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SINCE 1975

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INSTRUCTIONS

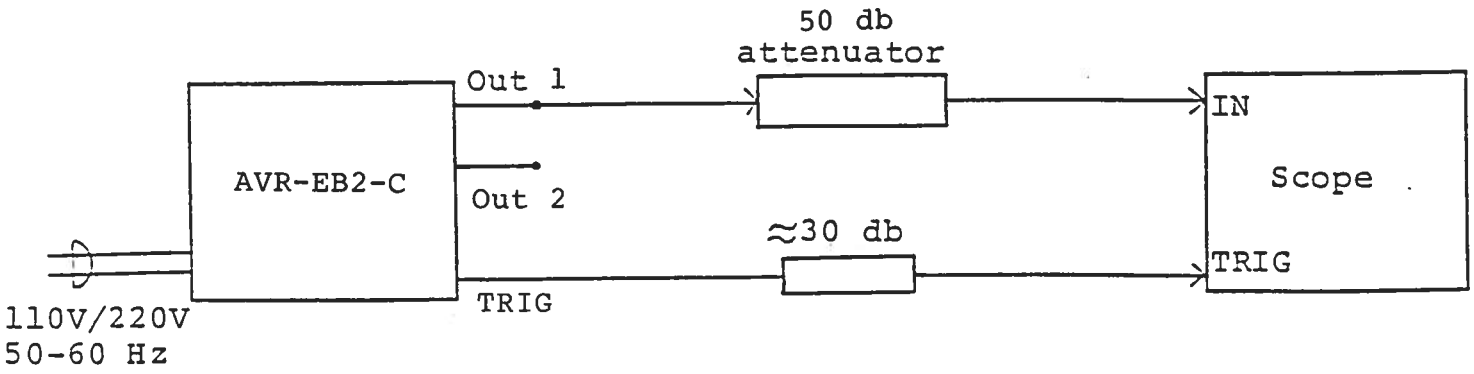
MODEL AVR-EB2-C-PULSE GENERATOR

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



Notes:

1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 1.0 GHz.

2) The use of 50 dB attenuator at the scope vertical input channel will insure a peak input signal to the scope of less than one Volt (necessary only if sampling scope used). If a high impedance real time scope is used, the pulse generator should be terminated using a shunt 50 Ohm resistor.

3) 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.

4) To obtain a stable output display the PW and PRF controls on the front panel should be set mid-range while the front panel PRF RANGE switch may be in either range. The front panel TRIG toggle 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 and by means of the PRF RANGE switch.

5) The output pulse width for Channels 1 and 2 is controlled by means of the front panel ten turn PW controls. The controls should be adjusted using an oscilloscope.

6) The output pulse amplitude for Channel 1 and Channel 2 is controlled by means of the front panel ten turn AMP controls.

7) The delay from the leading edge of the output from Channel 1 to leading edge of the output of Channel 2 is variable from 0 to 5.0 us using the ten turn DELAY 1-2 control. Channel 1 output (leading edge) always lags the Channel 2 leading edge output.

8) 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 0.2 us (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 TRIG output.

9) 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.

10) For additional assistance:
Tel: (613) 226-5772
Fax: (613) 226-2802.

