Soft Technology

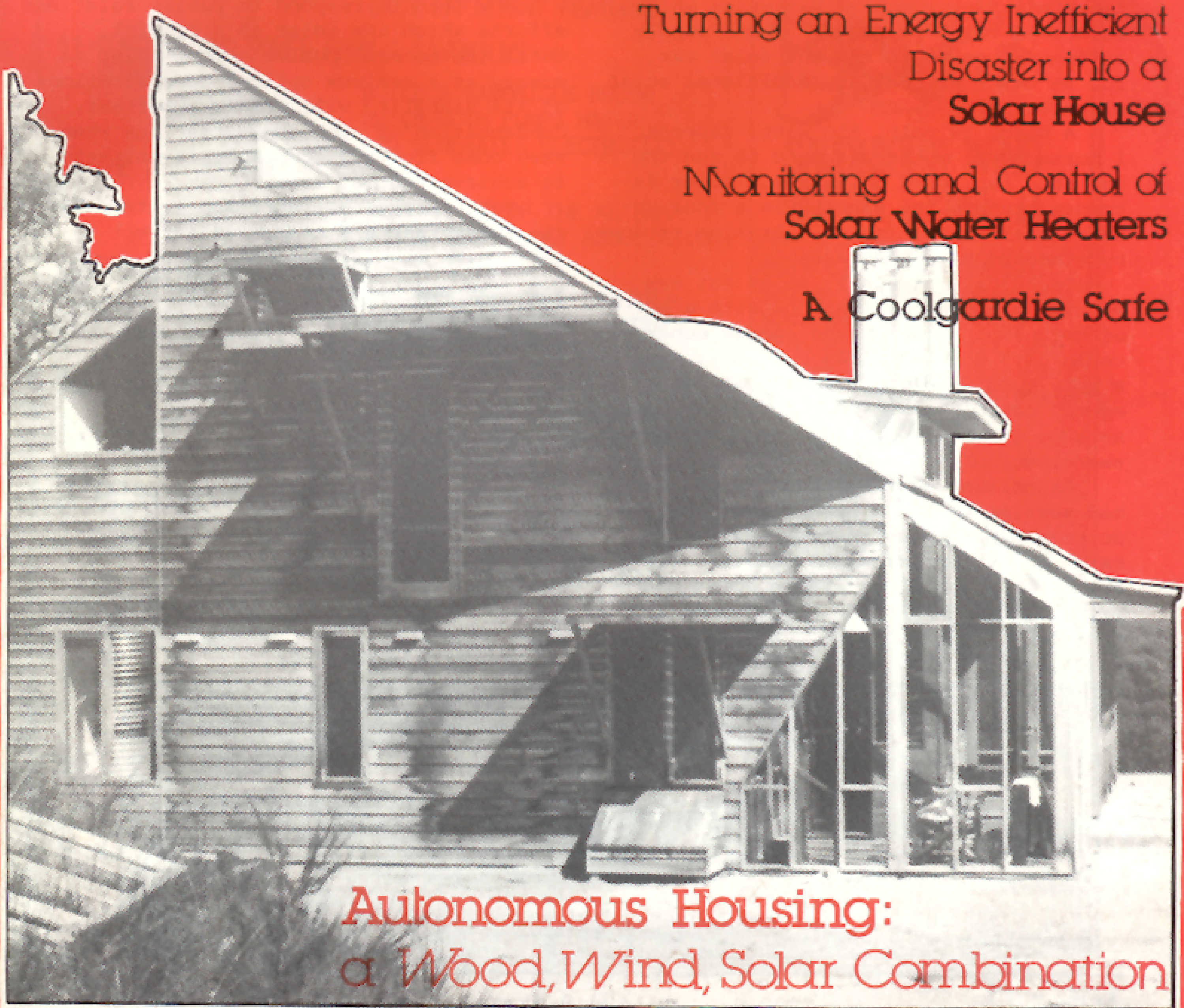
Alternative Technology in Australia No.12 May/July 83. $1.50

Power and Pumping from a
Savonious Wind Rotor

Turning an Energy Inefficient
Disaster into a
Solar House

Monitoring and Control of
Solar Water Heaters

A Coolgardie Safe



Autonomous Housing: a Wood, Wind, Solar Combination

Editorial

During December of 1982 and January of 1983 the B.P. solar car crossed Australia covering some 4084 kilometers. The journey took 172 hours running time with an average speed of 24 kph,

The vehicle was built of a tubular steel chasis with a streamlined fibreglass body; a total weight of 150 kg.

Power came from 8½ square meters of solar cells supplying 600 watts of power. The twenty (12 volt, 30 watts) solar modules were wired to supply 24 volts to two standard automotive batteries which were used to store power. These supply sufficient power to run the solar car for 1½ hours without any additional solar electricity.

A Bosch 24 volt, 650 watt, (approx. 1 horsepower) motor was used to run the car at a top speed of 65 kph. Power is transmitted to the wheels via a four speed chain transmission. Braking is done by standard bicycle brakes.

Technically the BP solar car was nothing spectacular. Anyone with a bit of technical know-how and enough money could have done what was done. It was, a very good gimmick to show what solar energy can do if you have the money, and as such it was a good awareness raising exercise.

As editors of this magazine we have had some problems in working out what to do regarding the solar car. The solar car was a very worthwhile exercise for BP from a public relations point of view. But the question should be asked just how sincere is BP's interest in solar energy, when at the same time BP. is involved with large environmentally damaging energy projects such as uranium mining in South Australia.

Recent years have seen oil companies buying into solar energy. Solahart, Australia's most successful solar water heating company, is now more than 50% owned by Shell.

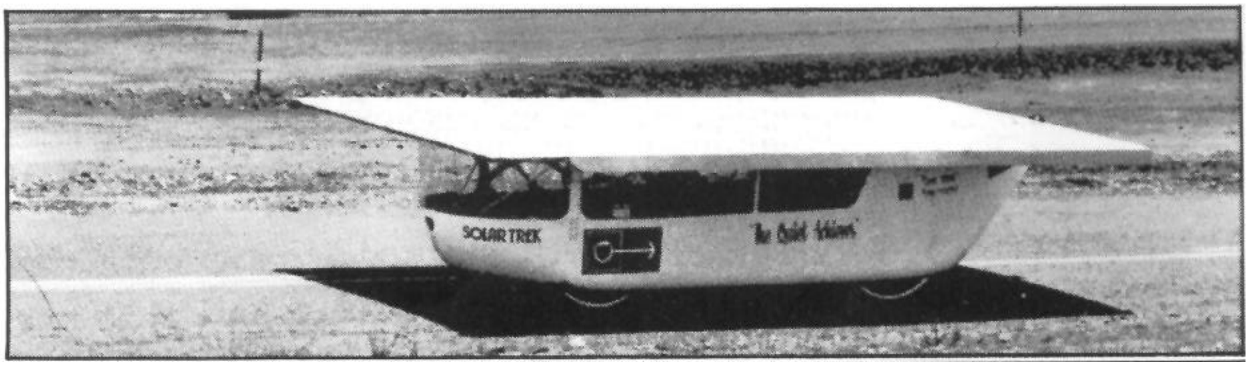
It would be nice to believe that the oil companies buying into solar for reasons other than profit. However this is unlikely.

How then to respond to public relations efforts which use solar as a gimmick. Until the general public accept solar energy as a serious option, demonstrations of its viability will remain important. Condemnation of such demonstrations when they come from oil companies, is unlikely to achieve a great deal,

Perhaps the best approach is to take the image that the companies attempt to sell, with the scepticism it deserves, BP did not send the solar car across Australia because of a passionate support for solar energy and its implication. They did it for the PR And they are now busy letting countries all over the world know about it.

Solar energy is not above corruption from those who wish to sell it. It can be pushed in an inappropriate and inefficient way. This should be kept in mind when we view such demonstrations as BP's "The Quiet Achiever".

Mick Harris



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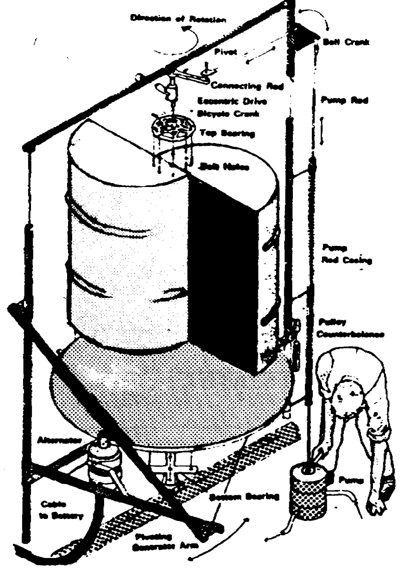

SAVONIOUS WIND ROTOR....PAGE 11

This issue of Soft Technology was edited by Mick Harris with help from Michael Gunter, Bob Fuller, Alan Hutchinson, Tony Miller, Andrew Blair and Alan Browne.

Comments, contributions and criticisms should be sent to the Alternative Technology Association, 366 Smith St, Collingwood Victoria, 3066.

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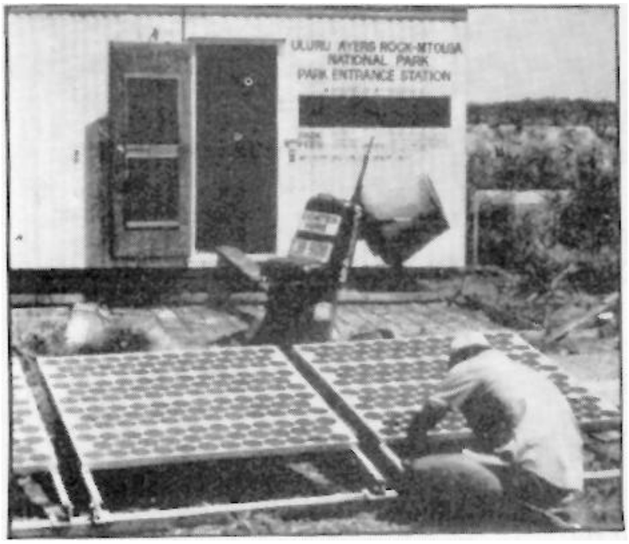
Cover: The east side of the wood, wind, solar powered house.

Energy - Flashes...

Solar cells at the Rock

Twelve photovoltaic modules are producing electricity from sunlight to power lights, UHF radio and evaporative air cooler at the temporary entrance station for Uluru National Park, home of Ayers Rock.

Eight batteries, capable of storing 840 amp-hours of electricity from the 12-volt Solar system, are sized to provide power for up to five cloudy or rainy days.



Other sources of power were considered or used at the park entrance, according to Bob Dennis, at Solar Energy NT in Katherine, Northern Territory, who installed the system. Electric power from Yulara Construction Camp, approximately three miles (five kilometers) away was too expensive, he said. A small diesel generator proved too noisy and required maintenance and costly fuel.

The array, tilted at 20 degrees north to optimize summer sunshine, has been producing an average 147 amp-hours per day since installation last October.

A permanent entrance station is planned and will most likely be solar-powered.

ARC0 Solar News

It's a gas!

In New Zealand's South Island methane gas is being used to fuel vehicles in some rural communities.

A Christian community in Cust, North Canterbury, has designed and built a methane digester which is now producing 164 litres of petrol equivalent a day.

The digester is fuelled by animal wastes from the community as well as bought-in poultry manure. Poultry manure for the digester costs about $80 a week and is the major expense for the operation.

Gas produced from the digester is used to fuel a fleet of 15 vehicles - mostly vans, plus two diesel tractors the community has converted to run on methane.

When running on methane, a Ford 4000 tractor achieved 10 per cent more power and 20 per cent more torque than it did on diesel. In the field this means the tractor can do tasks (such as ploughing) a gear higher running on methane,

In Waikouaiti, 40 km north of Dunedin, a poultry farmer has set up a public biogas refuelling station selling 98 per cent pure methane produced from poultry manure. The energy content is almost identical to that of natural gas.

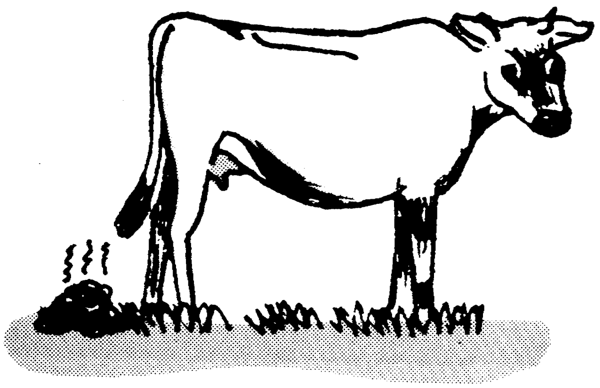
The plant comprises three $55m^3$ volume digesters, one of which is now in full operation.

The digester in operation is loaded with 2500 litres of manure containing about seven percent solids every day. About $68m^3$ of biogas is produced daily, containing 65 percent methane with an energy content equivalent to 48 litres of petrol.

Six of the town's vehicles have been converted to run on the gas which include a Toyota Landcruiser, Holden Monaro and Mitsubishi van used as the local taxi and for the town's mail deliveries. Four more vehicles are currently being convert&d to run on the gas.

The 13,600 laying birds and 5,000 young birds on the property will provide enough manure to feed the three digesters and provide fuel for about 30 vehicles.

ROYALAUTO.



Sex and the Silicon Chip ?

On October 30th, 1982, the world's first solar breeder was dedicated. The Breeder, brainchild of Dr. Lindermayer, Solarex's visionary leader, is designed to use solar energy to power a plant entirely for the manufacturing of more photovoltaic- panels.

Statistically it is impressive: 25,000 square feet of Powerline™ photovoltaic panels produce up to 200 kw. of electric power at 300 volts DC. Most of that power, stored in a 2800+ amp hour storage bank of Exide batteries, (enough for four sunless days), is used directly for powering machinery or resistance heaters, without converting it to AC (thus saving power). The completed plant cost in the neighbourhood of six million dollars.

The Breeder represents the first light industrial plant anywhere in the world to be totally solar powered. It is intended to be a prototype of other plants, which could be built practically anywhere in the world, for the manufacturing of basic consumer goods.

by Marcus J. Smith

Three way contest

The solar power industry could be the next high-technology battlefield, with the United States, Japan and Europe fighting for dominance, the Worldwatch Institute has said.

