

## SUNDIAL FRYER

*We make a frying pan tell time*

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What is a sundial really? Essentially, it is a clock that uses the position of the sun in the sky to tell time. There are many different types of sundials and the methods used are slightly different. The most common type of sundial is the horizontal sundial, which you might see in an episode of the “Flintstones” or as a garden ornament. Horizontal sundials look, for the most part, like a flat disc with a triangular piece of metal on it. This triangle is called the gnomon. Each gnomon is made specific to the latitude in which the sundial is to be used. In fact, the markings on a sundial

must correspond to the gnomon. Sundials can't be moved much in a north-south axis.

Besides being decorative, sundials can also be very accurate. This takes a few calculations. For the sake of brevity we decided to go with a slightly more decorative sundial, which still turned out to be reasonably accurate. Our sundial is comprised of three basic parts: the face, the gnomon and the furniture. The gnomon, as mentioned earlier, is what casts the shadow onto the base of the dial, which we call the face. Any other materials on the face of the sun-

dial including numerals, decorations, or bird droppings, are called furniture.

The first step in making a sundial is to draw out and make plans for the face of the sundial. On a sheet of graph paper make two lines, one horizontal and one vertical, that intersect at the centre of the page. Call the meeting point “O”. At this point, you need to know your latitude, which can be found on the Internet or via GPS. A few centimetres below “O”, make a new point “C”. How far below “O” is up to you, but if you go beyond about 5 cm you will need to use paper two feet wide. Point “C”.



Scratch before buffing to keep track of the position of any furniture.



In order to get an even finish, buff in the same direction.



For best results, dust all moulds with talc powder and pour pewter slowly.



Lightly brush blackening off the pewter casting with a scrub sponge. Details will be highlighted.



Let the saw do the cutting, very little pressure is necessary to make a smooth line.



Do not melt the braze with the torch, it should melt on contact with the joint.

How far below “O” is up to you, but if you go beyond about 5 cm you will need to use paper two feet wide. Point “C” will now be the centre of your sundial. Draw a line from “C” to the horizontal line on an angle equal to your latitude. Call the new intersection with the horizontal line “D”. The triangle that now appears on your page (OCD) is now the perfect final shape of your gnomon so you can trace this onto another sheet of paper and use it as a template.

From point “O” draw a line that intersects segment “CD” at an angle of 90 degrees. Using a protractor centred at “O”, draw an arc upward from the intersection of CD until it reaches the vertical line. Call the new intersection of the vertical line and the arc point “I”. Centre the protractor at point “I”, and draw a circle around it starting from point “O”. The radius of this circle should be equal to the distance from “O” to the line segment “CD”. Starting at segment “IO” draw lines spaced 15 degrees apart in both directions until they are horizontal to each other.

Extend each of these new lines until they touch the large horizontal line. At this point you should have ten new lines intersecting the horizontal. Now run lines from “C” up to each of the new intersection points on the large horizontal line. Draw one line through “C” that is horizontal, and this will be

your new six o’clock line. Your sundial is finished! Erase the lines that do not run through point “C”, including the large horizontal line. Label the hour lines of your sundial 12, 1, 2, 3, in a clockwise direction from the vertical line and 11, 10, 9, 8, counter clockwise. To be able to tell time later than six o’clock simply extend the 4, 5, 7 and 8 o’clock lines through point “C”, which will give you four more hour lines.

Having completed the most exacting part of the sundial, the rest is up to your own artistic abilities. As this issue’s feature story is about scrap, we used salvaged materials almost entirely to make our sundial. For the face we got an old aluminum frying pan. We cleaned the grease splatter with a wire brush mounted to an angle grinder and got a nice matte silver finish on the frying pan. After a little ingenuity, we found the centre of the pan and drew on all the hour lines with a pencil.

It is important to note that the hour lines are not all equidistant from each other. This is intentional, but can cause some problems when trying to fit furniture on your sundial.

### Furniture fun

For the numbers on the face of the sundial we decided to use Roman numerals instead of Arabic numbers. To

make things even more interesting, we decided to cast them out of pewter by melting down some old belt buckles from the scrap bin, then antique them and any other furniture we would use.

Making the moulds was simple, as we only required the letters “X”, “I” and “V”. We carved the letters out of wax and made rubber moulds using PoYo putty (see page 12). Pewter can be found in many discarded knick-knacks and can be easily melted. Always be careful with pewter because some of them may have high lead content which is poisonous. Old pewter is very likely to contain lead.

In order to give our pewter furniture an old fashioned look, we blackened it with Birchwood Casey PB1 Immersion. After rubbing off some of the black with a Teflon hand pad, all the furniture came out with great looking highlights. Results may vary depending on the composition of your pewter.

