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

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

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

3) Set DELAY 1-2 on about 1.0.

4) Set PRF in Range 3 and PRF one turn control in mid-range ($\therefore$ PRF $\simeq$ 10 KHz).

5) Set DELAY in LOW, LAG.

6) Connect to diode test jig as shown in Fig. 1A. CAUTION: Channel 1 of the pulse generator provides a rise time of $\leqslant$ 0.5 ns. Consequently, the user supplied 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.

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. 2 (adjust DELAY and scope set-up to center waveform display on CRT). With 40 db attenuation on 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. 2A is obtained.

9) Increase AMP 1 to near maximum to obtain display shown in Fig. 3 (200 mA/div).

10) Set scope time base on 5 or 1 ns/div to obtain display shown in Fig. 3A and/or Fig. 3B (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. These effects can be reduced by using a longer rise time (note that the rise time of the AVR-EB2-C unit may be increased by about 20% by removing the +5.8 supply to the EB2-TRA module).

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.

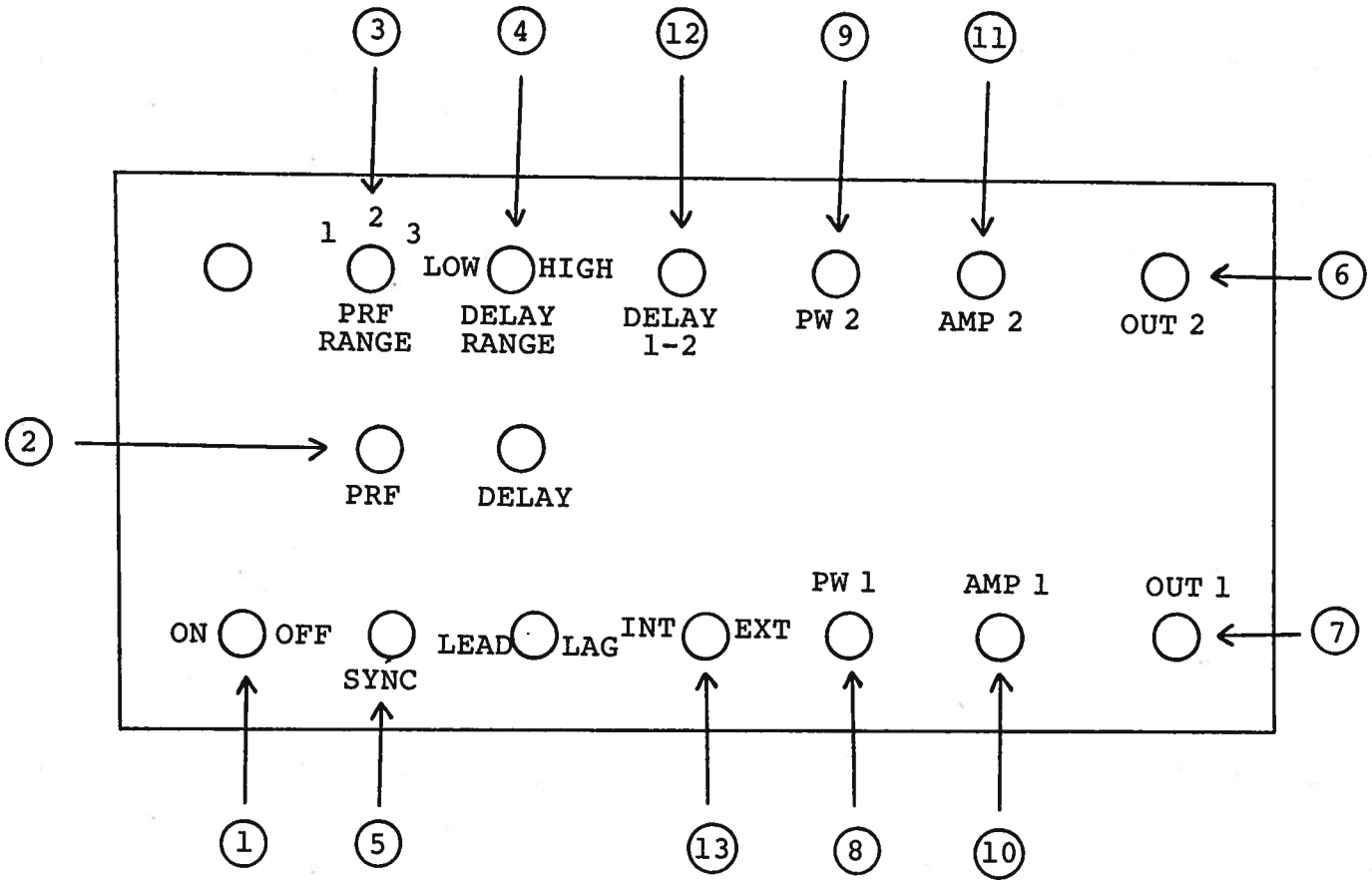
13) Note that if the PRF is set higher (eg. 20 KHz) and PW 2 is set higher (eg. 5 us), the apparent available maximum $I_F$ will decrease to less than 500 mA because of the effective clamping action of the diode load under such higher duty cycle conditions. For this reason, a PRF of 10 KHz and a PW 2 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 20 db replace 40 db in the test jig.

