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

e-mail: info@avtechpulse.com
http://www.avtechpulse.com

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

INSTRUCTIONS

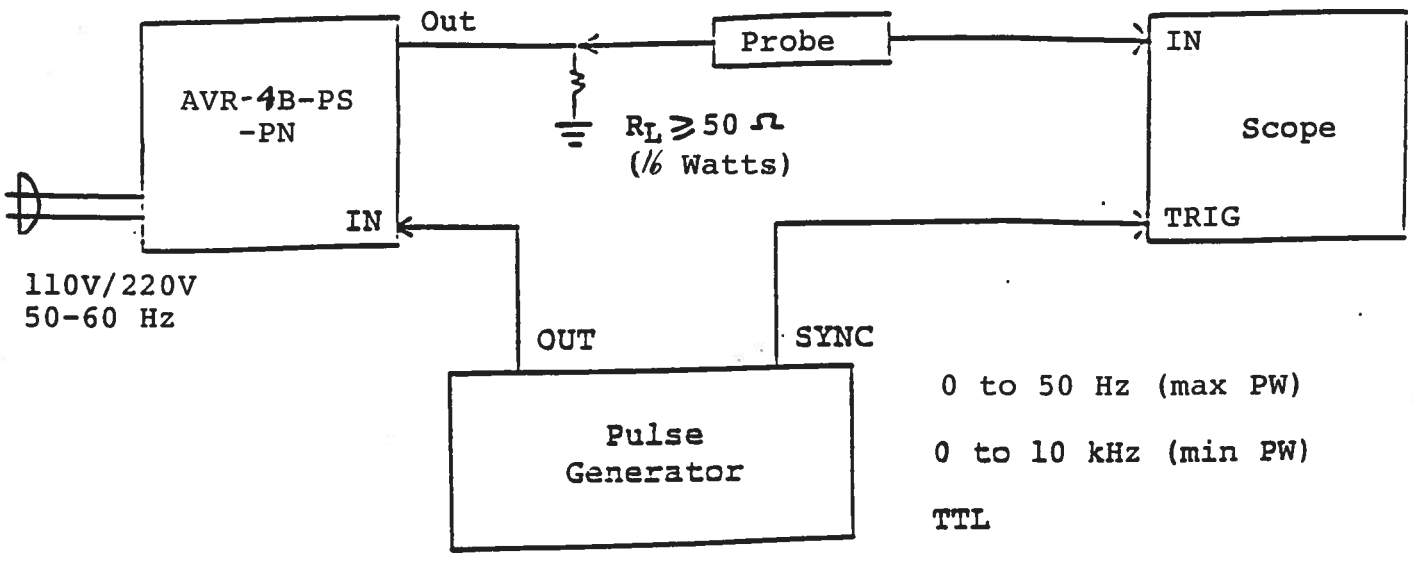
MODEL AVR-4B-PW-PS-PN PULSE GENERATOR

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 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



Notes:

1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 100 MHz.

2) With the AB mode switch in the A position, the output pulse width is controlled by the 3 position PW range switch and the one turn PW control (10 turn control for units with the -PWT option). The minimum and maximum PW for each range and the corresponding maximum PRF are as follows. Note that the unit may fail if operated at duty cycles exceeding 0.5%.

	PW min	PW max
1)	0.1 us PRF max 10 kHz	1.0 us PRF max 5 kHz
2)	1.0 us PRF max 5 kHz	10 us PRF max 500 Hz
3)	10 us PRF max 500 Hz	100 us PRF max 50 Hz

3) With the AB mode switch in the B position, the output pulse width is equal to the input trigger pulse width.

4) The output pulse amplitude is controlled by means of the front panel one turn AMP control (ten turn for -AT opton units). To voltage control the output amplitude, set the rear panel switch in the EXT position and apply 0 to +10 Volts to connector A ($R_{IN} \geq 10K$). (-EA option).

5) The output polarity is controlled by the two-position polarity switch. Note that to avoid stressing the output stage the amplitude should be turned down to zero before changing the position of the polarity switch.

6) The AVR-4-PS features an output impedance of the order of several Ohms (rather than 50 Ohms). The following consequences of this feature should be noted:

   a) When used to switch some semiconductor devices (eg. bipolar and VMOS power transistors), the AVR unit will yield much faster switching times than those provided by 50 Ohm pulse generators.

b) The output switching elements may fail if the unit is inadvertently operated into a short circuit. The switching elements are easily replaced in the field following the procedure outlined in the REPAIR Section.

