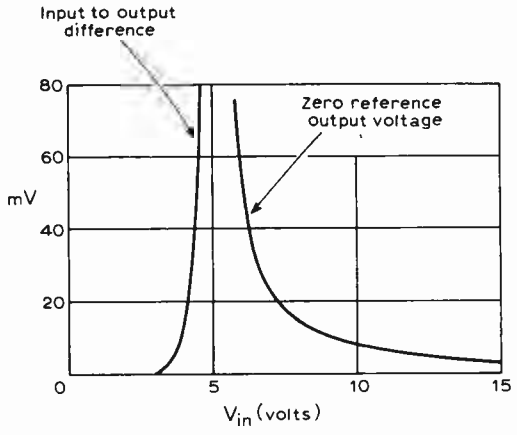
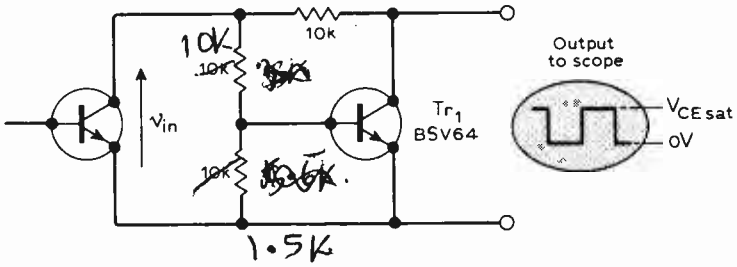
# Circuit Ideas




## Measuring $VCE_{SAT}$ in power transistors

To determine the saturation loss in power transistors it is necessary to measure the saturation voltage, which may be about 1 to 2V. The measuring circuit must also accommodate the high collector voltage which is present when the switching transistor is in the off state. A problem therefore arises if a d.c. coupled oscilloscope is used as it is often difficult to obtain adequate voltage resolution without overloading the deflection amplifier during the off state of the transistor. Furthermore, a very small disparity between a.c. and d.c. gain in the deflection channel can lead to a substantial error in the apparent saturation voltage.

The circuit shown is inserted between the switching transistor and an oscilloscope which may then be a.c. coupled. Output to the oscilloscope is a rectangular waveform with a low voltage state representing 0V and the high voltage state being the transistor saturation voltage. Errors in the circuit are typically less than 10mV, and may be established by d.c. measurements if desired. Accurate measurements of saturation voltage may be made simply by reading the peak to peak voltage of the displayed waveform. When the collector voltage of the power switch is below 4V, $Tr_1$ is non-conducting. During the off state of the switch, its collector voltage is assumed to be greater than 10V in which case $Tr_1$ is heavily saturated and the zero reference output is typically less than 10mV. Note that $Tr_1$ is a large-chip transistor operating at low collector current. The same technique may be used to drive an integrating wattmeter which, by sampling collector current, will show saturation power loss directly.




D. R. Boit,
Charlwood,
Surrey.

## Windscreen wiper controller

The delay between successive sweeps of self-parking wiper blades can be altered by a single variable resistor. Any delay between approximately three seconds and three minutes can be obtained with the values shown. The wiper blades can easily be made to perform two or more successive sweeps between the delays instead of one double sweep. When the delay is set to the minimum value, the wipers operate almost continuously.

The relay contacts are connected across the existing wiper switch and merely override the existing controls.

J. B. Dance,
Alcester,
Warwicks.