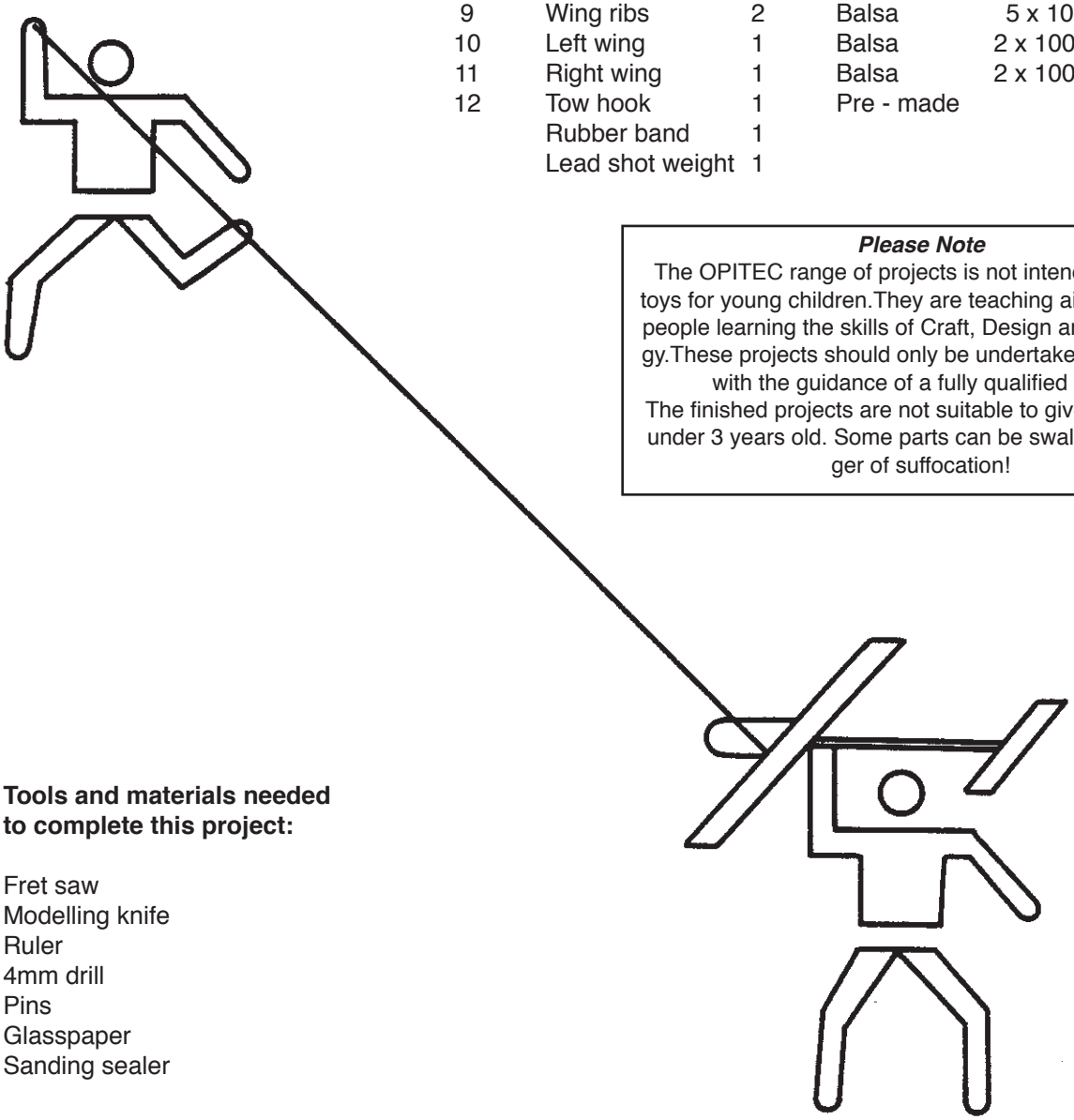
102.032

Miniature Glider

Contents

Part. N°	Description	Quantity	Material	Size
1	Pod	1	Plywood	5 x 48 x 250 mm
2	Boom	1	Pine	5 x 10 x 500 mm
3	Pod sides	2	Balsa	2 x 48 x 245 mm
4	Wing dowel	1	Beech	ø 4 x 30 mm
5	Wing mount	1	Plywood	2 x 20 x 100 mm
6	Tail plane	2	Balsa	2 x 48 x 245 mm
7	Tail fin	2	Balsa	2 x 48 x 80 mm
8	Wing middle	1	Balsa	2 x 100 x 500 mm
9	Wing ribs	2	Balsa	5 x 10 x 500 mm
10	Left wing	1	Balsa	2 x 100 x 110 mm
11	Right wing	1	Balsa	2 x 100 x 110 mm
12	Tow hook	1	Pre - made	
	Rubber band	1		ø 60 mm
	Lead shot weight	1		30 g



Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technology.These projects should only be undertaken and tested with the guidance of a fully qualified adult.
The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Danger of suffocation!

Tools and materials needed to complete this project:

Fret saw
Modelling knife
Ruler
4mm drill
Pins
Glasspaper
Sanding sealer

INSTRUCTIONS

STAGE 1 BODY:

First transfer part 1 from the plan (Body middie section) onto the plywood provided (use carbon paper or photocopy taken from plan). Then cut out using a Coping saw or similar. Next mark out the boom (2) and glue to part 1. Mount part 2 on boom and then pants 3 (2) on part 1 and glue into position.

Warning: Do not cut out the lead chamber in these two pieces! Assemble and glue together.

STAGE 2 WING SUPPORT:

Drill the body as shown on the plan to accept the 4 mm dowel which is the fixing point for the wings. Glue on wing support (part 5) and allow to dry .

