Soft Technology

Alternative Technology in Australia No. 28 Aug 1988 $2.00

Wood Heater Buying Guide

Haybox Cookery

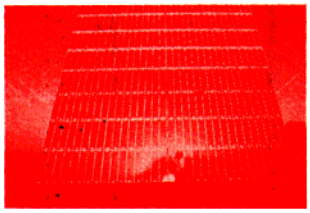
Pulsar Batteries

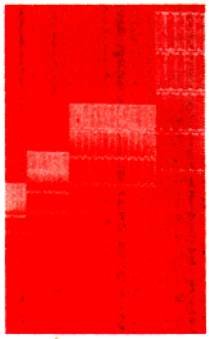
Solar Electric Houses

SUN POWER

from Solar Modules manufactured by...

SOLAR CELLS AUSTRALIA PTY LTD





10 Yr Warranty

SOLAR CELLS AUSTRALIA (SCA)

Solar Cells Australia is an **Australian owned** Photovoltaic (PV) Module manufacturer. SCA manufactures the solar modules in Perth under licence to SHOWA-ARCO Solar using the latest technology and quality engineering. Anti-reflection coated cells, by-pass diodes, (M55, M75, M65) weatherproof junction boxes and individual serial numbers are standard features of SCA modules. The cells within each module are electronically matched and laminated behind tempered glass with layers of EVA for moisture resistance, UV stability and electrical isolation. A rugged aluminium frame completes the package. The SCA/ARCO technology modules are the most popular world wide due to their proven reliability and high efficiency. They are extensively and continually tested in extreme climatic conditions, including the rugged USA JPL Block V Test.

THE ULTIMATE FREEDOM
RUGGED MODULES FOR AUSTRALIA

The M55, M75 and M65 monocrystalline modules have a 3 amp current output under full sun; the highest available. They are backed by a ten year warranty on power output.

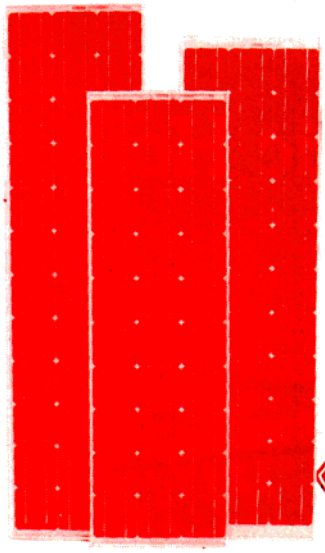
The M55, the **"outback performer"**, is the most powerful module. Ideal for water pumping and battery charging. Under the harshest outback conditions it provides the ultimate in performance and reliability.

The M75 is ideal for home power systems and battery charging in Australia's coastal regions.

The M65 is a self regulating module, ideal for caravans and other small power systems.

The M32, M24 and M16 modules suit smaller area and power requirements and particularly for marine battery charging.

Your dealer will help you select the right Solar Cells Australia module for your needs.



SUNPOWER for

REMOTE HOMES
WATER PUMPING
CARAVANS and BOATS
TELECOMMUNICATIONS
CATHODIC PROTECTION

PROUDLY MADE IN AUSTRALIA

We can provide more information on these high efficiency (13%) modules on request.

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ELANTE PTY LTD

382 Canterbury Road, Surrey Hills, VIC. 3127.
Telegrams and Cables ETNALE Melbourne.
Telephone – 836 9966 (2 lines).
Telex – 31845
FAX – 836 6743

I am interested in more information on the following systems:

LIGHTING ☐
TV, RADIO, VIDEO ☐
ELECTRIC FENCING ☐
WATER PUMPING ☐
REFRIGERATION ☐

Name: _____
Address: _____
_____
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VIABLE ALTERNATIVE ENERGY P. 10.

This issue of Soft Technology was edited by Mick Harris and Ian Scales with the help of Alan Hutchinson, Noel Jeffrey, Jeff Hilder, Tony Murphy and others.

If you are interested in being involved in the production of this magazine, please leave a message on 419-8700.

Comments, contributions and criticisms are welcome and should be sent to the Alternative Technology Assn. 366 Smith St. Collingwood, Victoria, Australia. 3066.

Advertising is available for products and services relevant to the magazines content. Rates are $120/full, 60/half and 30/quarter page.

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Front Cover:
Solar powered house in Osaka, Japan.
Rear Cover:
Array of 14 waterwheels built near Paris in the 1680's for pumping water.

The ATA Report

News, Events and Activities from the Alternative Technology Association

After editing Soft technology since its inception in 1979, this is to be my last issue. While I have enjoyed producing most of the 28 issues we have published to date, some of the joy of the process has now worn off, and it is that little bit harder to get enthusiastic about producing the next issue.

This is one of the reasons we have been running late during recent issues. So time for some new blood and while: Mick Harris (me) will still appear as a contributor to Soft Technology, I will no longer be the lynch pin of the magazine's production.

So a personal thanks to all to all who have helped me over the years both in writing articles and in the production side of the magazine.

This may well be an appropriate time for the promised change in magazine format, as a result of computerised desktop publishing which will be here with the next magazine.

After extensive discussion we are going to use bits of the design from "Australian Society" and "Business Review Weekly".... shock horror. Don't worry, we will still maintain that friendly AT feeling we have had over the years.

On to other matters, things have been very busy at the Solar Workshop with a number of very successful activities including a meeting and practical workshop on "Motors and Generators".

This covered everything you ever wanted to know, how they work, picking one to suit you needs, modifications, building from scratch and what type for that wind generator, hydro installation or those low voltage appliances.

As a spinoff from the process we have produced a video which covers the basics. The video, which was filmed on location at Nimbin, NSW, shows numerous motors and generators in their native habitat doing things which would surprise even the most worldly electrical engineer.

It also includes explicit close ups of dissected machines all discussed in language we can all understand. The video will be available to members shortly.

Another very successful activity has been a number of welding workshops we have recently run. These were so successful they have been booked out and actually raised money which has allowed us to purchase more equipment.

Well that's it from me. Once again thanks to all those who have helped me in the past, and lets look forward to bigger and better things in the future.

MICK HARRIS

Our new workshop supervisor, Geoff, at the recent motors and generators workshop.

Energy Flashes

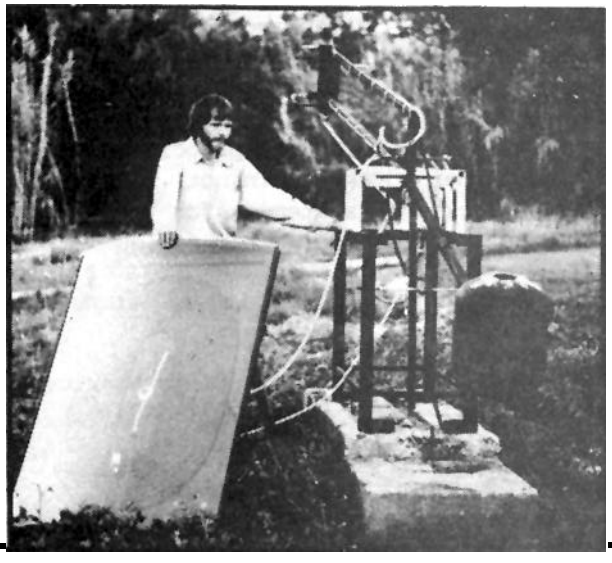
Solar-powered Water Pump

For fuel economy, few machines could match one that has recently been invented in South Africa. This machine runs happily on nothing but solar energy.

The inventor uses his original prototype solar-powered machine as a pump for pumping water from a 30' deep well. In bright sunshine, the solar pump can lift almost as much water in an hour as any similar-sized windmill would in a good stiff breeze.

The solar pump resembles an oversized playground see-saw. A long steel boom swivels on an axle. A master chamber is perched on the long end of the boom. This is connected to a reservoir of heat sensitive fluid - a refrigerant with a very low boiling point - which is heated by a solar panel on the ground.

As the sun's rays heat the panel, the fluid boils and vaporises. Pressure quickly builds up, forcing fluid through a special plumbing system up into the master chamber. During 10 to 15 seconds in bright sunshine the chamber fills with fluid and plunges downward in a swift power stroke.



This trips a valve-switch which equalises the pressure allowing the fluid to flow back into the reservoir. The master chamber returns to the top position, hits a switch to close another valve and the system is ready for the next power cycle.

While bright sunshine works best, the sun still gets through on an overcast day, says DeBeer. Construction is easily do-it-yourself from standard valves, an old car radiator and finds in junk or scrap heaps. Plans are available for $24 from Invent-A-Plan. 76 Montpelier Rise, Wembley, Middlesex HA9 8 RQ, England.

Solar-based Self -sufficiency in Israel

Kfar Klil, a remote settlement in Israel's Western Galilee, has become one of the world's first communities to rely exclusively on sunlight for almost all its energy needs.

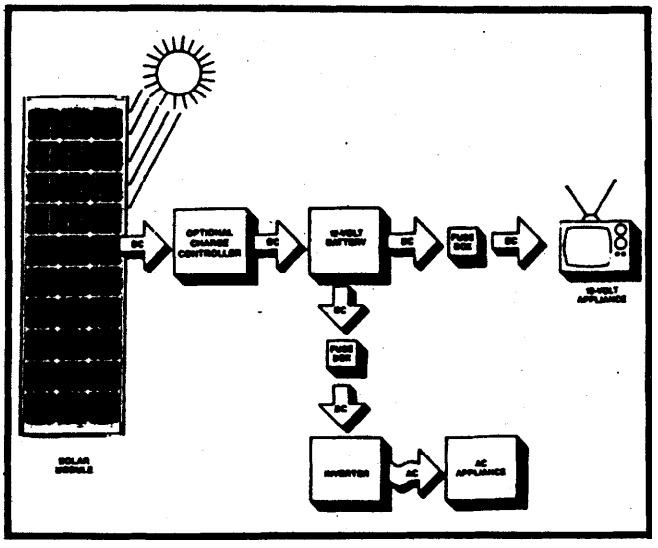
The solar project originated with the arrival of the first settlers nearly 10 years ago. They wanted electricity but the remoteness of the site made the traditional use of power lines and supply systems impractical.

However, the location of Kfar Klil made solar energy the best viable alternative.

The self-contained unit installed at every household in Kfaf Klil consists of 3 basic elements: 18 flat reflecting solar panels, an inverter capable of changing a 24-volt DC charge to a 220-volt AC current, and a regulator-battery protector that monitors battery fluid levels and maintains the system's overall

functioning. The dark solar panels, acting like battery chargers, are placed on the roof and adjusted seasonally according to the direction of the Sun. Each panel consists of 30 to 40 photovoltaic cells that convert the rays to energy units. On a day with maximum sunshine, the system can generate up to two and a half kilowatt hours of electricity. The energy is then stored in 12 deep cell batteries, similar to those used on submarines, which hold enough power for a week or normal electrical output.

The houses are wired for both types of current used in Israel. The 240 volt DC outlets are differentiated by colour from the 220 volt AC terminals and also serve distinct purposes: the lower charge is good for lights and portable appliances while standard electrical equipment is served by the more powerful voltage.



