



# 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](mailto: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-3-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 disassembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

### TECHNICAL SUPPORT

Phone: 613-226-5772 or 1-800-265-6681

Fax: 613-226-2802 or 1-800-561-1970

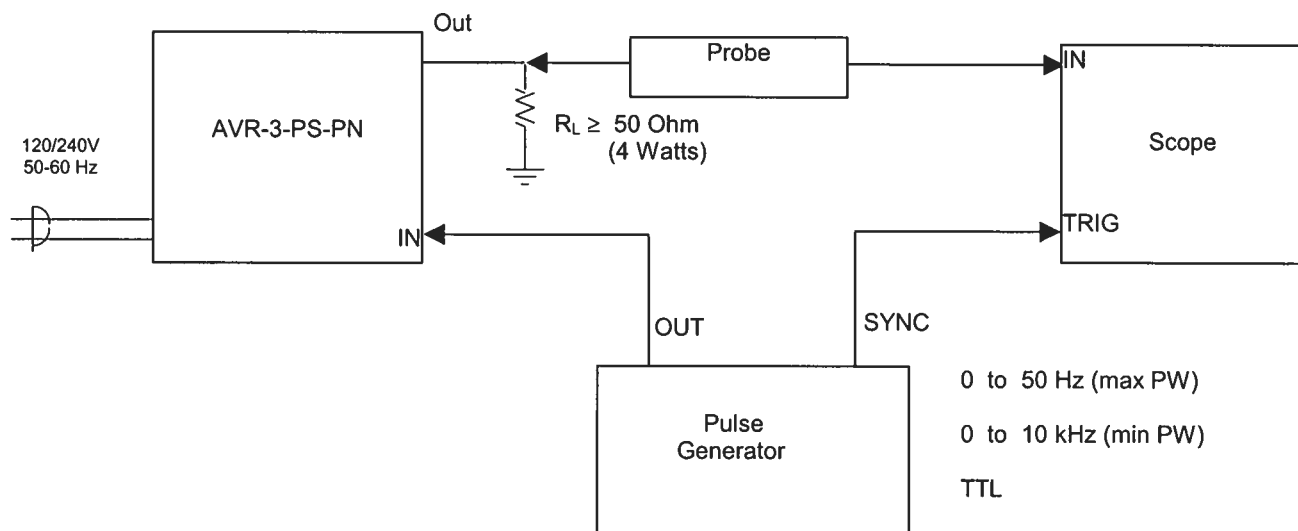
E-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)

World Wide Web: <http://www.avtechpulse.com>

## TABLE OF CONTENTS

<u>WARRANTY</u> .....	2
<u>TABLE OF CONTENTS</u> .....	3
<u>FIG. 1: PULSE GENERATOR TEST ARRANGEMENT</u> .....	4
<u>GENERAL OPERATING INSTRUCTIONS</u> .....	5
<u>FIG. 2: FRONT PANEL CONTROLS</u> .....	7
<u>FRONT PANEL CONTROLS</u> .....	8
<u>FIG. 3: BACK PANEL CONTROLS (EA, EW OPTION UNITS)</u> .....	10
<u>BACK PANEL CONTROLS</u> .....	11
<u>START-UP CHECK LIST</u> .....	12
<u>POWER SUPPLY AND FUSE REPLACEMENT</u> .....	14
<u>PERFORMANCE CHECK SHEET</u> .....	16

