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SINCE 1975

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INSTRUCTIONS

MODEL AVN-3-C-P-ATT2 LASER DIODE DRIVER

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.

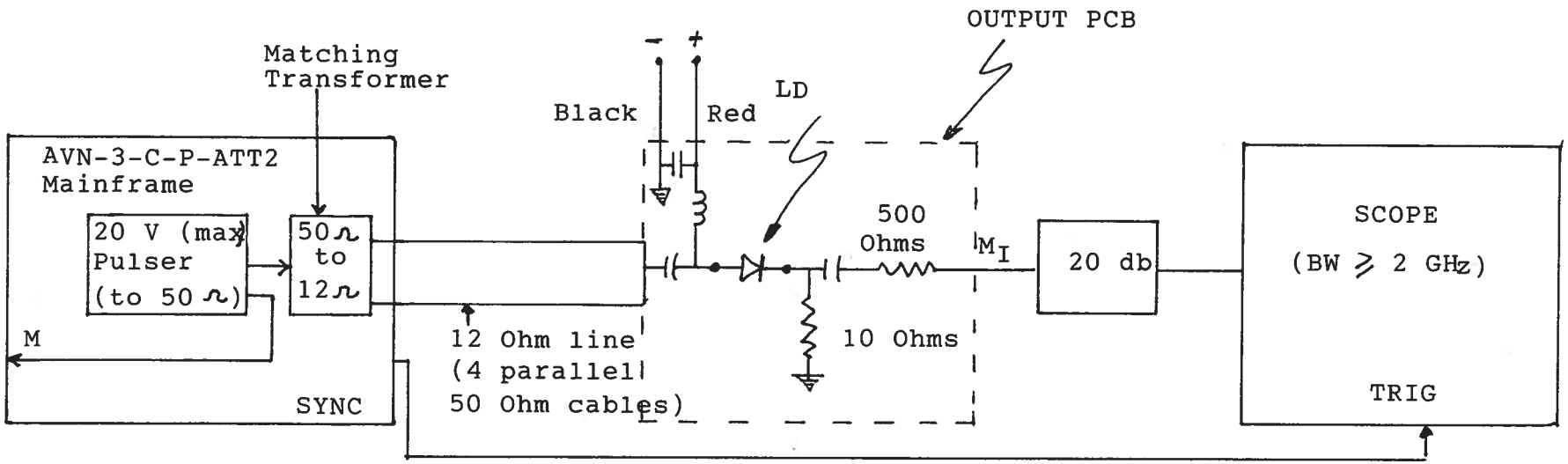


Fig. 1: General test arrangement

A) Basic Theory

Model AVN-3-C-P-ATT2 consists of a mainframe instrument (4" x 8" x 12") which powers 4 parallel 50 Ohm cables which in turn connect to a 1.5" x 1.5" output PCB module into which the laser diode is socket mounted. The mainframe contains a pulser module which generates pulses with a maximum amplitude of 20 Volts to a 50 Ohm load. This pulse is transformed to a maximum output amplitude of 10 Volts to 12 Ohms (835 mA max) by a matching transformer in the output stage of the mainframe. Note that the 20 Volt pulse may be monitoring using the rear panel M output SMA which provides an attenuated (x10) replica of the pulse (to 50 Ohms). The output of the matching transformer is connected to the four 50 Ohm parallel cables (12 Ohms) which protrude from the mainframe front panel. The 12 Ohm transmission line is effectively terminated in a load consisting of the laser diode (typically 2 Ohms) and the 10 Ohm current sensing resistor. For an assumed maximum input voltage of 10 Volts, this would a peak diode current of 835 mA. The diode current waveform may be monitored or observed at the MI port. The 500 Ohm resistor attenuates the amplitude of the voltage across the 10 Ohm resistor by a factor of ten. The voltage at the M_I port (V_{MI}, Volts) and the diode current (I_D, Amps) are related as follows:

$$I_D = V_{MI}$$

A forward DC bias may be applied to the laser diode by a DC potential applied between the red and black leads as shown in Fig. 1. This current should not exceed 200 mA and is given by (approx):

$$I_{BIAS} = \frac{V_{DC} - 1.5}{10}$$

B) Basic Operating Instructions

1) Insert the diode into the socket assembly. The diode is inserted into the side marked LD.

2) Connect the M_I port to a very fast scope (BW > 2 GHz, R_{IN} = 50 Ohms) using a 20 db attenuator. With a peak diode current of 800 mA, the scope will display 80 mV. Connect the SYNC out BNC converted on the mainframe to the TRIG In port of the scope.

