

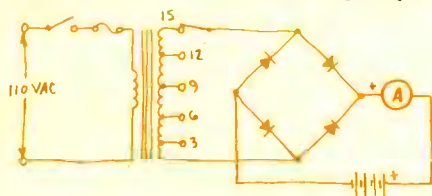
BY JEFF SANDLER

## Ten the easy way

I've been looking for an inexpensive battery charger that can handle up to 12 volt batteries and provide as much as 10 amps of charging current. I haven't been able to find anything ready-made at a price I can afford. Do you have a circuit I could build for around \$10?

J.F., Hammond, IN

It's very hard to make a high-current, variable voltage charger for \$10. The biggest problem is the transformer. The best one I know of is a 3 to 15 volt, 15 amp unit available from Delta Electronics, P.O. Box 2, Amesbury, MA 01913. The last time I inquired, the unit, cataloged as number 6481, was about \$9 plus shipping. Add to that the cost of four 15-amp diodes and the miscellaneous hardware you'll need, and the price goes up pretty fast. But, the total should be well under \$20. If you have an ammeter kicking around, put it in series with the charging lead. No filtering capacitor is used, so the voltage across the battery is raw, pulsating dc. Then, select the voltage tap that gives you



the desired charging current. Don't worry about the pulsations. Some battery makers believe that the pulse charge may actually be more effective than filtered dc.

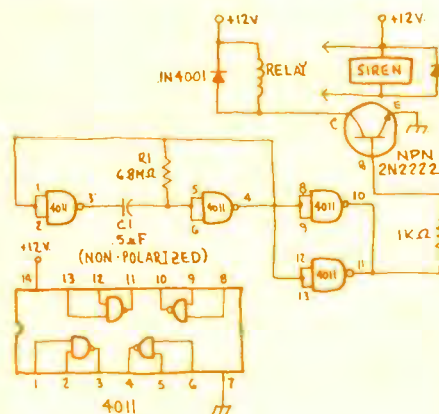
## Three-second siren

I have a 12-volt antique police siren and would like to make an automatic switch that will turn it on and off at three second intervals. What's the easiest way for me to do this?

B.H., Sanford, ME

This circuit should do the trick. It uses half a 4011 quad NAND gate to generate a symmetrical on-off signal. The time period for each state is controlled by the time constant of R1

and C1. The values shown will give you about three seconds each. C1 must be non-polarized. You should be able to get a paper or mylar cap that size, but you can parallel five



0.1 mfd ceramic disk capacitors too. You didn't mention how much current the siren draws. If it's less than an amp, you can connect it directly into the collector circuit. If it draws more, use a relay as shown.

## Battery crash

My hobby is flying radio-controlled model airplanes. Inside the plan is a radio receiver and escapement powered by batteries. The escapement current drain is high, and the batteries go dead after only a short time. Once they gave up while the plane was flying, and when they did, the plane didn't. Is there a really long-lasting battery that has enough power to run the escapement.

A.V., Terre Haute, IN

Carbon zinc and alkaline batteries all have reduced power output as they age. If your escapement is hanging up, the current drain can be very high, causing the voltage to drop to a point where there just isn't enough power to overcome whatever is hanging up the escapement. A new battery, called the sintered-electrode nickel cadmium, is now becoming available to the general public. These batteries can supply up to one ampere with virtually no drop in the output voltage. You didn't mention the size of your plane, so it's hard to know the size batteries you use.

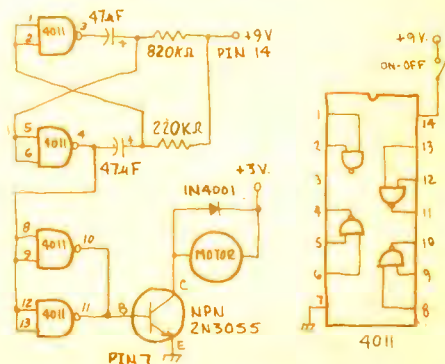
But, a pair of D cells will give you almost 2 1/2 amp hours of service. That should be more than enough to handle that escapement.

