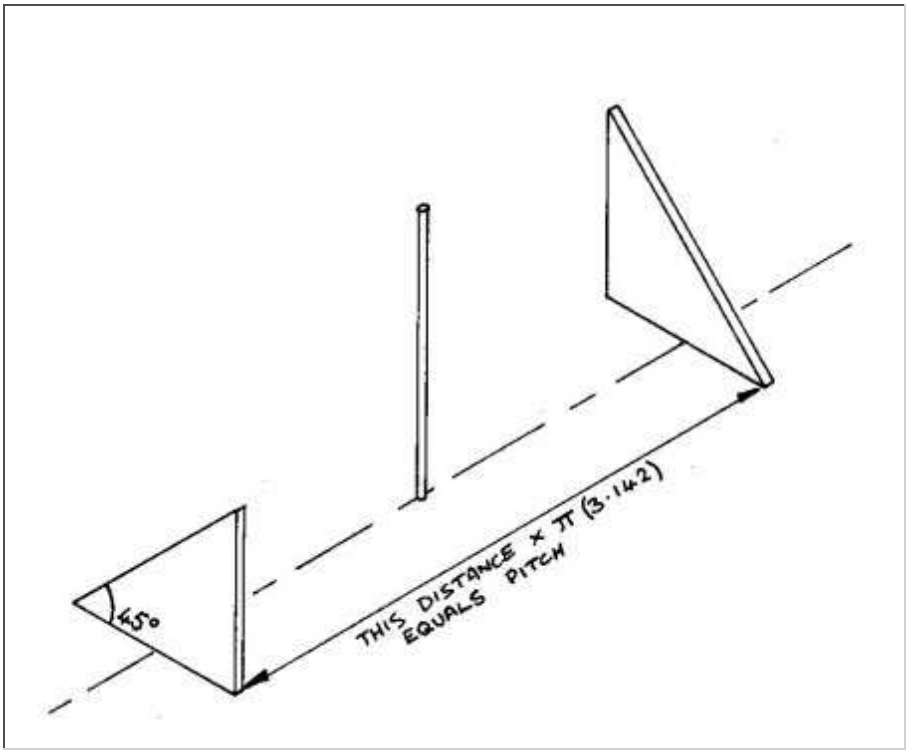
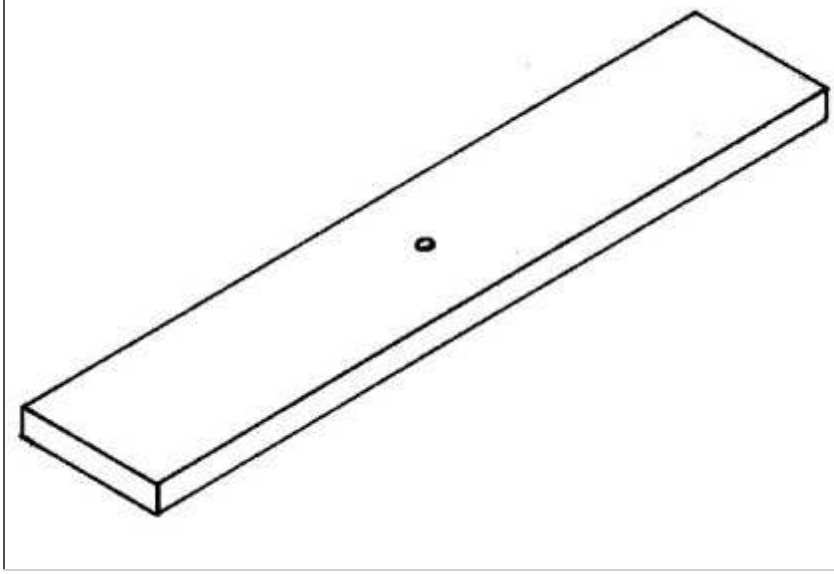
Making Balsa Props using the Laminated Fan method