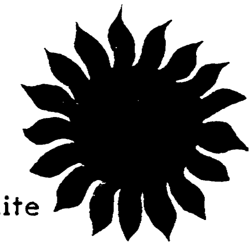
Approximately 60 companies are now manufacturing photovoltaics in 20 different countries, the Institute said, with 25 in the United States, 12 in Europe and 15 in Japan.

The report warned the Reagan Administration's budget cuts for solar research have been welcomed by European and Japanese competitors, whose governments are stepping up their support of photovoltaics,

Progress in such research has been gradual because industry lacks the capital and large markets needed to support investment in large-scale manufacturing plants.

While the report predicted solar cell manufacturing will expand at least 50-fold by the early 1990s, it found solar power already a substantial business. Total sales of solar electric systems climbed to about $150 million in 1982.

AAP



ORGANIC FERTILIZERS

Rock Phosphate (for natural P) Granite Dust (for natural K)
Blood and Bone, Pellitised Poultry Manure (for natural N)
Complete Organic Plant Food (for natural balance of N:P:K)
Seaweed Concentrates (for natural trace elements) Gypsum Dolomite
Organic Foliar sprays

NATURAL / LOW RESIDUE PEST CONTROLS

Pyrethrum Sprays Quassia Chips Derris Dust Dipel Garlic Sprays
Bordeaux Powder Dusting Sulphur Lime Sulphur White Oil
Lavender Extract Spray Camphor Extract (for use instead of mothballs)
Fly strips (sticky) Fly traps Cockroach Traps

OTHER AIDS FOR THE ORGANIC GARDNER

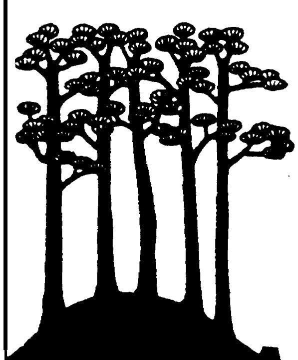
Testing kits for Ph, N, P, K Compost Activators Soil Bacteria
Shadow Forecasting Compasses Compost Bins Compost Shredders (hand-operated)
Books on organic gardening and farming, natural pest control, companion planting

NATURAL FOOD EQUIPMENT

Flour, Seed and Grain Mills (hand-operated or electric) Mincers Sprouters
Juicers Water Distillers Water Purifiers Bread Tins Yeast
Preserving Outfits Books on Wholefood and Vegetarian Cooking, Sprouting, Preserving and Breadmaking

NATURAL ENERGY

Solar Hot Water Systems Solar Electricity for Household Supply and Electric Fences
Wind Generators Wood-fired Cooking Stoves Wood-fired Heating Stoves
Wood-fired Hot Water Systems, Chip Heaters, Boilers and Coppers



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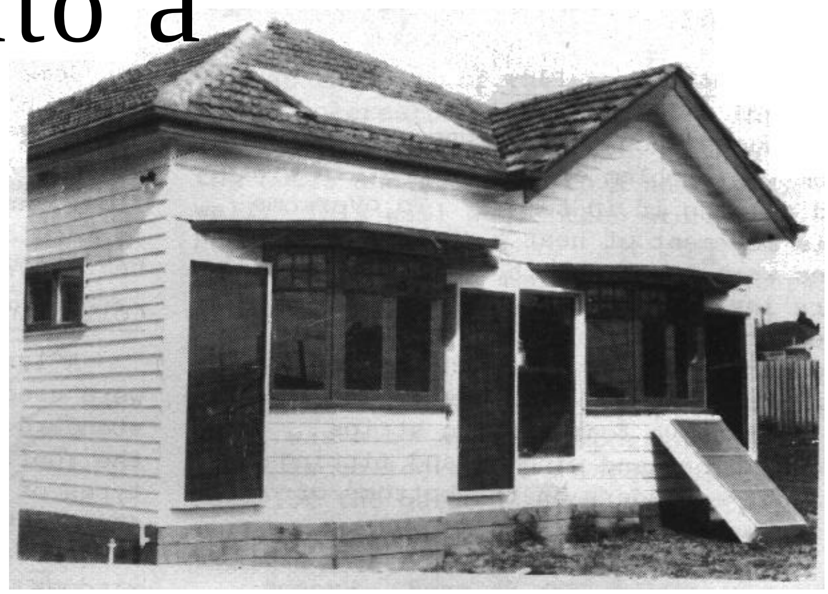
Turning an Energy Inefficient Disaster into a

LOW ENERGY HOUSE'



While many of us dream of the "great escape" into a peaceful country lifestyle the truth of the matter is that most of us will live our lives in the city in houses which have already been built with no attention to low energy design.

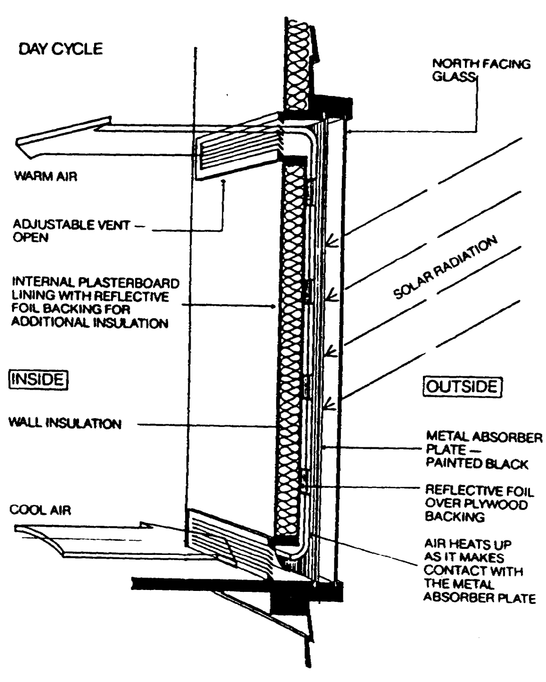
So looking at ways of making established houses energy efficient becomes very important. Recently a Brunswick community group, CERES (Centre for Education into Environmental Strategies) and the Brunswick Electricity Supply set out to make a typical Melbourne inner suburban house as energy efficient as possible.

A three bedroom weatherboard house was moved to the site at CERES, and with the help of RMIT students, modified to overcome many of the problems inherent in the design.

Relocating the House

When relocating the house on the CERES site a decision needed to be made on how the house would be positioned. From a **solar** energy point of view, it would have been best to position the house so one of the long walls faced north. This would allow for the maximum collection of **solar** energy in winter. However most Brunswick houses were not facing this way. As the house is attempting to demonstrate what a Brunswick resident can do, and **an** average resident cannot winch up his house and rotate it to a new position, it seemed wiser to locate the house at CERES in the position of the average Brunswick house.

SOLAR WARM AIR CONVECTOR
WINTER OPERATION



SOLAR RADIATION STRIKES THE METAL ABSORBER PLATE AND IS ABSORBED. THE ABSORBER PLATE HEATS UP AND IN TURN HEATS UP AIR BEHIND IT. THE HEATED AIR RISES AND IS ALLOWED TO CIRCULATE INTO THE ROOM BY NATURAL CONVECTION.

LOW ENERGY HOUSE

Stopping the Heat Flow

Houses such as the CERES house suffer from the problem of losing heat in winter and gaining it in summer.. To overcome this movement of heat a number of measures were taken. Both the roof and walls were insulated with fibreglass. To prevent air leaking through cracks around window and doors the house was weatherstripped. This involved fitting self adhesive foam sealing strips around doors and windows and fitting draught excluders on the bottoms of outside doors.

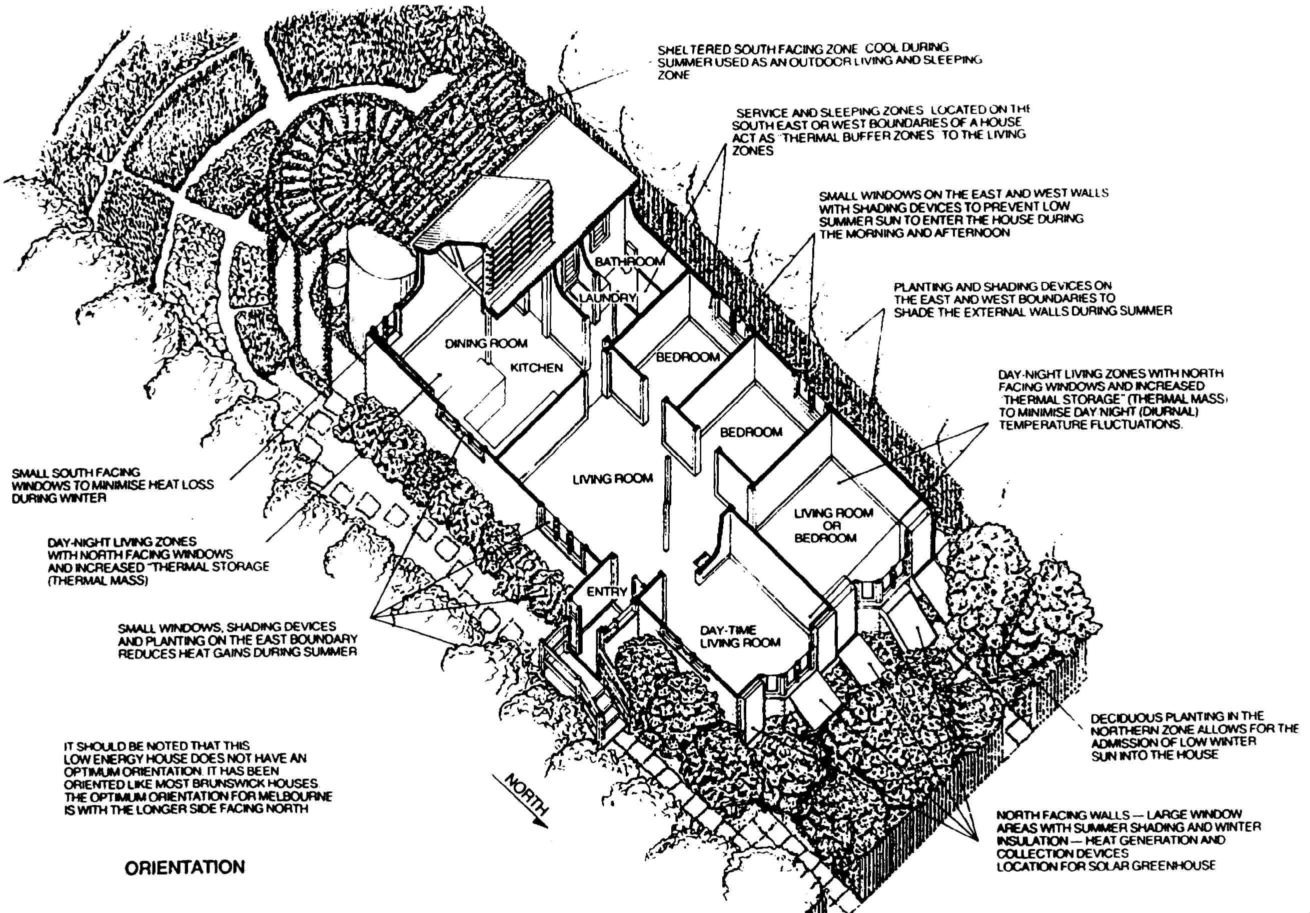
An alcove entry was used in a similar way that an air lock is used. Except in this case the aim was to stop air flowing from the outside to inside or visa versa. Thus less heat is lost in winter and gained in summer.

Some windows were double glazed to reduce heat flow through the windows. Curtains with pelmets were also used on windows to act as a barrier against heat flow. Another feature yet to be installed is insulated shutters once again to reduce heat flow through the windows.

Collecting the Sun

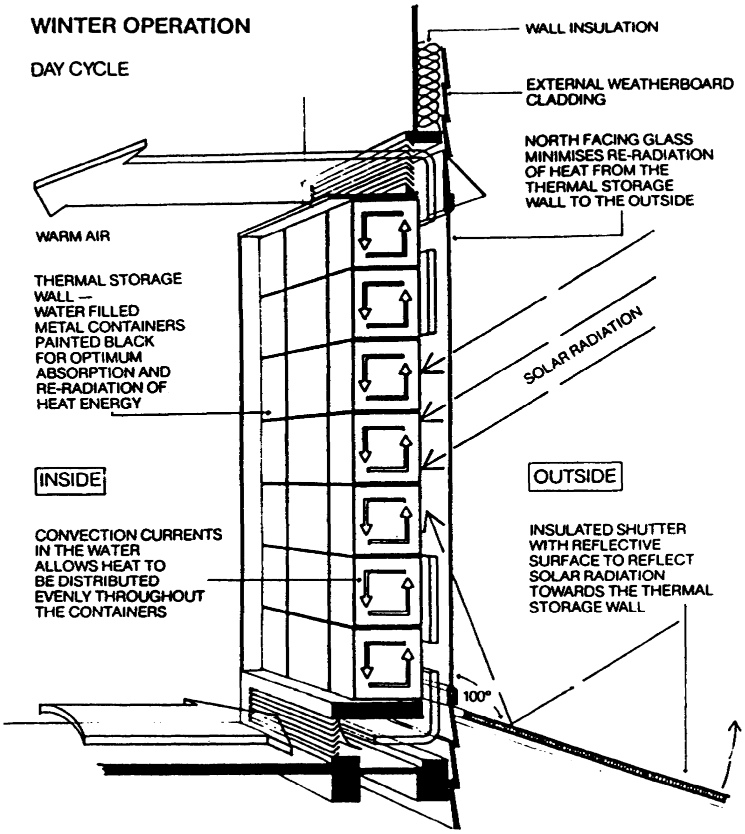
A large variety of solar collectors were used for the house. One was a standard solar water heating system on the roof. To heat air, four different types of collectors were built. Two of these involved large quantities of liquid in containers placed next to two of the windows. As the sun shines the liquid heats up and because of its large mass stays warm keeping the house warm at night and during cloudy days.

