Soft Technology

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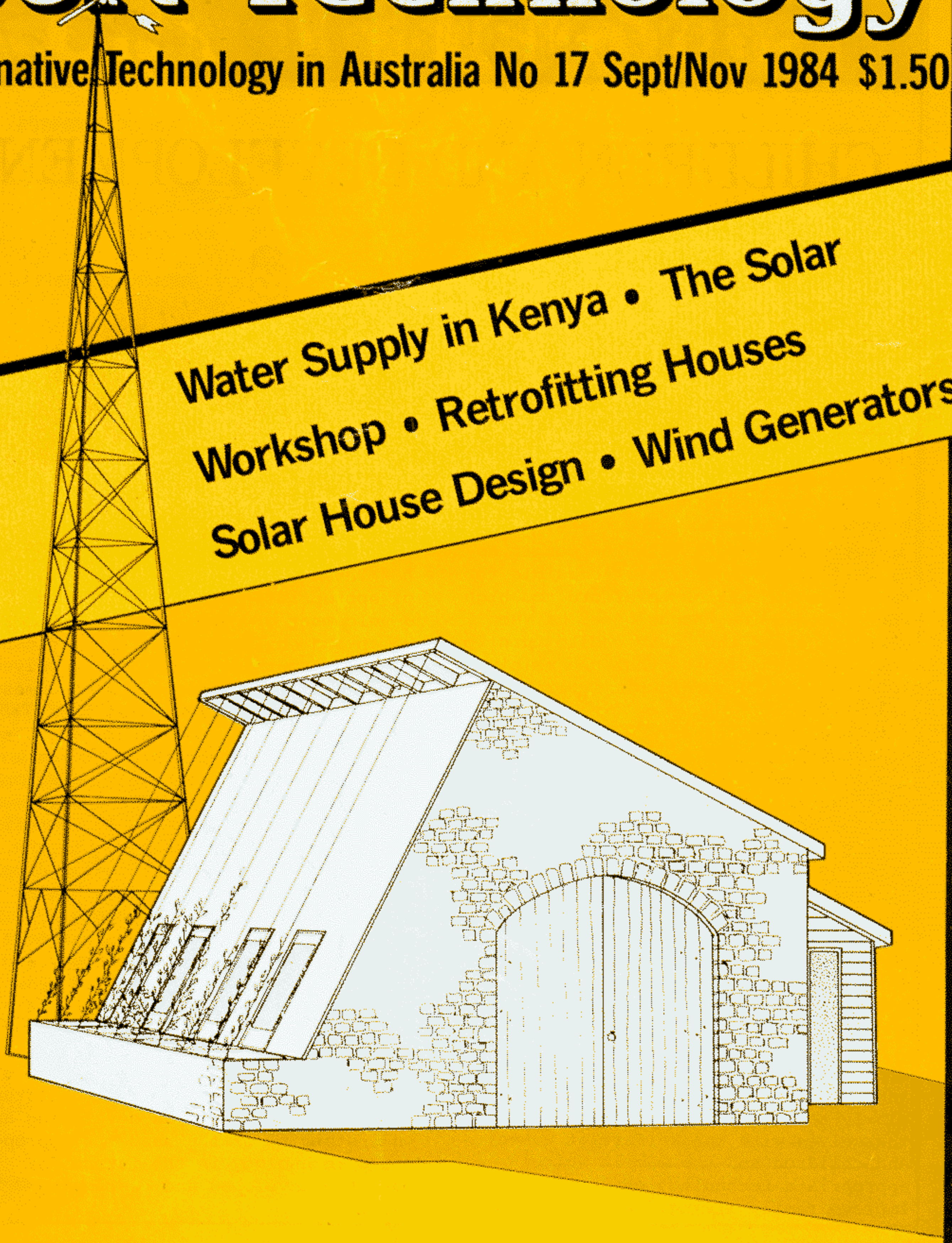
Water Supply in Kenya • The Solar Workshop • Retrofitting Houses

Solar House Design • Wind Generators



Editorial

CHILDREN AND DEVELOPMENT

Over the last thirty years it has become more obvious, in both the developed and developing world, as to the need for appropriate technology. In the developing world appropriate technology is needed to satisfy the basic needs of people, while in developed countries it has become more necessary as energy consumption and the corresponding energy crisis becomes more severe. The energy crisis directly affected developing countries as well. No longer was it possible for developing countries to afford the high energy consuming technologies of the west. Instead they have had to turn to low cost technologies that use mainly local or easily obtainable materials and skills.

Much of the appropriate technology that has been developed in developing countries has centered around the introduction of new techniques in agricultural and industrial production. Living standards have been improved in economic terms through the establishment of small scale enterprises, the aim being that technological progress be compatible with the capacity for change within the existing communities. The growing problem of unemployment has been tackled by the use of local skills and resources.

Added to the economic aspect of appropriate technology is the social aspect. The social aspect is particularly taken up by UNICEF who concern themselves with the welfare of women and children and the way in which appropriate technology can be used to improve family living. Education and

health care become as important a form of appropriate technology as does the development of farming equipment. For women and children in developing countries, appropriate technology revolves around lessening the burden of domestic duties and the agricultural load. Water collection, food storage and fuel for cooking are three of the most vital areas, with emphasis being on women participating in the development of the new technologies. The benefits for women are then passed on to the children through improved water supply and nutrition resulting in a higher survival rate among children.

UNICEF sees the need for awareness regarding appropriate technology and so has made the theme for this year's universal Children's Day on the 24th October, Appropriate Technology and Children. An education kit has been compiled that will develop awareness of appropriate technology in children in Australia as well as developing an understanding of the need for appropriate technology in the future for both the developed and developing world.

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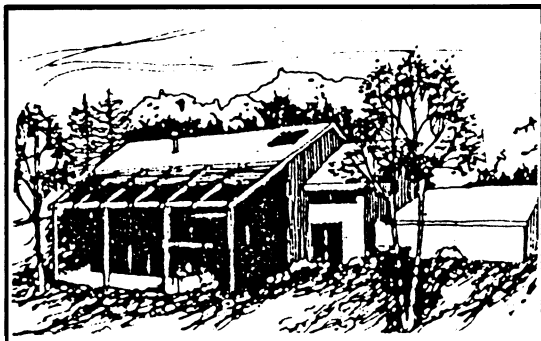

6 Solar House Design

This issue of Soft Technology was edited by Helen Stokes, Cathy Croke, Mike Reeves and Mick Harris and Yogi Micheals.

If you are interested in joining the editorial collective, ring us on 419 8700.

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

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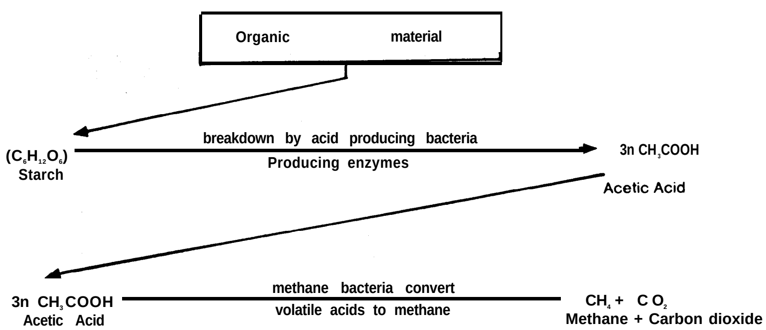
Cover: Solar Workshop

Energy Flashes ...

Energy generated from Tip

A council in one of Melbourne's northern suburbs has pioneered in Australia a scheme to use methane gas from an old tip to produce electricity. According to an interim report on a feasibility study, the gas could be enough to generate at least half a megawatt of electricity, worth at least $400,000 a year.

The feasibility study showed that the tip had an unusually good capacity to produce methane gas, due to its high water level. The moisture promotes the bacteria which makes the gas. To convert the gas into electricity, it is burned in an engine similar to a diesel engine, which drives an alternator, which in turn generates electricity.



Although this project will be the first of its kind in Australia, there are many places across the world making the most of these unplanned methane digesters. In America, where power utilities are mainly privately owned, tip sites are becoming valuable pieces of real estate, providing millions of dollars worth of energy annually, to say nothing of the recyclable scrap metal.

The Council is now very proud of having repeated the American experience here, proving to their political opponents that methane gas is a viable alternative to our conventional energy sources.

Co-generation

A new subsidiary is being considered by the Victorian government and the SEC to encourage private industries to generate their own electricity.

"Co-generation" would be promoted by the subsidiary, encouraging the use of waste industrial heat and the burning of fuel to produce electricity. A handful of companies in the State already generate some of their own power, but a new report claims that much broader participation is feasible. It claims that co-generation could save industry up to $79 million a year by 1999 and reduce the need for more expensive power stations to be built.

According to the report, the subsidiary could advise companies on the benefits of the scheme, and provide the expertise and equipment to run it. It also urged the State and Federal governments to provide tax incentives to participant industries, who would be saving tax payer s money.

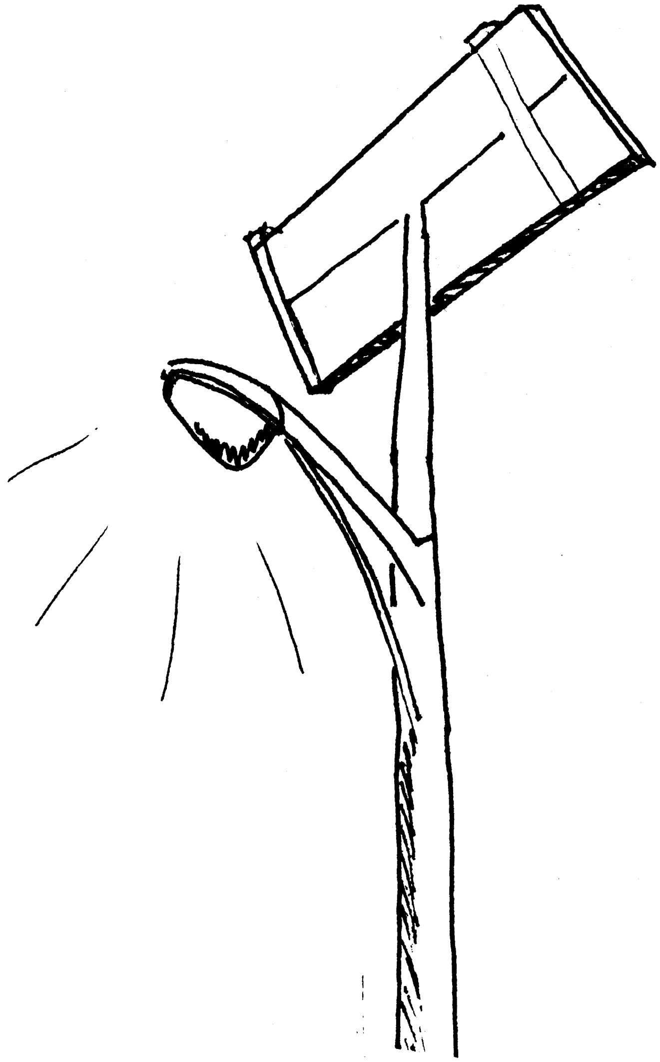
Energy Inquiry

The Victorian Department of Minerals and Energy has begun an inquiry into ways to encourage low energy buildings. The inquiry will use as its starting point a Monash University report which recommends a major overhaul of the residential subdivision process to eliminate obstructions to low energy constructions.

The report, Regulatory barriers to Low Energy Housing, claims that the lack of coordinated planning and legislation has led to major restrictions on the use of solar energy. The present subdivision process is controlled by four different acts, which are described as overlapping, complex and inconsistent. State, regional and local building regulations often conflict, and the combined restrictions result in allotments unsuitable for optimum use of solar energy. There are many problems at the local level with restrictions on siting, allotment size, spacing of houses and aesthetic controls on building materials. All of which do little to encourage solar design in construction.

If solar power is to be a real energy option for suburban dwellings, then it is essential that solar access be protected by law, As the law stands now, there is nothing to stop neighbours putting up buildings or growing trees which shade windows and solar devices. The ***report claims that new laws are*** needed to give both encouragement and protection to people willing to use alternative sources of energy. This would include regulations on wind generator towers and earth shelters.

It also recommends that insulation be made compulsory in cavity walls, with priority being given to rented buildings. The lack of incentive both for the landlord and tenants currently makes insulation a low priority for rented buildings.



Solar Street Lamp

A Japanese company - "Komatsu Electronic Metals" have made it possible to disconnect street lamps from the electricity grid with their new solar powered model. The solar cell street lamp is designed for public places where commercial electricity is not available.

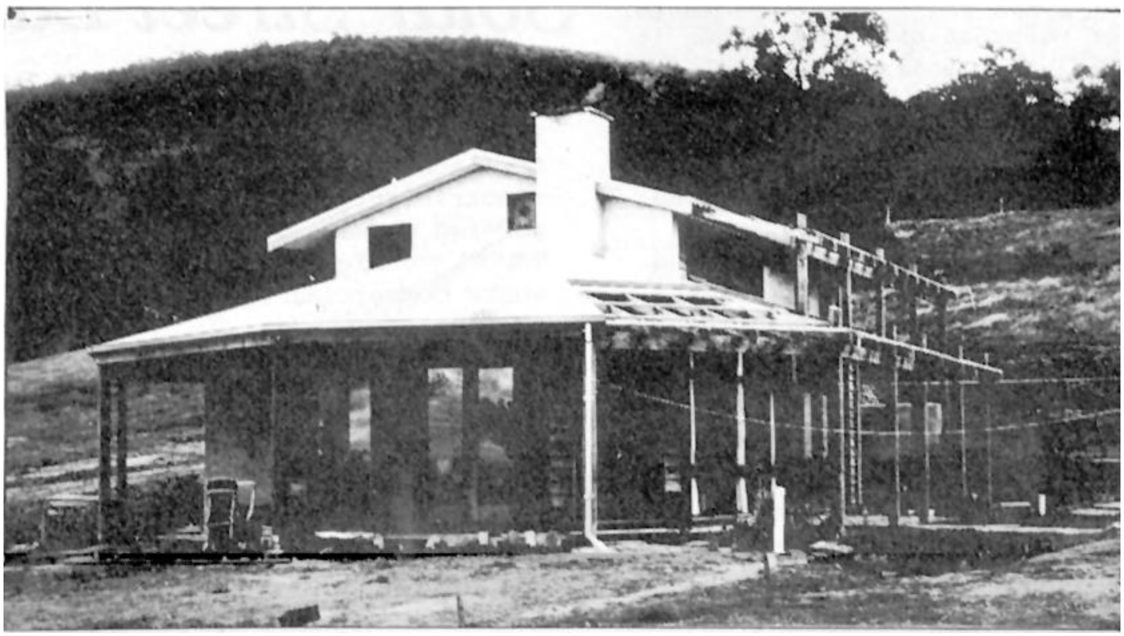
12V compact sealed lead batteries are charged during the day by photovoltaic cells converting solar power to electricity. The fluorescent lamp is then turned on and off by a timer. According to the company, the **solar** cells require less maintenance than a diesel generator, and, of course they're. far quieter and environmentally sound.

Realities of Solar Design

Legalist&ally following the principles of passive solar design is not in my view a good way to go. There are more forces operating in the generation of a house design than just the solar heating/cooling one. For instance there are the near and far views, the quality of light: the east and west light has great beauty at certain times of year and the south light can have a peacefulness. Light only from the north can have an undesirable monotony. And there is the form of the building derived from the confluence of any number of forces: the personalities and dreams of the people who will live in the house, the shape and form of the surrounding land, consideration of any nearby obstructions, the way the building will be constructed. The solar consideration is of course another one.

From computer studies simulating the thermal behaviour of houses, it is emerging that strict adherence to the design rules is not all that important to the overall performance of the house. It is important that the building be properly insulated and sealed against draughts, and that the majority of glass areas be adequately shaded in summer, especially east and west glass (this is often not all that easy). It is also important that there be a reasonable amount of northish glass feeding winter sun to the living areas. But such rules as the rectangular shape of proportions 1:1.5 - 1:1.6, strict true north orientation and no east or west glass can be relaxed (within reasonable limits) without much effect on the overall thermal behaviour.