FIG. 1: PULSE GENERATOR TEST ARRANGEMENT



## GENERAL OPERATING INSTRUCTIONS

- 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

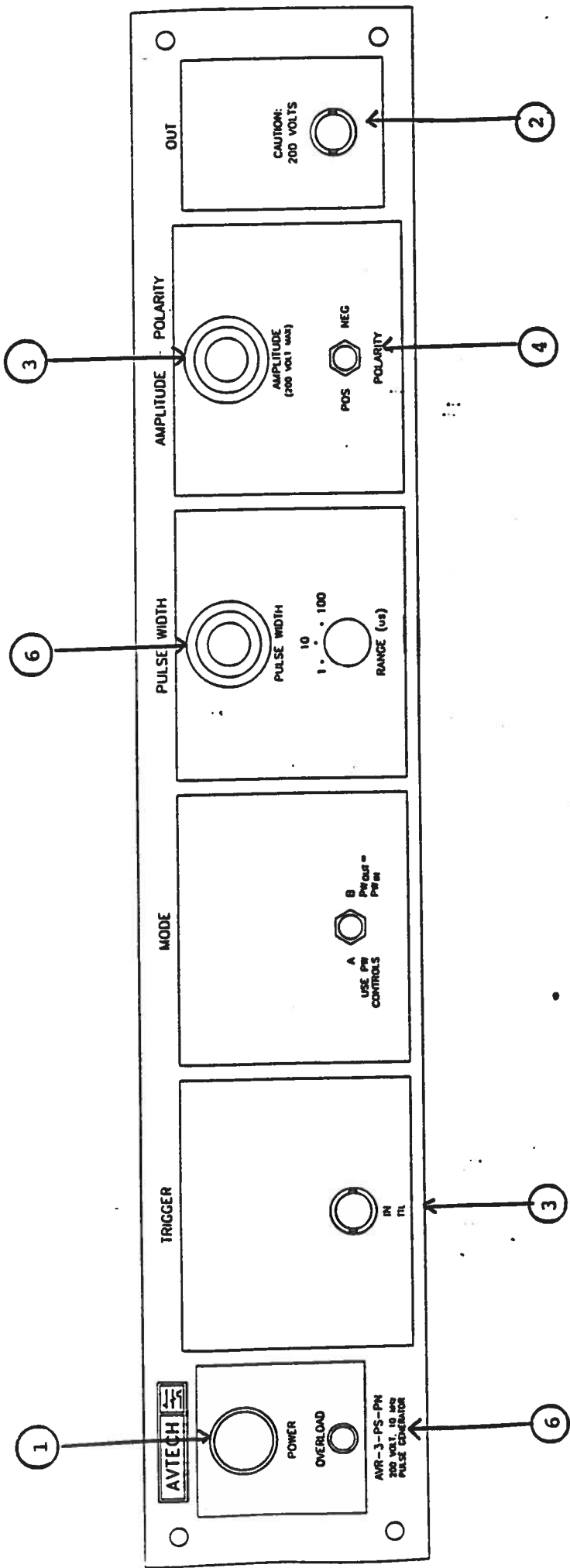
- 3) With the AB mode switch in the B position, the output pulse width is equal to the input trigger pulse width.
- 4) The output pulse amplitude is controlled by means of the front panel one turn AMP control. To voltage control the output amplitude, set the rear panel switch in the EXT position and apply 0 to +10 Volts to connector A ( $R_{IN} \geq 10K$ ). (-EA option).
- 5) For units with the -PN option, 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-3-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) Ringing and overshoot will result when driving high impedance loads. To reduce the ringing, place a 50 Ohm resistor at the Pulser output. Also, keep the output cable length as short as possible.
- 7) OVERLOAD INDICATOR. AVR-3 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.

- 8) 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.
- 9) For additional assistance:
- Tel: (613) 226-5772  
Fax: (613) 226-2802  
E-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)



**FIG. 2: FRONT PANEL CONTROLS**

## FRONT PANEL CONTROLS

- (1) ON-OFF Switch. Applies basic prime power to all stages.
- (2) OUT Connector. BNC connector provides output to the load ( $R_L \geq 50 \text{ Ohm}$ ).
- (3) AMP Control. A one-turn control which varies the output pulse amplitude from 0 to 200 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. (-PN option)
- (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  $\mu\text{s}$  to 100  $\mu\text{s}$ . 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 $\mu\text{s}$ PRF max 10 kHz	1.0 $\mu\text{s}$ PRF max 5 kHz
Range 2	1.0 $\mu\text{s}$ PRF max 5 kHz	10 $\mu\text{s}$ PRF max 500 Hz
Range 3	10 $\mu\text{s}$ PRF max 500 Hz	100 $\mu\text{s}$ 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-3 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.