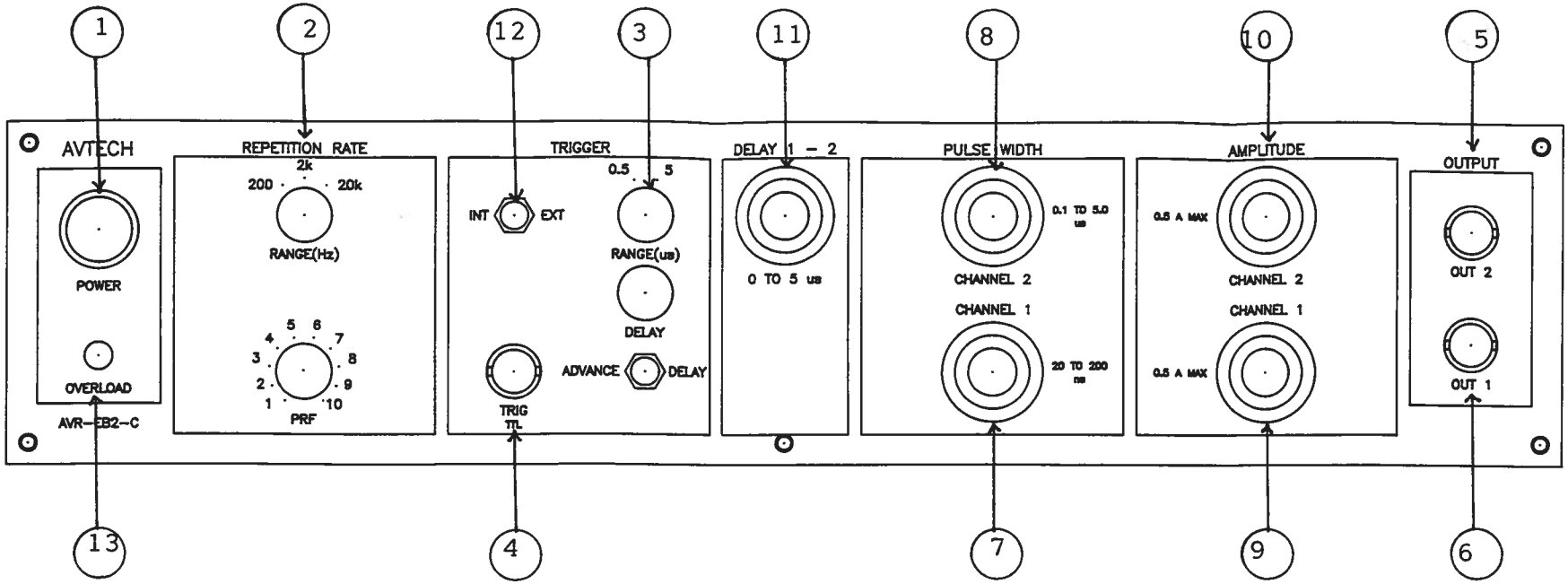


Fig. 2 FRONT PANEL CONTROLS

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

(2) PRF Control. Controls PRF as follows:

	MIN	MAX
Range 1	20 Hz	200 Hz
Range 2	200 Hz	2 kHz
Range 3	2 kHz	20 kHz

(3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) and the Channel 2 output (5). This delay is variable over the range of 0 to about 1.0 us (LOW) and 1.0 to 5.0 us (HIGH). 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. The relative delay between the TRIG output and Channel 2 output is variable for 0 to $\pm$ 5.0 us using the DELAY controls.

(5) OUT 2 Connector. BNC connector provides output to a fifty Ohm load (0 to +50 Volts, 0.1 to 5.0 us).

(6) OUT 1 Connector. BNC connector provides output to a fifty Ohm load (0 to -50 Volts, 20 to 200 ns).

(7) PW Control. Ten turn controls which varies the output
(8) pulse width.

(9) AMP Control. Ten turn controls which varies the output
(10) pulse amplitude.

(11) DELAY 1-2 Control. The delay from the leading edge of the output from Channel 1 to leading edge of the output of Channel 2 is variable from 0 to 0.5 us using the ten turn DELAY 1-2 control. Channel 1 output (leading edge) always lags the Channel 2 leading edge output.