Polar Solar Surprise

On a clear day when the ambient temperature is zero degrees Celsius, a really good solar collector converts radiation into heat with an efficiency of only about 40%. It has recently been discovered that a certain natural collector can however convert ultraviolet solar radiation to heat with an efficiency exceeding 95% - polar bear fur!

The discovery that polar bear pelts, along with those of other arctic mammals absorbed ultraviolet radiation was made in a roundabout way some years ago. Further research on polar bear fur (the most efficient) showed the hairs are transparent, not white.

A porous thin core in each hair presents a rough surface which internally scatters the incoming solar radiation, giving the hairs their white appearance. It appears this scattered radiation is predominantly conducted to the surface of the skin (which is actually black) where it is absorbed and converted into heat.

Subsequent studies have shown a 50% gain in efficiency when flat-plate solar collectors are filled with hairlike fibres. A further promise is that solar panels could be thus modified to absorb more of the entire solar spectrum. The advantage of capturing ultraviolet radiation is that it penetrates cloud cover, thus collectors would function even on cloudy days.

Collectors using the principle would have a further advantage in not requiring solar tracking systems for optimum performance, as a collector filled with hairlike material should capture radiation regardless of the direction of incoming radiation.

Scientific American.

NEW PRODUCTS

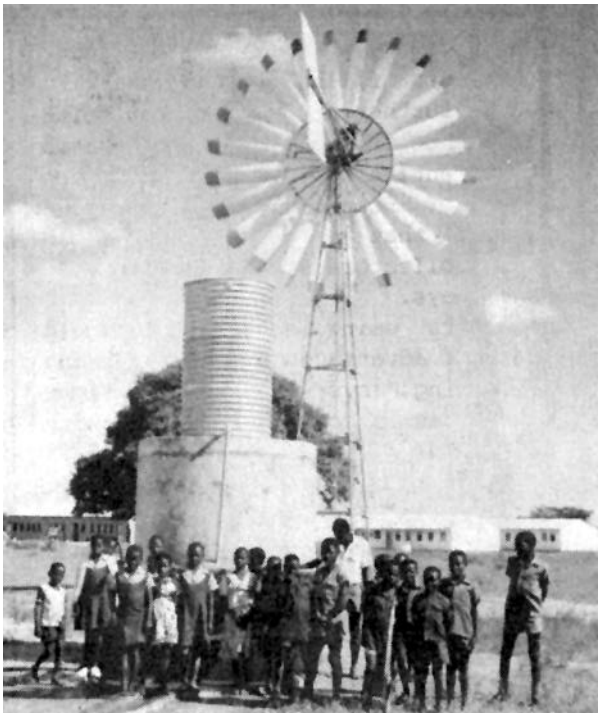
I.T. Wind pump

A new high efficiency windpump has, been put together by the Intermediate Technology Development Group. The windmill has been specifically designed with third world countries in mind, and is ideal for local production in developing countries.

The design is such that the windmill is easy to transport and erect in remote locations. Also, construction and repair is easy with locally available materials and equipment.

Instead of selling the actual machines ITDG sells the "Technology", the design, specifications, plans, workshop equipment, instructions, etc. The idea is instead of taking valuable foreign exchange from already poor countries, ITDG provides the information, equipment and backup required for the countries to actually produce the windmills themselves.

Once the license has been purchased the country can also export the the windmills they make earning some foreign exchange in the process.



Contact: Intermediate Technology
Development Group.
9 King Street, Covent Garden,
London, WC2E 8HW, UK.

Mudbrick Machine

People who have battled away making their own mudbricks often decide to "buy the mudbricks" next time and save the sore backs.

Riverina Earth Brick Industries in Deniliquin, NSW, make a range of bricks, tiles and pavers. Their machine can churn out 2,500 blocks per day, enough to build an average 15 square home.

By using different soils you can end up with the colour of your choice either in the bricks or the render; designer mudbricks.

Riverina sell their standard 250mm x 300mm x 100mm for 70 cents each. They point out that at this price the bricks are less than half the cost of traditional bricks for the same area.

New Solar Controller

An Australian company, Felscott Electronics, has produced a new Solar Controller. The controller, or to give it its full name, Solar Differential Temperature Controller, is designed for use in solar heated spas and swimming pools.

The controller has an adjustable temperature level and can be run on 240 volts or 24 volts for people with low voltage systems. It is also weather proofed so it can be mounted outside.

The basic units sell for a little over $200. If you want more information contact Felscott Electronics, Shop 6, Hardwick Cres. Holt, ACT.

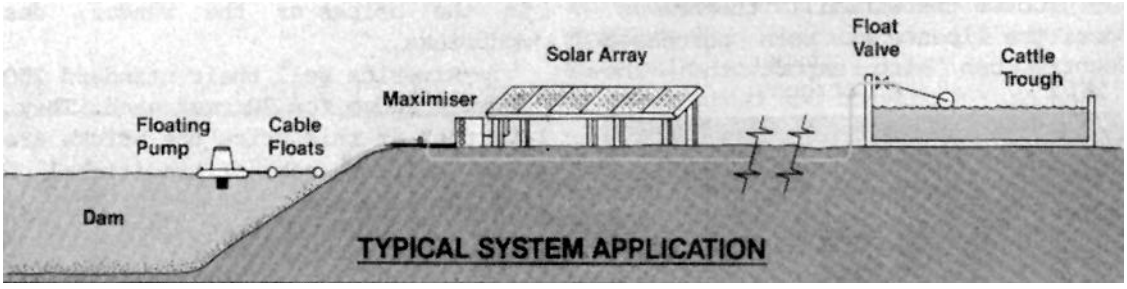
New B.P. Releases

B.P. Solar have come up with several very bright new products for the photovoltaic user. The first is a range of batteries marketed for photovoltaic use.

The PVSTOR are made by LUCAS. INDUSTRIES (NZ) for B.P. Solar and feature a 2-3% per month self discharge (and that's very low), and a large electrolyte reservoir to reduce maintenance. The range is from 207 to 1101 ampere hours and all of this with a 5 year replacement guarantee.

Number two on the B.P. Solar line up is the FP-DC Solar Floating Pump. When matched to between 4 to 10 photovoltaic panels and using the MAXIMISER controller, water pumping up to 780 gals per hour and up to a 180 ft head can be achieved.

Number three continues the pump line up as BP SOLAR have transfer and bore hole pump/panel (away sets to give up 5300 gals per day with heads up to 400 ft).



B.P. Solar Australia has released a new range of solar modules they call the 'Suntamer' range. The new modules have peak power outputs of 44, 52 and 58 watts; the 58 watt module (pictured) providing the highest power output available in 36-cell solar modules in Australia. B.P. Solar attribute the higher efficiencies gained as due to the use of monocrystalline silicon cells.

For more information, contact:
B.P. Solar Australia
P.O. Box 519,
Brookvale, N.S.W. 2100.
Phone: (02) 938-5111.

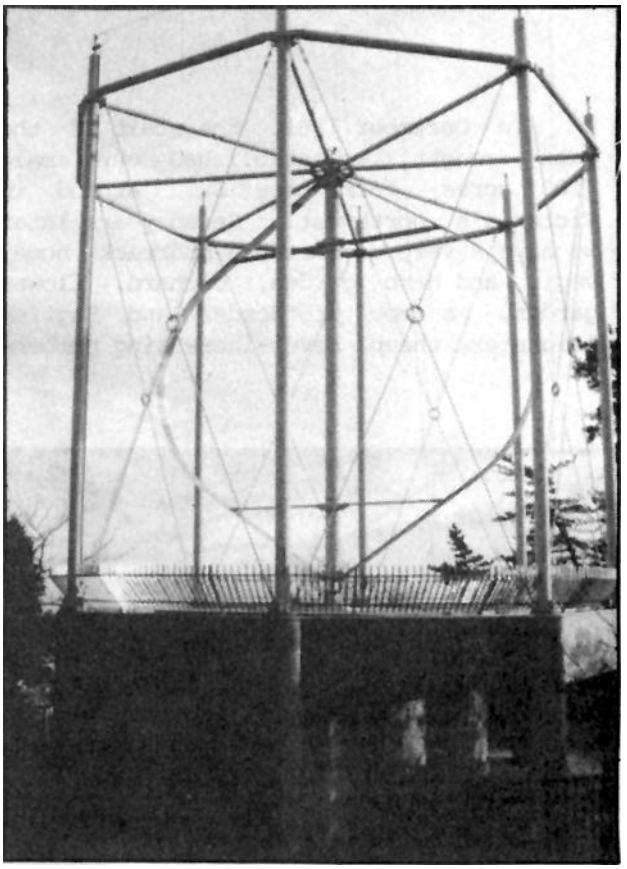
From Our Japanese Correspondent

For those lucky enough to go to the 1989 International Solar Energy Society Conference in Kobe, Japan, an added point of interest is the Darrieus Wind generator mounted on a hill above the city.

The two element turbine supplies electricity to light up at night the city's emblem and a beacon on top of a nearby hill. Below the tower are a series of diagrams showing the circuit which involves 2 solar arrays to provide back up power on windless days.

There is also a diagram showing the physics of how the turbine rotates and the toothed belt gearing to drive the **D.C.** generator. The turbine has 2 stays to prevent vibration and trim tabs to stabilise the speed.

Some light weight transport can also be seen on the Japanese streets. The small Suzuki motor cycle/side car assembly has a fully enclosing plastic body. A much more comfortable ride for both rider and passenger.



