



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

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

INSTRUCTIONS

MODEL AVR-3-PW-C-BTIA PULSE GENERATOR

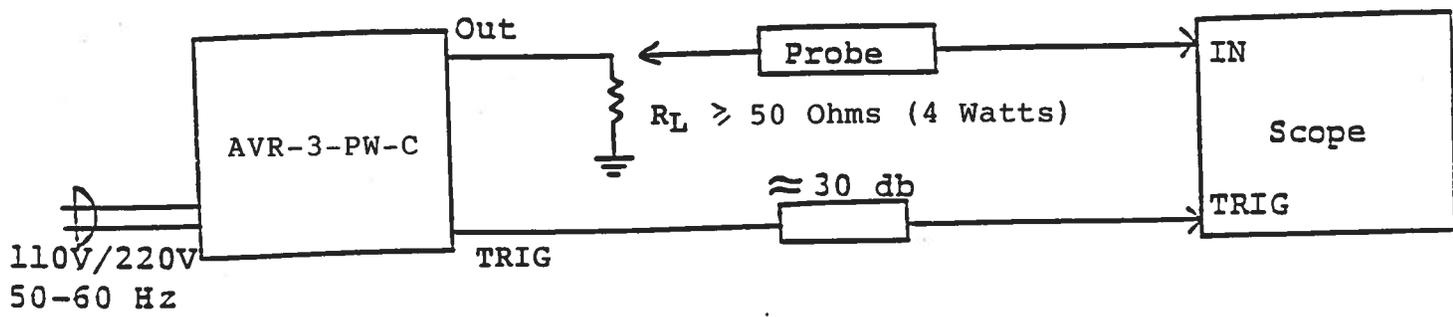
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WARRANTY

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



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) 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.
- 3) The output pulse width is controlled by means of the front panel ten turn PW control and by the PW RANGE control as follows:

	Min	Max
Range 1	0.5 ms	5.0 ms
Range 2	5.0 ms	50 ms

To voltage control the output pulse width within each range, set the rear panel switch in the EXT position and apply 0 to +10 Volts between terminal A and ground ($R_{IN} \geq 10K$). (option).

- 4) To obtain a stable output display the PRF control on the front panel should be set mid range. The front panel TRIG 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 control.
- 5) The output pulse amplitude is controlled by means of the front panel ten 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 the A BNC connector ($R_{IN} \geq 10K$). (option). Note that when attempting to reduce the output amplitude (by rotating the amplitude control counter clockwise), the peak output amplitude may delay very slowly (with a time constant of tens of seconds). This phenomena is particularly noticeable if the load impedance is high ($\gg 50$ Ohms) and/or if the PRF is low. The time constant may be reduced by placing the

rear panel C switches in the "OUT" position (see rear panel controls). Also, when operating at very wide pulse widths (eg. 50 ms), the amplitude control should be rotated slowly when attempting to increase the output pulse amplitude (to prevent triggering of the overload function).

- 6) An external clock may be used to control the output PRF of the AVR 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.
- 7) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.
- 8) 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 0.5 ms to 50 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	0.5 us	5.0 ms
Range 2	5.0 us	50 ms

- 9) AVR-3-PW-C units with a serial number higher than 5600 are protected by an automatic average power overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle), 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) Reducing the output amplitude

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

- 10) Units with a serial number higher than 7400 are protected against short-circuited load conditions by an automatic circuit which senses the load current and inhibits triggering of the output stage if the peak load current exceeds 2.5 Amperes.
- 11) 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.
- 12) For additional assistance:

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

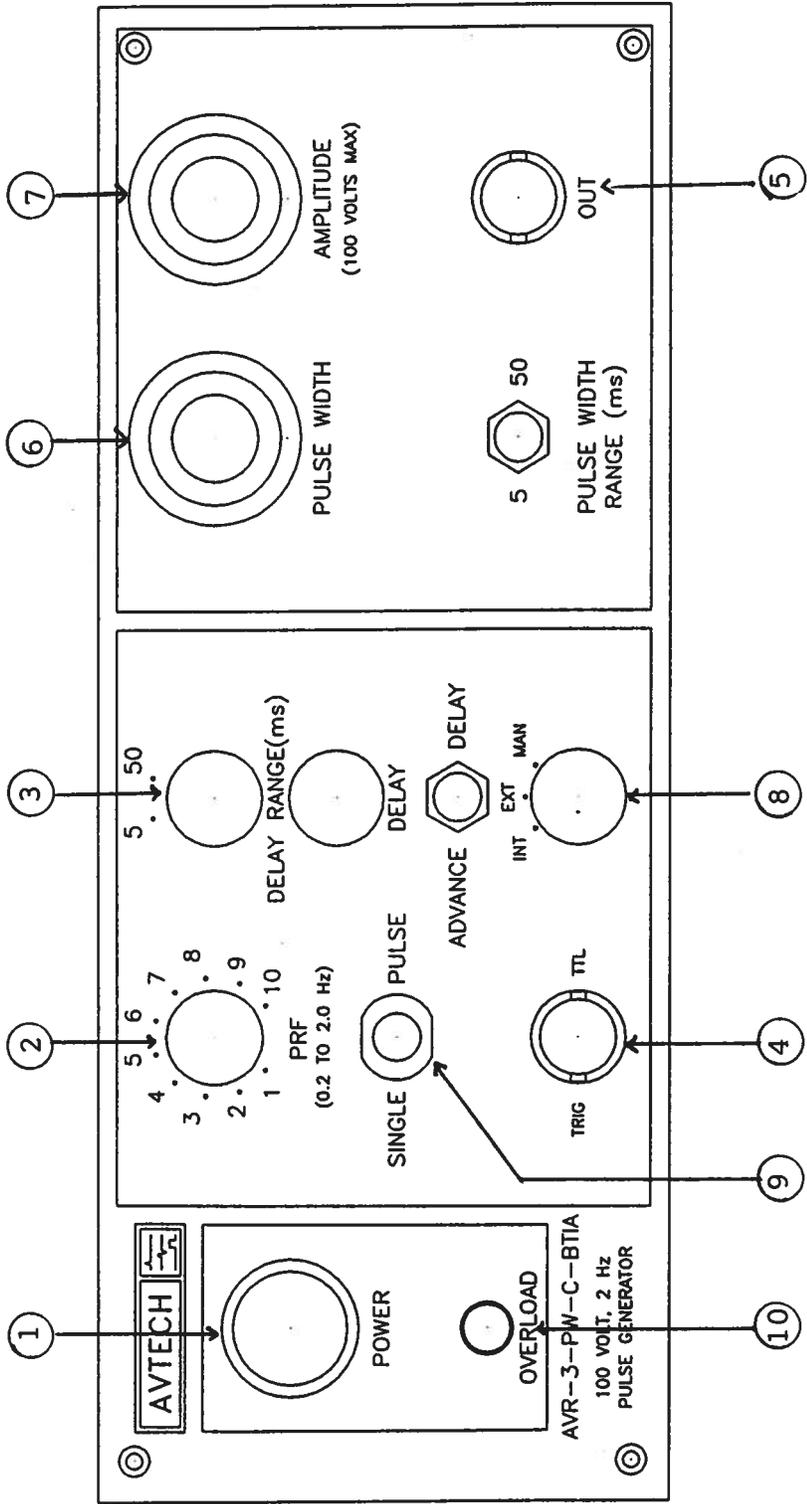


Fig. 2: FRONT PANEL CONTROLS

- (1) ON-OFF Switch. Applies basic prime power to all stages.
- (2) PRF Control. Varies PRF from 0.2 Hz to 2.0 kHz as follows:
- (3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) and the main output (5). This delay is variable over the range of 0.1 to about 100 us. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.

	MIN	MAX
Range 1	0.5 ms	5.0 ms
Range 2	5.0 ms	50 ms

- (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. This output precedes the output at (5) if the two position ADVANCE-DELAY switch is in the ADVANCE position. This output follows the output at (5) if the switch is in the DELAY position. The delay range is variable from 0.5 ms to 50 ms. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.
- (5) OUT Connector. BNC connector provides output to a load ≥ 50 Ohms (up to 4 Watts).
- (6) PW Control. A ten turn control and 2 position range switch which varies the positive output pulse width from 0.5 ms to 50 ms.
- (7) AMP Control. A ten turn control which varies the output pulse amplitude from 0 to 100 V to $R_L \geq 50$ Ohms. Note that when attempting to reduce the output amplitude (by rotating the amplitude control counter clockwise), the peak output amplitude may delay very slowly (with a time constant of tens of seconds). This phenomena is particularly noticeable if the load impedance is high ($\gg 50$ Ohms) and/or if the PRF is low. The time constant may be reduced by placing the rear panel C switches in the "OUT" position (see rear panel controls). Caution: When operating at very wide pulse