One set of containers were large



ORIENTATION

THERMAL STORAGE — WATER WALL



SOLAR RADIATION STRIKES THE THERMAL STORAGE WALL AND IS PARTIALLY ABSORBED. THE SOLAR ENERGY WHICH IS ABSORBED HEATS UP THE WATER IN THE CONTAINERS WHILE THE SOLAR ENERGY WHICH IS NOT ABSORBED HEATS UP THE AIR BETWEEN THE THERMAL STORAGE WALL AND GLAZING. THE HEATED AIR RISES AND IS ALLOWED TO CIRCULATE INTO THE ROOM BY NATURAL CONVECTION.

tins painted black and filled with water, The second set were wine flagons filled with sump oil.

The other heat collection devises were solar air heaters. Two of these were built into the north wall of the house and basically consisted of an insulated box with a metal sheet painted black absorbing the heat from the sun's rays.

The other air heater was an "add on" window box air heater. This was also basically an insulated box with blackened metal which heated up in the sun. It was designed to be easy to add on to an established house without having to rebuild a wall as would be necessary with the other air heaters.

At the back of the house a north facing clerestory has been built into the roof to allow winter sun to enter the house and shine on to a near brick wall. This wall would then store the heat and help keep this part of the house warm: not to mention added natural light.

Water

Efficient collection and use of water was also-seen as important. Rain water is collected in a large tank and used for the garden. Grey water from washing etc. is also to be used for this purpose.

Integration with Garden

It was seen as important to make the garden work with the house to make a pleasant environment, For this reason deciduous trees are to be used to provide shade in summer but allow sun in winter. Deciduous creepers growing over the roof would also shade the house in summer. Evergreens are used in selected places to act as wind-breaks which will take the sting out of cold winter winds and hot summer winds.

LOW ENERGY HOUSE

The garden is also used for food production with vegetables and food bearing trees.

<u>Conclusion</u>

By using the features outlined it is expected that energy use in the house will be much lower than it would be in a similar house of this type. In addition to this the house should be a more comfortable and pleasant environment.

In the future the house is to be used as a real working demonstration of what can be done to an established house. It will be open for inspection to the public and people wishing to have a look should contact the Brunswick Electricity Supply. Phone (03) 389 4100.

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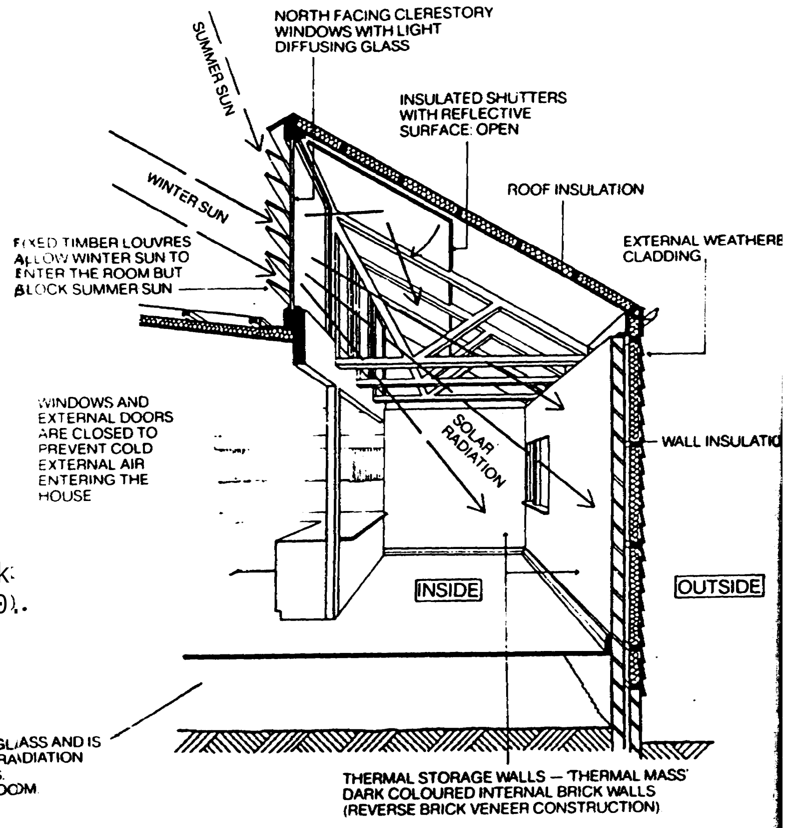
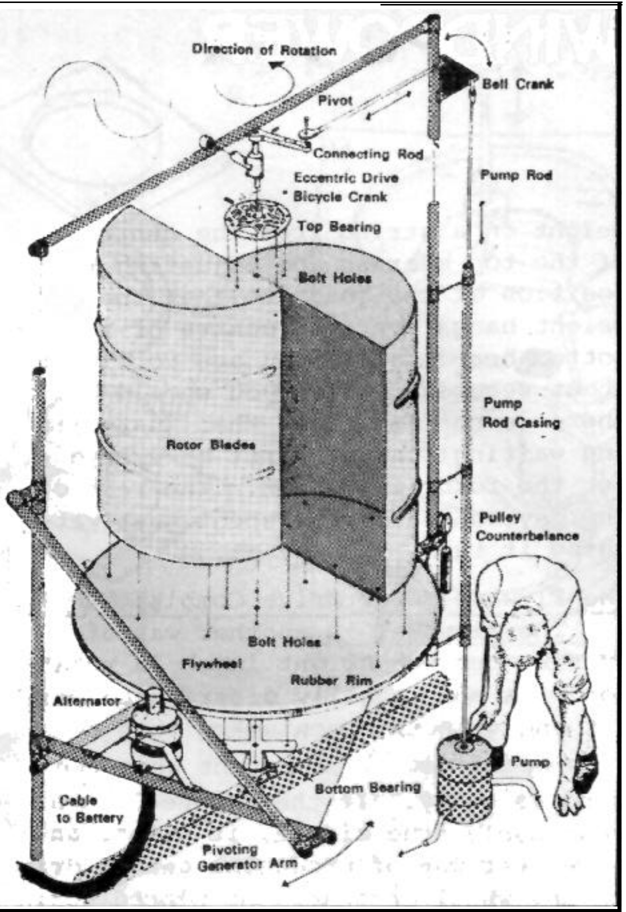


WINDPOWER: pumping and Power from a Savonious Rotor



We found this information on do-it-yourself windpower buried in the bottom of a filing cabinet. The author is unknown even though the reference to pounds seems to indicate that these plans originated in Britain.

The plans start off with a design for a savonious rotor which both pumps water and generates electricity. By the looks of it the savonious is made from a 44 gallon drum cut in two. The plans have a number of pages missing, and this must have included some of the information on building the savonious, as the first page we have on this describes the flywheel/gear drive combination.

Nevertheless there is certainly enough information here for you to have a go at building the savonious or the novel bicycle airscrew pump made of bike parts.

The Frame

Timber as strong as you can get, 4" x 2" or even better 6" x 2" or 4" x 4". Floor joists from demolished buildings are good for the job or, if you can get hold of it, scaffolding is ideal. Whether using timber or scaffolding, an H frame closed at the top and guyed with rope should be erected. Check that the uprights are indeed vertical, but more important that the cross-members are horizontal. If the frame is attached to the ground, dig holes and cement the posts in before guying.

The rotor should be erected as high as possible as wind is less turbulent and stronger as height increases.

In built-up areas, it is probably worth considering erection on roofs or between the gables of neighbouring houses. We put one on a fairly exposed site about 15' off the ground attached to the side of our house. It rotates when the wind is otherwise not perceptible, In a breeze that is felt in your hair, the rotor is spinning rapidly.

Test your rotor by erecting low at first. Check for plumb by hanging a

WINDPOWER

weight on a string from the centre of the top bearing and adjusting the position of the rotor so that the weight hangs over the centre of the bottom bearing. If you are confident about security, which you should be, there is nothing finer than just sitting waiting for the first breeze to set the rotor in motion. The rest of the day can easily be spent just watching it turn... Enjoy it.

The Flywheel/Gear Drive Combination

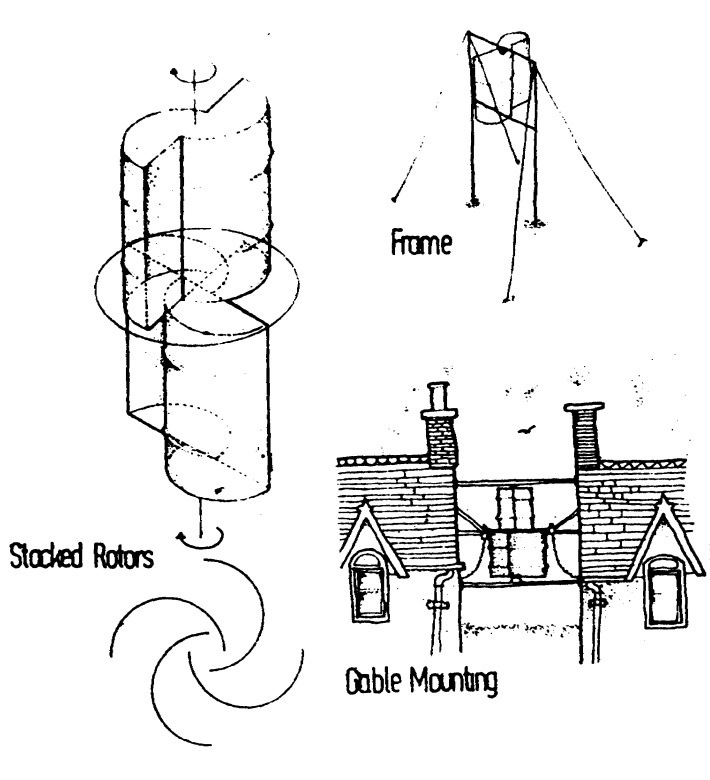
The flywheel is another way of evening out the slight lurch in rotation. It adds equally distributed weight and gathers momentum so that rotation speed remains constant when the wind is gusty. If the flywheel is a reasonably true circle, it offers an excellent way of producing geared drive to any wheel or generator placed against it. This is important if what is being driven - in the model illustrated an alternator - requires relatively high revs to operate.

As Savonious rotors do not reach the high speeds that airscrew-type wind machines achieve, the use of a flywheel/gear drive makes it possible to use a Savonious with alternators and certain unmodified slow dynamos, if the flywheel is say 4' in diameter and the alternator axle has a 2" diameter, a gearing ratio of 24:l is achieved which means that at a mere 25 rpm, a rotation speed caused by light winds, the alternator is turning at 600 rpm, enough to provide a good charge. The flywheel can be made from ¼" chipboard or ½" ply suitably treated to protect it from the weather. A rubber strip pinned and glued to its edge makes a good friction drive to any other rubber wheel placed against it. Heavy duty sponge rubber is good for the job - the sort used for draught proofing car doors is ideal. The rotor is bolted to the flywheel so providing another means of joining the two halves.

The Bearings

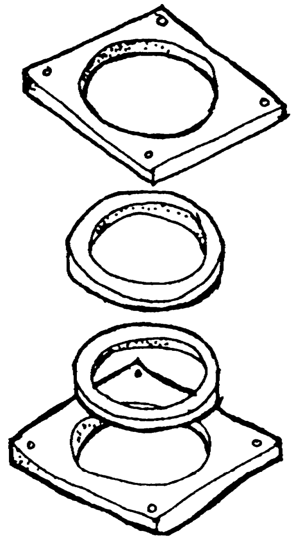
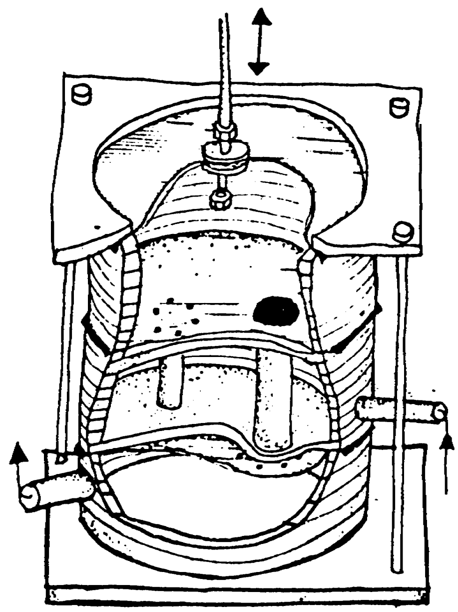
From modest experiments involving models made from tin cans and soap bottles, it was found that axles running through the rotor impair the rotation. Instead of an axle, top and bottom bearings should be used if possible. Bicycles, mopeds and cars provide suitable bearings.

The crankshaft from a bicycle was used for the top end of the Savonious illustrated. It's strong and turns easily, and the chain drive, when drilled in suitable positions, is a means of joining the two halves of an oil drum, The crank is sawn off and the chain drive is best fitted on the inside of the join of the two halves. The rotor is fixed by a cotter pin to the crankshaft as in bicycles. The other crank can be used to form the eccentric drive via a bell crank, or another chain drive can be attached to form the bottom bearing of another rotor stacked on top.



A water pump and flattened fan (from the cooling system of a car) is another convenient bearing when stripped down and lubricated before re-assembly. The flattened fan is drilled to take the bolts that attach the rotor to the bearing and hold the two rotor halves together. On a water pump is a pulley drive that takes a U-belt that could be the basis of a geared driving system on rotors without a flywheel.

The pump part of the car water pump is not suitable for lifting water over a head but can be used for circulating water. However, more often, it is possible to remove only a part of the water pump that comes away from the engine casing. Some cars have a pump which can be removed in its entirety* If used as a bearing, only the easily removed part is necessary. It is attached to the engine by three or four bolts that can be used in fixing the bearing to the frame, If bearings can't be found, a bearing known as a Plummer Block can be bought for about 2- 3 each.

PUMP CHAMBER ASSEMBLY

Making the Pump

The pump body can be made out of a shell case 155mm in diameter, divided into three compartments of equal length. Or as in the diagram with chipboard circles with holes in them stacked on top of each other, and glued and sealed. The lower part is drilled on its side by the base, and a steel pipe for exacuation is fitted to the hole.

