



**AVTECH ELECTROSYSTEMS LTD.**

NANOSECOND WAVEFORM ELECTRONICS  
SINCE 1975

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

TEL: 1-800-265-6681  
FAX: 1-800-561-1970  
U.S.A. & CANADA

e-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)

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

INSTRUCTIONS

MODEL AV-107B-PS-P-EA-EW-FOICB1 PULSE GENERATOR

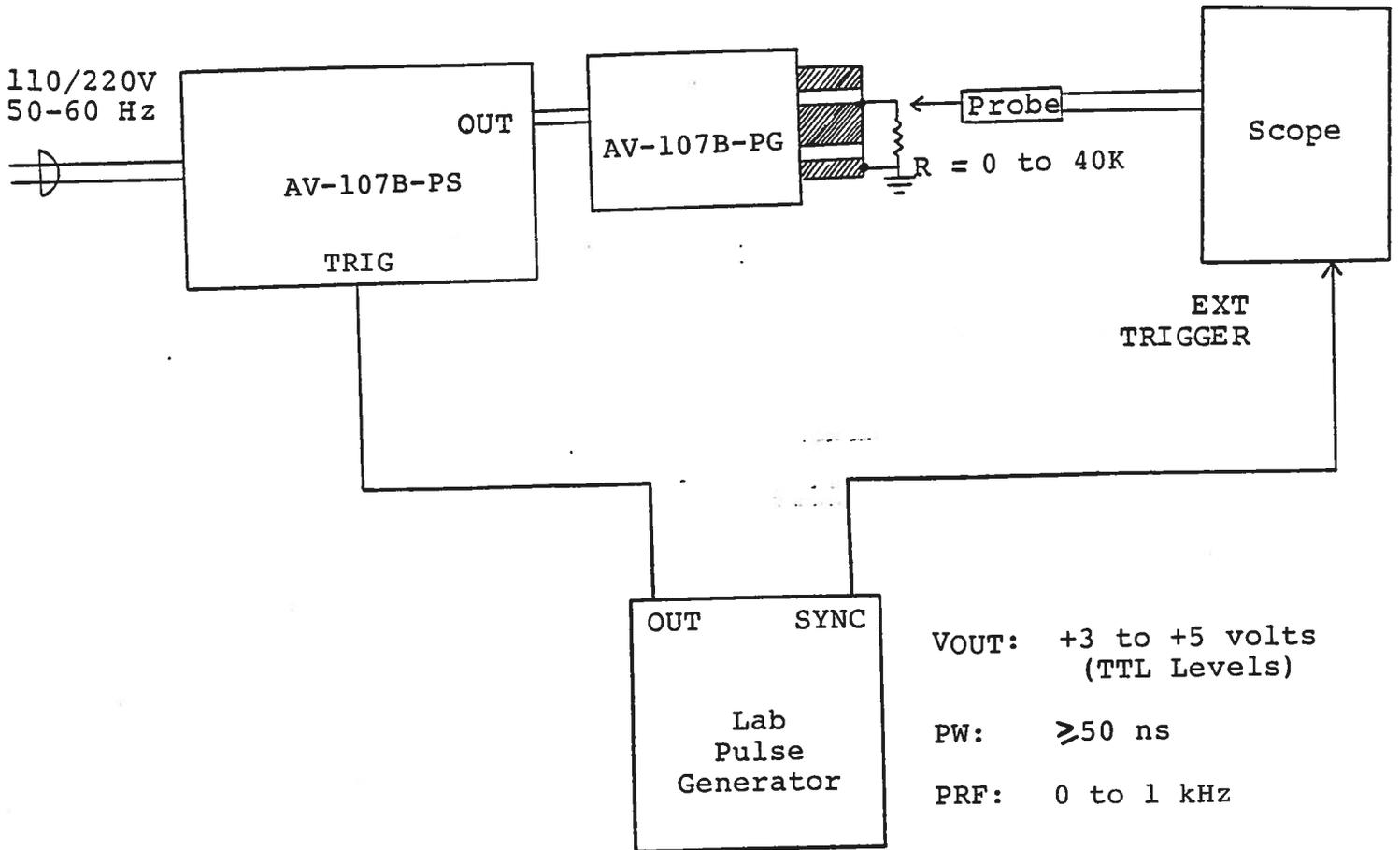
S.N. :

