Build a Colloidal Silver Generator

Do-it-yourselfing has always been the heart of hamdom.

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The discovery of antibiotics is often considered the most important breakthrough in modern medicine. Beginning with the introduction of penicillin in the early 1940s, one disease after another fell to the constant onslaught of new and more powerful drugs. Armed with this powerful new arsenal, many doctors believed that the end of all infectious disease was within their grasp.

Bacteria, however, are difficult to conquer. The oldest life form on the planet, they have survived, and thrive, virtually everywhere on Earth precisely because they are adaptive—capable of changing themselves in response to a hostile environment.

When bacteria are constantly exposed to antibiotics, they will do what they do best—adapt. If only a single bacterium manages to survive an antibiotic attack, that organism can produce over 16 *million* offspring within 24 hours, and each of these will inherit the ability to resist that drug.

In the late 1970s, new strains of disease-causing organisms began to emerge that were resistant to antibiotic drugs. Researchers have tried to counter by developing new and even more powerful drugs, but it appears to be a losing battle. More and more bacteria are becoming MDR (Multi-Drug Resistant), and new drugs are becoming more difficult and expensive to produce. And, while a new drug may take a decade to reach the pharmacy shelf, bacteria can mutate in hours.

"Unlike antibiotic drugs, the use of silver does not produce resistant strains of bacteria."

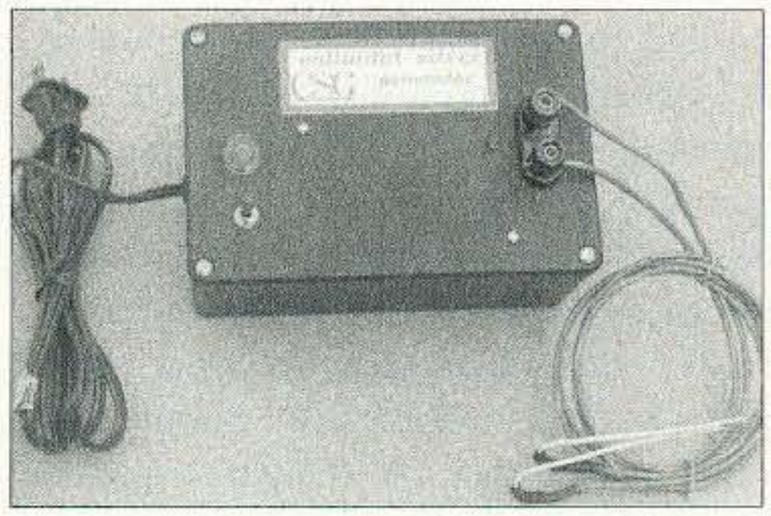

Photo A. *The Colloidal Silver Generator, with pure silver electrodes. Pure silver colloid, a natural antibiotic, can be made for the cost of distilled water!*

Don't despair!

Fortunately, alternatives to antibiotic drugs do exist, and the most promising is silver. Commonly used prior to 1938, silver is a natural broad-spectrum antibiotic. In fact, while most antibiotic drugs are effective against a select few types of bacteria, silver is known to kill over 650 different disease-causing bacteria, and many viruses as well—yet silver is completely non-toxic. Unlike antibiotic drugs, the use of silver does *not* produce resistant strains of bacteria.

Like other metals, pure silver is generally found in the crystalline state. The body, however, cannot utilize crystalline metals; they must first be transformed into the *colloidal* state. A colloid consists of extremely tiny particles of a substance, suspended (not dissolved) in pure water. Each particle contains only about 15 atoms, and is hundreds of times smaller than a red blood cell. Colloidal silver can be easily absorbed and utilized by the body to fight bacterial and viral infections. Some doctors believe that silver is necessary for proper operation of the immune system.