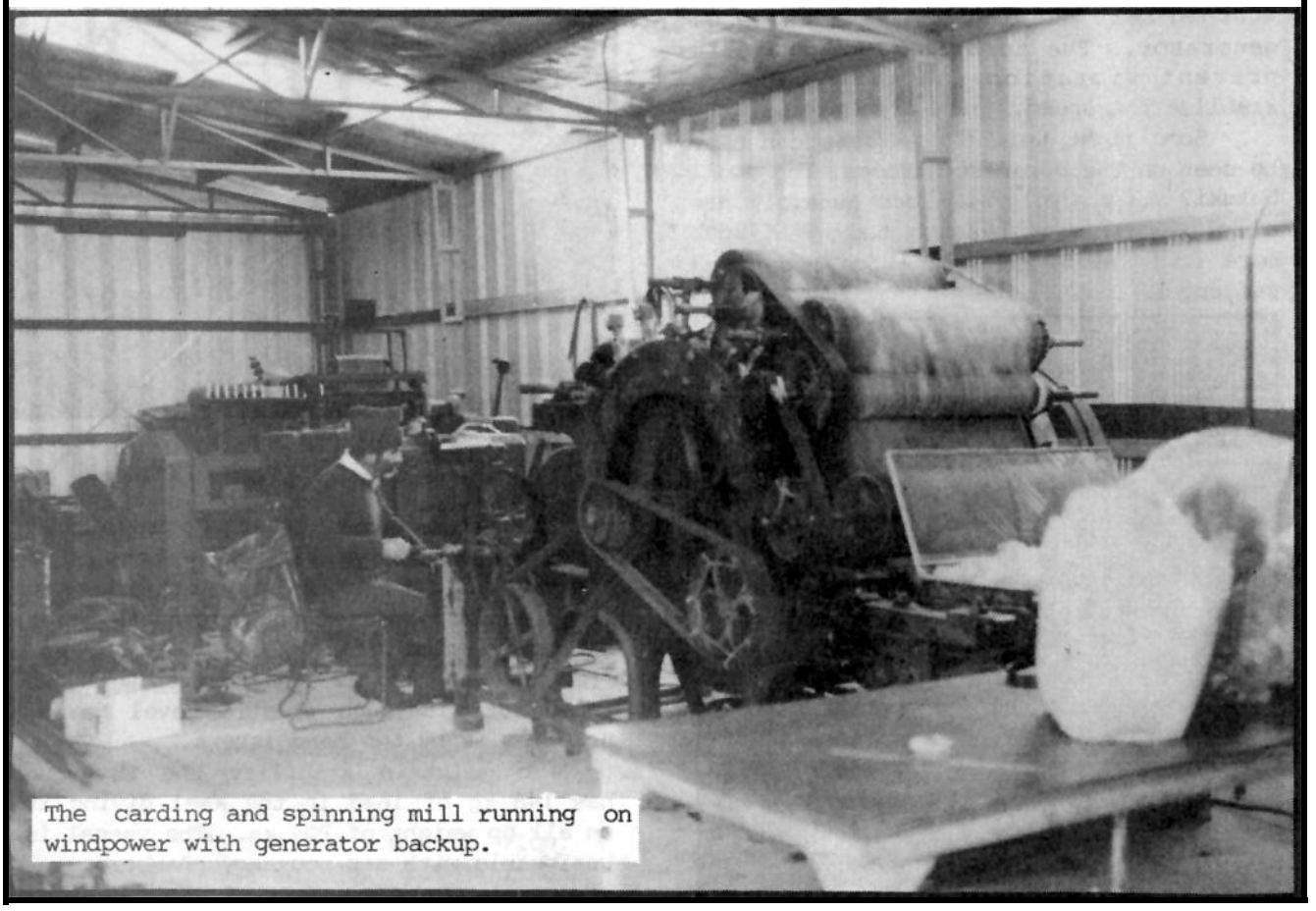
The Hoyt-Harken Waterbug provides a novel way of travelling by water. The hydrodynamic plastic body provides an efficient and safe means of travelling at a steady speed of 8 km/h.

The Waterbug is pedal driven with two speed ratio through plastic bevel gears. Steering is by two hand levers.

To maintain stability the Waterbug has 148 kg of lead in the keel giving it an all up weight of 204 kg. The vessel is unsinkable with air buoyancy chambers.

Viable Alternative Energy

In December 1981, the start of the last drought, we established our small (100 acres) farm near St. Arnaud in Victoria's northwest. Seven years later we have a very comfortable mudbrick home, vegie and herb garden, orchard, flower garden, a mob of Border and English Leicester sheep, ever-increasing numbers of Pekin bantams, ducks and geese and six milking goats (Toggenburgs). Our worn out land with its "good history of super" is being restored with a modified Wallace plough using Yeoman's keyline principles and Mollison's permaculture methods. After two years, we are already seeing improvement in both pasture and animal health.



The carding and spinning mill running on windpower with generator backup.

When we bought "Folly Farm", as it is affectionately known to friends and relatives, we knew we could not have the SEC connected, having heard vague sums of $10,000 and higher being mentioned, so from the outset we planned an alternative energy system.

A 1930s vintage Hannan's 12V wind generator and four solar panels charge our 500 amp. hours battery bank, with an occasional boost from our backup generator set. This battery bank supplies all our lights, refrigerator and freezer and through an inverter, ceiling fans, TV, stereo and juicer. The backup generator set is used for the washing machine, vacuum cleaner, grain grinder, Kenwood mixer and overhead pump.

After much research we decided to convert a 6 cylinder Holden red engine to a 3 cylinder low speed engine to drive the generator. Our "General" has clocked up 1200 hours now, averaging 4 hours a week. It runs not only the heavy household appliances but also the extensive workshop, saw bench and one-stand shearing plant. Fuel consumption is l/3 - l/2 gal/hour, depending on the load. We opted not to have an automatic start as this encourages us to check oil, water and fuel before start-up; however, a remote stop would be a big improvement as it is a 50 yard dash to the power house.

So successful is alternative energy for us that we have set up our small-scale carding and spinning mill (we process our own and others' wool) to run on alternative energy also - 36V wind generator, battery bank and back up 36V petrol generator set.

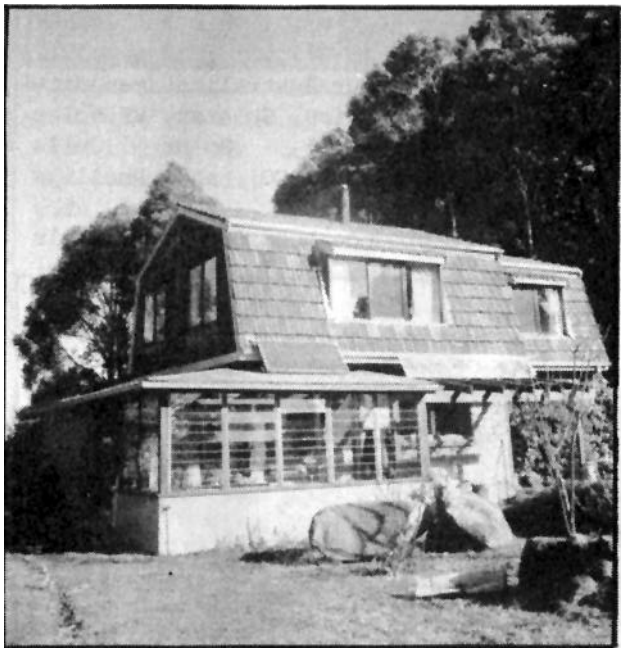
We have a second "General" for sale (see ad in this issue) and anyone interested in what we are doing is welcome to contact us -
phone (054) 963 268 or write, Robin & Anne Hughes, RMB 202, St.
Arnaud, Vic. 3478.

Solar Electric Houses

By MICK HARRIS

In, the last issue of Soft Technology we had a look at the basic items you should take into consideration when planning a solar electric power system.

We are now going to have a look at the components of your system and how you put them together. We will also look at a number of examples of peoples' working solar electric systems, which should give you an idea of the range of options available to you.



Perhaps the most critical early decision you have to make when going for solar electricity, is the extent to which you "do-it-yourself". Here you have the option of going to the local retailer and letting him design the system and sell you a complete package. The alternative is to plan, design, buy the individual components and install the system all by yourself.

If you really have no interest in the technology and simply want something "that works", then the best option is to get the advice of the retailer and buy something "off-the-shelf". This option generally works fine, unless you happen to be dealing with a retailer who doesn't know his stuff, or who supplies you with an inadequate system in an effort to give you a price which will guarantee a sale.

A good retailer will spend some time with you, going through the details of your needs and explaining to you exactly what you are getting and how it works.

If you are about to hand over your money for an off the shelf system, it is best that you learn a little about the technology first, so that you can make certain the retailer is supplying you the kind of system you really need.

The do-it-yourself alternative is more work, and can lead to a poorly designed system which doesn't suit your needs if you don't do your homework properly. However if you do put in the effort, you can end up with a system that works well, which you understand, and which may well save you money.

Before we move on from here a word of caution. Often the uninitiated think that solar is automatically going to be cheap. That is often not the case. While solar electricity is often cheaper than connecting to the grid, that does not mean the equipment is cheap.

Even a basic system is likely to cost thousands of dollars, with large systems going into the tens of thousands. Often people on a tight budget decide to skimp and save on their solar system. Even though a solar electric system can be added onto as funds become available, there are times when it is better to spend that extra dollar and get quality the first time round.

1. VOLTAGE

Before you even start your shopping you will need to make fundamental decisions about the design of your solar electric system. The key decision is whether to have a low voltage system, 240 volt AC, or a combination of both.

We discussed the subject of voltage in the article on planning you solar electric system in the last issue, so we will keep this brief.

If your system is small and your energy needs modest, you can stick to 12, 24 or 32 volts. If your energy needs are greater you may choose to use a combination of low voltage (usually used for lighting) and 240 volt (usually used for electrical appliances, tools, entertainment, etc.). Alternatively people with larger power requirements may choose to run everything on 240 volts.

The advantage of running everything on 240 volts is simplicity. You can use standard wiring and fittings throughout the house, (which is cheaper) and you only have one switchboard.

An advantage of a mixed voltage system are you can buy a smaller inverter, saving money. Also when you are only running a small number of appliances or lights, you can run them direct from the low voltage and not lose power due to the inefficiency of your inverter.

2. COMPONENTS OF YOUR SYSTEM.

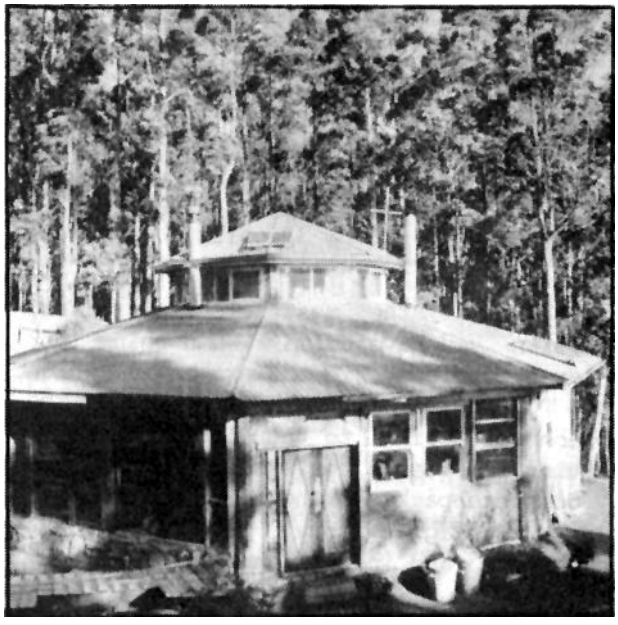
a. Solar Panels

In general the best value for money solar panels (photovoltaics) are those manufactured in Australia. This is because of an import duty on all imported panels.

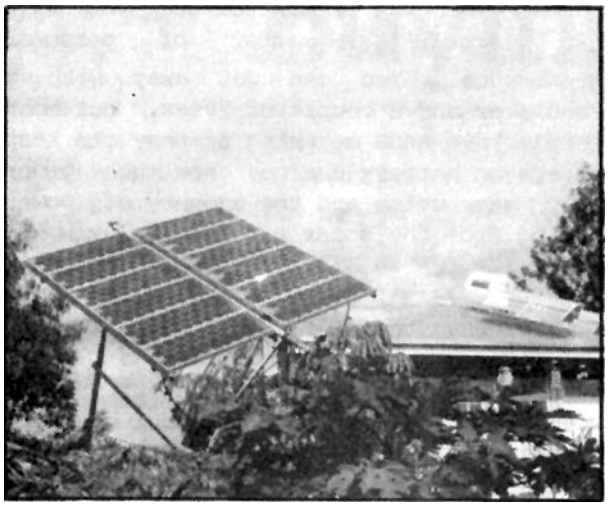
There are four Australian manufacturers of photovoltaics, Solarex, BP solar (formerly Tideland), Solar Cells Australia (linked to ARCO) and Philips (marketed by Suntron). All of the manufacturers produce good quality panels

System 1

Location: Healesville, Victoria.
House: Medium sized, permanent.
PV Panels: 2 * Solarex 37 watt, 2 * BP 43 watt.
Batteries: USL, 4 * 6 volt, 90 AH, (ex Telecom)
Inverter: Selectronics. 450 watt.
Voltage: 12 volts.
Other Elect: Backup generator, Briggs & Stratton 5 kva Dunlite generator.
Charger: Replex, 30 Amp.
cost: $2,000
Installed: 1985.
Appliances: Lights
Features: Uses high efficiency 12 volt fluorescent lighting.
Assembled: Did it themselves.
Comments: Satisfied. the house is used as a testbed for new designs and ideas.