3) Connect a DC supply between the red and black leads and vary the voltage between 0 and +3 Volts. A maximum DC current of about 150 mA should result.

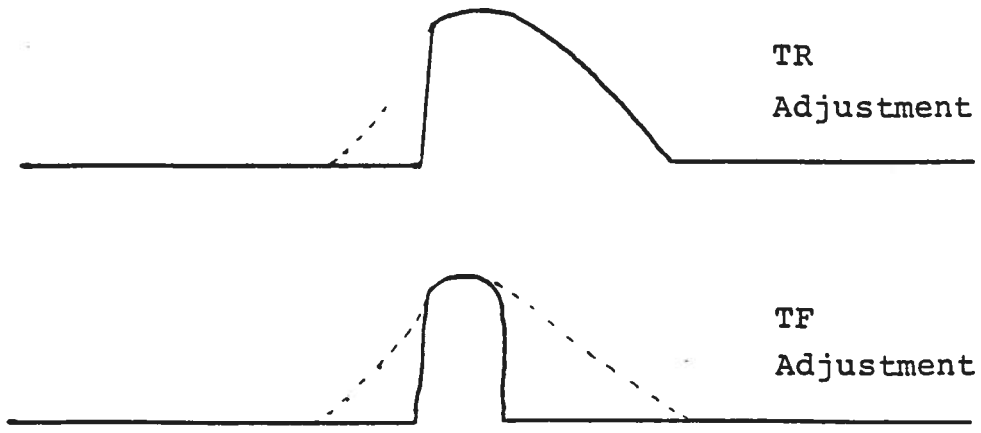
4) With the prime power off, set the mainframe controls as follows:

   - AMP control fully counter-clockwise.
   - TR control mid range and the T_F control fully clockwise.
   - IN-EXT switch in the INT position.
   - PRF range in the 200 MHz position and the PRF control in mid range (for a PRF of about 150 MHz).

5) Turn on the prime power (to the mainframe) and confirm that the scope time base is being triggered. Rotate the AMP control to about 3. The CRT display should resemble the following:

If necessary, adjust the scope triggering controls to stabilize the display and adjust the PRF control to obtain the desired PRF.

6) Having obtained a display of the form shown above, the desired pulse width is then obtained by adjusting the two front panel pots TR and TF. Rotate the TR control from the position set in step 5) until a sharp 200 ps leading edge is observed. Then rotate TF counterclockwise until the desired pulse width and fall time are obtained.



Further iterative adjustments of TR and TF will be necessary to simultaneously obtain the lowest rise time, lowest fall time, the desired pulse width, and pulse top shape, and low spurious signal level. Some additional adjustment of signal level will be necessary to obtain the desired amplitude. CAUTION: For frequencies in the range of 50 to 160 MHz, the Amp control setting should never be set higher than 5 since this may result in damage to the output stage and will also cause the overload function to turn off the output (See 7) below). For frequencies between 160 and 250 MHz, the maximum Amp settings may be increased beyond 5 (to 10) as the PRF is increased. If the input frequency is then changed it will be necessary to readjust AMP, TR and TF to establish the required pulse shape. Following the above sequence it is possible to generate output pulses having amplitudes of at least 700 mA with variable pulse width (at least from 300 to 1000 ps) with pulse repetition frequencies in the range of 50 to 160 MHz (max output amplitude decreases to 400 mA at 250 MHz). WARNING: Do not operate below 50 MHz as failure may result.

7) AVN-3-C units with a serial number higher than 6600 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 high output amplitude), 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 output amplitude
2) Reducing pulse width

As discussed in 6) above, the Amp setting must never exceed 5.0 for frequencies in the range of 50 to 160 MHz since this may result in change to the output stage. The Amp setting may be progressively increased to 10 as the PRF is increased beyond 160 MHz and on to 250 MHz.

8) To trigger externally, set the INT-EXT switch to EXT and connect a sine wave generator to the TRIG connector. The output PRF will equal the sine wave PRF. The sine wave amplitude should be set at 0.3 VRMS.