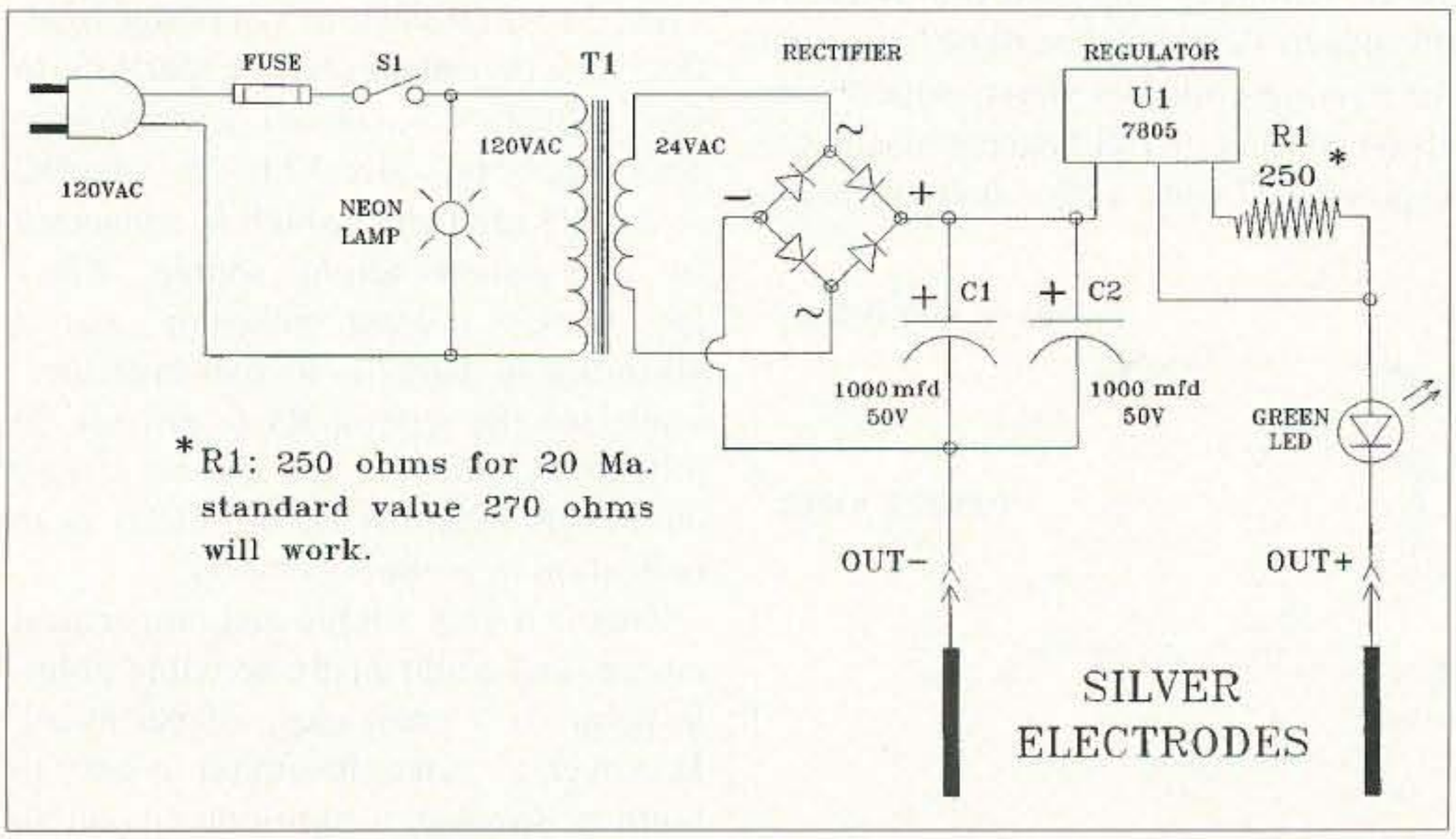

Fig. 1. *Schematic diagram of the Colloidal Silver Generator. Regulator U1 provides a constant 20 milliamps to the pure silver electrodes. The green LED indicates current flow.*