System 2



Location: Brisbane, Queensland.
House: Medium sized, permanent.
PV Panels: 12 * BP (Tideland), 38 watt.
Batteries:, 4 * Dunlop 220 AH, (6 volt).
Inverter: Sunforce Alternatives, 1,500W
Voltage: 24 volt.
Other Elect: Can be boosted by the mains
Charger: Compac, 30 Amp.
cost: $8,500
Installed: November 1984.
Appliances: Lights, 750W iron, Sanyo Washing Machine, 170 litre "Danfoss" fridge, TV, Stereo, Hair dryer, Mixer, Vacuum Cl.
Features: Uses a tracker for the solar panels which increases output by 40%.
Assembled: By owner.
Comments: During bad weather, external charger needed after four days. Formally had Besco batteries which failed quickly. The current Dunlop batteries are excellent.

and the decisions you will have to make when buying are more likely to be related to panels size and number of cells per panel.

In general you will find that you get the best value for money with the bigger panels. In other words you get the greatest number of watts or amps for your dollar. Don't be fooled into buying one panel rather than another, simply because it is cheaper. Check the wattage or amperage.

The other issue is the number of cells per panel. Those panels with lower numbers of cells are called self regulating panels. These panels which generally have 30 to 32 cells, are cheaper because they have less cells. They are good in small, simple remote systems, where low maintenance is important1 What's more they do not require a separate regulator, saving money.

The lower number of cells mean a lower voltage is produced and this prevents batteries from overcharging. However these panels give you less power when they heat up. So in hot conditions they will deliver a lower voltage and may not fully charge your batteries.

Also, under low light conditions, (eg winter), you may not be able to get enough voltage to bring your batteries to full charge. (When batteries are colder they need a higher voltage to charge them).

Hence it is best to restrict the use of self regulating panels to small installations where low maintenance is important.

You get more power from the panels with more than 32 cells, and you should always use these panels in home power systems. What's more, the regulator you will need will include temperature compensation helping to improve the operation of the system.

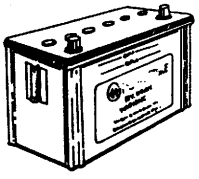
b. Batteries.

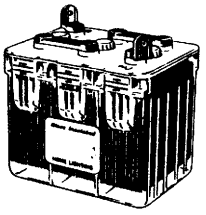
Most people use deep cycle lead acid batteries because they are the cheapest and best value for money. Some of the major manufacturers are Century and Dunlop.

Sealed lead acid batteries are now becoming widely available and have the advantage of low maintenance. Although these batteries tend to be of the smaller sizes, these batteries are becoming increasingly viable for solar electric systems as larger sizes become available.

You could use nickel-cadmium which have advantages of longer life, low maintenance and high reliability. However the initial cost of these batteries is higher.

Another option is to get some good quality, second hand batteries. The most favoured source of these is Telecom which maintains high standards of battery care. Ex Telecom batteries are often still in very good condition after being retired and if looked after can give many years of good service.





c. Control gear.

While there are some systems (other than those with self regulating panels) which don't have control gear they are very few. The control gear usually consists of a regulator which prevents the batteries from being damaged due to overcharging, fuses and meters which give an indication of how the system is operating.

The amount of control gear you have is largely a matter of personal preference. You can get away with a regulator and a couple of fuses, but most people have some metering so they can keep an eye on battery charge, how much power they are using and the amount of power coming from the solar panels.

d. Inverters.

Inverters are used to convert the low voltage DC electricity in your battery bank into standard 240 volts AC.

Most solar electric systems end up with an inverter of one size or another, There are quite a range of these manufactured in Australia, and once again the Australian made units tend to be the cheapest.

In working out what inverters should cost a good rule of thumb is $1.00 per watt. In other words a 400 watt inverter would cost around $400 and a 1,500 watt

continued on p.27

System 3

Location: Healesville, Victoria.
House: Medium sized permanent.
PV Panels: 2 * BP, 45 watts ea.
Batteries: Exide 6 * 2 volt, 200 AH, ex Telecom.
Inverter: No
Voltage: 12 volts.
Other Elect: Wind Generator and back up generator along with other local houses.
Charger : 10 Amp, LEP (from New Zealand)
cost : $1,300
Installed: September, 1986.
Appliances: Lights, car stereo, TV, Bamix.
Assembled: Did it themselves
Comments: System is adequate, however in winter additional power is supplied by shared wind generator and backup generator,

Wood Heating Buying Guide

With Winter rapidly approaching we thought now may be an appropriate time to look at the options currently available with wood heating.

Slow Combustion

Slow Combustion or "Starved Air" heaters rely on two precisely controlled air supplies to maintain combustion. The "Primary Air" is the one that actually keeps the fire going, feeding in through a control slide or spin wheel. The primary air permits the heat output of the fire to be adjusted by controlling the combustion rate of the fuel.

The "Secondary Air" is what gives the efficiency by burning the resins and gases given off by the wood in a separate chamber near the flue outlet.

The efficiency range for slow combustion heaters varies between 60% and 92% depending on design and method of operation.

Convection Types

As a performance booster may slow combustion heaters, draw air from floor level and pass it around the fire box and then out into the room.

Fans are of often used to project this convected air further forward, to allow a more consistent heating of the area.

Convection type heaters may be a poor choice when heating large open areas, halls factories etc. and raked or cathedral ceilinged areas unless some means of returning the heated air back to floor level is used.

Radiation Units

While all wood heaters supply Some heat output by radiation, the "Pot Belly" or "Franklin" stoves maximise this. making them suitable for heating open areas, while retaining the high efficiency of a slow combustion heater- However protection must be provided all round the unit for children and clothing.

Open Fire High Efficiency Inserts

The open fire is one of the least efficient means of supplying heat, as only radiant heat is supplied with the rest of the heat (about 94%) going straight up the chimney. But the open fire is the most desired solid fuel heater for appearance and atmosphere.

The insert type units still give the open fire appearance and its radiant heat output, but add convected air from a double skin box surrounding the fire box.

While these are not as efficient as a fully enclosed heater, efficiency of 20-30% can be achieved. Another advantage is the open fire can be installed in a false chimney without all the cost and weight of a full brick chimney.

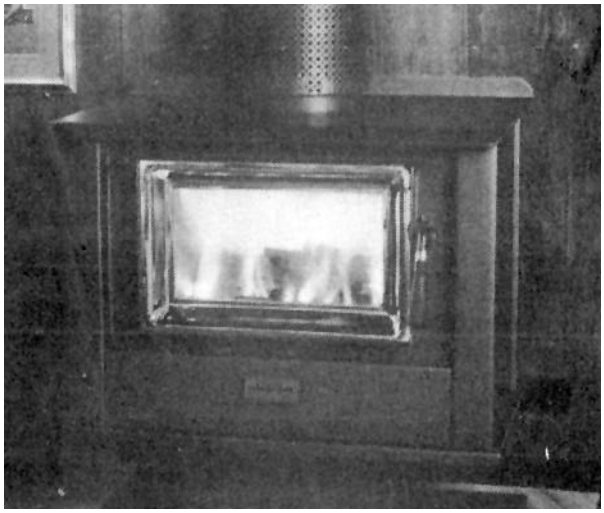
Please note the inclusion of or lack of inclusion of any brand or model of wood fire heat cannot be taken as support or criticism of any brand or model. All information is as supplied by and confirmed with the manufacturer or its agent prior to publication. The "Soft Technology" journal, the A.T.A. or its members and servants take no responsibility for the accuracy or information supplied.

Some Currently available Wood Heaters

Brand: Kent
Model: Spectra
Size: H 624 W 640 D 450
Price: $995
Output:
Features: Firebrick Lining, Cooking Top
Options: Fan Hot Water Booster
Manufactured: New Zealand
Distributed: Vic. Tas. N.S.W. W.A. S.A.

Brand: Heatmaster / Fire Power
Model: 900 (600)
Size: H 695 (600)
w 935 (680)
D 480 (380)
Output: 5 Kw (?)
Price: $1,070 (870)
Features: Damper
Options: Rear Vent, Flue, Offset, Fan, Sealing Glass doors, Cowls
Manufactured: Australia
Distributed: Vic. Tas. N.S.W. W.A. S.A. N.T.
Guarantee: 10 Years
Other Models are available

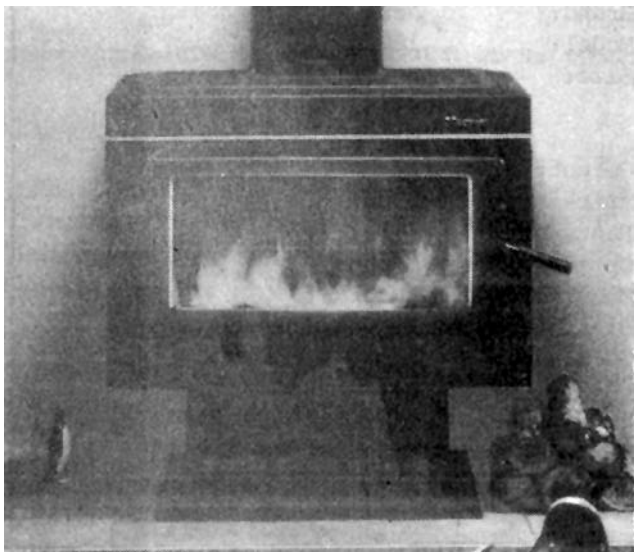
Brand: Delta Heat
Model: Series 1
Size : H 605
W 670
D 395
Output: 13.80 Kw (Approx)
Price: $895
Features: Damper, Log Pan, Spark Screen
Options: Flue Gather Rear Duct
Manufactured: Australia
Distributed: Vic, N.S.W. S.A. W.A. Tas.
Guarantee: 10 year
Larger Units Available



Brand:	Arrow
Model:	1800A
Size :	H 781
	W 683
	D 496
output:	17 Kw
Price:	$960
Features:	
Options:	**Damper**
Manufactured:	Australia
Distributed:	Vic. N.S.W. S.A.
Guarantee:	5 years Prorata