As an architect, I have been involved in the design of quite a few low energy houses. Some of them are presented below. None have active solar space heating because, as has been shown countless times before, it's simply not worth doing in our climate, especially if the house works as a 'passive' solar one. Some have active solar water heating, some don't. It is not clear-cut whether this is worthwhile economically, so many people opt for the conventional gas or electric type.

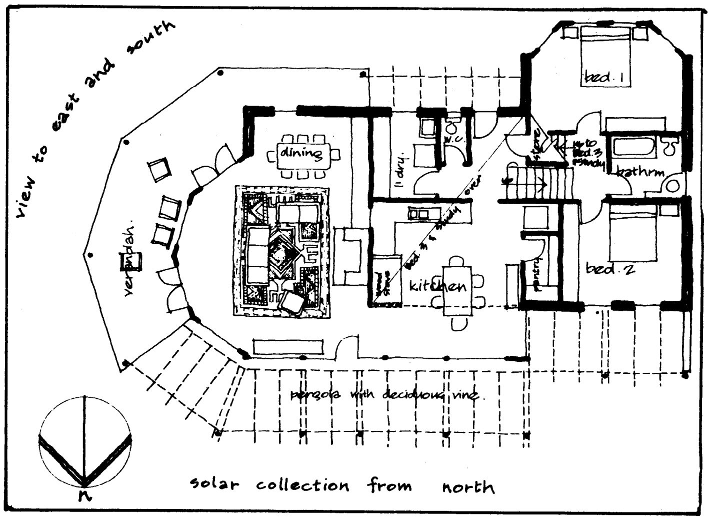


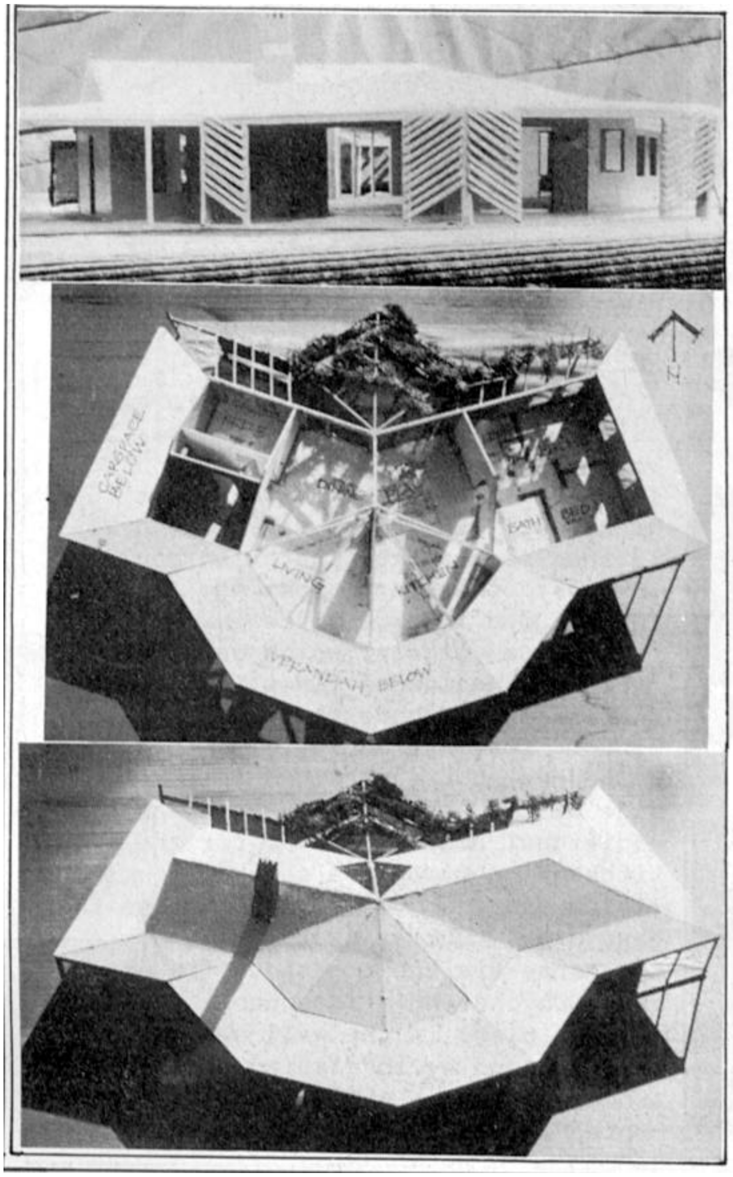
House at Riddells Creek

The house site was on the side of a hill sloping down towards the south, from which there was a magnificent view towards the east and south over the flat plains separating the Riddell's Creek area from Melbourne.

Here, the main conflict of forces was between the south-east orientation demanded by the site focus and the north orientation demanded by the solar design principle.

The solution was to put the main living area at the east end of the house and to build a bay projection with verandah all around. The verandah changed into a pergola along the north to permit entry of spring and late autumn sun.





House at Baxter

Here, the site is on the highest part of a sloping block, close to the northern boundary. There are no specially beautiful views, particularly not to the north, but it was important that the house have good visual links with the rest of the land to the south, south-east and south-west, because the property was to be developed as a goat farm.

The main living areas were thus designed in a large roughly open planned space taking up the whole width of the building from north to south. This worked in well with the clients' desire that the house reflect their cohesive family life.

In order to get solar radiation into the south part of the space, roof glass was designed, with insulated screens sliding across the ceiling to cover the glass in winter at night and in summer during the day.

Because of the absence of north view and because the north on this site is particularly prone to unpleasant north winds, the pergola is widened outside the living areas and vertical screening mesh with deciduous and some evergreen vines, is fixed between the pergola posts, thus enclosing a north outdoor living area.

House at Mt. Macedon

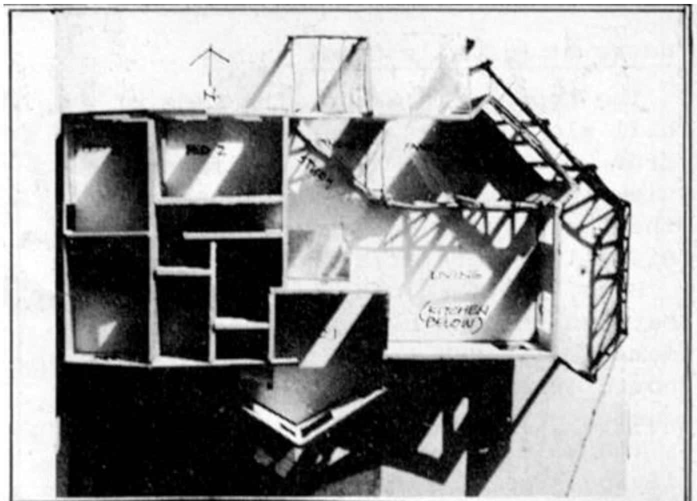
The design is a response mainly to the character of the surrounding country and to the people who are to live there.

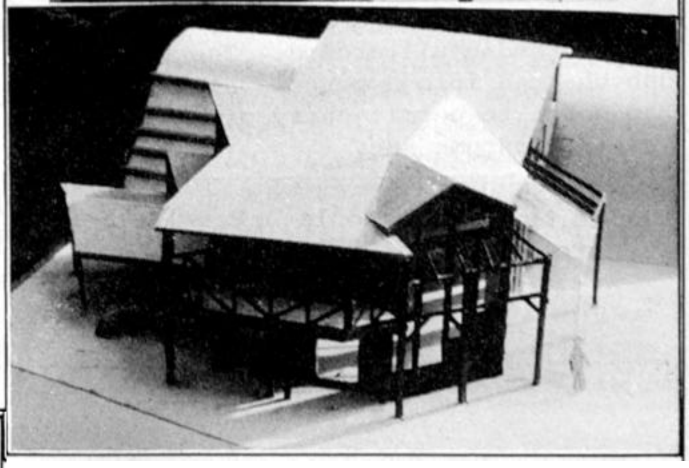
The thermal design was quite a problem because the north aspect of the site was blocked by tall gum trees. The view and site focus was towards the north-east round to the south.

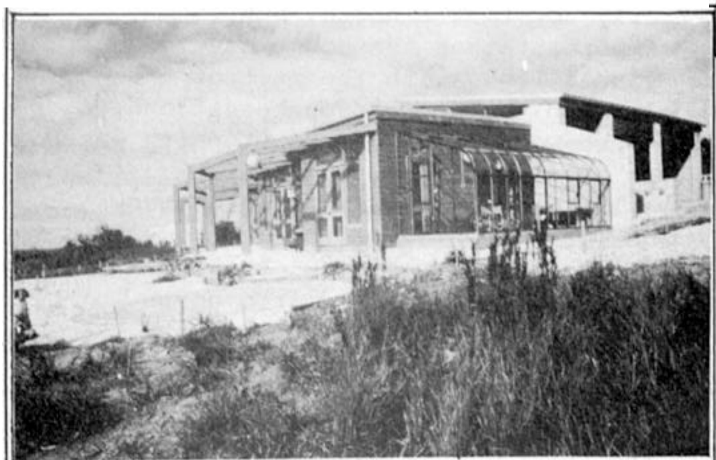
Along the north is a two-storey greenhouse, the top section of which at least will be heated by the sun in winter. A duct and fan will carry the warm air from near the top of the green-house to a point low down inside the house.

Internal blinds are to be pulled across the glass roof in summer and there are two full height side panels of louvre windows for ventilation.

A large area of north-east glass was introduced, so the winter sun can enter the building directly in the morning. This worked in well with the north-east view. The glass is shaded in summer by a pergola with vertical mesh which will take a deciduous vine.







House at Anglesea

In this case there was a very clear site focus: that of the breathtaking views of the ocean to the east. The land is close to the sea but much higher up. The north face of the house is thus bent back twice at an angle of 35° east of north so that the sea view is included in each living area.

The wide pergola, which depends on the growth of deciduous vines for proper shading, will shade these north-east windows for most of the time in summer..

The greenhouse attached to the west side of the house, is designed as an additional source of heat for the kitchen. A fireplace serves the middle living area, and a pot belly stove the east area. Summer overheating of the house via the greenhouse is min-imised by having a reasonably small area of glass in the wall separating the two, and by insulating that wall. A deciduous tree will in time offer protection to the greenhouse itself.

Batteries, Fuses, Volts and Amps.

No storage battery, whether lead-acid or nickel-cadmium, etc. should be charged or discharged without some sort of a control panel to protect it, A control panel also becomes a convenient junction box for the connection of silicon cells, battery charger& wind generators and various loads (lights inverters, motors, etc).

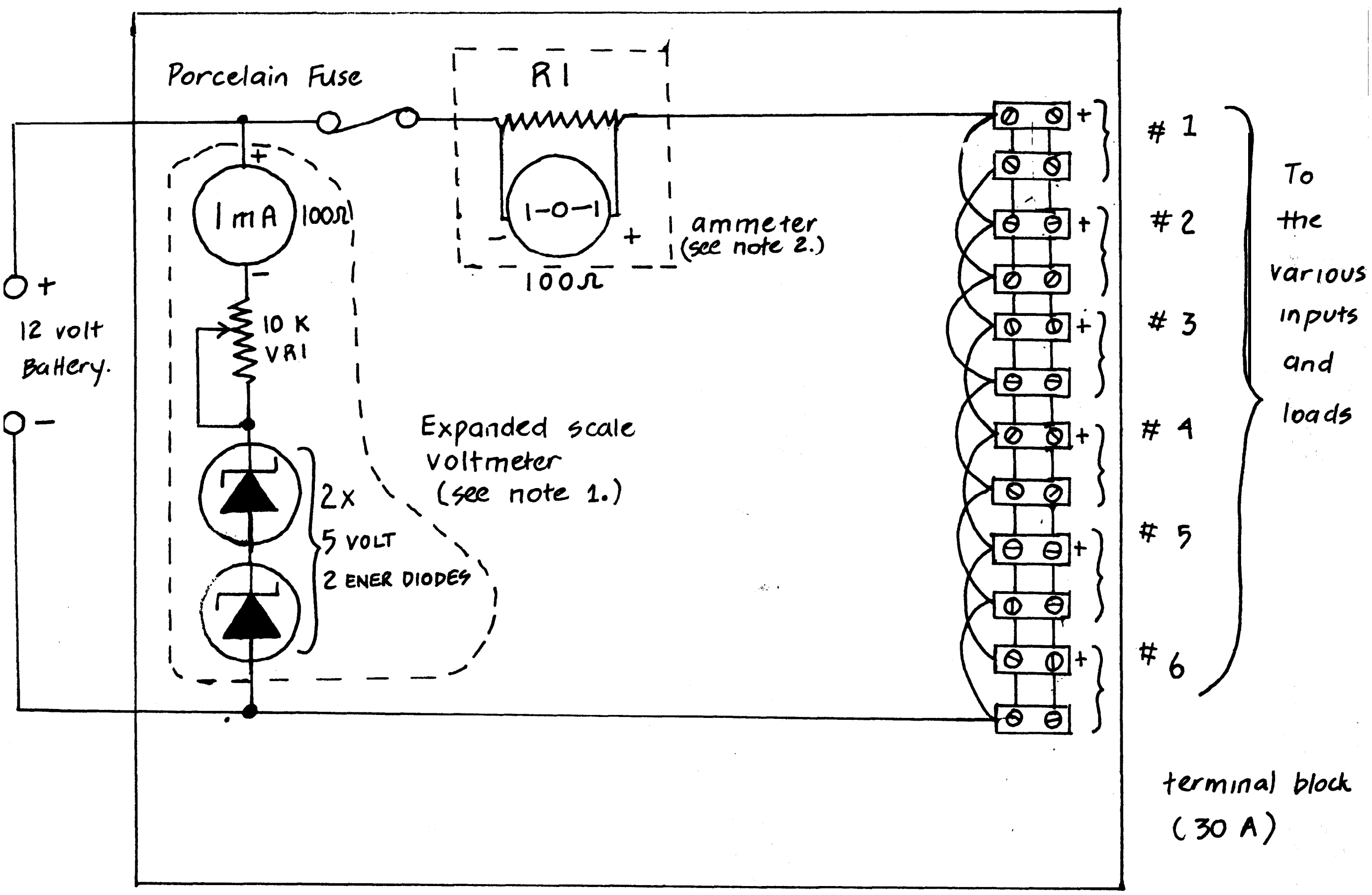
The most basic control box consists of a fuse (15 or 30 amps), a voltmeter and an ammeter. Heavy duty terminal strips and, heavy duty wire (eg 7/.85 building cable) should be used for all interconnections.

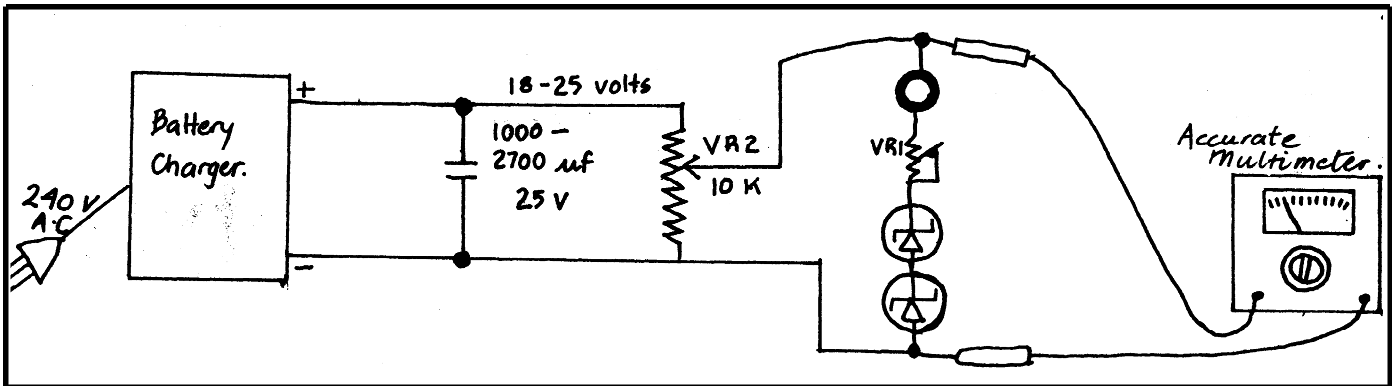
Here is a simple circuit you can 'wire up for $30-$40.