15) If further assistance or information is required, call (613) 226-5772.

Fig. 1

FRONT PANEL CONTROLS



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

(2) PRF Control. Controls PRF as follows:
(3)

| | | | | |
|---|---|---|---|---|
| Range 1 | 20 | Hz | to 200 | Hz |
| Range 2 | 200 | Hz | to 2 | KHz |
| Range 3 | 2 | KHz | to 20 | KHz |

(4) DELAY Control. Controls the relative delay between the reference output pulse provided at the SYNC output (5) and the Channel 2 output (6). This delay is variable over the range of 0 to about 1.0 usec (LOW) and 1.0 to 5.0 usec (HIGH). The TRIG output precedes the main output when the LEAD-LAG switch is in the LEAD position and lags when the switch is in the LAG position.

(5) SYNC Output. This output is used to trigger the scope time base. The output is a TTL level 100 nsec (approx.) pulse capable of driving a fifty ohm load. The relative delay between the SYNC output and Channel 2 output is variable from 0 to ±5.0 usec using the DELAY controls.

(6) OUT 2 Connector. BNC connector provides output to a fifty ohm load (0 to +50 volts, 0.1 to 5.0 usec).

(7) OUT 1 Connector. BNC connector provides output to a fifty ohm load (0 to -50 volts, 20 to 200 nsec).

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

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

(12) 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 5.0 usec using the ten turn DELAY 1-2 control. Channel 1 output (leading edge) always lags the Channel 2 leading edge output.

(13) 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 usec 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.

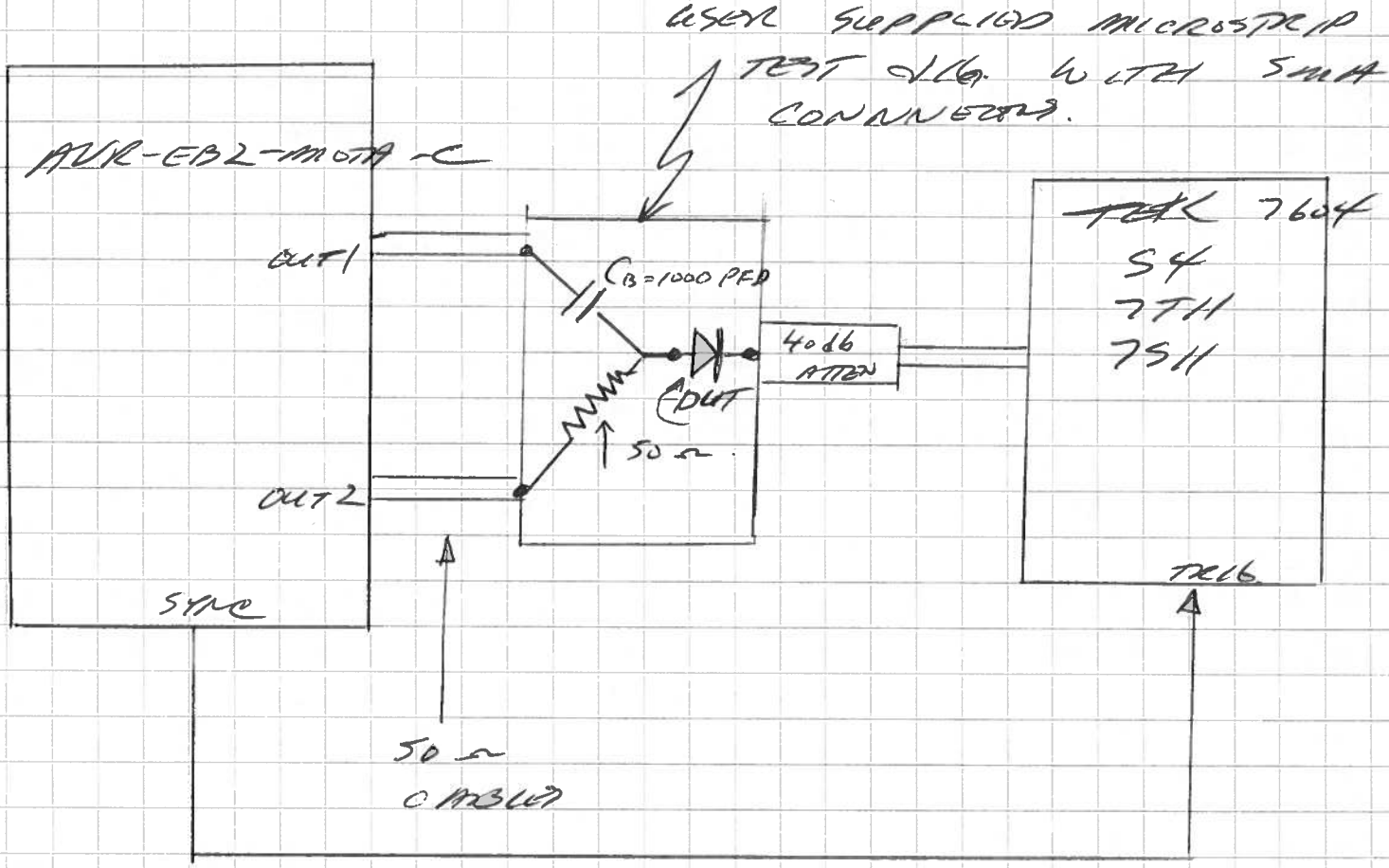



FIG 1A: BASIC TEST SET UP FOR TAU MEASUREMENT (1N4150).