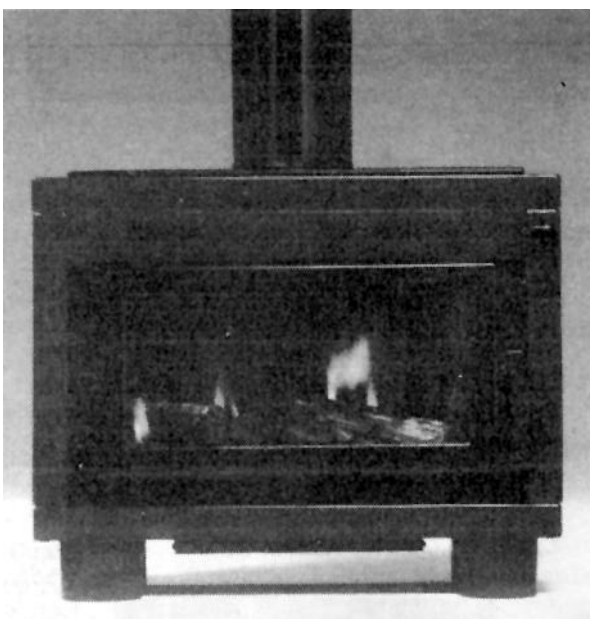
Brand:	Nectre
Model:	Mark2
	Qld
Guarantee:	10 year
	Larger and Smaller Units Available

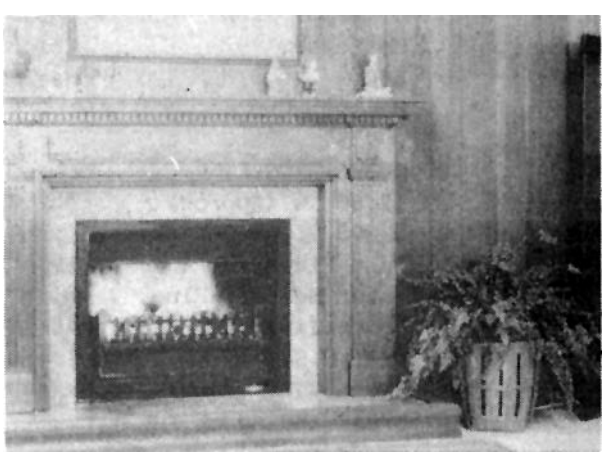
Brand:	Heatcharm
Model:	600
Size:	H 610
	w 735
	D 380
output:	12.80 Kw (Approx)
Price:	$1395
Features:	Fan, Firebrick
Options:	Water Heater, Flue,
Manufactured:	Australia
Distributed:	Vic. N.S.W. S.A.
Guarantee:	5 year
	Freestanding or Inbuilt



Brand:	Masport
Model:	Belevedere
Size:	H 660
	W 635
	D 460
output:	16 Kw
Price:	$912
Features:	
Options:	Fan, Water Heater, Flue
Manufactured:	New Zealand
Distributed:	Vic. N.S.W. S.A. W.A. Tas. Qld
Guarantee:	5 years

Brand:	Stack
Model:	640
Size:	H 525
	W 640
	D 400
output:	16.8 Kw
Price:	$980
Features:	Damper, Heat Shield
Options:	Fan, Water Heater
Manufactured:	New Zealand
Distributed:	Vic. N.S.W. S.A. W.A. Tas.
Guarantee:	10 years





Brand:	Jetmaster
Model:	700D
Size:	H 700
	w 770
	D 400
Output :	15 Kw (Approx)
Price:	$890
Features:	Damper, Log Pan
Options:	Water Heater, Flue Curved Lintel, Glass Doors, Rear Vent
Manufactured:	Zimbabwe, Canada
Distributed:	Vic. N.S.W. S.A. W.A. Tas.

Pulsar Batteries

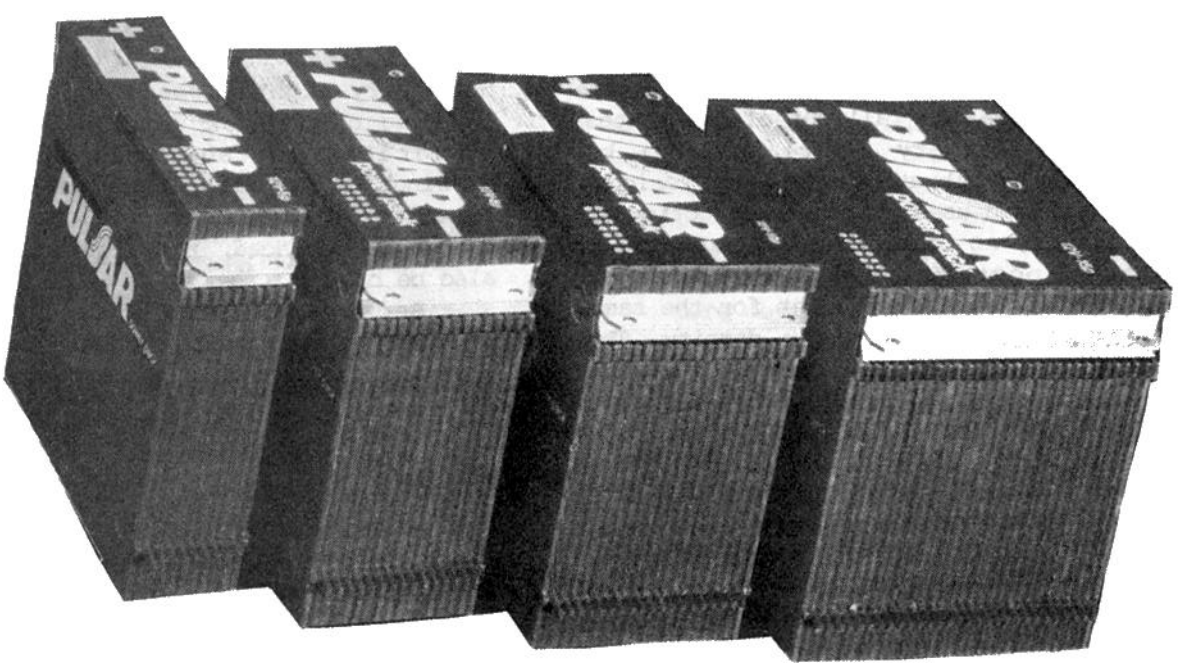
The Pulsar, a new concept in battery construction

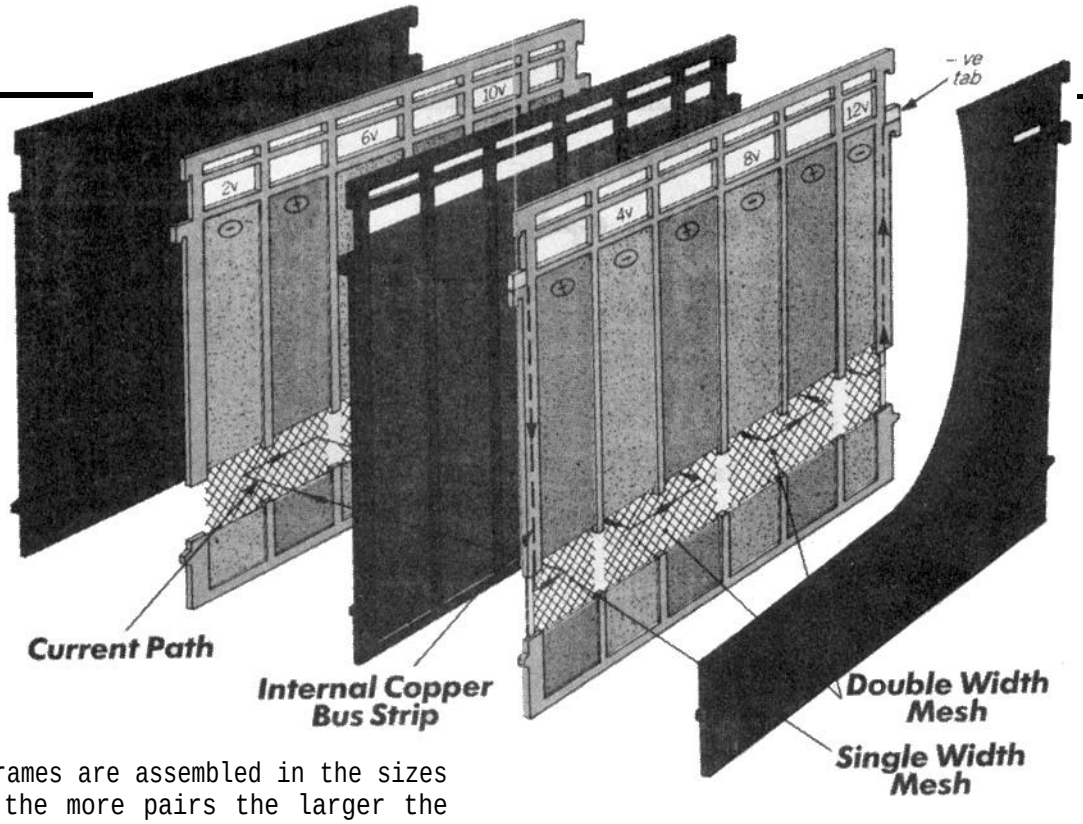
The Pulsar has been developed by Pacific Dunlop Batteries to provide a battery which is both easier to manufacture and which uses less lead. The resulting battery is approximately 40% lighter, smaller, maintenance free and since the plates are more tightly packed, longer lasting in places of constant vibration.

The battery chemistry is still that of a lead-acid battery but the changes that have been made make the battery much less labour intensive to manufacture and it is comparatively easy to alter the capacity with only a small change in the external length. Large numbers of the batteries are easy to recharge as the positive and negative busbars are along the end of the battery and a string of batteries can be charged in series with the opposite busbars touching without the need of connecting leads between cells,

Construction Details

The Pulsar is constructed of specially developed injection-moulded frames containing either active material or separators. The active frames have the usual lead dioxide and lead active material spread on lead mesh approximately 20 or 40 mm wide, set in alternative strips. These active frames are coloured blue, the red frames, containing paper separators, are between the active frames which start with either a positive or negative strip. The reaction between pairs of these frames produces 12 volts along their length then internal copper strips connect to brass busbars at every second active frame.





The frames are assembled in the sizes required, the more pairs the larger the capacity of the battery, and plastic welded together. The battery is then filled with electrolyte through holes in the top and charged. The top is then covered with a special Teflon seal which allows the battery gas to escape but still remain spillproof. The busbars provide a convenient carrying handle with holes for fitting bolt or post terminals.

Some Observations

Since the frames are compressed against each other it is difficult for the active material to fall out of the plates hence the battery is claimed to be unaffected by vibration over long periods. With less lead used in the construction of the plates, no lead internal busbars or battery post terminals there is a significant saving in weight for the same power, i.e. increased power density. The Better conducting path provide higher starting power, reserve capacity seems to be about the same as the smaller capacity but heavier batteries used in vehicles.

Because the Pulsar is sealed it is not possible to measure the state of charge by measuring the specific gravity of the electrolyte. This has to be done by measuring the voltage using an accurate voltmeter or one with an expanded scale. after a load test.

Because the plastic frames are' welded together the battery is rather susceptible to being dropped or hit by something falling on it. The acid keeps leaking out for some time but the other pairs **seem** to be unaffected and there is more leakage each time the battery is charged.

