The Hurst Stepping Motor Controller is a general purpose control and driver for 4-phase stepping motors rated at up to 500 ma per phase. It is fabricated using thick film hybrid technology and CMOS components, thus providing small size and low power consumption. The hybrid may be operated with external supply voltages from 6-24 VDC. It contains a regulator which provides an internal 5V logic supply.

The circuit includes a multivibrator which permits two modes of operation, continuous stepping at an adjustable frequency (RUN mode) or single steps (JOG mode). The period of the multivibrator output is determined by an external user-supplied resistor and capacitor. The pulse output and its complement are available at the output terminals.

Pulses from the multivibrator or external pulses are connected to the PULSE IN terminal of the logic sequencer. This circuitry generates 4-phase-control signals in the conventional 2-on, 2-off sequence. Direction of rotation is reversible and is determined by the state of the CW/CCW terminal. In addition all 4 phases may be deenergized without interrupting the power supply by means of the DISABLE terminal.

The phase drivers are open collector transistors with maximum $I_C$ and $V_{CEO}$ ratings of 500 ma and 80V respectively. In applications which require larger phase currents the phase drivers may be used to control power switching transistors.

**APPLICATION INFORMATION**

**MOTOR CONNECTIONS**

The 4 motor phases are connected to terminals 7-10 as shown in the figure. The phase commons are connected to the positive terminal of the supply voltage.

**LOGIC SEQUENCER**

When power is applied to the hybrid the sequencer outputs will assume a 2-on, 2-off configuration corresponding to one of the 4 steps shown in the switching sequence diagram. Each input pulse at Terminal 16 results in one step in the sequence. The direction of the step, CW or CCW, is determined by the state of Terminal 6. If Terminal 6 is unconnected, the sequence is CW. If Terminal 6 is connected to COMMON, the sequence is CCW. When the DISABLE control, Terminal 14, is pulled to COMMON, all 4 phases drivers are deenergized. This action is independent of the sequence step and may be used to deenergize the motor between steps.

**INTERNAL MULTIVIBRATOR**

The output of the multivibrator (Terminal 19) should be connected externally to the input of the logic sequencer (Terminal 16). The complement of the multivibrator output is also available for external use at Terminal 20.

The pulse period is determined by the choice of the external R and C. In the RUN mode the period is approximately 4.40 RC, while in the JOG mode it is approximately 2.48 RC. The hybrid contains an internal 10K $\Omega$ resistor to limit the minimum value of R. The maximum recommended value is 1 M $\Omega$. If a potentiometer is used, a logarithmic taper will provide a somewhat linear frequency adjustment.

**RUN mode:** When Terminal 4 is pulled low by either a manual switch to COMMON or an active device, e.g., CMOS, TTL or a discrete Transistor, the multivibrator operates as an oscillator. When Terminal 4 is unconnected, the phase drivers will remain in a "holding" mode with 2 phases on.

**JOG mode:** When Terminal 5 is pulled low, the multivibrator will produce a single pulse at its output. Note that if a manual switch is used, the contacts must be "debounced". The JOG control has no effect if the RUN control is low.