



HOME POWER

THE HANDS-ON JOURNAL OF HOME-MADE POWER

ISSUE #88

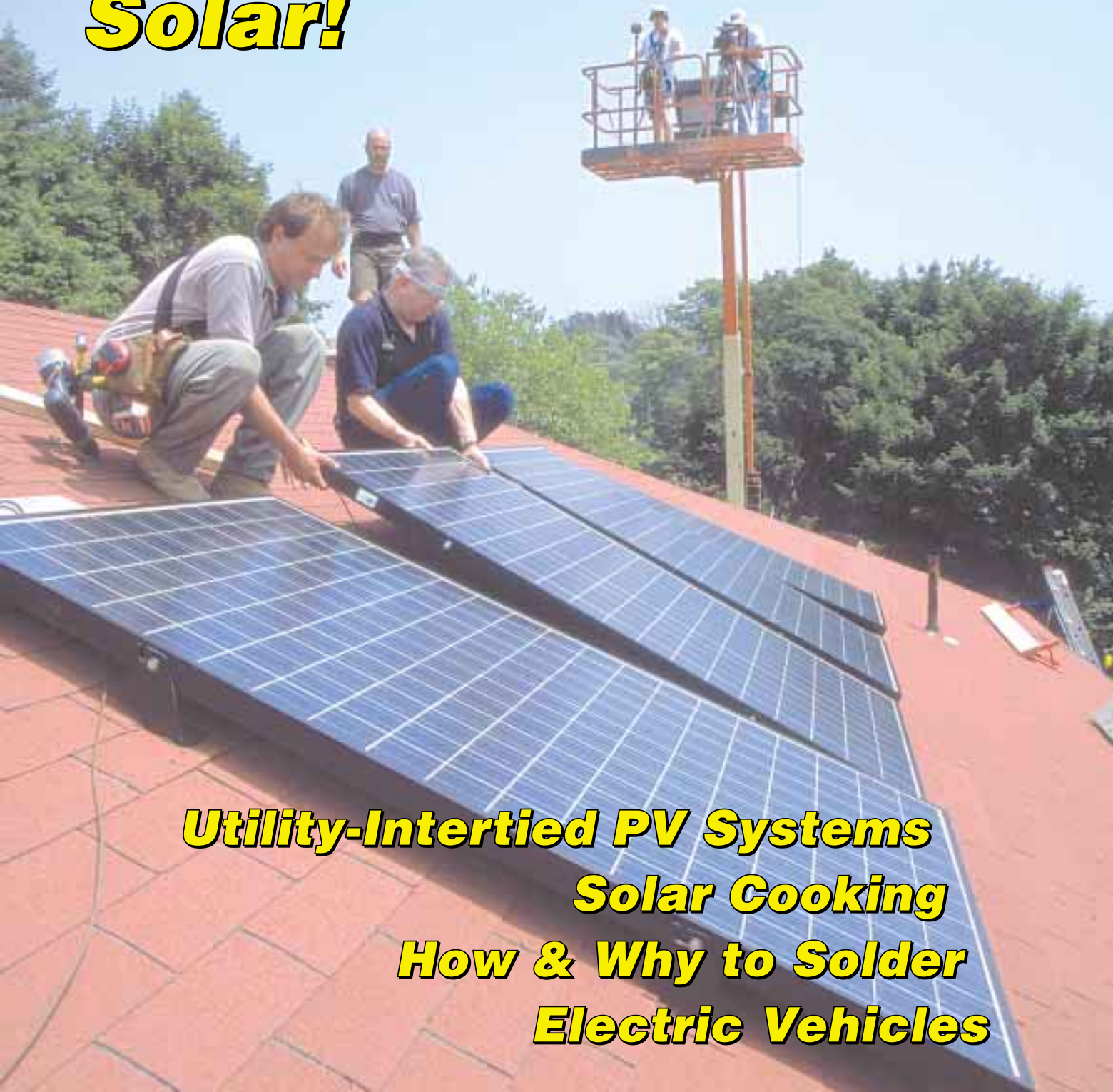
April / May 2002

\$6.95 U.S.

