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**NANOSECOND WAVEFORM ELECTRONICS
ENGINEERING . MANUFACTURING**

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INSTRUCTIONS

MODEL AVO-7B-C-SNL2 PULSE GENERATOR

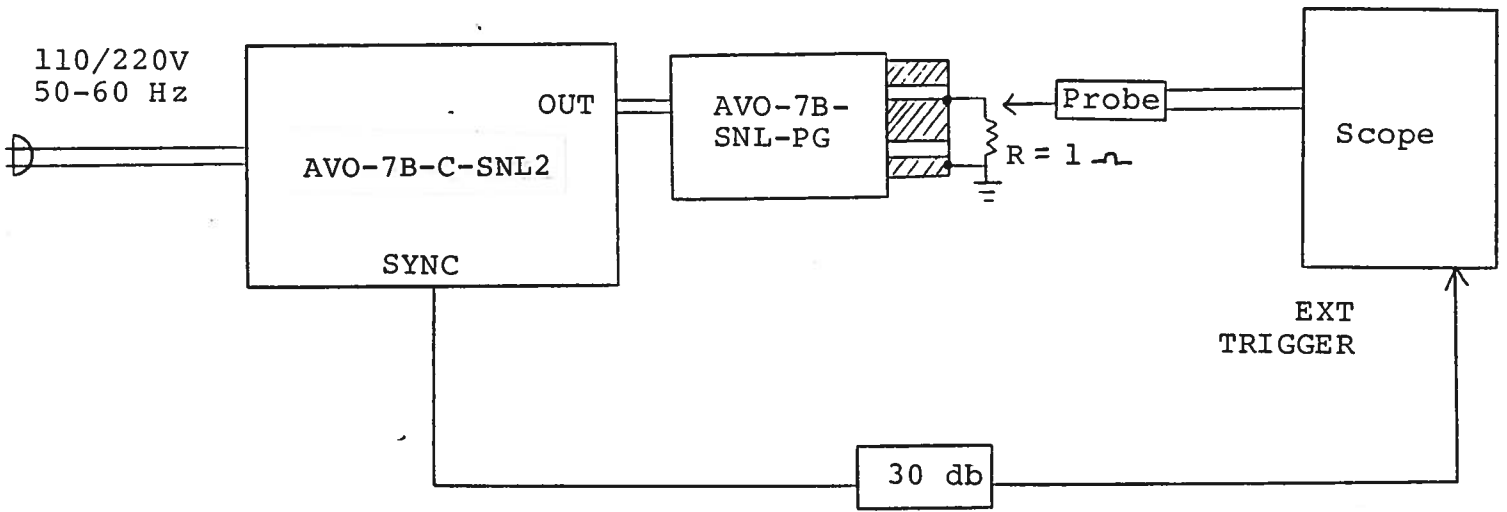
S.N. :

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.