STAGE 3 TAILPLANE & FIN ASSEMBLY:

Mark out the tailplane and fin (parts 6 & 7). After cutting out mount the fin on the boom checking that everything is square & vertical. When both sets are dry, cut them to the required shape according to the plan. When dry the tail plane can be added, it is better to mark the centre of the tail before gluing into position to ensure symmetry.

WING ASSEMBLY:

Transfer the panern for the wing ribs from the plan and cut out ribs, pin together and shape with sanding block making sure they are all of equal size (ribs part 9). The main wing section can be dampened (use steam from kettle) and glued to ribs. The whole section must be pinned down on a building board and allowed to dry.

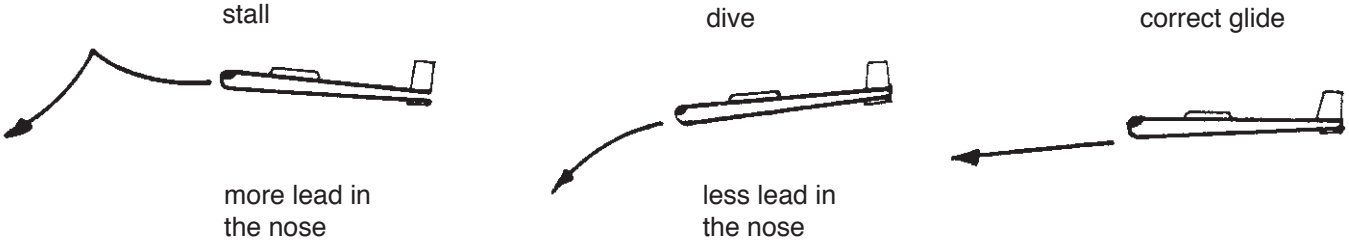
Meanwhile cut out the wing tips (parts 10 & 11). The angle for the wing tips is about 35 degrees and can be achieved using a sanding block as shown on plan. When ready glue into position and support with card until dry (see plan). After drying the wings can be mounted on the body using a rubber band from the rear of the support of the front dowel.

TRIMMING FOR FLIGHT

The balance point of the model is shown on the plan as IS (Centre of Gravity). When held at this point the model shouid balance. It will be seen that this model is heavier towards the rear, so lead must be added into the chamber at the front until a correct balance is achieved. This must be done carefully if good flight patterns are to be achieved.