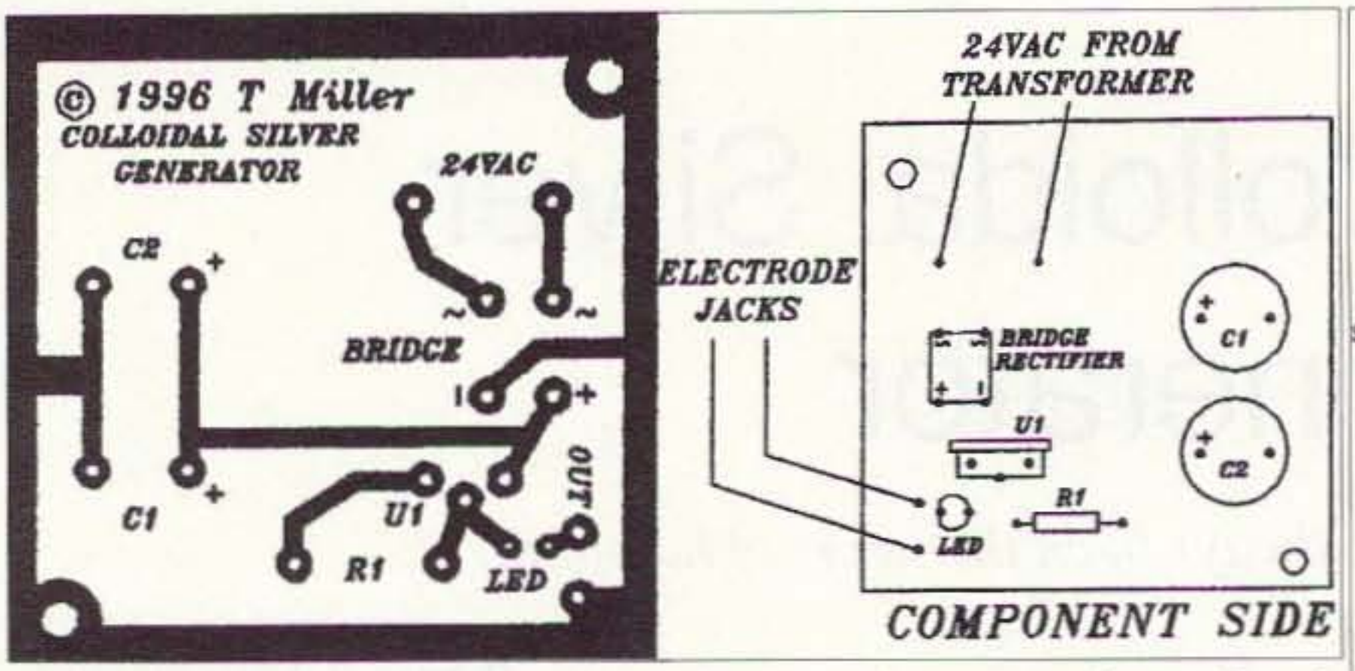

Fig. 2. Printed circuit board pattern (foil side) and component layout. Boards are available from FAR Circuits.

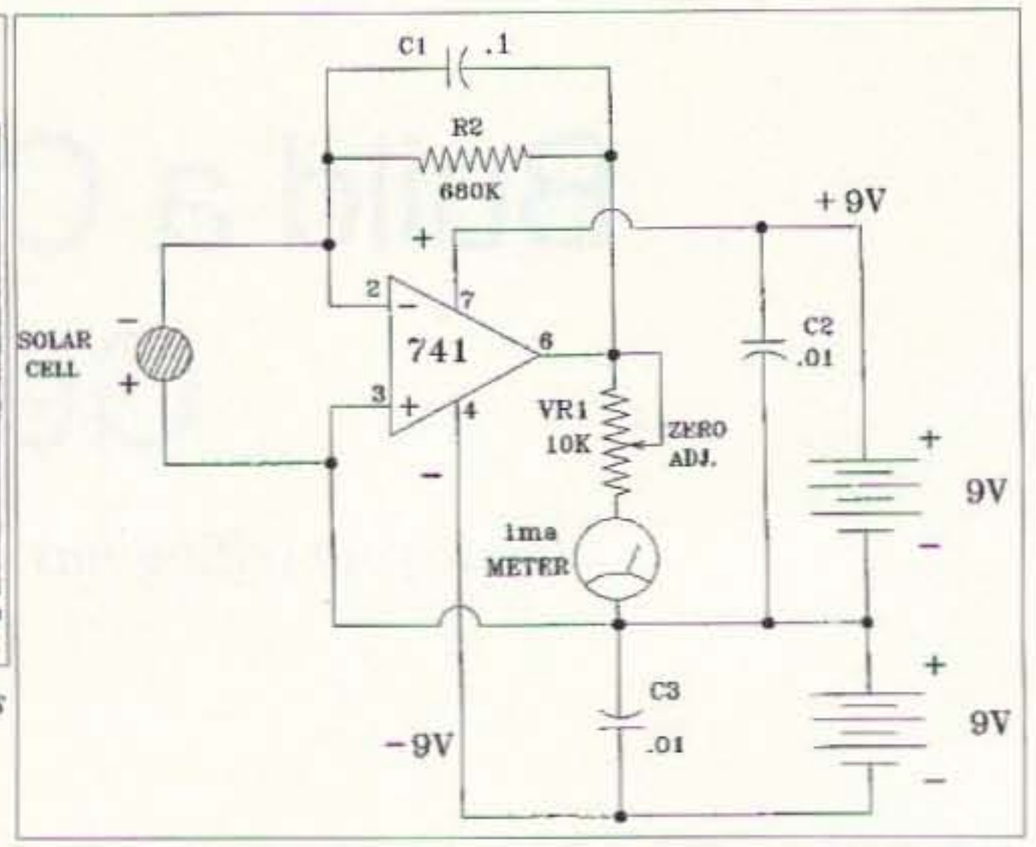

Fig. 4. Schematic diagram of the light meter used to check silver concentration. The circuit measures scattered laser light.

