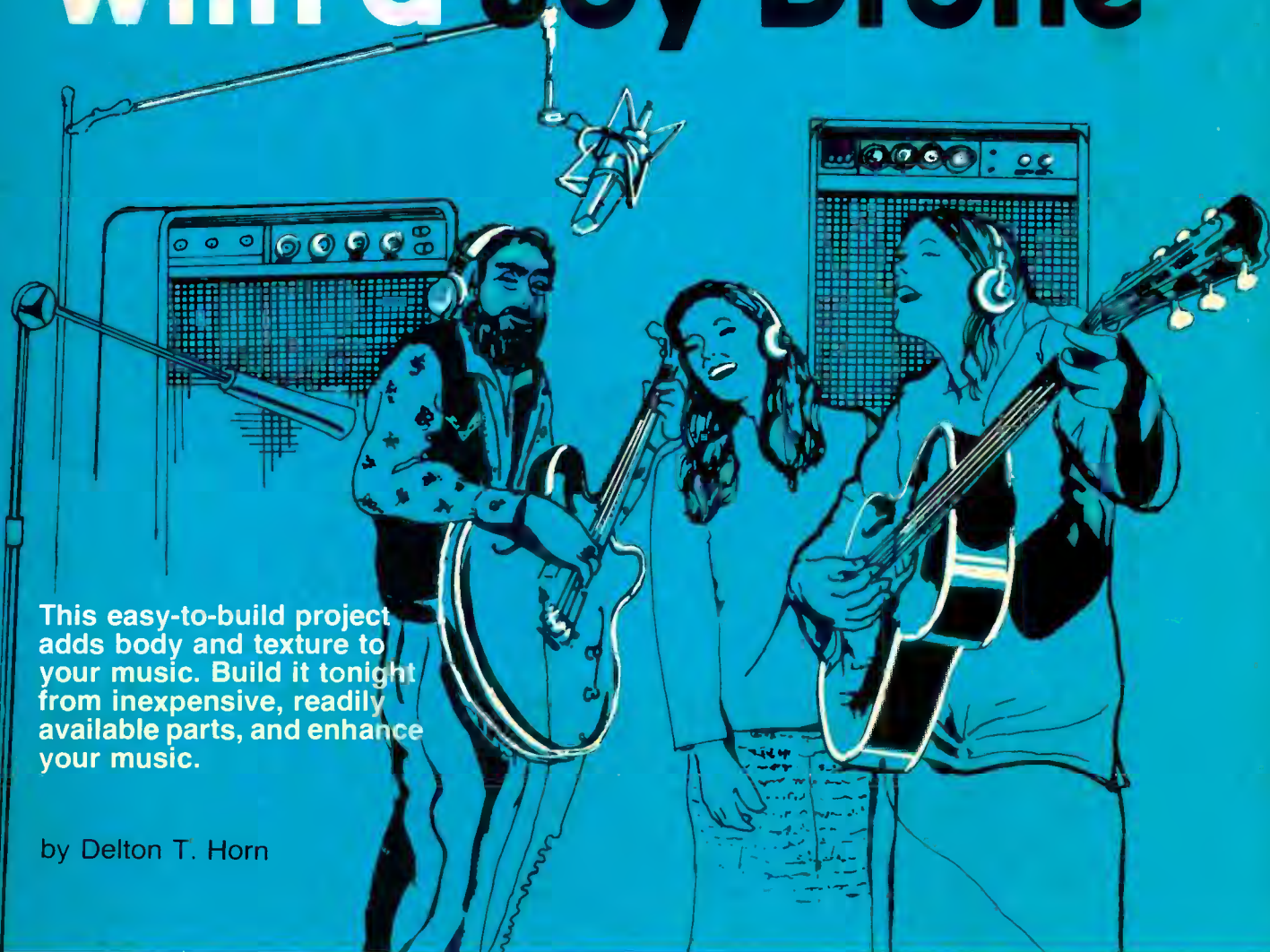


Make better music with a Joy Drone



This easy-to-build project adds body and texture to your music. Build it tonight from inexpensive, readily available parts, and enhance your music.

by Delton T. Horn

If you've ever gotten involved with electronic music, you know that some sort of drone is often used to add body and texture to the over-all sound.

