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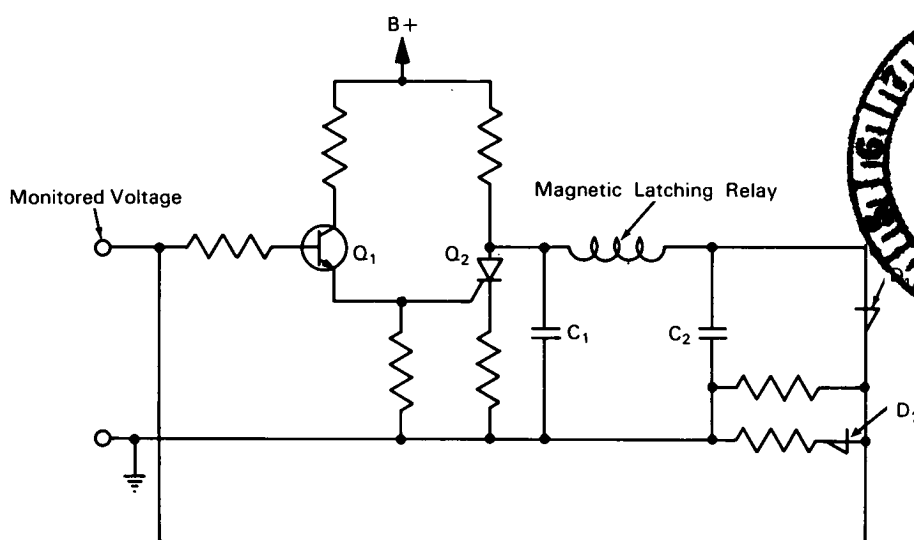
Brief 63-10508

NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

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-

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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.
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