Charging

The Pulsar needs 14.0 to 14.6 volts at the battery terminals (some vehicles have very light copper leads from the charging circuit and often do not supply sufficient voltage when current is flowing). It should not be charged above 15 volts as electrolyte will be lost and cannot be replaced, the liquid seals may also be broken.

Because of the Pulsar's small physical size Dunlop are reportedly bringing out a double battery which will provide starting power in the event of lights being left on for an extended period.

The Pulsar's light weight and the ease of charging strings of batteries seem to be steps in the right direction for electric vehicles if it can be produced as a deep cycle type.

N. JEFFERY

Soft Energy Policy Action.

In the last issue of the magazine we outlined an ATA submission which aimed at influencing the Victorian Government's plans for new power stations. We were arguing that the Government's energy planning should incorporate greater use of renewable energy and energy conservation.

The findings of the parliamentary committee have now been released and here is a rundown on how we influenced the report, (and hence hopefully Government policy) .

The report which was released in April 1988, is called "Electricity Supply and Demand Beyond the Mid 1990's". It was produced by Natural Resources and Environment Committee of the Parliament of Victoria.

The general objective and principles of the report include mentions of "conservation", and consideration of "social and environmental costs". Renewable energy sources are not mentioned specifically at this point but are covered by general terms such as "introduction of new technology".

The key elements include some more positive statements to which we could claim some credit.

In particular:

The development and implementation of economic conservation and demand side measures;

"The development of Research and Development programmes" including "energy conservation measures and renewable energy resources".

The specific recommendations of the report are the area in which we can really claim same credit. A number of these recommendations are directly drawn from those we suggested while other existing recommendations have been modified in the ways we suggested.

Recommendation 8 deals with energy conservation.

"SECV should continue its present programmes which are aimed at encouraging conservation and demand side measures"

Recommendation 9 deals with insulation.

"The government should amend the Victorian Building regulations to require thermal insulation in new buildings and should continue to promote the design and construction of solar and energy efficient buildings."

Recommendation 10 further deals with energy conservation and demand side measures. The committee was so disappointed with the SECV's work in this area that this recommendation of a further investigation was included in the report.

"Further terms of reference should be given to the committee to allow for a more detailed examination of demand side and energy conservation measures and their potential to contribute to economically, socially and environmentally beneficial strategies for balancing electricity supply and demand."

Recommendation 10 concerned the "greenhouse effect". We specifically suggested the SEC report on its CO_2 emissions, a suggestion which was adopted by the committee,

The Commonwealth and Victorian Governments should support the gathering and analysis of information which would improve the current level of understanding of the Greenhouse Effect and its implications". "In particular, SECV should assist by providing annual estimates of the total release of carbon dioxide and other contributing emissions from its operations. This information should be published each year"

Most of the recommendations regarding renewable energy sources are included under the heading "Small Scale Supply Options"

Recommendation 38 states,

"SECV should consider stand alone power supply systems as an alternative to extending the electricity distribution system into remote areas".

This is a rewording of one of our recommendations.

Recommendation 39 is regarding a review of the SECVs current co-generation and renewable energy incentives package.

Recommendation 40 deals with the option of the SECV buying power from small energy producers, while 41 states;

"SECV should significantly expand its involvement in research and demonstration projects related to renewable energy based electricity generating technologies.

The report contains other recommendations regarding "The performance of existing generating plant, R & D related to the use of brown coal, The desirable mix of Fuels, Loy Yang B Units 3 & 4", etc.

If you want to get a full copy of the report you can write to the :

Natural Resources and Environment Committee.
19th Level, Nauru House,
80 Collins Street,
Melbourne, Vic. 3000.
Phone: (03) 654 7149.

Now these recommendations have been adopted by the committee, the next step is to make certain they are adopted by the Government. Once they are it becomes possible for some real and tangible changes to be introduced in favour of environmentally sound technology and energy sources.

We have been so inspired by our success in this project to date that we have decided to form the Energy Research Group (ERG), with the aim of influencing Government policy, and community attitudes regarding renewable energy and appropriate technology.

This group will concentrate on the policy work while the ATA in general will continue on the more practical activities and information. If you would like to get in touch with ERG then write to us at:

Energy Research Group,
Alternative Technology Association,
222 Brunswick Street,
Fitzroy, 3065.

Or you can ring on Tuesday or Thursday on (03) 419 8700.

HAYBOX COOKERY

A haybox is an insulated box used for slow cooking and does the same job as a more expensive crockpot for cooking those dishes which require a long simmering time.

Their greatest advantage is that no energy is needed to cook the dish once it has been brought to the boil. The heat is kept in the pot and the long simmering period associated with stewing takes care of itself, saving time and money.

Using materials readily available you can make one of your own in half an hour at little cost. As hay, the traditional insulating material, is no longer available to city dwellers, other insulating materials such as polystyrene or crumpled newspaper can be used.

The first requirement is a cooking pot with a well fitting lid and two handles so that it can be easily lifted from the box.

Ideally the pot should exactly fit into the insulating box with as little space as possible. A five litre pot can fit nicely into a polystyrene fruit box which can be trimmed to size or filled with pieces of polystyrene to enclose the pot.

Polystyrene may be cut smoothly by heating an old knife in a gas flame and then used to shape pieces to fit the pot. If you wish to cover the inside or outside cardboard cartons are durable and good insulators. Use a water based glue or paste as most mineral solvents dissolve the polystyrene. A polystyrene lid and cover retains more heat.

The types of food which cook well in a haybox include soups, stews, sauces, stewed fruits, milk puddings, brown rice and stock. The box can be used to keep dishes of food warm until served, to make yoghourt and to keep food cool for short periods.

Food cannot be overcooked and if you have to leave the house there is no worry of leaving the gas or electricity on, thus saving fuel and money.

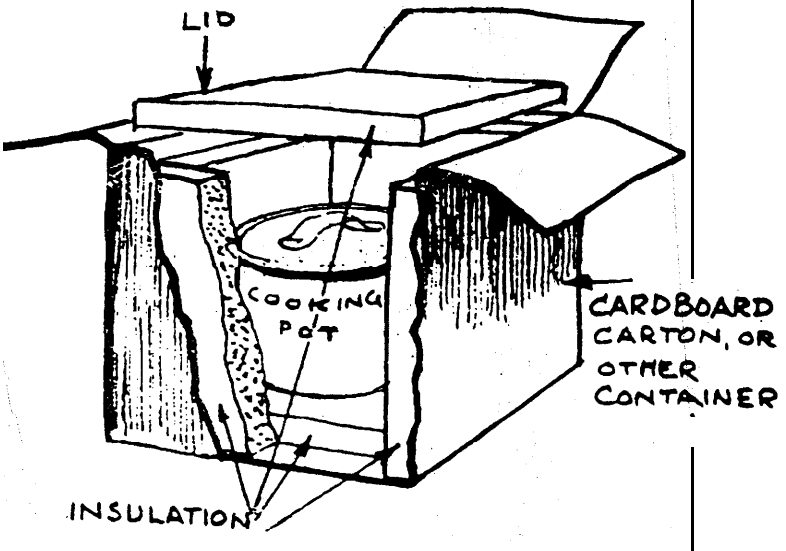
To use: bring the food to the boil, put on the lid, open the haybox and put the pot inside. Quickly close the lid of the box and cover to prevent heat escaping. Cooking will continue at a little below simmering point.

If the pan is removed at any time, such as to stir, bring it to the boil again before returning it to the box. It is recommended to boil meat dishes for a couple of minutes before serving. Cooking times are about half as long again as simmering on the stove but it is best to experiment for your own taste. Try soups 1 - 2 hours, stews 3 - 5 hours, lentils 1 - 3 hours and milk puddings 1 hour.

Some Recipes suitable for a Haybox:

1) Potato and Onion Soup. (Any soup may be cooked in the Haybox.)

2 medium onions, sliced
1lb potatoes, sliced
1oz butter or margarine.
Half a pint of water or stock
1 pint of milk
1 bayleaf



Melt butter in pan, add vegetables, over and stew slowly for about 5 mins. until softening. Add bayleaf, milk and water bring to the boil. Simmer for 2 or 3 mins, cover and put quickly into the haybox.

Leave for about 45 mins. When cooked, remove the bayleaf, put through sieve, Mouli or liquidiser. Season with salt, pepper and a grate of nutmeg (optional).

2) Casserole of Lamb.

One and a half to two pounds of middle neck lamb (in pieces).
2 medium onions, sliced
2 carrots, sliced
Small turnip or piece of swede, chopped
Quarter of a pound of mushrooms, washed and cut into quarters
Half a pound of tomatoes, skinned and cut into quarters
2 tablespoons dripping or oil
Bouquet garnis
1 tablespoon flour
1 pint water or stock

Melt fat in stewpan. Add pieces of meat and brown well on both sides. Remove from pan, add vegetables, except tomatoes, and brown also. Stir in flour and continue to cook for a few minutes,

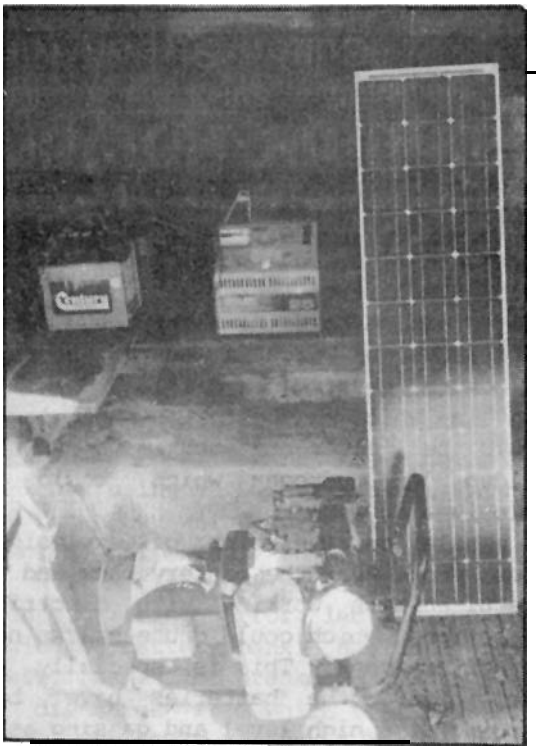
Return meat to pan, add tomatoes and bouquet garnis. Add stock or water to just cover the meat. Bring to the boil and allow to cook for 3 or 4 minutes, then put quickly into the haybox. Leave for about 2 hours. Reboil before serving and sprinkle with chopped parsley.

This item is based on information from a leaflet "DIY Plan No 6 Haybox Cookery", Produced by the Centre for Alternative Technology, Machynleth, Powys, Wales, Great Britain.

continued from p.16

System 4

Location: Tabulam, N.S.W.
House: Large permanent Dwelling.
PV Panels: 1 * Solarex (42 watt) + 1 * ARC0 (55 watt).
Batteries: 3 * Century, 68 Amp hour.
Controls: Home made.
Inverter: No.
Voltage: 12 volts.
Other Elect: 3 kVA Backup Generator.
Charger: Arlec, 25 Amp.
cost: $1,350, + (Generator $600)
Installed: 1985 to '87.
Appliances: Lights, TV, Stereo/cassette/ radio (12v), Iron, washing machine, Power tools, food mixer & Vacuum Cleaner, (240v)
Features: No.
Assembled: Built up over the years.
Comments: It works well but the batteries are the weak link.



