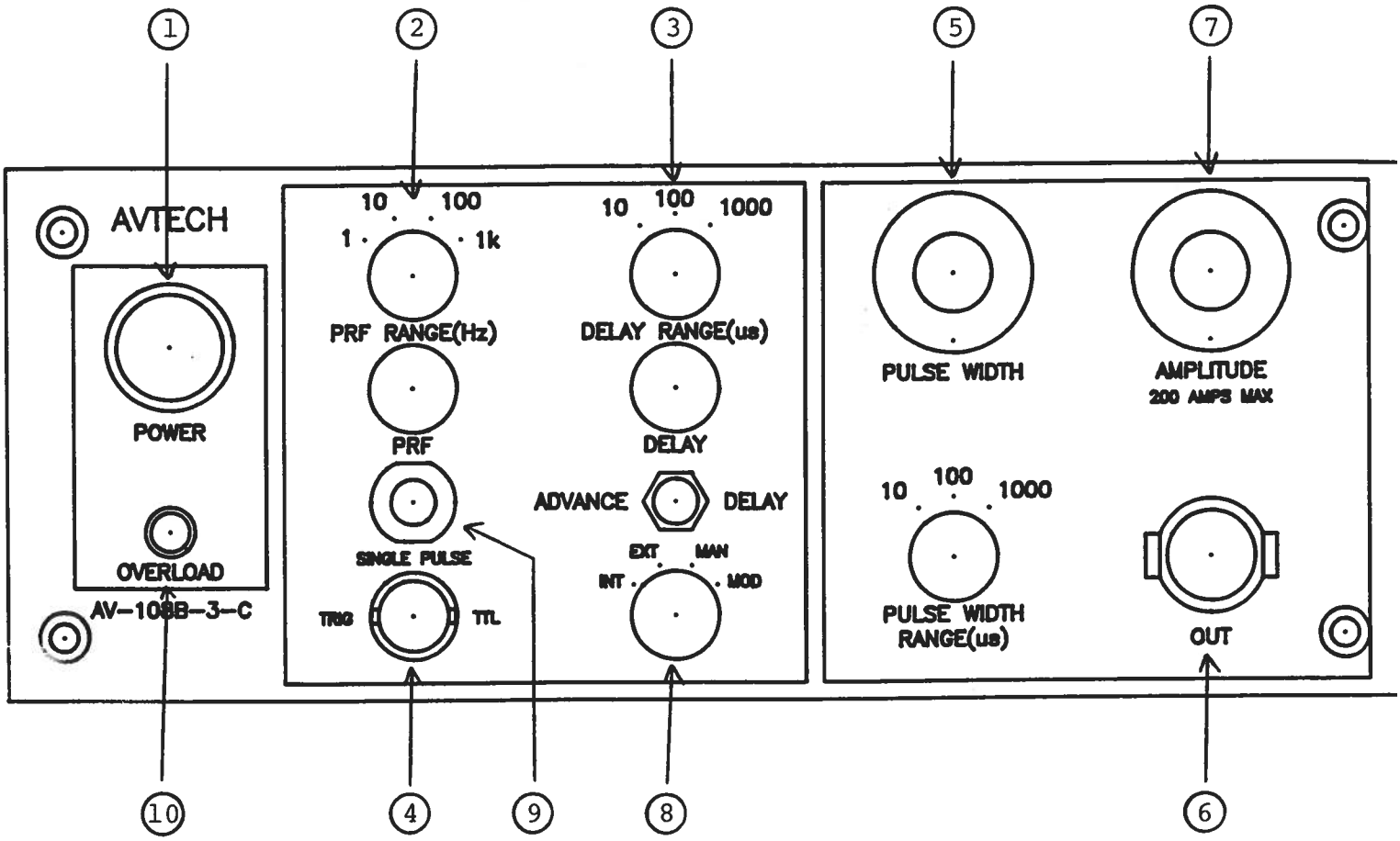


Fig. 2 FRONT PANEL CONTROLS

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

(2) PRF Control. Varies PRF from 0.1 Hz to 1 kHz as follows:

Range 1	0.1 Hz	to 1	Hz
Range 2	1 Hz	to 10	Hz
Range 3	10 Hz	to 0.1	kHz
Range 4	0.1 kHz	to 1	kHz

(3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) and the -PG output. This delay is variable as follows:

Range 1	1 us	to 10	us
Range 2	10 us	to 100	us
Range 3	100 us	to 1	ms

The TRIG output precedes the main output when the ADVANCE-DELAY switch is in the ADVANCE position and lags when the switch is in the DELAY position.

