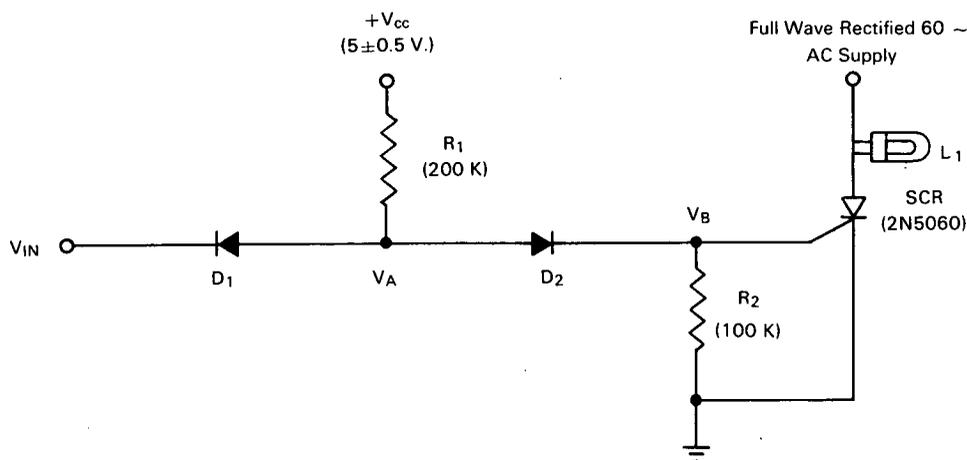


NASA TECH BRIEF



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Low Cost SCR Lamp Driver Indicates Contents of Digital Computer Registers



The purpose:

To design an electronic circuit that will provide a visual indication of the state of an electronic digital circuit. Previously, incandescent and neon glow lamps were driven by various transistor and silicon controlled rectifier (SCR) circuits, which undesirably loaded the output of the circuit whose state they were indicating.

The solution:

An electronic circuit that is particularly adapted for use in integrated circuit digital computers where it indicates the contents of the various registers.

How it's done:

Resistor R_1 , connected to V_{CC} , acts as a current source injecting about $25\mu\text{A}$ into node V_A . Assume that V_{IN} is at ground potential. Then the current through R_1 is shunted to ground through D_1 and the gate electrode of the SCR is maintained below its firing potential. In this condition the SCR remains off and the lamp does not light.

If the voltage V_{IN} is slowly increased, then the voltage at node V_A must also increase since D_1 is forward biased by the current flowing through R_1 . D_2 becomes forward biased as voltage V_A increases. As a result, voltages V_B (the SCR gate voltage) and V_{IN} are substantially equal. When V_{IN} (and hence V_B) reaches the gate firing potential, the SCR is triggered into conduction and the lamp lights.

Notes:

1. Resistor R_2 is included to shunt gate leakage current to ground. It must be small enough so that the SCR will remain turned off when $V_{IN}=0$ at the highest temperature to be encountered. Resistor R_1 must be sufficiently small so that enough current is available to turn the SCR on at the lowest temperature to be encountered. The values shown are suitable for a $+100^\circ\text{C}$ to -50°C temperature range when a typical 2N5060 SCR is used. Diodes D_1 and D_2 may be any computer type silicon diodes. L_1 may be any lamp within the current and voltage ratings of the SCR.

(continued overleaf)

2. Another advantage of this circuit is that the threshold voltage at which visual indication begins is very sharply defined and can be adjusted to suit particular system requirements.
3. Inquiries concerning this circuit may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B67-10656

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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(GSC-10221)