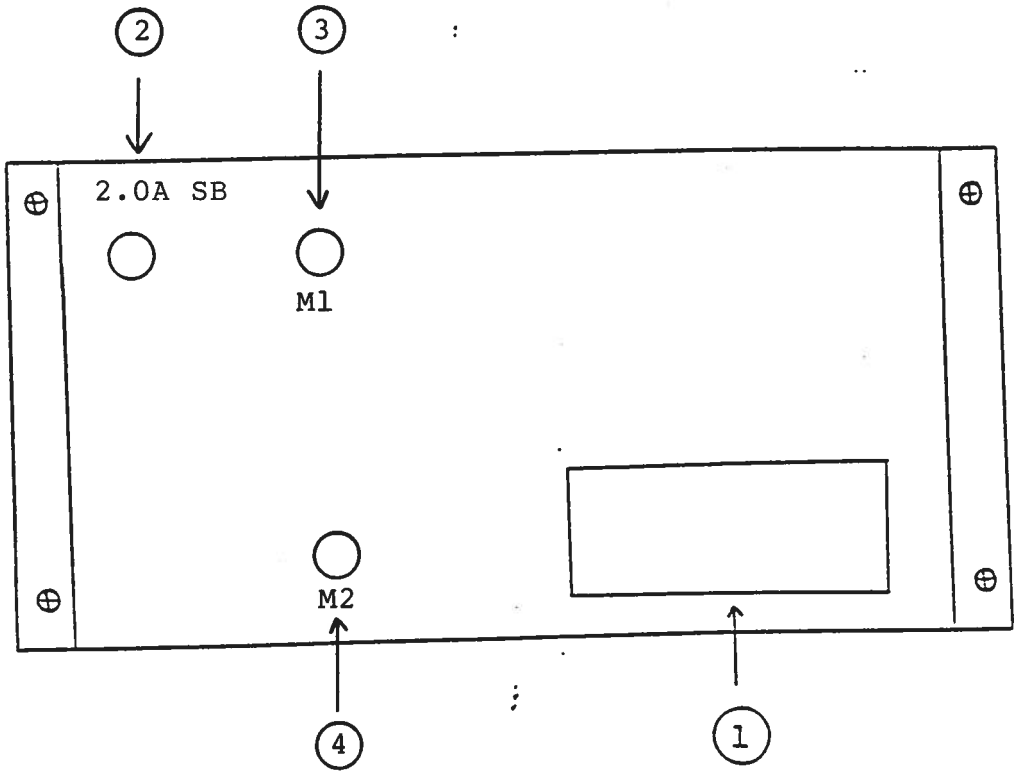
(12) EXT-INT Control. With this toggle switch in the INT position, the PRF of the AVR unit is controlled via an internal clock which in turn is controlled by the PRF controls. With the toggle switch in the EXT position, the AVR unit requires a 0.2 us TTL level pulse applied at the SYNC input in order to trigger the output stages. In addition, in this mode, the scope time base must be triggered by the external trigger source.

(13) AVR 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)

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 (0.5A SB).

(2) 2.0A SB. This fuse limits the DC prime power supplied to the output stage and will blow in the case of severe overloading.

(3) MONITOR OUTPUT (M1). Provides an attenuated (x10) coincident replica (to 50 Ohms) of Channel 1 output.

(4) MONITOR OUTPUT (M2). Provides an attenuated (x10) coincident replica (to 50 Ohms) of Channel 2 output.