(4) TRIG Output. This output is used to trigger the scope time base. The output is a TTL level 100 ns (approx.) pulse capable of driving a fifty Ohm load.

(5) PW Control. A one turn control and four position range switch which varies the output pulse width as follows (when the PW MODE switch is in the INT mode):

Range 1	1.0 us	to 10	us
Range 2	10 us	to 100	us
Range 3	100 us	to 1	ms

(6) OUT Connector. A multi pin connector which attaches the 2 foot cable from the pulse generator module to the main frame.

(7) AMP Control. A one turn control (ten turn for -AT option) which varies the output pulse amplitude from 0 to 30 Amps (to $R_L \leq 1$ Ohm).

(8) INT-EXT-MAN Control. With this toggle switch in the INT position, the PRF of the unit is controlled via an internal clock which in turn is controlled by the PRF control. With the toggle switch in the EXT position, the unit requires a 0.2 us TTL level pulse applied at the TRIG input in order to trigger the output stages. In addition, in this mode, the scope time base must be triggered by the external trigger source. When triggered externally, the output pulse width is controlled by the front panel PW controls provided the MODE A-B switch is in the A position. The MODE A-B switch is accessed by removing the top cover (by removing the four Phillips screws on the back panel and sliding the top cover back and off). When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width. The unit is shipped with the switch in the A position.

(9) SINGLE PULSE. For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.

(10) OVERLOAD ALARMS. Model AV-108B-3-C includes a high voltage protection circuit which sounds a loud audible alarm and activates the overload LED if the applied DC voltage exceeds 25 VDC or if a reversed polarity power supply is connected. The output stages of the unit will not trigger while the alarm is sounding. The unit also includes a temperature limit circuit which sounds an audible alarm and activates the overload LED if the temperature of the output stage switching elements exceeds $+50^{0}$C. To silence the alarm, do the following:

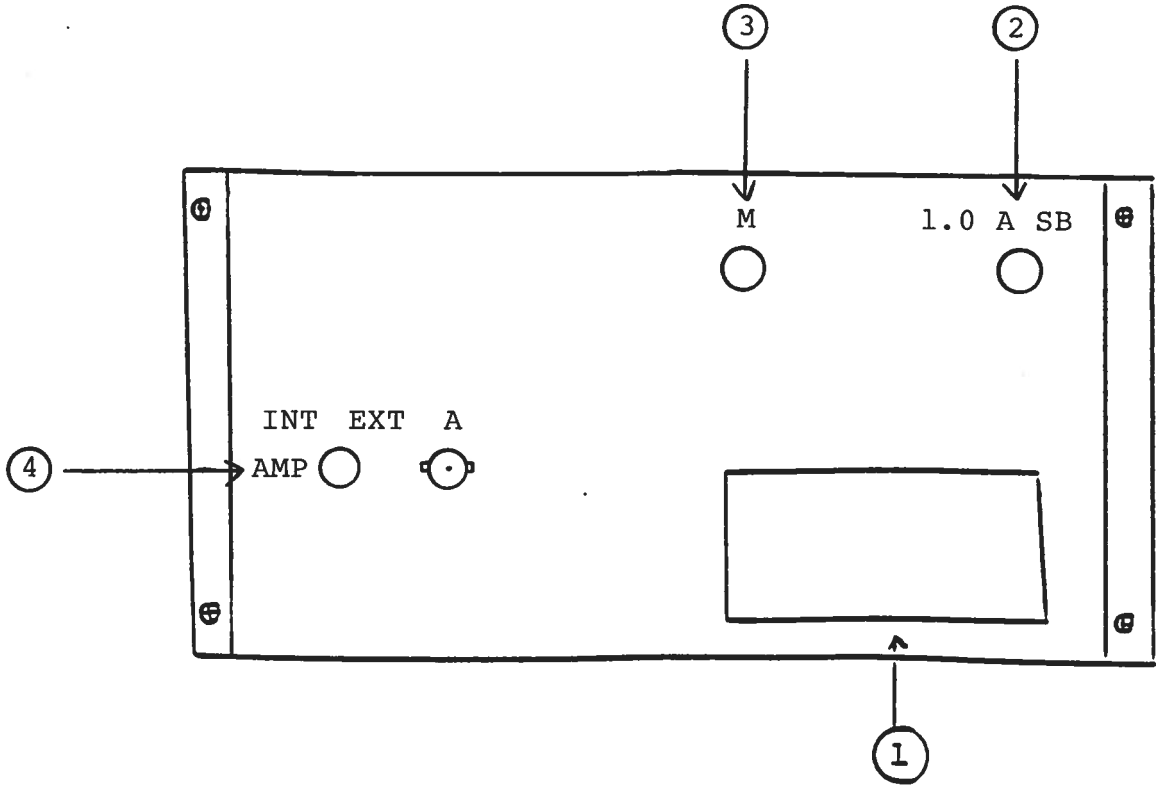
1) If the applied voltage was too high, then reduce the power supply voltage

