ECONOMICAL SCALER DRIVER*

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A scaler driver is described which permits the driving of slow scalers and slow nuclear modules with fast nuclear pulses of the order of 10 nanoseconds FWHM. The output of the device is a 4.25 volt square pulse when terminated in 50 ohms and is variable in width from 100 to 800 nsec. Since the output is transformer coupled positive or negative pulses may be obtained.

The device is constructed of three integrated circuits: 1) a Motorola MC1545L pulse amplifier, 2) a TI SN74121 multivibrator, and 3) a TI SN75450 driver (fig.1). A diode bridge on the input protects the amplifier from inadvertant over voltages. Since the multivibrator requires a minimum input pulse width of 50 nsec but triggers on the leading edge, the inverted pulse output of the amplifier is used in the ground-going logic input of the multivibrator. This produces an effective input pulse width equal to the time between pulses. Since the output width of the multivibrator is dependent on the timing components only and not on input pulse width this presents no problems. A 100 pf capacitor and 10K potentiometer are used as timing components to produce pulse widths from 100 to 800 nanoseconds. Other

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component values can be used for different pulse width ranges.

The SN75450 driver IC consists of two NAND gates and two open collector transistors. The output transformers are home-made consisting of 20 turns #30 bifilar on Ferroxcube H-10-3H2-137A cores. Output polarity is determined by which end of the output winding is grounded. Figure 2 shows the input and output for a typical unit. Horizontal scale is 50 nsec/cm and vertical scales are 0.2 v/cm for input signal (upper trace) and 2 v/cm for output pulse (lower trace). Minimum input pulse requirements are 0.3 volts with 7 nsec width.

The unit as described here can be built on one PC board and component cost is less than twenty dollars. Two such units will fit in one single width NIM module. NIM voltages of +6, or +12 volts must be dropped to less than 5.5 volts for the TI ICs. Stability of this supply voltage is not critical as pulse width is virtually independent of the supply voltage. Each scaler driver when terminated draws 16 ma from the negative supply and 100 ma from the positive supply.

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FIGURE 1. Scaler driver circuitry.

FIGURE 2. Input (top trace) and output (bottom trace) pulses. Horizontal scale is 50 nsec/div and vertical scales are 0.2v/div for upper trace and 2v/div for lower trace.