

Soft Technology

Alternative Technology in Australia No.11 Feb/Apr 83. \$1.25

**Wind
Generator Towers**

Natural Cooling for Summer

Human Powered Vehicles

**Build a VERY CHEAP
SOLAR COLLECTOR !**



Editorial

Soft technology devices make fascinating toys. Simple enough to build at home they provide hours of fun designing, welding, testing out on windy hills or attaching to the roof of your house.

However there is more to appropriate technology than the technical gadgetry. If it is widely implemented appropriate technology can contribute significantly to creating jobs and community income. While economists cannot explain, let alone agree on any way out of the current "recession" (i.e. depression) soft technology provides hope. It is cheap, it works, it doesn't squander resources and energy. It makes people's work more efficient but doesn't make them redundant, unproductive statistics.

George McRobbie, author of "Small Is Possible" discussed these ideas at the E.F. Schumacher Memorial Conference in Sydney last November. Many of Schumacher's predictions about resource costs, laughed at in the booming '60's, are coming true today, in the form of inflation and unemployment.

Together Schumacher and McRobbie set up the Alternative Technology Development Group which develops practical intermediate-scale technology for the third world (in the third world, a digging strike or a wooden plough represent small-scale technology). McRobbie showed slides of dozens of practical inventions produced by the group.

Speakers from Australia, the Pacific and South East Asia also discussed their discoveries and schemes operating. One Australian APACE member has developed a method of blending alcohol and

diesel as an efficient fuel, a technical breakthrough of enormous significance. The Conference discussed issues ranging from methane production and motorized pushbikes to micro-hydro schemes (a bit different from the Franklin) as used in the village of Iriri in the Solomon Is.

McRobbie suggested that cities exploit country areas in the same way as industrialized nations exploit the third world, extracting cheap raw materials. Country communities cannot compete with centralized manufacturing especially when the Government bends over backwards to assist large scale ventures, offering tax concessions and cheap electricity.

The local, labor-intensive workshop is squeezed out, replaced by inflationary capital-intensive complexes, highly mechanised to cut down on labour. Country areas are worst hit by the resulting unemployment, as is happening in Australia now.

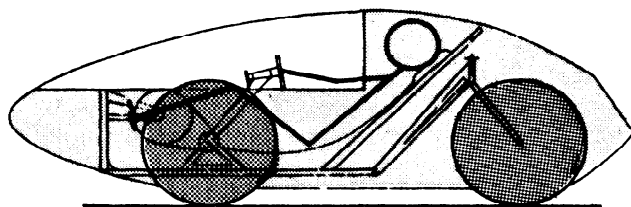
McRobbie said Governments must reverse their priorities and encourage local self-sufficiency, local employment.

Australia could concentrate on producing appropriate technology using our existing expertise - solar heating and cooling, solar electric devices, specialized automobile building and rebuilding workshops, recycling (Australia wastes a lot).

Instead of allowing our economy to be buffeted by every fluctuation in world resource prices we should make ourselves self-sufficient developing industries to meet our own needs. Appropriate technology not only saves resources but employs unemployed people, one of the few resources there is no shortage of.

Barbara Hutton.

Contents



- 4 ENERGY FLASHES
- 6 RECYCLED SOLAR COLLECTOR
A solar water heater to build very cheaply from recycled bits and pieces.
- 10 WIND GENERATOR TOWERS
The different types of tower and a design for an attractive free standing pole tower.
- 12 HUMAN POWERED VEHICLES
Human powered vehicles, past, present and the potential for the future.
- 15 A.T. UP TOP
What one person found while travelling on his holidays.
- 16 THE A.T.A. REPORT
News, information and reports on the A.T.A. and its activities.
- 18 NATURAL COOLING FOR SUMMER
Some simple but surprisingly effective ways of keeping cool during a heat wave.
- 20 CUSTOMIZING A COMMERCIAL SOLAR WATER HEATER
Making a commercial solar water heater work even better.
- 22 AN ENERGY SAVING CHECKLIST FOR URBAN HOME BUYERS
Find out how your dream home scores in energy efficiency.
- 28 THE LETTERS PAGE
Pedal powered drying and solar pumps.
- 30 BOOK REVIEW Methane: the anaerobic flame.

Human Powered Vehicles

Page
12

This issue of Soft Technology was edited by Mick Harris with help from Tony Miller, Alan Hutchinson, Tony Stevenson, David Anderson, Richard Nankin, Barbara Hutton, Ian Grey, Michael Gunter, Ron King and Howard Morine.

Comment, Contributions and Criticisms are welcome and should be sent to the Alternative Technology Association, 366 Smith Street, Collingwood, Victoria, 3066.

Advertising in the magazine is available for products and services relevant to the magazine's content. Rates are cheap and enquiries should be sent to the above address.

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Cover: Reconditioned wind generator on free standing pole at Mt. Toole-be-wong, Victoria.

Energy Flashes . . .

Solar Cell Plant for Oz

Solarex Pty. Ltd. is about to commence the construction of a new photovoltaic cell production plant in New South Wales. In the past Solarex has imported their cells from the U.S. and assembled panels and systems in Sydney. The new plant will produce the solar cells as well as putting together the panels and systems. The new polysilicon solar cells will also be manufactured at the plant.

Unfortunately Solarex does not anticipate the construction of a plant in Australia will reduce the cost of solar panels a great deal. Some slight drop in price may take place, partly due to the lower costs of a local plant, and partly due to competition with other local solar cell manufacturers such as Tideland. However it is difficult to judge just how much the price will be affected.

Today, Boera villagers are pumping 9,000 gallons of water a day using solar electricity and a sturdy self-priming pump which fills four holding tanks at the community well and water station.

"People come to the well every day and are happy", beamed Guba Mea, local church deacon and village spokesman.

The system is designed for simplicity. Sixteen ARCO Solar panels are bolted into an array which produces 8.8 amperes of electricity at 64 volts under noonday sunlight.

Power from the array runs a one-half horsepower self-priming centrifugal pump. Pump speed varies with intensity of sunlight. The pump runs slowly early in the morning, builds up to a maximum as the sun climbs and tapers off in the afternoon.

Villagers draw water for drinking, cooking and bathing from three taps below the tanks, which are open from 6.00 am to 6.00 pm.

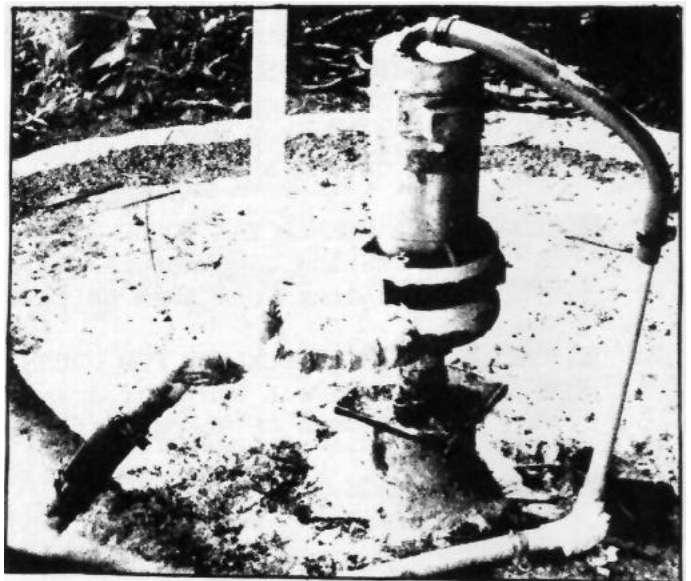
Arco Solar News.

Solar Pump for New Guinea Village

As in countless rural communities around the world, virtually no one in Boera village, Papua New Guinea, knows how to repair complex machinery beyond routine maintenance.

Boera bears testimony to this predicament in that it owns a hand pump with stripped gears, a defunct windmill, a broken gasoline set, and sundry broken parts for each device.

All were used in the village over the past 30 years to pump water for the 1,000 local inhabitants.



Pump at Boera Village

W.A. Solar/Hybrid Power Station

A solar/diesel/hybrid power station opened on November 19 at Meekatharra W.A. is said to be the first of its kind in the world. Mirrors on 30 pedestals within the solar "farm" section of the station concentrate solar radiation onto absorber tubes containing thermal oil. This is pumped to a storage tank which also collects waste heat from the diesel engines at the station. Oil from the tank is then transferred to a boiler, and steam produced there generates up to 100kW. Half of this is attributed to the solar heat and half to the diesel heat, Before the solar and heat recovery facilities were added to the power station it was rated at 800kW. Cost of the project was \$3.6 million, shared by SECW 46%, Federal Republic of Germany 38%, M.A.N. 13%, NERDDC 2%, and SERIWA 1%.

E.R.T. Energy News Journal

New Wind Turbine

A Mildura man has developed a new concept in windmills which could revolutionise windpower water-pumping.

Mr. Ken Cobden, a pilot of 27 yrs experience, has replaced the usual fan bladed windmill with a device that looks more like a jet engine.

The 'Cobden Wind Turbine' will pump with more power, without noise and operate at extremely low wind strengths.



It is being produced by Cobden Wind Turbines Pty. Ltd., in a Mildura factory and more than 70 orders have already been received,

Mr Cobden has been working on the concept for three years. Using his knowledge of aerodynamics he built the turbine on a suction principle with a low pressure similar to that of a tornado within which enormous wind strengths are created.

Blades of the turbine were set between outside and inside pressures using the same principle as the wing of an aircraft. The breakthrough came with the shape of the cowling forward of the blades which helped increase the airflow to a point where the wind strength is multiplied within the turbine,

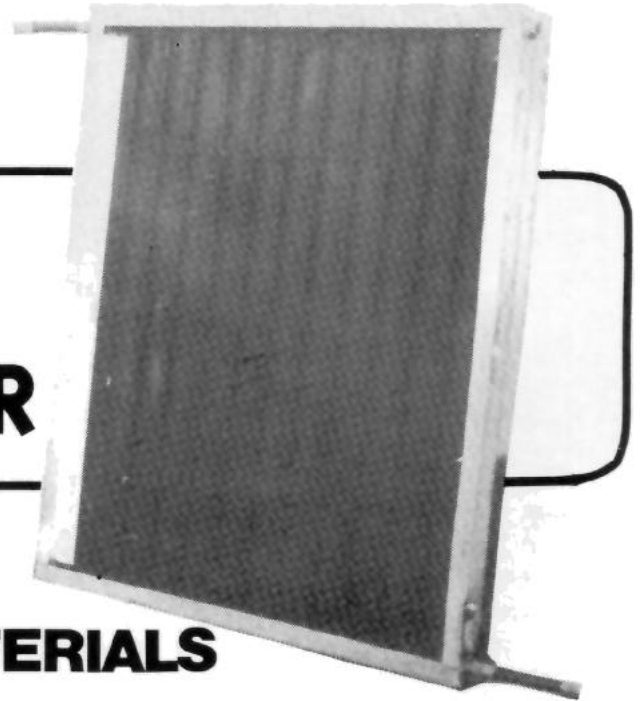
Manufacturing started on July 5, '82, with an initial staff of six, which has since grown to 13.

