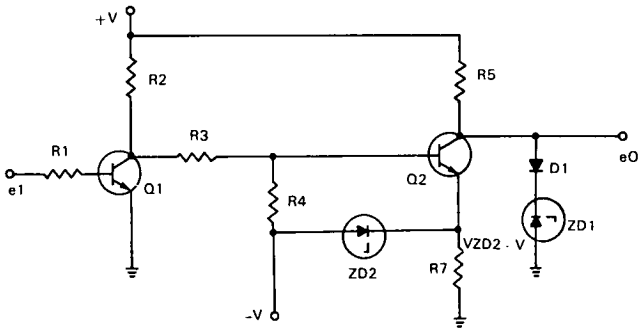
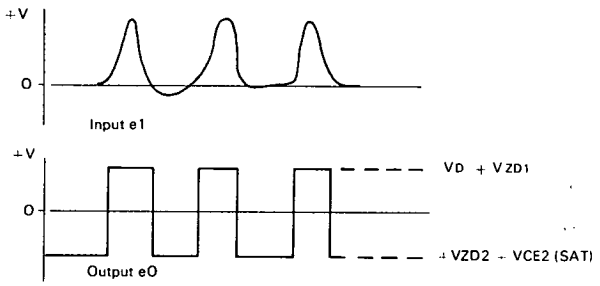
NASA TECH BRIEF

Positive and Negative Output Circuits





A trigger circuit which has a fixed positive output in the "on" state and a fixed negative output in the "off" state has been designed and tested. The amplitude of the positive and negative pulses may be independently chosen.

The output of a conventional transistor trigger in its "on" state is generally at a value of voltage near the power supply voltage. The output of this same trigger in its "off" state is at a voltage determined by the collector-to-emitter saturated voltage of the output transistor and the circuit trip point. However, in some applications, it is desirable to have the trigger undergo a change in polarity at its output. An example of this is a diode current gate which requires a small positive signal to make it conducting and a small negative signal to make it non-conducting. This requirement arose in the course of designing equipment to measure certain electrical characteristics of silicon controlled rectifiers as part of a radiation effects test program.

The circuit used is shown in the figure. In the "off" state, the input voltage, e_1, is too low to operate the trigger. Q_1 is off or non-conducting and Q_2 is saturated. The output voltage in this case is:

$$e_o = V_{D1} + V_{ZD1}$$

In the "on" state, e_i $V_{BE(1)}$, Q_1 goes into saturation and Q_2 becomes non-conducting. The output voltage is:

$$e_O = V_{ZD2} + V_{CE2(sat)} - -V$$

It is necessary that the bias resistors R_2, R_3, and R_4 be properly selected. The voltage at the base of transistor Q_2 must forward bias the base to emitter junction of this transistor when Q_1 is non-conducting. The voltage at the base of Q_2 must change to reverse bias this same junction when Q_1 goes into saturation. The procedures for selecting these resistors are those used for designing ordinary bistable multivibrator circuits.

Notes:

1. No further documentation is available.
2. Technical questions may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B69-10151

Patent status:

No patent action is contemplated by NASA.

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Category 01