Before 1938, colloidal silver was manufactured by a mechanical method; the silver was actually crushed and ground to fine particles. Unfortunately, it is nearly impossible to grind a substance to the size of atoms, so this method produced a very poor-quality colloid. Today, colloidal silver is produced by an electric process that results in extremely fine particles. Since these particles carry an electric charge, they repel one another and remain suspended in an electric field. This helps prevent the silver particles from settling to the bottom.

It couldn't be easier...

A daily tablespoon of colloidal silver can be taken orally, either alone or mixed with water or juice. It can be absorbed directly by simply holding a small amount in the mouth for a minute or two. It also promotes healing and prevents infection when used externally on cuts, scrapes and rashes. Colloidal silver can be sprayed on kitchen countertops, added to laundry and bath water, used to sterilize canning jars and lids, and even added to your pet's water dish to prevent bacterial growth.

The one drawback to this amazing substance is the cost. Colloidal silver is available in most health food stores as well as by mail, but the average cost is between $5 and $10 per ounce! This high cost prohibits most of the applications we've mentioned, since it would cost $100 to fill an average spray bottle. Also, tests have shown that the quality and purity of the colloidal silver on the market varies widely, and it's hard to tell exactly what you're getting.

The answer to these problems is to do what hams do best—make it yourself! The circuit required to generate a silver colloid is simple, and once built, will make hundreds of gallons for virtually the cost of the water.

"...Silver colloid solution may be the most useful health enhancement tool in your environment." — Bob Beck

A few months ago, a reader sent me a paper written by Physicist Bob Beck. In this paper, Dr. Beck described his circuit for making colloidal silver, which consisted of three 9-volt batteries connected to provide 27 volts, a 28-volt 40-milliamp light bulb, and two electrodes made of pure silver wire. The light bulb, wired in series with one electrode, acted as a ballast resistor to limit the current. Since distilled water does not conduct electricity very well, a tiny amount of pure salt is added until the bulb produces a "dim glow." Five minutes of this will, according to Dr. Beck, produce a high-quality colloidal silver concentration of 5 to 7 ppm (parts per million).

I built Dr. Beck's circuit, and it did indeed produce colloidal silver. The only drawback I found was that the "dim glow" of the bulb was a somewhat subjective indication of current, which varied with the conductivity of the water, the condition of the batteries and the length of electrodes immersed in the water. This made it difficult to get repeatable results. What was needed was a circuit with fewer variables.

With this in mind, I designed the circuit shown in **Fig. 1**. The circuit uses a small 24-volt transformer, a bridge rectifier, and two electrolytic capacitors to form a small AC-operated power supply. This supply provides 32 to 35 volts DC to a 7805 regulator, which is connected as a constant-current source. Since Dr. Beck's current indicator was a 40-milliamp bulb lit to half-brilliance, I selected the resistor R1 to provide 20 milliamps, allowing the use of a standard Light-Emitting Diode (LED) as an indication of proper operation.

This is a very simple and non-critical circuit, and could easily be wired point-to-point on a small piece of perfboard. However, to make the circuit as easy to build as possible, a circuit board pattern and parts layout is shown in **Fig. 2**. I mounted the completed circuit in a small

