



Europa Hi-Top Modification

Classification	Optional
Applicability	XS Europas
Compliance	N/A

Introduction

The Hi-Top modification provides taller occupants with an increase in headroom of approximately 5cm (2"). This was first achieved by attaching a fuselage lower moulding that has been moulded with a taller firewall to a standard fuselage upper moulding using a pre-moulded triangular in-fill section added to the joint. The rear of the fuselage is joined together in the standard way, but at the firewall the upper moulding is positioned 7cm (2 ¾") higher than normal. Refer to figure 1. It is necessary for the moulded phenolic firewall, which is integral with the lower moulding, to be taller than standard to accommodate this modification. The doors and side windows are unaffected as they simply remain with the upper moulding. The deeper firewall of the Hi-Top will also require a High-Top upper engine cowl.

Further work has led to the development of Mod 64B. This achieves the benefits of Mod 64 but also improves forward view and eliminates the need for a special lower fuselage and upper cowl. A specially made, deeper screen is required. Mod 64B also has the benefit that, if the upper fuselage moulding has not been fitted, an aircraft started as standard can have the Hi-Top option incorporated at modest cost.

A Mod 64 Hi-Top can be converted to the Mod 64B configuration if the improved forward view is required. This conversion requires the new screen and a standard engine upper cowl.

Attaching In-fill to Upper Moulding (Mod 64 and 64B)

The following instructions apply to both Mod 64 and Mod 64B. **DO NOT GLUE** the in-fill moulding forward of the screen rear flange if building Mod 64B. See page 7.

To make this easier, lay the fuselage upper moulding on one side, supporting it so that it is steady while you work on it.

Scuff sand the inside skin of the joint flange up to the foam. The in-fill will only go back as far as the point where the moulding angles up to the fin, so you needn't scuff further aft than here for now.

Cut the pre-moulded in-fill down the centre of the moulding and check that it fits to the fuselage upper moulding and make any adjustments necessary before you attempt to bond them together.

The in-fill piece should measure 95mm (3.75") at the front (with the angled flange) and taper to 50mm (2") where the upper and lower mouldings start to overlap. From this point aft, the joggled flange should be trimmed off so that the in-fill piece acts only to fill the gap between the mouldings. (See figure 1).

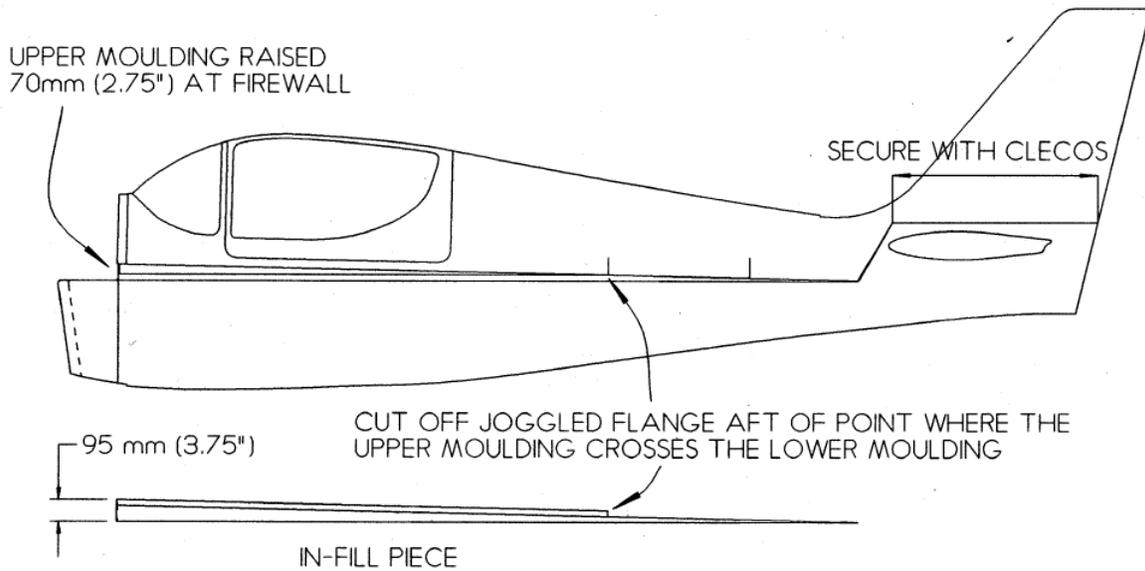


Fig 1. General view of hi-top fuselage

Temporarily secure the in-fill to the upper moulding, using temporary fasteners such as clecos or self-tapping screws, every few centimetres/inches (see figure 2).