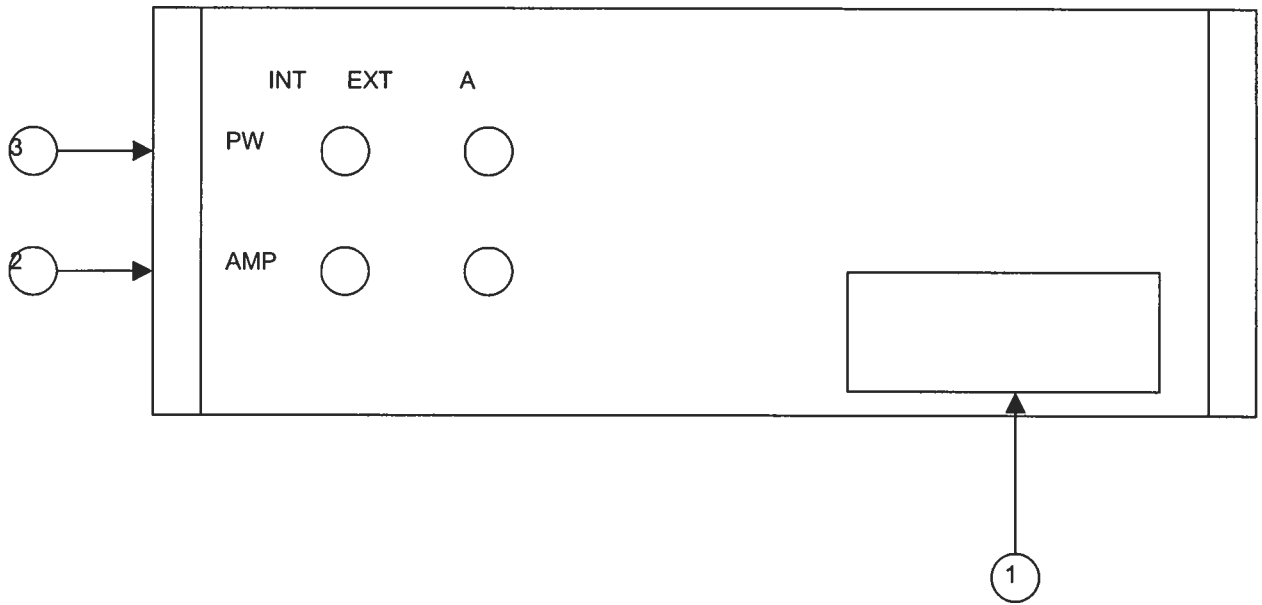
If the overload condition has been removed, the instrument will turn on and resume normal operation. Overload conditions may be removed by:

- 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 (EA, EW OPTION UNITS)



## 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.

For AC line voltages of 110-120V, the power selector card should be installed so that the "120" marking is visible from the rear of the instrument.

For AC line voltages of 220-240V, the power selector card should be installed so that the "240" marking is visible from the rear of the instrument.

If it is not set for the proper voltage, remove the fuse and then grasp the card with a pair of pliers and remove it. Rotate horizontally through 180 degrees. Reinstall the card and the correct fuse.

In the 120V setting, a 0.5A slow blow fuse is required. In the 240V setting, a 0.25A slow blow fuse is required.

- (2) **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).
- (3) **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).

MODEL AVR-3-PS-PNSTART-UP CHECK LIST

- 1) Study the instruction manual thoroughly.
- 2) Connect the equipment as shown in Fig. 1.
- 3) With the prime power off, set the AVR-3-PS-PN controls as follows:
 

Mode Switch:	Position A
Pulse Width Range:	1us
Pulse Width 10-Turn	Pot: Max CW
Amplitude Polarity:	Positive
Amplitude 10-Turn Pot:	Max CCW
- 4) Set the trigger pulse generator controls as follows:
 

Amplitude:	+5Volts (to an open circuit)
Pulse Width:	1us
PRF:	100Hz
- 5) Apply prime power to the AVR-3-PS-PN and to the scope and trigger pulse generator. Set the scope to trigger externally (from the trigger pulse generator sync out).
- 6) Set the scope controls at 50 Volts/DIV and 0.2us/DIV.
- 7) Rotate the 10-turn amplitude control to max CW. A +200 Volts 1us pulse should be displayed on the scope.
- 8) Change the scope time base to 2us /DIV and the AVR-3-PS-PN pulse width range to 10us. A +200 Volt10us pulse should be displayed.
- 9) Reduce the AVR-3-PS-PN 10-turn amplitude control to 2.0. A +40 Volts 10us pulse should be displayed.
- 10) Switch the polarity switch to negative. A –40 Volt 10us pulse should be displayed. (For –PN option units only).
- 11) Switch the Mode switch to Position B. A –40 Volt 1us pulse should be displayed (pulse width now determined by the trigger pulse generator pulse width).

