

This handy portable instrument was designed as an aid to car servicing to be used in conjunction with a timing light for setting up a car ignition system for peak performance. It consists of a

auto service meter

tachometer and dwell meter. The tachometer is useful for examining the igemitter is zero. The average voltage at the emitter of T4 is thus proportional to the ratio of contact-breaker-closed time to contact-breaker-open time i.e. it is dependent on the dwell angle. With switch S1 in the 'a' position the average

nition timing at various r.p.m. in conjunction with a timing light, or when used as a dwell meter it will measure the angle over which the contact breaker is closed and thus provide information about the setting of the contact breaker gap.

The circuit is shown in figure 1 and is intended for use with negative earth vehicles - which most modern cars are. It may, however, be adapted for positive earth vehicles by reversing all diodes and electrolytic capacitors, and by substituting TUP for TUN and vice versa. The circuit derives its power from the car battery

The circuit operates as follows: T1 and T2 form a Schmitt trigger. As long as the contact breaker is closed T1 is turned off and T2 is turned on, which means that T4 is also turned on, so that a positive voltage equal to the supply voltage minus the base-emitter voltage of T4 appears at the emitter. When the contact breaker is open the input (R1) is connected to positive supply through the primary of the ignition coil, so T1 is turned on and the Schmitt trigger switches the other way. T4 is now turned off so the voltage appearing at its current through the meter is also proportional to the dwell angle, so the meter may be calibrated linearly in terms of dwell angle.

With the switch in position 'b' the

instrument functions as a tachometer. Pulses from the collector of T3 are differentiated by C2 and used to trigger a monostable consisting of T5 and T6. The monostable produces pulses of constant width, but as the r.p.m. increase the mark-space ratio of the pulses increases. The average voltage on the emitter of T7, and hence the average current through the meter, is dependent on the ratio of 'pulse' to 'no-pulse' time.

2 100 Hz 3000 r.p.m. four-cvl. 2000 r.p.m. six-cvl 3181-2

so as the r.p.m. increase and the pulses get closer together, the current through the meter increases linearly. The instrument can be calibrated as follows: With S1 in position 'a' earth the input (R1) and adjust P1 to give full scale deflection of the meter. This corresponds to a 360° dwell angle and the scale can be calibrated linearly from

12...16 V/5mA

0 to 360 The tachometer scale should be calibrated with full-scale as the maximum required r.p.m. For most applications 8000 should be sufficient. If the instrument is to be used with both four and six-cylinder engines, then either two scales are required, or S1 must be replaced by a three-position switch and P2 must be duplicated to calibrate one scale for different engines. The reason for this is that a six cylinder engine produces more pulses for a given r.p.m. The instrument may be calibrated using the simple circuit shown. This produces a 100 Hz waveform. This corresponds to 3000 r.p.m. for a four-cylinder engine and 2000 r.p.m. for a six-cylinder engine. The output of this circuit is connected to the input of the instrument and P2 is adjusted to give the correct deflection of the meter