\$10.95 CAN.

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Lights, Camera, Solar!



Utility-Intertied PV Systems

Solar Cooking

How & Why to Solder

Electric Vehicles



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Features

- 10 High Desert Solar**
California energy crisis? Yehuda Shapira decided to help out by paying for half of a 5,760 watt of grid-intertied photovoltaic system. The state of California paid for the other half of this system that pumps electrons into California's grid...backwards through Yehuda's meter.



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In one day, Dan Bartmann & Dan Fink built a fully functional wind generator (including the alternator) from wood. Whether your goal is an educational model or functional power, you've GOT to check out this project!



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J. Oliver wanted an off-grid dream home in the woods, just like anybody. He came up with an energy and financially efficient solution—an inflatable-form concrete dome.



- 54 Lights, Camera, Solar!**
DJ Johnson sets an example and spreads the word by installing a PV system on his home, and simultaneously filming an educational video series for broadcast on public television.



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Rob Savoye powers both ends of his radio-telephone with PV. His stand-alone base unit runs on a portable system hiding unobtrusively in the woods.

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Jay Peltz has only basic plumbing skills, but that didn't keep him from building this fully successful solar drainback water heating system. You can too.
- 62 Get Out of the Kitchen**
Jennifer Barker has been a missionary for solar cookery for years. Here, she explains the basics of different ovens, cooking techniques, and even offers some recipes. Yum!

GoPower

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Not willing to let his 95 years stifle his hands-on history, Frank Silveria converts an '87 VW Jetta to electric.
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Mike Brown tells us where to get all those random parts needed to build an electric vehicle.

On the cover: Erich Stephens and Gene Plunkett install PVs on DJ Johnson's house as a TV camera crew films.

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This guerrilla overcomes grid deficiencies to get his 240 watts of PV and two MicroSines to perform.

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Access and Info

Access Data

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Paper and Ink Data

Cover paper is 50% recycled (10% postconsumer / 40% preconsumer) Recovery Gloss from S.D. Warren Paper Company.

Interior paper, Pinewood Web Dull, a 55# 50% postconsumer, ECF, manufactured by Crown Vantage, a peroxide/oxygen based mill in St. Francisville, Louisiana. Printed using low VOC vegetable based inks.

Printed by

St. Croix Press, Inc.,
New Richmond, Wisconsin

Legal

Home Power (ISSN 1050-2416) is published bi-monthly for \$22.50 per year at PO Box 520, Ashland, OR 97520. International surface subscription for US\$30. Periodicals postage paid at Ashland, OR, and at additional mailing offices. POSTMASTER send address corrections to *Home Power*, PO Box 520, Ashland, OR 97520.

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Solar Powered

Wireless Phone System

Rob Savoye

©2002 Rob Savoye

Two Uni-Solar US-64 PV modules provide power to the landline end of Rob Savoye's 4 watt, UHF radiotelephone.

Because the nearest phone lines don't come anywhere near my house, I wound up installing a Telemobile Ptel wireless phone for my off-grid, geodesic domes. This is not a cordless phone, but a telecommunications grade, long-range, wireless system. It is a 4 watt, UHF-based system with a line of sight range of about 25 miles (40 km).

The local phone company gave me some huge number for a quote to run lines to my house. At the same time, I didn't really feel like digging up the road to run a very expensive phone line. Good satellite technology is just around the corner, and there are good wireless solutions available now.

The home end of the radiotelephone system is wired directly into my 12 VDC household system. The full house electrical energy system has 480 watts of photovoltaics, and 340 watts of wind power. These charge a bank of twelve Trojan L-16s. My domes are wired for 24 VDC to power lights and heavy loads, 12 VDC for the phone, and 120 VAC for standard AC appliances.

I worked out the best location for the landline end using a GPS, mapping software, and two handheld ham radios. Once I identified the best four potential sites, I chose the one I could most easily negotiate access to.