On top of this part is a circular slab, cut from sheet iron or chipboard and placed between two soft rubber joints of the same diameter. The lower joint is circular and drilled with a circular series of holes. The upper joint is in the shape of a ring 20-30mm wide. The circular slab is drilled with a hole allowing for the passage of a tube which is fixed to it. The free end of this tube is threaded and then closed by two screw nuts. The tube can come from a water installation or from the front forks of a cycle.

The lower opening of the tube must coincide with the series of the holes drilled in the rubber joint to allow for drainage.

The middle compartment of the case, already fitted with its joints, is placed on the circular slab. A second joint in the shape of a ring is set up, together with a circular slab and another joint itself drilled with a series of holes. Both joints are identical to the first two but are inversely arranged.

The circular slab is drilled with two holes and its length is calculated so that its lower end stops 10mm from the first circular slab. The second hole is for the threaded end of the tube fixed to the lower slab, on which a nut is screwed and a ring is placed. A hole drilled in the upper joint allows for the passage of the tube. A second supporting ring is placed and the complete assembly is tightened with a screw nut.

A delivery pipe is fixed on to the base of the middle compartment to carry water from the well. The third compartment is now placed over the two others and a soft but thick rubber membrane is put on top of it. Car inner tubes can be used. This is held close to the edge of the cylinder by a metal ring. The rubber joint must be encased between the edge of the cylind-

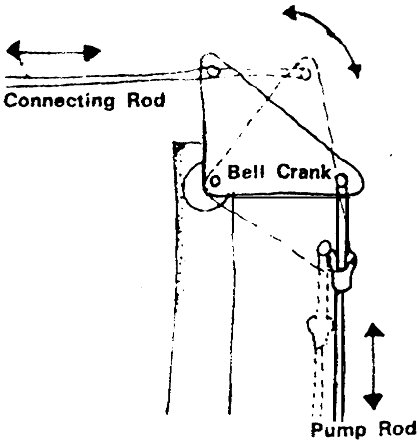
WIND POWER

er and the groove of the metal ring. The centre of the membrane has a hole drilled in it through which passes the threaded end of the connecting rod to the motion of the windmill. The rubber is tightened between two screw nuts and thick washers with chamfered edges so that the membrane is protected against deterioration.

All the elements of the pump are assembled and tightened together by four iron bars made with long strong bolts. These bolts pass through a thick board which forms the base. They also pass through the metal rings placed on the top and moderately tightened. The whole assembly must be perfectly airtight. The pump is fixed to the ground between the three legs of the tripod. It must lie perpendicular to the centre so that the transmission rod stands perfectly vertical.

Further Notes

The Bell crank converts rotational motion from the eccentric to reciproc-



ating motion necessary to drive the pump make it from plywood or sheet metal. Devise a means that enables the pump rod to be disconnected when the pump is not in use. Establish the radius of the eccentric suitable to work the pump by trial and error.

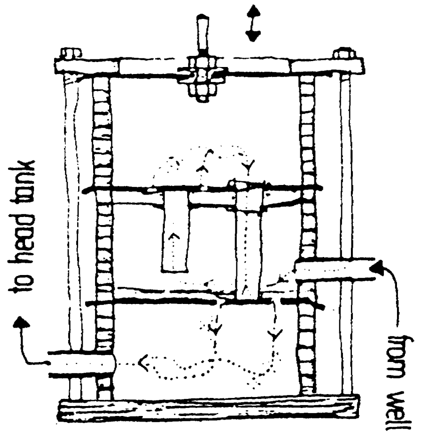
The modified head on the alternator replaces the usual pulleydrive and provides the latitude necessary to accommodate any slight wobble on the flywheel.

CONTINUED PAGE 31.

HOW IT WORKS!!

When the membrane is attached to the top, an intake is produced and the upper joint comes off the upper circular slab. The water is sucked by the tube connected to the middle compartment thus filling the upper compartment. Meanwhile a partial vacuum occurs in the middle compartment thus attracting the piped water from the well.

When the membrane goes back to its original position, the water in the upper compartment is sent to the lower one by means of the tube which joins them together and gradually fills it up. The water then travels to a tank through a pipe. Both joints drilled with holes act as stoppage valves by



Section

lying flat on the circular slabs when needed.

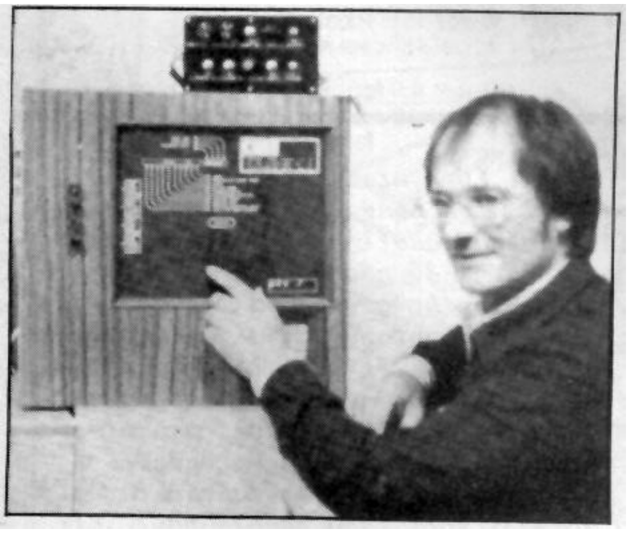
All that remains to be done is to build the complete assembly near enough to the well in order to have the shortest possible length for the piping.

THE ATA REPORT NEWS, EVENTS and Activities of the Alternative Technology Assn.

Our first activity for this year was a meeting which looked at solar greenhouses and using computers with alternative technology.

Bob Fuller spoke on the CSIRO's research into solar greenhouses. He pointed out the way people could make use of the CSIRO's findings in their own greenhouses in their own homes or gardens.

Chris Moss demonstrated a computer which has been designed and built to operate systems in a recently constructed solar house. The computer turns on and off heating and cooling systems according to the temperatures inside and outside the house. This makes it possible for the energy systems to operate unattended at maximum efficiency.



Chris Moss with his solar house computer.

Work has continued on the solar workshop. Two work days have been conducted, with a large quantity of bluestone being sorted and stacked, a small shed has been erected on the site and donated materials and equipment are being stored in the shed. Donations of materials are still flowing in. However our current problem is money for an increasing number of minor costs. Any donations for the workshop would be very very welcome at the moment,

At the end of a good days work: the completed shed.

Rough plans for the water wheel are already drawn up and the creek has been surveyed to find its potential. Excavation of the foundations should start shortly.

SOFT TECHNOLOGY PRODUCTION

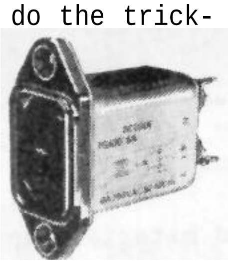
Producing a publication such as Soft Technology can be an interesting and rewarding experience. You can learn about publication production, which is a useful skill; and it's fun at the same time. None of the workers on Soft Technology are paid. We do it because we enjoy it. But we can always use more help. Interested?? If you are please get in touch

DEBUZZING INVERTERS

Recently I've come across a number of people with inverters which make their sound systems buzz. So I asked around to find out what one should do if faced with this problem.

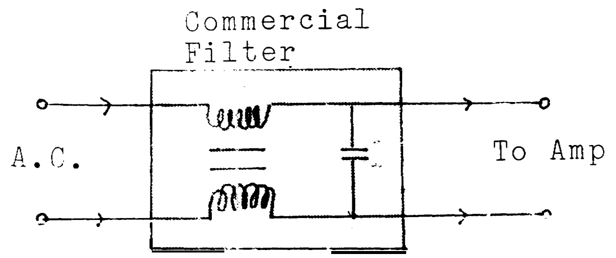
Here are a number of steps you can try. If one doesn't work go onto the next.

1. Move sound equipment as far as possible away from the Inverter.
2. Connect a capacitor across the power input of the sound system, (and possibly the power output of the inverter). A metalised polyester .l microfarad 250 volt AC. should do the trick-



A commercial mains filter as used to remove interfearance from computer lines.

3. Last resort is a commercial mains filter. These are available for around $15.00 from electronics shops. They are often used with computers to remove electrical interference. They are wired in like so -



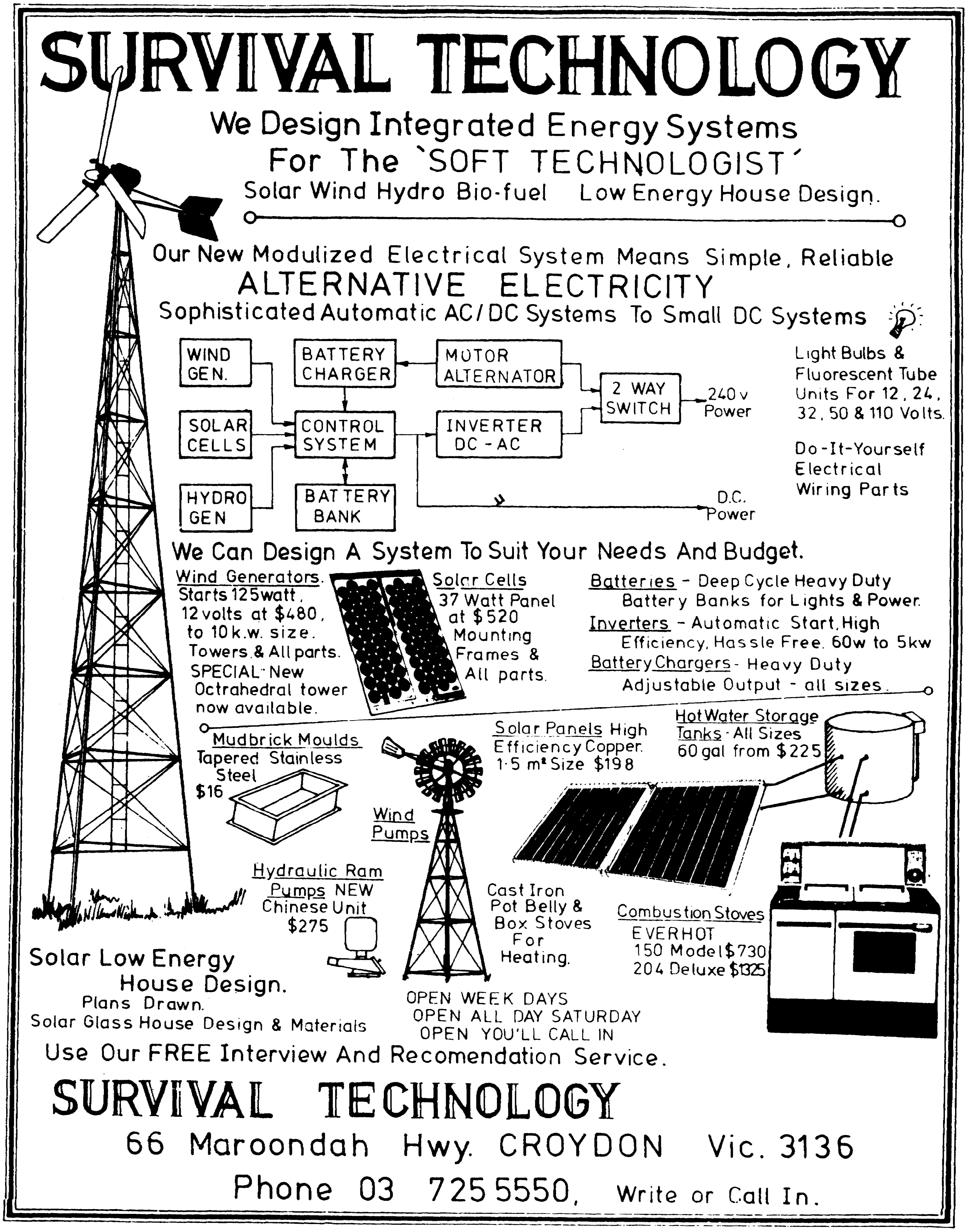
If this doesn't solve your problems write to us with the details and we will see if we can come up with an answer.

Mick Harris

HELP US HELP YOU

Ever since Soft Technology started some three years ago we have been working to improve the magazine both in size and quality. The first issue was 18 pages long.....the latest issue is a record size of 36 pages. The qaulity of the layout is better, we have added a bit of colour to the cover and we have even reduced the number of typing errors. However Soft Technology has always struggled to pay it's bills, and a number of new bills on the horizon will make this more difficult. The best way for us to get over these costs without reducing quality or increasing price to to sell more magazines. This is where you the reader can help. Here are some ways you can help. (1). Show the magazine around encourage people to subscibe or join the ATA, give people who might be interested a years sub. as a gift. (2). Show the magazine to your local library and suggest that they should have Soft Technology. (3). Tell your local newsagents about us and suggest they stock Soft Technology. If they are find out how many copies they want send us the details and we will take it from there. (4). Distribute some copies for us. Write in saying how many you would like to take ten sell them to people shops newsagents etc. In this way you help us get the magazine around and make a bit of money yourself.

Please help us to make this magazine work. We really need your support. If every member managed to get one new sub. or regular sale our problems would disappear overnight.