Inverter would cost around $1,500. In reality smaller inverters tend to be on the high side of this figure and of course you should only use this rule as a guide.

e. Battery Charger.

As far as battery chargers go you can use anything from a cheap "Arlec" or similar charger up to the more sophisticated constant potential battery chargers. The important thing is buying a charger that has the right capacity for you system.

Here the general rule is that you should have a charger with an output equal to about 10% of you battery capacity, This means that if you have a 500 Amp hour battery bank your battery charger should be capable of putting out 50 Amps (Max).

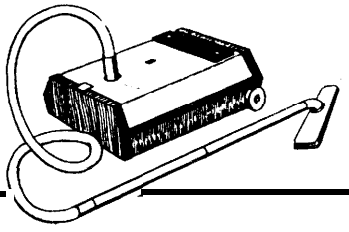
f. Appliances.

There is little need to comment on the standard 240 Volt appliances that you run off the inverter except to say keep them as efficient as possible.

Washing Machines are often a problem as the tend to trip the overload circuit of the inverter. Pick one which is small and simple. Hitachi have a good name for running well on solar electric power systems. If you are buying a dish washer get one that can run on cold water or external hot water.

A good rule is that when buying 240 volt gear, buy on approval. So that if it doesn't work well with your system, you can return it.

There is an increasing range of low voltage equipment around now, and you can buy most of the gear you will need to suit your needs. This includes lighting, stereo equipment, TVs (both black and white and colour), some kitchen appliances, tools, pumps, fridges, fans, irons, and vacuum cleaners.

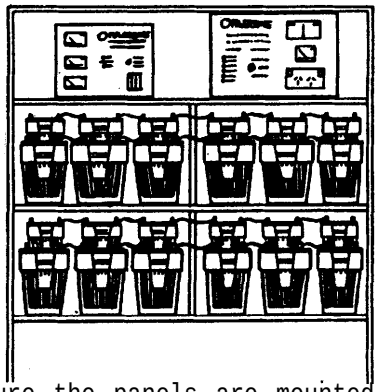


4. INSTALLATION.

Allocate an area in your house for the batteries and control gear. A good way to set it out is as a set of heavy shelves which hold the batteries, and a board above, on which is mounted the fuses and control gear, (see diag). The room or area in which the batteries are mounted should be well ventilated to prevent a buildup of hydrogen which could be explosive.

While on the point of explosions, never smoke near the battery bank and be careful when working with electrical connections which could cause sparks near the battery bank. This is especially the case after the batteries have been charging at a high level and gassing as a result.

Your photovoltaic panels should be mounted on aluminium frames (to prevent corrosion due to dissimilar metals), and stainless steels bolts should be used.



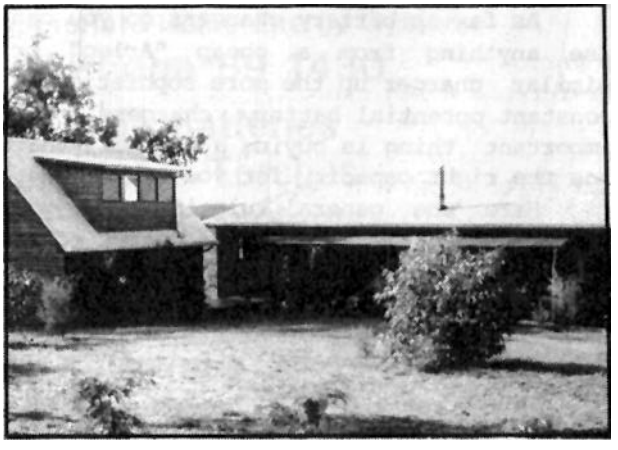
Make sure the panels are mounted firmly, It would be a pity to watch your expensive panels take off with the first strong wind.

The panels should face north and in the southern states can be set at an angle of approximately 48 degrees from the horizontal. If you want to go to the trouble of adjusting the angle of your panels during the year then the winter angle is 55 degrees from the horizontal. The summer angle is 15 degrees. It may be well worthwhile adjusting the angle from time to time as this can increase the output of your panels by as much as 25%.

The wiring between the panels and the battery bank should be heavy duty. How heavy depends on the distance you have to

System 5

Location: Grafton, New South Wales.
House: Large permanent dwelling.
PV Panels: 10 * 42 watt Solarex Panels.
Batteries: 24 * 2 volt, 225 AH Century,
Inverter: Powerstore, 2000 watt.
Voltage: 24 volt (fridge & light), rest of appliances run from the inverter.
Other Elect: 2.4 kW generator.
Charger: From Powerstore inverter.
cost: $7395, Generator $2,500.
Installed: April, 1986.
Appliances: Lights, microwave, fridge, blender, washing machine, shaver, hair dryer, ceiling fan, stereo, TV, pressure pump, electric jug.
Features: Fridge is a converted Westinghouse Tuckerbox with a "Technica" 24 volt motor.
Assembled: Off the shelf by Self Sufficiency Supplies.



Comments: System runs well. Care needed in selecting washing machine, (a 2kW machine can use 4kW when starting). Only used the generator about four times last year.

System 6

Location: Inglewood, Victoria.
House: Medium size, permanent.
PV Panels: Solar and wind yet to be added.
Batteries: 12 * 2 volt, 225 AH, Century.
Inverter: Powerstore.
Voltage: 48 volts
Other Elect: Backup geni used to keep batteries charged.
Charger : Done by inverter.
cost: $8,000, Generator $4,500.
Installed: May, 1986.
Appliances: Lights, dishwasher, stereo, washing machine, TV, computer, freezer, coffee grinder, mixer, answering machine.
Features: Used generators sets to power system while building house. First generator, a Honda, failed quickly. The next a Mitsubishi with an Italian generator lasted 14 months and cost $7.00 a day to run. Now using a "Deset" diesel. This is run 4 hrs a day which costs $10 a week.
Assembled: Off the shelf by Self Sufficiency Supplies.
Comments: Wiring error led to uneven charging of battery bank. Had to replace l cell. Generator breakdown led to very deep discharge from which the batteries did not completely recover. Backup from Self Sufficiency Supplies very good.

run the cable. Keep the distance as short as possible and ask your retailer what size cable to use.

When assembling your system keep the batteries disconnected until the last minute. Touching the wrong wires together can make a big flash not to mention cause a lot of damage.

Any 240 volt wiring should be done by a person with a sound knowledge of wiring, preferable a registered electrician. You can do the low voltage yourself, however don't tackle it yourself unless you are sure you know what you are doing. Those low voltage wires carry high currents and they can easily cause fires if a short circuit occurs.

5. MAINTENANCE

Once your system is in, all you have to do is a small amount of maintenance.

Initially keep your eyes on the meters or other indicators of battery condition until you get the feel of the system. It may take a little time to get used to the amount of power you have available in your system, and just what you can get away with in terms of usage.

Keep an eye on the acid levels in your batteries and top them up with distilled water at regular intervals. However don't fill the batteries up to the brim and then give them a heavy charge as the electrolyte will expand and overflow.

Also keep the tops of the batteries clean by wiping them down occasionally with soapy water. But don't spill any into the batteries themselves.

In some circumstances you may have clean your solar panels, however; unless some local birds have taken to roosting on them, you will very probably never have to clean them.

That's about it on maintenance unless you want to adjust the angle of your panels seasonally.

To find the answers to all the other questions that are bound to come up, ask questions. Ask questions of your supplier, ask questions of other solar power system owners and if you are really desperate write us a letter and ask Soft Technology. Good luck and now its over to you.

Book Review

Backyard Electrical Systems: a Low Cost Perspective.

AUTHOR: Greg Clitheroe.
PUBLISHER: Appropriate Community Technology Association.
PRICE: $4.00 ($1.00 pack & post)
REVIEWER: Jeff Hilder.

Backyard Electrical Systems is a small, low cost booklet produced by a group of people who are involved in the design, installation and personal use of alternative power systems.

The book has been written to give persons with little or no experience with electricity a simple and practical source of information on power systems not connected to the mains.

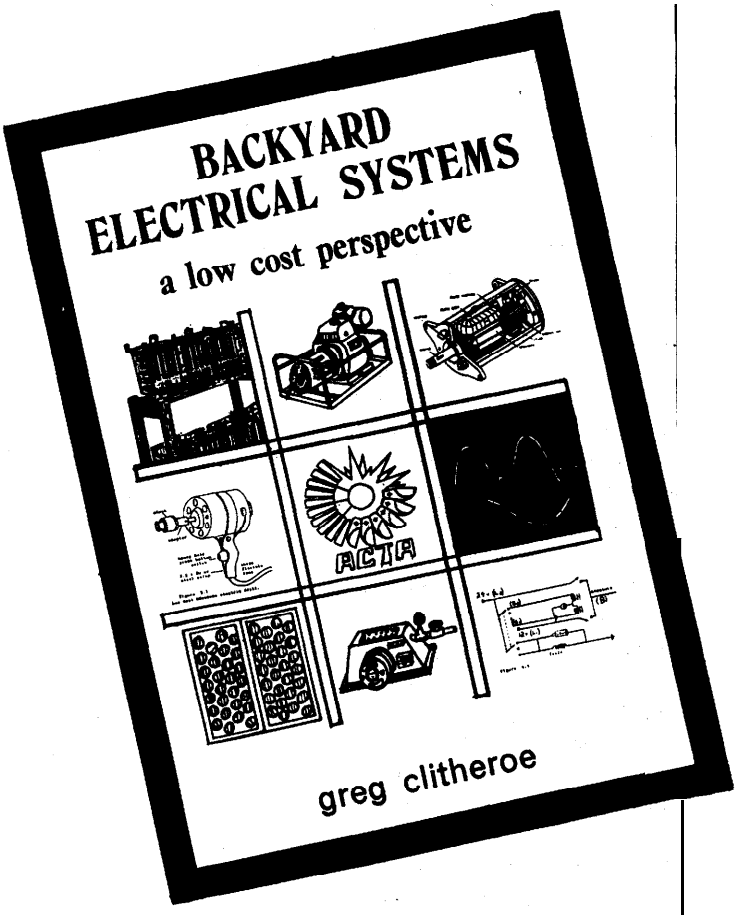
The information is drawn from direct experience and includes; basic electrical theory with useful information on low voltage transmission, fossil fuel generators for powering household equipment and the charging of batteries and converting household appliances to run on 12 or 24 volt D.C.

Some of the most useful information in the book deals with the conversion of large household equipment, like washing machines, and workshop equipment, such as grinders and drills, to run on low voltage D.C. motors.

Using generators from old cars, the book explains how they can be rewired or simply run as a motor to power many varied appliances. The information contained in this chapter should give enough information to allow the "do it yourselfer" to perform these conversion tasks.

Battery maintenance is covered with information to help select and maintain battery power systems. Inverters and shared power systems receive general operation theory with more detailed information becoming available in the future.

The main purpose of the booklet is to show people a cheap alternative power system that does not require the purchase of an inverter and show people information allowing them to make the conversions themselves.



The association plans to print more detailed publications in the future.