## CMOS turn-on

I enjoy your Clinic column very much. I wonder if you could suggest a CMOS circuit that would turn on a small dc motor for short periods of time. I'd like the motor to run for about 10 seconds, then remain off for between 20 and 30 seconds. The motor has a resistance of three to six ohms, and runs on three volts. The circuit should be physically as small as possible, and have no relays.

P.A., Georgetown, KY

Thanks for the kind words. Here's a circuit I think will meet your requirements very well. It uses a single 4011 CMOS quad NAND gate and a 2N3055 transistor. Two of the gates are connected as a free-running multivibrator providing the on and off time periods. You can change these times by changing the component values. The output of the multivibrator is passed through the remaining two gates into the base of the NPN transistor. Your motor is connected in the collector lead to your three volt power source. An on-off switch between the IC power source, such as a nine-volt transistor battery, starts and stops the operation.



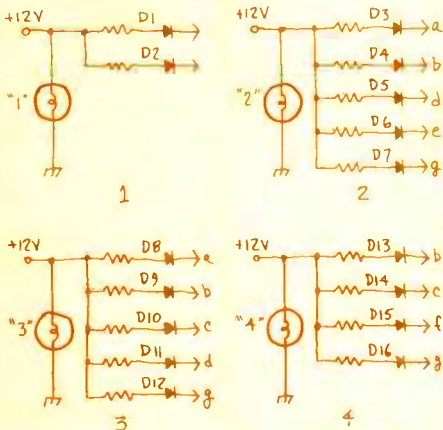
## One, two, three, four

I have an eight-track tape deck that has small green lamps to indicate the track in use. I'd like to replace them with seven-segment digital LED readout. Is there an

easy way to connect the readout to the four lamp sockets? I'd rather not get involved with a complicated circuit using ICs.

M.E., Atlanta, GA

I think you'll really like this circuit. It uses 16 1K resistors and 16 small signal diodes. Depending on the parts you have in your junk box, the whole project shouldn't cost more than three or four dollars. Each of the four bulbs is connected between the tape deck's power supply, usually less than 12 volts, and ground. Just connect the summing point of the diode-resistor networks to the power supply side of the bulb sockets. Then connect the diodes to the indicated terminals of the seven-segment display. You should have D3 and D8 connected to a, D1, D4, D9 and D13 connected to b, D2, D10 and D14 connected to c, D5 and D11 connected to d, D6 connected to e, D15 connected to f, and



D7, D12 and D16 connected to g. Then, as each bulb goes on, the corresponding segments of the display will go on, giving you a digital readout of the track number.

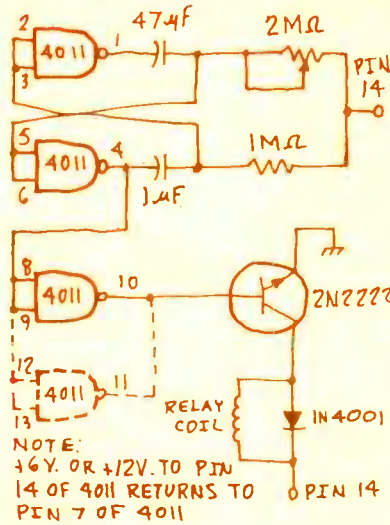
### One on, 60 off

I need a circuit that will energize a relay for about one second each minute, but with a control so I can set the period between relay closings from 57 to 63 seconds.

M.K., Jamestown, NY

Here's a straightforward free-running circuit built around a single 4011 IC. Two of the gates are connected to form a multivibrator that sets the on and off time periods. The variable resistor lets you trim the off period. If you need precisely one second of on-time, you may want to substitute a variable resistor for the 1 meg fixed resistor. The output of the multivibrator is buffered by a third gate, the output of which controls a 2N2222 switch. If the relay coil you're using requires more

current than the single gate can provide, you can parallel the fourth gate as shown in dashed line. If you don't use the fourth gate, make sure to tie the two input lines to pin 14 or pin 7 of the IC. This will prevent unwanted self-oscillation of the gate.

