

8 Cassette Control System

□ Let's say that you need a programmable control system that can perform a timed sequence of operations. This sounds like a job for a high-priced computer, doesn't it? In many instances, however, just a cheap cassette recorder can do a respectable job—provided, of course, that you build this 2-channel controller.

High-frequency signals (above 5000 Hz) at the controller's input are amplified by high-pass filter IC1-a; then detected and used to clock one half of a dual flip-flop (U2). Each tone burst toggles the flip-flop, causing relay K1 to alternately open and close. These high-frequency audio signals have no effect on low-pass filter U1b, but frequencies below 500 Hz will produce the same effect in the lower channel as high frequencies in the upper

channel, with the result that K2 alternately opens and closes a burst of low frequency audio.

Feed the signal from your recorder's speaker output jack to the controller's input. Record a short sequence of tones—about 300 Hz for the low channel, and 7500 Hz for the high channel. Play back the tape-recorded sequence, and adjust R1 somewhat past the point where toggling of the relays starts. The LED go on and off with the relays and serve as convenient indicators of channel activity. Pushbuttons S1 and S2 can be used to change the status of a channel independently of the audio input. Whistles, tuning forks and electronic oscillators can all be used as tone sources. Whichever you use, strive to keep the level of the recorded signal constant.

PARTS LIST FOR CASSETTE CONTROL SYSTEM

C1, C2—.002- μ F polystyrene capacitor
C3—.039- μ F polystyrene capacitor
C4—.02- μ F polystyrene capacitor
C5, C6—0.47- μ F mylar capacitor
C7, C8—0.1- μ F ceramic disc capacitor
D1-D7—1N914 diode
IC1—LM324 quad op amp integrated circuit
IC2—4013 CMOS dual flip-flop integrated circuit
K1, K2—6-VDC, 500-ohm relay
LED1, LED2—light-emitting diode

Q1-Q4—2N3904 NPN transistor
R1—100-ohm trimpot (all resistors 10% unless otherwise noted.)
R2—36,000-ohm, $\frac{1}{2}$ -watt resistor 5%
R3—6,900-ohm, $\frac{1}{2}$ -watt resistor, 5%
R4—56,000-ohm, $\frac{1}{2}$ -watt resistor 5%
R5—8,200-ohm, $\frac{1}{2}$ -watt resistor 5%
R6—5,100-ohm, $\frac{1}{2}$ -watt resistor 5%
R7—24,000-ohm, $\frac{1}{2}$ -watt resistor 5%
R8—33,000-ohm, $\frac{1}{2}$ -watt resistor, 5%
R9—240,000-ohm, $\frac{1}{2}$ -watt resistor, 5%
R10, R17—1,000-ohm, $\frac{1}{2}$ -watt resistor

R11, R18—220,000-ohm, $\frac{1}{2}$ -watt resistor
R12, R15—30,000-ohm, $\frac{1}{2}$ -watt resistor
R13, R16—39,000-ohm, $\frac{1}{2}$ -watt resistor
R14—3,900-ohm, $\frac{1}{2}$ -watt resistor
R19, R21—100,000-ohm, $\frac{1}{2}$ -watt resistor
R20, R22—47,000-ohm, $\frac{1}{2}$ -watt resistor
R23, R24—22,000-ohm, $\frac{1}{2}$ -watt resistor
S1, S2—pushbutton switch, normally open

