Q & A

Write to Q & A, Electronics Now, 500-B Bi-County Blvd., Farmingdale, NY 11735

LIGHTING CONTROL

I have built a lighting control system for my home using momentary switches. I have it set up so that the first press turns on the light and the next press turns it off. However, frequently a single press will cause the light to turn on and then turn immediately off. I think the problem is with the switches themselves. Can you suggest a way around this problem?—Y. Geben, Tetour, CO

You haven't given me much detail about your circuit but, from what you've described, the problem seems to be that the switches are "noisy." In other words, the switch contacts are "bouncing," or opening and closing several times very rapidly when you push and release the switch. This is a common problem with run-of-the-mill pushbutton switches, and there are several things you can try to get rid of the problem.

The first solution, which you probably don't want to hear, is to modify the circuit that the switches are controlling so that it won't respond to what I believe are the extra pulses from the switches. This can be done with a 555 timer IC set up as a one-shot multivibrator. But it does mean adding some new circuitry, which might not be easy to add to what you've already done.

A second idea is to get rid of the switches you're now using and replace them with high-quality units that won't bounce as much—but they are significantly more expensive than the ones you now have. Unfortunately, in spite of their price, even the world's best switches will bounce occasionally.

A much better fix is to debounce the switches you're currently using. This will take some additional hardware, but much less than would be needed for my first suggestion. You didn't include a schematic of your circuit, but the switch debouncers

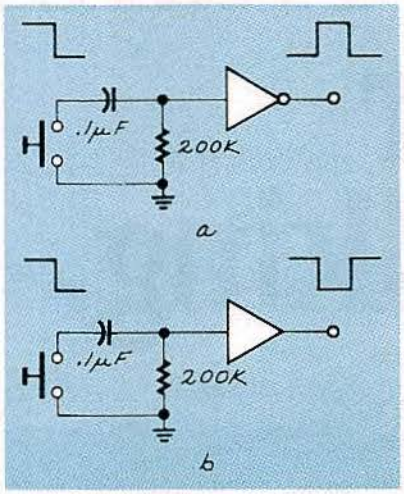

FIG. 1—SWITCH DEBOUNCERS. These circuits will cure problems caused by switch-contact bounce. The one shown in *a* will give you a positive output pulse, and the one shown in *b* will give you a negative output pulse.

that I've drawn in Fig. 1 should do the trick.

By the way, it's always a good idea to debounce mechanical switches, regardless of the application. In your case, the effect of switch bouncing seems to be fairly obvious, but in other circuits, it might be hard to track down the problem.

TIME DELAY CIRCUIT

I use an electronic timer in my darkroom, and because of the kind of work I do the exposure times for my prints are extremely long. In order to extend bulb life I've put a fan on the enlarger head to cool the bulb. I can't have it running during the exposure because of the vibrations, but I've rigged up a circuit that will turn it on when the bulb is switched off. What I need is a control circuit that will keep the fan running for a certain period of time and then shut it off automatically. The fan control circuit is now driven by logic signals. Any ideas?—J. Metzler, Portland, OR

Regardless of what you're controlling, it sounds to me as if you're looking for a simple time-delay circuit. And whenever you need a simple time-delay circuit, your first thought should be the 555 timer IC, the king of time-delay circuits.

Because you already control the fan with logic level signals, the output of a 555 should be perfect for the job. You neglected to say whether you need a high or low signal to activate the fan, but it's a simple matter to run the output of the 555 through a transistor set up as a simple inverter.

The circuit shown in Fig. 2 should work for you. Rotating the potentiometer wiper will change the time delay from the 555. If you use this circuit, it's a good idea to get a data sheet on the 555 in case you want to make a change in the time delay or alter the circuit to do something else.

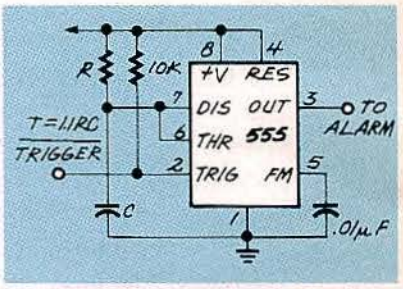

FIG. 2—SIMPLE TIME-DELAY CIRCUIT. Rotating the potentiometer wiper will change the time delay from the 555 IC.

TRIANGLE GENERATOR

I need a source of triangle waves to test a piece of equipment I have. I don't want to spend a lot of money on it because I'll probably use it once and never need it again. Is there some simple circuit I can build to generate triangle waves that also gives me control of the frequency?—T. Barabbas, Enid, OK

The schematic in Fig. 3 is the simplest triangle-wave generator I can come up with. All you need is three

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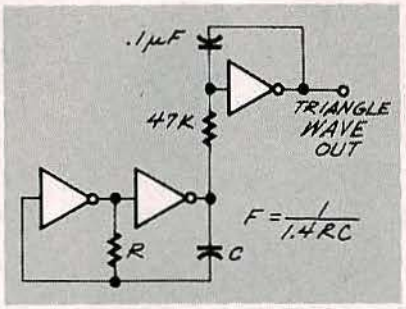

FIG. 3—TRIANGLE-WAVE GENERATOR. The first two gates are set up as a square-wave oscillator, and the last one makes the conversion to triangle waves.

inverters and a handful of passive components to put it together. Because it's built with CMOS parts, the output waveform will swing pretty close to the supply rails, and the operation of the circuit will be noise-free.

The first two gates are set up as a square-wave oscillator, and the last one makes the conversion to triangle waves. I'm pointing this out because if you already have a good square-wave generator, you can feed its output through the last part of the Fig. 3 circuit and convert the square waves to triangle waves.

FOREIGN CHARACTERS

The word processor I use allows me to type in the foreign characters that are part of the IBM character set, but it doesn't show me what they are. Because I write a lot of French text, it would be a great help if I could call up an ASCII table and see what codes I have to use to get the accented letters and other foreign-language characters. Do you have anything that would help?—P. Durand, Trinity, MA

This kind of request is one of the best arguments I know for using bulletin boards. The freeware and shareware files you can find there are usually written because someone has had a similar problem and decided to write a small piece of utility software to do the job.

The answer to your problem is a program called ASC.COM. It's a small TSR (terminate and stay ready) program that takes up about 1 kilobyte of memory and provides you with a complete ASCII table. All you have to do is run the program—and it's small enough to be considered as a permanent load via your AUTOEXEC.BAT file. Once the program is installed, it can be called up by pressing ALT-A. A window with an ASCII table will appear on the screen, and you can move around it with the cursor keys. When you get the code you need, the program is exited by pressing the escape key.

There are just a couple of things to watch out for. Because there's no source code with the program, there's no way to change the hot-key assignment. Also, if you use a spell checker, it might choke on the foreign characters.

DENSITY PROBLEMS

I recently bought a home computer so I could take work home from the office but I'm having trouble reading the office disks at home. The computer in my office is an IBM PS-2 model 50 with a 3½-inch high-density disk drive. My computer at home is a PC compatible with the same kind of floppy drive. Disks that are written in the office usually produce an "Undetermined

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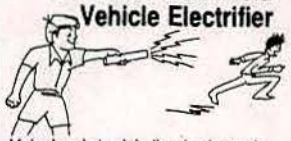

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