We ran into a bit of a problem – the numerals were just too big to all fit on the face of the sundial. The solution was simple. We took out all the even numbers giving our sundial a great “feng shui.” To attach the furniture we had many options to choose: solder, welding, bolting or epoxy. Seeking the path of least resistance we used Metal Set A4 epoxy, which can glue nearly anything together.

## Go gnomon go

Initially it looked like the gnomon would be made out of pewter as well, but such a large mould would be difficult to make out of PoYo. To the scrap heap we go! An old sheet of bronze had the perfect colour to contrast with the rest of the sundial. Using the template that was drawn earlier and a Fein jig saw with a metal cutting blade, a handsome looking gnomon was fashioned. To aid in attachment of the gnomon to the sundial, two flanges were also cut out. The entire cutting of the bronze gnomon took no more than 20 minutes.

The two flanges were attached to the main triangle of the gnomon by brazing. Brazing is a similar process to soldering however it creates a much stronger joint, and requires higher heat with an oxyacetylene torch. Prior to brazing a joint you must apply a flux which cleans any oxidation away and allows the braze to flow easily. Flux is made by mixing Borax and water into a paste. We used a Blockade Braze stick, which has a flux on it, so our job was made easier. A pair of right angles were used to make sure our gnomon was perfectly vertical while the brazing was done.

To join the gnomon and the sundial, we first lined up the gnomon on the face with the latitude angle at the centre of the sundial and the right angle along the 12 o'clock line. We drilled holes through the flanges and pan. With the ends of the bolts protruding under the sundial, we can use them to mount it onto something like an old stump, the edge of your deck or a large stone.

## Northward ho

Once you have put the sundial together, and polished it to a mirror-like finish, the final step is to point the 12 o'clock marker north. True north is the axis on which the earth turns, as opposed to the magnetic north. Several methods



Buffers can be dangerous. "Respect the buffer."



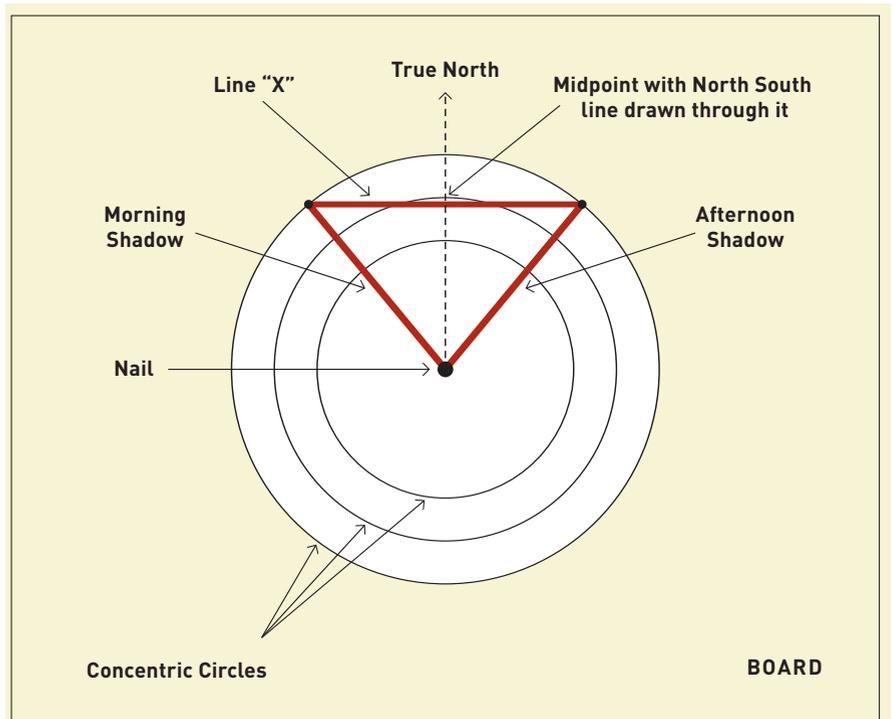
Use very little epoxy, it is easy to accidentally smear onto the finish.

exist to find true north, one such method is the "method of concentric rings." This is done by placing a levelled board on the place that you would like to set your sundial. Then draw three or four concentric rings and place a vertical nail in the centre. Mark the shadow of the head of the nail every time it crosses a ring throughout

the day. Draw the line "X" that connects the equidistant points. Draw a line from the nail to the midpoint of this line. You have found true north! 

For anything sundial related please check out [mysundial.ca](http://mysundial.ca). Thanks to Carl Sabanski.

All metal was found scrap. Birchwood Casey is available at Sculpture Supply Canada.



Reference: [www.mysundial.ca/tsp/true\\_north.html](http://www.mysundial.ca/tsp/true_north.html)