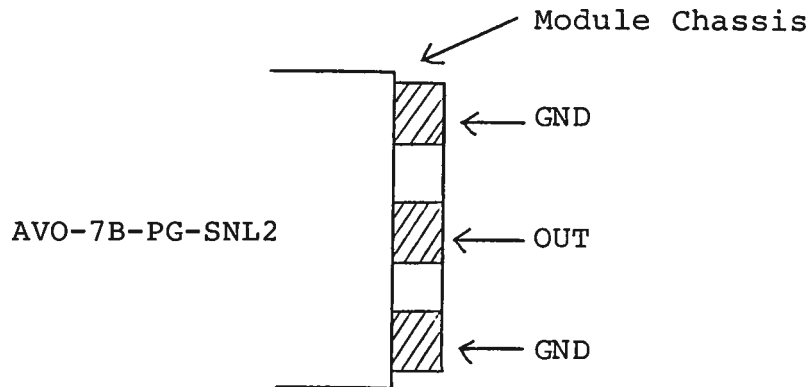
Fig. 1

PULSE GENERATOR TEST ARRANGEMENT

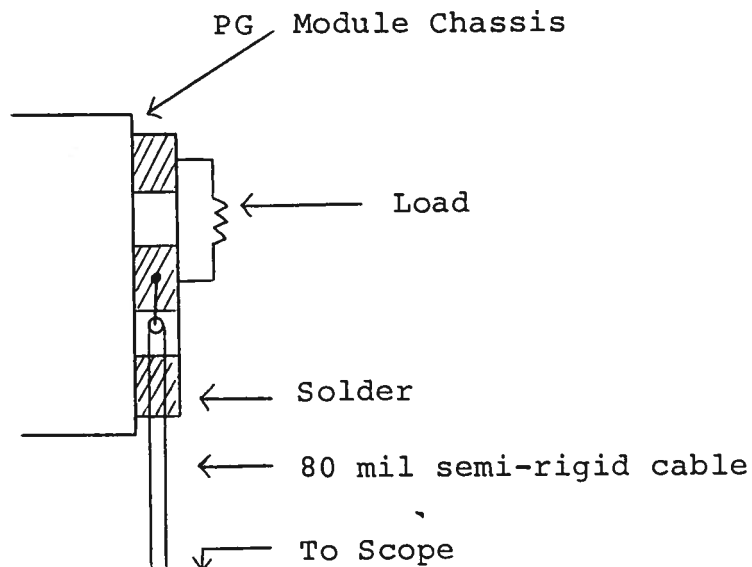


GENERAL OPERATING INSTRUCTIONS

- 1) The equipment should be connected in the general fashion shown above. Since the AVO unit provides an output pulse rise time as low as 100 nsec a fast oscilloscope (at least 50 MHz and preferably 200 MHz) should be used to display the waveform.
- 2) With the rear panel KEY SAFETY LOCK in the OFF position the output terminals of the AVO-7B-SNL-PG module are shorted by a set of relay contacts. In addition, the prime DC power to the final output stage is removed. These two features ensure that the AVO-7B-C-SNL pulse generator can not provide an output pulse if the key is removed or in the OFF position even if the instrument is turned on. With the key in the ON position the short across the output terminals is removed and the prime DC power to the final output stage is reconnected.
- 3) The sync output channel provides TTL level signals. To avoid overdriving the TRIG input channel of some sampling scopes, a 30 db attenuator should be placed at the input to the sampling scope trigger channel.
- 4) To obtain a stable output display the PRF and PRF FINE controls on the front panel should be set mid-range. The front panel TRIG toggle switch should be in the INT position. The front panel DELAY control 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 and PRF FINE controls. The main output is delayed with respect to the SYNC output by about 0 to 1 usec depending on the DELAY control setting.
- 5) 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 ($\ll 0.5$ cm). The voltage across the load may be monitored by connecting a length of 80 mil semi-rigid 50 ohm cable as shown below (or by means of a high impedance scope probe):

