INSTRUCTIONS

MODEL AVO-6C-C-OP1 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 assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

TECHNICAL SUPPORT

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(MANUAL FRONT PANEL CONTROL)

START-UP CHECK LIST

1) The instruction manual has been studied thoroughly.

2) The -PG module is connected to the mainframe.

3) The load is connected to the output module. If the load is a diode, the anode of the load is connected to the OUT terminal. Note that with a diode load, a current limiting high power resistor must be placed in series with the diode to help limit the peak current. For initial testing, it is recommended that a resistive load be used. Factory tests are conducted using a 0.1 Ohm 4000 Watt resistive load.

4) The user-supplied lab power supply is connected with the positive terminal connected to the red SUPERCON on the PG module and the negative terminal connected to the black SUPERCON. The negative terminal is grounded. The power supply potential is set to zero.

5) Set the mainframe pulse width controls at the approximate desired values and apply a TTL trigger pulse (>50 ns) to the BNC connector (while insuring that the duty cycle is less than 10%).

6) Set the INT-EXT switch on INT.

7) Connect the rear panel M output to the scope (1 VOLT/DIV) and connect the TRIG out to the scope time base.

8) Turn on the prime power to the mainframe. The scope time base should be triggering.

9) Connect a scope probe across the resistive test load and apply prime power to the lab power supply (after first insuring that the output amplitude is set to zero).

10) Gradually increase the output amplitude on the lab power supply and observe the waveforms on the scope and the DC current level on the DC power supply. A rectangular pulse should appear on the scope (for both the load voltage and monitor channels) and the amplitude should increase as the amplitude control on the mainframe is rotated clockwise. At the same time, the average current supplied by the DC supply will increase. Observe the pulse width and pulse period on the scope and confirm that the duty cycle does not exceed 10% and that the peak current does not exceed 500 Amps (i.e. 0.5 Volts out from the monitor output).

11) Observe the DC current supplied by the DC supply and insure that the average current does not exceed 100 Amperes.

12) Adjust pulse width, pulse period (i.e. PRF) and amplitude to obtain the desired settings.

13) If additional assistance is required:

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10)

FIG 2. PULSE GENERATOR TEST ARRANGEMENT

(AVO-6C-T OUTPUT MODULE CONNECTED)

TEST ARRANGEMENT

1) A general description of the AVO-6C-T module is given in Fig. 3.

2) The AVO-6C-T module should be connected to the AVO-6C-C mainframe via the supplied 24" RG174 cable.

3) The laser diode is solder-connected between the OUT and GND terminals on the side of the AVO-6C-T module.

4) The mainframe provides a voltage pulse of up to 200 Volts to the 40 Ohms in series with the laser diode in the AVO-6C-T module (to provide a maximum current of 5 Amperes).

5) The M out port provides a voltage pulse (V_M) which is 0.1 of the amplitude of the voltage pulse applied to the input of the AVO-6C-T module. The voltage V_M (Volts) and diode current I_D (Amps) are related as follows:

$$I_D = \frac{10\ V_M - V_F}{40}$$

V_F = laser diode ON voltage, typically 2 Volts.

6) The diode current may be monitored using a current probe (such as the TEKTRONIX CT-1, CT-2 series) or it may be monitored by placing a one Ohm resistor (to ground) in series with the laser diode. However, with this arrangement, the output waveform will exhibit pronounced overshoot and undershoot (but the amplitude and pulse width reading will be valid).

FIG 3: AVO-6C-T

FRONT PANEL CONTROLS

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

(2) PRF Control. Varies PRF from 1 Hz to 10 kHz as follows:

Range 1	1 Hz to	10 Hz
Range 2	10 Hz to	100 Hz
Range 3	100 Hz to	1 kHz
Range 4	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 output (5). This delay is variable over the range of 0 to about 1.0 us (Range 1) or 1.0 to 5.0 us (Range 2). 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.

(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.

(5) OUT Connector. SMA connector provides output to AVO-6C-T module (200 Volts to 40 Ohms).

(6) PW Control. A pot control and two position range switch which vary the output pulse width from 50 ns to 0.5 us and 0.5 us to 5.0 us. CAUTION: The output duty cycle must not exceed 1%. For example, for pulse width of less than 1 us, the PRF may be as high as 10 kHz. However, for pulse width of 5 us, the PRF must not exceed 2 kHz.

(7) AMP Control. A pot control which varies the output pulse amplitude from 0 to 200 V to a 40 Ohm load.

(8) 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 50 ns (or wider) 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.

(9) OVERLOAD INDICATOR. AVO 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 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 5: Back Panel Controls

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) LOCAL REMOTE SWITCH. This two-position switch must be in the LOCAL position to operate this instrument from the front panel controls. To control the instrument using your personal computer, the switch must be in the REMOTE position.

(4) OP1 CONNECTOR. GPIB cable (supplied) connects between this connector and your personal computer.

(5) GATE. The application of a +5 VDC level to this BNC connector inhibits the output pulse (option).

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).

SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVO-6C-C consists of the following basic modules:

1) AVO-6C-PG pulse generator module
2) +24V power supply board
3) -PS power supply module
4) AVO-OL overload module
5) OP1 Interface controller PCB

The modules are interconnected as shown in Fig. 5. The OP1 PCB module controls the output PRF and the relative delay between the main output and the TRIG outputs. The PG pulse generator module generates the output pulse. In the event of an instrument malfunction, it is most likely that the rear panel 1.0A SB fuse or some of the output switching elements (SL9T, SL23T) 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 SL9T and SL23T are selected VMOS power transistors in TO 220 packages and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL9T and SL23T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the black dot on the chassis. CAUTION: The SL9T element must be placed adjacent to the single black dot while the SL23T element must be placed adjacent to the double black dot. 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 10 kHz using the PRF controls.
c) The relative delay between the pin 2 and 3 outputs can be varied by at least 5 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.