Now remove the in-fill to scuff sand the joint flange thoroughly, then mix up some Araldite 420 and add floc until it doesn't slump. Apply the floc mix to the flange of one or other of the parts to be joined, then put them together, adding your temporary fasteners (lightly greased first so they don't get stuck) or cheap aluminium rivets which can be easily drilled out later. Clean off any adhesive that oozes out of the joint, both inside and outside

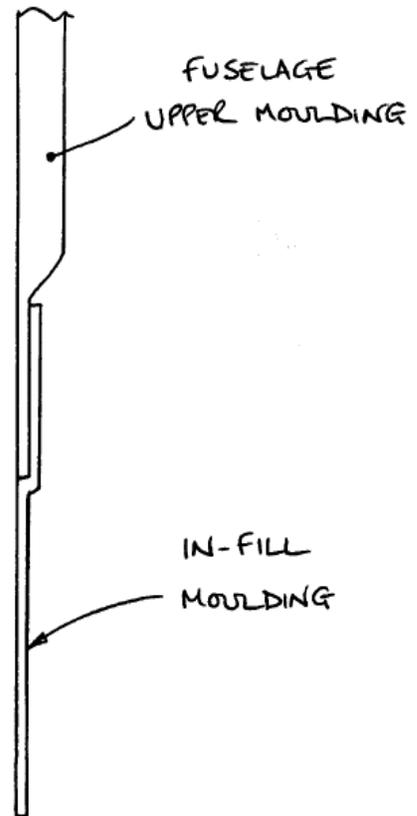


Fig 2. In-fill moulding attached to fuselage upper moulding.

After cure and having removed the fasteners cut the 3mm thick tan coloured foam into two long triangles, one for each side. (Due to the maximum length of the foam being shorter than the triangles needed, you'll need to make it from two pieces). One end should be wide enough to butt against the core of the upper moulding and to within just over 26mm (1") of the edge, this will be approximately 7cm (2.75") – see section view in figure 3.

The end should be cut at 90° to one edge. The other end should taper down to a point, the length being about 3.2m (127"). Chamfer the upper edge to match the core of the moulding.

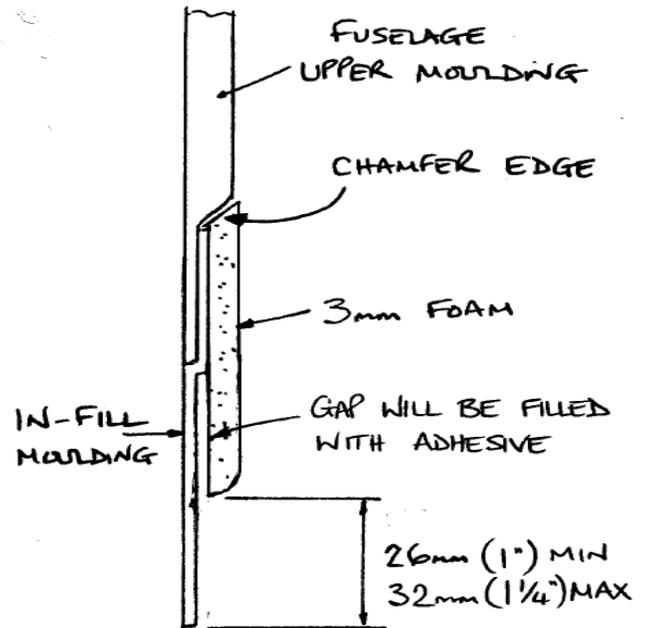


Fig 3. Positioning of foam core for cutting to size.