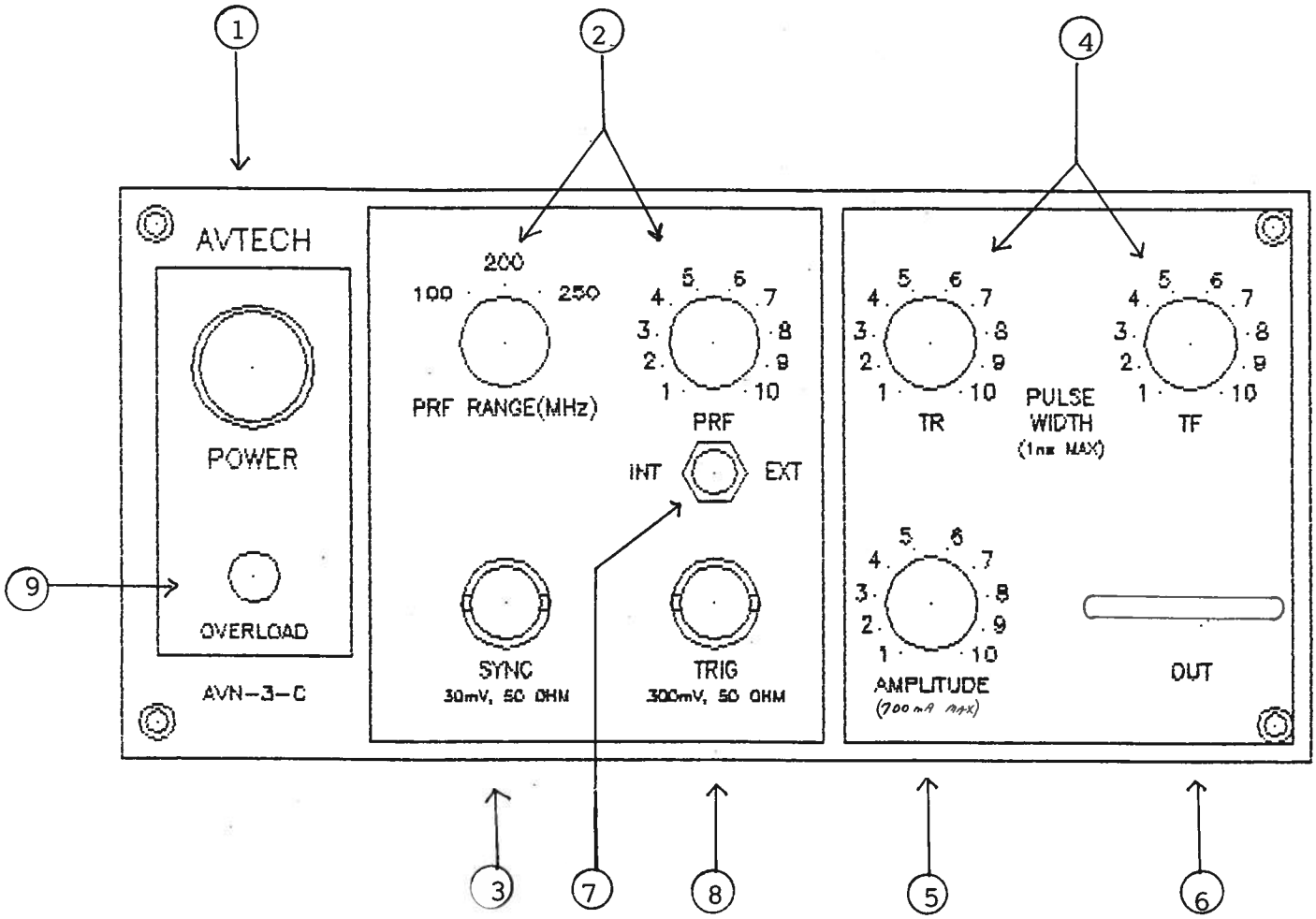
9) The AVN-C unit can be converted from 110 to 220V 50-60 Hz operation by adjusting the voltage selector card in the rear panel fused voltage selector-cable connector assembly.

10) For additional assistance:

Tel: 1-800-265-6681
Fax: (613) 226-2802

Fig. 2

Front Panel Controls



C) Front Panel Controls

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

(2) PRF Control. PRF RANGE and PRF controls determine output PRF as follows:

	PRF MIN	PRF MAX
Range 1	50 MHz	125
Range 2	100	200
Range 3	100	250

(3) SYNC Output. This output is approximately coincident with the main output (6) and is used to trigger the sampling scope time base. The output is a 30 mV sine wave capable of driving a fifty ohm load.

(4) PW Control. One turn controls which vary the output pulse width. The output pulse shape is determined by the two front panel pot controls TR and TF. TR controls the leading edge of the pulse while TF controls the falling edge. Clockwise rotation of TR and TF increases the output pulse width.