Notes

1. Voltmeter The zener diodes, potentiometer and ammeter connected across the battery form an **EXPANDED SCALE 'VOLTMETER (ESV).** Permanently connected, it draws about 0.5 mA from the battery. This very small current would take 80,000 hours to flatten a 40 AH car battery - quite a long time. The meter dial must be hand calibrated as follows.

Temporarily wire up an ordinary battery charger, large value capacitor, a 10 K potentiometer and a multimeter to your voltmeter as shown. Adjust VR2 to give 16 volts on the multimeter. Adjust VR1 to give a full scale deflection on your





E.S.V. Mark it as 16 volts. Adjust VR2 for 7 volts; the ESV should show almost no deflection (if it does show a deflection, 'the zener diodes are probably wired in back-to-front). Make several further adjustments for 8, 9, 10, etc. volts on the multimeter and mark each on the dial of the E.S.V. Paint the dial red above 14.5 volts and below 10.5 volts, orange between 12 and 10.5 volts.

2. Ammeter:

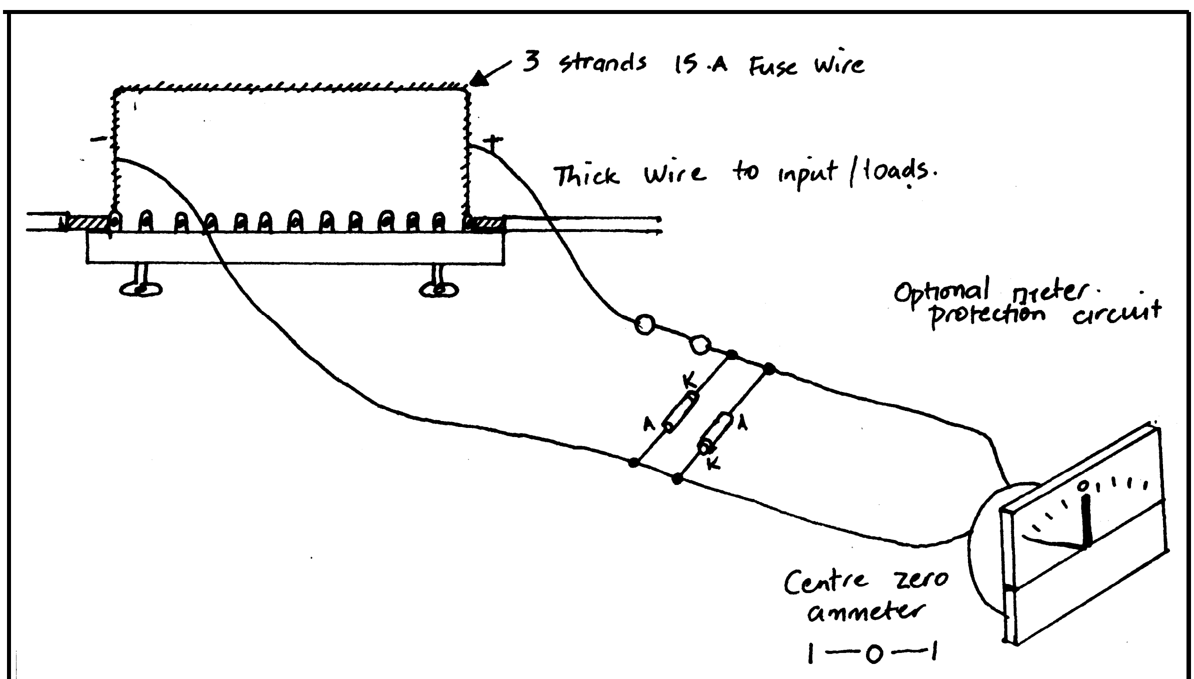
R1 is 3 strands of 15 amp fuse wire twisted together, each about 10cm Long, and soldered to a terminal strip.

The ammeter is calibrated by trial and error by soldering the meter leads (+ and -) at various points along the stranded fuse wire until. a suitable deflection is obtained on the meter. If your battery can handle more than 30 amps, then R1 must be made of heavier duty fuse wire.

The diodes and small fuse will protect the meter from total destruction in the event of R1 breaking or burning-out. Note that the meter minus sign goes to the battery positive side of R1. This is necessary to get a positive deflection on the ammeter when the battery is charging.

Having housed the circuit in a suitable box, it only remains to connect the P.V. cells, generator etc. to the terminal block and only run the system within the safety limits of your particular battery.

The same circuit can be modified for 24, 32 volt systems by adding more zener diodes to the voltmeter circuit (in series).



KEEPING COOL
Desert Style

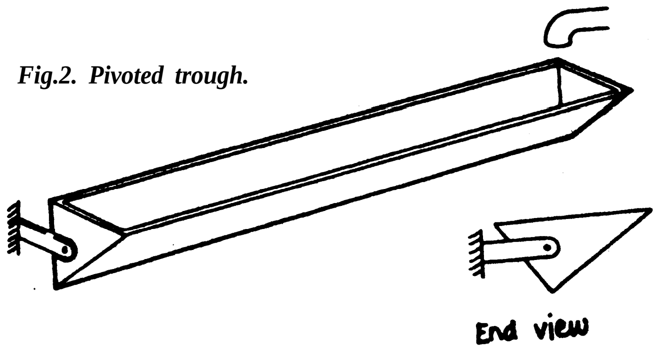
In the desert region of Rajastan, India, a method-of keeping cool has been used for many years. This is a TATTI and can be made quite simply.

Thorny bushes are piled in a layer about nine inches thick, in a roughly rectangular shape. The tatti is made to about the same size as the window or door for which it is intended. With the use of a pitch fork, a layer of bush is compacted and transferred to the. grid of bamboo slats. Another grid is placed above the bush layer and then both grids are tied together with string. The bush layer is held tightly in place. The sides are covered with straw matting to prevent clothes being caught in the thorns, to direct the flow of water vertically and to make the tatti look attractive. A water pipe runs along the top edge of the tatti; with uniformly spaced holes from which the water drips onto the tatti and moves downwards through the honeycomb-like structure of the bush layer. The breeze passing through the tatti into the room cools down by losing heat in evaporating the water and also by the screening effect produced by the interlaced thorns. A trough is placed below to collect the drips.

A tatti requires a certain amount of water but advantage can still be gained by the screening effect of the bush.

The article is based on an item in Appropriate Technology, Vol. 7, No. 2 page 9 by S. K. Sharma.

Fig.2. Pivoted trough.



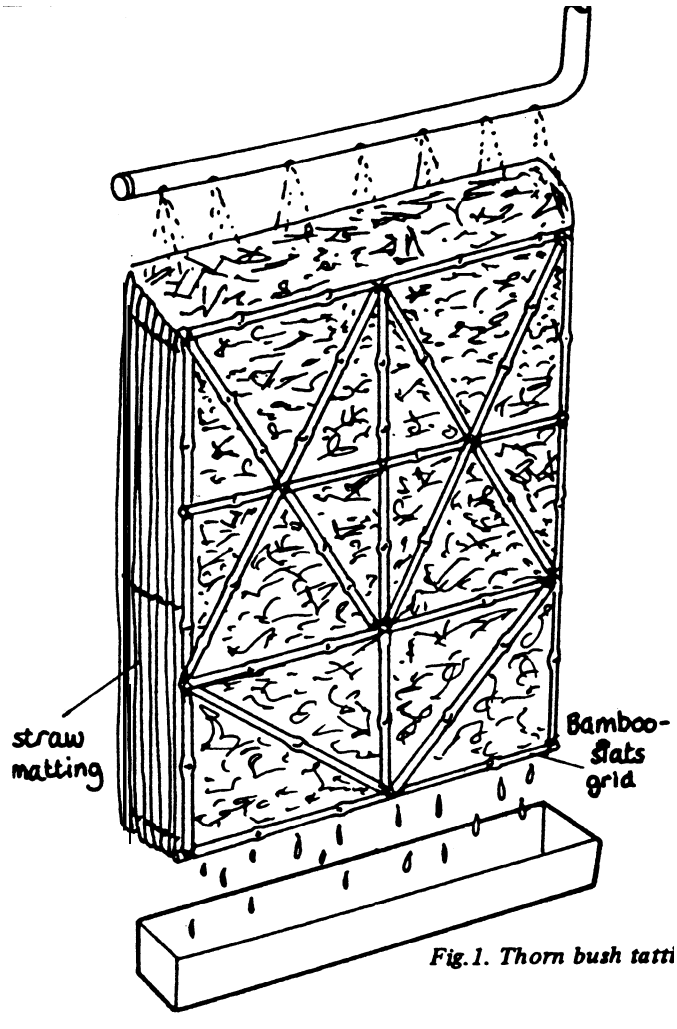
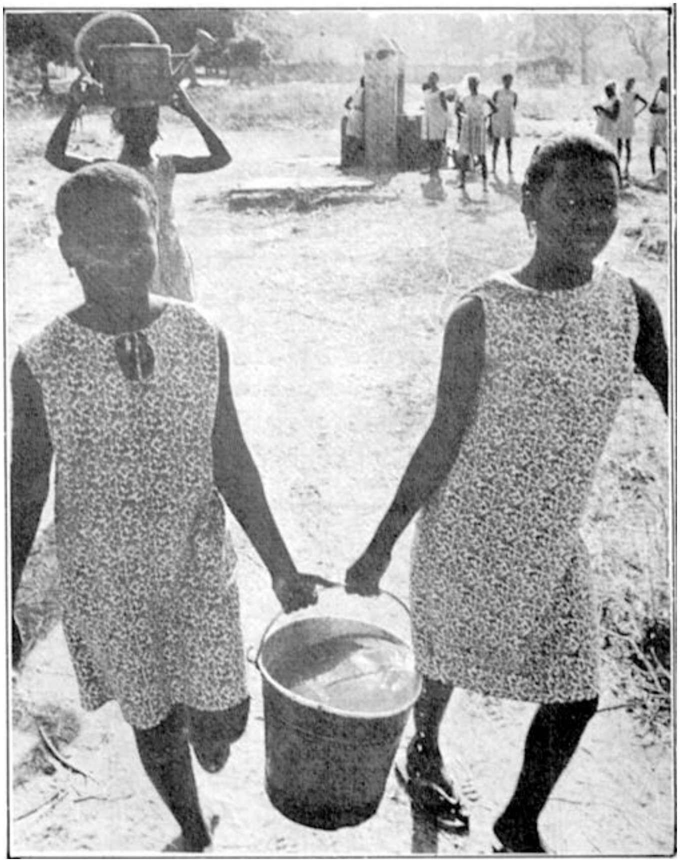


Fig.1. Thorn bush tatti

Self help Efforts for

In Kenya, women work together to improve their lives. There are now over 5,000 womens associations in Kenya. Self help efforts are a vital part of these associations.

There has been a long tradition of co-operation among women, with women working together to cultivate gardens, thatch houses and smear the walls of the houses with, clay or cow dung. This

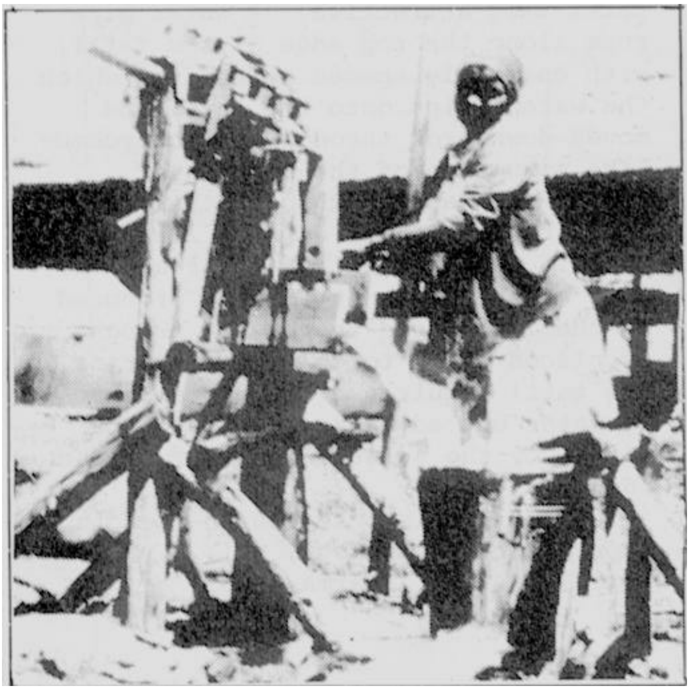


Kenyan women carrying water

co-operation has now become part of a major effort by the women to provide water in or near the home, as this relieves a major burden in their daily lives.

The programmes already initiated by the women have been assisted by the UNICEF/NG0 Water for Health programme.

There have been 15 programmes started, at least one in each province with the aim being to help rural women alleviate some of the basic problems in their daily lives and so then be able to participate more fully- in all aspects of development. The projects go beyond



UNICEF photo A chain pump

water supply to embrace all basic services such as water, health, hygiene, nutrition, sanitation and education.

An example of the programme is the cement jars for rain water collection. This was developed in Lusigitti about eight kms outside Niarobi. For the women here, poverty is an acute problem, they have no land and rainfall is scarce. The women are now being assisted by the UNICEF sponsored village technology unit at Karen to construct cement water jars. The women contribute half of the cost of the jars, which they earn by producing items made of local banana fibre while UNICEF contributes the other half.

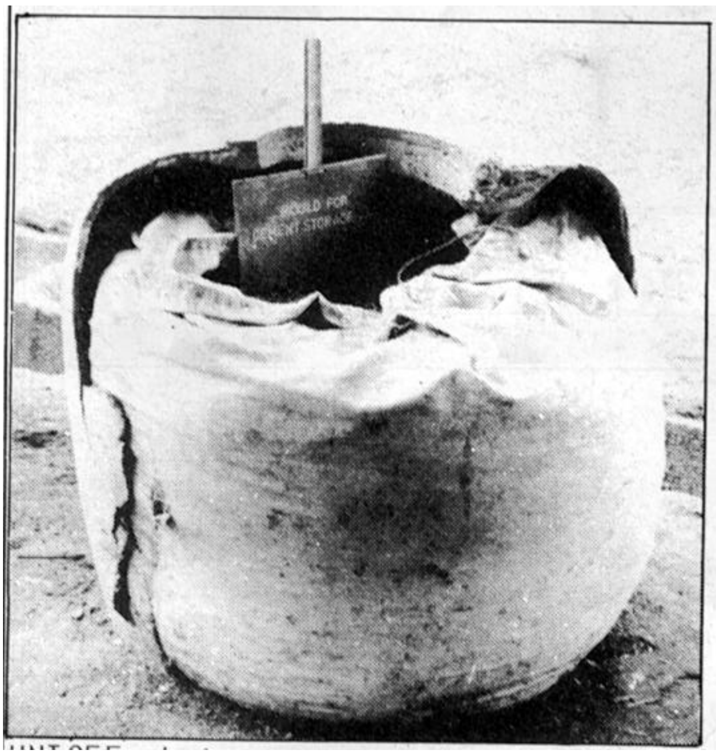
There are many other examples of water collection programmes throughout Kenya such as conservation tanks where water can collect overnight, so there is

Water Supply in Kenya

ample supply in the morning. It has been found that with a little assistance the womens' associations are motivated to improve basic problems in their daily living.