7) CAUTION: The output stage is protected against overload condition by a 1.0 A slow blow fuse on the main frame back panel. However, the output switching elements may fail if the unit is triggered at a PRF exceeding 10 kHz or at duty cycles resulting in an average output power in excess of 16 Watts. Heating and subsequent likely failure of the output stage is reduced if the following action is taken where possible:

a) PRF is kept to a minimum, i.e. operate in a low PRF range when possible rather than in a high PRF range.
b) Keep the output PW to a minimum.

8) OVERLOAD INDICATOR. AVR-4 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 (i.e. switch to a lower range)
2) Reducing pulse width (i.e. switch to a lower range)
3) Removing output load short circuit (if any)

Note that the overload light may illuminate when the prime power is first applied. The light will extinguish after a few seconds and the instrument will then function normally.

Note that the output stage will safely withstand a short circuited load condition.

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

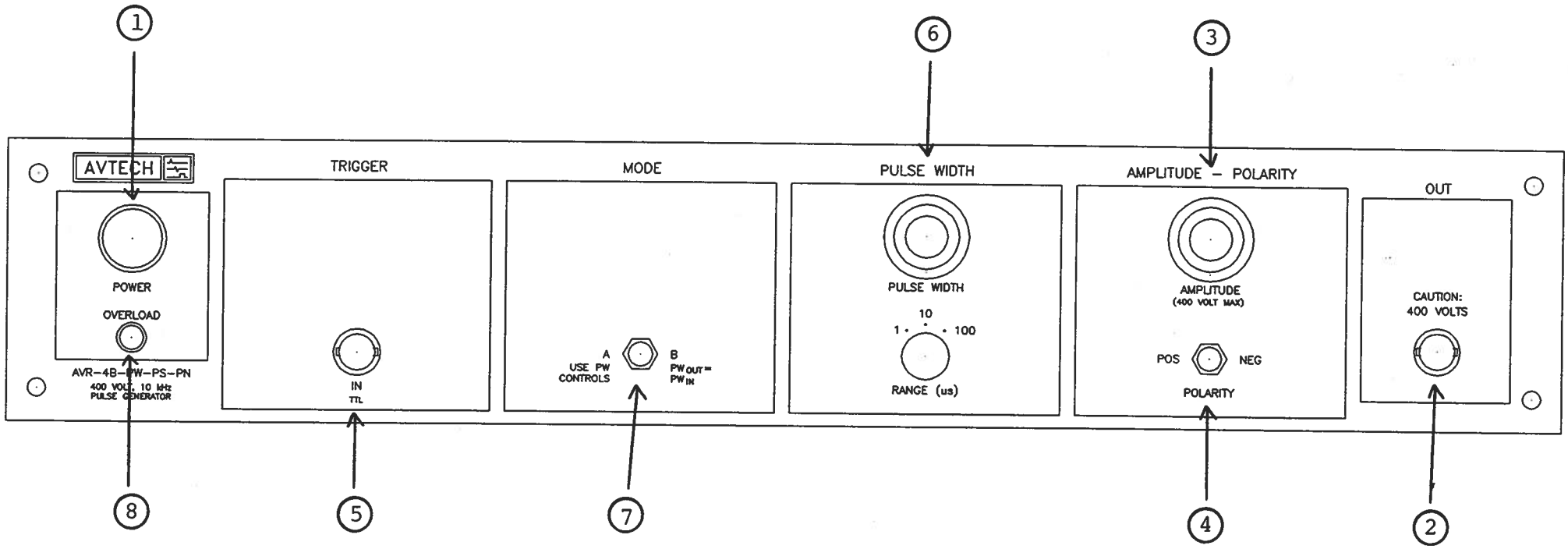


Fig. 2

FRONT PANEL CONTROLS

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

(2) OUT Connector. BNC connector provides output to the load ($R_L \geq 50$ Ohm).

(3) AMP Control. A one turn control which varies the output pulse amplitude from 0 to 400 V (ten turn control for -AT option units).

