See Revised Copy of Jan 31 used for SRI

AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS
ENGINEERING – MANUFACTURING

P.O. BOX 265
OGDENSBURG
NEW YORK
13669
(315) 472-5270

BOX 5120, STN. "F"
OTTAWA, ONTARIO
CANADA K2C 3H4
TEL: (613) 226-5772
FAX: (613) 226-2802
TELEX: 053-4591

INSTRUCTIONS

MODEL AVO-5-C-P-DSRCA1-SP 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

(PW = 3 TO 20 NS)

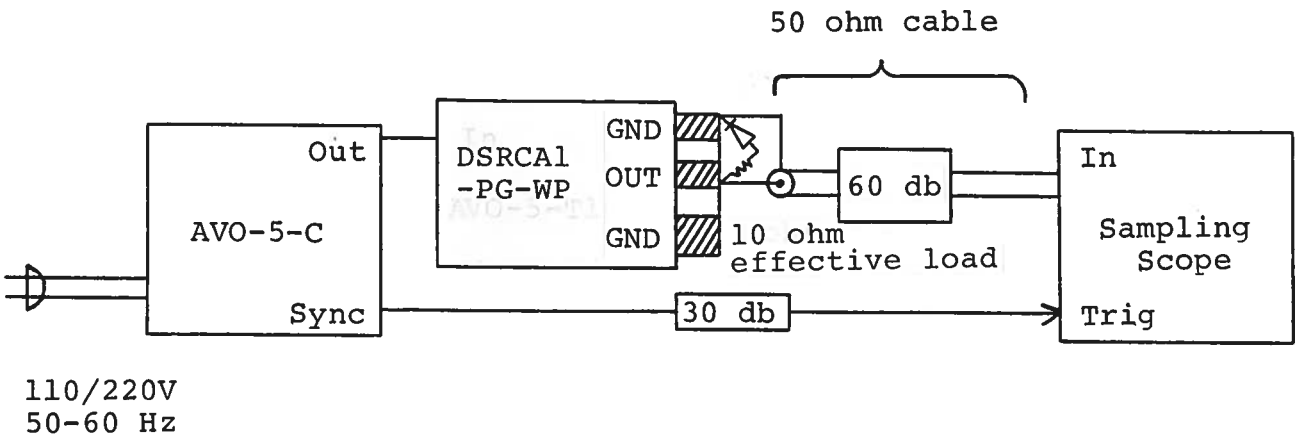
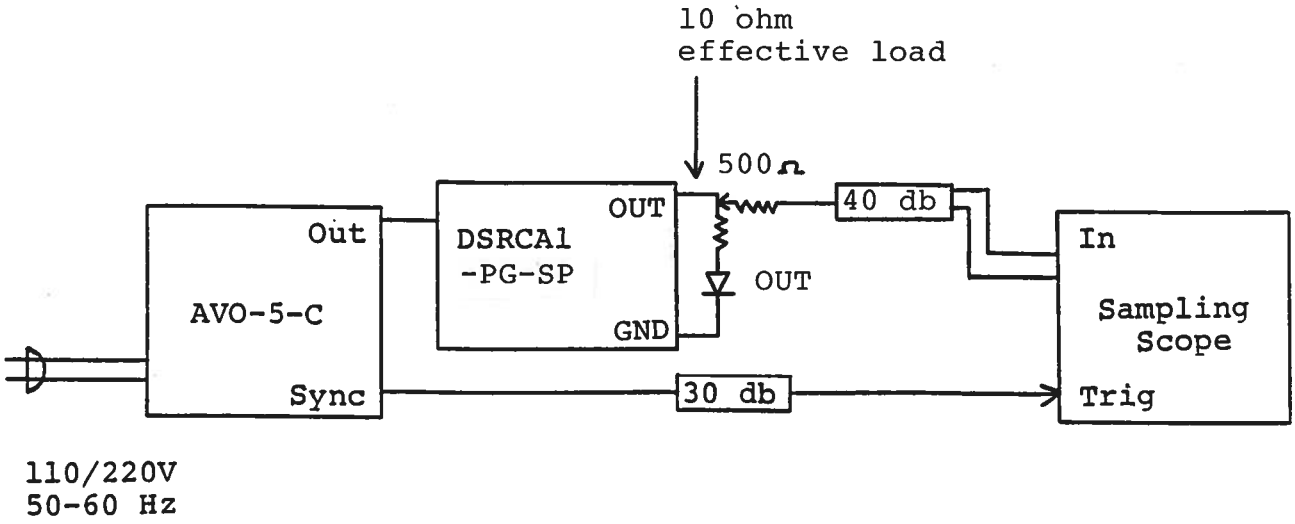


Fig. 1A PULSE GENERATOR TEST ARRANGEMENT

(PW = 1.5 NS)



PW = 3 TO 20 NS

1) Set front panel MODE switch in WP position.