How to Make a Cement Storage Jar

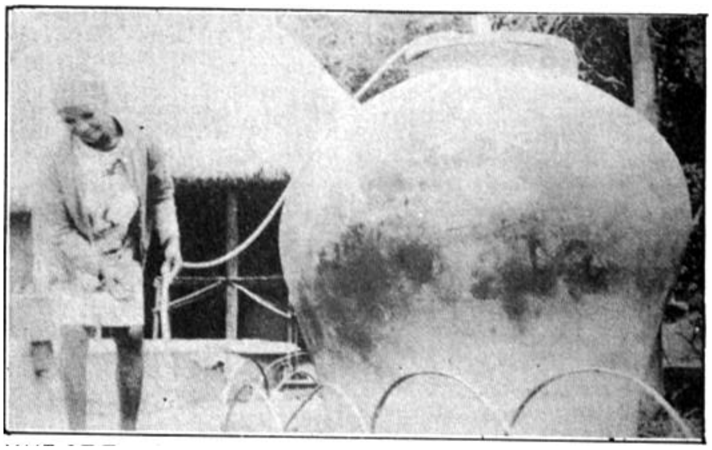
This cement jar was developed by UNICEF in Kenya. Apart from collecting rainwater, it can also be used to store grain. The jar makes the water more accessible; it is cheap and simple to build, and by keeping it covered water can be kept pure.



UNICEF photo A cement jar

Materials (for a 300-litre jar)

3 metres of coarse cloth, 1/3 bag cement, fine river sand, string, needle. and thread, water. (Greater quantities of all materials are required for the 1,200-litre jar, including chicken mesh and wire. Also piping and a tap).



UNICEF photo A cement jar in use

Construction

A large bag is made from coarse cloth or several sacks. This is packed with any convenient material, such as grass, leaves, chaff, sand or wood-shavings. A circular object is placed in the neck of the bag to make a large opening. The bag is moistened with water and a thin layer of cement (2.5 cm thick for a 1,200 litre jar) is plastered over the outside.

Chicken mesh and wire are wrapped around the bag on top of the cement; another. thin layer of cement is then applied.

When the cement is dry, the bag and contents are carefully removed. The jar is then plastered inside with waterproof mortar and left to cure for 10 days. The jar can be made on the ground or placed on a raised platform so that a pipe and tap can be fitted to enable water to be easily removed.

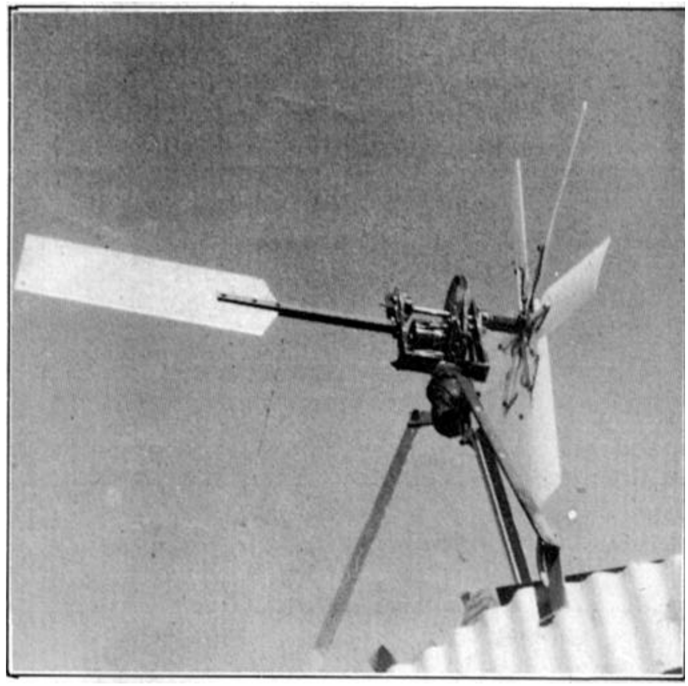
This article is based on an item in Appropriate Technology, Vol. 9 No. 3, page 19. For more information, the publication is "Appropriate Technology" I.T. Publications Ltd., 9 King Street, London, WCZE BHN, U.K.

Alan Morgan's Home Built Wind Generator

Alan Morgan is the proud owner of the pictured six-bladed windmill. The windmill uses the coated aluminium blades of a low-speed ceiling fan to drive a Lucas alternator via a vee-belt with a 3:l step-up ratio.

The alternator and separate rotor shaft are both mounted on the shaft of a heavy-duty starter motor, the base of which is fixed to the sub-tower. -This arrangement not only allows the mill to swivel in response to the wind but also the brushes and armature have been used as. a slip ring arrangement for the alternator output.

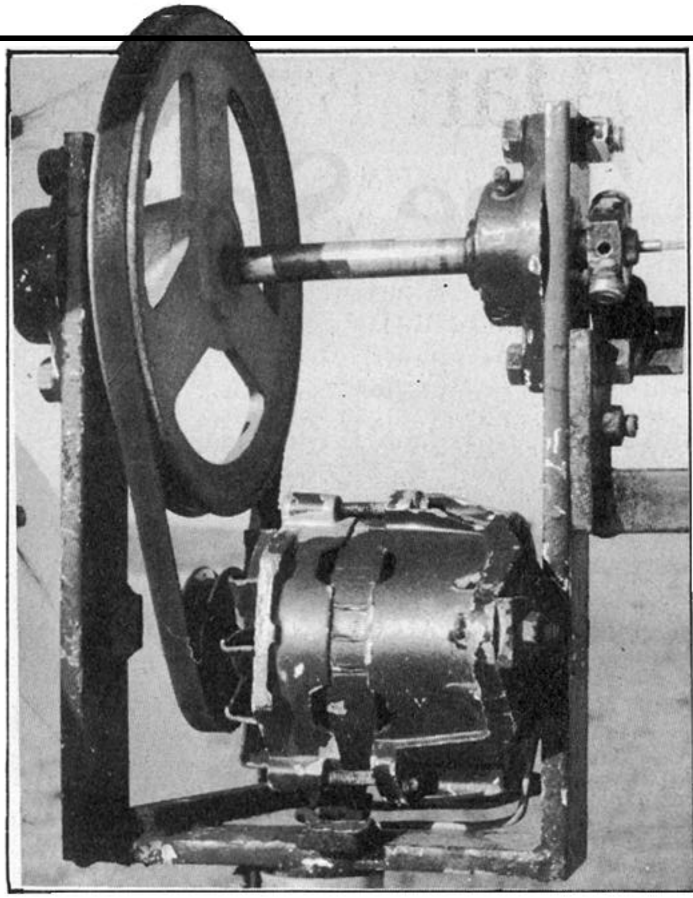
This has been achieved by using the armature shaft of the starter motor to mount the U-bracket on and feeding the battery and field wires inside it to sliprings which have been pressed on to the armature. The windmill has no overspeed control but Alan says that



the mill has been up turning in the wind for three years unattended with no apparent harm, except for a few small cracks near the bolts holding the blades on.

A major difficulty with alternators in home-made systems is supplying the rotor with an 'exciting' field current when the rotor has reached sufficient speed to generate electricity from the stator windings, and turning off this 'exciting' current when the stator r.p.m. falls below a useful value. If this is not done successfully, the alternator will either not charge soon enough, (or at all) and can also discharge the battery via the field windings during wind lulls.

Alan has successfully solved this problem by the use of an electronic timing switch which senses the rotor speed and switches on the field current when the rotor speed is high enough. Alan says he has achieved an output of 18 amps at 12-14 volts in a good wind.

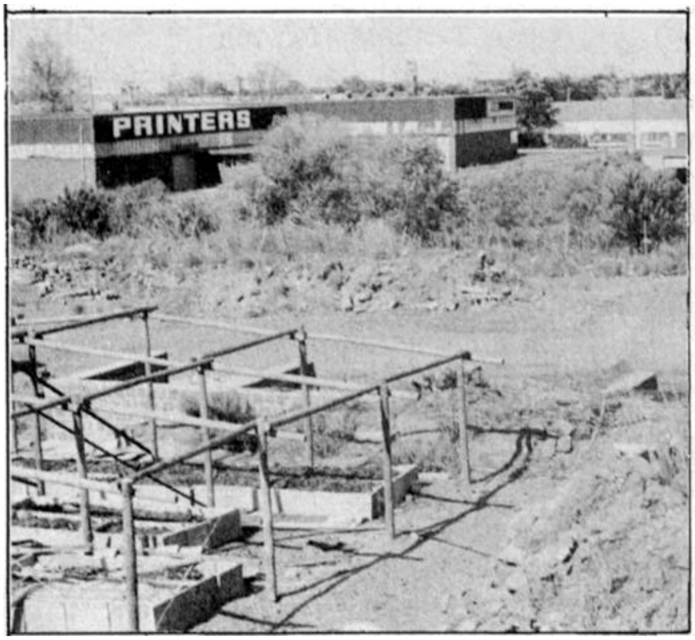


The Solar Workshop

The solar workshop first began in the closing months of 1982 as an idea in the minds of a couple of enthusiastic individuals. The idea was to build a workshop - - - a place with tools and equipment where members of the community could come to build their own alternative technology equipment. What's more, as well as being a place to learn about alternative technology by actually doing, the workshop was to be a living example of this technology, powered by the sun, wind, water and biomass.

Since then much has happened and the workshop is nearing completion. However it has been a slow process. The first step was organising the site for the workshop which was negotiated with the CERES group over a period of months. Next the slow and tedious process of clearing the tons of bluestone and earth from the site began. At the same time plans were put to the Local Council and a process which took over one and a half years was begun in getting the buildings plans approved.

The building was finally started early in 1984 with some initial trauma when the foundations were found to be on top of an MMBW easement. As a result the $3,500 foundations had to be moved adding about $1,000 to the cost. Since then the building proceeded steadily with the walls being completed at the end of September. The building will reach "lock-up" stage in October and will be completed late in 1984 . . . . early 1985. The grand opening should take place in Feb. 1985.



The workshop site in inner suburban Melbourne before construction commenced

The Energy System

The solar workshop uses small amounts of electrical energy from a number of sources to power lighting and equipment inside the workshop. The workshop will use a dual voltage electrical system with low voltage D.C. used for basic lighting needs and 240 volts A.C. used for powering the workshop equipment.

Power will come from four sources, photovoltaic cells, a wind generator, a small water wheel and a backup generator powered from a renewable oil such as sunfloweroil,

The six solar electric panels (which will all be of different types to demonstrate the variety available), will each deliver about 37 watts giving a total of 222 watts. Each of the solar panels will be monitored to see how much power is delivered. Then the power delivered will be compared to the panels' cost to see which is the best value for money.

The wind generator is a modified 1928 Dodge starter/generator. It will be mounted on a 60 foot tower. The generator will deliver 350 watts.

After the solar cells and wind generator are up and running, a small water wheel will be built and erected in the nearby Merri Creek.

This water wheel will be of the "breast" type with the water entering half way down the wheel. It will be about six foot in diameter and should generate 2-300 watts continuously.

The backup generator will be used to supply energy when other energy sources are inadequate. This generator system will to some extent be experimental running on different renewable fuels with different performance and problems

The Bobcat (small earthmoving equipment) as seen through the round window.

being recorded.

It is ultimately planned to integrate all the energy sources with a special type of inverter. This inverter will be able to produce 240 AC, to run the tools and appliances. It will

Helen and Cathy put the finishing touches on one of the bluestone walls.

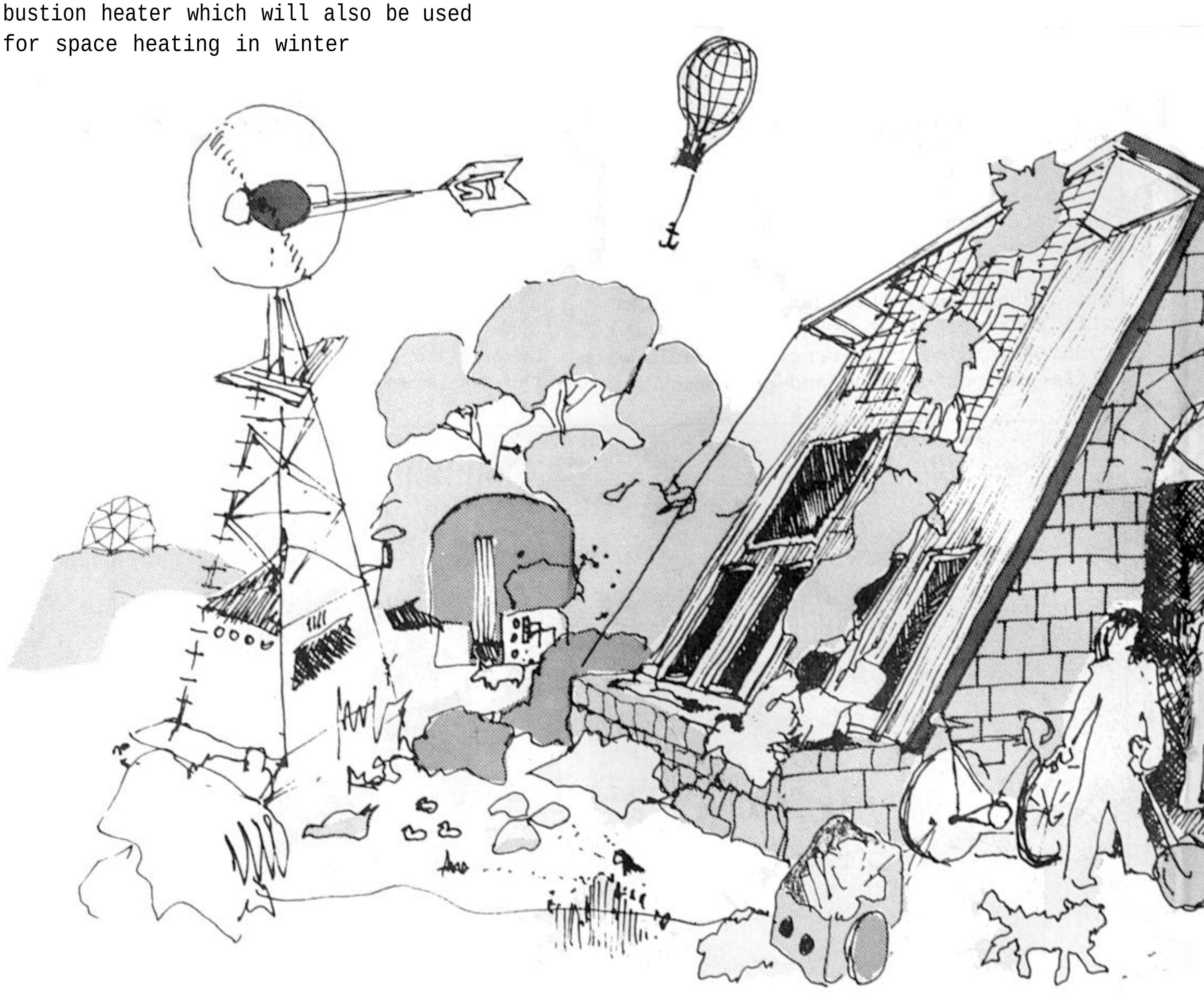
deliver up to 8 kW in bursts and 5 kW continuous. However the cost of the system will be well under $1,000 while the efficiency will be very high. The inverter will be the key to running all the workshop tools from solar, wind and water - a real breakthrough when in the past these energy systems have only been used for low power consumption equipment such as lighting.

As well as being used to generate electricity the sun will be used for solar water heating. Two 1 sq. metre panels will be used. The heating of water will be supplemented by a combustion heater which will also be used for space heating in winter

The Building

The workshop building itself is designed as a passive solar structure. The building faces north with a large area of clear fibreglass roofing material on the wall. This allows a large amount of solar radiation to enter the workshop in winter helping to keep the building warm.

In summer heat from the sun is kept out by deciduous creepers growing on a trellis in front of the north facing fibreglass.



Insulated shutters on the inside of the workshop also help keep the heat out.

The building is built of bluestone with a huge concrete slab foundation. This gives the building a large thermal mass which stores heat and keeps the temperature more stable.