SURVIVAL TECHNOLOGY
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Our New Modulized Electrical System Means Simple, Reliable
ALTERNATIVE ELECTRICITY
Sophisticated Automatic AC/DC Systems To Small DC Systems
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CONTROL SYSTEM
BATTERY BANK
MOTOR ALTERNATOR
INVERTER DC - AC
2 WAY SWITCH
240 v Power
D.C. Power
Light Bulbs & Fluorescent Tube Units For 12, 24, 32, 50 & 110 Volts.
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We Can Design A System To Suit Your Needs And Budget.
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A Coolgardie Safe

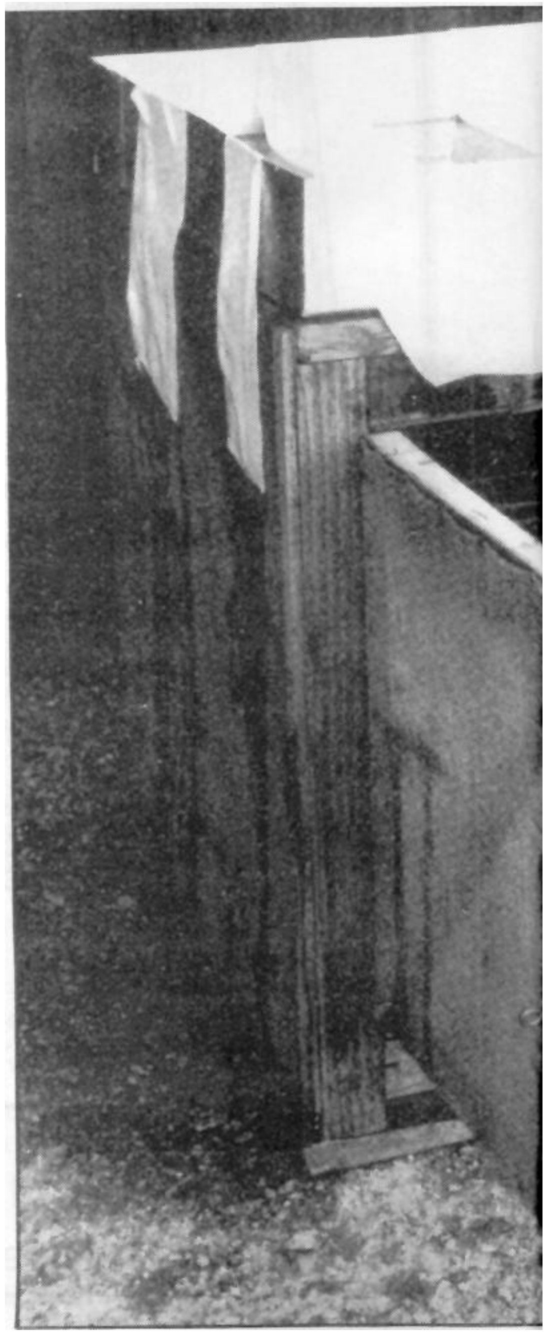
The Coolgardie Safe is an old piece of equipment which was used in the same way as the canvas waterbag, to keep the contents cool.

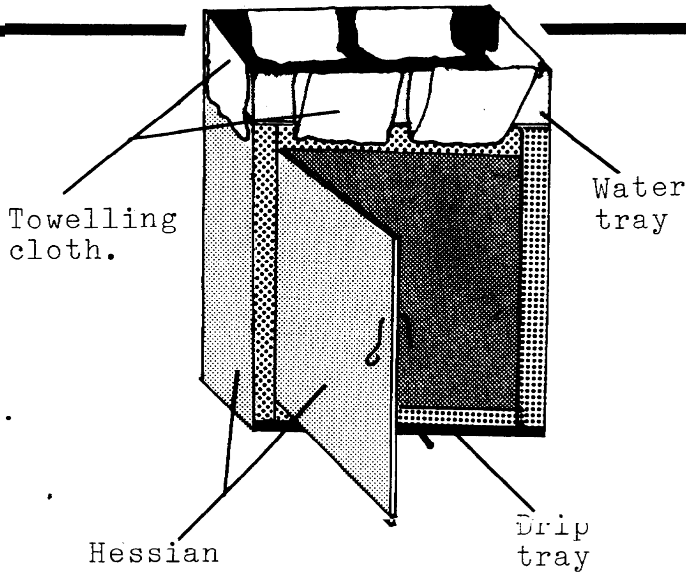
The construction is fairly simple, being basically a wooden frame with hessian covering the sides. An open water tray sits on the top. A drip tray can be used underneath, with a hose to carry away the overflow, though in many situations this is not required, and any overflow water runs onto the ground.

The safe should be in a cool place, if one can be found, in a breeze and out of the sun. The sun not only heats the safe but speeds up the rate at which the hessian rots away.

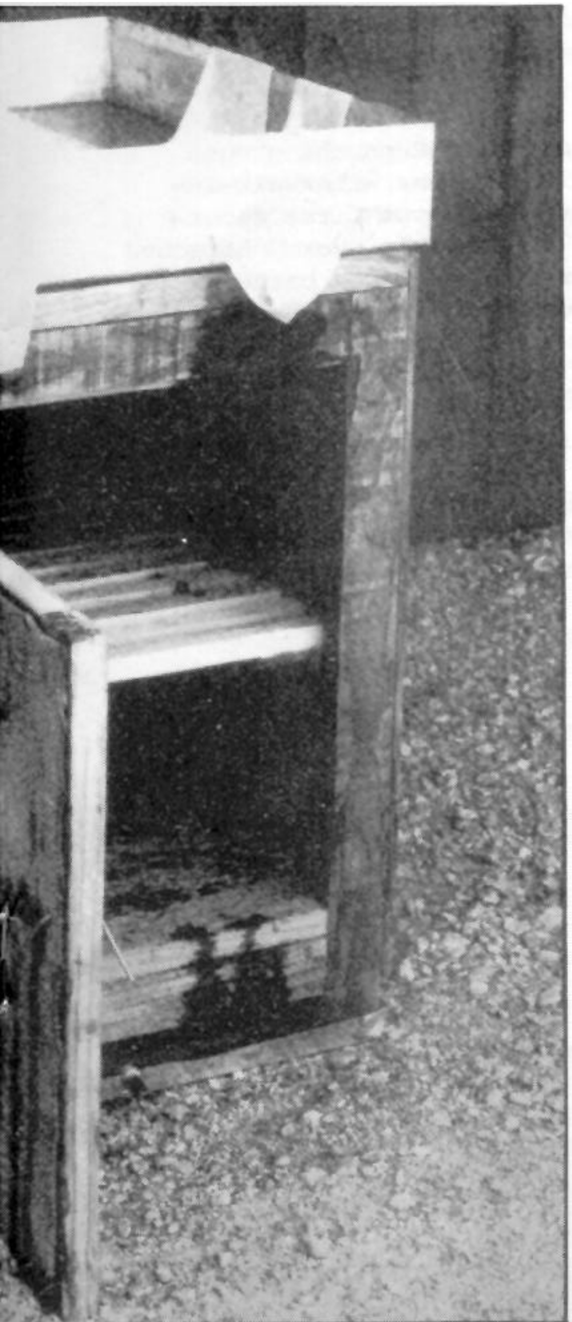
The frame of this safe is about 700mm high and 500mm square, It is made of treated pine so that it will not go rotten. A hardwood frame would have a reasonable life. The shelf is slatted so that air can move through between the top and the bottom sections. The top has to support the tray of water, which in this case is made from flat galvanised iron, and soldered at the seams. Pop rivets and silicon would be easier for those who do not have the equipment or skill for soldering. The door has a simple wire catch to prevent it from blowing open, and a diagonal brace prevents it from sagging. A variety of methods could be used to fasten the frame together. In this case wriggle nails have been used. If using glue, remember that it must be waterproof.

When the top tray is filled with water, it travels down to the hessian through pieces of cloth that act as wicks. In this case we have used pieces of old baby's nappy, but loose woven cloth such as towelling or hessian is quite suitable. Synthetic material is not satisfactory. The safe uses most water on a hot windy day. Cool days or days without wind require less water. On a cool day only a short length of towel need be in contact with the hessian. On very hot days we





have found that the towelling shown in the photograph is insufficient to keep all of the hessian moist, even with longer lengths down the side of the safe. Towelling across the full width of the safe would be required. The tray holds



about 25 litres of water, and on a hot windy day the tray would have to be topped up. On hot days we find that bees from our hive come to the safe to obtain water.

Compared to a refrigerator the Coolgardie does not have much to offer, but it does keep things cooler than they would otherwise be, and it only takes water to make it work, Eggs kept in a Coolgardie will last for weeks before they go bad. Usually it will keep butter cool enough to stop it from melting. Meat (particularly dog's meat) will keep longer than if it were left in the open, and if the door is close fitting it will keep the flies out. If it has meat in it put it out of reach of dogs. If there is no other source of coolness, it is amazing how attractive drinks from the Coolgardie can be. Put them in the evening before you want them.

Here are some performance figures to give you a better idea of how well a Coolgardie safe can work, Soon after placing water in the top tray you will notice the water runs right down the hessian sides and spreads across the full width of the sides.

On a 36°C day the safe was 23°C inside. When the temperature had dropped in the evening to 25°C it was 18°C inside. Early the next morning it was 16°C outside and 13°C inside the safe.

Andrew Blair.

AUTONOMOUS HOUSING

a wood/wind/solar combinatlon

The Site

This is a rural property, covered almost entirely by open forest containing two intermittent streams with east-west ridges to-the north and south boundaries. A north facing slope with grassland opening to to the north and west was chosen as the best location on the basis of access to unobstructed north winter sun, a view of the bay down the Kangerong Valley, minimal tree removal and play space for the children. This area is classified by the Western-port Planning Authority as Bushland C with an erosion prone slope, and was one kilometer from the nearest SEC mains, with *no* reticulated water or gas and no sewerage available. In summary an inaccessible, remote location requiring sensitive implementation to minimize the impact of development.

General Description

This home is a two storey, timber dwelling on a reinforced concrete slab and comprises a living room, kitchen/dining area, a greenhouse, a music room, a bunkroom to sleep 4, a bathroom/laundry and WC on the ground floor, 2 double bedrooms with walk-in-robes, an en suite on the first floor with an attic at the apex over. Attached but with separate entry is a battery store and a workshop with a storage attic over.

Passive Systems

Slab-reinforced concrete slab with perimeter edge insulated with 50mm thick "Isolite L" polystyrene foam, and 30mm "Isolite S" polystyrene foam under the outer 1000mm of the slab.

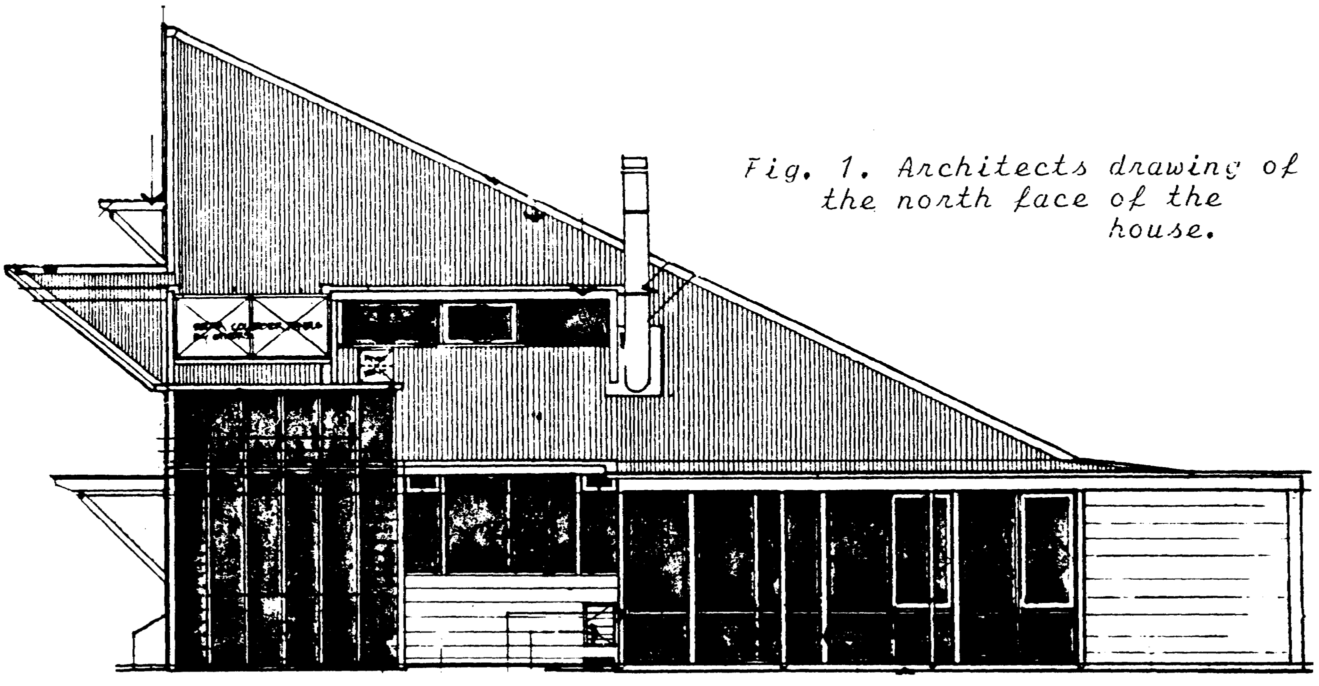


Fig. 1. Architects drawing of the north face of the house.

External walls and selected Internal walls have Rl.3 Bradford Insulation Batts on the inner face.
Roof - the roof has R2.5 Bradford Insulation Batts and double sided aluminium foil sandwiched between WRC ceiling linings and a corrugated galvanized steel roof cladding.
Sunscreens have been designed to shade the windows from October 21st - February 21st. Although accent penetration has been allowed to the kitchen, and bedroom 1 in the early morning to provide purely personal psychological need. At present vegetation is not yet established so currently there is excess ground reflection.
Sun Penetration Calculations were a major consideration in the design of the north-south depth of the common rooms. Consequently, in mid-winter the sun penetrates almost the full depth and length of the grey slate floors.
The house is oriented with the long axis perpendicular to TRUE NORTH i.e. 10°30'W of magnetic north.
The local topography and existing major trees and tree stands were as far as possible taken into account to estimate likely cut off solar times and shadowing of windows.
The Greenhouse - this is a multi-purpose space being
a) a space for growing plants
b) a winter meals area
c) a source of warm air for bedroom 1, kitchen and music room.

Tank Enclosure -this projection shades part of the west facing windows from late summer sun, contains the 110VC water pump and sundry garden tools.
Carport pergola is an extension of the sun shade to bedroom 2 windows.

Active Systems

Wood Stove - Rayburn Model MF provides
a) cooking directly

Fig. 2. The house from the West.

b) domestic hot water by thermo-syphon
c) small bore water central heating via small DC pump to radiator panels (yet to be connected) in the WC, en suite and workshop.