(5) AMP Control. A one turn control which varies the output pulse amplitude from 0 to 700 mA max to a laser diode load. CAUTION: For PRF in the range of 50 to 160 mA, the Amp pot setting should never exceed 5.0 as this may result in damage to the output stage. As the PRF is increased beyond 160 MHz, the Amp pot setting may also be increased beyond 5.0 to a maximum of 10.) at PRF of 250 MHz.

(6) OUT. Four 50 Ohm cables (in parallel) connect the mainframe to the output socket module.

(7) EXT-INT Control. With this toggle switch in the INT position, the PRF of the AVN 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 AVN unit requires a 0.3 V RMS sine wave 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.

(8) TRIG Input. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.

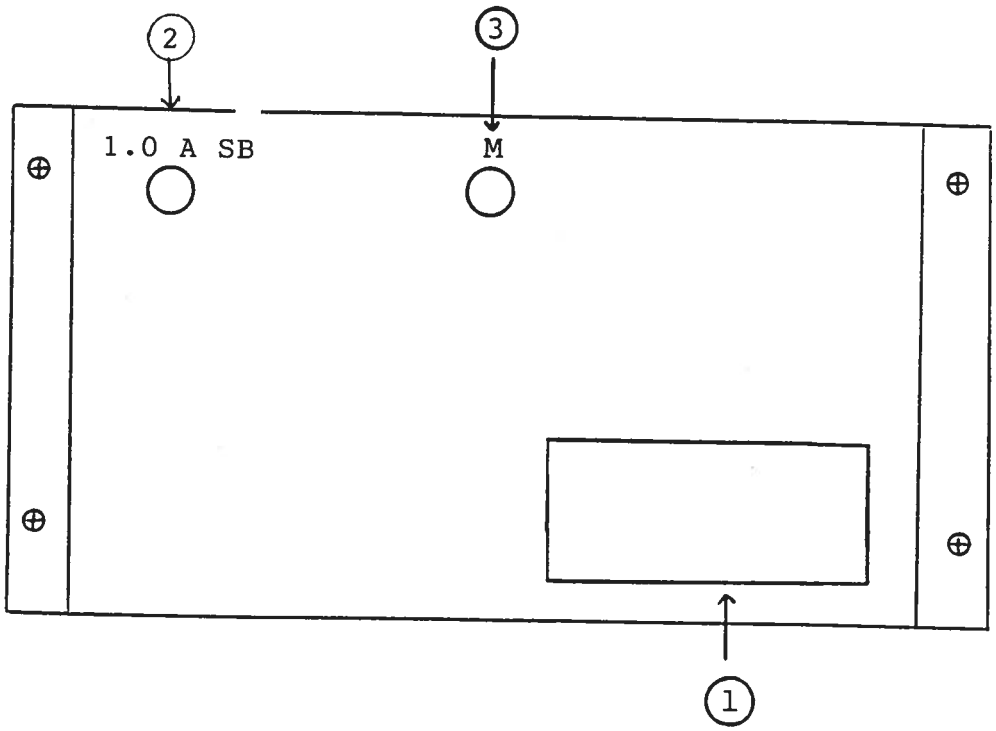
(9) OVERLOAD. AVN-3-C units with a serial number higher than 6600 are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or high output amplitude), the protective circuit will turn 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 output amplitude
2) Reducing pulse width

CAUTION: See the maximum Amp pot settings defined in 5) above.