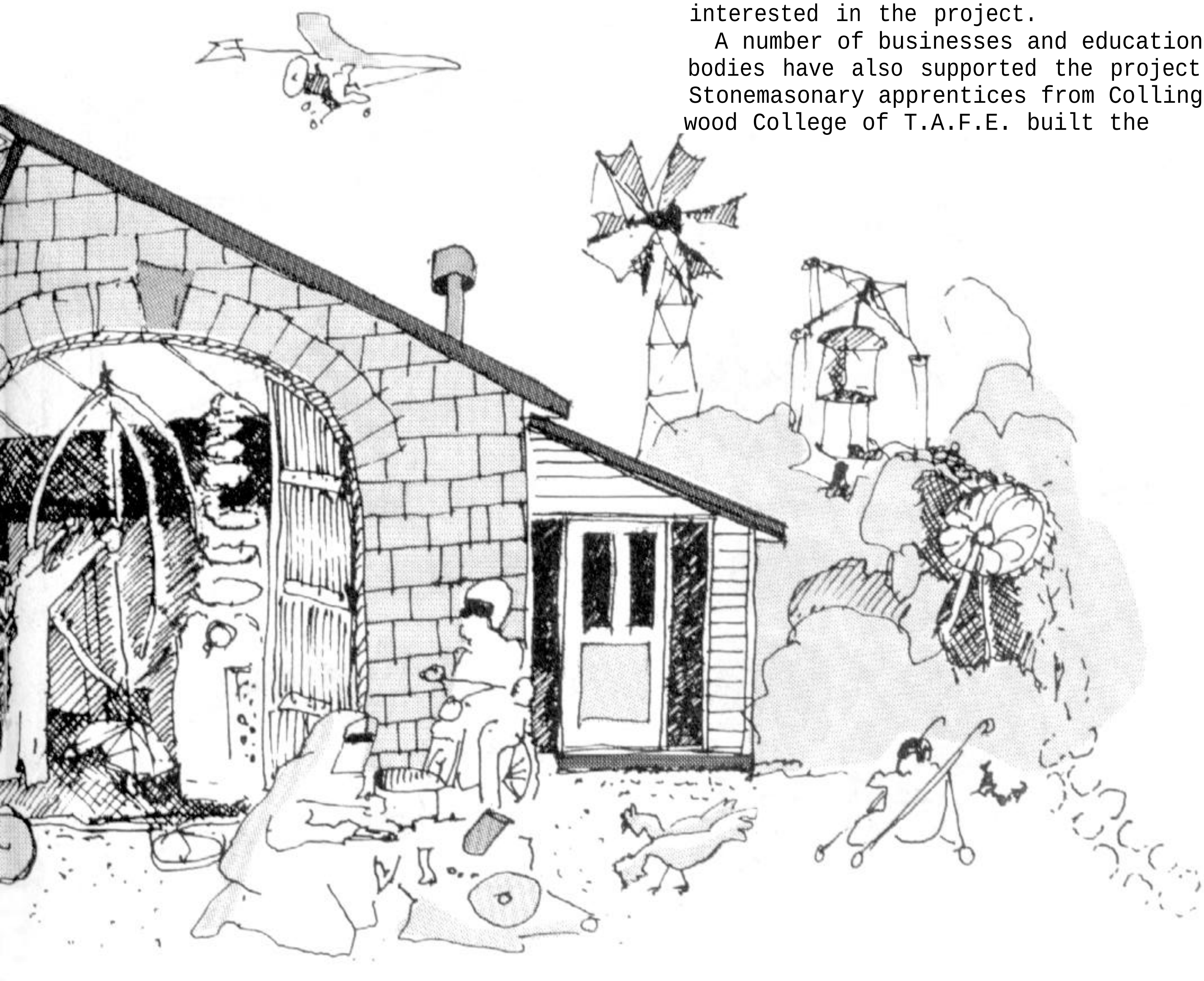
The whole structure can, be vented with large vents along the top of the building. Air is drawn into the building through large vents in the southerly walls. This venting system will allow hot air to be vented at night during hot summer weather. In winter a low speed circulating fan prevents hot air accumulating near the top of the roof.

Water is collected from the roof for use in the workshop. The water runs into a tank at ground level and is pumped into a tank in the roof to give adequate water pressure. From here water goes to the solar water heating system as well as cold water outlets.

Involving the Community

The workshop is being built by volunteers; members of the community interested in the project.

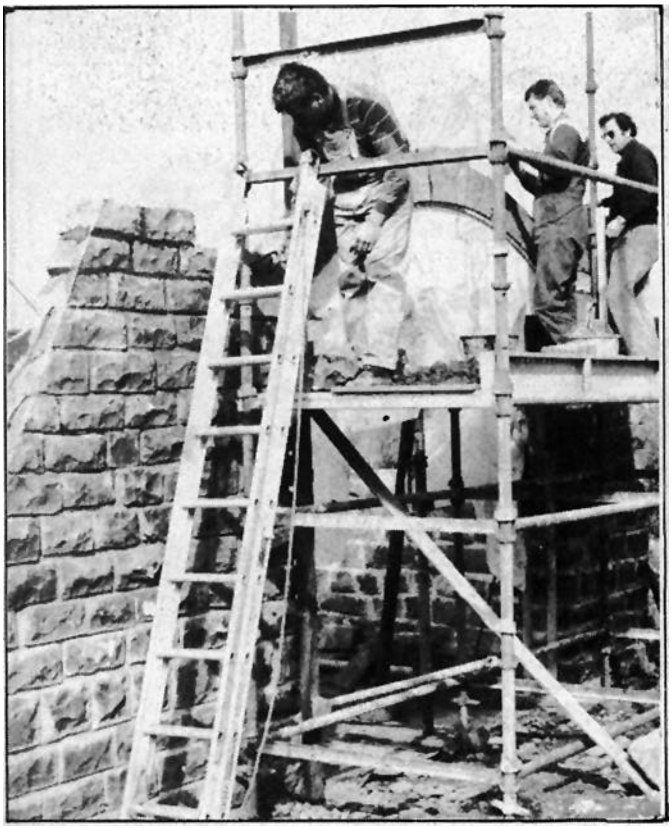
A number of businesses and educational bodies have also supported the project. Stonemasonary apprentices from Collingwood College of T.A.F.E. built the



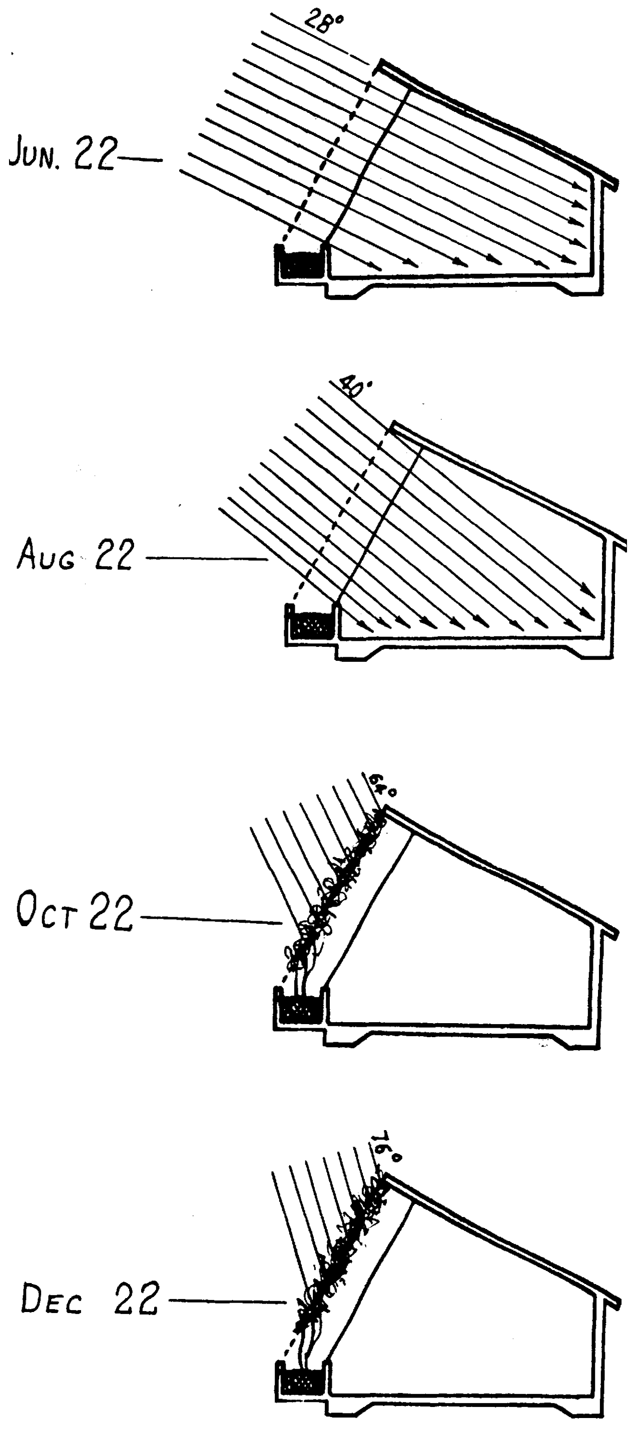
west wall complete with the massive bluestone arch.

Students from Preston T.A.F.E. building constructed the formwork for the arch and the huge timber doors which go into the arch. Survival Technology donated the wind generator, assisted in its erection and helped with the design of the building. Going Solar has made a considerable donation to the project.

The City of Brunswick Electricity supply Department assisted by providing solar cell panels, batteries, electronic components and part of the monitoring system. The Victorian Solar Energy Council has provided funding to pay for the wind generator tower, water wheel, electrical equipment and water tank. It also paid for a special educational and monitoring system.



Stonemasons from Collingwood TAFE at work on the workshops arch.



Solar penetration throughout the year.

The workshop with the walls approaching completion in late September.

The monitoring/education system will record temperatures inside and outside the building as well as all the electrical inputs and outputs of the building. This will give an excellent indication of the building's and energy system's performance. The information will be displayed in a very visual form as part of a program which describes the general operation of the building. Other programs will describe the operation of other specific aspects of the workshop. This system will also be used to monitor experimental solar equipment which will be erected near the building.

The Future

When finished the Solar Workshop will provide a novel and exciting example of alternative technology in action. People will have the opportunity to come to one of the many practical workshops on everything from wind power to blacksmithing. There will be opportunities for people to use the tools and equipment on their own projects.

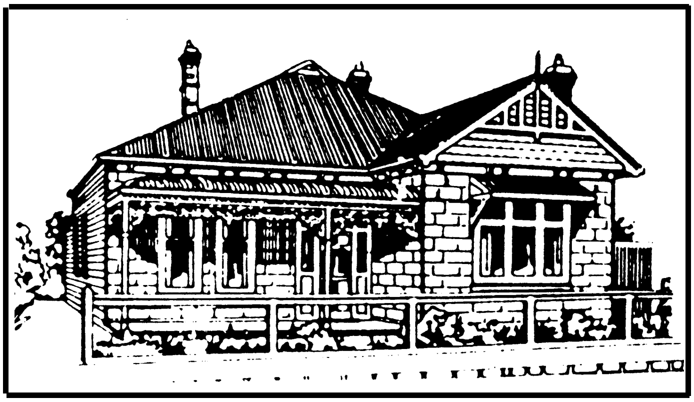
The workshop is nearing completion. However there is still time for people to see the building being put together and help in its construction.

Donations of money and building materials are being sought and will be gratefully accepted. without financial, material construction assistance a project such as this is impossible. But with a little help from our friends what is probably the most original solar building in Australia for years is becoming a reality. Ring the Alternative Technology Association on (03) 419 0250 for more details.

Retrofitting your House

Retrofitting is the art of adapting solar energy systems to existing buildings.

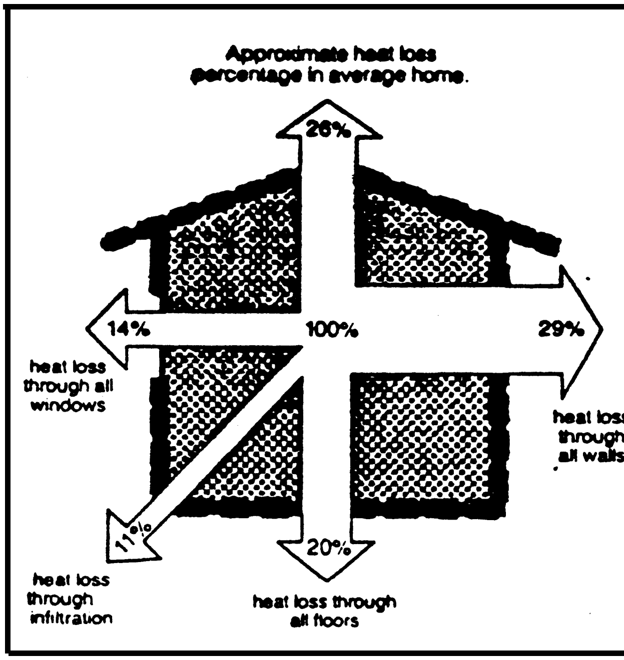
As most houses in existence have been built without using low energy and solar construction techniques, retrofitting will grow in popularity. Conserving energy is one of the first steps to take. The house has to be adapted to be a passive solar heat collector. Windows in north facing



walls can be increased to provide direct gain heating, sun spaces and window boxes can also be fitted or the north wall can be converted to trombe wall.

Thermal mass should be introduced into the house as much as possible. Most houses do not have enough mass in their structures. The mass can be increased by using water bottles or drums or major renovation such as concrete floors and new walls.

This article will now go on to show the steps that can be taken in retrofitting your home. The major steps involved are - insulation, weatherstripping, windows and curtains and vegetation.



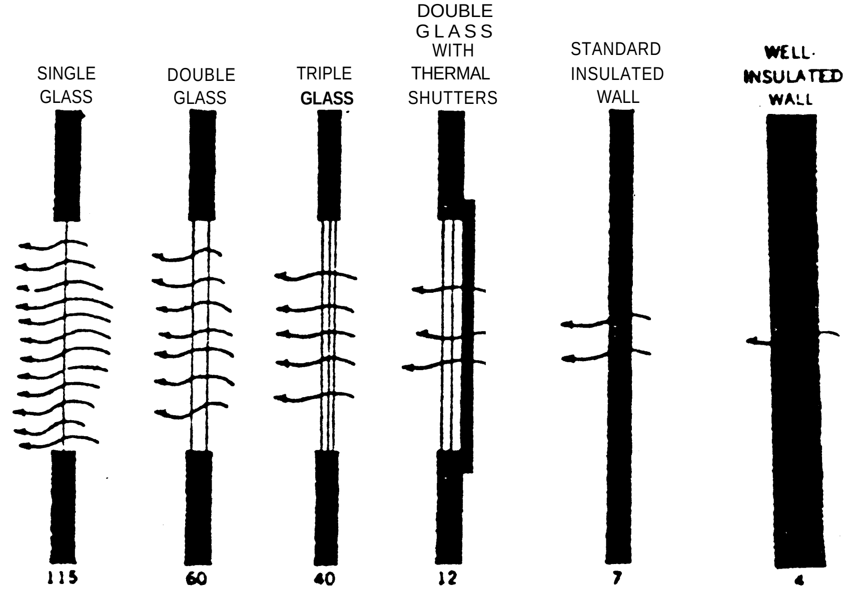
INSULATION

Insulation helps control the heat flow in and out of the building, through the walls and roof. Insulating materials are:

1. Fibreglass rock wool which comes as Batts, Blankets, Insulating board or loose fill.
2. Polystyrene foam.
3. Urea - formaldehyde foam (snow foam)
4. Sprayed polyurethane.
5. Reflective foil insulation.
6. Other insulating materials - these include cellulose fibre; eel grass; cork; straw and soft board.

INSTALLATION OF INSULATION

Insulation can be put in by yourself or by a contractor. When working out the area for insulation, space needs to be provided for joists and framing and extra space for wastage and mistakes.



An example of heat losses through various types of walls.