If you want to get hold of a copy you can write to ACTA at 88a Keen Street, Lismore, NSW, 2480.

Letters

POWER SYSTEMS

Dear Soft Technology,

In the article Solar Electric Power Systems by Mick Harris on page 13 of 27, there was a confusion of the terms (and units for) power and energy (and "juice" for that matter). This may in fact be an error of too much familiarity with the subject matter.

In comnon use, the words "energy" and "power" mean almost the same thing. Science and technology ascribe to them very specific and different meanings although still closely related to the common usage. A battery stores a certain amount of energy, not power. Energy in our case is most usually measured in watt-hours (wh). A kilowatt-hour (kWh) is of course a thousand watt-hours.

Power is a measure of the rate of consuming or producing energy or doing work, and is measured in watts (W). Note the abbreviation is a capital as it is a person's name. Some electric motors are still rated in horsepower (hp), where 1 hp = 746W. A kilowatt (kW) is of course a thousand watts.

Since power is the rate of doing work, we calculate the energy (and hence storage requirements) by multiplying the power in watts by the time in hours, i.e. "watts" times "hours" gives "watt-hours" (not "watts" again as stated in the above-mentioned article).

Historical note: This may seem a little back-to-front and it would probably have been better if historically we had used the single name for the energy units (e.g. joules) and spoken of power in units of joules-per-hour. (Watts are in fact joules per second).

It is also unfortunate that it is traditional to rate the capacity of storage batteries in amp-hours (Ah). To obtain the energy capacity we must multiply by the voltage of the battery, i.e. "volts" times "amphours" gives "watt-hours" (not "watts" again as stated in the article). Note that in a multi-cell arrangement the energy capacity is the same whether the cells are arranged in series (add up the voltages) or parallel (add up the amp-hours).

As stated in the article the main reason for this is the energy loss in the wiring. Some percentage of the energy is always wasted as heat in the wiring. Without going into further theory, the higher voltage, the thinner the wiring can be for the same percentage energy loss.

The wiring used in houses on the 240 volt grid is unsuitable for a 24 volt system whose wiring should in theory be about 3 times the thickness (10 times the cross sectional area). This is not usually a problem for low consumption areas such a lighting, but houses on low voltage systems have been burnt down as a result of too-thin wiring running high consumption appliances.

Yours, Dave Keenan.

Mick's Reply

Thankyou very much for your letters. When I sat down to write the article on "Designing a Solar Electric System" the approach I used was based on my experience in advising people in the field. Over the years many people had come up and asked about the number of solar panels they would need and what they would be able to run from them.

I quickly learnt that giving anything but the most basic explanation was generally a waste of time. If you wanted to get across the basic calculations that must be worked through these formula must be distilled down to the simplest form possible.

To a person who hates mathematics and avoids it at all costs calling the product of an equation "watts" or "watt hours" doesn't matter in the slightest just as

long as the figures give the required results. And "watt hours" is more confusing than "watts".

So when you are already battling to get a person to remember the most basic equation you don't make the job any harder by including the subtleties on your equations. You just give them enough for it to work.

By the way I got a local retailer who has been advising, sizing, and selling PVs for ten years. He read the draft and had no problem with the way the article described the design steps.

Having said that thanks for pointing out the subtleties, I agree with most of your comments and they should add another dimension to our readers' understanding of the maths behind PV system design. If you think we are ever wrong again ... let us know.

Mick Harris

WORLD SOLAR CHALLENGE

The 1987 results show that cars with gearboxes and other drag areas were paying the highest penalty, weight and aerodynamics come second, with rolling resistance third. Different quality solar panels played a minor role in the result.

A technical report sponsored by NED0 will be available late January.

Weather reports are available from BWD, radiation being most interesting.

The 1990 event:

Much was learned from competitors and organisers and 1990 looks like being a greater event, running faster and smoother. The 1990 World Solar Challenge will have different classes for solar panels, and we will endeavour to create a handicap class. A loop of Ayres Rock will also be included for the first 24 hour cars, adding some 500 kilometres to their run.

Better event scoring will be implemented, possibly using transponders monitored. by satellite, and increasing services to the media.

HANS THOLSTRUP
Energy Promotions,
P.0. Box 20,
Mona Vale, NSW 2130, Australia.

MORE ON RAPAS

Dear Sir,

Firstly, Solarex has never manufactured a solar module identified as a Gt1OO although we believe there is such a panel manufactured by a European company. We do manufacture the LX100GT which your reader may be referring to.

The LX100GT is on the list of equipment approved for purchase under the RAPAS Scheme, and has been since the inception of the scheme. Your reader intimates that the energy authority (now Department of Energy) is somewhat responsible for the limited number of products that have been approved.

He seems to have ignored the fact that it is the manufacturers' responsibility to seek approval for their equipment and provide a written guarantee for items purchased under the scheme.

That a particular item of equipment are not approved could be for one or more of the following reasons: a) that the manufacturer never sought approval; (b) that the manufacturer's guarantee was considered insufficient; (c) that the product failed testing; or (d) that the product has insufficient Australian content.

The effect described is typical of a "self regulating" type of system and is caused by insufficient voltage available

Classifieds

from the module or system to the battery. If, as is the case with all Solarex modules, there are enough cells to provide the extra voltage required at higher temperatures, there could be a problem with the wiring, length of wire, connections, regulator, etc. causing a voltage drop to the batteries.

Yours faithfully,

Kim Stavens, National Sales & Marketing Manager, Solarex Pty. Ltd.

Dear Sir,

To comment on your reader's problem. It is essential that leads between solar panels and battery be kept as short as possible so that voltage drop be below 5%. If this is exceeded then thicker wire should be used. Generally 4mm-6mm sq. wire is recommended but for lengths in excess of 40' this may be made even heavier. If this wire is too thin or too long or both then the effect mentioned in A.T.A. 27 will be described.

J. Paton, Solar Charge Pty. Ltd.

Dear Sir,

Under the "Guidlines for Remote Area Power Assistance Scheme" January 1987, component suppliers or manufacturers must make an application to the Energy Authority of NSW for acceptance of each product type. An extract from the Guidelines states in part that "For the purpose of these guidelines an Australian content greater than 50% of the value of the product would typically be required."

Des Meehan, Manager, National Sales Group. BP Solar Australia.

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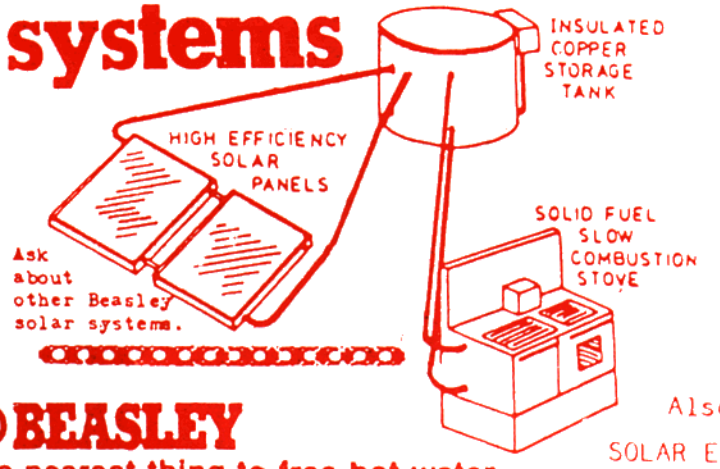
solar hot water systems



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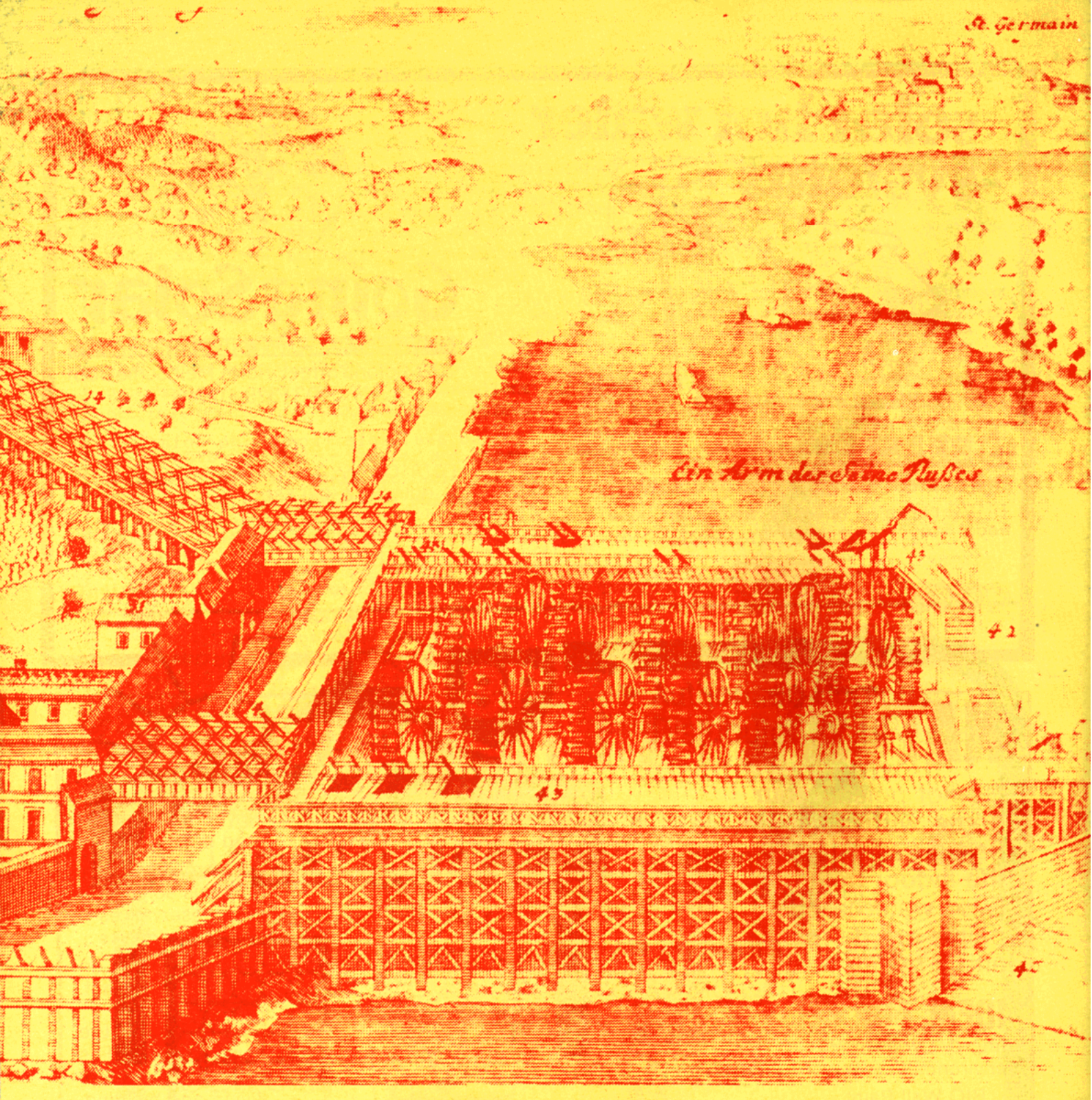

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