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

3) The use of 60 db attenuator at the sampling scope vertical input channel will insure a peak input signal to the sampling scope of less than one volt.

4) The TRIG 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.

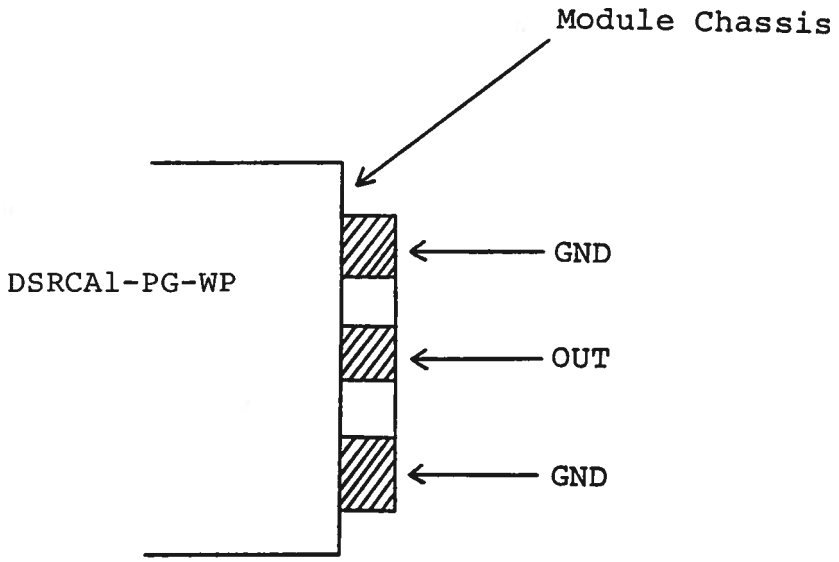
5) To obtain a stable output display the PRF controls should be set mid-range. The front panel TRIG toggle switch should be in the INT position. The front panel DELAY control and the scope triggering controls are then adjusted to obtain a stable output. The scope may then be used to set the desired PRF by rotating the PRF controls. The main output is delayed with respect to the SYNC output by about 0 nsec to 100 usec depending on the DELAY control setting. For initial triggering of a sampling scope, the delay should be in Range 1 (near min).

6) The output pulse width is controlled by means of the front panel one turn PULSE WIDTH WP control. The control should initially be set maximum clockwise and the pulse width adjusted using an oscilloscope.

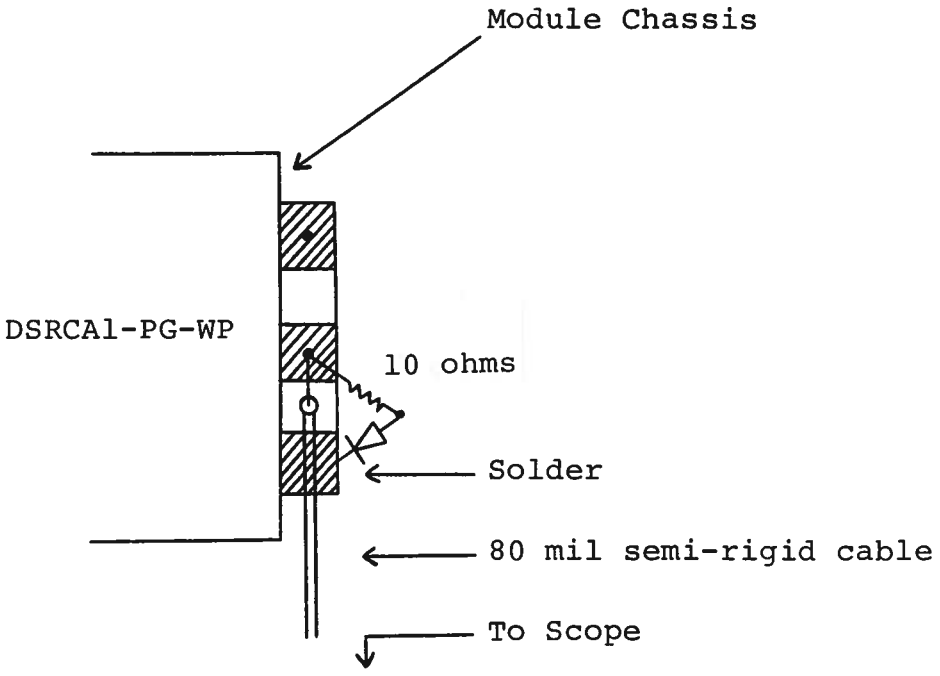
7) The output pulse amplitude is controlled by means of the one turn potentiometer AMPLITUDE WP.