Materials you will need

1. Suitable clothing - overalls, gloves and facemask.
2. Temporary lighting.
3. Cutting tools - scissors, Stanley knife.
4. Fixing tools - tacks; hammer; staple gun or masking tape.
5. boards to make temporary flooring on top of ceiling joists;

Ceilings

Check for leaks. Leaks will reduce performance of the insulation.

Walls

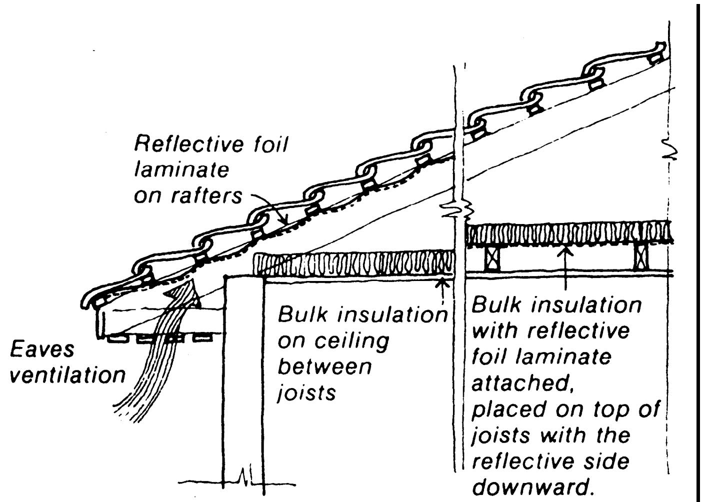
Far more difficult to insulate - best left to a contractor.

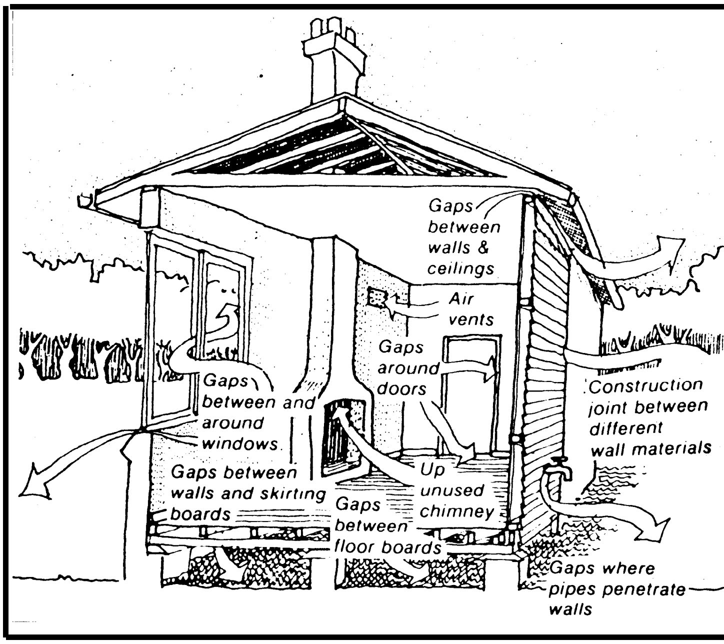
Floors

If you have timber floors and space to crawl beneath the floors, insulation can then be held in place by chicken wire nailed to the floor.

Windows

Double glazing helps to control heat flow, reducing heat flow by half. But it is expensive.



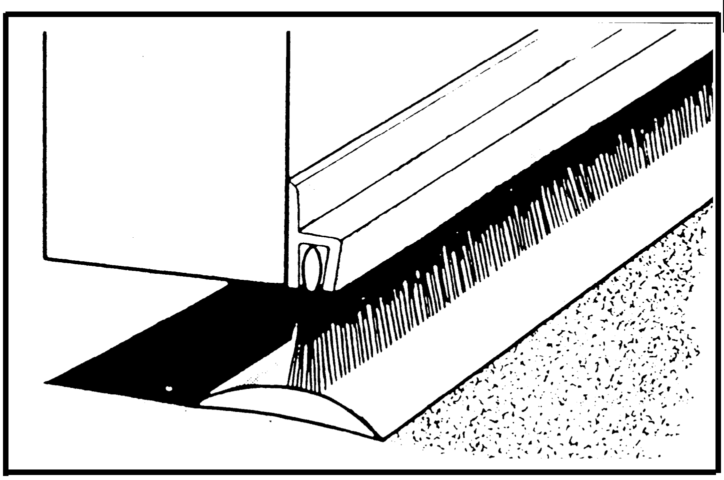


Major sources of heat leaks and draughts

WEATHERSTRIPPING

Over 20% ofunwanted heat loss is caused by air leaks. So sealing off leaks around doors and windows is vital. This can be done by:

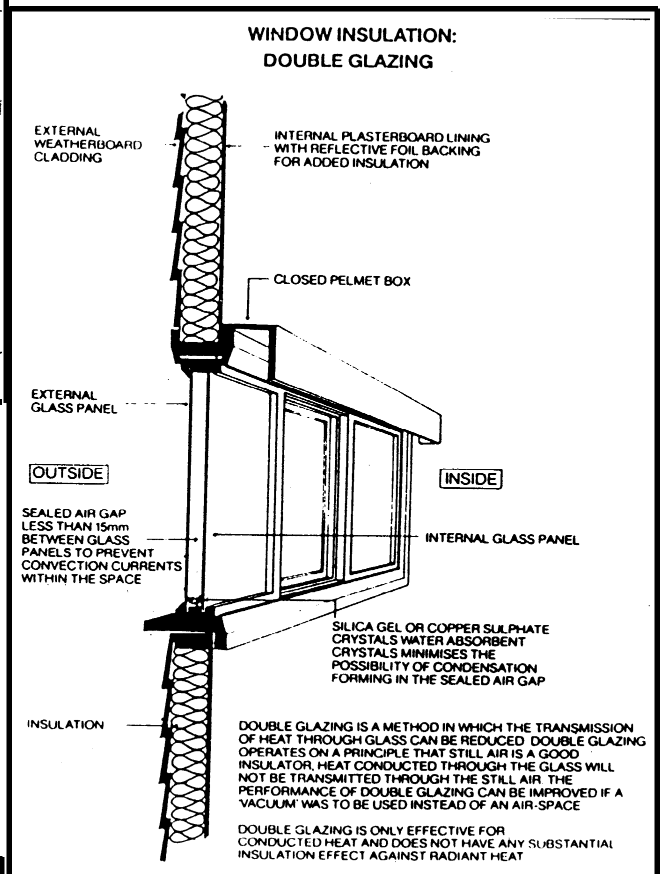
1. Foam strips
2. Draught excluders
3. Double glazing windows
4. Caulking along joints or cracks.



Draught Excluders

WINDOWS AND CURTAINS

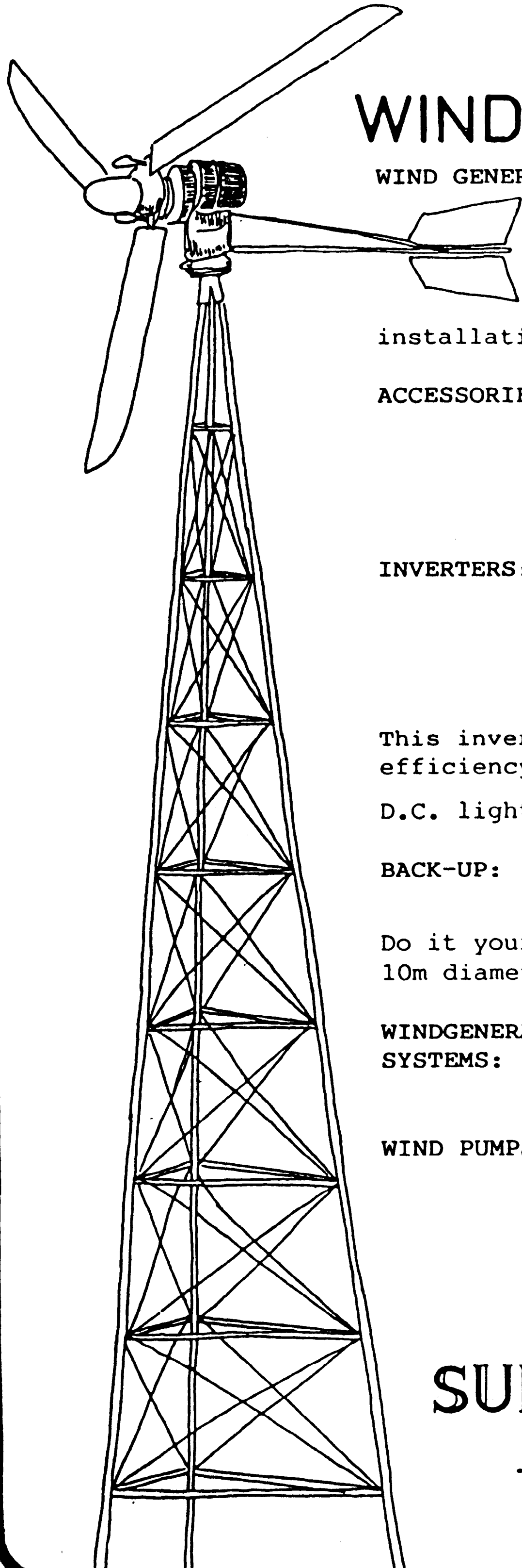
25% of heat is lost in winter and 35% gained in summer through windows, so thick curtains or curtains with a light or heat resistant backing should be used in conjunction with a pelmet.



VEGETATION

Vegetation can be used to supply shading in summer and exposure in winter which can then control heat flow to your house.

Deciduous trees which lose their leaves in winter should be placed on the north side of the house. They will shade the house in summer and allow the heat in during winter. Evergreens or creepers should be placed on the east, west and south to stop hot summer sun and provide shelter from winter winds.



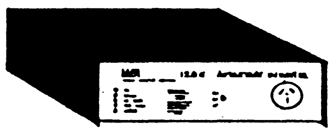
WIND POWER SPECIALISTS

WIND GENERATORS - REMOTE POWER SUPPLY SYSTEMS

New windgenerators: 125 watt to 10 kW D.C. Second hand windgenerators - fully reconditioned. Spare parts for new and second hand machines. Repairs, servicing and installation.

ACCESSORIES: Towers - free standing towers and poles. Tower cap adaptors, brake lever assemblies. Transmission cables. Voltage regulators and control panels. Deep cycle battery banks.

INVERTERS: WEA 'Autostart' solid state.



This inverter turns on and off automatically. Very high efficiency, guaranteed.

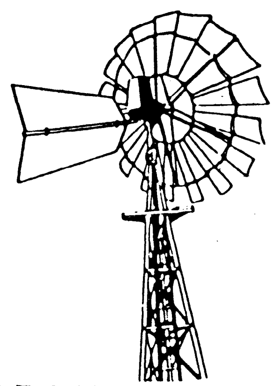
D.C. lights and appliances. Low voltage wiring parts.

BACK-UP: Generators. Heavy duty battery chargers. Solar photovoltaic and hydro generators.

Do it yourself parts - carved timber propellors, 1m to 10m diameter.

WINDGENERATORS - GRID INTERCONNECTION SYSTEMS: Size available: 10 kVA, 17·5 kVA and 55 kVA.

WIND PUMPS Fan sizes: 1.8m to 7.6m diameter. Towers, pumps and accessories.



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A.T.A. REPORT

News, Events and Activities of the Alternative Technology Association

As most of you who get the newsletter will be aware of, the Solar Workshop is nearing lock-up stage, with the west and southern walls now completed and Preston TAFE students working on the arch doors for us. In this issue of the magazine, we have included a feature article on the workshop to fill you in on the details of how it will actually run when completed, so I won't go into too much detail here about it.

A workshop management committee is being established over the next month to draw up guidelines for the use of the building when completed; the logistics of which will need a good deal of thought and discussion. However, by the end of the year we should have some details available for those of you who want to build with solar powered tools at the site. The committee will be an ongoing group with representatives from the A.T.A. and CERES (who hold the lease on the site) working on maximum community use of the workshop. In the meantime, we'd still like to hear from anyone able to put some time in at our fortnightly working bees. Whether you have building experience or are keen to get some, your help would be much appreciated.

And in our other activities - it appears that there's a lot of scope for practical workshops, with quite a lot of interest being shown in the Solar Education programme. The last workshop in particular, on Solar greenhouses was very popular, drawing in people with a general interest in solar power as well (of course) as keen gardeners. We're hoping to have similar courses in the future to cater for some of the many people who inquired about bookings and missed out.

Bob Fuller from the CSIRO ran the course, for which he produced an excellent set of introductory notes. Bob gave a detailed explanation of the notes with slides, explaining the principles of Solar greenhouses as well as the nuts and bolts of details of how to build them. A tour of a large greenhouse at Burnley Horticultural College was then followed by a look at a smaller model, ideal for the home gardener at the Collingwood Children's Farm. For anyone who's interested, the course notes are available from the A.T.A. for $1.50 plus postage.

★ The Free Access to Seeds Committee presents,

"A BAG OF DELIGHTS"

at the National Theatre, Barkly St; St Kilda
on Saturday NOVEMBER 10th at 2pm.

A Family Matinee of superb Comedy, Juggling, Mime and Magic

STARRING

SAM ANGELICO - Master of mime and magic,

★ PETER BRENNAN - Winner of New Faces National title, Australian Busking Champion, and juggler extraordinaire,

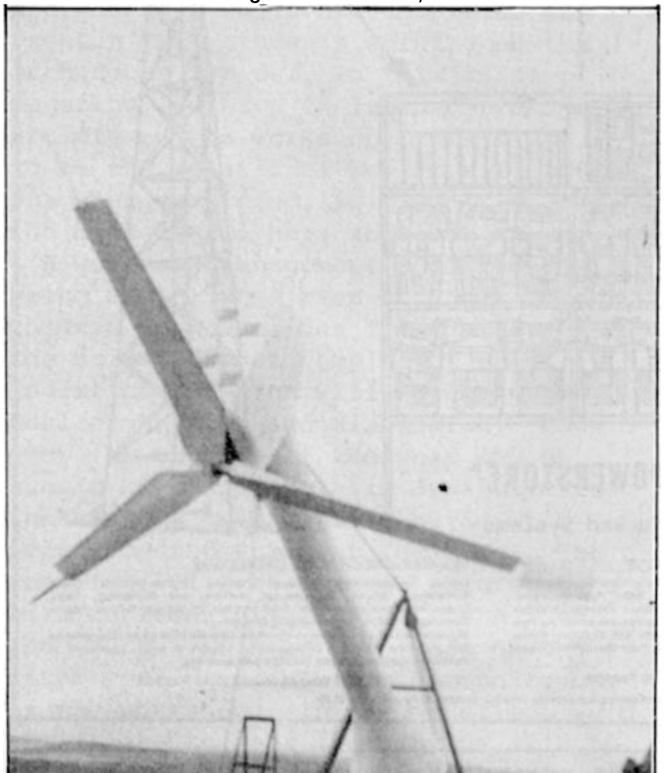
★ PETER GRAY - A one man Circus, as featured at the Victorian Arts Centre during the recent school holidays.

*PLUS a Surprise, Surprising Coordinator of Acts.

$4.90 Junior (Under 15), $5.90 Concession, and $7.90 for Adults. Bookings through Bass Outlets from 15-10-84. Proceeds to continue the campaign against the introduction of Plant Variety Rights into Australia.

Medium Size Windmill in United Kingdom

Since 1982 the Central Electricity Generating Board of the United Kingdom has commissioned two 300kw wind turbines- one at Carmarthon Bay in South Wales and at Burgar Hill in Orkney. An Alternative Technology Association member travelling in the UK describes the Burgar Hill turbine as 'a nice machine with a good sound',



Erection of the Bulgar Hill aerogenerator

The Burgar Hill turbine was the second machine supplied for remote power supply by the James Howden Company of the U.S., and was commissioned in September 1983.