FLYING AND HI START

After trimming in the workshop the model can be taken outside and tried. A simple hand propelled launch with the model held at the C of G between forefinger and thumb will show how it reacts. Don't forget always fly into the wind.



As a building board, we suggest using a piece of chipboard, blockboard or the cardboard supplied, size 100 x 500 mm. The main thing is, that pins can be easily inserted, to hold the parts whilst drying.

HI START TECHNIK

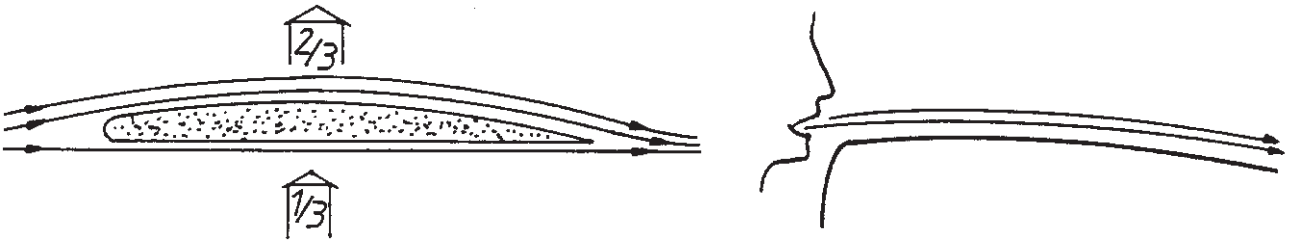
Use 50 metre long kite line and a metal ring from a cold drinks can or similar. Attach the ring on one end of the line and place on hook under the glider body. A helper is needed now to walk away with the line and hold it taught. The person with the glider holds it by the C of G, the helper with the line runs forward, keeping it taught. The glider is let go (command given by helper). When Ihe helper runs, the model will rise into the air until the line is vertical. At this point the plane carries on and the tow ring slips off and falls to the ground with the line. If the ring sticks, simply let go of the line.

HAVE FUN BUILDING AND FLYING!

HOW A PLANE FLIES

A plane flies by virtue of its curved wing section, which produces lift.

This is achieved by the following principle:



The air flowing over the top of the wing travels faster than that flowing underneath. This causes a difference in pressure, producing a pulling effect from above and pushing one from below. The relationship is approx. 2/3 pull to 1/3 push. A simple experiment can be carried out with a piece of paper. Hold paper with one edge folded in front of your mouth and blow over the top, and the paper will rise. This effect is produced by the wings moving into an airstream (against the wind).

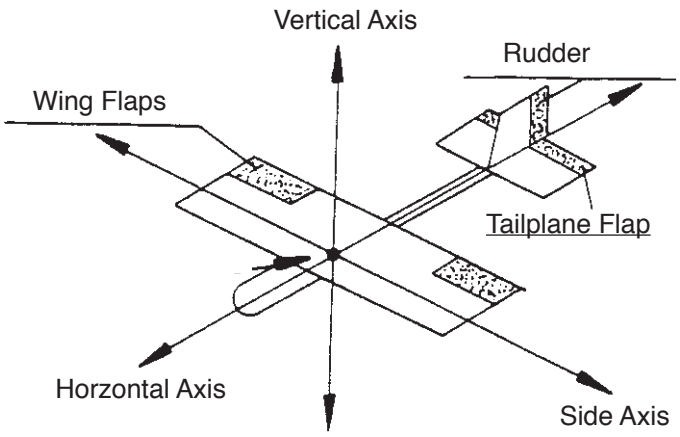
THE WING ANGLE

By varying the wing angle, different effects can be achieved (angle of attack). The lifting effect at 4 degrees is much greater than at 1 degree, however, the greater the angle. the more drag, thus slowing down the planes flying speed. A good compromise is about 2 degrees as in this model. Experiments with angles can be made by packing under the front of the wing.