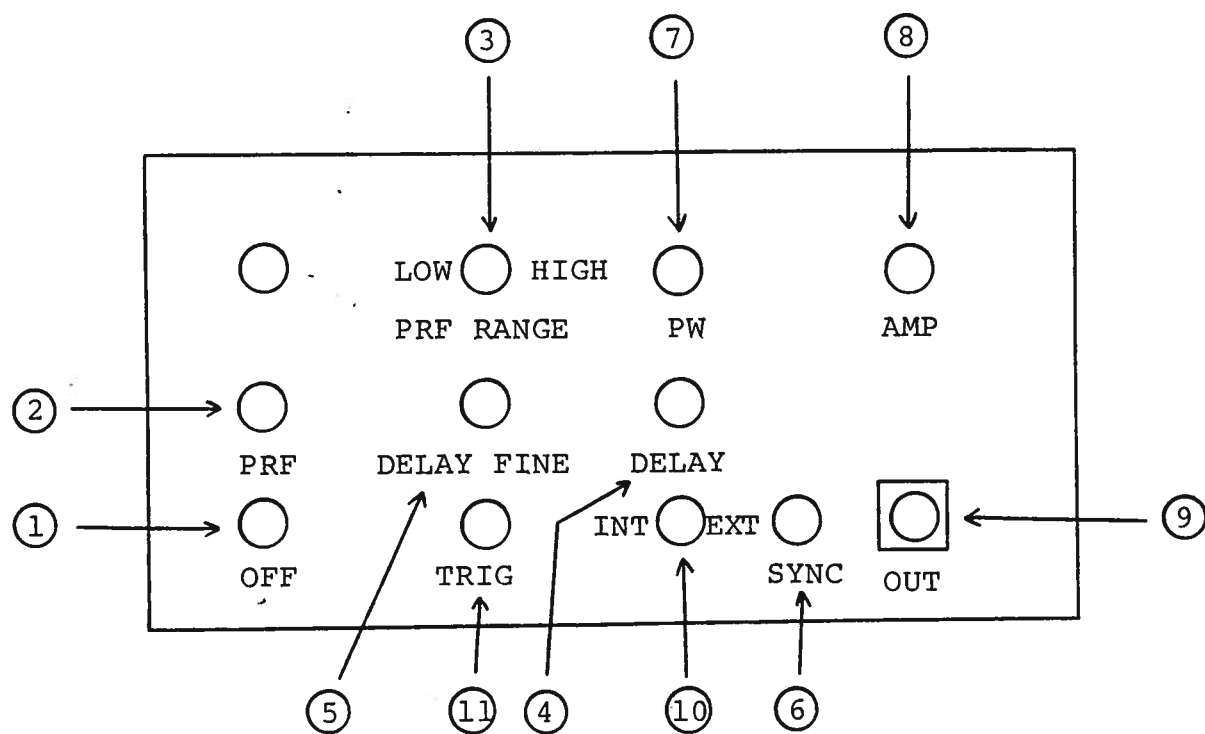


Take care to insure that during soldering the OUT conductor is not shorted to the chassis. Also, use minimal heat when soldering.

- 6) The output pulse width is controlled by the front panel ten turn PW control.
- 7) The output amplitude is controlled by the front panel ten turn AMP control.
- 8) To voltage control the output pulse width, remove the jumper wire between banana plugs A and B on the back panel and apply 0 to +10V to connector B ($R_{IN} \geq 10K$). (option).
- 9) To voltage control the output amplitude, remove the jumper wire between banana plugs A and B on the back panel and apply 0 to +10V to connector B ($R_{IN} \geq 10K$). (option).
- 10) At max output pulse width and amplitude, the unit will operate at PRF as high as 10 Hz. For pulse width less than 20 usec, the unit will operate at PRF as high as 100 Hz. If the above PRF ratings are exceeded the realizable maximum output amplitude will decrease and in severe cases lead to the failure of the output switching elements (see REPAIR SECTION).