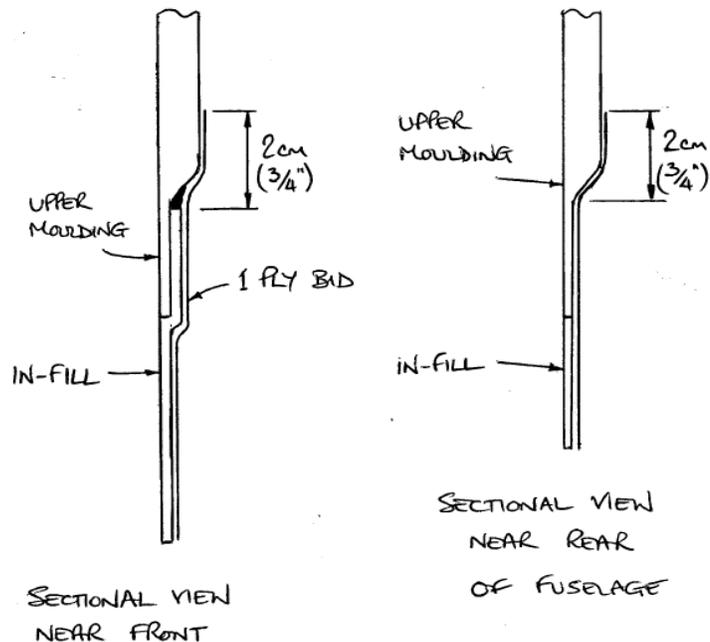


Fig 4. Applying first ply of 'bid'.



Putting the foam aside for now, scuff sand the bond area of the upper moulding and then apply a single ply of bid at 45°, overlapping joints by about 2cm (3/4"). (See figure 4).

Five pieces measuring 15cm (6") wide and as long as the roll allows should be sufficient. Apply a fillet of flox in any areas that may otherwise leave an air bubble.

Next apply a coating of micro slurry to the foam and also a thickness of dry micro to fill the gap between it and the joggle of the lower moulding and position it in place onto the still wet first ply. Weight the foam in place and allow to cure. (See figure 3).

After cure, chamfer the lower edge of the foam to allow an easy transition of a single ply of glass fibre you'll be laying over it.

Cut 5 pieces of 15cm (6") wide 'bid' (at $\pm 45^\circ$) as long as the roll allows.

Scuff sand the glass fibre about 3cm (1 1/4") each side of the foam along the full length, micro slurry the foam and then paint over it and about 3cm (1 1/4") either side of it with epoxy. Layup over the foam and 25mm (1") each side of it with 1 ply of 'bid', trimming the excess off before covering with peel ply. Refer to figure 5.

After cure, trim the excess material back to the flange edge and remove the peel ply. The upper moulding is now ready for bonding to the lower moulding. (See figure 5).

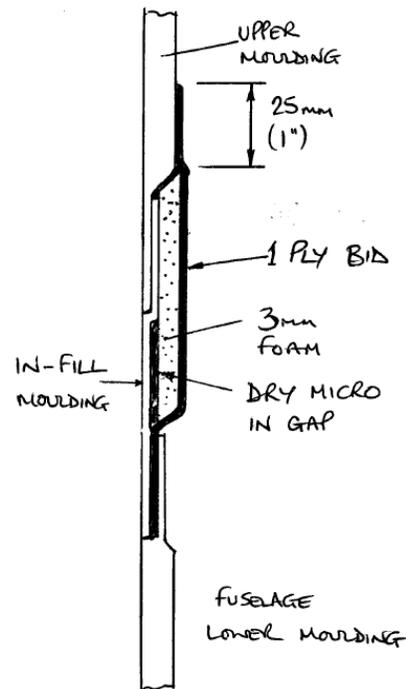


Fig 5. Section through finished joint



Additional reinforcement.

Bonding the upper and lower mouldings together is covered in chapter 23 of the Build Manual. As this is something that you may not do for a while, make sure to add a note in your manual at the appropriate stage to refer back to this Mod leaflet.