(4) POLARITY. The output polarity is controlled by the two-position polarity switch. Note that to avoid stressing the output stage the amplitude should be turned down to zero before changing the position of the polarity switch.

(5) TRIG Input. The external trigger signal is applied at this input (TTL).

(6) PW Control. A one turn control (ten turn control for -PWT option units) and 3 position range switch which varies the output pulse width from 0.1 us to 100 us. The minimum and maximum PW for each range and the corresponding maximum PRF are as follows. Note that the unit may fail if operated at duty cycles exceeding 0.5%.

	PW min	PW max
Range 1	0.1 us PRF max 10 kHz	1.0 us PRF max 5 kHz
Range 2	1.0 us PRF max 5 kHz	10 us PRF max 500 Hz
Range 3	10 us PRF max 500 Hz	100 us PRF max 50 Hz

(7) AB MODE. When switch is in the A position output pulse width is controlled by PW controls (6) while if switch is in the B position, the output pulse width equals the input trigger pulse width.

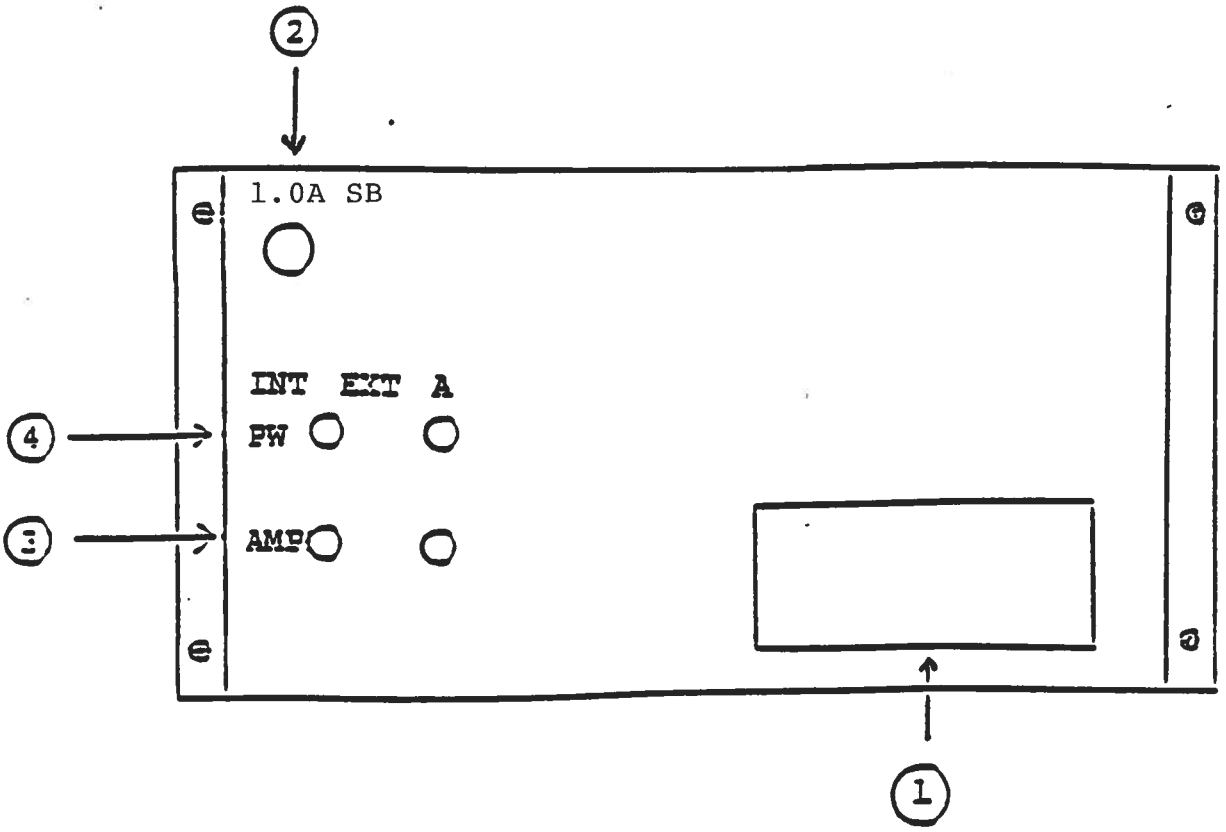
(8) OVERLOAD INDICATOR. AVR-4 units with a serial number higher than 5600 are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a short circuit), the protective 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 (i.e. switch to a lower range)
2) Reducing pulse width (i.e. switch to a lower range)
3) Removing output load short circuit (if any)

Note that the overload light may illuminate when the prime power is first applied. The light will extinguish after a few seconds and the instrument will then function normally.