Fig. 4 AVR-EB2-C

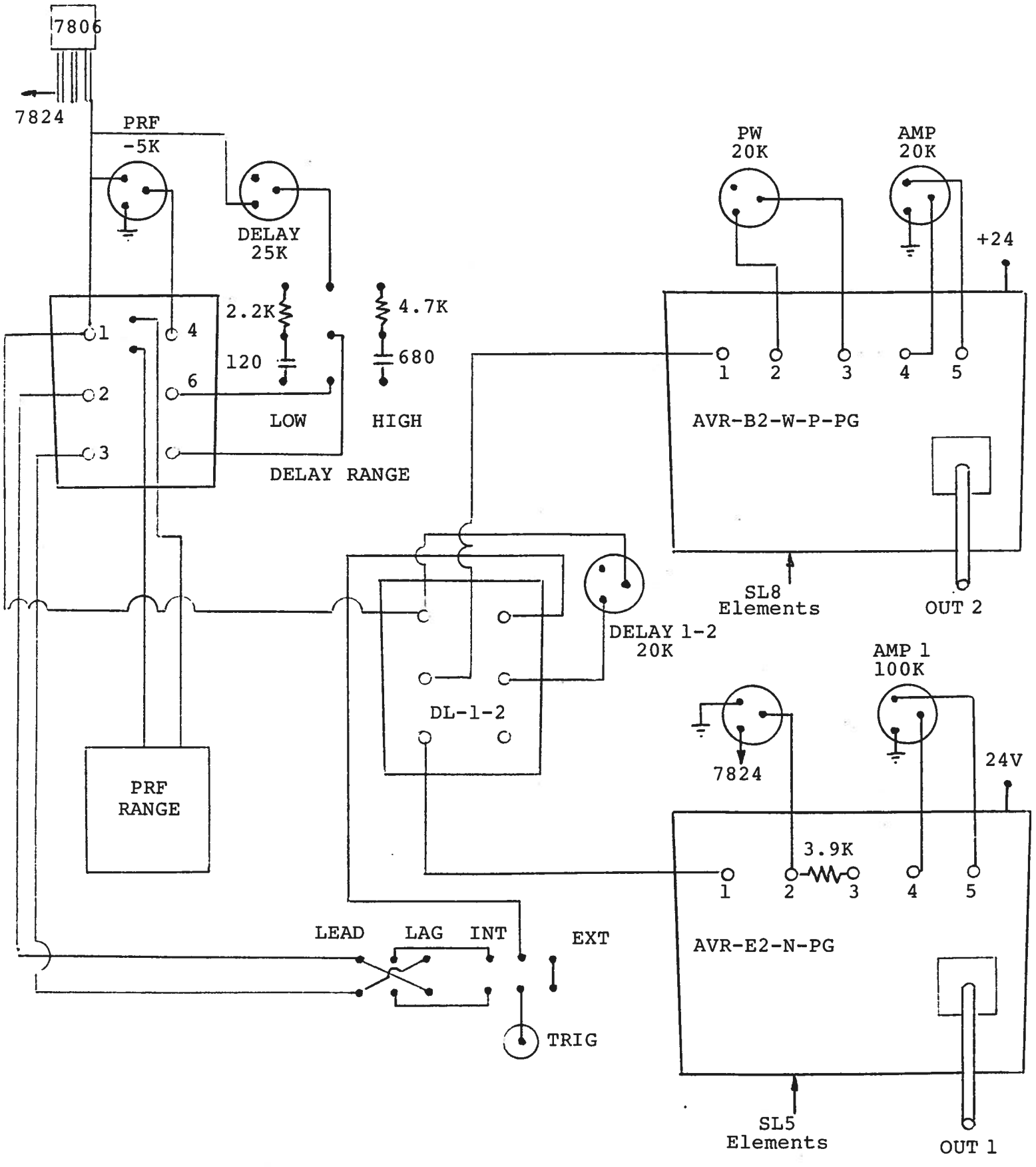