Mr Cobden's company manufactures the wind turbines, the towers and the drive mechanisms.

Energy Scene.

BUILD A CHEAP

SOLAR WATER HEATER



FROM RECYCLED MATERIALS

A CHEAP COLLECTOR

Back in August 81, we published a build your own solar water heating collector article. The collector described was fine but it cost \$180 to buy the materials. This makes it rather a waste of effort since you can buy a commercial unit for that. As a result of discussions with some other ATA members, I decided to see how cheaply I could make a conventional type of flat plate solar water heating collector. My first attempt resulted in a collector costing less than \$40 and its design, construction and performance is described below,

Materials

There are two ways to make a less expensive collector:

- (a) change the design to use cheaper materials;
- (b) get materials at a lower price by using secondhand materials,

The aim of the game is to use both methods to reduce the price without reducing the collector efficiency or lifetime too much. A target lifetime of about 5 years was adopted based on the twin premises that 'if you've

built it yourself you know how to fix it' and 'who knows what will come over the horizon in the next few years and make all this redundant', Some people want to include the cost of your own labor in the price comparison. This is not valid for most of us, because we can't actually go out and get a job for the 20 hrs of our spare time that it takes to make this collector (also you'd have to work for better than \$8 per hr).

One major problem with anything built with scrounged materials is that the costing can be unreproducible because you may not be able to get the same things as cheap as I can. However, all components of this design are readily available,

This design is the conventional one of riser tubes attached to an absorber plate which is enclosed in an insulated box with a glass cover to let the sunlight in (see fig. 1). Considering each part in turn -

- (a) Riser Pipes. I decided to make a collector suitable for mains pressure operation. This leaves copper pipe as about the only real option given the corrosion problems with

iron pipes and the expense and low conductivity of plastic pipes. Where do you get cheap 13mm (½") copper pipes? Suggested places were scraped air-conditioning systems and offcuts from plumbers. I found considerable difficulty in obtaining any secondhand copper pipe and so I resorted to buying it from a secondhand metals dealer. Copper pipe is sold in two forms - as rolls of annealed tube and as straight 6 metre lengths of hard drawn copper. For collector use, it is much easier to buy the straight tube rather than have to straighten out a roll, I bought two 6m lengths plus 2.5m of 19mm (¾") (to use as end pipes) for \$20 at Elgin scrap metals in Carlton, Melbourne. This was the most expensive part of the collector.

(b) Absorber Plate. The pipes are attached to an absorber plate. The plate absorbs the incident sunlight and conducts the heat along to the pipe. Copper is desirable for its good conductivity and compatibility with copper pipes but it too expensive, (So is aluminium). I decided to use corrugated iron which can be got for about 30c/metre at Whelan the wreckers (or other secondhand building material places). The thermal conductivity of galvanised iron is about 5 times lower than copper and so the riser pipes need to be closer together than for copper. I put one pipe in each corrugation giving an 8 cm spacing compared with about 12 cm for copper. Analysis of the absorber plate (assuming heat loss from any point on the plate is a linear function of the temperature of that point above ambient (not T) gives a simple (approximate) expression for the efficiency of the plate absorber

$$\eta = (1 - \frac{UT}{H})(1 - \frac{U}{12dk} w^2)$$

where H = incoming solar energy density, U = heat loss coefficient, T = temperature of riser tube above ambient, w = spacing between riser tube, d is plate thickness and k is the conductivity of the plate. The efficiency decreases as the square of the distance between riser pipes.

For H = 900 w/m², U = 10 w/m²/°C
T = 35°C, d = 0.4mm and k = w/m/°C
then $\eta = 61 (1 - 24w^2)\%$
for w = 8cm, the efficiency is 52%.

For a copper sheet 0.4mm thick and 12cm spacing, the efficiency would be 56%.

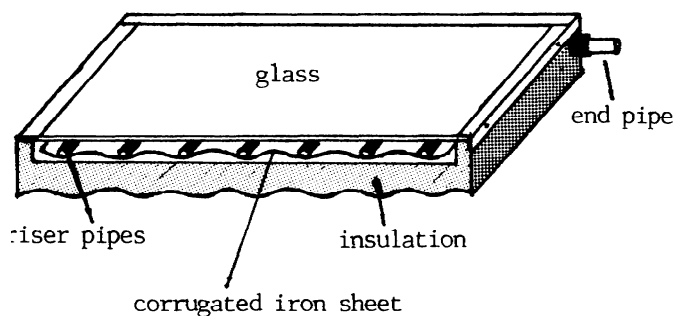


fig I. Collector construction

So you can see there isn't much to gain from using copper. Corrosion is a potential problem with dissimilar metals in a hot wet atmosphere. The zinc coating on the iron should provide a sacrificial protection layer and then the black paint will act as a further barrier to corrosion. Due to the difference in thermal expansion between copper and iron, there is a very slight bowing of the collector when it's hot. Good thermal contact between pipe and plate is obtained by soldering.

CHEAP COLLECTOR

(c)Glass Cover. The glass cover is needed to stop wind loss from the plate, It also absorbs the radiant component of heat loss from the plate, To get a sheet of normal window glass 1 metre square costs about \$15-18, If you used tempered glass (which is usually thicker) it could cost up to \$40. My solution was to buy a secondhand window from the wreckers - these cost about \$5-8 at Whelan the wreckers depending on how good a condition the frame is in and how the bloke feels at the time. Pick one with a rotten frame and haggle. Carefully chip the putty off and remove from the frame and you've got a cheap (but fairly fragile) cover. You then build your collector and box to suit the size of the glass sheet (so you don't have to cut it).

(d) Box. The box stops back loss, supports the absorber and glass cover and provides some protection against the weather. It should be rigid enough to support the glass without flexing when lifted. Wood is easy to work with, but expensive. I made it out of sheet metal which is cheap and a little more durable but harder to work, The back is a sheet of corrugated iron and the sides are made from a length of cliplock roof decking. The 2.4m length of cliplock cost \$2 at Whelans.

The box needs insulating with about 5-7cm of insulation. You could use a variety of materials - the main requirements are that they withstand the heat and will not disintegrate if they get slightly damp due to condensation. The cheapest would be old newspaper, finely shredded and put in plastic bags, I used pieces of polystyrene foam which I got from two sources - waste bins on building sites and old styrene fruit boxes which you can often find being thrown out by restaurants.

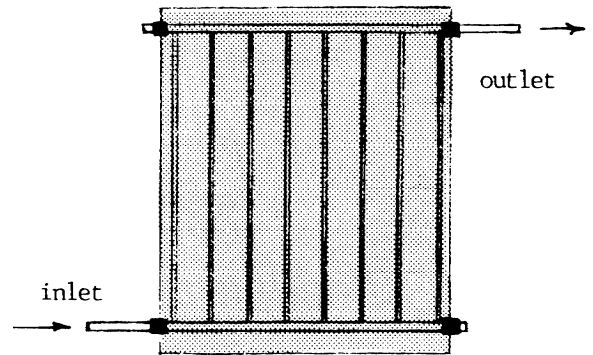


fig 2(b). riser pipe arrangement (front view)

Construction

It is assumed that you have (or can borrow) the following tools - a drill, a jigsaw with a metal cutting blade or a hacksaw, a pop riveting tool, a hammer, tin snips and a small oxy welding outfit (such as the oxy propane portacolt). At the meeting where I showed this collector design, it was pointed out that the small oxy welder, jigsaw and pop riveter were a bit too exotic for most people to get hold of (this is where good people networks are useful), and that it is too high a level of technology for some less technical people to cope with. I accept this, but answer it as follows. You can get by without the jigsaw, but it does make it a lot easier, you can buy a cheap pop rivet tool for \$8.00 in Coles (it's poor quality but should last for a while) and if you can't borrow a welder, then take it to one of the small welding shops around and get them to do it for you. For those who can't handle this technology, I've designed another type of collector which uses very simple technology, is cheaper than this one and will show this at the next meeting.

Riser Assembly

The first step is to obtain all the materials. Remove glass from the

frame. Be very careful as it is easy to crack the glass at this stage. Measure the glass. The length to cut riser pipes is about 5cm shorter than the longest side of the glass, which allows for mounting the glass. You need 11 tubes (one for each corrugation). If they are larger than 1 metre, you'll have to join one of them in the middle. Cut the 19mm tube into two 1.25m lengths, mark out the holes for the riser tubes so that each tube sits at the bottom of a corrugation and leave enough at each end for them to stick out either side of the box (fig. 2(a)). Centre punch to accurately locate the drill and then drill with a 1/8", then a 1/4" and finally a 1/2" drill. If you've got a drill that will only take a 3/8" drill shank, then you need a small round file and lots of patience or else get a 1/2" drill with a 3/8" shank (you can get them in Coles for about \$6.00).

Put a mark on the ends of the riser tubes 6mm from the end and assemble the tubes into the end pipe so that the mark is level with the outside of the end pipe (which will leave just a small amount sticking through on the inside). Clean up the join area and silver braze together. To braze properly, you have to heat the copper to a cherry red colour. The silver brazing rod will then melt and flow easily (a little brazing flux is useful but not essential). Sit the end pipe on a brick and have the

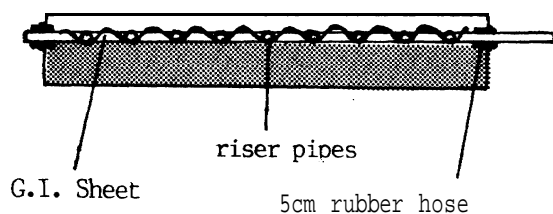
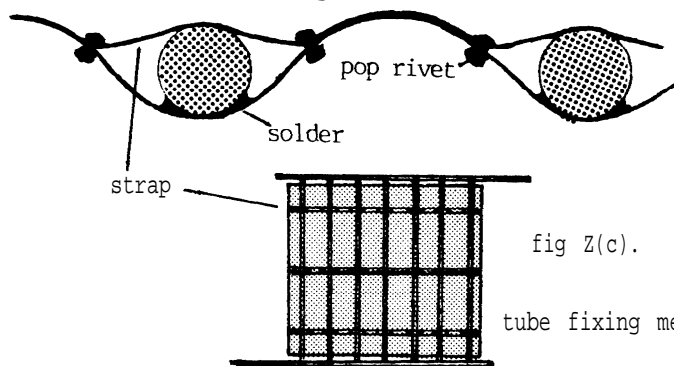


fig 2 (a). riser pipe arrangement (side view)

risers vertical so you can weld all the way round at one go. If you have to join a riser tube, cut a piece of 3/4" pipe about 1cm long, heat and allow to cool to anneal (soften) it, cut 1/4 of the tube away and wrap it over the area of the join. Braze it into position making sure it is watertight. The short ends of the end tubes are sealed by cutting 8 evenly spaced 15mm deep slots in the end, bending the flaps over flat and brazing the lot solid. Test to see if the whole structure is watertight.