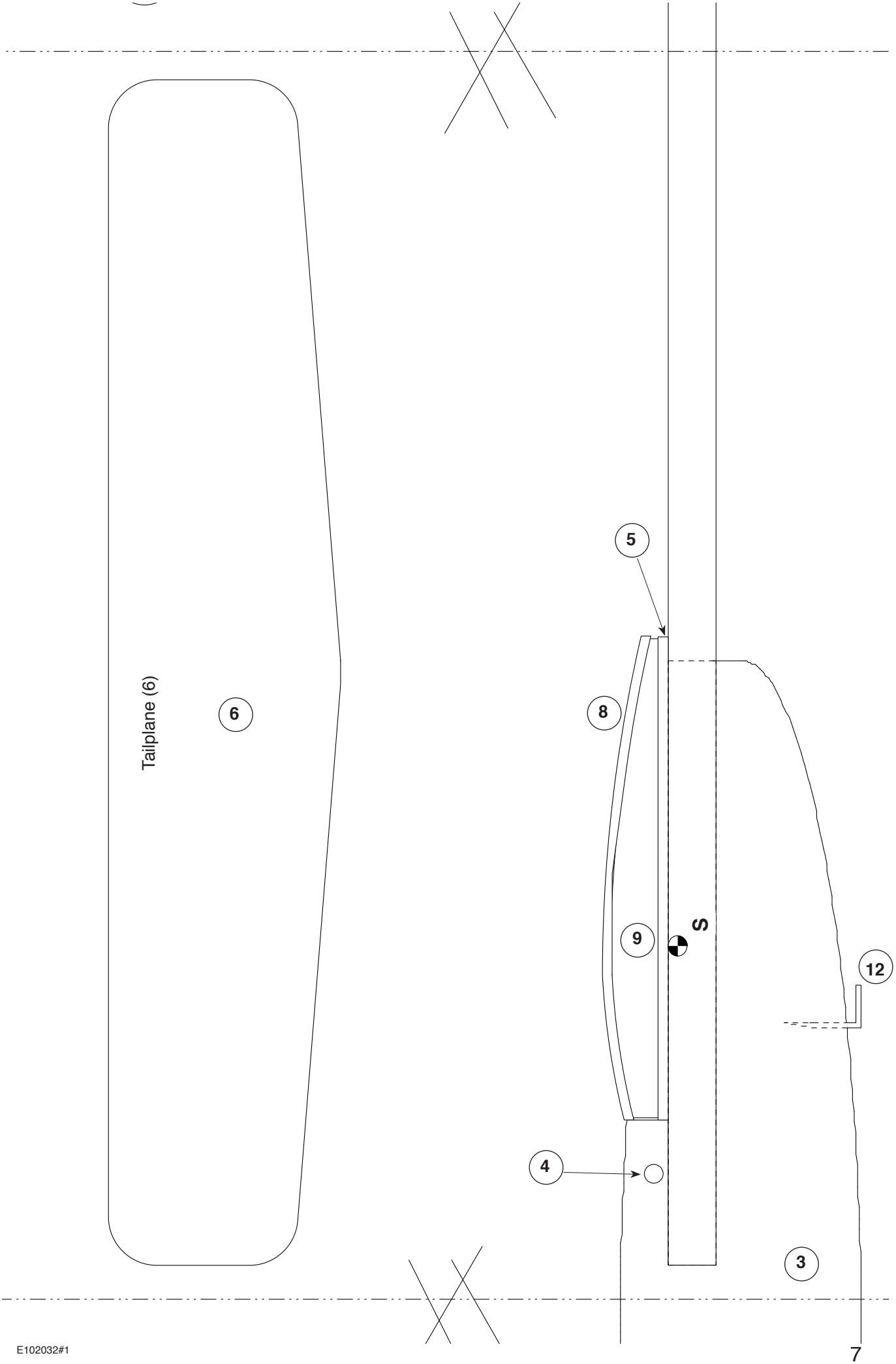
STEERING THE PLANE

A plane flies in 3 dimensions, e.g. moves forward, left, and right, up, and down. It can be steered by altering its path in these axes.