8) An external clock may be used to control the output PRF of the AVO unit by setting the front panel TRIG toggle switch in the EXT position and applying a 0.2 usec (approx) 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 SYNC output. WARNING: Model AVO-5 may fail if triggered at a PRF greater than 20 KHz.

9) The DSRCA1-PG-WP output module connects to the mainframe via five 50 ohm miniature coaxial cables approx. 2 feet in length. The output terminals of the transformer 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 diode and series resistor (to produce combined series rise times of about 10 ohms) should be connected between the OUT and GND terminals using very short leads (≪ 0.2 cm). The voltage across the resistor-diode load may be monitored by connecting a length of 80 mil semi-rigid 50 ohm cable as shown below (note that this voltage is as high as 200 volts):



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

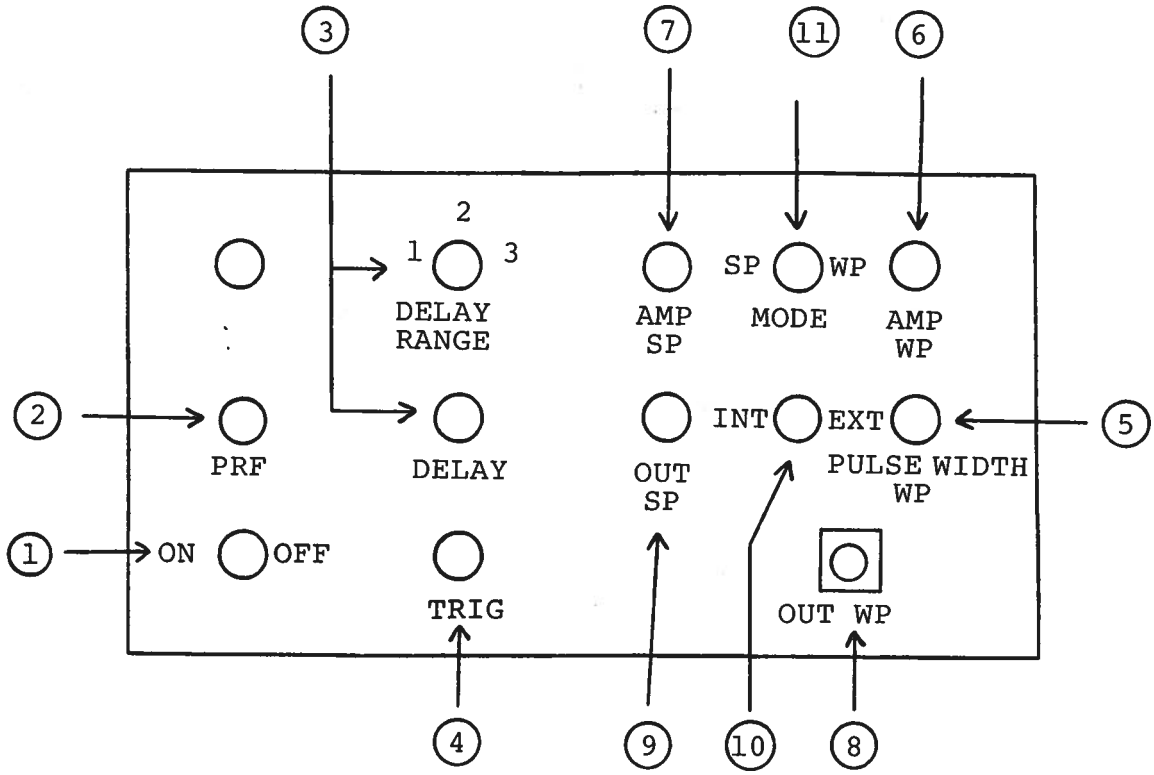
10) NOTE: The lifetime of the switching elements in the pulse generator module is proportional to the running time of the instrument. For this reason the prime power to the instrument should be turned off when the instrument is not in use. In the case of failure, the switching elements are easily replaced following the procedure described in the following section.