It's a more or less constant tone below the volume of the main acoustic events. The tone is usually of a fairly indefinite pitch, and any movement is usually restricted to timbral variations, or subtle changes in the textural quality of the tone.

As musically useful as the drone so often is, it's really a pretty simple function. Although most musicians use expensive voltage-controlled oscillators and filters to produce the drone, you can do it with this inexpensive special purpose drone box. And, even if you're not into electronic music, this simple project makes an amusing do-nothing box.

Description	Parts List	Quantity required	Radio Shack part number
1K resistor, ¼ watt		8	
4.7K resistor, ¼ watt		4	271-1300
18K resistor, ¼ watt		8	series
39K resistor, ¼ watt		4	
10K joystick (or 4 10K pots)		2	—
.02 mfd disk ceramic capacitor		4	—
.01 mfd disk ceramic capacitor		8	272-131
0.1 mfd disk ceramic capacitor		4	272-135
324 quad op-amp IC		1	276-1711
1N34 germanium diode		8	276-1123
SPST switch		4	275-324*
DPDT switch		4	275-1546*
RCA or phone jack		1	—
9 volt batteries and clips		2	

*The switches listed are subminiature types that work well. You may, however, substitute any switches you happen to have on hand.

You can use individual 10K pots for each of the tone-control variable resistances. But, since inexpensive joysticks are now available on the surplus market, they're a much better choice for the project.

A joystick, in case you didn't know, is simply four pots with a mutual control that can be moved in two dimensions—right and left, and up and down. By using a joystick on the drone, very subtle variations in timbre can be achieved with a single movement.

Joystick JS1 controls the frequency of four identical sine wave oscillators, each with a nominal frequency of about 900 Hz. Different component values will give you different frequencies, but the values of the components in each oscillator should be kept in the same basic ratio to each other.

How to get joysticks

You can obtain joysticks from any of these mail order parts houses. Before ordering, write for prices and minimum order policies.