Fig. 2

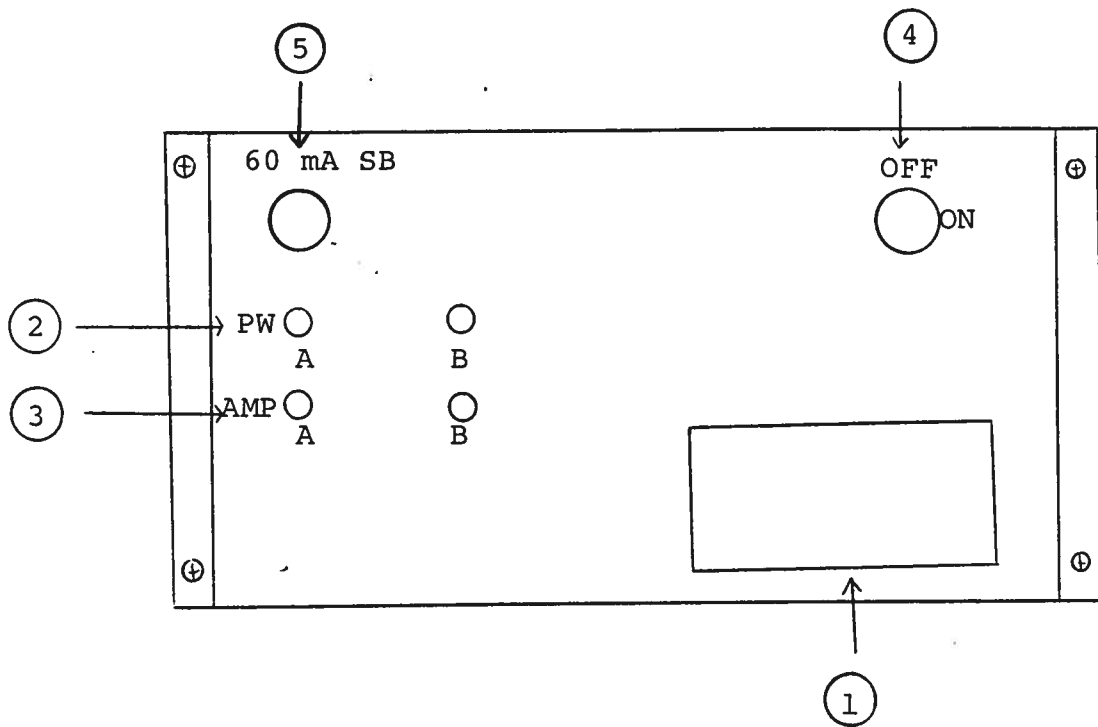
FRONT PANEL CONTROLS



- (1) ON-OFF Switch. Applies basic prime power to all stages.
- (2) PRF Control. Varies PRF from about 0.2 Hz to about 10 Hz (LOW range) and 2 Hz to 100 Hz (HIGH range). The operating PRF should be set using a scope. Note that at max PW and output amplitude, the PRF should not exceed 10 Hz.
- (3) PRF Control. Varies PRF from about 0.2 Hz to about 10 Hz (LOW range) and 2 Hz to 100 Hz (HIGH range). The operating PRF should be set using a scope. Note that at max PW and output amplitude, the PRF should not exceed 10 Hz.
- (4) DELAY Control. Controls the relative delay between the reference output pulse provided at the SYNC output (6) and the main output (9). This delay is variable over the range of 0 to about 1 usec.
- (5) DELAY Control. Controls the relative delay between the reference output pulse provided at the SYNC output (6) and the main output (9). This delay is variable over the range of 0 to about 1 usec.
- (6) SYNC Output. This output precedes the main output (9) and is used to trigger the sampling scope time base. The output is a TTL level 100 nsec (approx.) pulse capable of driving a fifty ohm load.
- (7) PW Control. A ten turn control which varies the output pulse width from 2 to 200 usec.
- (8) AMP Control. The output pulse amplitude is controlled by means of the ten turn potentiometer (AMP).
- (9) OUT Connector. A multi pin connector which attaches the 6 foot cable from the pulse generator module to the main frame.
- (10) EXT-INT Control. With this toggle switch in the INT position, the PRF of the AVD unit is controlled via an internal clock which in turn is controlled by the PRF controls. With the toggle switch in the EXT position, the AVD unit requires a 0.2 usec 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.
- (11) TRIG Input. The external trigger signal is applied at this input when the EXT toggle switch is in the EXT position. The output pulse appears about 60 nsec after the application of the TRIG pulse.