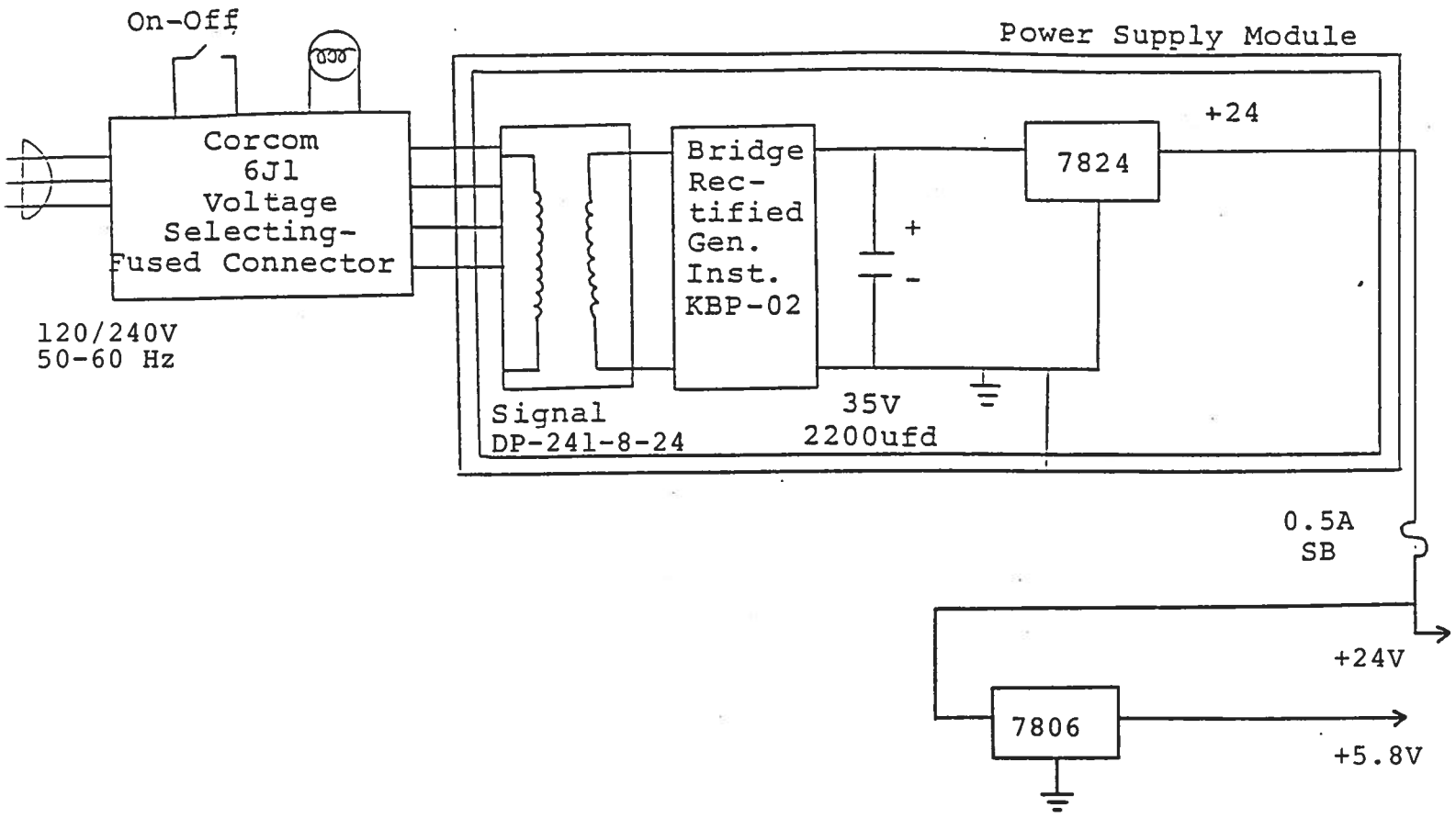