Fig. 3

BACK PANEL CONTROLS



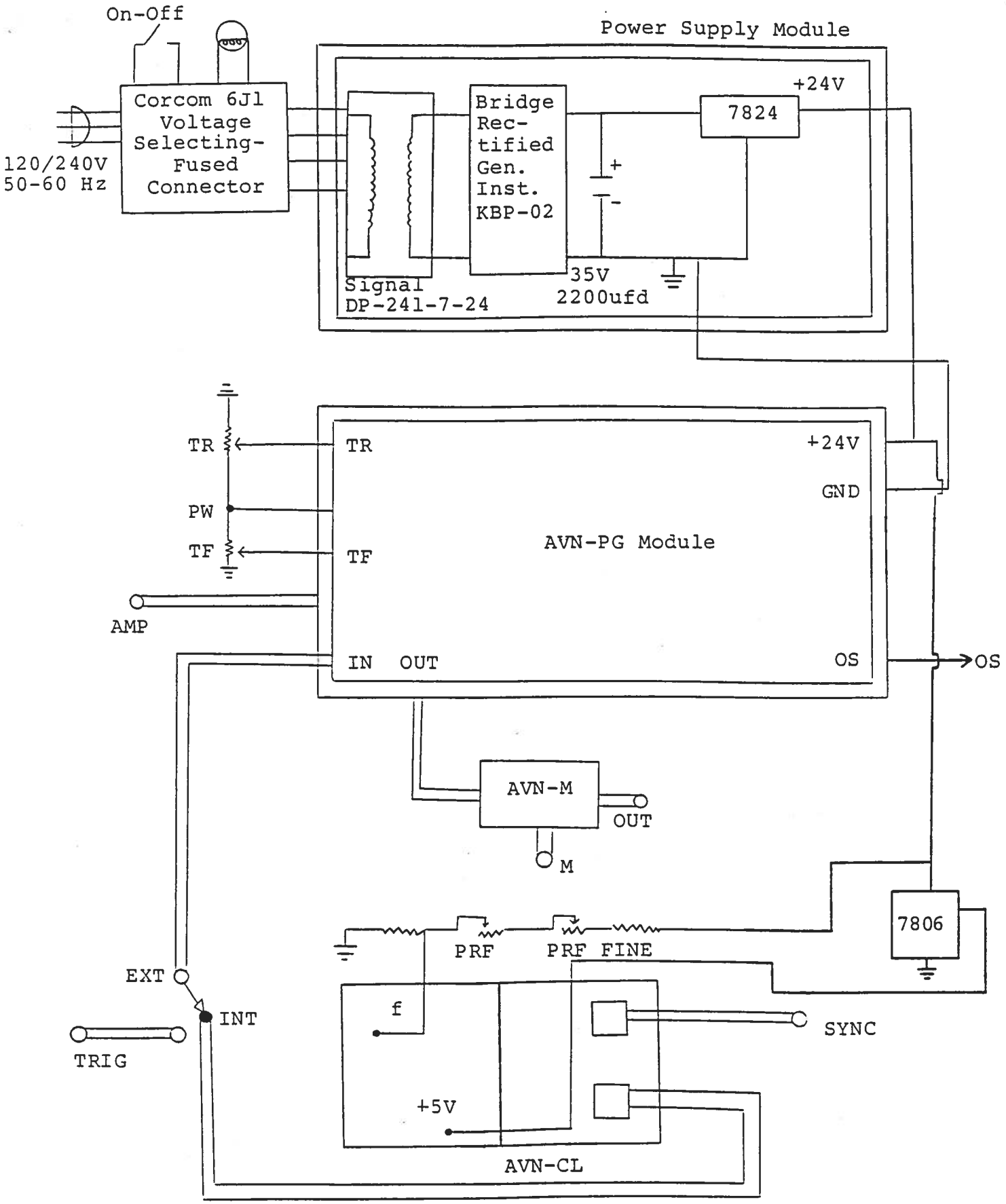
D) Back Panel Controls

(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) 1.0 A SB. This fuse limits the current provided to the output stage.

(3) MONITOR OUT M. Provides an attenuated (x10) coincident replica of the main frame pulse generator module output (which generates up to 20 Volts to 50 Ohms). CAUTION: The Amp control setting should never be set such that this output indicates a module output higher than 20 Volts. For PRF in the range of 50 to 160 MHz, a control setting of less than 5 will insure a peak output of less than 20 Volts.

Fig. 5 SYSTEM BLOCK DIAGRAM



SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVN-C consists of a pulse generator module (AVN-PG), a clock module (AVN-CL) and a power supply board which supplies +24 volts (600 mA max) to the pulse generator module. In the event that the unit malfunctions, remove the instrument cover by removing the four Phillips screws on the back of the unit. The top may then be slid off. Measure the voltage at the +24V pin of the PG module. If this voltage is substantially less than +24 volts, unsolder the line connecting the power supply and PG modules and connect 50 ohm 10 W load to the PS output. The voltage across this load should be about +24 V DC. If this voltage is substantially less than 24 volts the PS module is defective and should be repaired or replaced. If the voltage across the resistor is near 24 volts, then the PG module should be replaced or repaired. The sealed PG module must be returned to Avtech for repair (or replacement). The clock module provides a 0.3 V RMS sine wave to trigger the PG module and a 30 mV sine wave to trigger the sampling scope display device. The clock module is powered by +5.0V supplied by the PG module. With the INT-EXT switch in the EXT position, the clock module is disconnected from the PG module.

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

Dec. 31/93

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