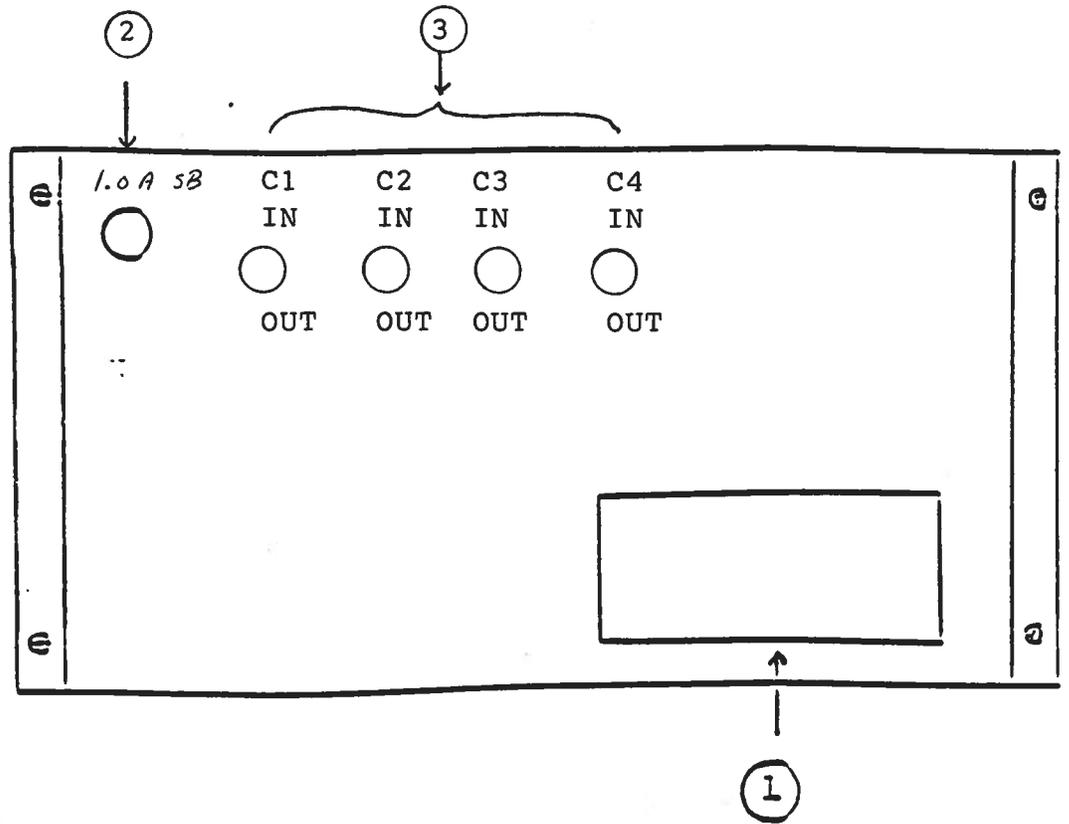
widths the amplitude control should be rotated slowly when attempting to increase the pulse amplitude (to prevent triggering of the overload function).

- (8) INT-EXT-MAN Control. With this toggle switch in the INT position, the PRF of the AVR 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 AVR 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 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.
- (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 INDICATOR. AVR-3-PW-C units with a serial number higher than 5600 are protected by an automatic average power overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle), 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) Reducing the output amplitude

Note the overload light may indicate when the prime power is applied. The light will extinguish after a few seconds and the unit will then operate normally.