Fig. 3

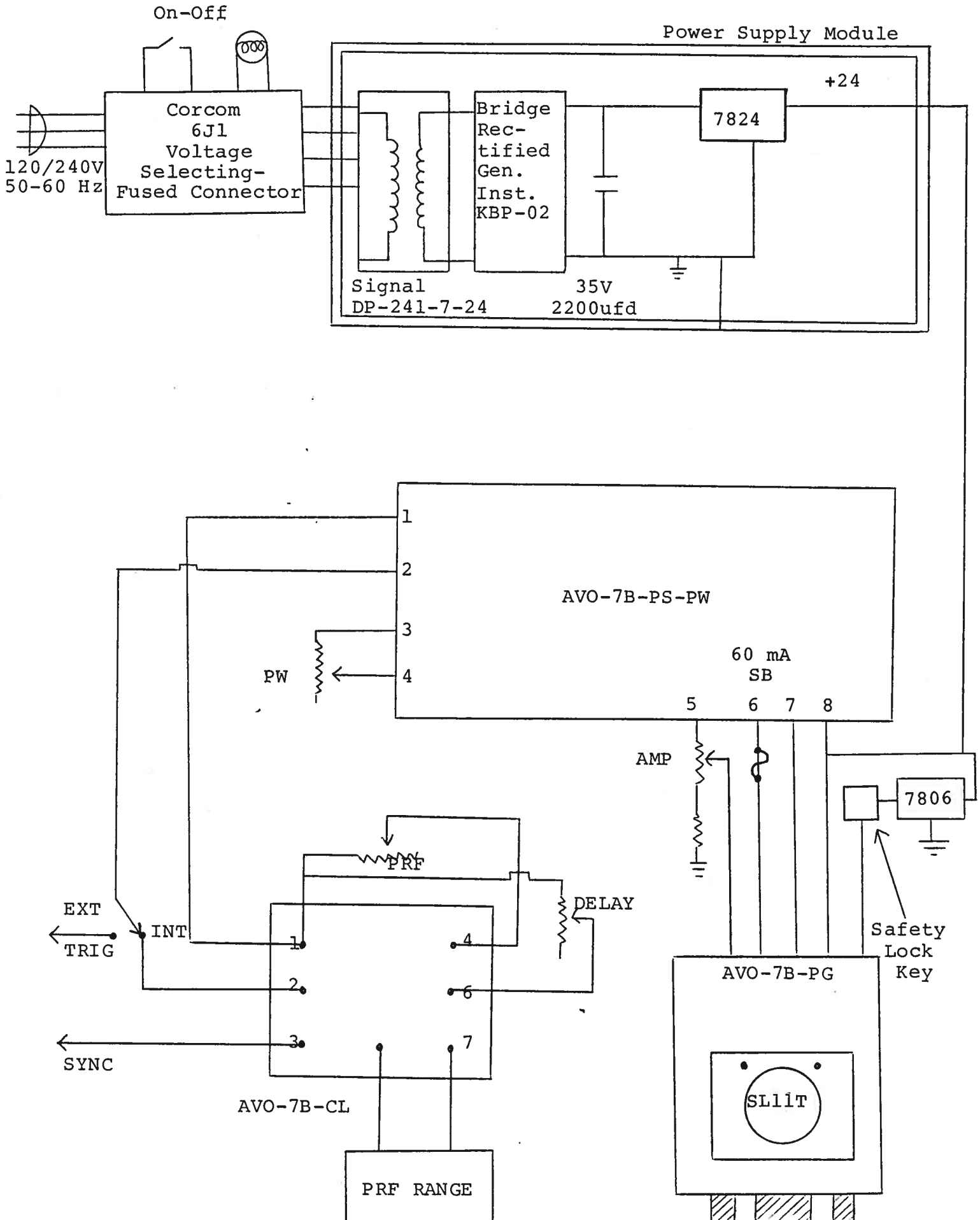
BACK PANEL CONTROLS



- (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.
- (2) To voltage control the output pulse width, remove the jumper wire between banana plugs A and B and apply 0 to +10V to connector B ($R_{IN} \geq 10K$).
- (3) To voltage control the output amplitude, remove the jumper wire between banana plugs A and B and apply 0 to +10V to connector B ($R_{IN} \geq 10K$).
- (4) KEY SAFETY LOCK. With the KEY SAFETY LOCK key in the OFF position the output terminals of the AVO-7B-SNL-PG module are shorted by a set of relay contacts. In addition, the prime DC power to the final output stage is removed. These two features ensure that the AVO-7B-C-SNL pulse generator can not provide an output pulse if the key is removed or in the OFF position even if the instrument is turned on. With the key in the ON position the short across the output terminals is removed and the prime DC power to the final output stage is reconnected.
- (5) 60 mA SB FUSE. Protects output stage against overload conditions.

Fig. 4

SYSTEM BLOCK DIAGRAM



SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVO-7B-C unit consists of the following basic modules:

- 1) AVO-7B-PG-SNL2 pulse generator module
- 2) AVO-7B-CL clock module
- 3) +24V power supply board
- 4) AVO-7B-PS-PW power supply-pulse width control module

The modules are interconnected as shown in Fig. 4.

