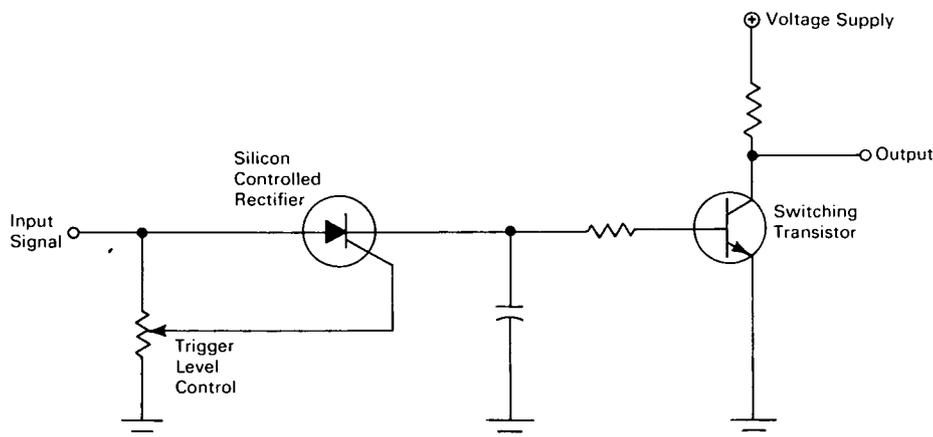


# NASA TECH BRIEF



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## Simple Circuit Reduces Transistor Switching Time



**The problem:** In transistorized switching circuits, efficiency is closely related to switching speed. Heat energy dissipated by the switching transistor is proportional to the length of the transition from *off* to *on* and vice versa. A detector is needed that would act as a gate to trigger the switching transistor only when the input signal reaches an amplitude that will switch the transistor rapidly.

**The solution:** A silicon-controlled rectifier (SCR), gated by a voltage divider, is placed in the circuit before the switching transistor.

**How it's done:** The potentiometer, or trigger level control, is adjusted to bias the SCR so that it will not conduct until the trigger point of the switching transistor is reached. This trigger point is set so that *off* to *on* time of the transistor switching event is of a duration determined by the very fast operating characteristic of the SCR. Thus, *off* to *on* occurs over an interval of time which is independent of detected input parameter magnitude. When the voltage at the tap of

the trigger level control (SCR gate voltage) reaches the SCR firing voltage, the forward-biased anode-cathode junction of the rectifier conducts heavily, providing the base current required to turn on the switching transistor.

### Notes:

1. This circuit would be useful wherever a quickly varying (digital) response is desired from a slowly varying (analog) sensed electrical parameter.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland, 20771  
Reference: B65-10234

**Patent status:** NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Westinghouse Electric Corporation  
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