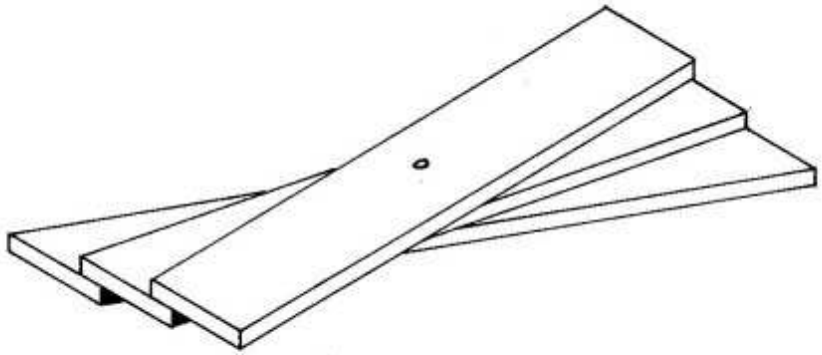
By Graham Knight with photos of his example by Rolf Christophersen



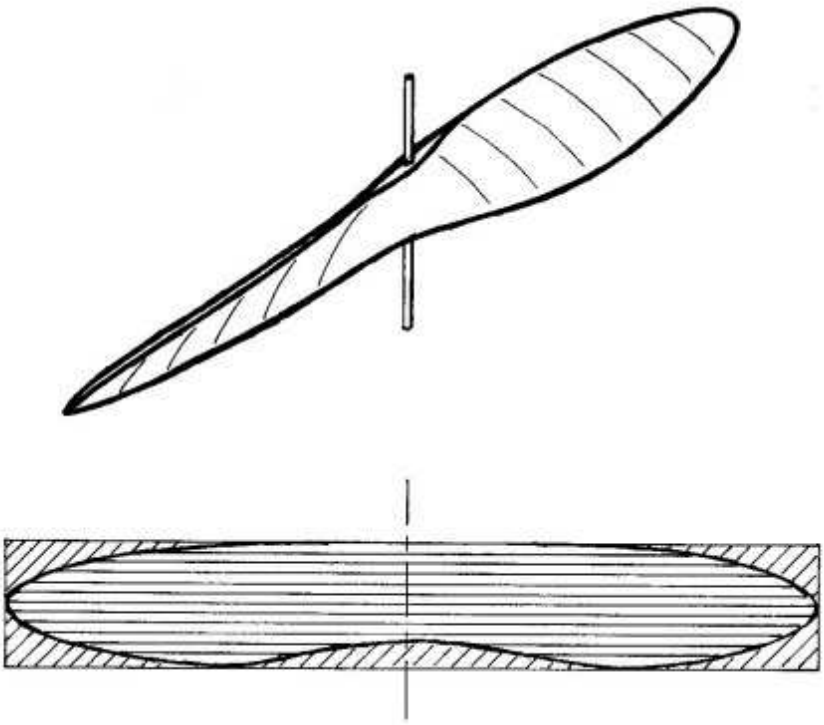
Picture 1
First you need to make a simple jig, this is not essential but is worth the couple of minutes it takes to make, your props will be more accurate and pitch will be easier to set. The central pin is a length of piano wire the diameter of your intended shaft, the 45 degree templates can be made from card or balsa. The distance between the templates, multiplied by PI (3.142), is the pitch, eg. to make a 15" pitch prop the templates should be 4.77" apart, (15 divided by PI) this is regardless of prop diameter.
NOTE: the jig shown is set up for an anti-clockwise tractor prop.



Picture 2
Cut strips of balsa (I normally use 1/8" sheet), slightly longer than your intended prop diameter, the width will be determined by the actual size and pitch of prop you are making, the number of strips depends on the thickness of the hub. As an example, an 8" diameter x 12" pitch prop I made recently used 7 strips of 3/8" wide x 1/8" sheet, the blades are 1 3/8" across at the widest point.
TIP: using harder wood for the top and bottom layers gives a more "ding" resistant LE and allows the TE to be sanded sharper.