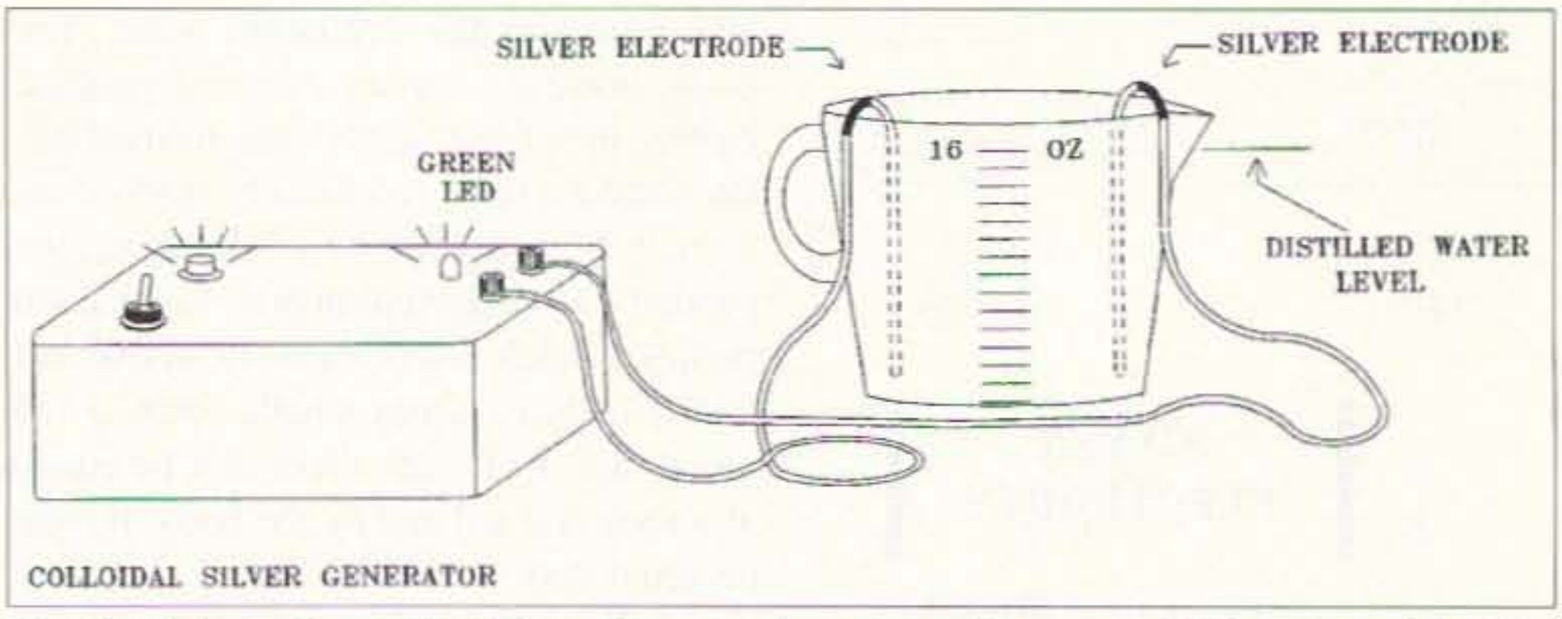

Fig. 3. Making silver colloid is easy; use a glass measuring cup and 16 ounces of distilled water. Let the generator run for 5 to 7 minutes.

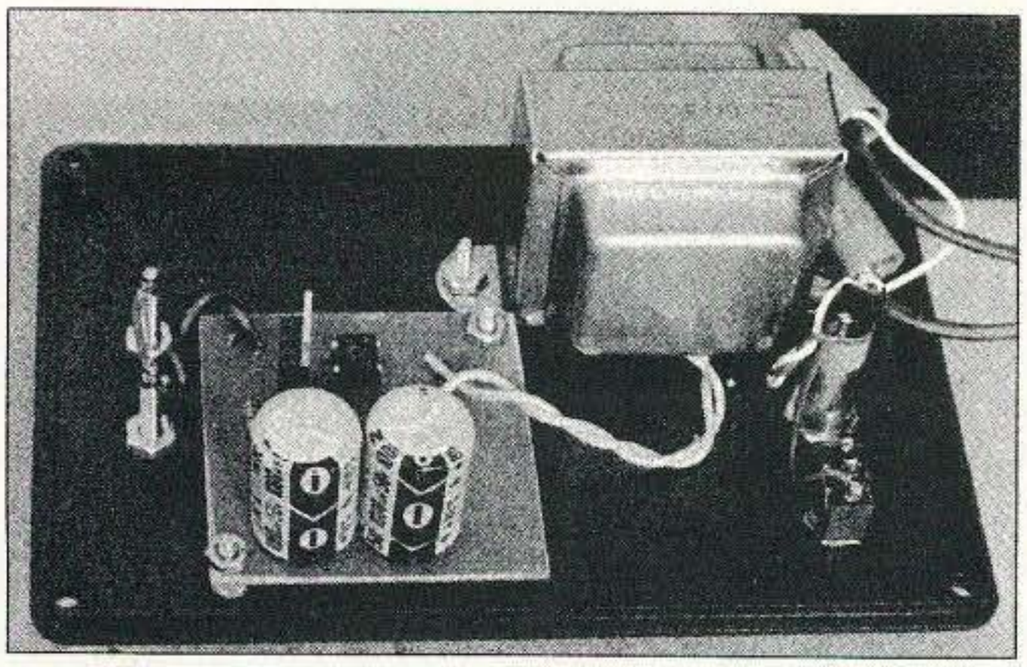

Photo B. *Inside the colloidal silver generator. The LED is mounted on the back of the circuit board and extends through the front panel.*

plastic project box with the AC switch and pilot lamp on the left side of the panel. I put the LED and a pair of binder posts to connect the electrodes on the right. The completed Colloidal Silver Generator is shown in **Photo A**.

The most critical component of this project is the electrodes. They **MUST** be made of .999 fine silver. **DO NOT** under any circumstances use "sterling" or any other silver alloy, as the metals used can be toxic in even very small amounts.

