Tester cycles system-power supplies

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Power-cycle testing is important because it tests the user environment. A poorly designed system board or chip can cause the power-cycle testing to fail, however. What's more, the power-cycle-test setup for system-board bench testing could require the use of a bulky and expensive commercial power supply. The situation gets worse when you need to simultaneously test several system boards.

This Design Idea describes a simple and inexpensive power-cycle circuit using just a few components (**Figure 1**). The power-supply input voltage is a dc supply from an inexpensive switching-power-supply adapter. This type of power adapter normally provides power for the system board. The circuit uses a 12V supply. You plug the power jack of the power unit into power socket J_1. The output voltage of this circuit from socket J_2 then connects to the system board to perform the power cycling. The 12V supply passes through resistors R_5 and R_6, which limit the current flowing through relay switches S_1 and S_2.

During start-up, the contact of relay S_2 is normally closed, allowing the 12V supply coming from R_6 to pass to resistors R_1 and R_2 and charge up capacitor C_1. Resistor R_8 in series with transistor Q_2 increases the charging and discharging duration of capacitor C_1. Transistor Q_2 turns on once capacitor C_1 charges toward 2V. This action impresses approximately 0.7V across the base-emitter voltage of transistor Q_2, which turns on Q_2. When transistor Q_2 turns on, it provides a low-resistance path for the coil of S_2 and thus energizes the relay, causing S_2's contact, 2_B, to close.

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When this scenario occurs, the 12V power supply switches its path to contact 2_B and enables the optocoupler's diode to conduct, turning on its internal transistor. The optocoupler then drives transistor Q_1. When Q_1 turns on, it provides a path for the coil of S_1, which energizes and thus connects the 12V supply to the output voltage. The circuit connects the output voltage to the power supply of the system board, thus powering up the board.

The system board remains powered up for approximately 45 sec. During the on time, capacitor C_1 discharges slowly through R_2, Q_2, and R_8. C_1 turns off transistor Q_2 once the voltage across the base of the transistor is below the transistor's turn-on voltage. Then, contact 2_B connects to contact 2_A, and the cycle repeats.

The off time for this circuit should be approximately 17 sec. Freewheeling diodes D_1 and D_2 reduce the large transient voltages that occur when the currents through the relay coils change quickly. EDN

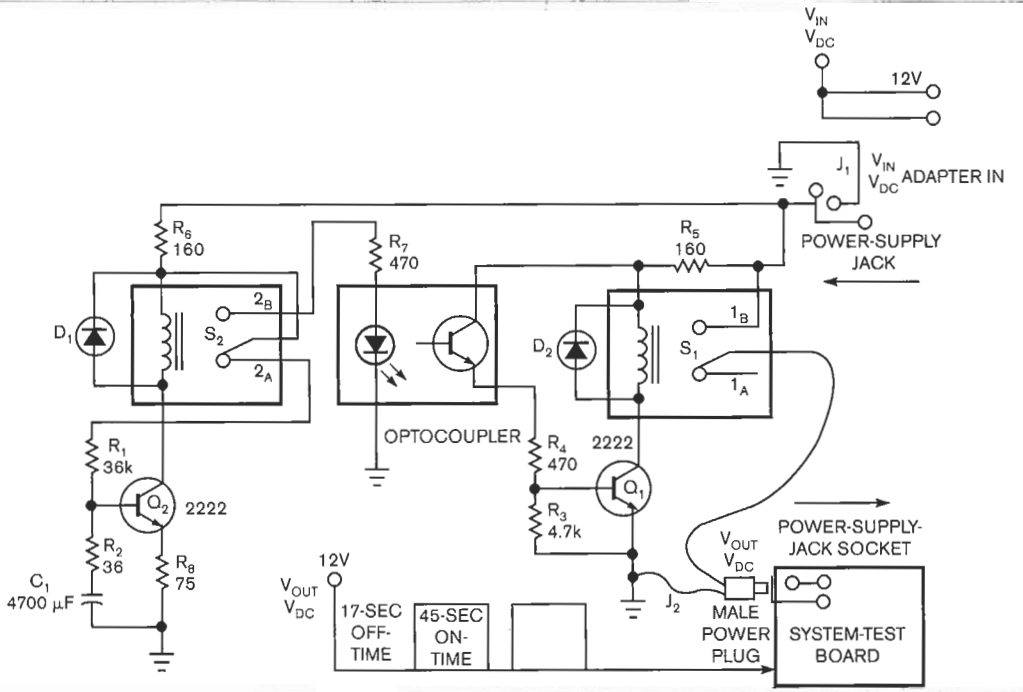

Figure 1 This simple and inexpensive power-cycle circuit uses just a few components.