Picture 3
Laminate the layers using an easily sanded wood glue, PVA or Aliphatic work best, threading them on to the centre pin of the jig (not shown for clarity) one at a time and fanning them out to touch the templates. Use plenty of pins to hold the laminations together and leave to dry. See photo 1 below.
TIP: faster drying can be achieved by removing the pins after 10-15 minutes, removing the laminated blank from the jig and baking it carefully for a couple of minutes in the microwave, use a low setting and experiment on scrap to determine the time required.



Pictures 4 & 5
When everything is dry, pull out the centre pin and carve and sand away the excess ridges and shape the blades, if this is your first prop you may want to copy the shape of a commercial prop. The back of the prop should be carved away at the hub to give a more pleasing shape and to cut down on drag, the very coarse pitch at the centre gives very little thrust anyway. See photo 2 below.

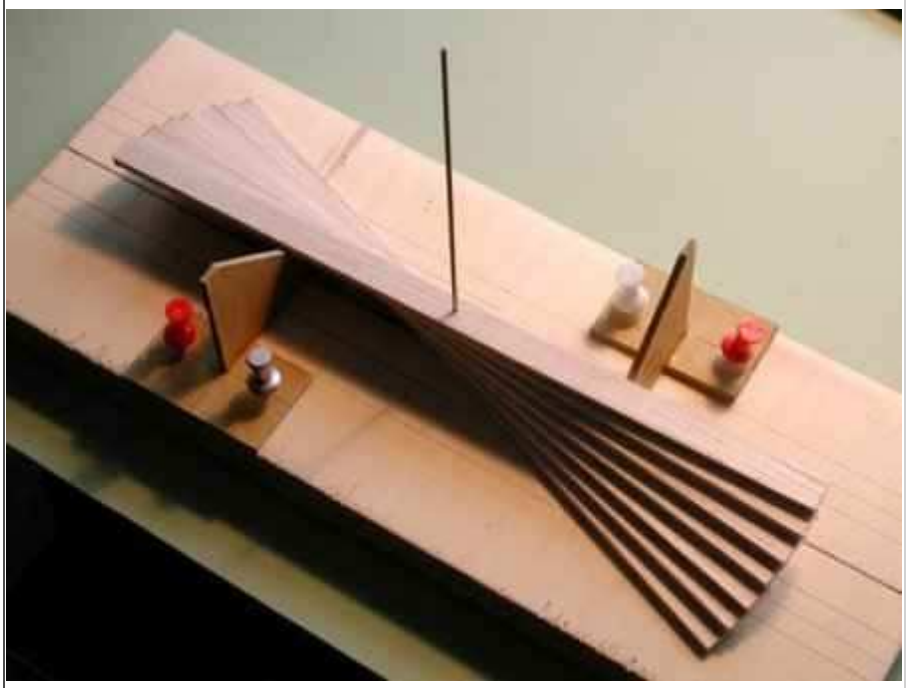


Photo 1

This photo shows the stage shown above in picture 3. Note also the neat implementation of the jig.

Photo 2

This photo shows one half of the blade carved and snded to shape as shown in pictures 4 & 5 above.

FINISHING TOUCHES:
When you are happy with the shape and thickness, try balancing the prop, sand the heavier blade until it balances level. If you intend to use a freewheel clutch it is worth planning it at this stage and adding some thin ply reinforcement if necessary, it will look much neater if it is let in flush rather than stuck on afterwards.
If desired the prop can now be given a couple of coats of sanding sealer and, if more strength is required, it can be covered in doped tissue, silk or glasscloth and epoxy, it really depends how strong you want it to be and how much nose weight your model needs.

MORE TIPS:
When making larger diameter props it is worth checking each lamination before glueing up to see if it has a heavy end, if it does, mark the heavy ends and laminate them alternating heavy-light-heavy, this will make balancing much easier later on.
Reverse the jig templates to make a clockwise prop, this is the easiest way

After covering it should be balanced again, final balancing being achieved with additional coats of dope or paint to the lighter blade. When finished add a brass tube bush and a freewheel if you are using one.	I know to make identical opposite rotation props for twin pushers. As you make more props, make a note of the number and size of blank strips you use for each one, it will be much easier when you need to make another one the same size.

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