Note that the output stage will safely withstand a short circuited load condition.

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 (1.0 A SB).

(2) 1.0A SB. Fuse which protects the output stage if the output duty cycle rating is exceeded.

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

(4) EW. To voltage control the output pulse width, set the switch in the EXT position and apply 0 to +10 Volts to connector A ($R_{IN} \geq 10K$). (option).

Fig. 3a

POWER SUPPLY

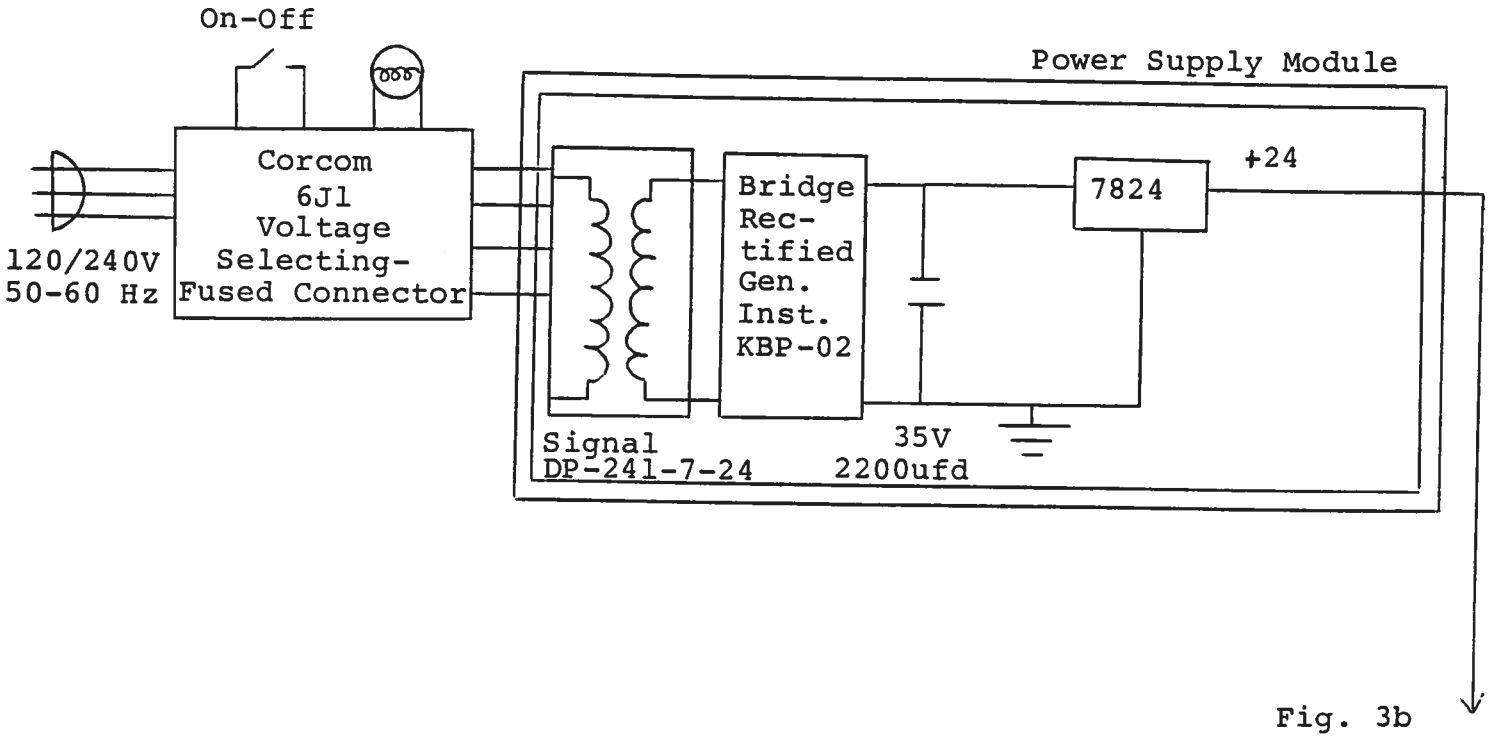
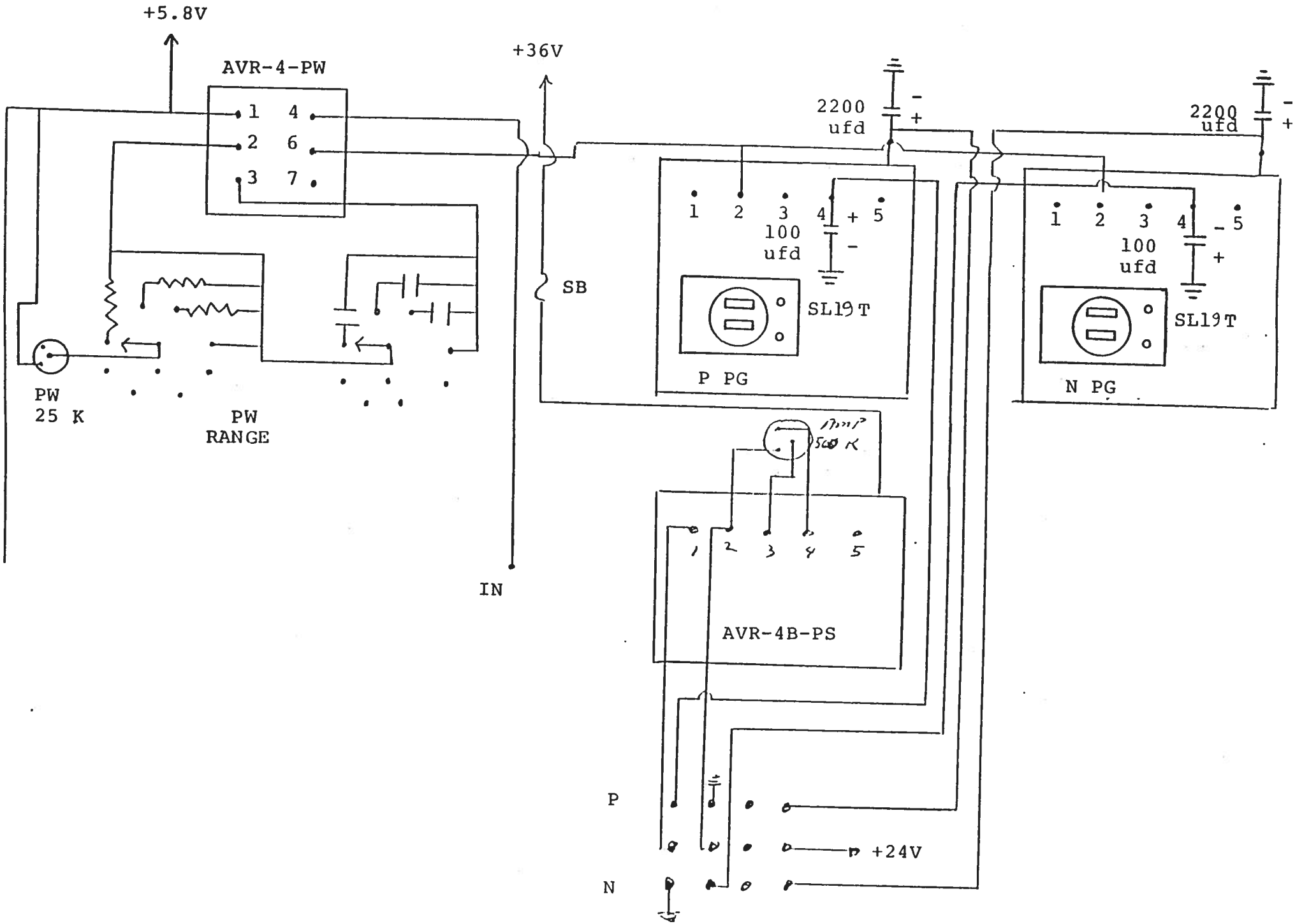