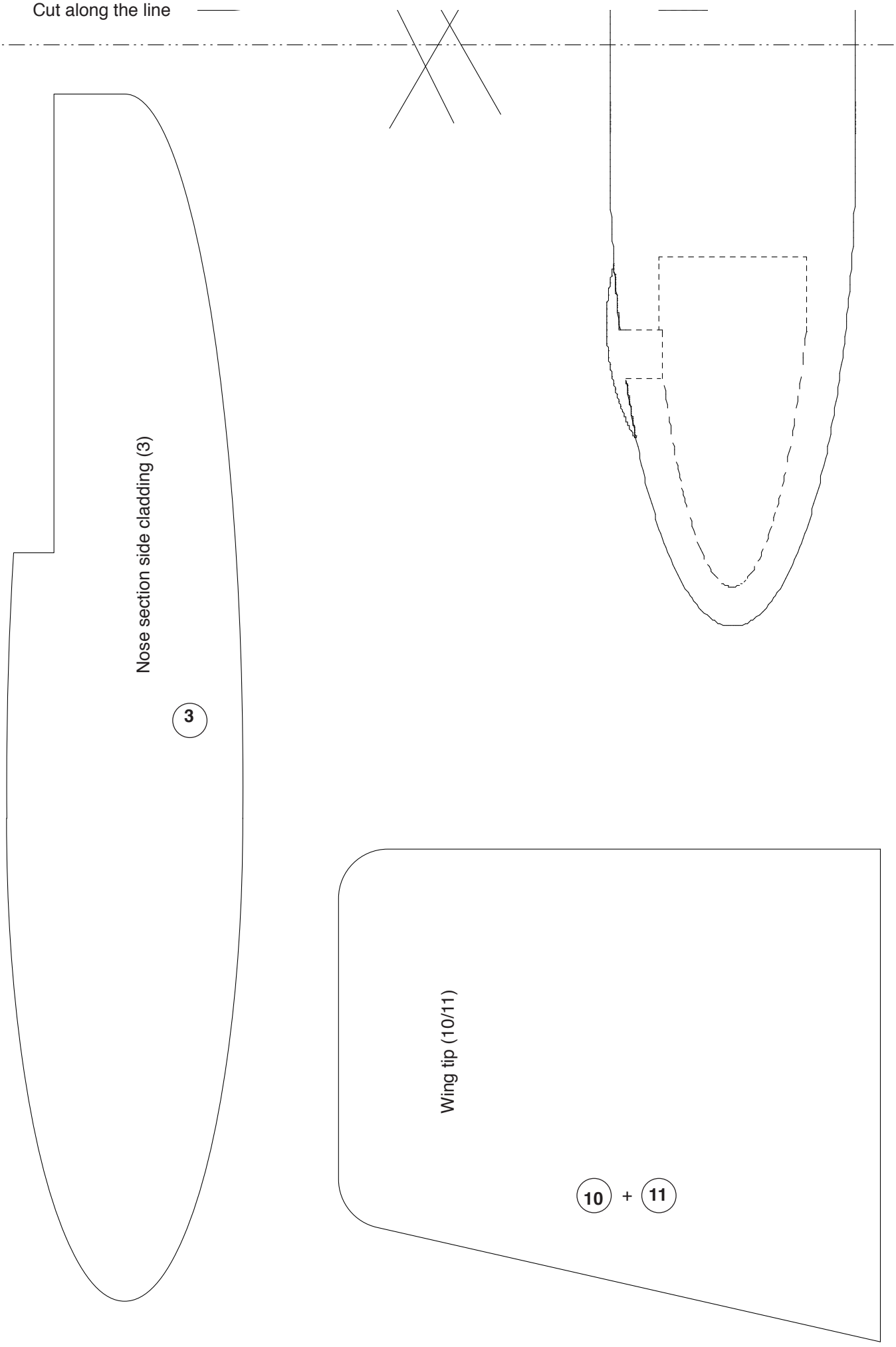
LONG AXIS Altering the wing flaps can cause the effect of ROLL.
VERTICAL AXIS Fin and Rudder movement can turn the plane.
SIDE AXIS Is controlled by the tailplane.