Flat plate collectors - 2 No. Somer Solar collectors connected by thermosyphon to 450 litre hot water tank.
Hot water Tank - 450 litre copper tank with hot water circulating coil inside connected to the wood stove and panels and a heating element in the base (currently dis-connected but wired to accept power from windlite when batteries fully charged). Overflow discharges to the roof and subsequently back into cold water supply system.
Fireplace - basically a modified Rumford design with the addition of a replaceable butterfly damper, a 10mm thick steel fireback and 6mm thick steel coving and expansion chamber with baffles behind forming air circulation ducts. The lower flue sections are galvanized steel encased in a minimum of 50mm thick insulating material consisting of 1 part Portland cement to 3 parts

vermiculite. The upper flue is a double walled galvanized steel section with insulating material between terminating in a special flue cap which incorporates a spark arrestor. Cold air is drawn into the rear of the firebox from the exterior of the dwelling through a baffled inlet vent with adjustable damper.
Windlite - 2KW Davey-Dunlite on an 18 metre tower located on the south ridge approximately 100 metres from the house. A lengthened modified tail has been fitted by Survival Technology and earth wires have been connected to each of the three legs to avoid damage due to lightening. This alternator supplies 110vAC at a variable frequency which is rectified and stored in batteries before being distributed through either the 110vDC circuits for lighting DC pumps and heating elements or via an 1800W 110DC-240vAC inverter to emerge as 240vAC square wave 50hz for electrical appliances or to a 100W filter before being used to operate the stereo equipment.

Cooling Mode

The house volume is so arranged as to create a chimney effect. Large vents are opened at the apex and windows are opened on the south and east faces of the house, thereby inducing cool air from the casuarina forest and the shade 'dish' behind the house to enter as hot air escapes through the top vents.

The glasshouse is opened to reduce its temperature to that of ambient air.

Direct radiation is shielded by sunscreens and indirect radiation will be minimized as the deciduous landscape planting develops.

Provision has been made for ceiling fans to cope with calm nights and still days.

It is hoped that curtains will not prove necessary.

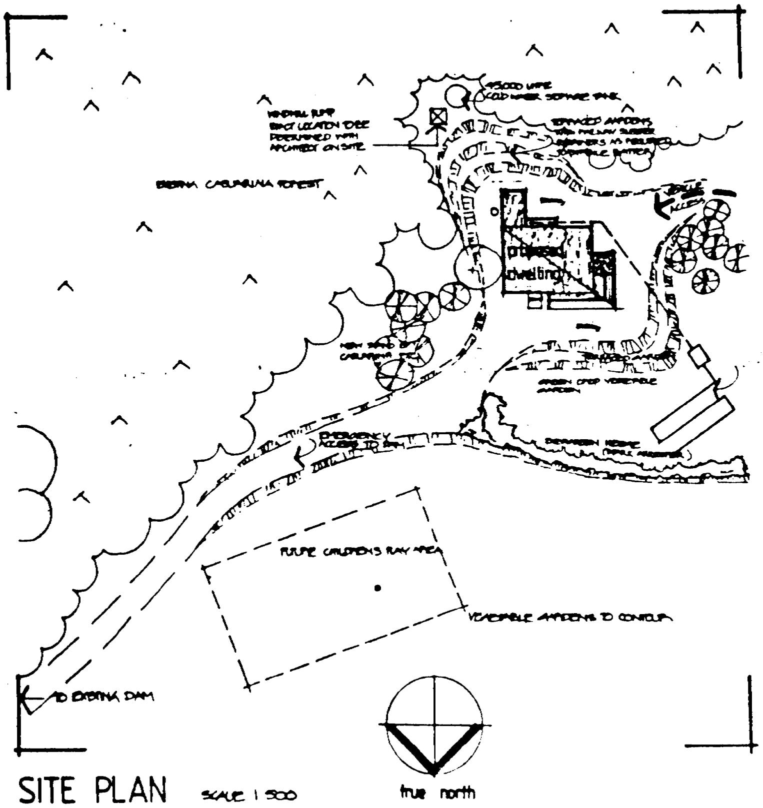


Fig. 4 The site plan of the house.

Heating Mode

Maximum intake of sunlight during the daylight hours. Heat stored in the chimney mass and slate/concrete floor which re-radiates black body radiation after an initial lag time. Heat rises to the apex where provision has been made for a small fan to push air down to the bunkroom where it filters back into the common spaces in a cyclic movement.

The entire building envelope is insulated to minimize heat loss from within the building.

Extra heat is available from the green house and can be "let in" in regular "packets". Should this prove insufficient, the fire can be lit to increase the temperature in the main living areas; remote locations are provided for by the small bore radiator panels (not yet installed).

How Well It's Worked

Christmas tree farm has operated autonomously for.5 months. The thermal performance of the dwelling has been excellent, daily temperatures fluctuating only 6-8 degrees C, whilst the open fire is only necessary after 2 days of cold overcast weather. In summer the cross ventilation and convection cooling has kept the house 10-15 degrees below shade temperatures.

The wind power generating system has consistently produced the 2 kwh per day needed to run the lights, fridge, colour TV, stereo, electric toaster, frypan, jug, iron, and the domestic water pump for its one hour per week. A small auto. washing machine is to be added soon,

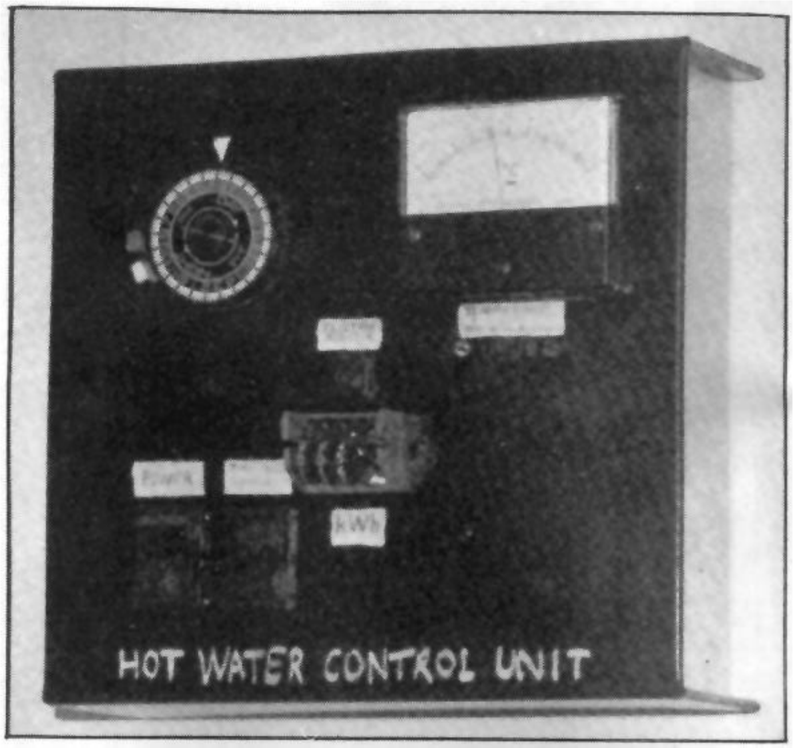
The hot water system has also proved very efficient, the solar heating only needing a boost from the wood stove after 2 winter overcast days. Both thermosyphons operate without assistance from pumps.

These notes may give the impression that the house was completed without any problems. It took two years to complete, and practically every step created problems from the failure of the low energy, built in, split system fridge (now replaced by a small commercial unit) to the replacement of wiring and powerpoints on the 110vDC wiring circuit.

Fig. 3 The house from the north-east

THE BLACK BOX

MONITORING AND CONTROL OF SOLAR WATER HEATERS



This article gives details of the "black box" mentioned in a previous article "Customizing a commercial solar water heater".

The device is basically very simple: it senses temperatures in the hot water tank, gives a visual display of them, and relies on you to make the right decisions about switching on backup systems (electric, gas or wood-fire boosters) or altering your patterns of water use.

It is equally applicable to thermo-syphon or pumped solar hot water systems. It is completely separate from the differential temperature sensor which controls the pump.

The Electronic Thermometer (Fig. 1)

Each temperature sensor consists of five low power silicon diodes in series (e.g. IN 91.4). They can either be all mounted at one point (e.g. glued to an old penny - sensor B) to measure the temperature at the top of the tank, or strung-out with inter-connecting wires to perform a crude integrating function and measure the average temperature of a large object, i.e. the average temperature of all the water in your storage tank (sensor A). The average temperature is a very useful parameter, as I will discuss later.

Circuit Theory

When either sensor is switched into the circuit, it has a small forward current flowing through it. The voltage drop across each PN junction is about 600 mV (millivolts) at 20°C. However it is affected by temperature, falling by about 2.2 mV for every degree rise in temperature.

For five diodes the voltage change is 11 mV/°C, so as the temperature of the sensor changes from freezing to boiling, the voltage across the sensor changes from 3.22 volts to 2.12 volts.

This voltage change is modified by the adjacent resistors, and buffered by the operational amplifier, which simply acts as a voltage follower with high input impedance and low output impedance. The resistors and meter between the amplifier output and the zero voltage source act as an accurate voltmeter.

During calibration with the sensor in an ice bath, the zero-set potentiometer is adjusted until there is a voltage of -5.1 + 3.22 = -1.88 volts across the 47K resistor. Thus the voltage at the non-inverting input of the op. amp. will be exactly zero. The current through the diodes is about 40uA.

Calibration

After wiring up the circuit as shown in Fig. 1, switch sensor B into the circuit. Put the sensor in a small freezer bag and place the bag into a cup of iced water. The diodes and connecting wires must be kept dry. Ten minutes later, switch on the circuit and adjust the ZERO SET potentiometer until the meter reads ZERO current. Then put the bag into a thermos of hot water at 50°C and adjust the GAIN potentiometer until the meter reads 0.5mA.

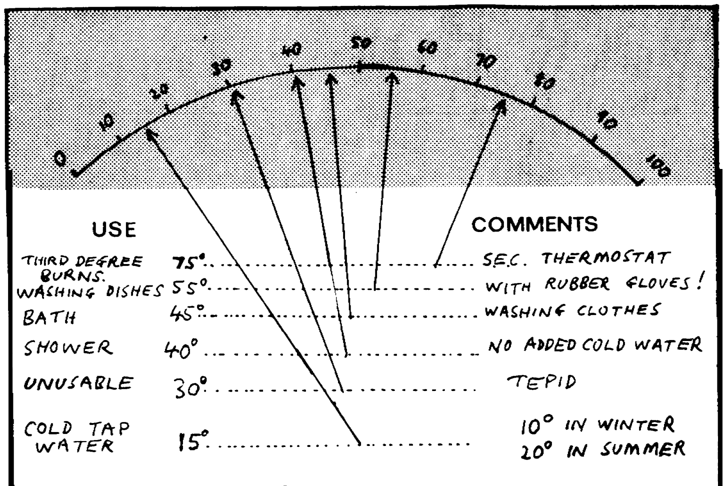
Leave the circuit switched on for a couple of hours, and repeat the above procedure to fine-tune the calibration.

If you have used good stability resistors and Zener diodes, you now have an accurate thermometer reading from 0°C to 100°C.

Re-calibrate the meter dial:
(0-1mA becomes 0°C to 100°C)

Installing the sensors

The two sensors must be in close thermal contact with, but electrically insulated from the hot water tank. I wrapped mine in PVC tape, but made sure they were then touching the copper wall of the tank, inside the layer of mineral fibre insulation. The easiest way to do this was to remove a small metal partition from around the heating element, and shove the sensors into position using a piece of coat-hanger wire.



METER CALIBRATION

The "Other Bits"

1. Adjustable thermostat:

IT SHOULD BE A STANDARD ITEM IN ALL ELECTRIC-BOOSTED SOLAR HEATERS. Mine is a Robertshaw Type EA C81N but there are probably other suitable types.

Its temperature probe is a cylindrical copper bulb on the end of some flexible copper capillary tube which leads back to the switch itself on which is mounted a dial and knob calibrated from 20°-120°C. I have wired it up in place of the standard 75°C pre-set thermostat which was supplied in the original tank. The probe is pushed up inside the insulation, just like the other two probes. The probe is non-electrical and does not have to be wrapped in PVC tape. If you place the probe about 2/3rds of the way up the tank, it means the booster won't switch

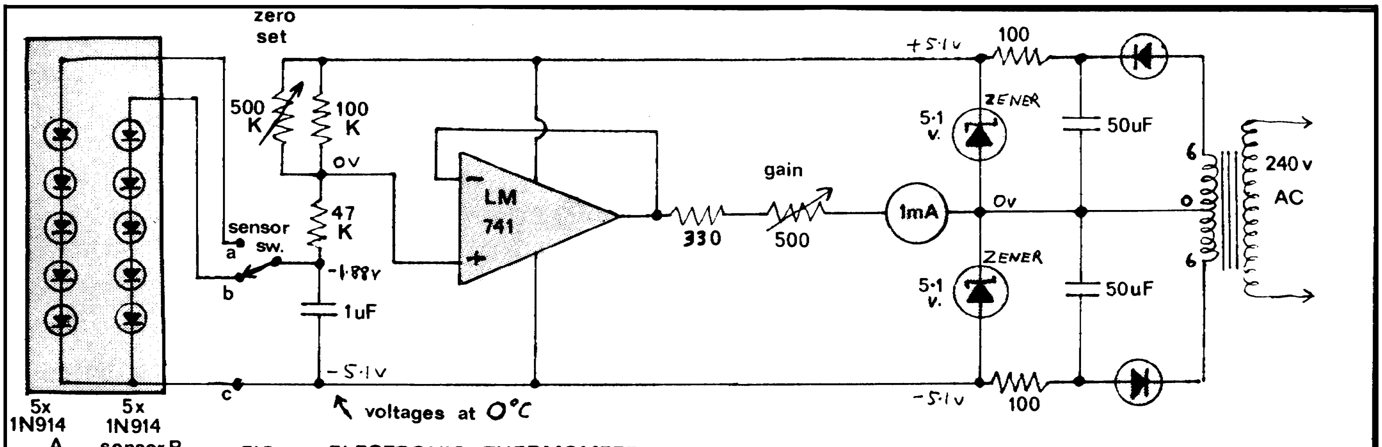


FIG 1 ELECTRONIC THERMOMETER

on until the supply is down to about 100 litres of water at a usable temperature.