Formula International Inc.
12603 Crenshaw Boulevard
Hawthorne, CA 90250

James Electronics
1021 Howard Avenue
San Carlos, CA 94070

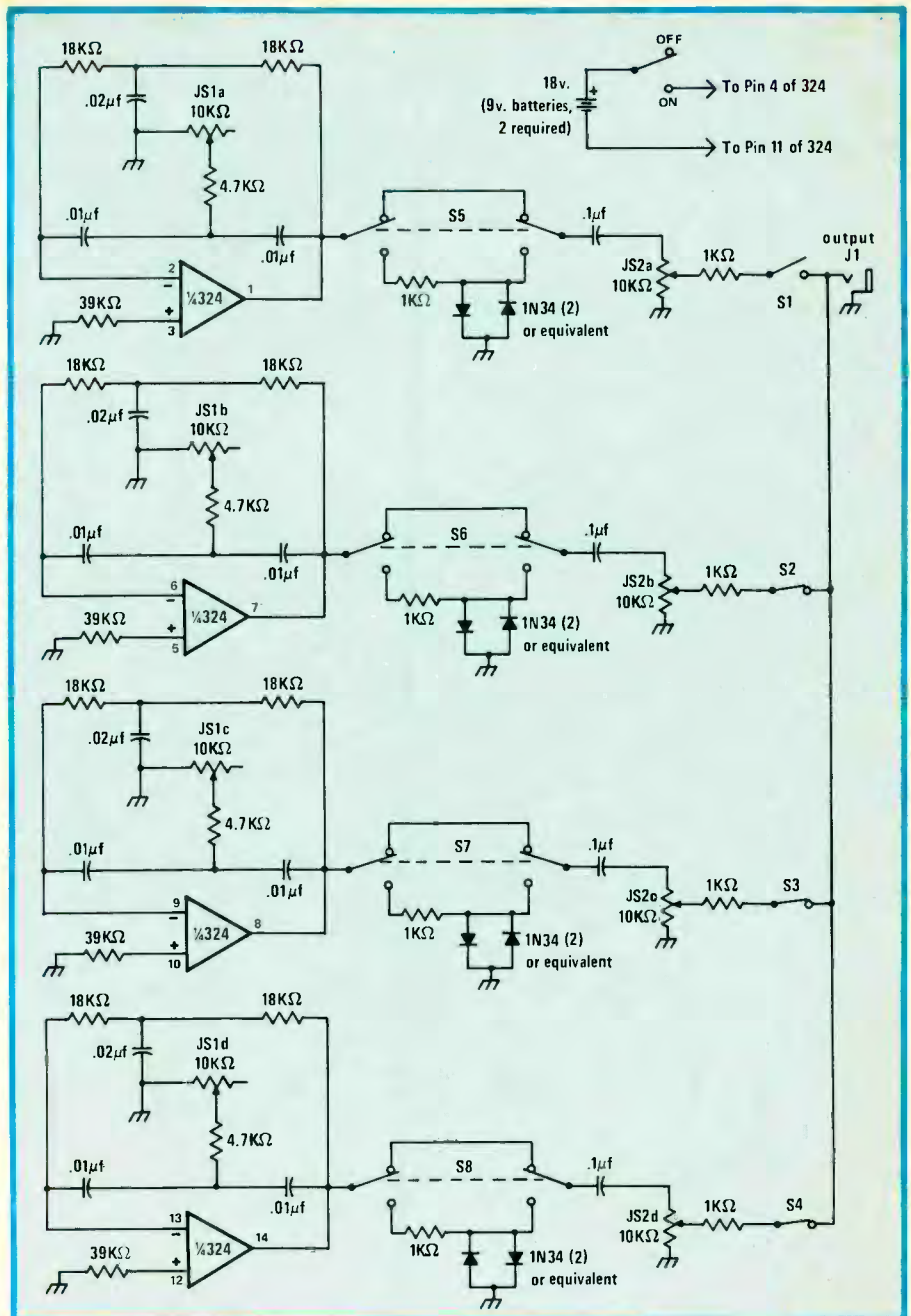
Poly Paks
P.O. Box 942
South Lynnfield, MA 01940

Quest Electronics
P.O. Box 4430
Santa Clara, CA 95054

Although you can build the circuit to produce up to four different tones, you'll find it musically more effective to have them all tuned together. Then moving the joystick will throw them slightly out of tune with each other, producing beat tones that help eliminate the sense of a definite pitch. This lack of definite pitch insures the drone won't sound out of tune with the rest of the music parts being played.

Any of the oscillators can be eliminated from the output by opening the SPST in-out switch, S1 through S4. The DPDT mode switches, S5 through S8, let you choose between a sine wave and a rough square wave.

The square waves are produced by the chopping effect of back-to-back diodes. Because square waves contain a large number of harmonics, more complex timbres can be created. However, too many harmonics placed closely together can result in a rather muddy sound. But, they can be used



The Joy Drone is built around a 324 quad op-amp integrated circuit. Each section of the IC is the heart of an independent audio oscillator. Although the four oscillators can be set to different frequencies, the best effects are obtained when all generate the same tone.

occasionally for special thick-texture effects.

The Joy-drone is by no stretch of the imagination a solo instrument. But it's handy to have around for filling out and giving body to a musical piece.

For best results, the volume of the Joy-drone should be kept low enough that you aren't really aware of its presence as a separate acoustical entity. At the same time, it should be loud enough that the sound of the main instruments are warmer and filled out.

Easy to build

The circuit is straight-forward, and the parts layouts is not critical. The Joy-drone shown here uses a single 324 quad op-amp, but you can use

individual 741 op-amps, or most any other op-amp you have handy.

The Joy-drone shown here uses 10K controls. You may find that only 100K joysticks are available when you're acquiring parts. If you get a 100K joystick, connect a 12K resistor across each of the four controls. This will reduce their resistances to usable range.

Although a joystick is ideal for controlling the pitch of the drone, it's a toss-up between a joystick and individual volume controls. Using individual controls, you have complete control over the intensity of each component in the drone.

The joystick offers less control, but does let you create interesting effects with a single movement.