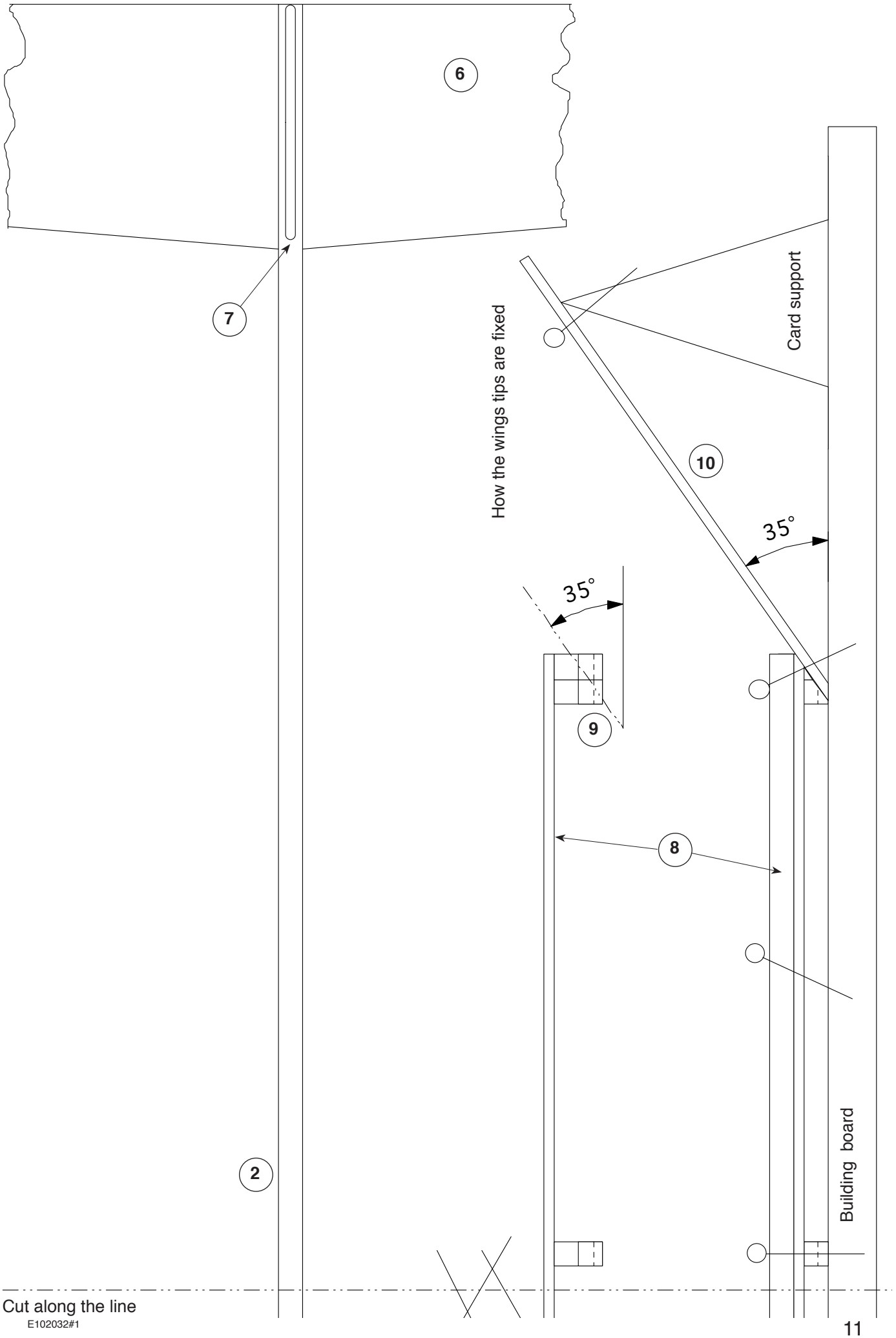


6
Tail fin (7)
7
Cut out for wing holder (2)
1
Nose section (1)
Balancing the model
Lead chamber and cover
2
Cut along the line