It will be necessary to add a 2 ply 'bid' tape over a 1m (40") length of the joint each side. From 75mm (3") forward of the point where the upper and lower mouldings overlap, to a point at least 1m (40") aft of here, add a 5cm (2") wide, 2 ply $\pm 45^\circ$ 'bid' tape to span the joint on the inside, overlapping evenly onto both parts. See figure 6.

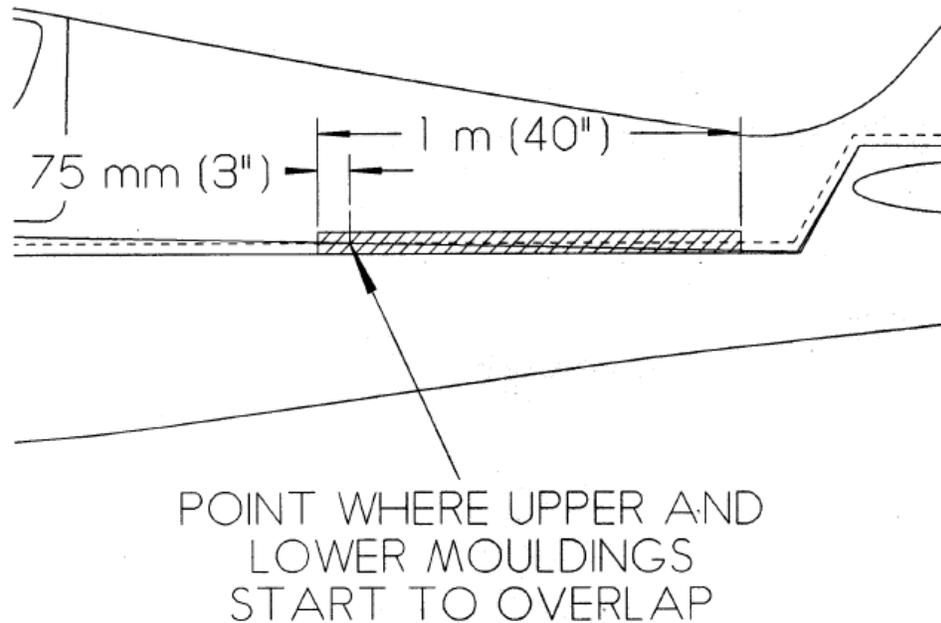


Fig 6. Reinforcement tape in fuselage rear.

With the base of the windscreen being positioned higher than standard, there will be a significant gap between the instrument module and the centre tunnel. Although not a structural issue - the instrument module does not rest on the tunnel in the standard aircraft - it is likely to be desirable to bridge this gap with a sub-module that could be used to house extra instrumentation. The instrument module should be installed first to establish the size and shape that any sub-module should be.

The deeper firewall of the Hi-Top Europa will require a Hi-Top upper engine cowling. Please remember to specify this when ordering the engine installation kit to ensure that the correct item is dispatched.

Mod 64B

Mod 64B uses the original fuselage lower moulding and requires the front and lower portion of the windscreen frame to be separated from the main part of the upper moulding. This cut is best made after the top has been fitted as its presence helps with aligning the upper module to the lower. A horizontal (parallel to the lower edge of the original upper moulding) cut will be made through the screen flange at (2). A vertical cut (3) is then made beside the flange joggle down to the joint line. See Fig 7 below.