### 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 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.

Fig. 1

PULSE GENERATOR TEST ARRANGEMENT



## GENERAL OPERATING INSTRUCTIONS

- 1) The equipment should be connected in the general fashion shown above. Since the unit provides an output pulse rise time as low as 30 ns a fast oscilloscope (at least 50 MHz and preferably 200 MHz) should be used to display the waveform. Alternatively, the output current may be monitored using a current probe such as the TEKTRONIX Model CT-2.
- 2) When the rear panel PW switch is in the INT position, the output pulse width is controlled by means of the front panel one turn PW control and a 3-position range switch as follows:

0.2 to 2.0 us  
2.0 to 20 us  
20 to 200 us

To control the pulse width via the rear panel D connector, set the rear panel PW switch in the EXT position and apply 0 to +10 VDC to PIN 2 of the D connector. To select the pulse width range, apply +5 VDC as follows:

0.2 to 2.0 us: No bias required  
2.0 to 20 us: Apply +5.0 VDC to PIN 4  
20 to 200 us: Apply +5.0 VDC to PIN 5

To obtain  $PW_{OUT} = PW_{IN}$ , via the D connector, set the rear panel mode switch in the EXT position and the front panel switch in the REMOTE position and apply +5 VDC to PIN 3 of the D connector. The input trigger pulse may be applied to either the front panel TRIG BNC connector or to PIN 10 of the D connector. To obtain  $PW_{OUT} = PW_{IN}$  via the front panel, place the rear panel mode switch in the INT position and the front panel switch in the REMOTE position and apply the input trigger to the front panel TRIG BNC.

- 3) When the rear panel AMP switch is in the INT position, the output pulse amplitude is controlled by means of the front panel one turn AMP control and a 4-position range switch as follows:

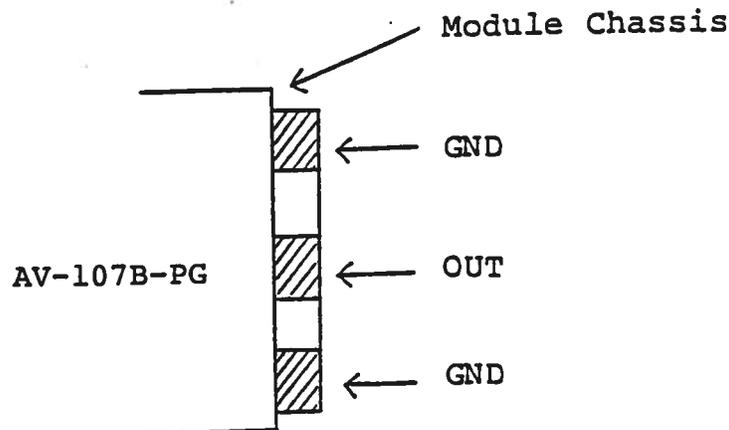
0.25 to 2.5 mA  
2.5 to 25 mA  
25 to 250 mA  
250 to 2500 mA

To control the output amplitude via the rear panel D connector, set the rear panel AMP switch in the EXT position and apply 0 to +10 VDC to PIN 1 of the D connector. To select the amplitude range, apply +5 VDC as follows:

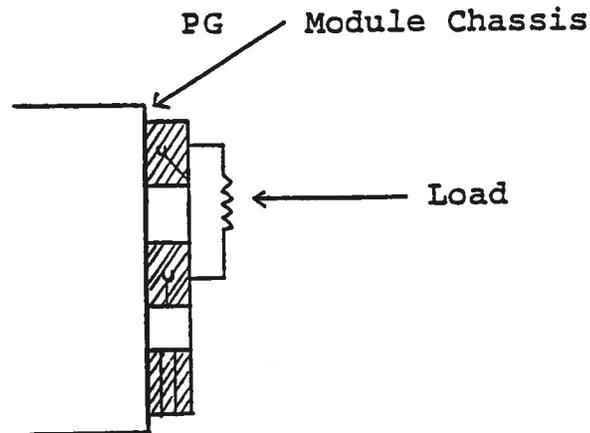
0.25 to 2.5	mA:	No bias required
2.5 to 25	mA:	Apply +5.0 VDC to PIN 6
25 to 250	mA:	Apply +5.0 VDC to PIN 7
250 to 2500	mA:	Apply +5.0 VDC to PIN 8

Note that the load voltage must not exceed 100 Volts as the unit will then cease to function as a constant current source and the unit may be damaged. To lower the load voltage either switch to a lower current range or reduce the load resistance. Note also that when operating at low amplitudes (eg. 0.25 to 2.5 mA) the output risetime will increase significantly to values as high as 25 to 50 us (see the performance check sheet).