Tailplane (6)
6
5
8
9
S
12
4
3

Cut along the line





Cut along the line

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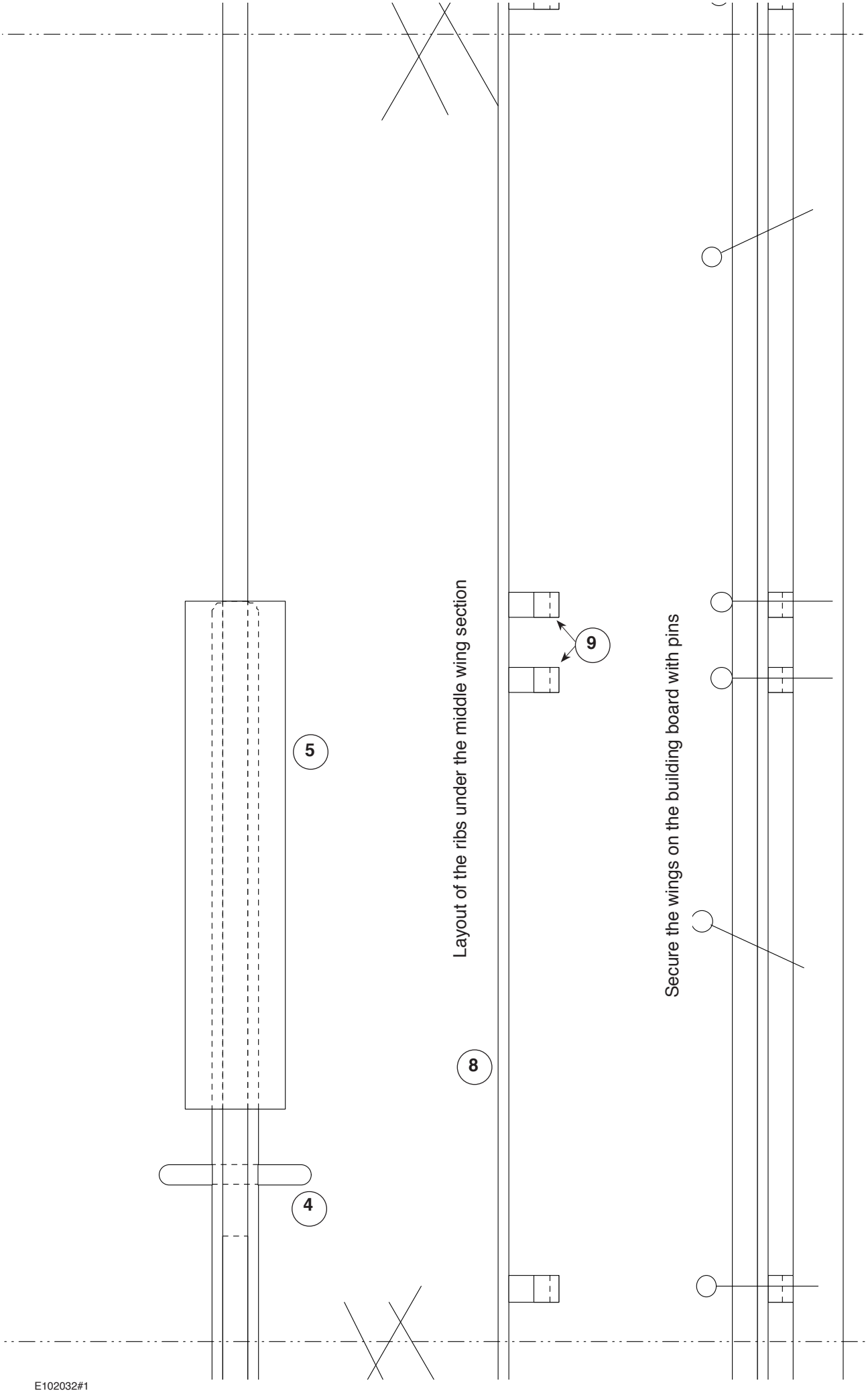
5
4
Layout of the ribs under the middle wing section
8
9
Secure the wings on the building board with pins

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Cut along the line

Rib pattern (9)

Glue the middle wing section (8) on to the ribs (9) Hold it in place with pins. (If necessary dampen the top surface of the wing section)