Fig. 3

BACK PANEL CONTROLS

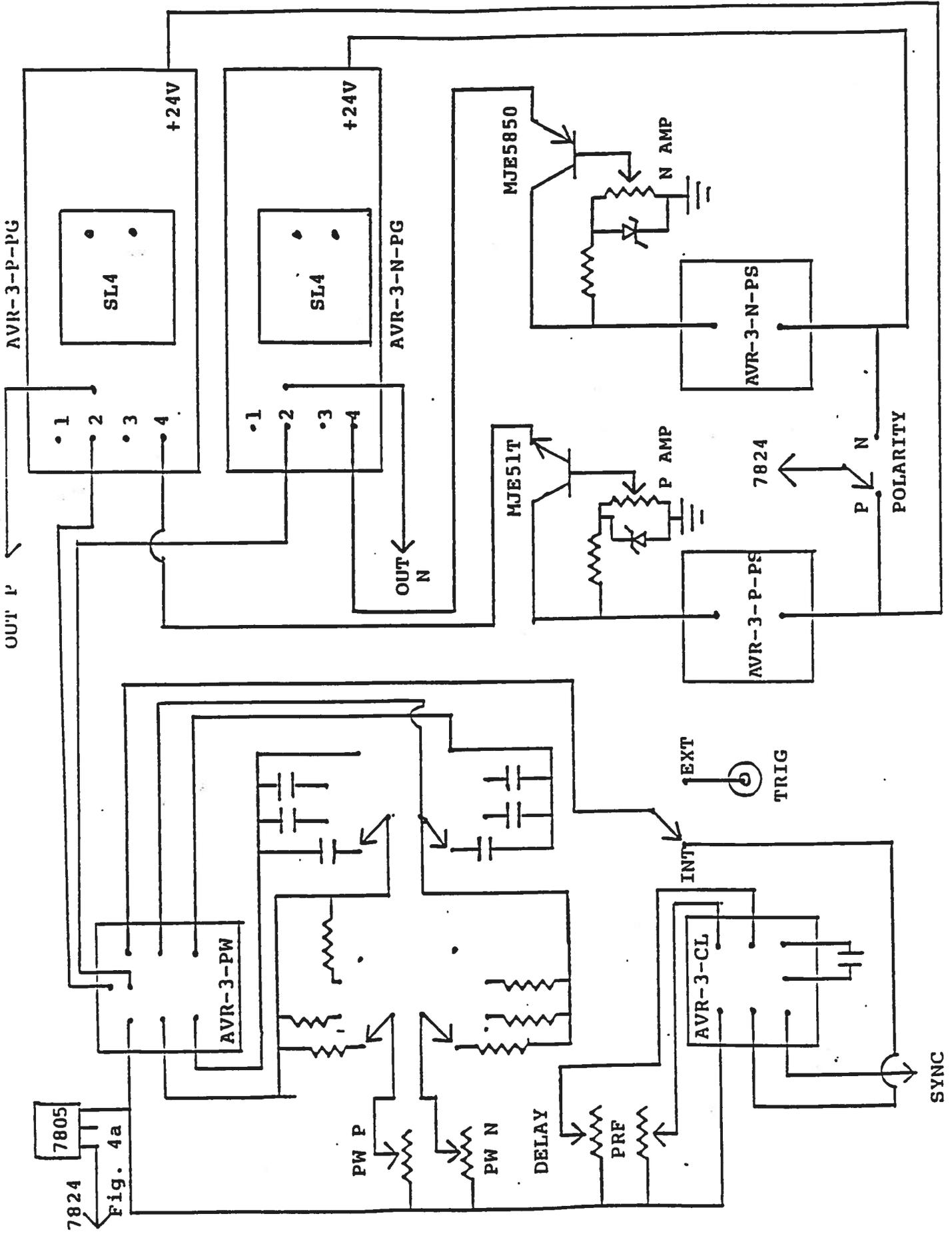


- (1) FUSED CONNECTOR, VOLTAGE SELECTOR. The detachable power cord is connected at this point. In addition, the removable cord is adjusted to select the desired input operating voltage. The unit also contains the main power fuse (0.5 A SB).
- (2) 1.0A SB. Fuse which protects the output stage if the output duty cycle rating is exceeded.
- (3) C Switches. In order to provide low pulse top droop ($\leq 5\%$) when operating at extremely wide pulses (50 ms) into 50 Ohm loads, the AVR-3-PW-C contains very large energy storage capacitors which power the output stage. As a result, when attempting to reduce the output amplitude (by rotating the amplitude control counter clockwise), the peak output amplitude may delay very slowly (with a time constant of tens of seconds). This phenomena is particularly noticeable if the load impedance is high ($>>50$ Ohms) and/or if the PRF is low. The time constant may be reduced by placing the rear panel C switches in the "OUT" position. Placing C1 in the "IN" position increases the minimum capacitance by a factor of x20 while placing C2, C3 or C4 in the "IN" position increases the capacitance by a factor of x40.

Caution: The C switches should be moved to the "IN" position only when the Amp control is set fully counter clockwise.

TOP COVER REMOVAL AND RACK MOUNTING

- 1) The interior of the instrument may be accessed by removing the four Phillips screws on the top panel. With the four screws removed, the top cover may be slid back (and off).