Absorber Plate

Cut the corrugated iron sheet to fit between the end pipes and clean its surface back to bare metal. The tubes are held in tight contact with the sheet during soldering by three straps pop riveted on (fig. 2 (c)). Cut three 20mm straps about 1 metre long from the G.I. sheet offcut. Pop rivet as shown in fig. 2 (c) making sure the tube is tightly held against the plate. Solder the tube to the plate starting in the middle and working toward the end of the tube. (Heat the copper tube much more than the plate). Clean up plate and tubes and paint the side with the tubes on black. This completes the absorber.

The Box

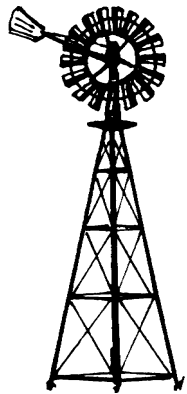
The sides of the box are cut from the piece of cliplok roofing. First

CONTINUED PAGE 25 ...

WIND GENERATOR TOWERS

When setting up a wind generator or wind pumping system, the tower is a vital part and must be correctly designed and placed or the project may prove ineffective,

The cheapest tower is the guided tower, when a single column tower is supported by a number of guide-wires tensioned to the ground around the tower bale. Though the most economic design I don't like it as it requires extra maintenance, extra space and a risk of failure if one wire were damaged.



The most common tower is the free standing tower, usually 3 or 4 leg steel frame design, with height to bale ratio of about 5 to 1 and the legs set in concrete, it stands strongly. We use this sort of tower most commonly, but some people don't like the look of it.

Another option, which looks very nice is the free standing pole. With freeway lighting towers, the technology for free standing poles is well developed. These use tapered galvanized steel pipes, and have been used for wind generators with great success.

It is quite possible to build one yourself using stepped lengths of normal steel pipe. The diagram shows

a 12m (40 ft.) pole I recently drew for a client in New Zealand who wished to build one himself. This one is for a 2 Kw wind generator, smaller pipe sections could be used for a smaller wind generator,

A pole of this type, but 90 ft. in height was recently installed near Melbourne. The owner-built tower now holds a 1000w model 'L' Dunlite Caravan a 32 volt battery bank. The concrete block for it measured 14 ft. x 14 ft. and 2.5 ft. thick.

Including the cost of the concrete required the pole tower isn't as cheap as a normal tower, but if the looks are important, it would be worthwhile.

Tony Stevenson,

COMMUNIVERSITY

A new cooperative community is currently being established in North-eastern NSW.

It is based on a 1650 ha. working farm title to which has already been secured. Developments planned include the construction of a residential village, various community facilities, a Learning Exchange (the Comm-University) and a Healing Centre.

It is envisaged that income from the farm will finance these developments in the early stages. Eventually they will become income earners in their own right. The planned population of the community will be about 250 people, including children. Shares are available at \$1000 each and each adult member must own 5 shares to secure residency rights. For further information please contact:

Communiversiity, 18 Selbourne St., Hawthorn, 3122.

DUNLITE WIND GENERATOR



POLE

4.5m (15ft) x 150 (6") PIPE
 4.5m (15ft) x 200 (8") PIPE
 4.5m (15ft) x 250 (10") PIPE
 ALL 6mm (1/4") WALL THICKNESS

NOTE: 9.10 x 12" HOLES WILL GIVE A
 POLE TO SUIT A 5 KW WIND GENERATOR

DRILL AND INSTALL FULLY
 FOR BRAKE WIRE.

FOOTING SLAB

2400 x 2400 x 500 DEEP
 CONCRETE WITH REINFORCING MESH.

JOINING PIPES

OVERLAP 500mm
 CUT 2 DISCS FOR EACH
 JOIN, 1" MS. PLATE
 MACHINE TO FIT
 I.D. AND O.D. OF PIPES.
 FULLY WELD TO SMALL
 PIPE, FIT & WELD
 TO LARGE PIPE.

BASE PLATE

500mm DIA 25mm (1") PLATE
 DRILL 8 HOLES ON 400mm
 P.C.D. 30mm (1 1/4") DIA
 WELD 8 WEBS, 100 x 100mm
 x 45° BETWEEN HOLES
 FULLY WELD ALL HOLES

DRILL 8 - 1/2" HOLES
 FILL WITH WELD

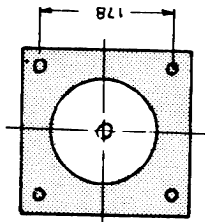
NUTS & WASHERS

RAG BOLT ASSY

2 PLATES, 300 x 850 x 25mm
 DRILL 8 HOLES, 26mm DIA
 ON 400mm P.C.D. IN EACH
 WELD 8 550mm x 25mm
 BOLTS IN PLACE

MOUNTING PLATE

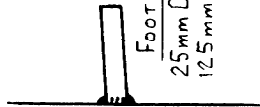
225mm x 225mm
 13mm MS. PLATE
 DRILL AND TAP
 4 HOLES, 1/2 B.S.W
 WELD TO PIPE
 DRILL 25mm DIA
 HOLE IN CENTRE



LOWER SECTION OF PIPE

FOOT PEGS

25mm DIA M.S. ROD
 125mm LONG, WELD.



TITLE:

12m FREE STANDING WIND GENERATOR POLE

SCALE:

1mm=1m (1:100) & 10mm=1m (1:10)

DRAWN:

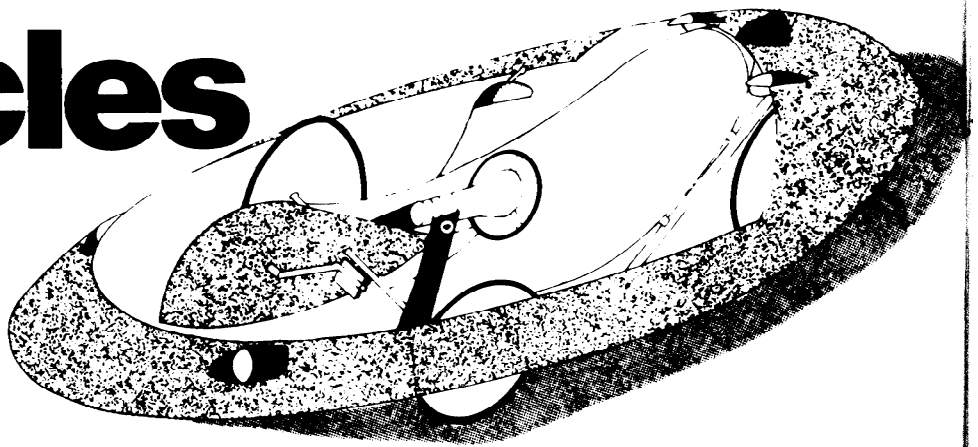
TONY STEVENSON

AUG. 1982

DRG. NO.

SURVIVAL TECHNOLOGY

Human powered vehicles



The modern history of human powered transport must start with astonishing vision of Leonardo Da Vinci whose fascination with the flights of birds and attempts to translate his observations in practical human powered flight have long intrigued historians, Da Vinci's visions in this area proved sterile but with cycles he had a most incredible foresight, a recent discovery in Spain of sketches made by one of his pupils on the back of one of his drawings of the 1490's shows a striking familiarity to the modern design complete with saddle chain drive cranks and step up gearing, but Da Vinci was so far ahead of the then H.P.V. technology, that he had no apparent influence on the direction it took, and not for a further two centuries did a 2 wheel vehicle appear and it was not for 4 centuries before the chain driven bicycle we know today was developed.

The Flowering of the Bicycle

The roots of the bicycle is an 18th toy upon which children would gallop a stick with a horse's head at one end and sometimes a wheel at the other, about 1790 someone put a non-steerable wheel under the head end of

the stick, a saddle in the middle to make an adult version of this toy - this "dandy" or "hobby horse" was a significant aid to fast walking or running. The weight of these devices, the unsprung wheels and high friction bearings and Britain's unmade roads must have restricted their use to the dedicated or masochistic.

A German agricultural engineer was impressed with two wheeled transportation to traverse the forest land over which he had responsibility, he started the development by making the front wheel steerable, these velocipedes enabled people to beat the times achievable by merely walking and the human powered utility transportation had arrived, indeed the speed of a light weight English version was 16kmh - so fast it was considered dangerous by London police who outlawed its use. Velocipedes had a major disadvantage yet to be overcome, they were propelled by being pushed along by the feet on the ground and the opportunity to lift one's feet were limited and the distance by the length of the stride,

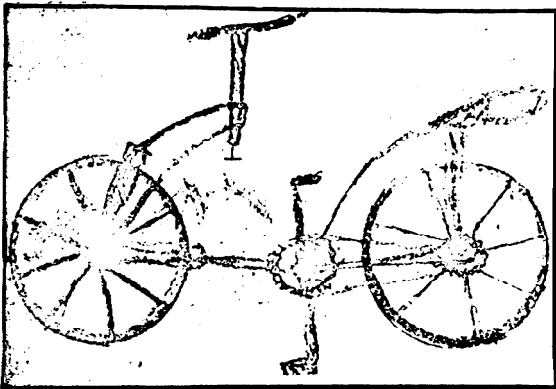
The really outstanding discovery of the period was that one could maintain one's balance on a two wheeler and this

finding led quickly to the true bicycle, propelled by foot driven cranks.

In 1890 a Scotsman used connecting rods to join swing cranks to cranks on a rear wheel which was larger than the front, one swing of the legs could now carry the rider about 12 ft.

The bicycle's influence on the lifestyle of the middle-class of the late 1800's was enormous, mobility was suddenly dramatically available to people who had delighted in touring the country side on a regular basis.

By the turn of the century all of the features of the modern bicycle had emerged including the longitudinal spoked wheel, pneumatic tyre, ball bearings which had been sketched by Da Vinci, speed increasing chain drive, another Da Vinci concept, multispeed transportation which could be used with externally geared hubs to enable riders to change mechanical advantage at will, but just as these innovations were coming into their own the exciting world of the automobile and later the aeroplane attracted bicycling pioneering engineers, sadly the art of bicycle design remained virtually stagnant from the turn of the century until now.



A sketch done by one of Da Vinci's pupils some 2,000 years before the modern bicycle was developed:

Modern Bicycle Design

Athaw in bicycle design started only recently. The annual races held since 1974 by the human powered vehicle association have been an important catalyst giving rise to an astonishing range of racing H.P.V.'s. The association founded by Chester Kyle a professor of mechanical engineering at a southern state university holds its annual contest amongst human powered wheeled vehicles. These can be propelled by any number of riders as long as no energy storage is involved.

The pace of development under this competitive pressure has been rapid compared with the small increment that records are broken in track and other human power events.

When Prof. Kyle organized the human powered vehicle association he did not confine competitors to the restrictive design formula used in most bicycle racing circles within a couple of years races were being won on recumbent designs on which the rider lay with feet forward rather than the upright posture.

Unfortunately recumbent bicycles suitable for racing are not suitable for commuting with briefcase and business suit, but none the less they are the cutting edge of development and have painted the way toward the Phase 111 cycle.

Future Cycles

The phase 1 cycle, that is the "Dandy" which led to the "penny farthing" has now gone, we are in the midst of the phase 11 cycle. The 10 speed lightweight touring cycle we know so well has moved at its maximum development, it almost seems we cannot go beyond this point.