Fig. 5

SYSTEM BLOCK DIAGRAM



SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVR-EB2-C consists of the following basic modules:

1) AVR-B2-W-P-PG pulse generator module
2) AVR-E2-N-PG pulse generator module
3) AVR-EB2-CL clock module
4) AVR-EB2-DL-12 delay module
5) +24V power supply board

The modules are interconnected as shown in Fig. 4. The clock module controls the output PRF and the relative delay between the Channel 2 output and the TRIG outputs. The delay module controls the delay between Channel 1 and Channel 2 leading edge outputs. The PG pulse generator modules generate the output pulses. In the event of an instrument malfunction, it is most likely that the rear panel 2.0 SB fuse or some of the output switching elements (SL5, Channel 1) 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 SL5 are selected VMOS power transistors in a TO 202 package and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL5 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 0.1 Hz to 20 kHz using the PRF and PRF RANGE 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.

General Instructions For Performing T_{RR} Measurement, Method 4031.1, Test Conditions B (For 1N4150)

1) Turn both AMP controls on AVR-EB2-C to minimum (see Fig. 2).

2) Set PW 1 control to about 6.0 (i.e. ≈ 100 ns) and PW 2 control to about 2.0 (≈ 1.0 us).

3) Set DELAY 1-2 on about 0.7.

4) Set PRF in Range 3 and PRF one turn control in mid-range (∴ PRF ≈ 10 kHz).

5) Set DELAY in 0.1 us, ADVANCE.

6) Connect to diode test jig as shown in Fig. 4. CAUTION: Channel 1 of the pulse generator provides a rise time of ≤ 0.5 ns. Consequently, the diode test jig must be extremely broad band or the pulse rise time will be degraded and severe ringing will be observed. It is recommended that the test jig be constructed on microstrip employing high quality connectors (eg. SMA), microwave capacitors and resistors and that the diode lead lengths be less than 0.2 cm. The T_{RR} test jig SN 7031 meets these requirements. Carefully insert the diode into the clip lead sockets and insure that the leads do not connect any other point on the jig.

7) Set scope time base on 50 ns/cm range and vertical to 100 mV/cm.

8) Increase AMP 2 to near maximum to obtain display shown in Fig. 4A (adjust DELAY and scope set-up to center waveform display on CRT). With 30 dB attenuation following the test jig, the scope reads 10 Volts per div (or 200 mA per div). Therefore, set to 2 div to obtain I_F = 400 mA. Note that the coupling of OUT 2 to OUT 1 results in the increase of the rise time of OUT 2 to more than 5 ns. This is due entirely to C_B in the test jig. For this reason, C_B should be limited to 1000 pfd. Note that with OUT 1 disconnected, the fast rise time waveform shown in Fig. 4B is obtained.

9) Increase AMP 1 to near maximum to obtain display shown in Fig. 4C (200 mA/div).

10) Set scope time base on 5 or 1 ns/div to obtain display shown in Fig. 4D and/or Fig. 4E (adjust DELAY to center on CRT). Note that the leading spike (and ripple) on the I_R waveform are primarily due to the extremely short rise time of OUT 1 and the parasitic reaction of the test jig.

11) Adjust AMP 1 and AMP 2 as desired to obtain final values for I_F and I_R. Note that if I_F is increased then I_R will decrease (since pulse generators are cross-connected). It is therefore necessary to increase the AMP 1 setting to return I_R to the original value.

12) The DELAY 1-2 control may be adjusted to re-position the leading edge of the I_R waveform with respect to the leading edge of the I_F waveform but note that provided DELAY 1-2 is more than about 100 ns, the T_{RR} reading is quite independent of the DELAY 1-2. Consequently, PW 2 should be limited to less than 1 us and DELAY 1-2 should be in the range of 0.2 to about 0.8 us.

13) Note that if the PRF is set higher (eg. 20 kHz) and PW 2 is set higher (eg. 5 us), the apparent available maximum I_F will decrease to less than 500 mA because of the effective clamping action of the diode load under such higher duty cycle conditions. For this reason, a PRF of 10 kHz and a PW 2 of 1.0 us are recommended.

14) 1N4148: Specifications for 1N4148 call for I_R, I_F of 10 mA. It is recommended that 10 dB attenuation be placed on OUT 1 and OUT 2 and that 10 dB replace 30 dB in the output of the test jig.

15) If further assistance or information is required:
Tel: (613) 226-5772.
FAX: (613) 226-2802.

