## CONSTRUCTION OF ROTOR.

- A: 1.45 meters [145 cms.] plastic roof gutter eg. "Plastmo nr. 12" [145 mm. inside diameter, with smooth inside and outside finish 2.5 mm. thick walls].
- B: Hand tools, drill, jig or fret or pad saw, adhesive, clamps, sandpaper, scraper, etc.
- C: Thin pliable cardboard, sissors, pencil, ruler, filt-tipped pen, tape, etc.

The **145 cms.** length of plastic roof guttering is cut into two lengths. One piece of about **20 cms.** and another of about **123 cms.** [Any end junction-collar is cut off as close as possible].

A cardboard pattern is made from the drawing. The center-line must also be clearly marked. A tiny hole is pricked in the center-line as a mark for the future shaft. The cardboard pattern is placed inside the guttering, **- with the indicated lettering facing upwards.** - This ensures that the rotor shall have the desired direction of rotation. The center-line must be completely true with regard to the lengthwise axis of the guttering. If necessary the pattern can be pressed down inside the guttering with the assistance of a wooden straight edge and a couple of screw clamps.

Using a filt-tipped pen, the pattern is carefully transferred to the inside of the guttering. The rotor is sawn-out with a jig-saw, etc. and possible jagged or rough edges are filed clean.

To reinforce the rotor, - the short **20 cms.** piece is marked in the middle and placed at the exact center on the **rearside** of the rotor. A **5 mm.** hole is drilled through both pieces and they are then assembled together with a **5 mm.** bolt, a nut and washer.

The rough shape of the rotor is then drawn on the inside of the shorter piece. They are disassembled and the shorter piece is cut out, and filed clean. The ends are rounded as indicated by the dotted lines shown on the pattern drawing. Sandpaper the edges of the junction between the two pieces to ensure that the joint will be as smooth as possible.

The two facing sides that are to be joined together - are cleaned for dirt or dust and then further prepared, as specified in the advisory accompanying instructions where or when the guttering was purchased, - such as, - "Instructions for joining plastic guttering". After the adhesive has been applied, - the 5 mm. bolt is replaced in the center hole and tightened. As many glue clamps as possible are placed around the edges of the reinforcing unit, - as shown.

When the adhesive is completely dry - the rotor is roughly balanced by removing material from the blade center area - **on the side that meets the wind - [the leading edge].** Balance is found by allowing the rotor to come to a level rest, by placing a rounded object - such as a vertically handheld fountain-pen in the 5 mm. center hole. After the rotor is roughly in balance, - the edges are carefully and gently sandpapered, - at first with coarse sandpaper, then followed by finer - **using a wooden backing block.** Fine balance adjustments are also made.

The edge that meets the wind under rotation - the leading edge - is rounded.

The edge where the wind slips the blade - the trailing edge - **is sharpened** - by removing material from **the inside of the guttering.** This final treatment can be done by using a fine, thin and sharpedged steel cabinet-scraper. During these final finishing processes - the rotor must be constantly checked to maintain correct balance.



Glueing & application of clamps.



Final finishing process.

Specifications: 145 cms. Plastic roof gutter. 145 mm. Inside diameter. 2.5 mm. Wall thickness. 120 cms. Rotor diameter.





Balancing of rotor.

WARNING: PVC is a fickle type of plastic. Sometimes you can bend it and beat it and it seems like it will not break. Other time a slight tap can break it. So if you use PVC to make a tower or rotors, Remember the tower can break and fall and the rotor can break and be thrown hundreds of feet and could hurt someone. In fact, my first rotor (made from schedule 80 pipe) was thrown about 300 feet perpendicular to a 50 mph gust.



Find a sraight center line down the length of the pipe. If there are words down the length, line up on them. Measure the distances from the blue center line and tape the ends of a stretched string to them. Draw a line along the taught string and cut along the line ( the red line in diagram ) with a jig saw. Drill a hole in the center and balance the blade by removing a little material from the heavy end. You can sand and file the rotor edges to make it look nice.

The rotor looks pretty unusual and it doesn't look like it will work. The end view is cupped quite a bit and at first it looks like it will have a lot of drag. Of the rotors I have made like this, I am surprised at how well they work and I am guessing the efficiency is around 25 to 50%.

This rotor design seems strong enough until the wind reaches about 40 mph. I have had this rotor break before, so I now use 4 pipe thicknesses of reducing length. 5 foot 4 foot 3 foot and finally 2 foot on the inside. I then use small screws to hold each length together. If you use an over speed brake of some kind, you may not need to nest sections together for extra strength.

## **Experimental**

Other pipe sizes can work for a smaller rotor. My first trial was with a 2" schedule 40 pipe 2 feet long. Note the end view in the diagram and use a drawing like it to figure your blade angel. An angle closer to 34 degrees at the tips will give you a slower rotor design. Consider using other pipe materials also.

Make a longer rotor. If you do Please let me know how it works.

You should paint the rotor when it's finished. This will keep UV light off the surface. Some PVC will deteriorate in sunlight. I paint mine with silver spray paint. It looks like a "store bought" aluminum rotor.