2) If the power supply polarity was incorrect, then reverse the polarity

3) If the output module has overheated (due to poor cooling or high duty cycle operation) then reduce the duty cycle to allow more rapid cooling

4) To quiet the alarm immediately, simply turn off the 60 Hz prime power

Fig. 3 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 (0.5 A SB).

(2) 1.0 A SB. Fuse which limits the current supplied to the mainframe.

(3) M. This monitor output provides an output voltage (to 50 Ohms or higher) which is linearly proportional to the current flowing through the output terminals (5 Volts = 100 Amps). The pulse width (and general wave shape) at M is a replica of the load current.

(4) EA. To voltage control the output amplitude, set the switch in the EXT position and apply 0 to +5V to the "A" BNC connector ($R_{IN} \geq 10K$). (option).

START-UP CHECK LIST

1) The instruction manual has been studied thoroughly.

2) The required output pulse polarity is selected and the correct -PG module is connected to the mainframe.

3) Connect the tap water supply to the -PG module and turn on the water.

4) The diode load is connected to the output module. If the anode of the load is connected to the OUT terminal, then the PG-P module must be used. If the cathode is connected to the OUT terminal, then the PG-N module must be used.

5) If the PG-P module has been selected, the user-supplied lab power supply is connected with the positive terminal connected to the red SUPERCON on the PG module and the negative terminal connected to the black SUPERCON. The negative terminal is grounded. If the PG-N terminal is selected, the power supply positive terminal is connected to the red SUPERCON and grounded, while the negative terminal is connected to the black SUPERCON. The power supply potential is set to zero.

6) Set the amplitude control on the mainframe fully CCW and set the pulse width and PRF controls at the approximate desired values (while insuring that the duty cycle is less than 10%).

7) Set the INT-EXT switch on INT.

8) Connect the rear panel M output to the scope (1 VOLT/DIV) and connect the TRIG out to the scope time base.

9) Turn on the prime power to the mainframe. The scope time base should be triggering.

10) Turn on the lab DC power supply and increase the DC voltage to 20 Volts. If an alarm sounds, immediately decrease the DC voltage and investigate the cause (polarity reversal or voltage greater than 25 Volts?). At this point, the DC power supply should not supply any average current (but will supply the surge current to charge the 220,000 ufd when the DC voltage setting is being increased).

11) Gradually clockwise rotate the amplitude control on the mainframe and observe the waveform on the scope and the DC current level on the DC power supply. A rectangular pulse should appear on the scope and the amplitude should increase as the amplitude control on the mainframe is rotated clockwise. At the same time, the average current supplied by the DC supply will increase.

12) Observe the pulse width and pulse period on the scope and confirm that the duty cycle does not exceed 10%.

13) Observe the DC current supplied by the DC supply and insure that the average current does not exceed 20 Amperes.

14) Adjust pulse width, pulse period (i.e. PRF) and amplitude to obtain the desired settings.

15) If additional assistance is required:

Tel: (613) 226-5772
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TOP COVER REMOVAL

To remove the top cover, remove the four Phillips screws on the top cover and then slide the cover back and off.

Nov. 1/95

-M

Disk: AV-108

Name: 108B3CEA.INS