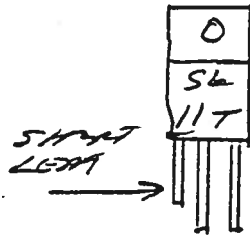
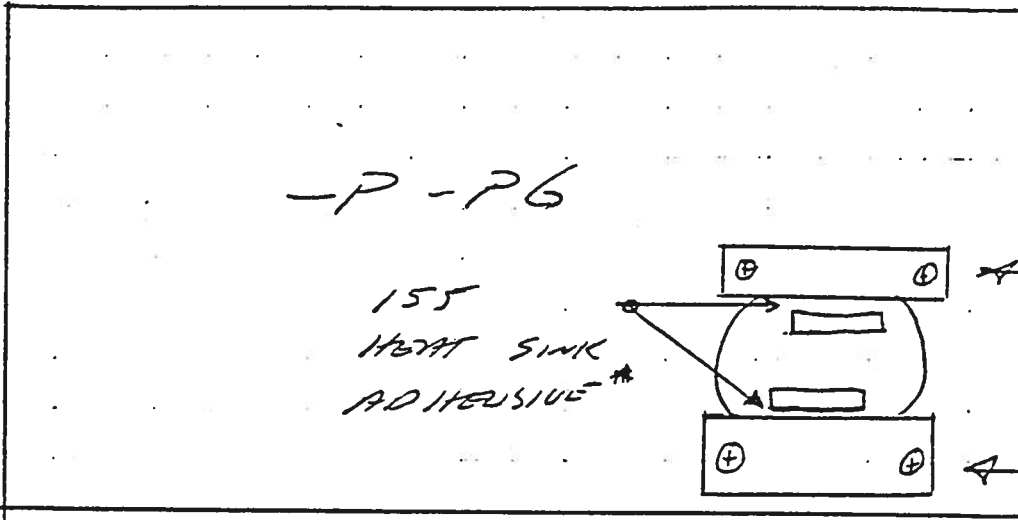
In the event of an instrument malfunction, it is most likely that the 60 mA slow blow fuse or the main power fuse on the rear panel has blown. Replace if necessary. If the unit still does not function, it is most likely that some of the output switching elements (SL11T) may have failed due to an output 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 SL11T tabs to discharge the 60 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 AVO-7B-PG module. The SL11T 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 SL11T 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 SL11T elements are electrically isolated from the small aluminum heat sinks but are bonded to the heat sinks using WAKEFIELD TYPE 155 HEAT SINK ADHESIVE. 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 the operation of the clock and power supply modules checked. The clock module is functioning properly if:

- a) 0.1 usec TTL level outputs are observed at pins 2 and 3.
- b) The PRF of the outputs can be varied over the range of 0.2 Hz to 100 Hz using the PRF controls.
- c) The relative delay between the pin 2 and 3 outputs can be varied by at least 1 usec by the DELAY control.

The sealed clock module must be returned to Avtech for repair or replacement if the above conditions are not observed.

AVO-B-C

SLIT HEAT SINK



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July 10, 1987.

Larry Weirick
Div. 2514
Sandia National Labs
Albuquerque, NM 87185

Dear Larry:

With reference to our recent telephone conversations, I am pleased to offer a price and delivery quotation for a special purpose pulse generator meeting the following specifications:

Model designation:	AVO-7B-C-SNL2.
Output amplitude:	0 to +30 amperes to one ohm load via ten turn dial locking control.
Output impedance:	≥ 10 ohms.
Load voltage range:	0 to 30 volts.
Pulse width:	Variable from 2 to 200 usec via ten turn dial locking control.
Input trigger:	May be triggered externally using a TTL pulse, 50 nsec or wider. Output PRF equals input PRF. Also contains own internal clock.
Rise time:	≤ 0.5 usec.
Fall time:	≤ 2 usec.
PRF:	3 to 30 Hz (internal clock). 0 to 30 Hz (external clock). (Specifically designed for use at 1 Hz).

Other: a) Includes keyed safety lock which controls relay which places short circuit across output terminals and removes prime power from output stage.

b) Basic system format as per AVO-7C-C, page 52-53, Cat. No. 7.

Price: \$4,400.00 US each, FOB Destination.

Delivery: 60 days ARO. (Before Sept. 30).

Terms: 2% 10, Net 30 days.

Shipping: Transport via Emery Air Freight included in above price.

I hope that the above specifications adequately address your application and that you will call me again if you require any modifications or clarifications.

Yours truly,

Walter J. Chudobiak
Chief Engineer

WJC:vb

Schroff

09.16.87

-EW

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