Cut two pieces of #12 round fine silver wire, each 4 inches long. Solder a 24-inch piece of flexible insulated hookup wire to one end of each electrode. Clean each solder joint with flux solvent and coat the solder with a drop of clear urethane varnish or nail polish. Slip a 1-inch long piece of shrink tubing over each wire and push it down to cover the solder joint. Use a heat gun to shrink the tubing over the connection.

Using needle-nose pliers, bend the upper portion of each electrode, just below the solder joint, in a "U" shape about one-half-inch wide. When the electrodes are hooked over the side of the glass, about three inches of silver wire should extend down into the water. Note that the shrink tubing and solder joint **MUST NOT** be submerged! You do not, after all, want to make "colloidal lead" or "colloidal tin." Strip the ends of the electrode cables and connect them to the Colloidal Silver Generator.

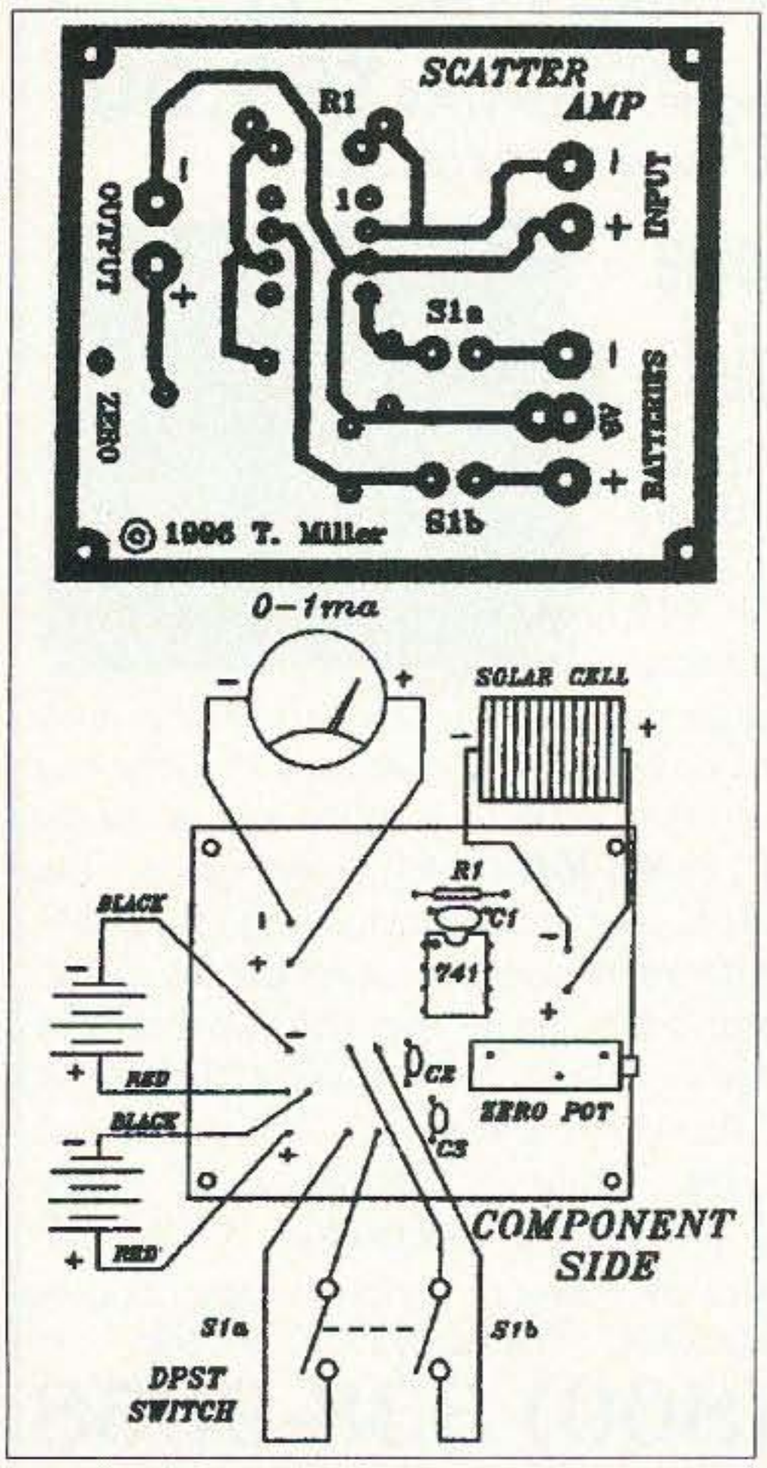

Fig. 5. *Circuit board pattern (foil side) and parts layout for the light meter. The solar cell is* very *fragile, so handle with care.*

"Every mineral that exists is dissolved in the sea, and therefore is also present in sea salt."

