Relay driver saves substantial power

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It is common practice to operate relays and solenoids at a reduced holding power once the mechanical actuation takes place. Relays are usually specified to pull in within 3 msec at 80% of the rated voltage and to release at 30% of the rated voltage. The circuit in **Figure 1** drives as many as eight 12V (120Ω coil) power relays, which memory-map into an 8-bit μP bus. An octal latch stores the relay status, where each bit of the 8-bit word serves a separate relay (0=off, 1=on). The latch's Select line latches data on the rising edge. Whenever the relay's status data changes, the relay's drive voltage rises to the full 12V for 140 msec to ensure that the relay pulls in. A series zener diode then reduces the relay's drive voltage by 50% to reduce dissipation.

A ULN2803, an octal Darlington array with base resistors for direct logic interface, drives the relays. A useful feature is the inclusion of eight inductive-load clamping diodes, internally connected between the Outx pins and the Com pin. Com thus connects to the relay-supply rail. The power-saving timing comes from IC_1, a micropower MAX810 processor supervisor powered by the normally high Select line. When the system processor writes to the IC_2 latch, the supply to IC_1 toggles for 200 nsec, causing IC_1 to take its RST output high for 140 to 560 msec. Q_1 operates as a gated current source, dragging current from Q_2, thereby shorting out D_1, a 5.6V zener diode. Hence, the relays receive full bus power during the switching phase. After this period, Q_2 turns off, and D_1 drops the relay supply to the holding voltage. (DI #2217)

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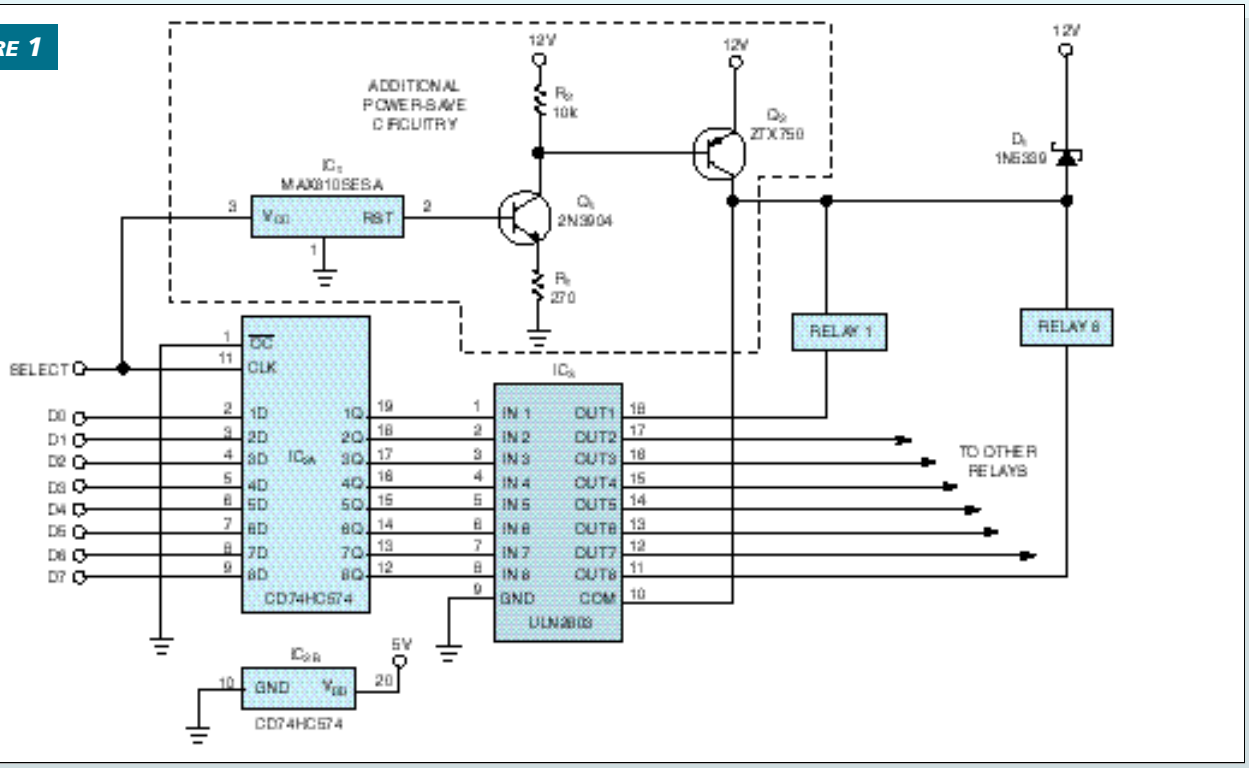
FIGURE 1



This power-saving circuit takes advantage of the large turn-on/turn-off hysteresis in electromechanical relays and solenoids.