

HOBBY CORNER

Following the sun

EARL "DOC" SAVAGE, K4SDS, HOBBY EDITOR

I WANT TO THANK ALL OF YOU FOR THE great response to our invitation to send in your questions related to hobby electronics. The amount of mail has been very gratifying.

Just because I have a backlog of questions, however, don't hesitate to send any more that you may have. And don't forget to send in any circuits and/or applications that you have found useful. Those chosen for use here are not printed in the order that they are received. One could come in tomorrow and go immediately to the top of the list. It depends entirely on the nature of the inquiry or circuit/application.

How are your letters chosen for Hobby Corner? It's quite simple and straightforward: the highest priority goes to those that I feel will be of the greatest interest to the largest number of readers.

Unfortunately, some of the items that seem to fit that requirement cannot be used. I am flattered by some of the questions that have appeared in the mailbag. They indicate tremendous confidence in me and the others here at **Radio-Electronics**. However, there is no way we can come up with a design for a circuit that is simple to build, has a parts cost of no more than \$15, and works better than the \$195 commercial unit you would like to have! We wish we could help, but there are limits!

AN INVITATION

To better meet your needs, "Hobby Corner" will undergo a change in direction. It will be changed to a question-and-answer form in the near future. You are invited to send us questions about general electronics and its applications. We'll do what we can to come up with an answer or, at least, suggest where you might find one.

If you need a basic circuit for some purpose, or want to know how or why one works, let us know. We'll print those of greatest interest here in "Hobby Corner." Please keep in mind that we cannot become a circuit-design service for esoteric applications; circuits must be as general and as simple as possible. Please address your correspondence to:

Hobby Corner
Radio-Electronics
200 Park Ave. South
New York, NY 10003

Following the sun

Mark Zilm (CO) sent a nice letter in which he asked for suggestions for a method of automatically tracking the sun with a solar collector. Well, Mark, the task isn't all that difficult unless you need to track the sun precisely. Fortunately, such precision is seldom necessary.

I'll outline an approach to the problem and most readers can fill in the details for themselves. If enough of you need additional help, we'll work it out together here in a future column.

Let's see just how much we can simplify the requirements. First, the collector need be moved in only one plane if it is mounted on a polar axis. Then, all you have to do is to turn it clockwise (as seen from the top) to follow the sun as it moves from east to west. Of course, that suggests that a mechanical clockwork affair could be rigged up to do the turning. However, let's stick with electronic control if for no other reason than it's more fun!

Next, because it is a *solar* collector, we know that it is not necessary to have it continue to turn after sunset. It should stop when it points west in the evening and start up in the morning pointing east. I will assume that it is no great hardship to point the thing manually toward the east each morning. (That can be done electronically, too, if necessary.)

Finally, let's assume that you don't want to have to throw an OFF switch when a cloud passes in front of the sun, in the evening, or on cloudy days, to keep the thing from "hunting" for the light. If you can live with those assumptions, at least for now, we'll proceed.

Take a look at the block diagram shown in Fig. 1. There you see a light detector that controls how much voltage is applied to a motor. It is rigged so that the *presence* of light on the detector closes the circuit and causes the motor to run. What kind of a setup could that be?

A bit of thought shows that the whole operation is quite similar to the action of one of those devices that turns a light on when it gets dark. The main difference is that we don't care about turning on a light; we want to run a motor. We can use a commercial night-light controller to do the job if we have it operate a relay to run the motor when the light is on it (rather than when it is in the dark). Such a setup

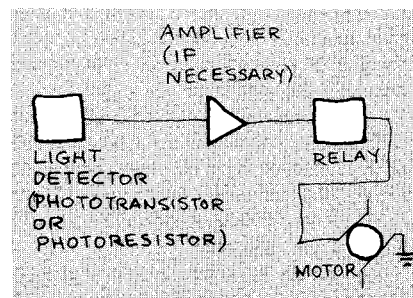


FIG. 1

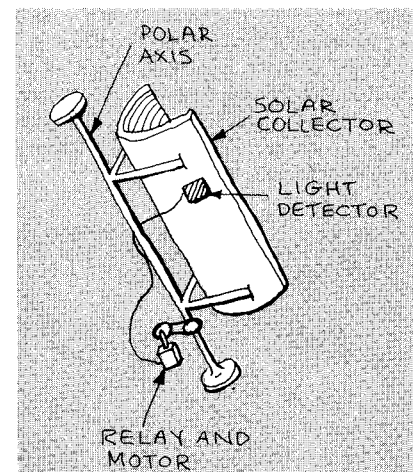


FIG. 2

would work but it would be difficult to adjust properly.