2. Time Switch: Cannibalized from a Kambrook timer, Rated at 10 amps but happily switching a 3 kW booster (12.5 amps) in my system.

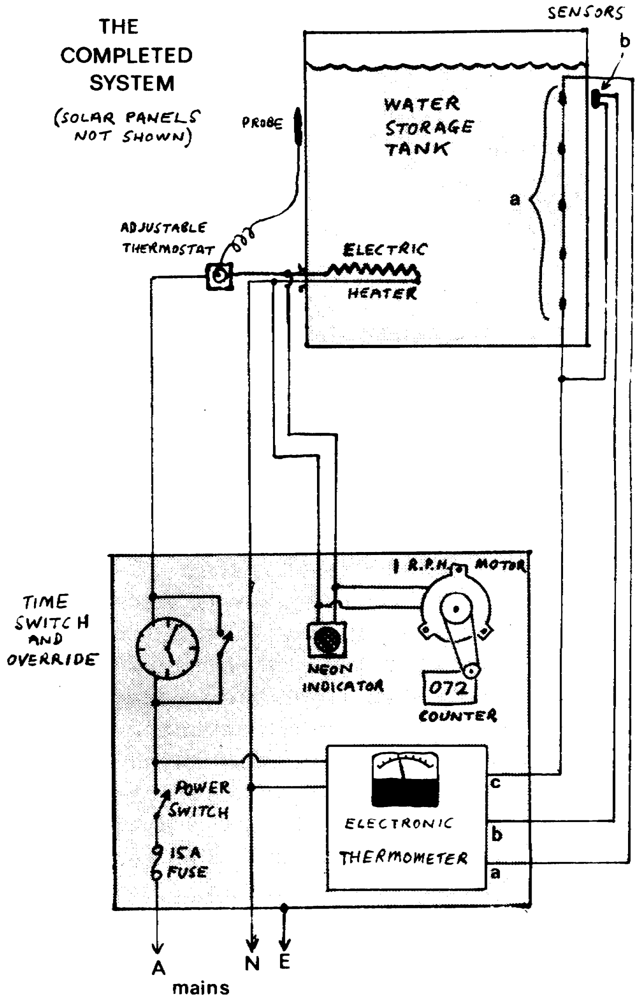
3. Override Switch (optional) : This is wired in parallel with the time switch, To be switched on when the water is too cold but you don't want to re-adjust the timer.

4. Watt-hour meter (very optional - only for obsessional enthusiasts): This was made from an old synchronous motor geared down to do 1 rev. per hour. It is connected to a cassette tape counter via a couple of plastic pulleys and a rubber band. The sizes of the pulleys must be worked out so that the counter registers one unit for every kilowatt-hour used. In my case with a 3 kW element, the counter advances one unit every 20 minutes. The synchronous motor must be wired up in parallel with the electric element, and this may involve considerable lengths of high voltage wiring. A perfectly adequate substitute is just a neon pilot light which glows whenever the heating element is on.

The Completed System

Typical Operation

1. Switch on the main power switch. The electronic thermometer uses only a tiny amount of power (probably about 1 watt) so may be left running continuously.
2. Up in the roof, adjust the thermostat to the minimum usable water temperature (say 40°C, but not above 50°C)
3. Adjust the time switch to come on in the evening. Typically 5 pm to 10 pm. Thus on cloudy days it will provide hot water if the solar panels have been unable to. If the family insists on hot water in the mornings, it could also switch on between 5 am and 7 am.



However it is more economical to have the time switch on only for brief periods in the evening. At other times of water use, switch the thermometer to sensor B (tank -top temperature) and see if it is adequately hot for your needs. If not, switch on the override switch for a couple of hours and check the temperature again. For doing dishes you need quite hot water (about 55°C or above). But you only need about 8 litres of it. It seems rather a waste to use the HWS to provide it, as you will be heating at least twenty times as much water as you need. Boil a kettle instead.

4. Be warned - you may become addicted to compulsively watching the dial on days when you are home! It is fascinating to see how the system performs in different weathers. During a sunny day, the average temperature may rise from 30°C to 50°C. However if you left the override switch on overnight by mistake and have the adjustable thermostat set at 50°C, the tank on a similar sunny day will go from 50°C to only 60°C. Obviously at higher temperatures the system is collecting only 50% of the solar energy. These are typical figures I have recorded on my system, and it has solar panels with a selective coating which is supposed to be quite efficient at high temperatures!

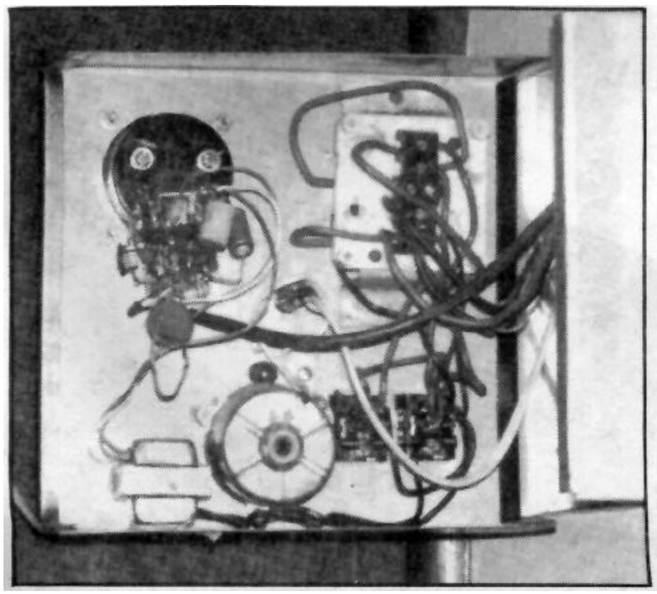


Fig. 2. Inside the black box-what a mess!!!

Another useful function of the average temperature sensor is to check for heat losses. Make a note of the temperature when you go to bed. Switch off the override and time switches until you plan to get up. Note the temperature next morning. It should have dropped by less than 5°C. If the previous few days have been very sunny, with little use of hot water, and the tank is very hot at night (say 60°C) you will probably find that the temperature drops by up to 10°C overnight.

This highlights the inefficiency of trying to keep the tank very hot all the time: the heat just leaks away.

If the average temperature plummets as soon as the sun goes off the panels in the afternoon, it means the system is suffering from reverse thermosyphon: hot water is flowing back into the solar panels and heating the evening sky.

This is especially bad if that heat energy happens to be electrical energy supplied via the booster element.

Comparison of average and outlet temperatures

By switching from sensor A to sensor B and comparing the readings you can get a good idea of how well the water is flowing or being pumped through the panels. At the end of a sunny day, the average should be only a couple of degrees less than at the top. If they are the same, your pump is switching on for too long or stirring up the water in the tank too much by pumping too fast.

If there is a large temperature difference, there is probably a blockage somewhere, or the pipes between panels and tank are too small.

After using some water, the top temperature might be 45°C and the aver- 'age temperature only 30°C. Assuming the inlet water is at 15°C, then you still have about half a tank of hot water.

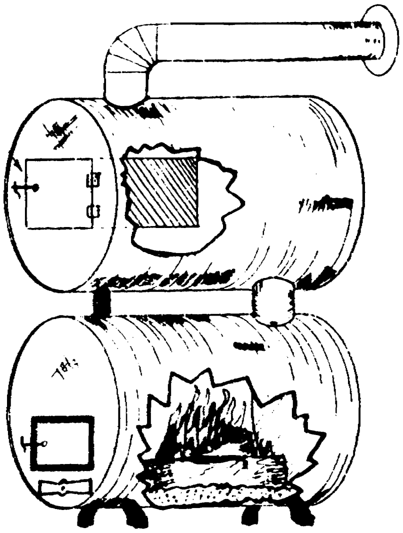
There are probably many other uses I haven't even thought of yet. The sensors are quite cheap. With extra positions on the switch you could - monitor temperatures at the inlet and outlet of the solar panels, air temp- erature, water inlet temperature, etc. If all the diodes are the same type, there should only be a need to calibrate one sensor. The lengths of wire between the sensors and the switch are not critical.

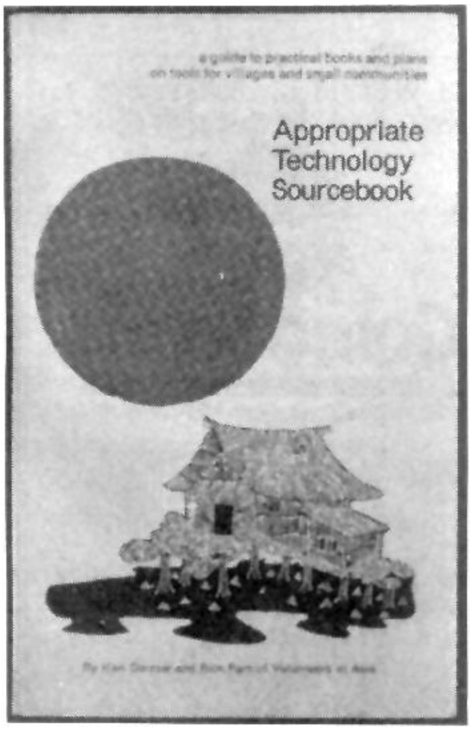
Book Review.

Appropriate Technology Sourcebook, Volume 1.

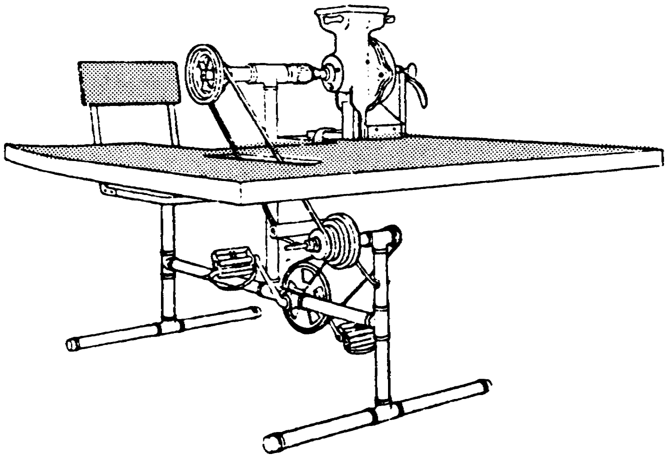
Ken Darrow & Rick Pam
revised Feb. 81,
pub. Volunteers in Asia (U.S.A.)
$7.95

There is a vast quantity of written information in the area of 'appropriate technology'. This book is a guide to practical books and plans for village and small community technology. It is information about information, information sources and organizations. After an introduction to philosophy of A.T., they present short summaries of almost 400 books, manuals and magazines, grouped into subject areas ranging from agriculture, energy and building through to health and water supplies. The emphasis is on simple, highly practical ideas that can be readily adapted to other situations.



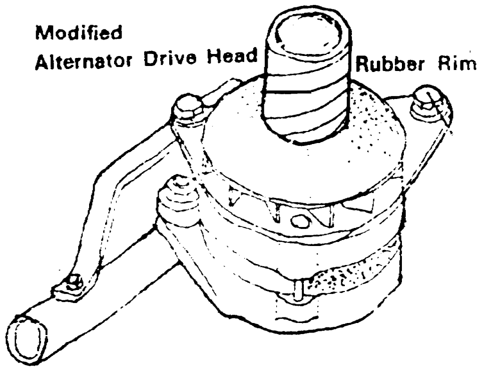


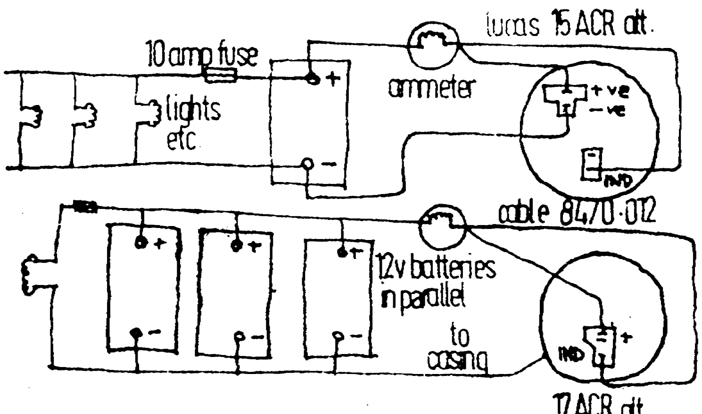
There are 200 illustrations which are a good source of ideas in themselves. The main use of the book is for finding books which have the sort of information about a particular topic that you want. The summaries give you enough information to decide if the book really deals with the area you want. This is very useful for people in remote situations who have to order books by post, sight unseen.



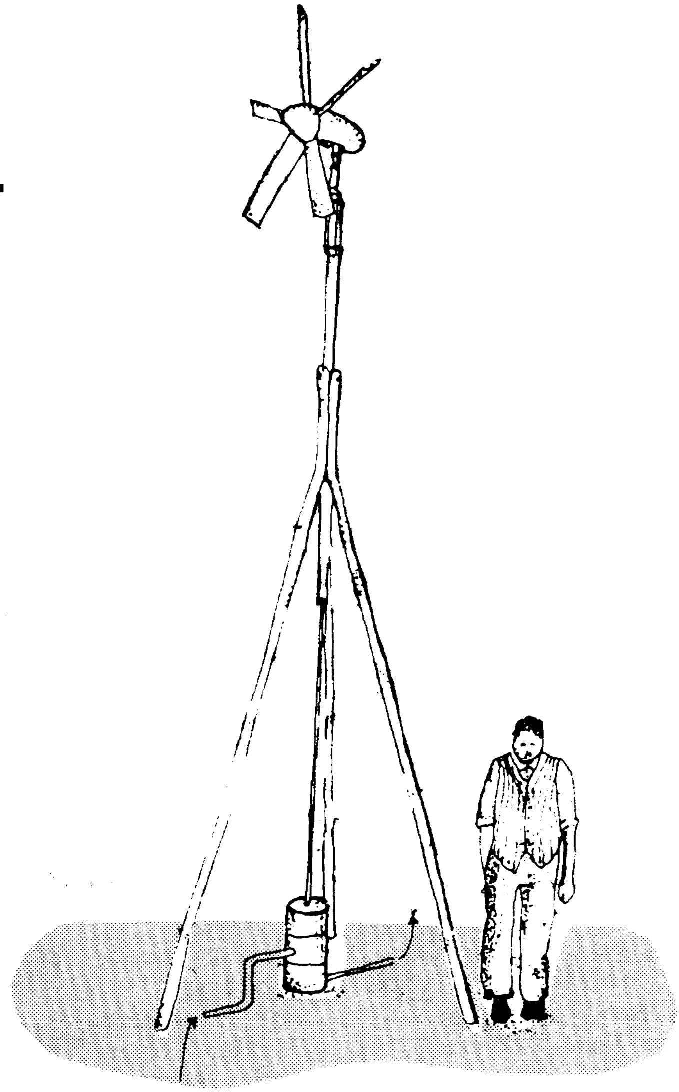
WINDPOWER
Continued from page **14**

Provide a housing for the alternator by inverting a plastic bucket with appropriate holes in it, as a means of sheltering it from the weather.