1) At (2) cut through the screen flange ONLY.
DO NOT cut the door pillar

2) The vertical cut (Down to 3) is made at
the rear of the screen flange

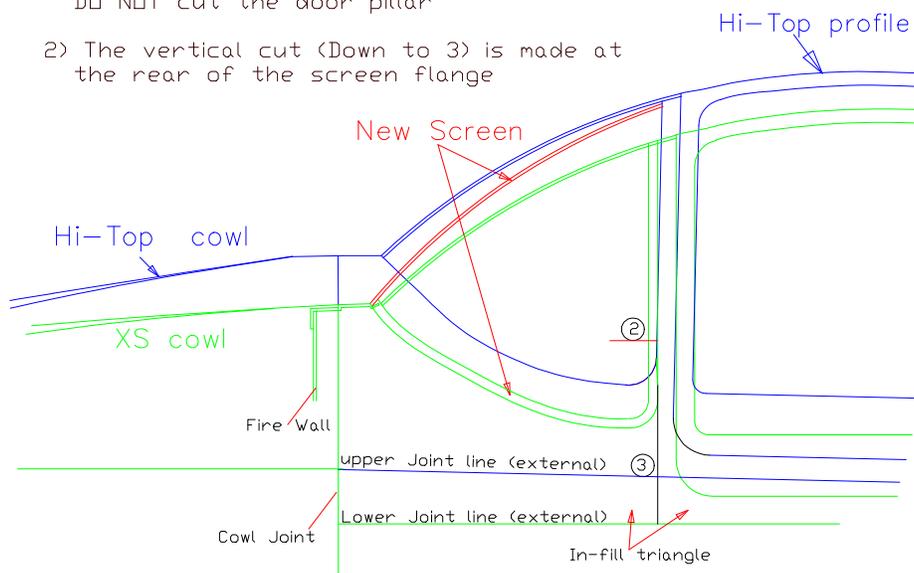


Fig 7 Detail of cuts to fuselage top

Follow the installation instructions as set out in pages 2 to 4 but **DO NOT GLUE** and **GLASS** the length from the cut line 3 to the firewall. Retain this section in place with temporary fasteners

Use the shape of the top of the firewall to make a temporary extension that can be bolted to the rear face of the firewall. Bolt the extension in place extending the firewall up 70mm. Bonding the upper and lower mouldings together is covered in chapter 23 **DO NOT BOND** the section forward of the cut at (3) or to the firewall extension.

When the fuselage upper section (from cut line 3 aft) has been bonded in place make the horizontal cut at (2) and the vertical cut at (3). Take care to not cut through the flange on the lower fuselage. Separate the portion of forward fuselage and remove the section of the in-fill triangle. Remove the temporary firewall extension. The fuselage forward section can now be fitted to the firewall and lower fuselage. This will leave a gap in the screen flange at (2) which should be 65mm on both sides of the aircraft.

Ensure that the outer skins at the joint (3) are aligned and bond on the forward fuselage section with Araldite 420 () and apply the four layers of glass to the joint as specified in chapter 23 of the Build Manual.

Scuff sand the external skin 1 inch either side of the cut (3) and apply one layer of 'bid' (at $\pm 45^\circ$) to the outer skin over the cut (3) to hold the skin aligned. After the internal reinforcement is complete this may be left in place or removed.