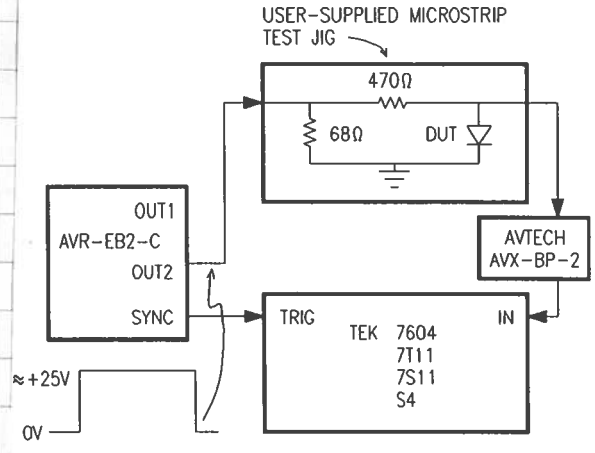
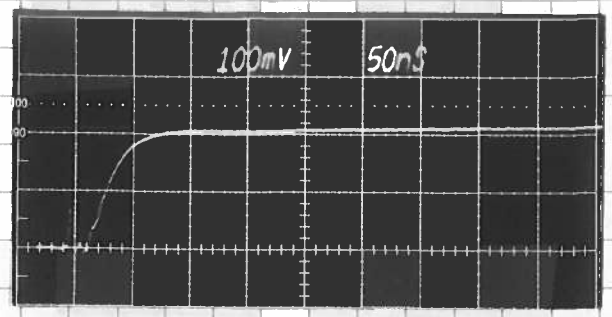
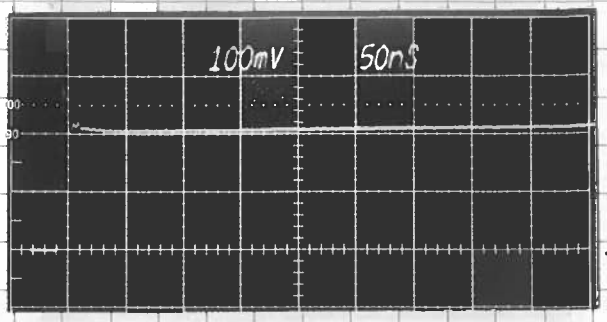


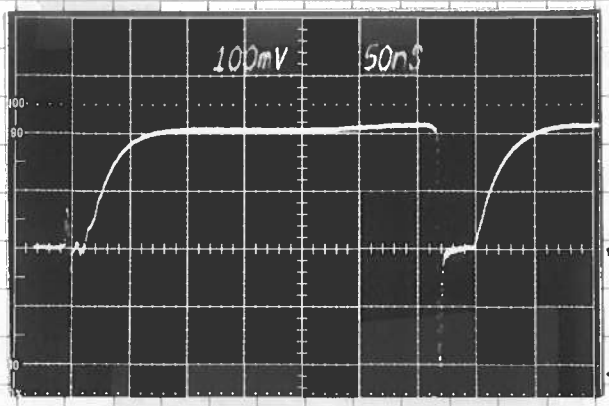
Fig 4 **1N4148, T_{FR} Method 4026.2.**



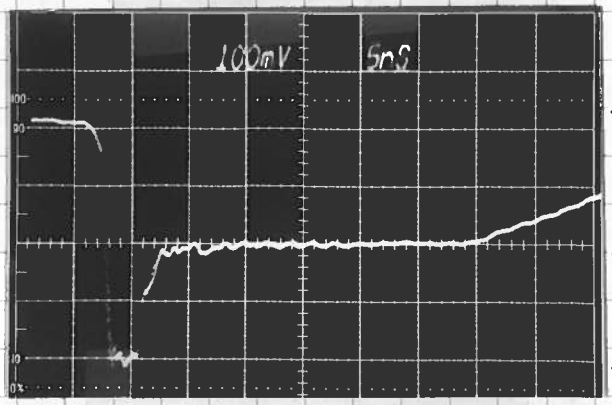
(4A) AMP 2 NEAR MAX (TO OBTAIN $I_F \simeq 400$ mA