- 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):



The load should be connected between the OUT and GND terminals using very short leads ( $\leq 0.5$  cm). The voltage across the load may be monitored using a high impedance scope probe. The current may be monitored using a current probe such as the TEKTRONIX Model CT-2.



- Take care to insure that during soldering the OUT conductor is not shorted to the chassis. Also, use minimal heat when soldering. Fifty Ohm cable may be used to connect remote loads (to the output terminals) with minimal degradation of the waveform (see the performance check sheet for typical results).
- 5) The AV-107 is specifically designed for driving resistive loads and laser diode loads with series resistance. The loads should be connected directly to the microstrip line protruding from the PG module with very short leads. The importance of short leads is critical as LENZ'S LAW will predict large voltage spikes. If a highly nonlinear load such as a zener diode or IMPATT diode is connected to the PG output oscillations may be observed. The oscillation can be controlled by introducing some series resistance. In addition, shunt capacitance (10 to 100 pfd) placed across the diode and/or across the PG output will serve to reduce oscillation.
  - 6) The rear panel two-position HV switch must be in the ON position to obtain an output pulse. To avoid transients during the turn on of the 60 Hz prime power, the switch may be in the OFF position and then later switched to the ON position.

- 7) MAXIMUM DUTY CYCLE. CAUTION: This unit is designed to operate to a maximum duty cycle of 4% and it may be damaged if this duty cycle is exceeded. The maximum PW and PRF are related as follows:

<u>PW OUT</u>	<u>MAX PRF</u>
200 ns	20 kHz
2 us	2 kHz
20 us	200 Hz
200 us	20 Hz

- 8) OVERLOAD. AV-107 units with a serial number higher than 5600 are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a short circuit), the protective circuit will turn the output of the instrument OFF and turn the indicator light ON. The light will stay ON (i.e. output OFF) for about 5 seconds after which the instrument will attempt to turn ON (i.e. light OFF) for about 1 second. If the overload condition persists, the instrument will turn OFF again (i.e. light ON) for another 5 seconds. If the overload condition has been removed, the instrument will turn on and resume normal operation. Overload conditions may be removed by:

- 1) Reducing PRF
- 2) Reducing pulse width

Note that when the prime power (60 Hz) is first applied, the overload light may come on even though the output amplitude is set to zero. In such cases simply wait until the LED goes out before proceeding.

- 9) 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.
- 10) For additional assistance:

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

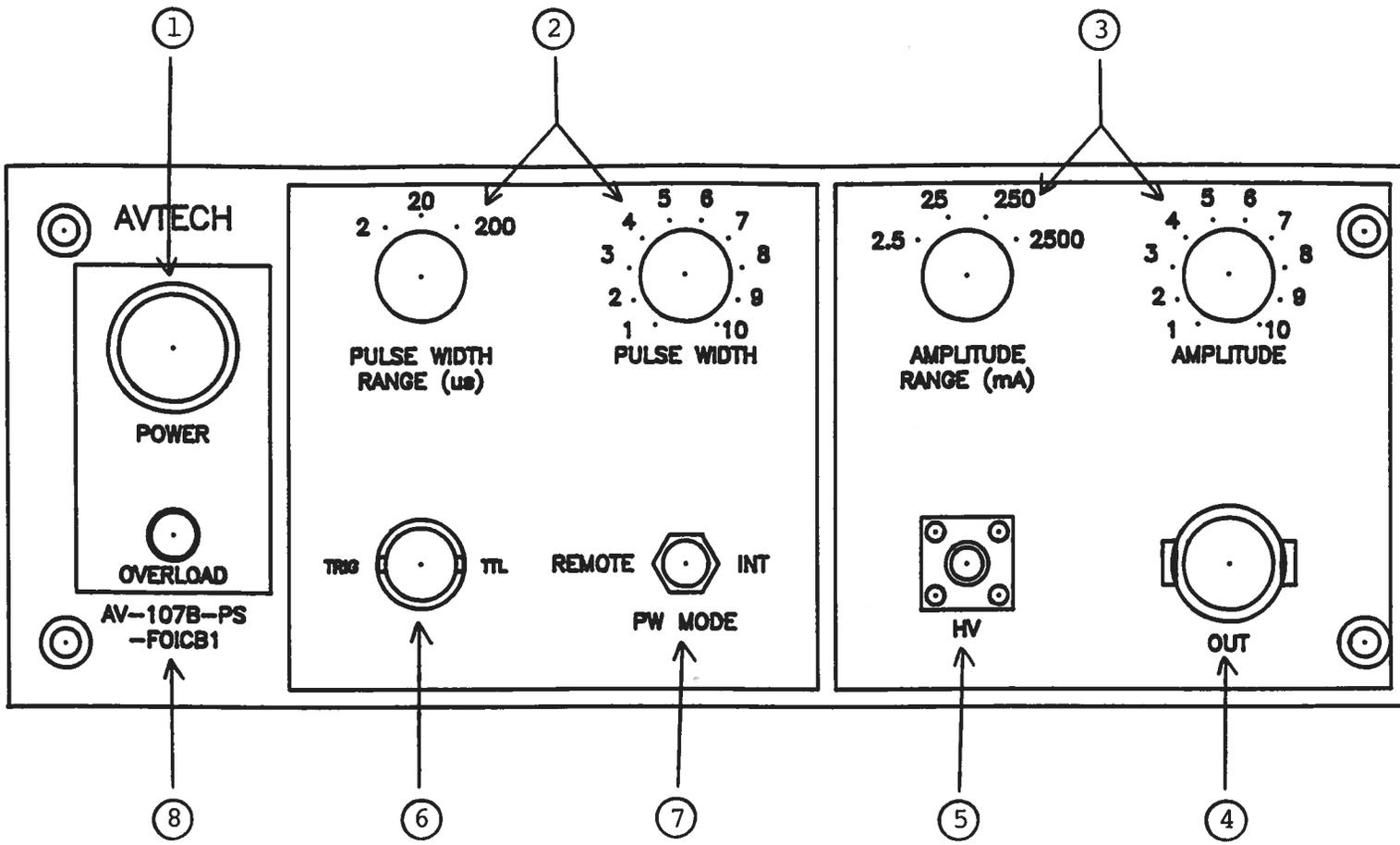


Fig. 2

FRONT PANEL CONTROLS

## FRONT PANEL CONTROLS

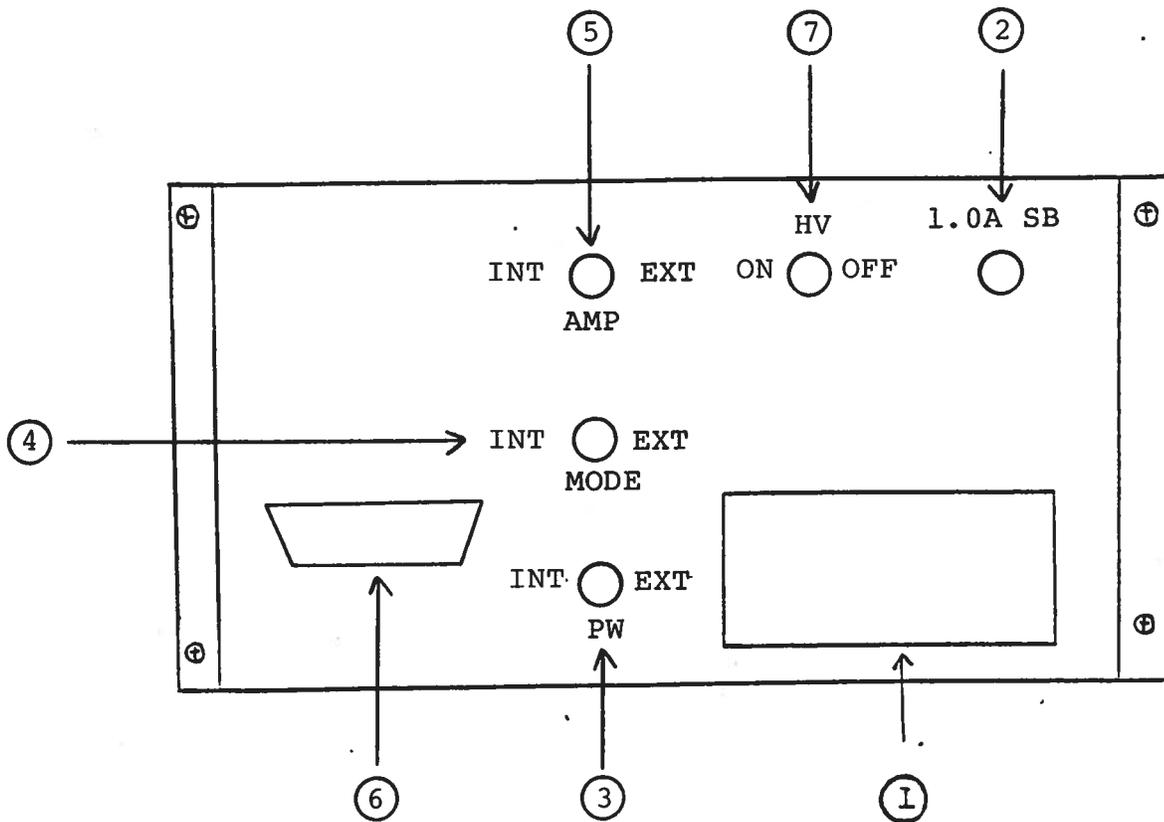
- (1) ON-OFF Switch. Applies basic prime power to all stages.
  - (2) PW Control. A one turn control and 3-position range switch which vary the output pulse width as follows when the rear panel PW control is in the INT position:  
  
0.2 to 2.0 us  
2.0 to 20 us  
20 to 200 us
  - (3) AMP Control. When the rear panel AMP switch is in the INT position, the output pulse amplitude is controlled by means of the one turn potentiometer and four-position range switch as follows:  
  
0.25 to 2.5 mA  
2.5 to 25 mA  
25 to 250 mA  
250 to 2500 mA
- Note that the load voltage must not exceed 100 Volts.
- (4) OUT Connector. A multi pin connector which attaches the 2 foot cable from the pulse generator module to the mainframe.
  - (5) HV Connector. The RG174 coaxial cable from the output module must be connected to this SMA connector.
  - (6) TRIG. The external trigger signal (TTL, PW  $\geq$  50 ns) is applied at this input.
  - (7) INT-REMOTE. With this switch in the INT position, the output pulse width is controlled by the front panel PW Controls (2). If the switch is in the REMOTE position, the output pulse width equals the input trigger pulse width.

(8) OVERLOAD. AV-107 units with a serial number higher than 5600 are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a short circuit), the protective circuit will turn the output of the instrument OFF and turn the indicator light ON. The light will stay ON (i.e. output OFF) for about 5 seconds after which the instrument will attempt to turn ON (i.e. light OFF) for about 1 second. If the overload condition persists, the instrument will turn OFF again (i.e. light ON) for another 5 seconds. If the overload condition has been removed, the instrument will turn on and resume normal operation. Overload conditions may be removed by:

- 1) Reducing PRF
- 2) Reducing pulse width

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. Fuse limits DC current available to the output stage.
- (3) PW, INT-EXT. To control the pulse width via the rear panel D connector (6), set the rear panel PW switch in the EXT position and apply 0 to +10 VDC to PIN 2 of the D connector. To select the pulse width range, apply +5 VDC as follows:

0.2 to 2.0 us: No bias required  
2.0 to 20 us: Apply +5.0 VDC to PIN 4  
20 to 200 us: Apply +5.0 VDC to PIN 5