Reinforcement Details

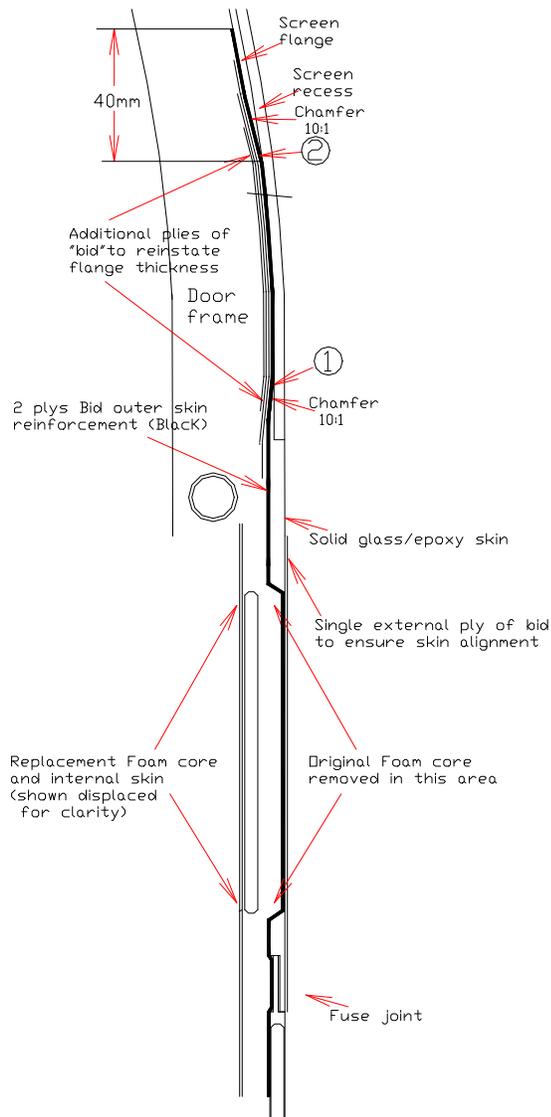


Fig 9 Reinforcement Details

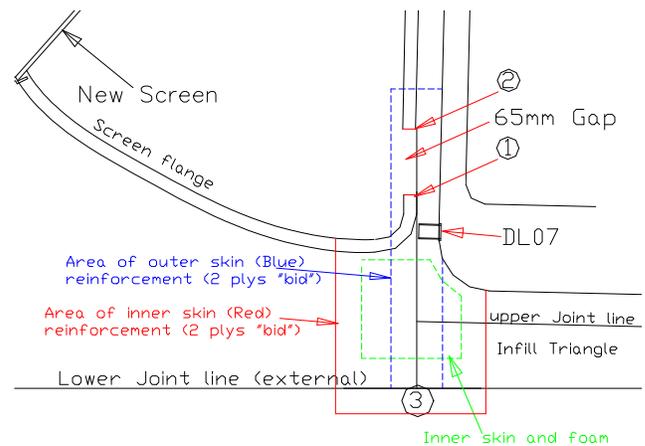


Fig 8 Reinforcement layout

Remove the inner skin and foam core in the area shown in figure 8. The exact shape of this area will vary slightly due to manufacturing variations. The top and bottom of this area should be at the point where the foam core stops and the shell is solid glass.

Chamfer the inner face of the screen flange at (1) and (2). The angle of the chamfer should be 10 to 1. Scuff sand the door frame from the reinforcement area to 40mm above (2). Using aluminum covered with polythene (or similar) create a former to support the new area of screen flange between (1) and (2) and hold this in place.

Scuff sand the skin and apply two layers of "bid" (at $\pm 45^\circ$), 60mm wide, to the inside of the outer skin from the bottom of the reinforcement area (3) to 40mm above (2) to cover the cut line and form the new flange. Additional layers of "bid" (at $\pm 45^\circ$) should then be applied to the area between the outer ends of the chamfers to reinstate the flange to its original thickness. This will require some 5 or more layers.

In the area where the inner skin and core have been removed fill all voids with wet flox and install a foam core cut to fit. Again fill any voids with wet flox and apply two layers of "bid" (at $\pm 45^\circ$) as the inner skin, overlapping the existing skin, all round, by 25mm.

Screen Installation

As can be seen from Fig 7 the angle at which the screen meets the top and bottom flanges is greater with the enlarged screen than the original screen. To achieve a good fit the forward edge of the top flange and the bottom edge of the screen should be relieved to obtain a good fit. If the top flange is weakened, by sanding too much away, it should be reinforced with further layers of "bid" (at $\pm 45^\circ$).



Fig 10 Finished joint & flange

Conversion of Mod 64 to Mod 64 B

As discussed in the introduction a Mod 64 aircraft can be converted to Mod 64B. This conversion requires the new screen and a standard engine upper cowl. This is not a task to be undertaken without either considerable experience with composite materials or good, on the spot, advice. Great care must be exercised separating components with heat to avoid serious damage to the surrounding structure.

The old screen is removed using a hot air gun to soften the Araldite 420 adhesive. The new firewall profile is cut into the firewall only (not into the forward portion of the screen surround). The cuts at (2) and (3) are made taking care not to cut through the flange on the lower fuselage. A horizontal cut, in the center of the in-fill, is made from (3) to the firewall. The lower forward portion of the screen surround that has not been cut must be separated with heat. When the forward fuselage section has been removed the top 70mm of the firewall and the parts of the in-fill triangle are removed with heat.

Once separated and cleaned up the installation process is as above for Mod 64B. Sufficient clearance must be created (by removing the Araldite 420 and floc) between the shoot bolt guides (DL07) and the screen flange to allow the proper construction of the new flange. If this is not possible it will be necessary to remove the shoot bolt guides (DL07) and reinstall them when the screen flange is completed.