Instead, let's use a phototransistor or a cadmium-sulfide photoresistor as the detector. Either one can be set up to operate a relay to handle the higher voltage/current demand of a motor.

Let's attach a motor to the collector so that when it runs, it turns the collector to the west on its polar axis. Next, attach the detector to the west side of the collector so that it is in collector's shadow when the entire device is pointed at the sun (see Fig. 2). As the sun moves west, it reaches a point where it shines on the detector. When that happens, it triggers the relay, which in turn causes the motor to run. That, of course, turns the collector. But when the collector turns far enough west, so that it's pointing directly at the sun, the detector is shaded, which turns off the motor!

What could be simpler? Every five minutes to an hour, depending on exactly where the detector is attached to the framework, the motor turns the collector

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until it is pointing at the sun once again. Of course, you can put "blinders" around the detector as needed.

What happens at sunset? No light shines on the detector so the motor stays off. How about clouds? The same thing—When a big cloud obscures the sun, the collector remains motionless until it passes. Even if the sun doesn't come out again until hours later, when it does, the motor simply cranks the collector around until it is pointing at it and the detector is in shadow again.

Well, Mark, there you have it—a pretty crude control, but one that works. All you have to do is to turn the collector back toward the east in the mornings. If that is too much trouble, rig another detector and motor, or timer and motor, to do the job for you.

You should be able to take it from there.

Good ideas

But getting back to some of your letters, it seems there's no shortage of really good ideas for this column. How about a simple gadget to put the date and time on the screen of a TV set? Or how about ones to add "last number redial" or a display of the number dialed to any telephone? Well, gentle readers, those things can be done, but not with a handful of parts—unfortunately. And we wish we did have the resources to design a robot that could talk, see, and be programmed for various duties such as greeting guests and acting as a watchdog.

I'm exaggerating a bit, but you get the idea. There are, of course, many interesting things on the "coming up" list and we're looking for more. For now, let's tackle a couple of shorties.

To the reader who is looking for an "audio transmitter" to use for remote control of garage doors and models: be advised that the simplest audio transmitter is the human voice—just yell in the direction of the receiver. In addition, you may want to try a whistle, a clap of the hands, or a plain old audio oscillator and amplifier. Be advised further, however, that the device being controlled is quite likely to respond to sounds over which you have no control. The folks who had the early garage-door openers that operated every time a plane flew overhead had it easy compared to someone whose audio-controlled door flew open every time a car passed on a busy street.

For Ronald Cadman (CT) who is looking for a light-sequencing circuit: check the Hobby Corner in the March 1978 issue of **Radio-Electronics**. There you'll find several IC circuits for building a sequencing or traveling light device. They can be cascaded for any practical number of lights. The lights can be LED's, or incandescent lamps if you use the proper driving relays/transistors.

For Joe Guillette (CT) who needs help in identifying leads on a power transfor-

mer: there is a color code that used to be used on such leads. It is an old one and is most often honored by being ignored; many manufacturers now use their own codes, which doesn't help us a bit.

Just in case your transformer follows the code, it goes like this. First, the primary winding is designated by black insulation. An untapped primary has two black leads. A tapped primary's leads are black and black-red (black with red stripes), with black-yellow for the tap.

Each secondary winding is indicated by two wires of the same color. Red is the high-voltage winding; yellow is the low-voltage winding (usually 5 volts), and other secondaries may be green, brown, or slate. A yellow stripe indicates a tap (usually a center tap) on a winding. Thus, a center tap on the high-voltage winding is red-yellow, and others follow the same pattern except, of course for the low-voltage winding. Yellow-yellow would be meaningless so that insulation is yellow-blue.

Again, I remind you that those codes are not often used these days. (I had to refer back to a 1956 publication to refresh my memory on the colors.) If the codes do not help, the Hobby Corner that appeared in the April 1979 issue of this magazine contained a rather extensive treatment of how to identify unknown power-transformer leads. In any case, be careful as you work out that problem.

For Jim Marting (NY) who is looking for information on the SN76477 sound-generator IC: Sorry, but space does not permit going into the details of that fascinating device at this time. Take a look at the Hobby Corner columns that appeared in the February and April 1982 issues of **Radio-Electronics**. You should be able to get a good start with the information there.

Before leaving the subject of old Hobby Corner columns, let me give a quick response to those of you who have asked how to get started in this hobby electronics field. In a nutshell, do some experimenting with circuits you find in magazines and books; read the articles carefully and you'll understand a bit more with each one; it's also a good idea to get hold of a few basic books and study them carefully.

R-E



"You said this computer would pay for itself so collect from it!"