Alternator and Cable to Battery and 12v DC Circuit



Bicycle Airscrew Pump

This has been conceived to draw water out of a well and store it above ground level. Thus, water is available at any time with enough pressure to water a garden. The winding parts, mounted on ball-bearings, are bicycle parts.

Construction of the Tower

This is made of four tubes 45-5Omm in diameter, three forming the legs and a central one supporting the mechanical part, The three legs are slightly bent at about 600rpm from their top ends to give enough distance to splay the legs at the bottom and to allow a joint with the central tube.

This joint can be made by either welding or slightly curved bolts, in which case each tube is drilled with two holes near the bend. Six bolts should be sufficient for the complete assembly.

The legs can be fixed to the ground in two ways, either by sawing along their axes for about 100mm and bending them to form fixing tabs which are then cast in concrete, or by welding the bottom of each leg to an iron tab drilled with a 12-14mm hole, This must rest flat on a rectangular concrete block to which it is fixed by a sealed threaded stud. This method has the advantage of allowing the tripod to be taken down.

The leg tubes are about 3.3m long. The central tube is 2.lm. It rises lm above the others and is surmounted with the front forks of a bicycle,

WIND POWER

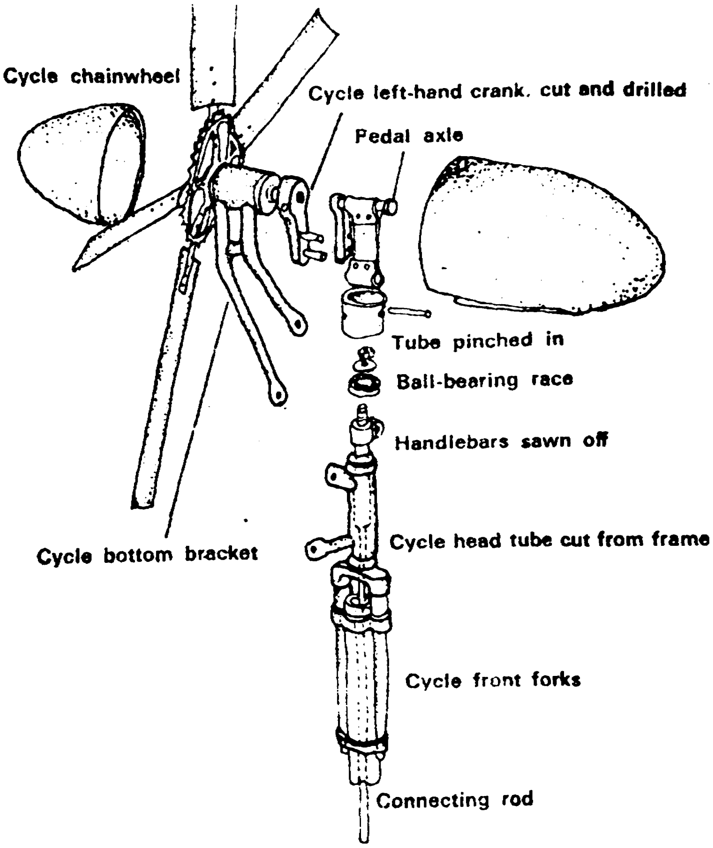
both fork tubes having been straightened out to allow their fixing by two iron rings. Each ring is made of two parts tightened together with bolts. The iron should encase the fork tubes without squashing them.

The Mechanism

This has two parts: the airscrew with its bearing and motor-drive, and the pivot which is fixed to the tripod and allows the airscrew to rotate into the wind.

The pivot is formed by the main tube of the forks in which the front tube of the frame revolves. This has been separated from the rest of the frame' by sawing through the tubes which terminate in it, leaving enough length for the fixing of the mechanism, The cycle headset ball-bearing mounting has been kept as it was. It should be cleaned, greased and adjusted so that it rotates easily without any play.

The bearing of the airscrew is made from the rear forks of a bicycle frame from which only both horizontal tubes and the bottom bracket have been kept. The tubes are bent, as shown, near the small brace which separates them and then cut to different lengths to bolt on to the stubs of the tubes protruding from the pivot of the forks. To join these two pairs of tubes, they must be flattened and then drilled to accept bolts,



The Letters Page

A word from one of our spies

One of our members, Neil Matthews, is currently traveling round North America. We asked him to have a look at the American scene while he's there and he sent us the letter below.

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Firstly, I visited Cambridge Alternative Power Co. Inc., 299 Concord Ave, Cambridge, MA 02138, U.S.A. These guys are the leading alternative energy company in New England, operating now for 5 years.

They run a very professional shop and consulting service installing solar water heaters, wood and coal stoves and boilers etc. But surprisingly enough, they told me they sold no photovoltaic cells at all as yet, since there was no demand from the private sector. What was interesting to me was that any person who installs an active home energy conserving system (which can include solar water heater, tank, pot belly stove, insulation, double glazing, silicon cells) receives state and federal tax credits adding up to 60% of the cost as a tax rebate in the state of Massachusetts. A great incentive for people to go solar. It's a pity Australia doesn't have a progressive Department of Energy such as this one.

Cambridge Alternative Power Co. also displayed (and sell a lot of) 'window quilts' which pull down like a roll-blind on the inside of a window, with runners down each side to fit snugly to the window frame and they claim, drastically reduce heat loss through windows in cold climates.

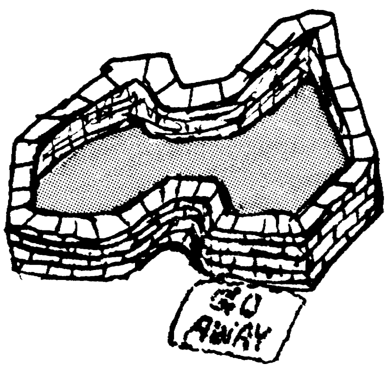
The wood stove heaters for heating rooms they rave about are 'JØTUL' brand, imported from Norway.

Admitting they were inexperienced in the area of photovoltaics, these guys put me onto SOLENERGY CORPORATION in nearby WOBURN. I visited there and had an interesting rave with Vice President BILL CLARK. It turns out he has visited Melbourne several times, selling through his distributor LUCAS INDUSTRIES to people like Telecom the Army and mining companies. He said that since the Australian Government bought in a 35% import duty on both silicon cells and panels of cells during 1982, he has been unable to sell to private buyers in Australia. His wholesale prices in the U.S. are:

FOR A 4" CELL: $5.98 U.S. for 10,000 cells or more
$7.60 U.S. for 1,000 cells or less

FOR A 35 WATT PANEL OF 4" CELLS:
$3 30 U.S. for 100 modules or more.

He showed me a new panel with a thin plastic laminate backing which will sell for about $300 in the U.S. He also



showed me samples of the new SILICON RIBBON cells they are working on, but are still having trouble reducing its thickness sufficiently to make *it* economic (they do this by extruding the silicon and by stretching it on a matrix webbing).

Bill also said that the Australian Government has given companies such as 'TIDELAND' in Sydney money for further research and set up of facilities for manufacturing silicon cells in Australia.

Anyway it seems the hope of bringing over cheap cells from the U.S. is fairly doomed, Bill Clark seemed to think the Australian companies were boosting up the price of their panels because they knew they had the 35% tariff protection margin. I'm yet to see any Alternative Energy research installations in the U.S. - maybe some in Texas where I'll be in 1-2 weeks. Otherwise it'll have to wait till I visit California and New Mexico on my way back from Mexico in March, April 83.

Good luck with the Energy Workshop on Merri Creek:

Neil Matthews

Battered Batteries

An answer to Peter Taylor, Guildford, Victoria.

BATTERY AGING

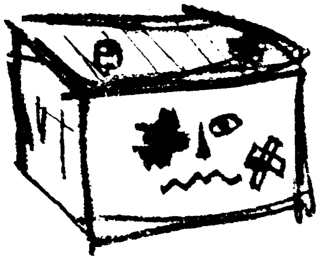
Dear PT:

I have witnessed the demise of hundreds of batteries and in very few cases do they ever live the term of their natural life, either in age or cycles. They are usually ruined by abuse. This is probably why manufacturers do not give warranty past two years. I have listed below what I think are the usual causes of death in practical applications, from the most common down,

1) broken cases.
2) broken posts.
3) sulphation - from being left flat,
4) boiled dry.
5) cracked case from overdischarge.
6) shorts from overdischarge and slow charging causing bridges.
7) fast overcharge blowing off +ve plate material.
8) explosion.
9) people throwing out batteries when some other aspect of their electrical system is at fault.

Other damaging conditions of operation are:

topping up with tap water, siting in



full sunlight; allowing stratification of acid by charging only slowly and never to gassing, spilling acid and making up with wrong concentration, never giving equalizing charge, and operating them with the average state of charge ¼ capacity.

If however you don't do anything stupid to batteries, they can last as long as Michael Bos' claim of 20-25 years. I just threw out some home lighting batteries for the crime of only holding 11 volts on discharge which would not run my television, and they had 1961 stamped on the post. The brand was EXIDE.

Another set stamped 1971, USL brand, I am still using on 40 amp loads after about 400 cycles of half capacity with an unregulated 25 amp generator. I have only had Century home lighting batteries for 5 years, but they are doing fine. I don't like their non-flameproof caps, but I do like the coloured balls. It seems like a gimmick but it really helps people treat them sensibly, and this is the fundamental problem with Soft Technology - the consumer must take more responsibility.

My favourite batteries though are a stack of 150 AH nife pocket plate cells made of steel with wooden crates all rotting and the whole dipped in tar. Spring loaded caps keep out CO_2 and make nice popping sounds when gassing occurs (even better than coloured balls). When I got these cells in 1975 from Simsmetal they looked like they were left over from WW2 but I scrubbed off all the corrosion, refilled them with electrolyte from NIFE BATTERIES, Sydney and now I have a bank I can charge at 1 amp (unlike sintered plate variety) and discharge at 150 amps with enough stamina to burn a handful of 10 gauge electrodes without stopping. Also they have withstood consistent overcharging, slow charging, fast charging, undercharging and even reverse charging.

Yours sincerely,

Karl McLaughlin,
Nimbin

Where the energy comes from??

In Soft Technology No. 11 in the article entitled A.T. up Top, it was stated of the National Centre for Alternative Technology, "The whole establishment is self-sufficient, importing no external energy".

In the "Quarry Association Newsletter" Summer 1981, the NCAT did an Energy Survey of their usage, and that survey suggests that the above statement is far from true. I have enclosed a copy of their results for you, and you will see that they in fact consume 62% of their total energy from fossil fuels, namely coal and LPG, They are not connected to the electricity supply grid, and this may have caused the mistaken idea that no fossil fuels were used. Even here however 15% of their electricity came from the burning of LPG, *78%* from the hydro scheme (they have an annual rainfall of about 100 inches) and a disappointing 7% from the wind.

At our Centre for Alternative Technology, Outlook Alternatives, I would estimate our energy usage as follows:

Firewood, heating and hot water:	12,000 K watt/hrs	86%
Solar hot water:	1,000 K watt/hrs	7%
Electricity SEC:	1,000 K watt/hrs	7%
Wind & solar:	15 K watt/hrs	0.1%

As a general conclusion, I feel that it comes through very clearly from figures such as these, that there are enormous savings to be had from the use of firewood, and some savings from the use of solar for hot water. It is because of the savings that firewood has to offer that we have a woodlot and are encouraging those who have the land, to use it for this rather unspectacular energy saving crop,

Regards,

Andrew Blair,

Back Copies

Back issues of No. 9,10 and 11 of Soft Technology are available. Cost is $1.50 each. Please include 50¢ postage for 1 or 2 copies and $1.00 for 3 or more copies

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Issue 9. Appropriate Technology, An Experimental Methane Digester, Electric Vehicles, A Solar Train, Cheap and Simple ways of measuring the wind, Solar Ponds, Electric Moped Race.

Issue 10. A Solar power station at White Cliffs, Storage Batteries, Solar Electric Fridge, Solar Mudbrick Flats, Centre for Approppiate Tech., The Rowing Bike, Air Wells.

Issue 11. Recycled Solar Collector, Wind Generator Towers, Human Powered Vehicles, A.T. up Top, Natural Cooling for Summer, Energy Saving Checklist for Home Buyers, Customizing a Solar Water Heater.

The Alternative Technology Assn.

The Alternative Technology Association is a group of people interested and involved in Alternative Technology. The membership of the association covers a wide variety of interests and skills. Solar and wind energy are areas of common interest, other areas of interest include: water power, methane digestion, agriculture, energy efficient houses and other buildings, crop fuels, pedal power, electric vehicles and alternative transport, domes, mudbricks,.....etc.

Activities of the group include meetings, field trips, practical workshops and film nights. We also produce this magazine Soft Technology.

MEMBERSHIP

Members recieve Soft Technology and the newsletter which gives details of our activities.

Rates $14, $7 pensioners, students, unemployed; $20 institutions.

SUBSCRIPTION

Subscribers recieve Soft Technology four times a year.

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I wish to JOIN ☐ SUBSCRIBE ☐ and enclose $.............(new year begins in July. After December pay half rates only).

NAME..DATE................

ADDRESS...POSTCODE...........PHONE...............

SEND TO the Alternative Technology Association, 366 Smith St. Collingwood, Victoria, 3066.