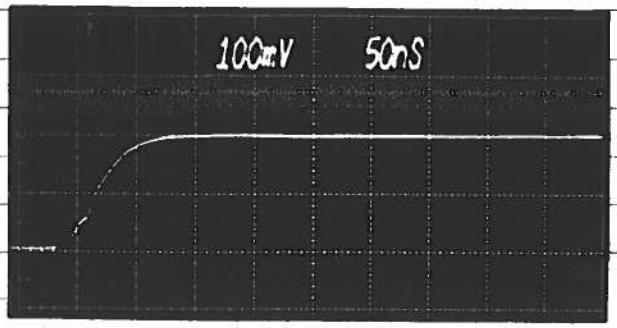



Fig 2 AMP 2 NEAR MAX TO OBTAIN $I_F$ = 40 mA

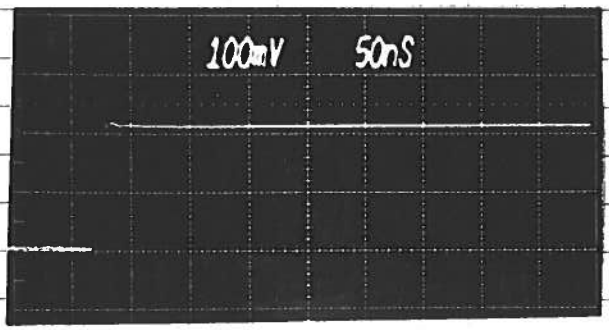



Fig 2A AS (2) BUT OUT DISCONNECTED. NOTE RISE TIME IS INCREASED BY $C_B$ IN TEST J16.

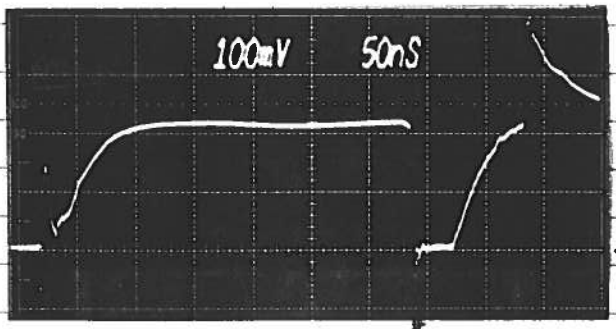



Fig 3 AS (2) BUT AMP 1 INCREASED NEAR MAX.

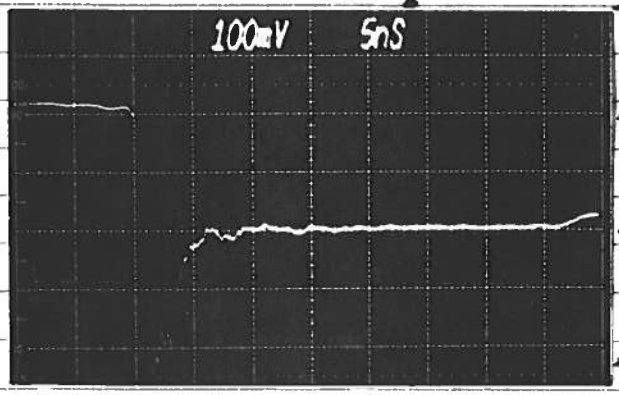



Fig 3A AS (3) BUT 5 NS/DIV

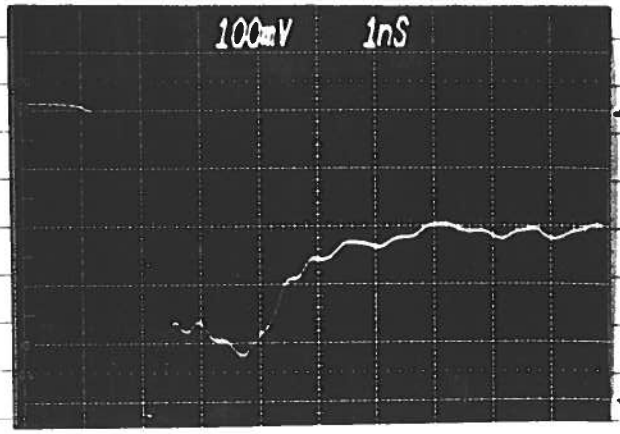



Fig 3B AS (3A) BUT 1 NS/DIV.

12.13.90

for Motorola AVR-EB2-MOTA-C-M, SN 5507