

35 Computer-Controlled Note Generator

□ Computer music can be created in many different ways. One method is to specify all of a note's parameters—frequency, harmonic structure, amplitude, and attack/sustain/decay times—as well as special effects by means of software. Naturally, this gobbles up a lot of memory, thus making such an approach impossible for the owner of a very small computer. All is not lost, however. By augmenting your system with some inexpensive hardware, the software burden is diminished.

This computer-controlled note generator produces 5 octaves of the equally tempered chromatic scale under the control of one of your computer's 8-bit parallel ports (only 7 bits of which are used). Lines D6 through D4 select the octave, while Lines D3 through D0 select one of the twelve notes within that octave.

The lowest octave is selected by a binary 0 on lines D6 through D4. A binary 1 selects the next higher octave, and so on until you reach the

highest octave, coded by a binary 4 (100). (Note: D6 is the most significant bit; D4 is the least significant.) Codes higher than 4 yield no output.

The note-selection lines behave similarly, except that 12 codes are used. (Here D3 is the most significant bit, and D0 is the least significant.) Binary 0 gives you a C#. D is produced by a binary 1, and binary 2 yields D#. This continues on up the scale until you reach binary 11, which gives the twelfth note, C. Codes above binary 11 give no output.

Turning can be accomplished by adjusting R1 to produce a 1,000, 120 Hz signal at pin 13 of IC1, or you can tune by ear against some pitch reference. The output at pin 12 of IC5 is a square wave that can be filtered and/or shaped (see the computer-controlled keyer circuit). The software we'll leave to you. In general, your programming burden has been reduced to the generation of a rhythmic sequence of 7-bit binary codes.

PARTS LIST FOR COMPUTER-CONTROLLED NOTE GENERATOR

C1—30-pF polystyrene capacitor

IC1—4047 CMOS multivibrator, integrated circuit

IC2—4024 CMOS binary divider integrated circuit

IC3—4051 CMOS 8:1 multiplexer integrated circuit

IC4—50240 Mostek top-octave generator integrated circuit

IC5—74C150 16:1 CMOS multiplexer integrated circuit (National)

Q1-Q7—2N3904 NPN transistor

R1—10,000-ohm trim potentiometer (all resistors 10% unless otherwise noted.)

R2—10,000-ohm, ½-watt resistor

R3-R9—100,000-ohm, ½-watt resistor

R10-R16—33,000-ohm ½-watt resistor