You will need some distilled water and also some non-iodized salt. Don't use iodized salt, as the iodine could make unwanted chemical compounds. Also, some brands of salt use aluminum silicate as a desiccant, and while it's not likely that this could be harmful in such tiny amounts, I checked the labels until I found one that uses sodium silicate instead of aluminum.

Some people have suggested using "sea salt" as an alternative to table salt. Sea salt is the residue left behind when seawater is evaporated away. Not only iodine, but *every mineral that exists* is dissolved in the sea, and therefore is also present in sea salt. In fact, sea salt is sometimes used in place of table salt as a trace-mineral supplement. Use only pure, plain, non-iodized salt.

Colloidal silver should be made and stored in a glass container. Plastic can hold a static electric charge which will cause the silver particles to collect on the sides. I use a 16-ounce glass measuring

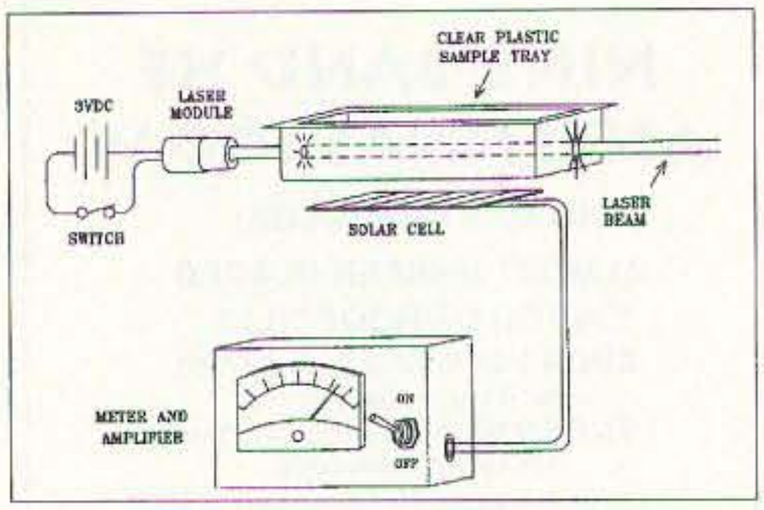

Fig. 6. *Method for checking silver concentration. The solar cell comes packaged in a plastic "bubble pack" which makes a perfect sample tray.*

cup. Hook an electrode over each side of the rim, and fill the cup with distilled water. The electrodes should extend down into the water, but remember that the solder joint must be above the water line. The proper setup is shown in **Fig. 3**.

When you first turn on the Colloidal Silver Generator, the pilot lamp will glow. The green LED may glow very faintly, or not at all, depending on the conductivity of the water. Add a tiny amount of salt, just a few grains at a time, and stir gently with a plastic spoon. Add just enough to make the green LED glow to normal brightness. If you look closely at the positive electrode, you will see a wispy cloud of silver particles coming off into the water like faint white smoke. After five minutes, turn off the Colloidal Silver Generator, remove the electrodes from the cup, and gently stir the colloidal silver with a plastic spoon. Silver is sensitive to light, so keep the colloidal silver in a dark brown glass bottle and store it in a cool, dark place. Always shake the bottle before using your colloidal silver.

After each use, the electrodes must be polished slightly to remove the oxide and scale. Use a small piece of fine synthetic scouring pad, such as Scotch-Brite™, and gently polish them until they are clean. Avoid over-polishing, since you don't want to wear away the silver.

Testing the concentration

After making a bottle of colloidal silver, I realized that I had no way to determine exactly how much silver was in suspension. Colloids are measured in parts per million (ppm), and the concentration of most commercial colloidal silver is in the 5 to 10 ppm range. With a constant current regulator and a measured amount of distilled water, the only remaining variable is time: How long does it take to make a 5 ppm concentration of colloidal silver?