PW = 1.5 NS

1) Set front panel mode switch in SP position. Output amplitude is now controlled by AMPLITUDE SP one turn control (and by series load resistance).

2) Connect load to DSRCA1-PG-SP output terminal as shown in Fig. 1A. Note that lead lengths must be extremely low ($\ll$ 0.2 cm). The diode current can be controlled by the AMPLITUDE SP pot and by the resistance placed in series with the diode. The total resistance presented to the -PG-SP output terminal may be as low as several ohms.

Fig. 2 FRONT PANEL CONTROLS



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

(2) PRF Control. Varies PRF in combination with rear panel HIGH-LOW switch as follows:

LOW:	100 Hz	to 1	KHz
HIGH:	1 KHz	to 10	KHz

(3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) and the main outputs (8) and (9) as follows:

1) 0 to 1 us
2) 1 us to 10 us
3) 10 us to 100 us

(4) TRIG Output. This output precedes the main outputs (8) and (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.

(5) PULSE WIDTH WP Control. A one turn control which varies the output pulse width from 3 to 20 nsec (-WP mode).

(6) AMP WP Control. The pulse amplitude at DSRCA1-PG-WP output is controlled by means of the one turn potentiometer from 50 to 200 volts to 10 Ω (-WP mode).

(7) AMP SP Control. Controls output amplitude at output of DSRCA1-PG-SP module from about 75 to 150 volts (to 5 to 10 ohms).

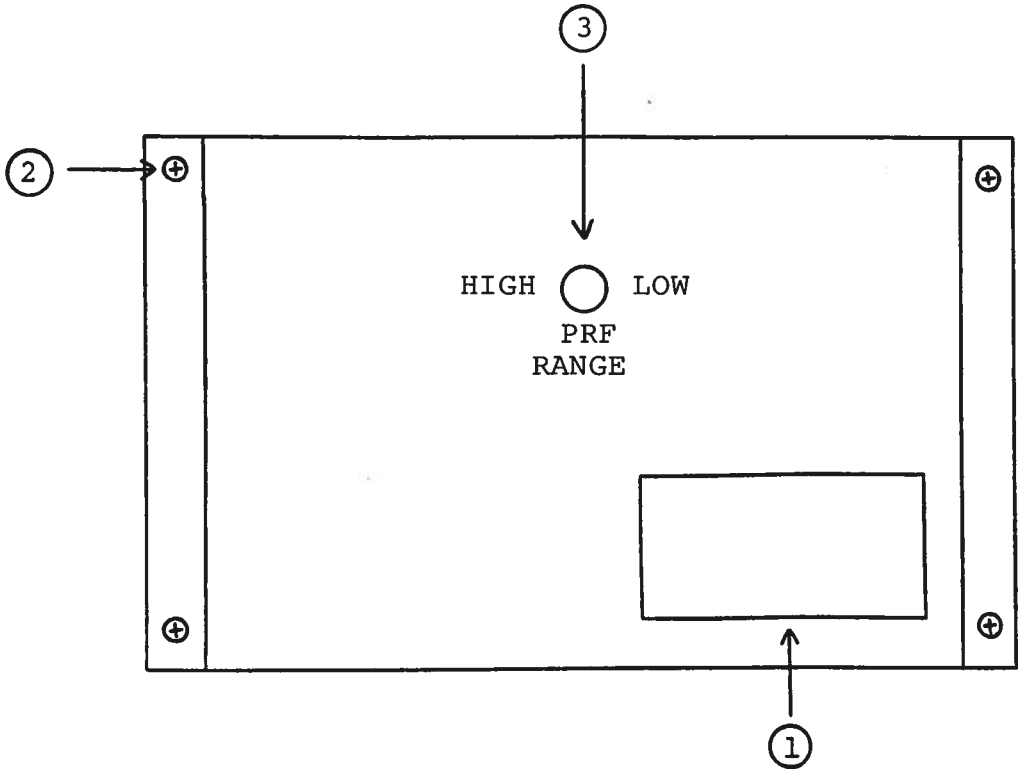
(8) OUT WD Connector. Five parallel SMA connectors provide output to DSRCA1-PG-WP module.

(9) OUT SP Connector. 5 pin cable to DSRCA1-PG-SP output module.

