

that the voltage steps are equal for all pin shortings. Figure 16 shows an oscilloscope voltage-time record for a typical velocity measurement.

For the tilt circuit the current ratios have been set at 1::2::4::8 for the circuit inputs 1, 2, 3, and 4 respectively. These ratios were chosen so that the sequence of pin closures can be discerned in the case of simultaneous pin shortings, i. e. any additive combination of 1, 2, 4, or 8 will correspond to a unique voltage combination on the measurement oscilloscope.

The tilt and velocity circuits do not have infinite rise-times as implied by Eq. (1). In fact, the combined rise-time of either circuit and a Type 585A Tektronix oscilloscope normally used for the measurement is typically 10 nanoseconds for any pin closure. A typical tilt record is shown in Fig. 17.

Figure 18 is a block schematic of both the velocity and tilt circuits. When the input pins are all ungrounded the circuit may be placed in a "reset" mode by depressing the reset key. Any subsequent input pin shorting will change the circuit from the reset mode to the "set" mode. To the operator these two modes are distinguishable by the use of an indicator lamp, which is turned on when the circuit is in the reset mode. (See Figure 18).

Describing the reset mode more specifically in terms of circuit operation, each pin input is clamped on electrically by means of a 220 ohm resistor connected to the 3.6 volt supply at the input of "nor" gates G1, G2, G3, and G4. The "nor" designation means that the sign of the output of the gate is opposite to the input. The outputs of nor gates G1, G2, G3, and G4 are connected to the "set" terminals of gates I1, I2, I3 and I4 respectively. I1, I2, I3 and I4 are properly designated as set-reset flip-flops. It is the property of these gates that produces the set and reset modes in the circuit.

A set-reset flip-flop is a bistable electronic device. A positive going pulse of amplitude greater than 0.7 volts applied to the reset input will place the flip-flop in reset state where it will remain until a