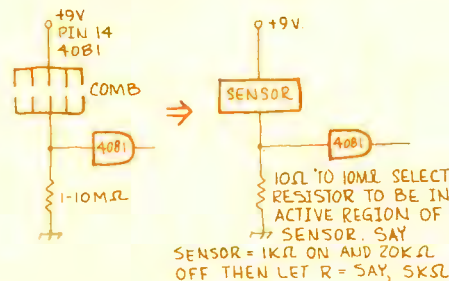


### Rain, rain, go away

I picked up the March issue of *Modern Electronics* and came across your rain-drop counter. It's a neat idea. I'm not interested in counting rain drops, but I would like to use the counter circuit. Can it be triggered by another source such as a broken light beam?

G.M., Niles, OH

You bet it can. It will operate with any detector that has an on resistance of less than one-third R1, and an off resistance at least three times R1. The value of R1 can be between 10 ohms and 10 meg., provided it falls between the on and off resistances of the detector. You didn't mention how you planned to detect the light beam, but a photocell seems the most obvious. It should work as a direct replacement for the comb used in the raindrop counter. You may, however, have to add a few extra parts to get the circuit operating the way you want it to.



### TV fm

I would like to receive the audio portion of tv programs on my fm radio. Could I build a converter similar to those that put CB into am radios?

L.W., Auburn, IL

There's no question that such a converter can be built. But working at the very high fre-

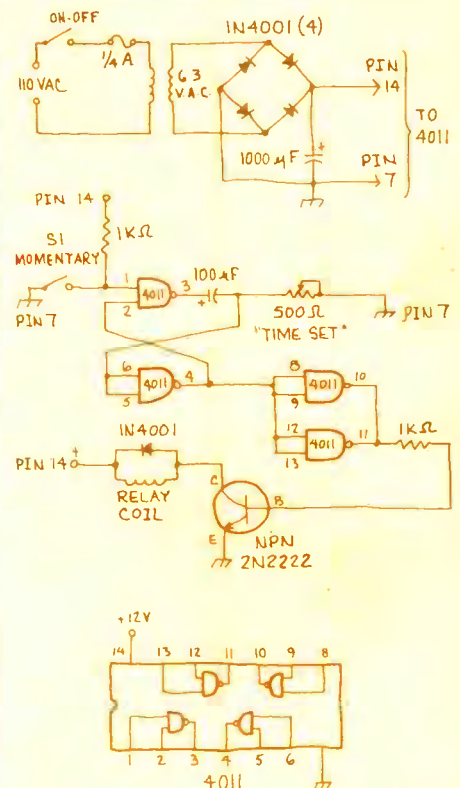
quencies of tv requires special wiring and layout techniques most hobbyists don't know. Channel 13, for example, has a frequency of 214 to 220 MHz. At those frequencies, even a short piece of wire acts like a tuned circuit, which can cause no end of problems. Unless you really know your way around rf circuits, I'd advise you stay away from the project you have in mind. In fact, by the time you obtain the special parts you'll need, you'll have spent as much or more than a ready-made fm-tv portable radio costs. Radio Shack, for example, has an am-fm-tv portable for \$40. Many other similar radios are available, some for considerably less.

### 20-second egg

At my restaurant, I need a small 20 second timer. Being a beginner in electronics, I need a very detailed diagram to follow. Could you possibly set one up and send it to me? Oh yes, it must run on 120 volts ac.

K.S., Morristown, NJ

I'm really sorry to have to say that it's totally impossible for me to build projects for *Clinic* readers. I just don't have the resources to handle the hundreds of requests I receive each month. As far as your timer is concerned, the diagram shown is relatively easy to build.



However, because you want to power it from your ac power lines, I'd suggest finding a local electronics hobbyist who can take you by the hand through the construction process. Although the circuit diagram is complete, only the coil of the relay is shown. Explain to your electronics mentor what you want the timer to do and he'll show you how to connect the timer to do the job.