The proposal contained here follows on the work of Professor Kyle and brings closer the day of the true H.P.V. (Human Powered Vehicle) as a commuting vehicle.

The acceptance of pedal power has been seen on the Gas and Fuel's "Energy Week" with several hundred cyclists setting off for a tour round Melbourne, but even more striking was seen during the New York city's recent rapid transit strike. Before the subway and bus services shut down an average of 14,000 cyclists pedalled into the Manhattan district every day, but on the first day of the strike the number of commuter cyclists immediately doubled as the strike continued the New York city department of transportation estimated that the figure rose quickly to 25,000 then soon to 50,000 with some departmental estimates rising as high as 250,000.

The transit strike ground to a halt, the trains and buses started running but the cycling boom did not collapse, two months after the strike the number of commuter cycles entering Manhattan held steady at over double the pre strike average, moreover the transportation department stepped up its efforts in a long term plan to link some 142 miles of commuter cycle lanes in all 5 boroughs, including 2 cycle highways, one on Broadway and the other on the Avenue of the Americas (5th Avenue) separated from automobile traffic by witches hats.

This discovery that the bicycle

was not just a toy or recreational aid but a practical Vehicle that could carry commuters to and from work has caused mainstream America and very soon will cause Australia to look more closely at the Phase 111 industry.

What, and Why the Phase 111 Cycle

It is given in bicycle circles that the average person gives out between 0.2 and 0.3 horsepower when pedalling a phase 11 cycle.

Much of this tiny amount of energy is wasted in 3 ways:

1) it must overcome the friction in wheels and tyres

2) it is lost in the bending of the frame

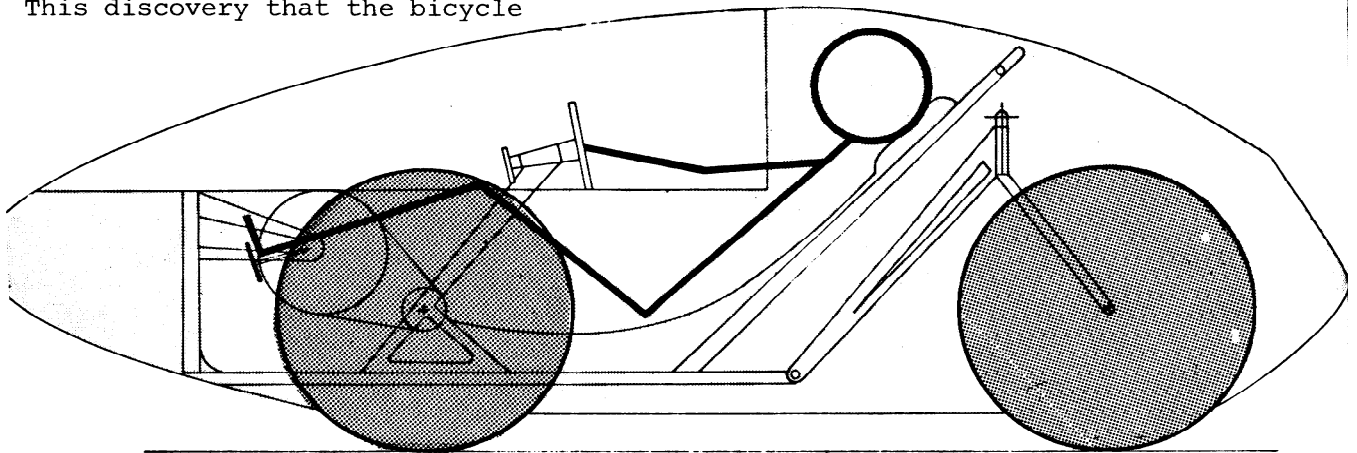
3) and the third and by far the greatest effort is required to push the air out of the way

with a fraction of this power left over to propel the cycle,

It is no longer a question of when this technology will be available to the public, but who will market it.

Ian Grey

An Australian branch of the International Human Powered Vehicle Association has been formed in Melbourne. Membership costs \$10 and anyone interested can contact Mr Ian Grey, Energy Information Centre, 139 Flinders St. Melbourne, ph 63 1195.



A.I. up Top.....

"Or What I did on my Holidays"

On a recent trip to Europe, I was able to visit some Alternative Energy establishments. The most impressive by far was the Centre for Alternative Technology at Machynlleth in Wales. Going by the local name of "The Quarry"! It is situated in a disused slate mine. The display includes many examples of solar and wind power, water wheels and methane gas and a well equipped workshop that can produce, amongst other things, bricks and fibre glass sheeting. Other displays include bee-keeping, garden plot arrangements and fish ponds.

The whole establishment is self sufficient, importing no external energy. There is of course much more to the centre and it is sufficient to say that this is one of the most impressive places I have visited, giving me great faith in the possibilities of "alternative" energies becoming the "appropriate" energies.

One other inspiring place was Tvind in Denmark where volunteers have constructed their own 2000KW (currently

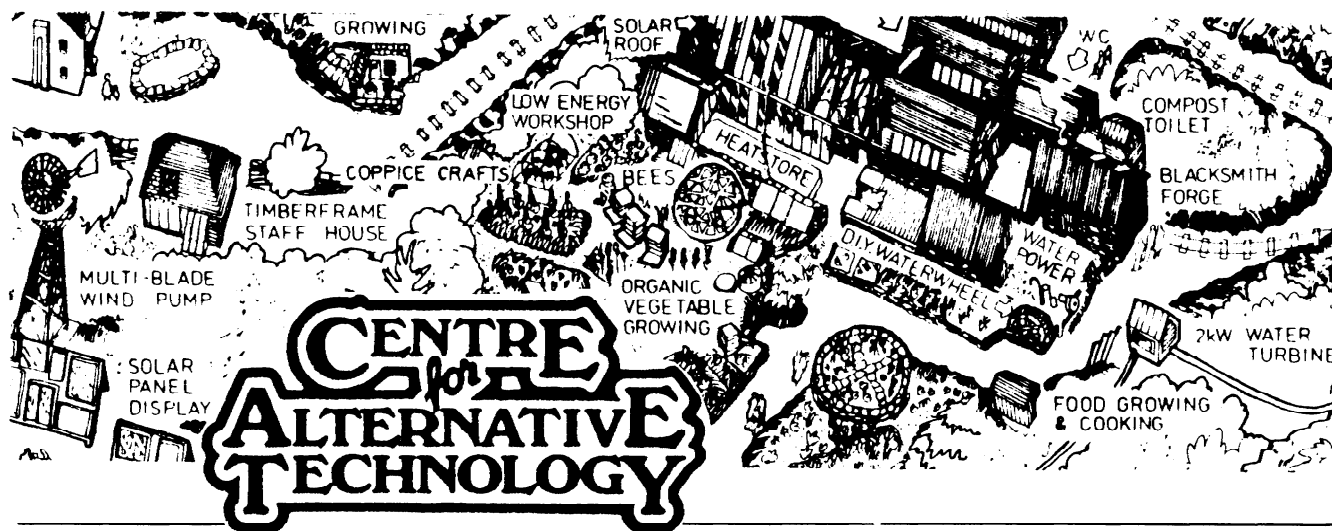
producing 900KW), 53 metre high windmill, to supply power to an alternative school. Given the complexity of this windmill, which includes lifts, a computer and parachutes on the blade tips it seems a miracle that such a windmill was built. It is inspiring that such a machine can be built outside of the mainstream of industry and technology.

All over Denmark, I felt hope as the countryside was dotted with windmills.

In Germany I had a brief contact with "Die Gruner" (The Greenies) A political party based on environmental issues, which is having some measure of success. It is refreshing to see such a party standing up to the powers who are hell bent on such things as Nuclear power stations and Autobahns (freeways) on everyone's doorstep.

If anyone is travelling through Europe I recommend a visit to Machynlleth and Tvind, as I am sure anyone who visits these places will be similarly inspired as I was.

DAVID ANDERSON



MACHYNLLETH, POWYS, WALES.

the ATA report

Goodbye 82

The year ended with a rush of activity for the Alternative Technology Association. In September the second film night for the year was held. Films shown included "Solar Heating, Harness the Wind, The Solar Front,ir and Energy: the problem and the future". The night was very successful with standing room only.

In October we looked at Do-it-yourself wind power, with slides on different wind systems from around Victoria.

December was very busy with the solar smorgasboard meeting which had a bit of everything including a solar film produced by Robert Redford, the

unveiling of the plans for the solar workshop, a demonstration and talk on the low cost solar collector featured in this issue of Soft Technology.

The following weekend between 20 and 30 people visited Michael Bos's solar cell powered house. But that wasn't all. We also visited a second solar house which obtained its power from a Dunlite wind generator.

Behind the scenes work continued on Soft Technology which people received in early December. Work began on the book on Australian Soft Technology, which will contain the best of the Soft Technology articles from the first 10 issues plus additional articles, resource and contact lists etc.

Solar Workshop Progress Report

Work is progressing steadily on the autonomous solar workshop. The item in the last Soft Technology resulted in numerous offers of help in construction as well as a donation of a considerable amount of building materials.

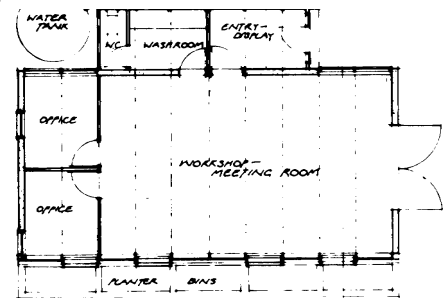
The plans are now completed and **are** being examined by the Brunswick Council. As soon as they are approved we will be commencing construction.

We are still seeking donations of building materials and fittings. So anyone with timber, plumbing bits, roofing iron, furniture, doors, windows, in fact anything that may be of use... please channel the materials our way. Just think when you visit the workshop you will be able to look up at some window or something with the knowledge you donated it. Imagine the satisfaction, So don't hesitate, be the first one on the block to donate to the solar workshop.

To raise funds we have produced 100

(collector's item) copies of the formal 7 page proposal we produced for initial examination and approval by CERES (Centre for research into environmental strategies) where the workshop will be located. Included with the proposal will be a copy of the architect's plans and a drawing of the finished building.

If you would like a copy of the proposal send \$2.50 to the ATA at 366 Smith St., Collingwood, 3066. The money will go into a special separate account we have set up to pay for the workshop. Any donations above \$2.50 for the workshop will be received with much joy.

