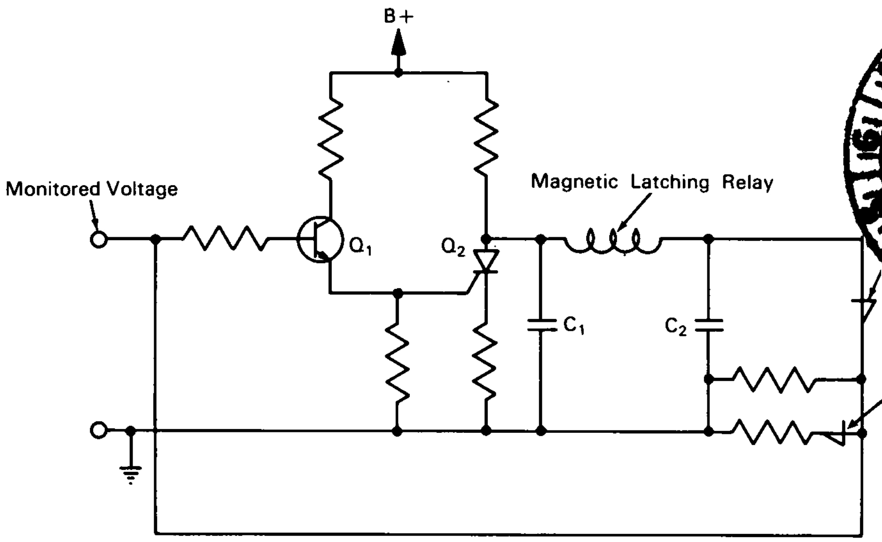
GA6

May 1964 Brief 63-10508

NASA TECH BRIEF

Circuit Switches Latching Relay in Response to Signals of Different Polarity



The problem: In order to cycle the armature of a single-coil magnetic latching relay between two opposite positions (i.e., between latch and unlatch) in response to a change in polarity of a monitoring signal, either of two methods has generally been used: one requires the use of two power supplies; the other requires a fixed reference level, which presents a stability program.

The solution: A circuit using only one power supply and two storage capacitors which can be separately discharged in opposite directions through the relay. A discharge path from one capacitor through the relay is switched by a silicon-controlled rectifier element. A discharge path from the second capacitor, which produces a current in the opposite direction through the relay, is switched by a pair of four-layer negative-resistance diodes.

How it's done: The B+ power supply places approximately equal charges on storage capacitors C_1 and C_2. When the monitored voltage is positive, the silicon-controlled rectifier Q_2 is triggered, and C_1 is quickly discharged. As a result, C_2 discharges through the relay, with a current flow from right to left. If the monitored voltage goes from positive to negative, Q_2 becomes nonconductive and acts as an open switch, since an appropriate trigger voltage is not applied by transistor Q_1. The four-layer negative-resistance diodes D_1 and D_2 are then triggered to conduction, and C_2 is quickly discharged. As a result, C_1 discharges through the relay, with a current flow from left to right.

If the monitored voltage remains negative, D_1 and D_2 would continue to be conductive and the capacitors would remain discharged. If the monitored vol-

(continued overleaf)

tage subsequently goes from negative to positive, D_1 and D_2 become nonconductive, since they offer very high impedance in the reverse direction. Should the monitored voltage then remain positive, Q_2 would remain conductive, and the capacitors would remain essentially discharged.

Notes:

1. The circuit should be specially useful for driving components which are sensitive to current direction and which require greater power than is normally available at the output of a high-impedance source.
2. The circuit can be made quite sensitive by proper selection of components and introduction of gain stages at the input.

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

Source: Electro-Optical Systems, Inc.
under contract to Western Operations Office
(WOO-055)