7824
7805
Fig. 4a

SYNC

POLARITY

TRIG

EXT

INT

7824

AVR-3-N-PS

AVR-3-P-PS

MJE5850

MJE51T

N AMP

P AMP

AVR-3-N-PG

OUT N

AVR-3-P-PG

OUT P

+24V

+24V

SL4

SL4

PW P

PW N

DELAY

PRE

AVR-3-PW

AVR-3-CL

Fig. 4a

POWER SUPPLY

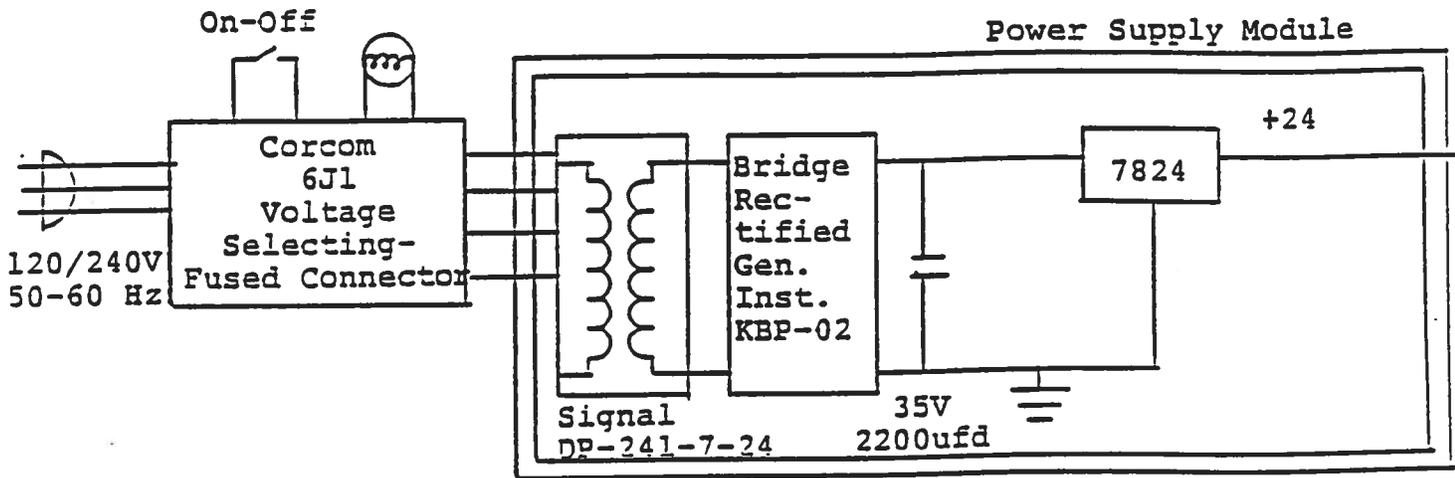


Fig. 4b

SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVR-3-C consists of the following basic modules:

- 1) AVR-3-PG pulse generator module
- 2) AVR-CL clock module
- 3) +24V power supply board
- 4) AVR power supply module
- 5) AVR-PW pulse width module
- 6) -OL-471 overload module

The modules are interconnected as shown in Fig. 4. The clock module controls the output PRF and the relative delay between the main output and the TRIG output. The PG pulse generator modules generate the output pulse. The -PS-P module generates 0 to +220 Volts to power the pulse generator module. The PW module controls the output pulse width. In the event of an instrument malfunction, it is most likely that the rear panel 1.0A SB fuse or one of the output switching elements (SL5T) 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 instrument. NOTE: First turn off the prime power. The elements may be removed from their sockets by means of a needle nosed pliers. The SL5T is a selected MOSFET power transistor in a TO 220 packages and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL5T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the black dot on the chassis. If the switching elements are not defective, then the four Phillips screws on the back panel should be removed. The top cover may then be slid off and operation of the clock and power supply modules should be checked. The clock module is functioning properly if:

- a) 0.1 us TTL level outputs are observed at pins 2 and 3.
- b) The PRF of the outputs can be varied over the range of 1 Hz to 1 kHz using the PRF controls.
- c) The relative delay between the pin 2 and 3 outputs can be varied by at least 0.1 us to 100 us by the DELAY controls.

The sealed clock module must be returned to Avtech for repair or replacement if the above conditions are not observed. The power supply board generates +24V DC to power the other modules. If the voltage is less than +24V, turn off the prime power and unsolder the lead from the 7824 regulator chip on the power supply board. Solder a 100 Ohm 5 Watt resistor to the 7824 output to ground and turn on the prime power. A voltage of +24 Volts should be read. If the voltage is less then the power supply board is defective and should be repaired or replaced.

3 PWS BTIA.IWS

May 27/96

AVR-3-C1 Disk

-EW

-EA