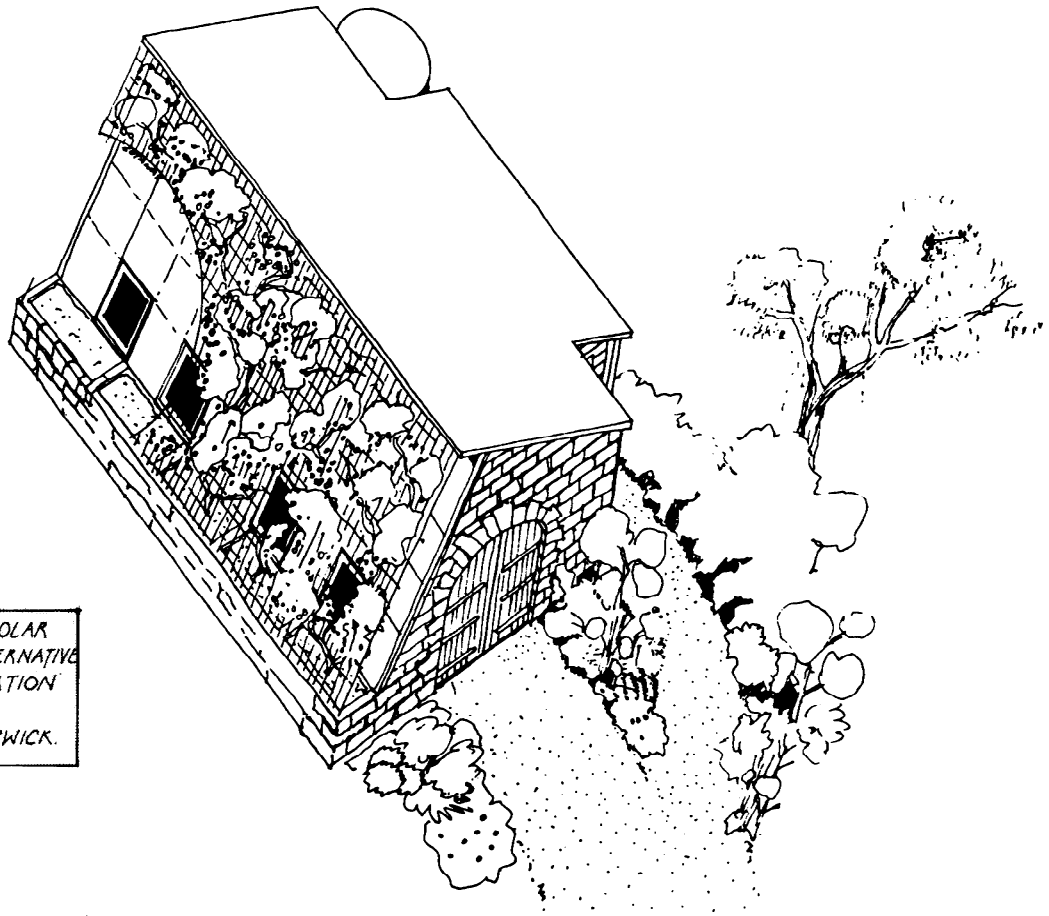


Because we could be starting construction of the workshop anytime now, we need to make a list of people who could be interested in coming down and being involved in building the workshop. If you would like to be kept informed send us your name, address, phone no. and any skills you think may be of use, Send them to us A.S.A.P. and we will let you know what is happening. The contacts are Mick Harris on 419 8700 or Tony Stevenson on 725 5550.

So that's it on the workshop. It is the most exciting project the ATA has ever undertaken so if you can help in any of the above areas don't hesitate. It could be the only chance you will have to be involved in the construction of a real solar building.

Hello 83

1983 is shaping up to be a busy year. With the workshop being constructed in the first six months, the Australian Soft Technology book coming out in the middle of the year as well as the routine meetings, film nights, field trips etc. It should be a very full year. We will be involved in a lot of_ Alternative Technology displays around march including one at Moomba and one rural farmers field day. Also once the workshop is finished we will begin a series of practical workshops and courses. It will be a good year.



PROPOSED PASSIVE SOLAR
WORKSHOP FOR ALTERNATIVE
TECHNOLOGY ASSOCIATION
AT THE CERES' SITE
LEE STREET BRUNSWICK.

Natural Cooling for Summer

Here is a simple and easy way to avoid cooking to death on those hot summer days. When I made these changes in a room of my house I managed to drop the temperature on a hot day from about 38°C to 28°C. The key to this was the use of a fan in the floor drawing cool air up from under the house. Added to this the room was insulated and cracks in the room sealed.

I was driven to make these changes by trying to work and sleep in a room which was an environmental disaster. It was freezing cold in winter and got very hot in summer. In fact in summer this room would often get hotter inside than it was outside; almost like a greenhouse.

The room I had to work with is built of fibro-cement sheeting. It was full of cracks and gaps both in the wall and around the doors and windows. It had no insulation with both the north, the east walls and part of the west wall exposed to the sun. All in all the room was very good at collecting the sun's energy, but very poor at keeping it out.

Stopping the sun getting in

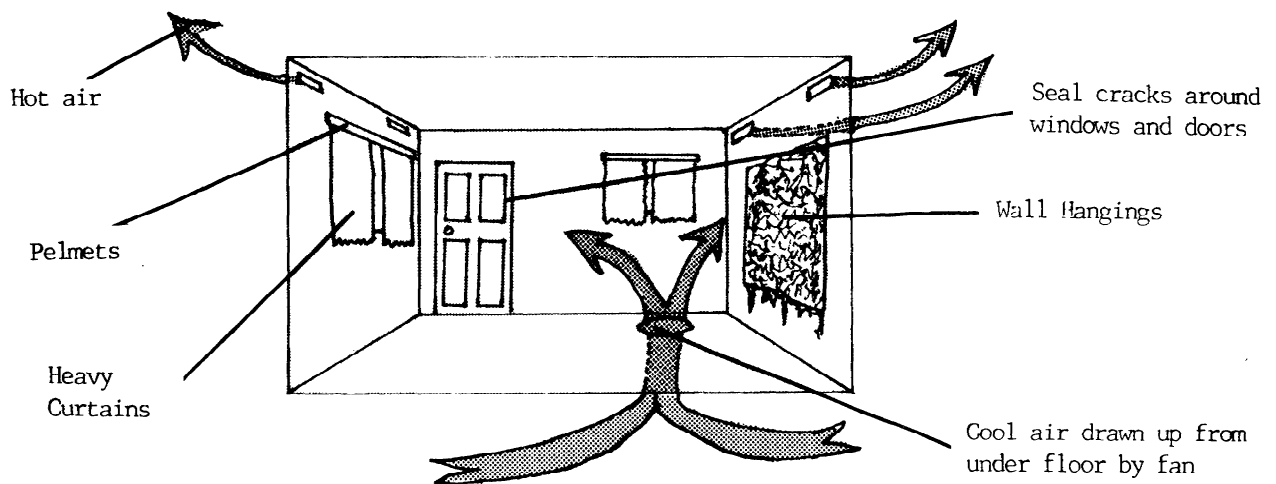
The first step in making the room bearable to live in was to stop so much heat getting in. Here I did the obvious; insulated the roof with "Alpanite" (eelgrass seaweed). Other types of insulation can be used of course, but I used the seaweed because it is a natural material which was easy to handle unlike fibreglass which is hell if it gets stuck in your skin.

Cracks in the wall were sealed with "Acrylic poly flexiseal" which is dispensed with a "polygun" dispenser. Gaps in windows and doors were sealed with self adhesive plastic foam sealing tape.

When sealing air gaps it is important to leave some path for air to escape when you are blowing air in with the fan described next. Roof vents which are standard in most houses tend to be good as an outlet for this air.

Getting cool air in

Insulating and sealing the cracks by themselves did not have a major effect on keeping the room cool. The



most important method I used for keeping the room cool involved using the space under the house as a source of cool air.

I'm sure you have noticed how it is always cooler under houses, in underground car parks, basements, etc. This is because very simply the temperature of covered ground stays fairly constant and cool all year round. In summer in Melbourne it would be expected to be below 20°C most of the time. If you draw air into the room over the large area of cool ground under the house you end up with a much cooler room.

To do this I bought an old two speed fan from a weekend market for \$4.00, I then cut a round hole using a jigsaw. The fan was mounted inside the hole just below floor level. The pieces of timber I had cut out were joined together and a handle fitted so I could cover the hole when I didn't want cool air entering the room (in winter).

The next very important step was to seal the wall of the under the house area near the fan so hot air would not get drawn straight in when I turned the fan on. Houses with bricked in foundations are particularly good for this type of cooling. Because the brickwork goes right around the house from floor to ground level there is little air movement and the ground stays cooler. These bricked in areas have air vents so air still has a way of getting in. It would be a good idea to block air vents within 20 ft. or so, so the air being drawn in has a chance to be cooled by the ground it is passing over.

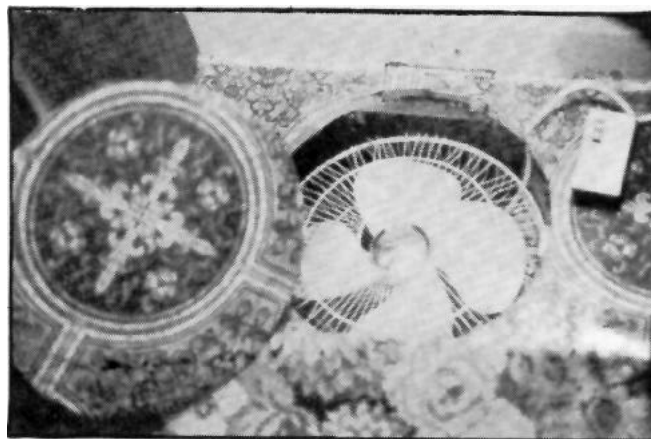
If the space under your house is high and very open the system will not work as well and you may have to do a fair bit of sealing to get good results.

Results

Now onto how well it worked. Before making any changes a temperature check

at 3.00 pm on one hot day showed an outside temperature of 35°C and an inside temperature of 36.5°C. So it was 1.5°C hotter inside than outside.

After the insulation was fitted and the cracks sealed a temperature check on a similar day at 2.30 pm showed temperatures of 36°C outside and 33°C inside. So as you can see it still wasn't staying very cool being only 3°C cooler than outside. Nevertheless this is probably 4-5°C cooler than it would have been.



Cool air is drawn up through a hole in the floor. The tight fitting cover is also visible.

Now for the effect of the fan. Running the fan on a day which had a temperature of 37° C kept the room below 29°C, 8°C lower than the outside temperature. What's more, on another day I left the fan off until the hottest part of the day. The temperature dropped by 6°C in the 'first four minutes.... pretty spectacular. What's more it is quite possible both insulation and sealing could be further improved with even better results.

The only disadvantage of the fan was on occasion a faint earthy smell could be detected by those entering the room. However this was not strong and after being in the room about 10 seconds you couldn't even notice it.

Customising a Commercial Solar Water Heater

I recently bought a 60 year old single storey house in an inner suburb. It had a tiled roof (about 30°) but poorly orientated for solar access: one facet of the roof faced NW, another faced NE. Solar panels are usually laid flat on the tiles: in my case this would have involved a low panel angle facing either 36°W of north or 54° E of north.

This would have been rather inefficient. The manufacturer, naturally enough, will tell you to compensate by buying more panels, but I discovered that it was possible to get the panels facing due north at the Melbourne latitude angle (38°) from horizontal by tilting the panels i.e. holding up one edge with a simple angle-iron frame.