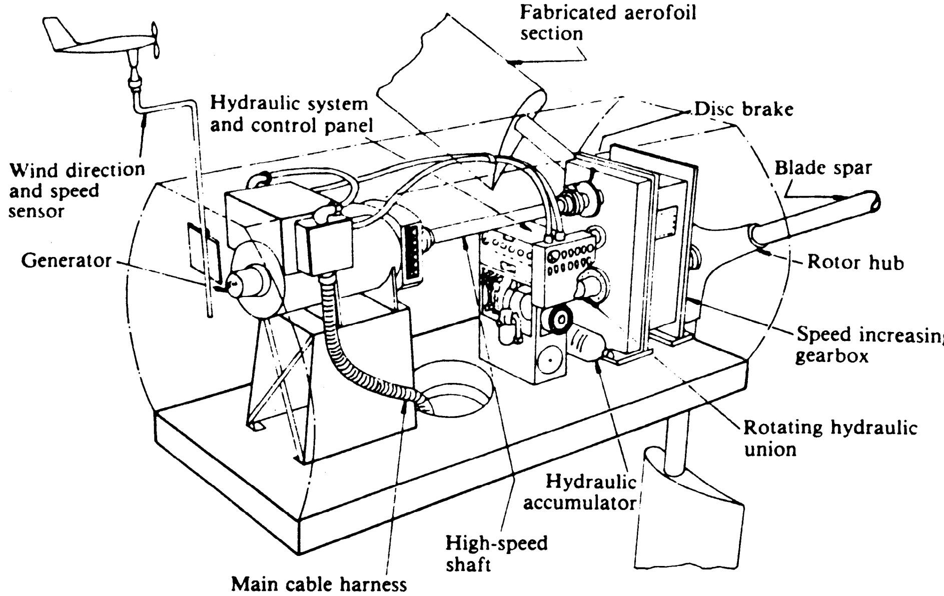
The wind turbine is designed to be transported by road in sections and erected without the use of special cranes.

The tower and rotor were assembled on the ground and raised to the upright position in forty minutes, using an 'A' frame and a hinged tower.

This method has also been successfully used to erect the Westwind wind turbine in Western Australia.

The Bulgar Hill 300kw machine is typical of the new generation of wind turbines, requiring very little maintenance, quick erection and good reliability. The upwind turbines are pointed into the wind by hydraulic motors controlled by a computer, acting from sensors mounted on the nacelle.

A computer controls the entire operation of the turbine, including start-up shut-down, 'yawing' into the wind and synchronisation with the electricity grid, as well as over-seeing a number of fail-safe devices.



Carmarthen Bay aerogenerator nacelle layout

The rotor speed is controlled by moveable blade tips which are hydraulically held in position against spring pressure, giving automatic shut-down in case of hydraulic failure.

The total cost to install a similar machine in the U.S. is $US500,000. The wind, however, is free.

Installing a Ceiling Fan

Can the installation of a ceiling fan improve the efficiency of a heater? Having installed one in our house, the answer is no doubt a Yes.

We live in a Victorian Cottage with 11 foot ceilings and the rooms we heat are a lounge and kitchen with an area of approximately 300 sq. ft. Our heating consists of an open fire and a Gas Wall Heater. As the open fire heats by radiation we do not use the fan with it. However, as the Gas Heater works by convection, i.e. it heats the air and then circulates it, the use of a fan greatly improves its efficiency.

The table below shows how the temperatures vary from floor to ceiling, with and without the fan. As can be seen with the fan on the temperatures are more even. We haven't actually checked the running costs as this would be difficult, firstly because we have other gas appliances and secondly because both heater and fan were installed around the same time. However, we can definitely run the heater on a lower setting with the fan on and as shown by the table, the floor where the heat is required benefits from a raise in temperature.

As the fan runs on low power, around 60W, its running costs are minimal, so a net saving on gas is still achieved.

Of course in summer the fan can also be used for cooling, so its a year round appliance.

	Roof	Floor
Fan Off	26°C	15°C
Fan On	22°C	20°C

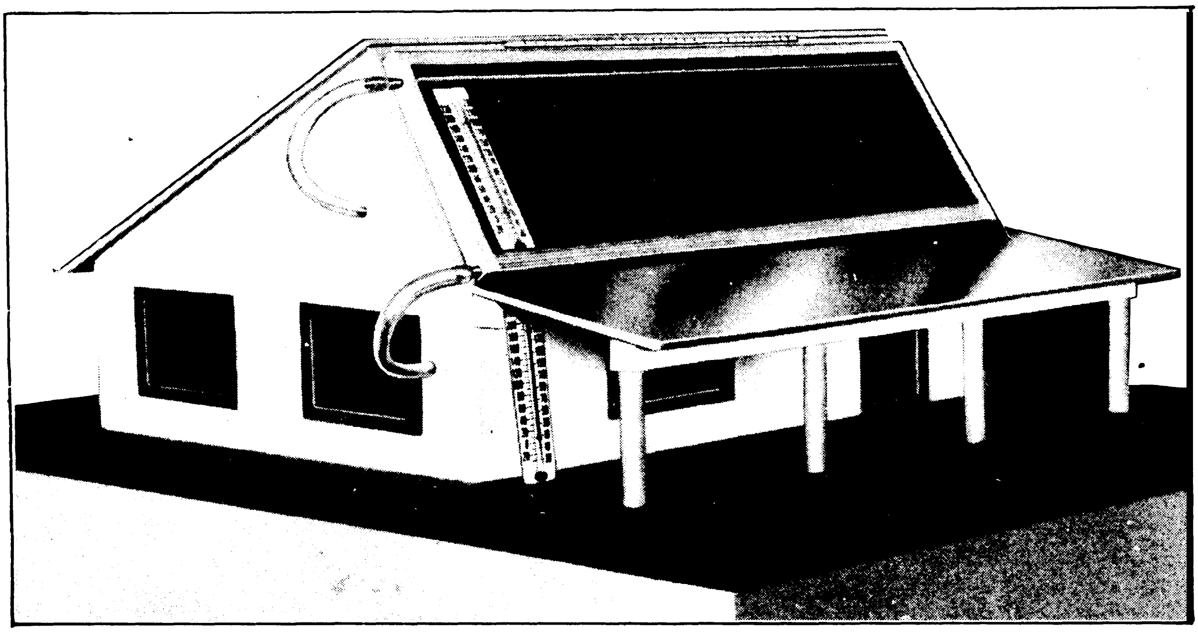
David Anderson

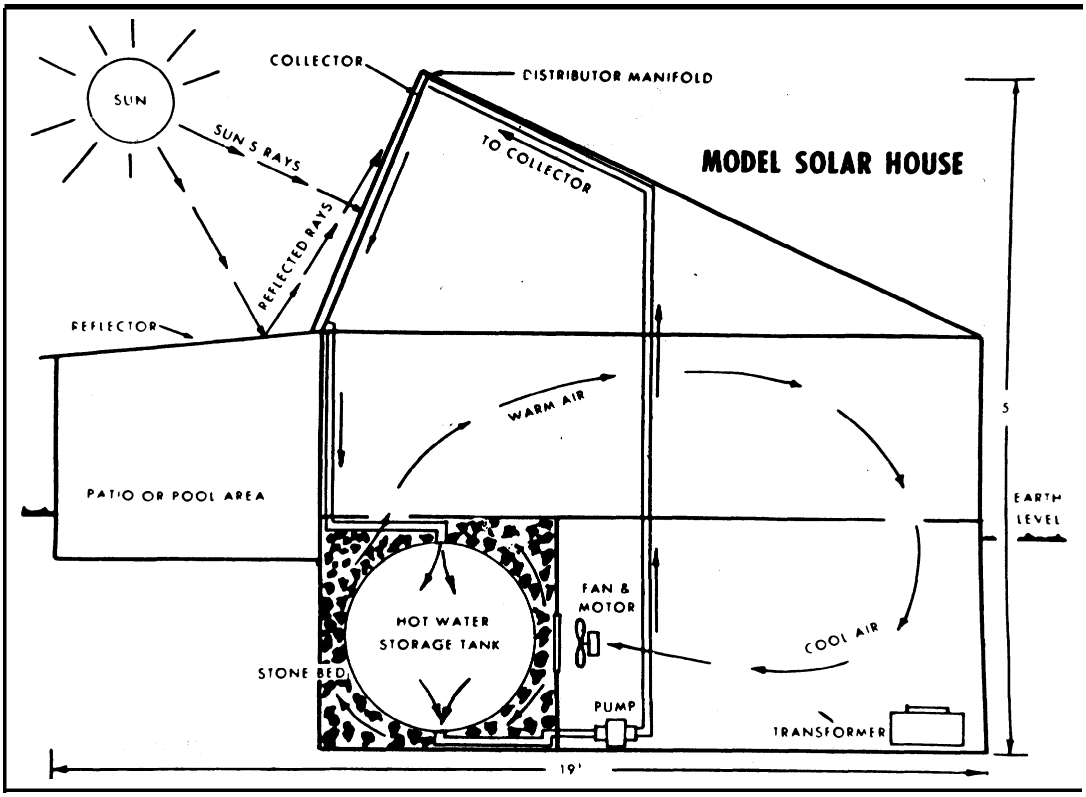
Simple Solar Projects

These ideas come from a book called "Solar Energy" by John Hake. The book was published in 1968 by Franklin Watts, and although some of the ideas are a little dated (notably the section of photovoltaics) there are a number of good ideas on simple items you can build. Some of the ideas are specifically orientated toward education, such as the solar model house while others have more general appeal. The book generally retails at about $8.00, you may be able to pick one up for a few dollars as I did.

Working Model of a Solar House

A model solar house demonstrates how solar heat is converted into useful forced-air heating in order to comfortably control the temperature in a home. It is an actual working model that will operate in a sunlit classroom - or else out of doors in the sun, on a table located by the window of your classroom. Once it is built, various experiments can be conducted to show the relationship between the temperature- outside the house and the warmth at various locations inside. As in the real house it is modeled after, pumped water is the medium used to carry warmth absorbed by a dark panel mounted in the roof of the house to a storage tank in the cellar of the model house. A cluster of small rocks surrounding the system's water tank absorbs the heat from the tank. A small fan blows the air in the model house through the rock so as to warm the air before it is recycled through the house and back to the fan,



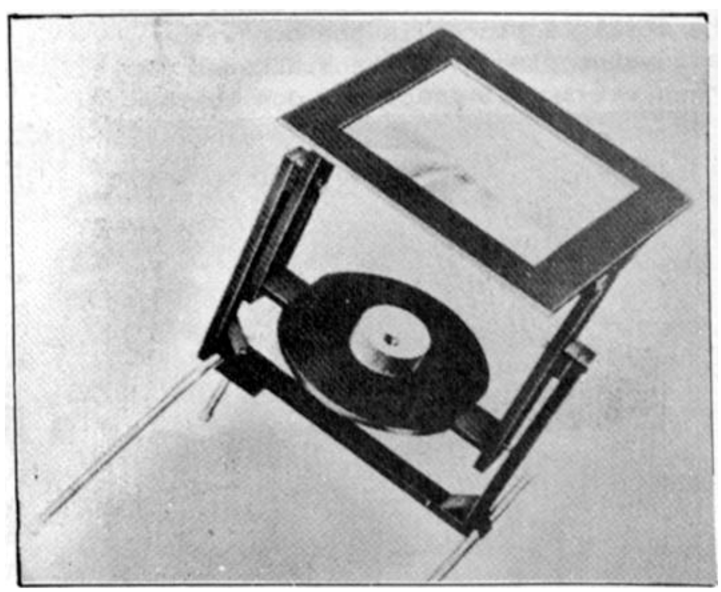


The model solar house can be built from parts found in various electrical and electronics supply houses, and simple hardware and lumber materials.

high temperatures. Only a large forge or an oxyacetylene torch is able to generate heat at such temperatures using conventional fuels.

Building a Solar Furnace

When you ignite a piece of paper or char wood by means of a magnifying glass, the heat needed to achieve combustion is derived by concentrating a large area of sunlight onto a very small spot. The larger the area that is concentrated onto a small spot, the greater the amount of heat that can be obtained, A solar furnace can be made from a large Fresnel of the type used in overhead projectors. With this furnace and lots of sunlight, you can conduct experiments that include the melting of metals. Although this furnace is but a miniature edition of the large solar furnace located in the French Pyrenees, it is able to generate very

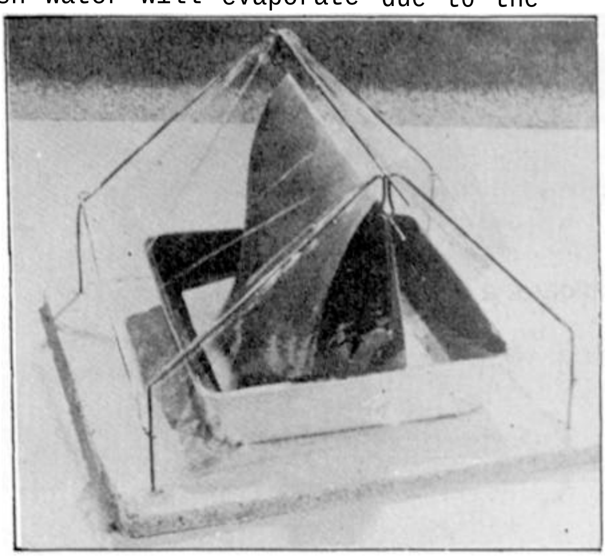


Making a Solar Still

The most serious problem facing persons stranded or adrift at sea due to air or ship disasters is that of obtaining enough drinking water to survive.

Here is one interesting example of a very simple device for obtaining fresh water from the sea. This is a small collapsible bladder or balloonlike device made of plastic that distills fresh water from ocean water. It employs the heat of the sun to carry out the process. By floating the still in the ocean (tethered to a lifeboat) the heat of the sun evaporates fresh water from a small measure of salt water that was earlier poured into the still. The cooler surrounding ocean water condenses the evaporated water on the walls of the still. The condensed water settles into a collecting trap in the still where it can be drawn off by those in need of the fresh water.

Making a working model of a solar-powered still is relatively simple. It can be made of several coat hangers, some plastic wrap or similar plastic material, a blackened aluminium pan, a piece of dark terry-cloth towel, and two shallow saucers or film cans. When the still is placed in the sun with salt water placed in the blackened pan,' fresh water will evaporate due to the sun's heat, condense on the sides of the plastic wrap "tent", and then drip off into the catch-saucers located near the drip-off points. While you can experiment with your own tentlike configurations, the accompanying illustration of a greenhouse-like still will give you an idea of one approach to the experiment.



Solar still tent made of plastic wrap and coat-hanger wire. Wire is bent to form the two end frames and to hold the top layer taut. Note blotting paper in tray for speeding up evaporation of salt water in tray. Moisture condenses on plastic wrap and drips down sides of tent.