12) This completes the basic start-up check list. For additional assistance:

Tel: 613-226-5772

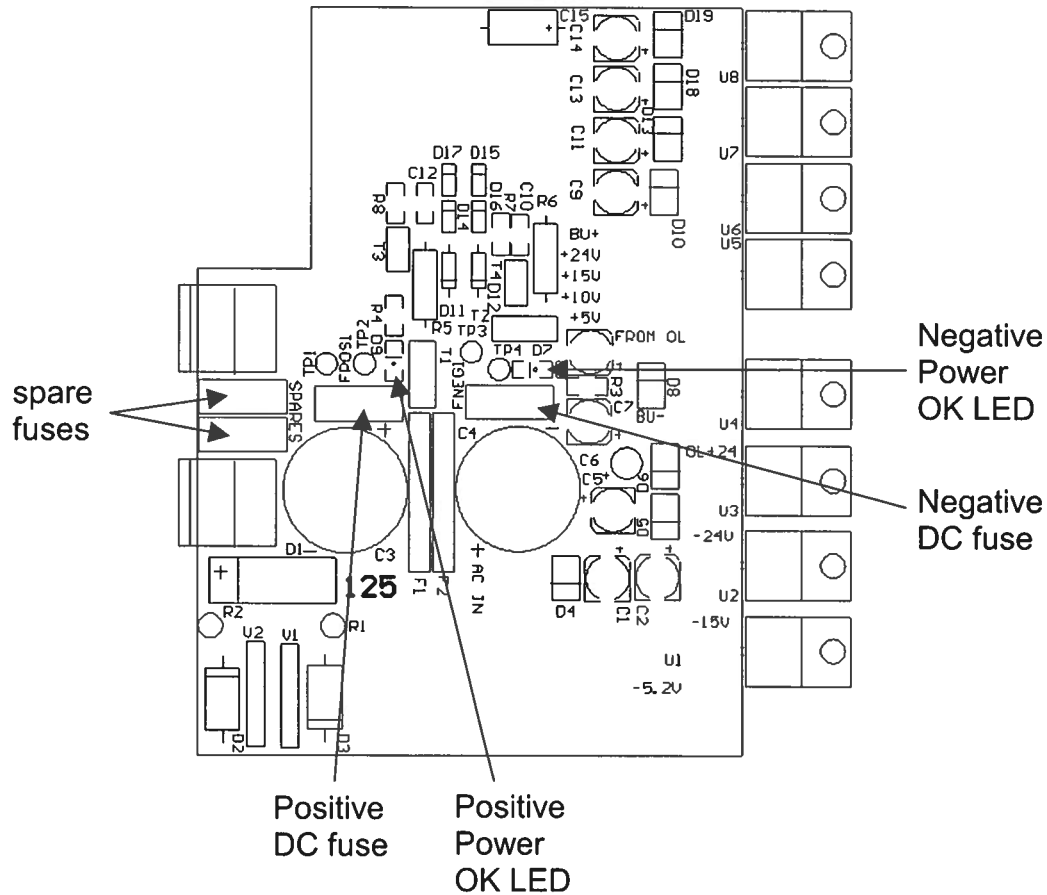
Fax: 613-226-2802

Email: [info@avtechpulse.com](mailto:info@avtechpulse.com)

## POWER SUPPLY AND FUSE REPLACEMENT

This instrument has three main fuses, plus two spares. One, which protects the AC input, is located in the rear-panel power entry module, as described in the “Rear Panel Controls” section of this manual. If the power appears to have failed, check the AC fuse first.

The other two fuses (plus two spares) are located on the internal DC power supply, as shown below:



The positive fuse and one of the spare fuses on this circuit board are 1A slow-blow fuses, Littlefuse part number R452001. (This fuse can be ordered from Digikey, [www.digikey.com](http://www.digikey.com). The Digikey part number is F1343CT-ND). The negative fuse and the second spare fuse are 0.5A slow-blow fuses (Littlefuse R452.500, Digikey part number F1341CT-ND).

If you suspect that the DC fuses are blown, follow this procedure:

1. Remove the top cover, by removing the four Phillips screws on the top cover and then sliding the cover back and off.
2. Locate the two "Power OK" LEDs on the power supply circuit board, as illustrated above.
3. Turn on the instrument.
4. Observe the "Power OK" LEDs. If the fuses are not blown, the two LEDs will be lit (bright red). If one of the LEDs is not lit, the fuse next to it has blown.
5. Turn off the instrument.
6. If a fuse is blown, use needle-nose pliers to remove the blown fuse from its surface-mount holder.
7. Replace the fuse. (Spare 1 Amp and 0.5 Amp fuses are provided on the circuit board. They may be transferred to the active fuse locations using needle-nose pliers.)

-

May 14/2022