(10) EXT-INT Control. With this toggle switch in the INT position, the PRF of the AVO 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 AVO 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) SP-WP Mode Switch. Two position switch activates either -SP or -WP output modules.

Fig. 3 BACK PANEL CONTROLS



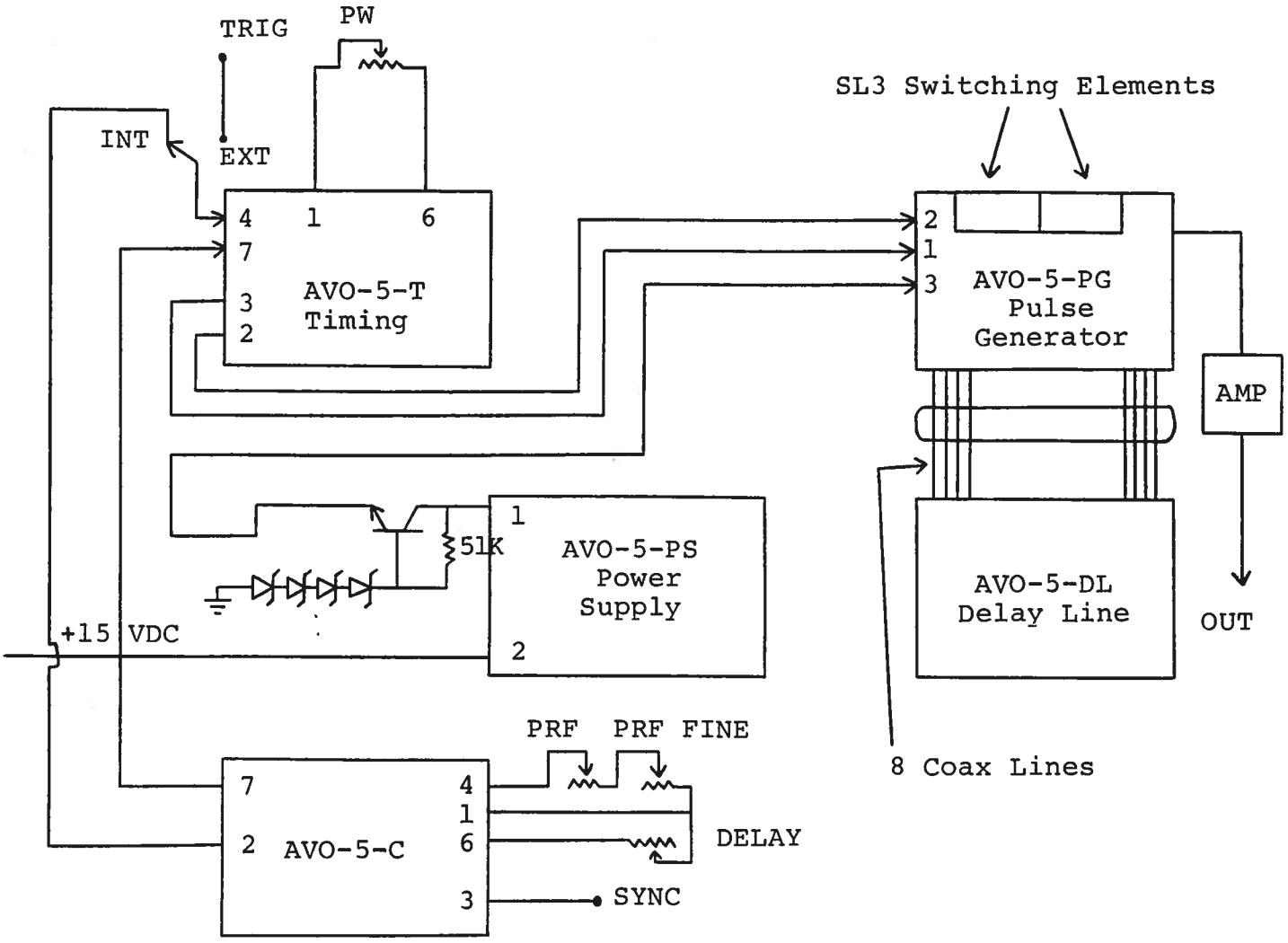
(1) FUSED CONNECTOR, VOLTAGE SELECTOR. The detachable power cord is connected at this point. In addition, the removable cord is adjusted to select the desired input operating voltage. The unit also contains the main power fuse.