- (4) MODE, INT-EXT. To obtain  $PW_{OUT} = PW_{IN}$ , via the D connector (6), set the rear panel mode switch in the EXT position and the front panel switch in the REMOTE position and apply +5 VDC to PIN 3 of the D connector. The input trigger pulse may be applied to either the front panel TRIG BNC connector or to PIN 10 of the D connector. To obtain  $PW_{OUT} = PW_{IN}$  via the front panel, place the rear panel mode switch in the INT position and the front panel switch in the REMOTE position and apply the input trigger to the front panel TRIG BNC.
- (5) AMP, INT-EXT. To control the output amplitude via the rear panel D connector (6), set the rear panel AMP switch in the EXT position and apply 0 to +10 VDC to PIN 1 of the D connector. To select the amplitude range, apply +5 VDC as follows:

0.25 to 2.5 mA: No bias required  
2.5 to 25 mA: Apply +5.0 VDC to PIN 6  
25 to 250 mA: Apply +5.0 VDC to PIN 7  
250 to 2500 mA: Apply +5.0 VDC to PIN 8

Note that the load voltage must not exceed 100 Volts.

- (6) D Connector. Mates to AMPHENOL TYPE 57-50240. PIN assignments are as follows:
- PIN 1      Amplitude control, 0 to +10 VDC
  - PIN 2      Pulse width control, 0 to +10 VDC
  - PIN 3      For  $PW_{OUT} = PW_{IN}$  via D connector, apply +5 VC to this pin and set rear panel switch (and front panel switch to EXT)
  - PIN 4      To operate in the 2 to 20 us range, via D connector, apply +5 VDC to pin 4
  - PIN 5      To operate in the 20 us to 200 us range, via the D connector, apply +5 VDC to pin 5
  - PIN 6      To operate in the 2.5 to 25 mA range, via the D connector, apply +5 VDC to pin 6
  - PIN 7      To operate in the 25 to 250 mA range, via the D connector, apply +5 VDC to pin 7
  - PIN 8      To operate in the 250 to 2500 mA range, via the D connector, apply +5 VDC to pin 8
  - PIN 9      Ground
  - PIN 10     The TTL external trigger may be applied either to PIN 10 or to the front panel TRIG BNC
- (7) HV Switch. The rear panel two-position HV switch must be in the ON position to obtain an output pulse. To avoid transients during the turn on of the 60 Hz prime power, the switch may be in the OFF position and then later switched to the ON position.

## SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AV-107B-PS unit consists of the following basic modules:

- 1) AV-107B-PG pulse generator module
- 2) +24V power supply board
- 3) +100V power supply board

The modules are interconnected as shown in Fig. 4.

In the event of an instrument malfunction, it is most likely that either of the rear panel fuses have blown or that some of the output switching elements (SL4T) may have failed due to an output short circuit condition or to a high duty cycle condition. The switching elements may be accessed by removing the cover plate on the bottom side of the -PG module. The cover plate is removed by removing the four counter sunk 6-32 Phillips screws. NOTE: First turn off the prime power. CAUTION: Briefly ground the SL4T tabs to discharge the 100 Volts power supply potential. The elements may be removed from their sockets by means of a needle nosed pliers after removing the four counter sunk 2-56 Phillips screws which attach the small aluminum heat sinks to the body of the AV-107-PG module. The SL4T is a selected VMOS power transistor in a TO 220 package and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL4T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the black dot on the chassis. The SL4T elements are electrically isolated from the small aluminum heat sinks but are bonded to the heat sinks using WAKEFIELD TYPE 155 HEAT SINK ADHESIVE.



PC-107B-C

SL4T

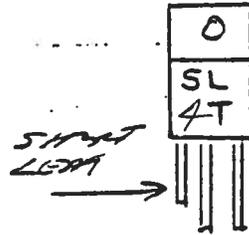
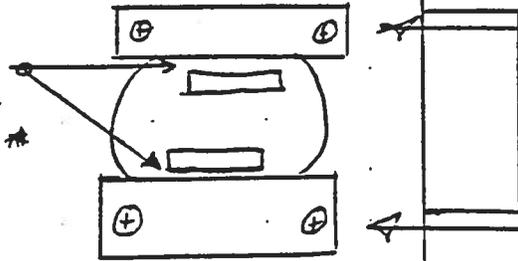
HEAT SINK

-P-P6

BACK

FRONT

155  
HEAT SINK  
ADHESIVE\*



Sept. 19/95

Disk: AV-107, 7A, 7B

Name: BPSFOICB.INS