The landline end is powered by a stand-alone PV system. This system is housed in a PortaPak plastic container. I lined the box with closed cell foam all around, and a 2 inch (5 cm) thick piece of Styrofoam for the base. I then cut holes for the phone line input, the antenna coax cable, and the power cable from the solar-electric panel. The box protects the system from the weather, and has good handles for the locks. I chained the box through both the handles to a tree. While this is a remote location, I still wanted to be careful to prevent easy vandalism.

The landline end is literally at the termination point of the phone lines in this area. Due to the inability to negotiate access with the local phone company, I got permission to use private property. The bills come directly to me. The system is in a meadow, about 500 feet (152 m) from the property owners' house, and by their request, is totally out of sight from anywhere in their yard.

Portable & Permanent Power Systems

I initially started by using a portable power system I already had, while I ordered the parts for a permanent system. My portable system is powered by a Uni-Solar

amorphous 64 watt panel. I started out using two panels, but found that only one was necessary. Two, 235 amp-hour (6 VDC) Trojan T-125 deep-cycle batteries, and a 24 amp Lyncom charge controller complete the system.

The system was designed in a seat of the pants way, but worked well for its temporary use for the phone. I used the two T-125s because at 66 pounds (30 kg) each, I can cart them to wherever I need them.

The permanent system is a little different from the portable one. It has a smaller charge controller, a Solsum 5.0, which only handles 5 amps. I also have a 12 volt Deka 280 AH gel-cell battery. This battery will deal much better with the cold weather (-40°F; -40°C) that we get around here at 8,700 feet (2,650 m) elevation in the Colorado Rockies.

Replacing the batteries turned out to be interesting. The old batteries were heavy, but still hand cartable by one person. The new gel cell weighs more, around 135 pounds (61 kg). I wound up doing the replacement as winter was kicking in. I used a sled to transport the batteries, since there wasn't any vehicle access to where the landline terminated, and there was plenty of snow.

This system was much more "designed" than the portable one. I used a spreadsheet to size the power system and specify the correct wire gauge to keep the voltage drop between the PVs and the battery under two percent. These free spreadsheets are on my Web site at www.senecass.com/software.html.

A plastic tub protects the 280 amp-hour Deka gel-cell battery, Solsum 5 amp charge controller, and Telemobile Ptel radiotelephone.



Rob's son, Abel uses a Solar Pathfinder to pick the best location for the PV panels.

Phone System

The phone system is two dedicated UHF transceivers, each with a Yagi directional antenna. This system is FCC approved, and is built specifically for wireless telephones. One transceiver is wired into the landline, and the other is wired into the phone lines at the domes. At that point, it works like a regular phone, with a dial tone, etc.

It uses a "command and control" channel at about 3.8 GHz, and the main frequency is 452.462. Because it's full duplex, it uses two adjacent UHF frequencies for transmission.

I have a much more detailed document on the trials and tribulations of installing and maintaining this system at www.senecass.com/rob/domes/phone.

How It Has Worked Out

So far, it has worked pretty well. The main problem is that my antenna coax, at the house end, runs too close to the Heart HF-24-2500X inverter power feed, which causes some 60 Hz hum in the phone line.

We've also discovered a problem with heavy loads. If I run the large 1,400 watt miter saw during the day

when there is plenty of excess energy, things work OK, although the saw makes a noise on the phone line. But if I try to do this at night, when running 100 percent off the batteries, running the saw will disconnect the call. This hasn't been too inconvenient—I just have to make sure I don't saw anything when anyone is on the phone. The 120 VAC booster pump for my domestic water also creates a lot of noise on the phone line. So we've found that it's not good to use water when somebody is on the phone.

I've tried to get my computer modem to successfully connect over the wireless phone. I've discovered that if I turn off my inverter, I can get my computer to establish a decent PPP connection. It's about the same baud rate as a cellphone, but at least it's inside...

This is the only phone in my domes, because the telephone company lines terminate almost a mile from my property. Cell phones barely work around here, so the wireless phone is our only communication link from the domes, which we live in full time. We're used to using solar electricity at our off-grid home. So setting up a PV system for the radio phone was a natural.

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