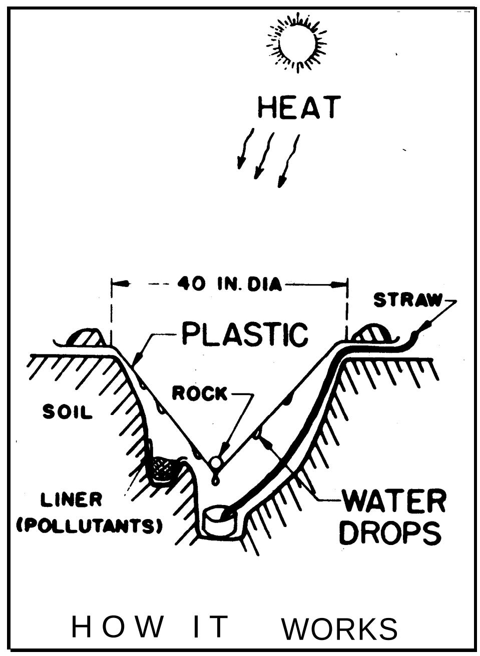
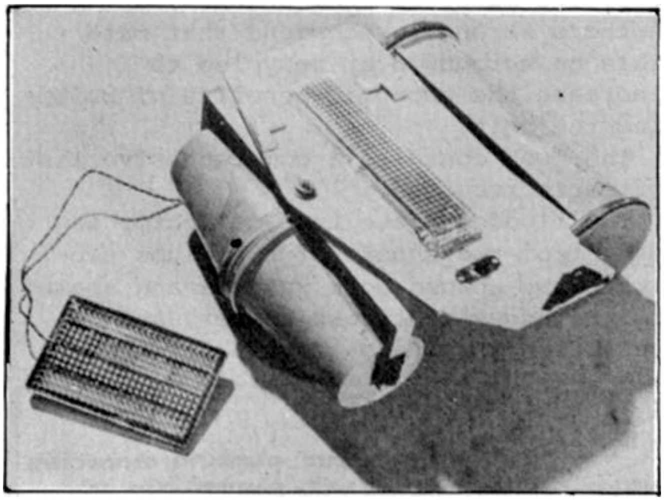


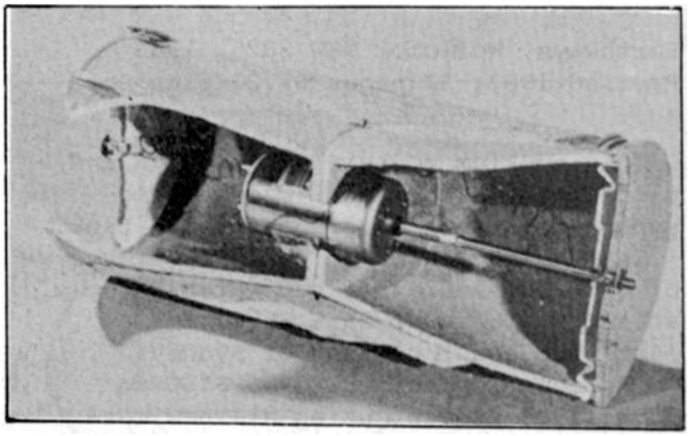
Diagram of solar still that condenses and captures ground moisture from sun's heat.

Solar-Powered "Gamma Goat"

The Gamma Goat is a military vehicle specially designedto run on rough terrain and over swampy land. The model shown here does not look too much like it, but it does the same thing - and it runs on sunlight. The model is made of readily available materials. It will operate on as few as four solar cells and an Incabloc or Dunker gear-head motor with an output of about 1-5 rpm. With this low-speed motor, the Gamma Goat will negotiate very rough land and will float and move on water. If you want the model to move fast (and if you confine its use to smooth surfaces), a gear-head motor of 10-15 rpm can be used to run it at faster speeds. More speed can also be had by using additional solar cells in series to increase the voltage



going to the motor. In this model, the motor is fixed in the center of the rear paddle-wheel float and turns about its own fixed axle. Power from the solar cells is fed to the motor through the brass eyelet bearings at each end of the assembly.



Cutaway in drive roller shows gearhead motor fixed to core of roller. Shaft through bearing (right) is pinned to frame of vehicle. When shaft tries to turn, drive roller turns instead and propels the vehicle forward.

Book Reviews

Earthways, Wollombi NSW 2325, 1983 Revised 1983, 32 pages $5.20 plus postage.

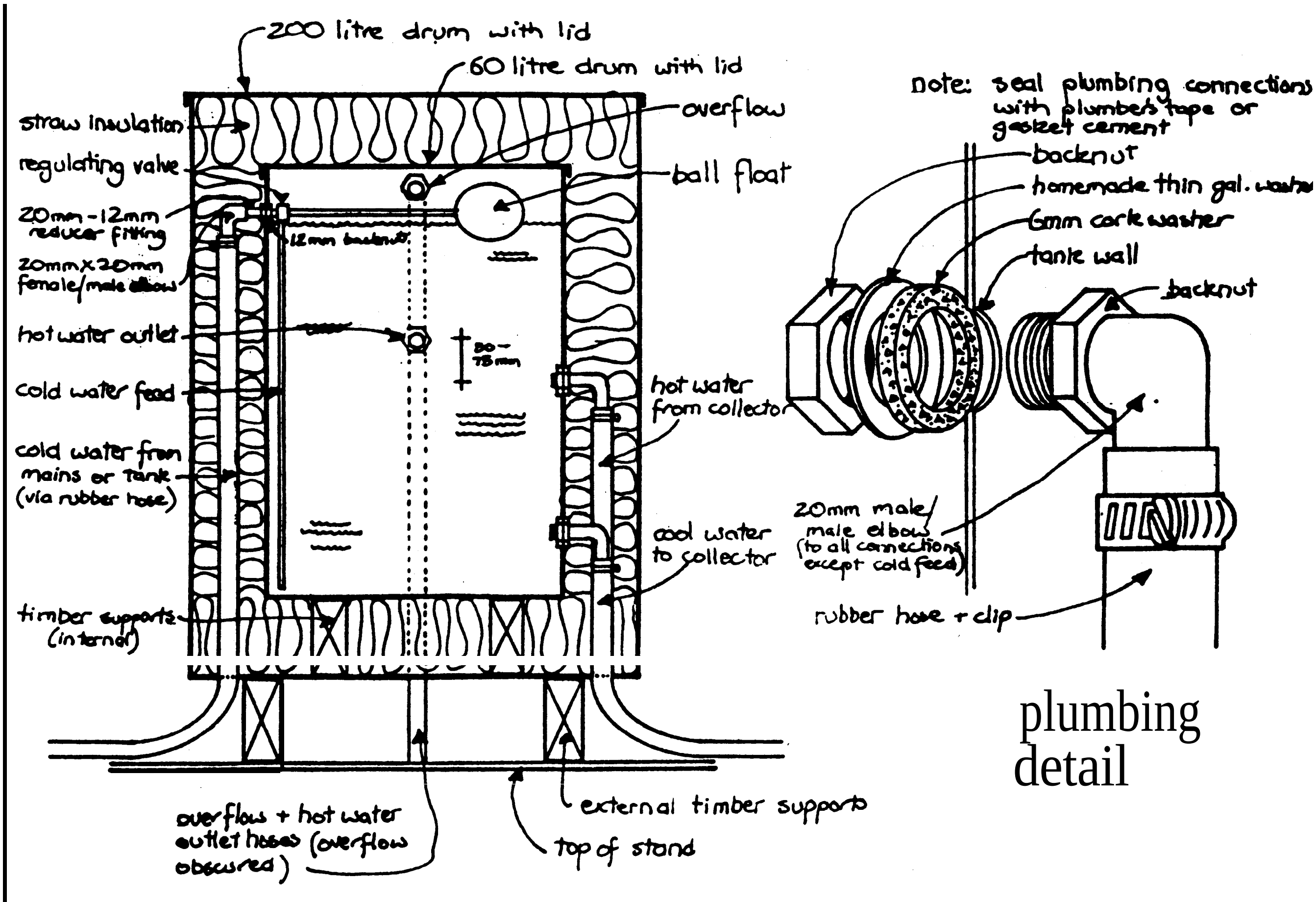
This booklet contains the design and plans for a simple home-made thermosyphon solar hot water heater and tank.

The design claims to provide a range of 60 - 100 litres of hot water per day at temperatures of 25 - 65°C, for a lattitude equal to that of Sydney.

The cost is claimed to be $150 to $200 (1982 prices) using all new materials, and the time taken to construct the unit without installation is 30 - 40 hours, using hand tools. The area of the collector is 1.6 square metres. The authors have set out to make the construction process simple, requiring no soldering or welding. Second-hand and recycled materials can be used, and the authors strongly recommend that materials be scrounged or recycled to increase the economic benefits of building the unit.

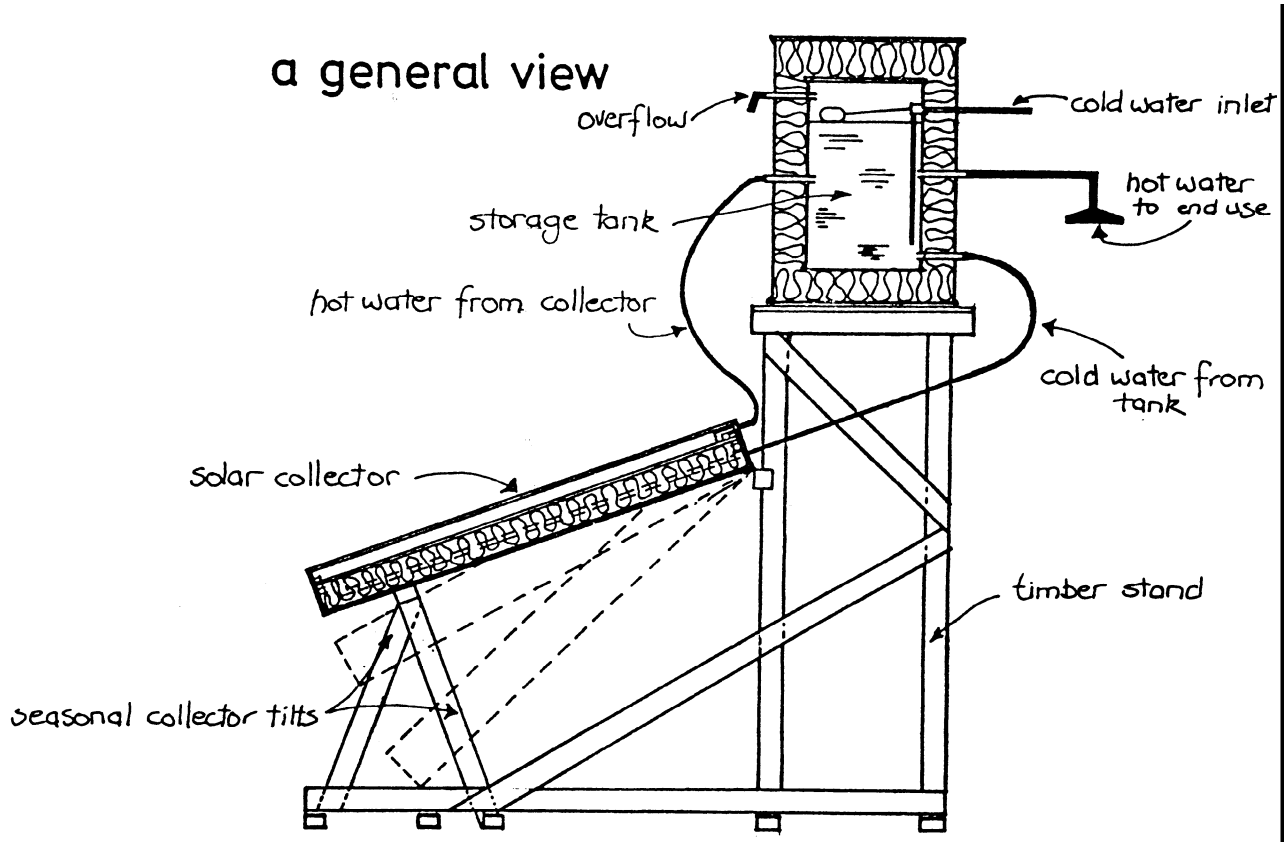
The book contains a comprehensive list of parts required.

The flooded-plate type collector is made from two sheets of zincalume separated by spaced cork washers and sealed at the edges by a cork gasket, and several options are offered for the



storage tank

plumbing detail



storage tank.

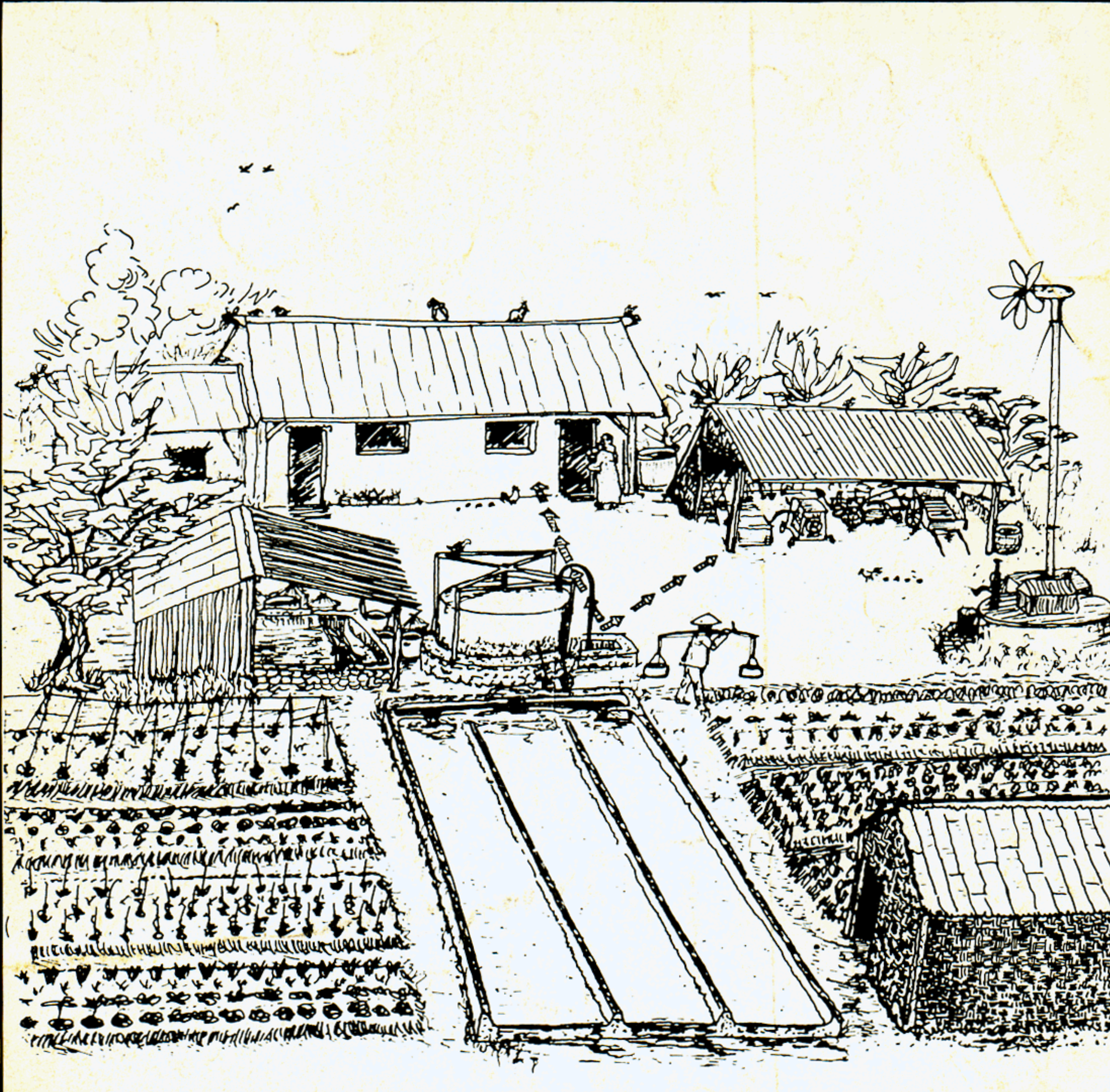
The text is well illustrated by numerous diagrams and is easily understood. The unit is said to have a life of five to six years, the reasons for this being corrosion of the tanks and absorber, weathering of the collector casing and degradation of some rubber hoses.

People considering this design are advised by the authors to check the condition of their water supply for an acid or alkaline condition, as it may affect the economic benefits of the system. The authors suggest that a commercially made unit would be more cost-effective as a long-term investment, lasting at least 30 years compared to a possible rebuild every 5 - 6 years for the D.I.Y.

The benefits of this system are that the owner-builder of the unit can service and repair the system themselves, and the initial outlay is much smaller. Because of this, this system might be suitable for isolated situations where the simple parts can be accumulated and replaced when required by the owner.

A reading list is contained at the back of the booklet, and the authors can be contacted by writing for advice on any problems.

Readers living in NSW can attend a weekend workshop on building the water heater which will be held on the 26th, 27th and 28th of October 1984, Food is included and bring your own tent. For more details contact Earthways Farm at the above address.



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