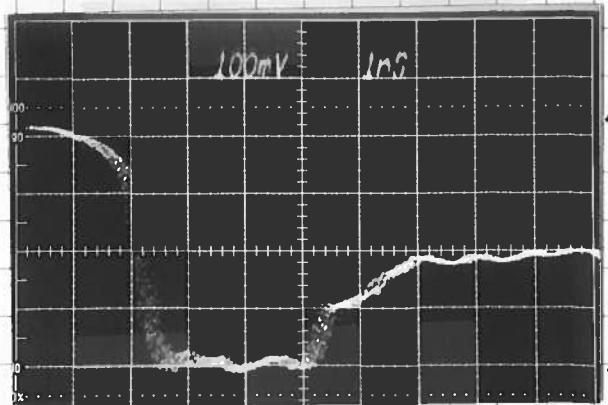
(4B) AS (4A) BUT OUT 1 DISCONNECTED. RISE TIME OF 2 IS DEGRADED BY 1000 pfd IN TEST 1/16.



(4C) AS (4A) BUT AMP 1 INCREASED TO NEAR MAX.



(4D) AS (4C) BUT 5 NS/DIV



(4E) AS (4C) BUT 1 NS/DIV.

General Instructions For Performing T_{FR} Measurement, Method 4026.2, 1N4148

1) Turn both AMP controls to zero and connect the AVR-EB2-C and the T_{FR} test jig and the AVX-BP-2 as shown in the figure below.

2) Set PW2 control to about 0.1 (≈ 150 ns).

3) Set the PRF to about 10 kHz.

4) Set AMP 2 to about 5.0 (25 Volts). The display shown in Fig. 5A should be obtained.

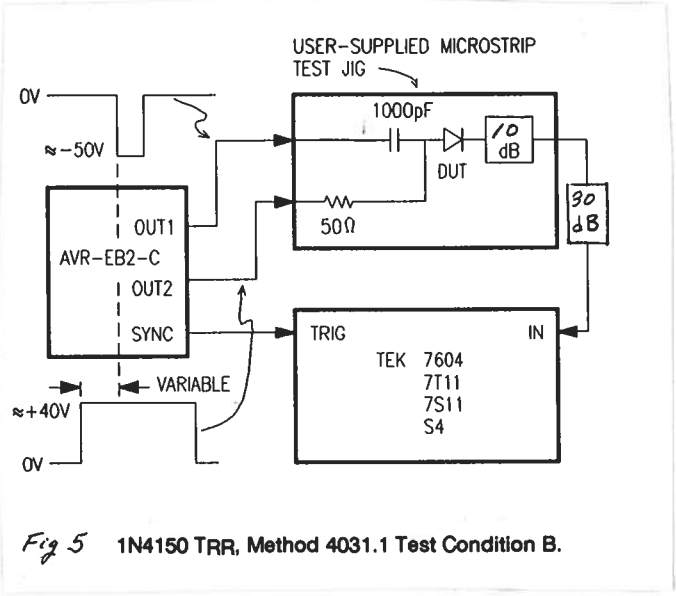


Fig 5 1N4150 TRR, Method 4031.1 Test Condition B.

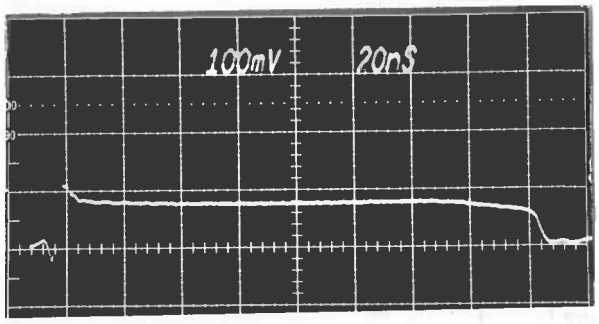


Fig 5A TRR 1N6 output

Sept 15/94
EB2C. Ins