Remote controller sets universal motor's speed

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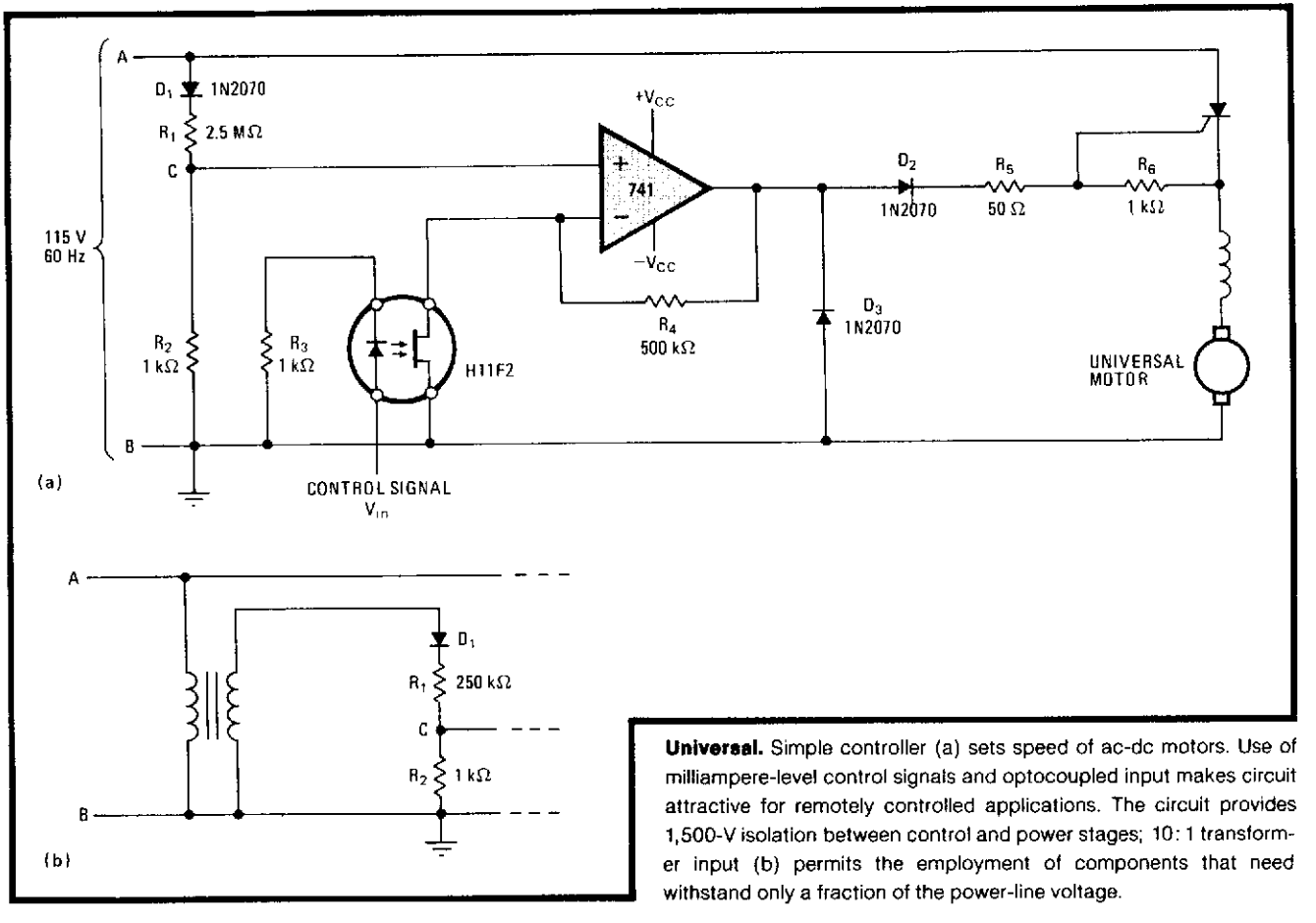
The speed of an ac-dc motor is easily set with this circuit. Millivolt-level input voltages drive its variable-speed control amplifier through an optocoupler that is isolated from the rest of the circuit to permit its use in remotely controlled applications.

Control signals in the range of 0 to 3 volts are applied to the optoisolator (GE H11F2) as shown (a). The resistance between the drain and source of the device's field-effect transistor varies with input voltage V_{in}, and so the gain of the 741 operational amplifier, which amplifies the rectified 60-hertz power-line input, is controlled accordingly.

When the instantaneous output of the op amp is greater than the motor's counter electromotive-force voltage, diode D_2 conducts and thus the silicon controlled rectifier is switched on. Power is thereby applied to the motor. The greater the difference between the op amp's output and the counter emf voltage at any instant, which indicates motor speed is lower than programmed, the earlier in the cycle the trigger pulse to the SCR occurs.

Diode D_1 and resistors R_1 and R_2 have been selected so that the circuit will withstand a reverse voltage of 200 V. If a transformer-based input circuit (b) is substituted, however, it is only necessary for D_1 to have a reverse-breakdown value of 20 V. □



Universal. Simple controller (a) sets speed of ac-dc motors. Use of milliampere-level control signals and optocoupled input makes circuit attractive for remotely controlled applications. The circuit provides 1,500-V isolation between control and power stages; 10:1 transformer input (b) permits the employment of components that need withstand only a fraction of the power-line voltage.