Fig. 3b

Fig. 4

AVR-4B-PW-PN-PS BLOCK DIAGRAM



SYSTEM DESCRIPTION AND REPAIR PROCEDURE

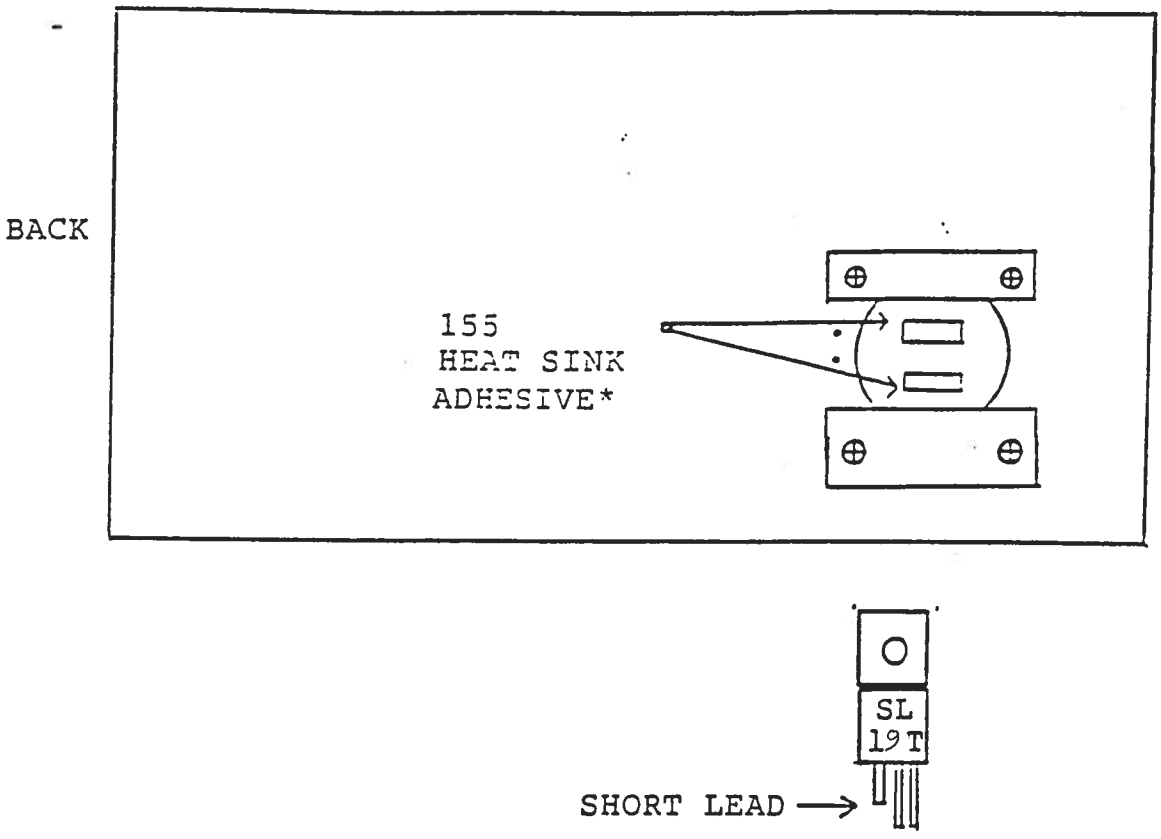
The AVR-4-PW-PS-PN consists of the following basic modules:

1) AVR-4-PW-PG pulse generator modules (-P and -N)
2) +36V, +24V, +5.8V power supply board
3) AVR-4-PS power supply module
4) AVR-4-PW pulse width module

The modules are interconnected as shown in Fig. 4.

In the event of an instrument malfunction, it is most likely that the 1.0 A slow blow fuse or the main power fuse on the rear panel has blown. Replace if necessary. If the unit still does not function, it is most likely that some of the output switching elements (SL19T) 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 plates on the bottom side of the instrument. The cover plate is removed by removing the two 2-56 Phillips screws. NOTE: First turn off the prime power. CAUTION: Briefly ground the SL19T tabs to discharge the 400 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 instrument. The SL19T 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 SL19T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the back of the chassis. (See following Fig.). The SL19T elements are electrically isolated from the small aluminum heat sinks but are bonded to the heat sinks using WAKEFIELD TYPE 155 HEAT SINK ADHESIVE.

SL19T HEAT SINKING



March 24/98 Edition B

in WP

C:\WPINSTR\AVR4BPS\PWPSPNB.INS