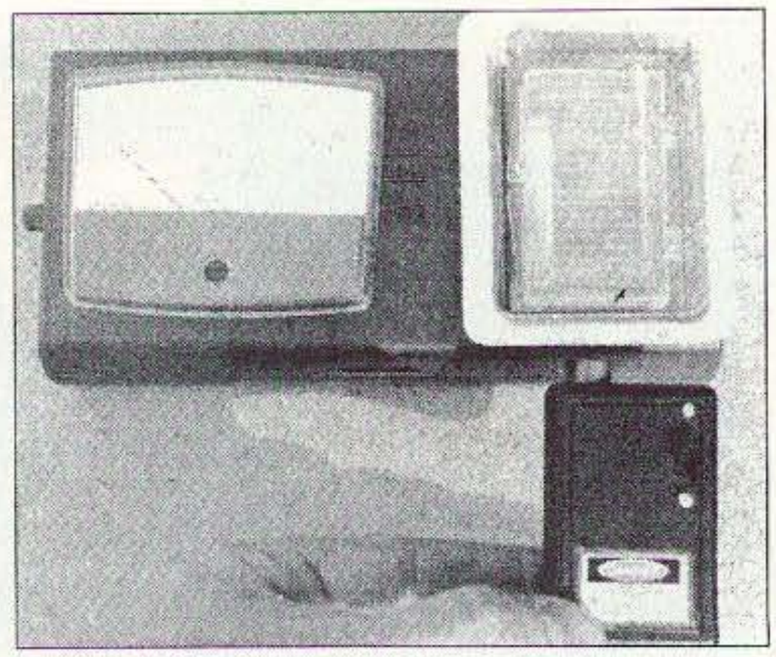

Photo C. *Since the radius of the silver ion is less than 2 angstroms, far too small to see, silver concentration is checked with a diode laser and a light meter to measure the scattered light. Five to ten parts per million (PPM) is ideal.*

Dr. Beck's article recommended using a small laser pointer to check the silver concentration. These pointers use a laser diode to produce a visible red beam. I ordered a laser diode module and mounted it, along with two 1.5 volt "N" cells and a switch, in a small plastic box.

The laser beam, shining through a sample of distilled water, is invisible when viewed from the side. However, when the laser is directed through colloidal silver, it makes a softly glowing red beam due to the tiny silver particles scattering the light. The intensity of the glow is proportional to the concentration of silver—the more particles there are in suspension, the more photons will be scattered. Simply looking at the glow, however, does not give an accurate measurement. I needed a way to actually measure the scattered light.

RadioShack™ sells a small silicon solar cell (part number 276-124). I bought one of these cells, and *carefully* cut the plastic bubble-pack from the solar cell package—the clear plastic bubble is just the right size to make a small transparent sample tray. I built a small amplifier to drive a meter and attached it to the solar cell. By placing the clear plastic sample tray on top of the solar cell and directing the laser beam through the sample, I could directly measure the scattered light. Of course, the solar cell was also sensitive to normal room light, so my first experiments were done in the dark. I set up the sample and shut off the lights before turning on the amplifier. Later, I made a small cardboard box which I could place over the sample under test.

I first tested a sample of colloidal silver and adjusted the meter zero pot until the meter read full scale. Then I mixed a sample diluted 50% with distilled water—the meter read half scale! A sample of distilled water read nearly zero, with only a tiny amount of reflected light caused by the sides of the sample tray.

This method worked, but it provided only a relative reading. To calibrate it, I filled the sample tray with a commercial 5 ppm colloidal silver purchased at a local health food store. I adjusted the meter zero to read "5" on a 0 -15 scale, then tested a sample which I had made by running the Colloidal Silver Generator for exactly 10 minutes. This sample registered nearly "10" on the meter; double the concentration of the commercial product.

It was clear to me that running the Colloidal Silver Generator in 16 ounces of water for five to seven minutes will produce an ideal concentration of silver. Therefore, if your only interest is in making your own colloid, it's not necessary to build the light meter. I have included the circuit here for those who wish to experiment with the laser backscatter phenomenon.

Fig. 4 shows the schematic diagram of the meter amplifier, while the circuit board pattern and layout is shown in **Fig. 5**. There is nothing critical about the circuit, but note that the solar cell is *extremely* fragile, and you must carefully solder wire leads to each side. Use only small, flexible wire to avoid placing any stress on the solar cell. I used a piece of tiny two-conductor wire from an old earphone. **Fig. 6** shows the method used to measure the laser backscatter.

I would enjoy hearing from readers about their experiences with colloidal silver. The easiest way is via the Internet: My E-mail address is thomil@infocom.com. Also, information on this and many other circuits is available on my Web page. If you have access to the Web, the URL is: http://www.infocom.com/~thomil/.

Letters sent via the U.S. Postal Service will also (eventually) reach me. If you write, please include an SASE.

Further reading:

"Colloidal Silver, What the Pharmaceutical Cartels Don't Want You to Know," *American Survival Guide*, August 1996

"Silver, Our Mightiest Germ Fighter," *Science Digest*, March 1978

"Currently Preferred Silver Colloid Making Apparatus, Means and Methods," Robert C. Beck, August 1995

"A Few Unique Plus Traditional Uses For Silver Colloid," Robert C. Beck, August 1995

Acknowledgments

Thanks to Justus Parrish, metallurgist, author and president of Metallurgical Services of Richmond, Indiana for his insight into testing metallic colloids.

Special kudos to the eminent and somewhat elusive physicist, Robert C. Beck, D.Sc., for his many original ideas and his willingness to share them with experimenters.

Continued on 81