I initially tried to work it out on paper, but got my 3-dimensional cosines knotted around my log tables. So with scissors, cardboard and sticky tape, I made a scale model of the roof and panels, took it out in the September (equinox!) midday sun and read-off the angles with a protractor. The panels look odd, and must catch the wind a bit, but they haven't blown away yet.

The system is two 1.5m Beasley panels and a 315 litre (nominal volume) thermosyphon tank. Because of the internal plumbing of these tanks, they can be mounted almost level with the panels without suffering from that dreaded condition "nocturnal reverse thermosyphon" otherwise known as "cold shower in the morning".

The tank has also been connected up

to a wood-fire stove in the kitchen - a romantic but fiddly way of getting hot water. We use it occasionally on cold weekends.

The tank was supplied with the standard pre-set 75°C thermostat. This is ok for an all-electric night-rate hot water service, but a very inefficient temperature at which to run a solar-electric hybrid. I bought an adjustable thermostat with a probe on a long piece of capillary tube. This was wired up in series with the existing thermostat. The probe was positioned near the top of the tank. This means that the electric booster switches on only if the temperature of the water in the top of the tank falls below a usable level.

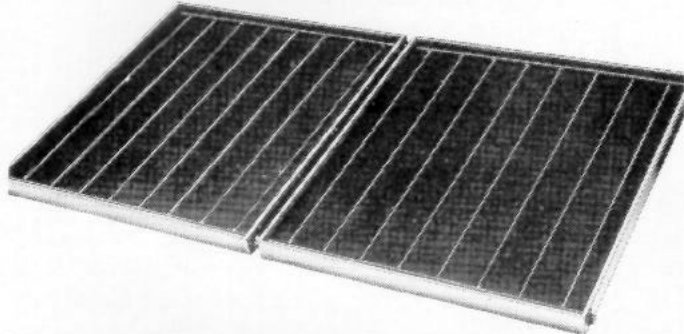
After much experimentation and persuading of my wife, I found it was -possible to set the thermostat as low



A Beasley solar water heating system mounted on a roof with the thermosyphon system of circulation.

as 40°C and still have a hot shower every evening. We boil a kettle to do the dishes!

Since I regard this system as an on-going experiment, I built an electronic "black box" bolted to the kitchen wall. In addition to the usual on-off switch to the electric booster, it has a time-switch, a thermometer (measuring the temperature at the top of the tank, and the mean temperature over the whole depth of the tank), and an electro-mechanical watt-hour meter. Through two winters the watt-hour meter has clocked up only about 500 kWh of electricity



(= \$25 at day rate), Over about 5 months of last summer the booster was not necessary at all. However we are a family of only two, using a tank and panel-area recommended for a household of four,

The whole system cost about \$1000 (D.I.Y. labour) and it should pay for itself in less than 10 years.

Solar heating has one similarity with a motor car - the performance you get out of it depends on how well you "drive" it. There is no point in having solar heating, especially a hybrid (electric/gas boosted) if you don't have an "energy-consciousness" in its installation and everyday use.

The system described above shows the viability. of domestic solar hot water for the energy-conscious household, even when retro-fitted into an old house under less than ideal conditions.

M. Gunter

Natural Cooling

Some other ideas

If you want to do a super dooper job, here are some more ideas.

1. Fit heavy insulating curtains over the window and close them during the day. The curtains should form a sealed barrier being fixed at the side of the window and dropping to the floor or mantelpiece. A pelmet at the top can seal the top of the curtains to prevent air flow.
2. Insulate the walls. Often this is very difficult. A less effective but possibly quite attractive alternative is to hang lots of heavy cloth wall hangings which can form an insulating barrier similar to the curtains.
3. Plant deciduous trees or creepers

(Con't from page 18)

- outside to shade the walls,
4. If your walls get very warm you could build a type of heat chimney outside. This involves fixing an additional light weight wall to your room's wall. This will shade the room's wall and if it is built with the two walls closer together at the bottom compared to the top air will be drawn up between the walls acting in a similar way to a chimney.
5. You might like to experiment with moist cloth around your fan. The evaporative cooling as the air passes through the damp cloth might make your room even cooler. (It could also increase the humidity making it more "sticky").

Mick Harris

An Energy Saving checklist for Urban Home Buyers



Here is a checklist of things to consider if you are planning to buy a house in the suburbs. Go through the list and add up the number of points for the place and house you are considering. The more points you get the better the house and site is from an energy efficiency point of view.

This checklist assumes you are going to largely use conventional energy sources so don't expect to see wind generators, methane digesters etc. making an appearance.

To work out how well your dream home would score add up the points and look at the score table below.

How To Read Your Score

150	Highest possible score (you're cheating)
150-120	Excellent (buy immediately)
120-100	Alright, improvement not really necessary
100-80	Acceptable
80-50	Not very good, needs improvement
50	High energy demand dwelling (run away very fast)

Location

1. Can you walk to public transport? 4
2. Can you walk to shops? 4
3. Can you drive less than 2 km to public transport? 4
4. Can you drive less than 2 km to a medium-size shopping centre? 4

5. Is it greater than 3 km to public transport? 1
6. Is it greater than 3 km to a medium-size shopping centre? 1
7. Is it close to your employment or alternative employment? 3
8. Are public services available
 - gas 1
 - electricity 1
 - water 1
 - sewerage 1
 - garbage collection? 1
9. Is the area zoned residential? 2
10. Is the area adjacent to an industrial or semi-industrial area? -1
11. Was the land previously filled (i.e. rubbish tip, etc.) -3
12. Was/is the land true virgin land? 2



13. Does the locality fit your outside interests, be they cultural, sporting or educational? 2

Land

1. Is the land enough for you, i.e. garden, food garden, etc. 2
2. Can the home fit on the land and face north (or does it already)? 5
3. Is there possibility of tall trees or multistorey buildings north of your home site? -1
4. Is water table below 1m? 1
5. Is water table above 1m? -1
6. Shading (or provision for) to west wall? 2
7. Adequate clear area to the north? 4
8. Planting (or provision for) on south or east faces? 3

Plan - Layout: General

1. More than 80% of living area faces north? 6
2. 50% to 80% living area faces north? 4
3. Living area facing south/west? -4
4. House can be zoned to reduce heat loss? 4
5. Children's bedrooms face north? 5
6. Master bedroom faces north? 1
7. Kitchen has view of children's playing area indoor and out? 4
8. Access ways and doors pass diagonally through living areas? -1
9. Access way and doors pass along walls and not across living rooms? 4

Roofing

1. Pitched roof - flat ceiling? 4
2. Pitched roof - pitched ceiling? -4
3. Flat roof? -2
4. R2 insulation or greater in roof? 5
5. R1-2 insulation? 3
6. Foil only? 1
7. No insulation? -1
8. Light coloured tile? 4



9. Dark coloured tile? 1
10. Light coloured metal? 4
11. Dark coloured metal? -1

Walls

1. Exterior brick? 1
2. Exterior timber? 3
3. Other light weight cladding? 3
4. Interior walls - exposed brick? 3
5. Interior walls - plastered brick? 3
6. Interior walls - framed plaster or timber? 1
7. R1.3 to R1.5 bulk insulation to exterior walls? 3
8. Foil only to exterior walls? 2
9. No insulation? -1

Floors

1. Timber? 1
2. Concrete? 2
3. Sub floor bulk insulation? 2
4. Carpet? 2
5. Concrete slab edge insulation? 2

Lighting

1. Fluorescent fittings in main living area? 2
2. Incandescent fittings in main living area? 1
3. Downlights in living or bedroom areas? -2
4. Skylights? -3
5. Pelmet lighting? 1
6. Provision for "task lighting"? 2
7. Spotlights, if any fitted -1

Hot Water

1. Solar hot water system:
5m² collector area) or greater 6
400 l. storage

2. Solar hot water system less than above? 2
3. Solar compatible hot water system? 2
4. Day rate electric hot water system? -1
5. Off-peak electric or mains gas hot water system? 2
6. All hot water use sites close together? 2
7. Water use points located some distance apart? -2

Ventilation

1. Weatherstrips on all doors and windows? 2
2. Draught excluders on external doors? 2
3. Door closers on all exterior doors? 2
4. Wall vents at ceiling level? -1
5. Tops of windows ventilated (except shower and toilet)? -1
6. Exhaust fans with auto closing hood? 2
7. Exhaust fans without hoods? -1
8. Recirculating range hoods? 2

Heating

1. Ducted central heating - gas? 1
2. Ducted central heating - oil? -1
3. Hydronic (water circulated - not ducted) central heating? 6
4. Heat duct outlets in floor? 2
5. Return air at highest available point? 2
6. Return are in floor? -4
7. Time switch fitted? 2
8. Individual room heaters fitted? 8
9. High efficiency fireplace inserts? 3
10. High efficiency solid fuel heaters? 4
11. Solar central heating air or water? 6
12. Heat outlets in ceiling? -4
13. Electric off-peak floor heating? -4

This information was supplied by the Energy Information Centre. Phone (03) 63 1195 or (03) 63 1986 and they will be happy to help with any enquiries regarding the checklist.

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CHEAP COLLECTOR cont

cut the section in half at 1 (fig. 3(a)) and then each piece is cut again at 2. Cut to length as shown in 3 (a) and bend the side piece over a piece of wood as shown in 3 (b). Cut the ends of the two shortest side pieces (B) to form 1cm wide tabs and bend over square. Take the two longest sides and drill two $\frac{1}{4}$ " holes for the mounting bolts, and silver braze in the four bolts (3 (c)) Push the end of the rubber tube over the $\frac{3}{4}$ " pipe and measure the outside diameter, Draw two holes of this diameter on side A for the end tubes to mount in so that the collector surface is about 1.5cm below the glass,

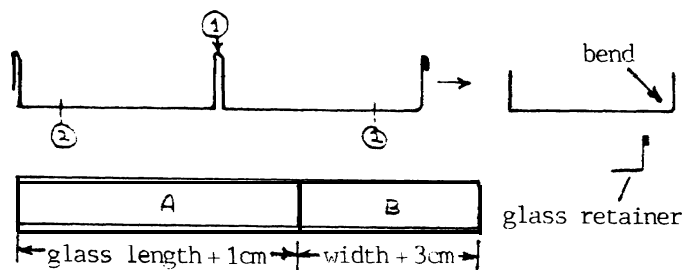


fig 3(a). cutting of cliplok sheet

Drill a $\frac{1}{2}$ " hole in the centre of this and then make small cuts at about 4mm spacing around the edge of the hole out to the circle you drew. Bend these little tabs out so as to make a hole big enough for the $\frac{3}{4}$ " tube and rubber to squeeze through (tightly) without any sharp edges to cut through the rubber.

Cut the second piece of corrugated iron to the same length as side A. If the sheet is not wide enough you will have to join two sheets together (overlap by two corrugations and pop rivet together). Flatten the edge corrugation and pop rivet one side A piece to the bottom, Pop rivet both side B

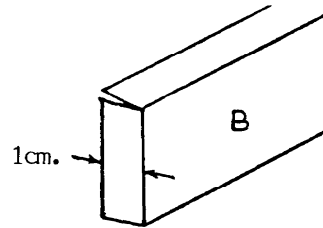


fig 3(b). end of 'B' piece.

pieces on as shown in 3 (d) using one rivet per corrugation.

