

The DATS: A solar heater with 12 sides and 2 angles



by *Teong H. Tan*



Already in 1982 I've discovered the world of solar heaters for me. At that time I was attending an experiment of heat exchange at the research institute of Brace in Montreal as a student.

Brace has made experiments of heat exchange and was soon testing different solar heaters.

Many years passed and I was far off cooking with solar energy until I discovered the website of the Solar Cookers International 3 years ago. Since then I've dealt with cooking with solar energy more frequently.

Background

I like the solar heater CookKit most of all. After I realised that many people had problems to find heat resisting bags, I wanted to design an easy and cheap heater, which can be built easily and

doesn't require a plastic bag. And I invented a heater I call DATS: with double angle and twelve sides. It's working quite well on clear and sunny days.

The solar heater DATS consists of 24 small metalised stripes to focus the sunlight maximally and to reduce the loss of heat. This loss occurs due to the missing of plastic bags.

The solar heater is similar to a parabolic solar cooker, but inspite of a curved slice there are many plane pieces which focus the sunlight in a single spot. The surfaces are mounted under 2 angles: 45° and 60°. Additionally a carrier for a pot was assembled.

Due to the stare structure the solar heater can also be built with other materials than board.

A DATS heater that has been testen in Shanghai produced a maximum temperature of 140° in an empty black pot. It was a sunny day with an outdoor temperature of 21° and there was a breeze. Two eggs were cooked in 30 minutes; two cups of rise were done in 95 minutes. The solar heater was readjusted every 45 minutes to reach a maximum effectivity.

To fix the pot in the required position the carrier can be supported by bamboo tubes and wood sticks.

Furthermore the DATS is stabilised by a rope connecting the 12 stripes of 45°. You achieve the tension of the rope by putting a stick into a loop and spinning it around. The tighter the rope the better the shape of the DATS. If necessary, a rope can be stretched from one stripe to the opposite, for example from east to west to strengthen the shape.

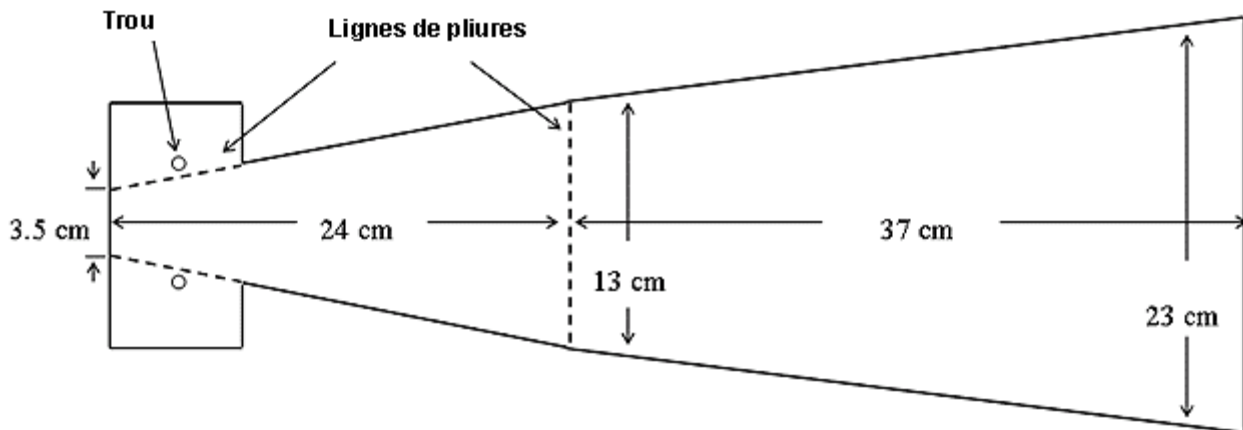
To transport the DATS you only have to remove the second rope and the carrier and then you can fold it.

The required materials are the following: board, aluminium foil, glue, tape, bomboo tubes (or similar), pieces of wood, rope.

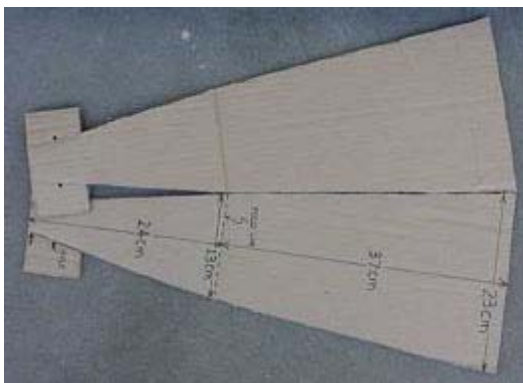
Construction

Cut off 12 rectangular pieces of board measuring 24 cm x 61 cm.

Plot the following shape onto each piece of board and then cut it. Fold the pieces after 24 cm of the thinner end (dash-dotted lines). Punch 2 holes at the thin end ("Trou") and bend the „ears“ to the outside.



Order the pieces with the long edge next to each other and connect them with tape so that they make up a ring. Mount the aluminium foil onto the inner surfaces.



Tape together the pieces of the two sides.



The 12 pieces shape up a ring.

To achieve the correct shape of a ring, the rope is pulled through all holes in the "ears" so that the lower boards of the heater are fixed together.



The rope is keeping together all pieces.



With a sick in the rope you can tighten it.



The parabolic mirror seen from the outside.

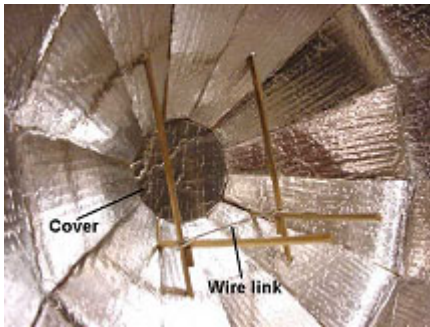


The parabolic mirror seen from the inside.

To build the carrier for the pot, first of all drill small holes into 4 pieces of the lower half. Two bamboo tubes or wood sticks with a length of 35 cm are put into the holes in parallel to form the first part of the carrier. Orthogonally to those two extra sticks of about 29 cm length are put into the other holes. Then compound both with rope or wire. Use elastic strap to fix the sticks from the outside. This carrier will charge a pot up to 2.5 kg.



Additional boards support the places where the sticks jut out.



That's the final carrier for the pot.

Now you can use the solar heater! Set it up in this way that it's directed to the sun. A black pot can now be filled with food and be mounted onto the carrier. It will be cooked by the heat of the reflected light!

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[\(Advice from the autor: SCI hasn't tested this solar heater for: security, efficiency, stability, usability\)](#)