

# Complementary lighting control uses few parts

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A very useful tool for stage lighting, light shows, or even home movies is a complementary lighting-control unit that will fade out one lamp while simultaneously increasing the light output of another. The usual design for such a control unit is rather complicated, relying on dual potentiometers, two fader circuits, and two of everything else. But the circuit in the diagram can perform this function with a minimum of parts, and the two loads track each other accurately without adjustments.

The gate of SCR<sub>1</sub>, a silicon-controlled rectifier, is driven from a standard phase-control circuit, based, for example, on a unijunction transistor or a diac. It controls the brightness of lamp L<sub>1</sub> directly. Whenever SCR<sub>1</sub> is not on, a small current flows through L<sub>1</sub>, D<sub>1</sub> and R<sub>1</sub>, permitting SCR<sub>2</sub> to fire. When SCR<sub>1</sub> turns on, current

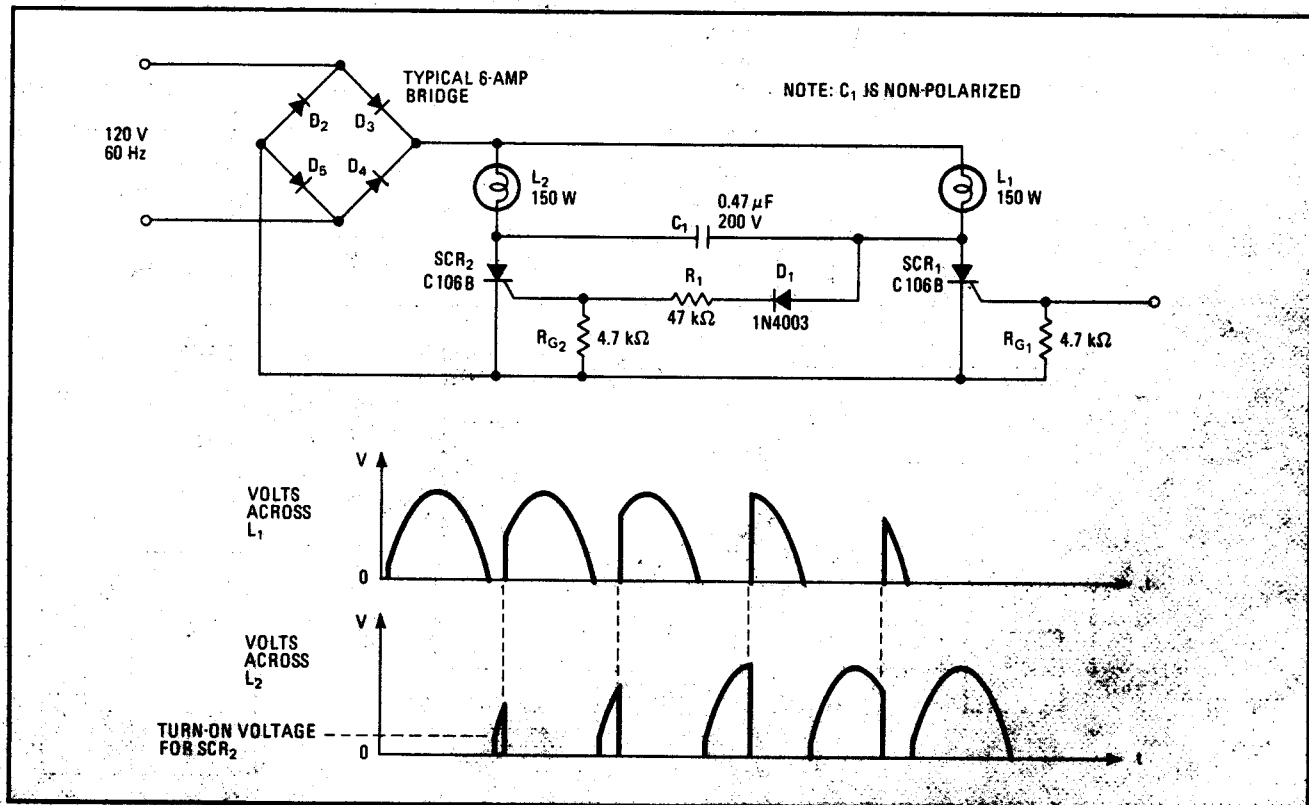
flow ceases through D<sub>1</sub> and R<sub>1</sub>; the energy stored in C<sub>1</sub> produces a negative spike that turns SCR<sub>2</sub> off.

In this circuit, the peak current through the diode bridge never exceeds the peak current through either SCR, because the two SCRs can never be conducting at the same time. This is an advantage over the conventional circuit, in which each SCR would be fired at a 45° phase angle to produce half brilliance from the lamps. This represents the worst case of simultaneous conduction and draws a peak current from the bridge that is twice the magnitude of the current of a single 150-watt lamp.

If this control circuit is to be used with lamps rated at more than 150 watts, the value of C<sub>1</sub> should be increased. The value of C<sub>1</sub>, in microfarads, equals or exceeds:

$$(1.5 t_{off} I) / E$$

where  $t_{off}$  is the turn-off time of the SCR in microseconds, I is the maximum load current, and E is the voltage at this maximum load current. □



**Parts miser.** Complementary lighting control fades one lamp out while bringing up the other one, with fewer parts than conventional controls use. Waveforms are segments of successive half-cycles of a full-rectified sine wave as control signal varies.