(2) COVER SCREWS. To remove top lid of instrument, remove four Phillips screws and slide top lid back to expose interior.

(3) PRF RANGE. In concert with front panel PRF control, varies PRF as follows:

LOW:	100	Hz	to 1	KHz
HIGH:	1	KHz	to 10	KHz

Fig. 4 System Block Diagram With Wiring and Pin Connections



Notes:

1) All module chassis are grounded to main chassis and to each other via separate ground lines.

2) WARNING: The line connecting pin 1 of AVO-5-PS to pin 3 of AVO-5-PG is at a potential of 360 to 380 volts.

REPAIR PROCEDURE

1) WARNING: Before attempting any repairs, note that potentials as high as 400 volts are employed in the chassis structure.

2) The pulse generator is constructed from the following basic subsystems or modules:

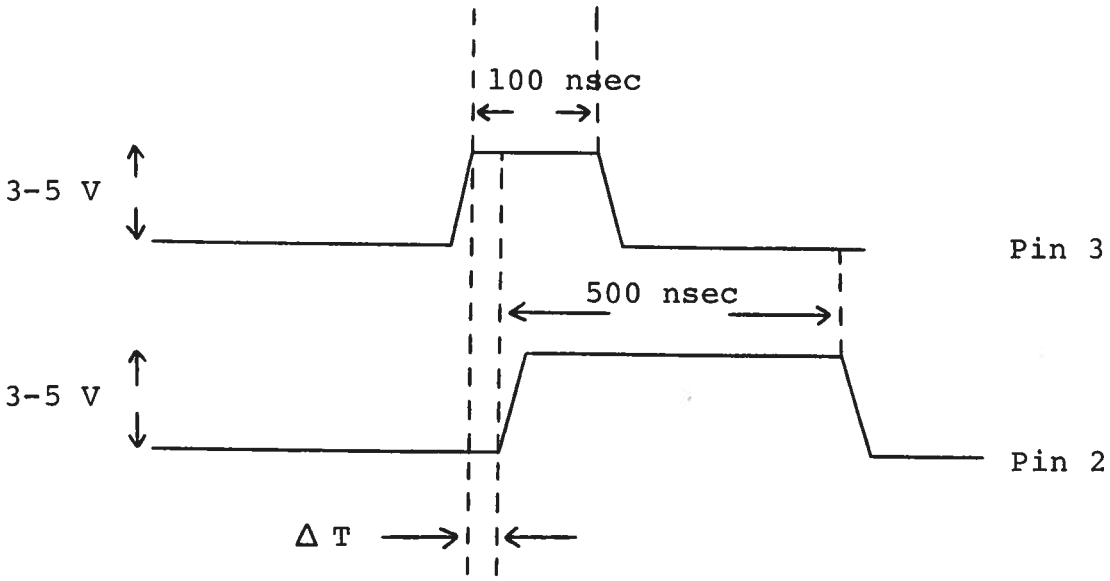
   a) Metal chassis
   b) Pulse generator module (AVO-5-PG)
   c) Delay line module (AVO-5-DL)
   d) Timing module (AVO-5-T)
   e) Power supply module (AVO-5-PS)
   f) Clock module (AVO-5-C)

   The five modules are interconnected as shown in Fig. 4.

3) If no output pulse is provided by the AVO-5 unit, turn off the prime power supply and remove the top cover panel by removing the four Phillips screws on the back of the instrument (see Fig. 3). Apply a scope probe or voltmeter to pin 3 of the AVO-5-PG unit. With the unit untriggered, turn on the prime power supply. A voltage of about 360 to 380 volts should be read at pin 3. Alternatively, the voltage may be measured on the cases of the SL3 switching elements. If the voltage is zero or much less than 360 volts, then one of the switching transistors (Part No. SL3) in the AVO-5-PG module has probably failed. With the prime power supply off remove one of the transistors by removing the two 2-56 screws which secure the transistor in its socket. CAUTION: Before touching or removing the transistor, the cases should be briefly shorted to the instrument case to discharge charged capacitors (as high as 400 volts). Pull the transistor out of the socket. With the unit untriggered turn on the prime power supply and measure the voltage from the case of the remaining transistor to ground. If this voltage is about 360 to 380 volts then the transistor which was removed is defective and should be replaced. If the voltage which is measured is less than 360 volts then the transistor still in position is defective and should be replaced.