Insulation

Install the insulation at this stage. The polystyrene boxes can be cut up with a saw and either wired or glued together with PVA glue. Roughly seal the joins in the box with some of the excess blackboard paint. Stick a layer of aluminium cooking foil over the top of the insulation to reflect heat back to the plate. (Use a sheet of sizational if you can scrounge some), There should be at least 1cm clearance between the plate

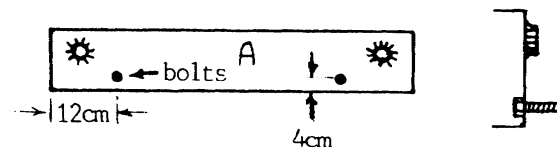


fig 3(c). bolts & holes in 'B' piece.

CHEAP COLLECTOR

and the insulation, The edges of the box should be insulated too - see 3 (e).

Push rubber tubes onto the end pipes, insert the plate into place and attach the remaining side A to hold it in position (seal the joints with paint). It is impossible to effectively seal the collector against moisture so it's better to drill a couple of holes on the bottom side of the collector to let any water out.

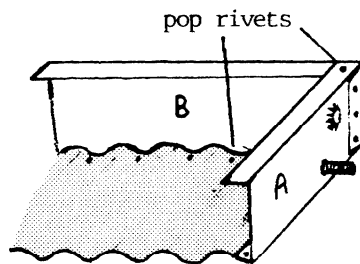


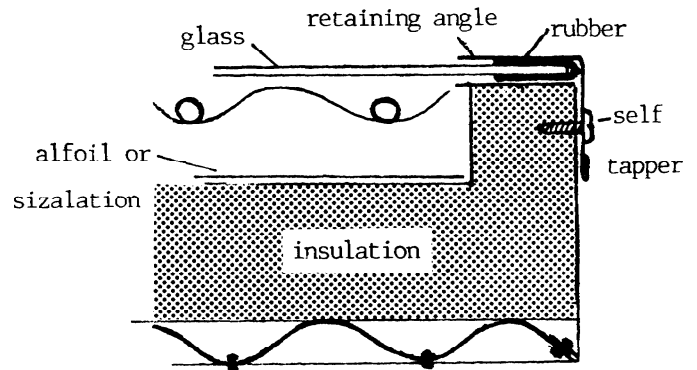
fig 3(d). joining sides & back

The Cover

The glass mounting is cushioned by using a rubber strip cut from an old 700mm (27") bicycle tube. This tube is about 2.1 metres long, Cut the valve section out, lay out flat and slit down each edge to create two strips about 2 metres long and 3cm wide. cut to fit glass and mount glass by folding over the edge.

The angle pieces left over from the cliplok are used to hold the glass on. Cut to length and attach using the self tappers as per 3 (e).

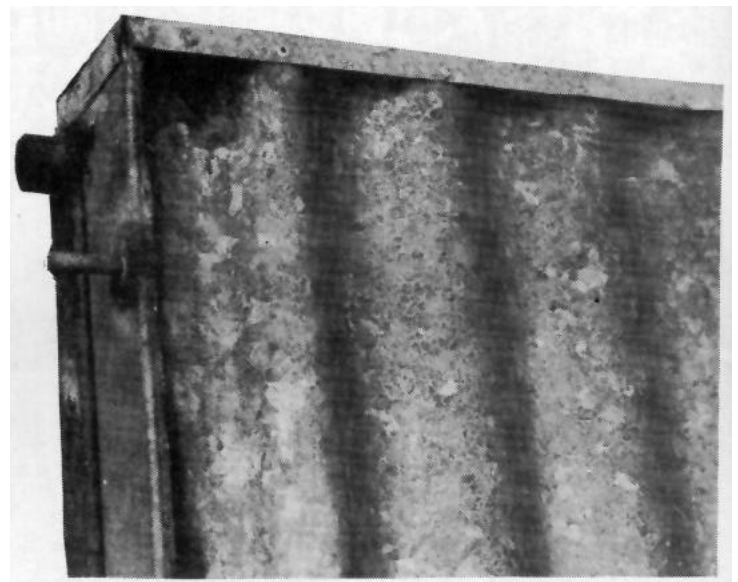
Your collector is now ready to use,. Handle it carefully when lifting it into position.



fig; 3(e). insulation & glass mounting.

Performance

My collector had an absorber plate area of 0.9m^2 . At a flow rate of 1 litre/minute, an ambient of 28°C and a slightly hazy day in December, the



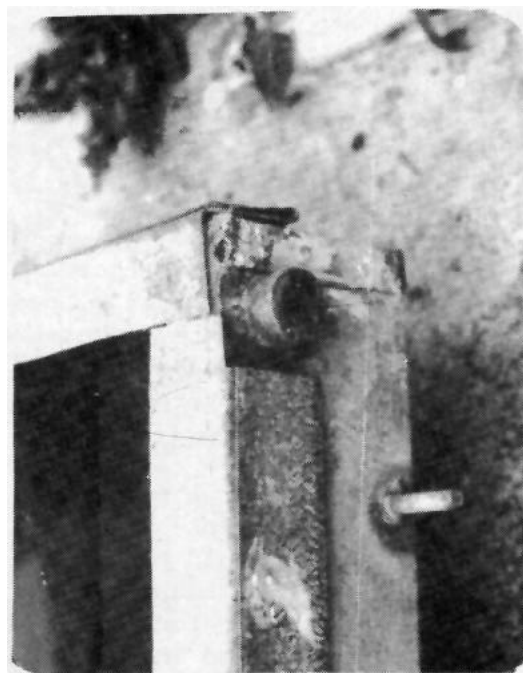
collector performed as follows.

T_{inlet} °C	T_{outlet} -inlet °C	power ab- sorbed W	Efficiency (assuming in- cident power =900 watts)
29	9.1	637	71%
42	8.3	581	65
44	7.5	525	58
50	6.5	455	51
58	5.4	378	42

as you can see, it's not too bad.
Because it has a black paint surface,
it will perform better than a commer-
cial collector with a selective surf-
face at low inlet temperatures but
rather worse at high temperatures.

Have fun.

Alan Hutchinson.



COSTING

Costing for 1 sq. metre collector

Material:	cost \$
2 x 6 metres of 13mm (½") hard drawn copper tube)	20.00
2.5 metres of 19mm (¾") hard drawn copper tube)	
3 sheets of secondhand corrugated galvanized iron roofing 1.2 metres long X 910mm wide (35")	0.90
1 secondhand window about 900 x 1100mm (any size will do)	5.00
1 2.4 metre length of cliplok roof decking	2.00
2 sticks of 2% silver brazing rod (C.I.G.)	1.80
1 450g stick of plumbing solder	4.00
1 packet of short 3.2mm pop rivets	1.00
1 packet of self tapping screws #6 x 6mm long	0.50
1 250ml tin of black blackboard paint	2.60
4 6mm x 25mm long mounting bolts	0.60
20cm of rubber tube, push fit over 19mm pipe	0.50
insulation and rubber mounting are assumed to be zero cost	
TOTAL	<u>\$38.90</u>

The Letters Page

Pedal Powered Drying



Dear A.T.A.,

I have been wondering whether powering a domestic spin dryer by pedal would be feasible? In my experience they are gentler on clothes, as well as much more efficient at removing water, than wringers,

I currently live in a flat with no space really for extensive trial and error. I like the concept of a pedal powered spinner, but would probably have to get much of the adaptation/constructional work done for me were it possible. So I'd need to get it "right" first time, or it would become expensive,

Also in my experience the style of washer that includes a spinning cycle at the end is NOT very efficient at removing water. And investigation has shown that they all spin at a maximum speed of about 600 rpm,

On the other hand those machines that have a second, (usually fairly small diameter), spinning tub are quite efficient. And they spin at from 1,000 to 1,400 rpm. Unfortunately there seems to be no unit produced, (other than large, very expensive, commercial models), specifically FOR spinning, with no wash tub attached. So one needs must get a second hand twin tub to convert in lieu of a straight-out second hand spinner as such,

I guess the vertical pedaling motion could be converted to turning a pulley with a vertical axis by using a "twister belt" easily enough. And obviously a reasonable pedaling rate of say 60 rpm could be geared up. But what I have no idea of is whether

gearing up from 60 rpm to, say, 1,400 rpm would impose an impossible burden on the pedaller? Though I guess achieving the speed would be the hard part, with its maintenance probably easier once arrived at.

The spinner's pump could be dispensed with, and gravity drainage used to lessen the load on the pedals. But I imagine that the flexible suspension and drive belt used in spinners to enable them to run above their critical speed, (and hence run smoothly even with unbalanced loads), would have to be retained or copied as far as possible,

What I seek to learn is:

- (a) whether the speed mentioned could be achieved without undue strain, and maintained, pedaling at about 60 rpm?
- and
- (b) what gearing arrangement....from a chain on the pedal unit, I guess, to belt(s) would make this possible with least effort?

I have no idea whether you people are a business, selling devices for profit, or a group of interested amateurs perhaps advising others who like the idea in today's world of trying to do things in ways not draining finite energy resources. If the latter perhaps you will reply. And, in optimistic anticipation of that, I offer my thanks.

Sincerely,

Peter Riddell.

Eds Comment: A typical spin dryer motor is rated at about 200 watts. A person on a bicycle can deliver at least 4 times this in short bursts. An 80 kilogram cyclist (includes bike) riding up a 1 in 10 grade at 10km/hr is delivering about 200 watts; (neglecting friction etc.)

While it would be hard work, it appears to be possible and might even be good exercise,

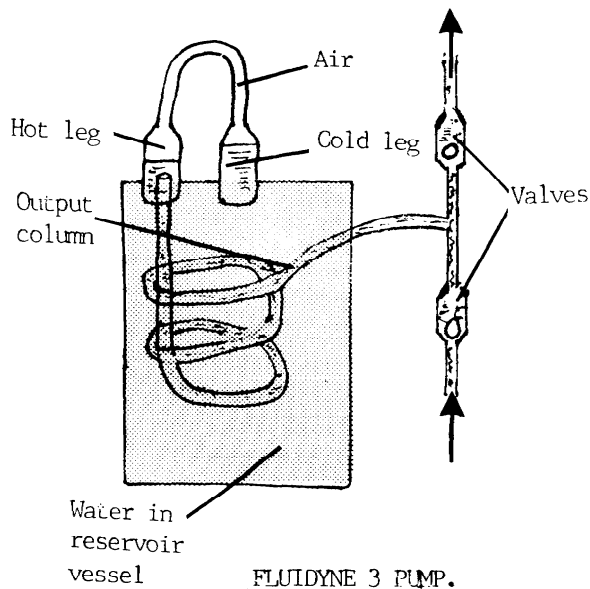
Solar Pumping

Dear A.T.A.,

I have just read #10 of Soft Technology and found it very useful. Enclosed is \$7 membership fee (unemployed) plus \$3 for some back copies of Soft Technology if you have any to spare.