   Note that the two transistors are completely interchangeable (Order Avtech Part No. SL3). Note that with both transistors removed, the voltage at pin 3 on the AVO-5-PG module should be in the range of 360 to 380 volts. If the voltage is less then the AVO-5-PS module must be replaced.

If both the AVO-5-PS module and the AVO-5-PG module are not found to be defective then the AVO-5-T module is suspect. Connect one scope probe to pin 3 of the -T module and a second probe to pin 2 of the -T module. With the scope triggered externally by the pulse generator providing the trigger input signal to the AVO unit, the waveform at pins 2 and 3 of the -T module should resemble:

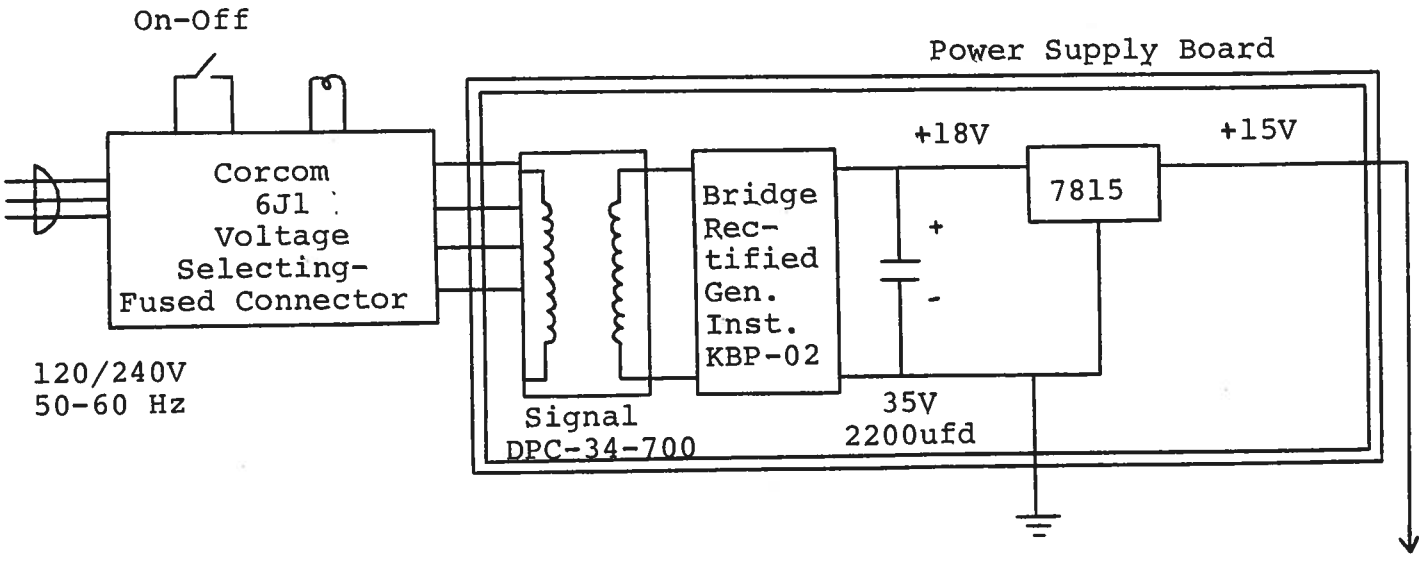


T MODULE WAVEFORMS

As the PW pot is varied over its full range ΔT should vary from about 0 to approximately 100 nsec. If the waveforms at pins 2 and 3 do not resemble the above, then the -T module is defective and should be replaced. If the waveforms do resemble the above then the -PG module is at fault and should be replaced.

Replacement modules should be ordered by part No. (eg. AVO-5-PG) from Avtech.

Fig. 6 +15 V POWER SUPPLY BOARD



+15 VOLT POWER SUPPLY

The AVO-5-C consists of the five standard modules and a power supply board which supplies +15 volts (600 mA max) to the pulse generator modules. In the event that the AVO-5-C unit malfunctions, remove the instrument cover by removing the two screws on each side of the unit, thereby exposing the modules. Measure the voltage at the +15 V pin of the PS module. If this voltage is substantially less than +15 volts, unsolder the line connecting the power supply board output and connect a 50 ohm 10 W load to the power supply output. The voltage across this load should be about 15 V DC. If this voltage is substantially less than 15 volts the power supply board is defective and should be repaired or replaced. If the voltage is near +15V then see instructions in preceding section.

Schroff 01.25.91