Do you have much information on solar powered water pumps? We are building our own solar hot water system but our panels will be higher than the storage tank and we will need to use a pump. We have thought of using an electric pump driven by solar cells but would prefer to avoid the solar cells if possible (cost and high technology used in the production of solar cells).

I have found a simple design for a pump called "Fluidyne 3" in Sun Power - An Introduction to the Application of Solar Energy J. C. McVeigh 1977 (p. 109). However the book does not give many details, "One end of the U tube (inverted) is heated and the



resulting change of air pressure causes the water in the output column to oscillate, forcing water through the outlet valve and drawing fresh water into the system through the inlet valve. As long as the heat is applied the pump will continue to oscillate at its resonant natural frequency."

Unfortunately there is no information given concerning output pump efficiency or dimensions of the components, Do you have any more info, on the FLUIDYNE 3 or any other good solar pumps?

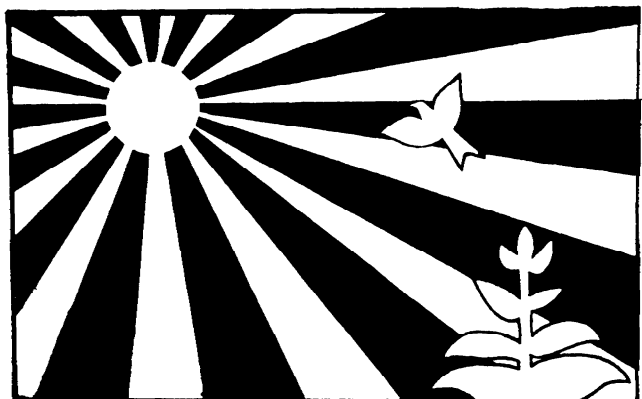
Please keep up your good work.

Regards,

Ashley Campbell

Eds Comment: Somewhere in our files or in the books and information in our library we have information on the Fluidyne. However we didn't find it in time for this issue of the magazine. When we do we -will put_ it in the magazine. However one of our members is currently working on a solar pump design. When he has a working prototype we get a article together on it.

In the meantime the diagram you sent us almost gives enough information to have a go at building the pump. I would+ t worry too much about efficiency. After all what does it matter if the gadget is only 10% efficient if the energy source is free and limitless.



Book Review

Title: Methane: The anaerobic flame

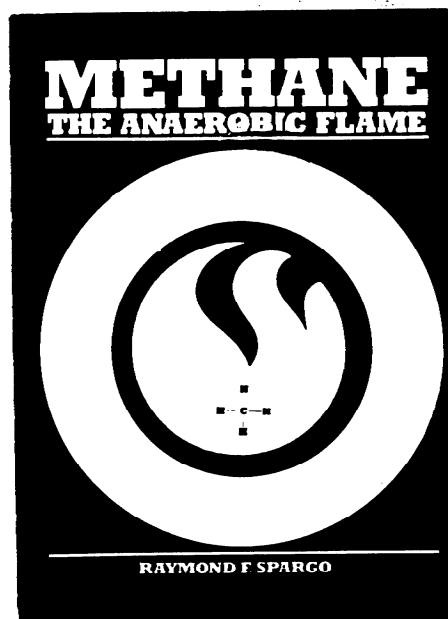
Author: Raymond F. Spargo

This book is written in an unusual style, Mr. Spargo does not favour the gradual build up of a slow introduction with a few examples terminating in a final flourish, The book immediately launches into a welter of examples of machinery and appliances that can be powered or heated by Methane. Actual Methane production and how to go about it gets a mention towards the end of the book,

On the subject of methane production, construction techniques are sufficiently detailed to give a good start to the D.I.Y. enthusiast although preparations and trouble shooting in the bio-chemical area are a bit sparse. This underlines the mechanical theme running through the book. Since the author has had extensive experience in Methane production we can conclude that it's so simple and reliable he has forgone elaborate mention of the actual process involved.

The resulting general mechanical information is just the ticket for anyone wishing to run a stationary engine or refrigerator on Methane. An example of this is the extensive coverage of the "Impco" carburetor system for I.C.E.'s, all good, hands on stuff. There is a fascinating look into Thermo electric generation and perhaps the author may expand on TALC. in a future text. Novelty items such as Methane powered radio are included, not really hard core A.T, survival stuff, but useful as an example of methane utilization,

The book is written in a straight forward style without elaborate phraseology or lengthy words; there



are photographs and diagrams, although more diagrams would not go astray in helping to explain certain applications, T.E.G's for example.

To sum up then, if you want to run your stationary I.C.E. on methane or study other potential applications for this renewable fuel then this is the book for you. A final point here, the amount of methane you get and therefore its use to you is dependent on the amount of bio-man resources you have available. If you live on a farm or in an autonomous community then fine. Otherwise as an introductory text on the practical uses of methane the book is recommended.

Ron King.

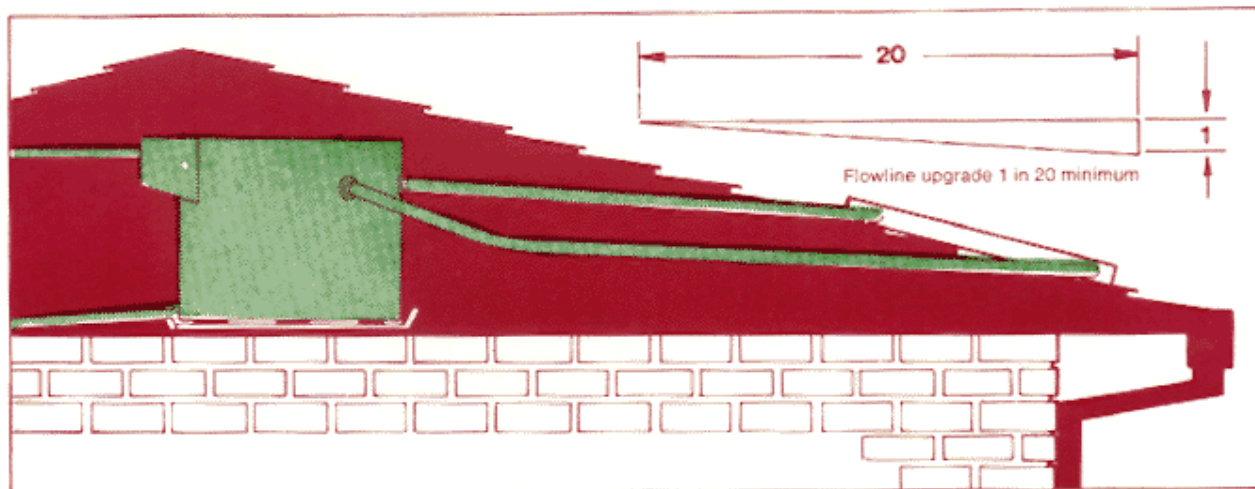
Editor's Note: Methane production is dealt with in detail by another book written by Raymond Spargo, called "Methane CH₄, the replaceable energy". Both books are available from the author Raymond Spargo, Australian Methane Gas Research, Tomerong, N.S.W., Australia, 2540, for \$9.95 which includes postage. It is also available from some alternative bookshops.



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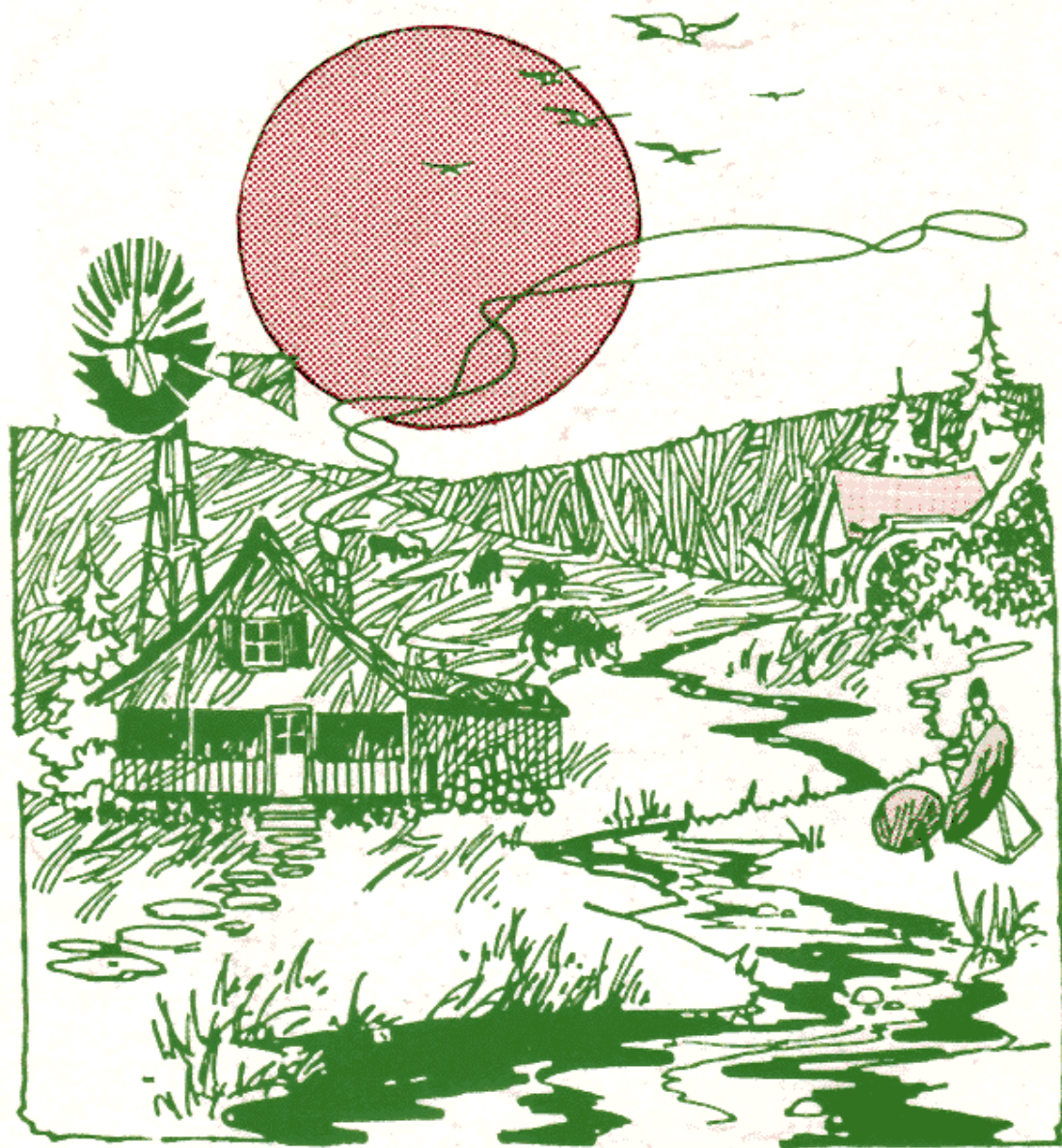


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Activities of the group include meetings, field trips, practical workshops and film nights. We also produce this magazine Soft Technology.

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

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

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