

16. Fuel tank

The fuel tank, made from polyethylene by the roto-moulding method, has very good crash survivability, an important feature for any fuel tank especially a fuselage mounted one. Various cylindrical bosses are moulded with the tank which will allow fittings to be installed for fuel inlet and fuel outlet.

Before installation open up the three small bosses using a good quality 3/4" hole saw to accept the fuel fittings F09B and F09C. The large boss should have a hole of at least 38 mm (1.5") diameter and ideally no more than 45 mm (1.75"). This boss is for the fuel filler pipe which clamps to its outside diameter; no internal fitting is used.

Fuel fittings

The fuel fittings F09C are to be made into finger strainers for coarse filtering, requiring a gauze to be bonded into them. The vent fitting F09B requires a 29 cm (11 1/2") length of 1/4" light alloy tube to be bonded into it to ensure that the air outlet is at the highest point within the fuel tank, so enabling the tank to be completely filled. Although not required until a little later it would be wise to carry out this bonding now so that the Araldite 420 is properly cured well before they are exposed to fuel.

For each F09C outlet cut the supplied brass gauze to be approximately 60 mm x 65 mm (2 3/8" x 2 1/2") and roll it to form a tube 65 mm (2 1/2") long so that it can slide into the large bore of the F09C fittings. Close one end of the tube by squeezing it flat then, to enable it to fit into the hole in the fuel tank, fold the corners inwards. Solder or bond with Araldite 420 all the joints, having ensured it still fits into F09C.

Scuff the bore of the fuel outlet fitting and clean both the fitting and gauze with solvent. Bond the gauze into the fitting with Araldite 420, leaving approximately 25 mm proud of the fitting, and allow to fully cure. See figure 1, which shows the gauze fitted.

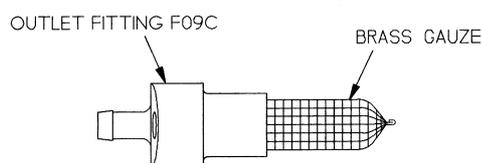


Fig 1. F09C outlet fitting with gauze strainer fitted.

Ensuring that all parts are clean first, insert the aluminium tube (part no TU25RM) into the inside of the fitting F09B, then partly fill the space around the tube with Araldite 420. Leave to cure fully - see figure 2.

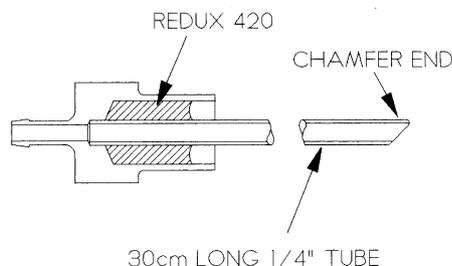


Fig 2. F09B vent fitting with extension tube.



Chamfer the end of the tube so that inadvertent contact with the tank won't block it, and bend it slightly so that it ends up in the top front corner of the tank.

Installation into cockpit module

Step 1

To allow the tank to be installed into the cockpit module the starboard bracket CS14S will need removing as mentioned earlier.

Step 2

A cut-out will be required in the front bulkhead of the cockpit module's baggage bay to allow the 50 mm (2") and 25 mm (1") bosses, which protrude from the tank's rear surface, to go through. The tank will be slid in from the starboard side.

Make the cut-out according to the sketch in figure 3, retaining the scrap to be used to fill the gap left around the bosses after the tank has been installed. When making the cut-out, ensure there is enough clearance for the outside diameter of the fuel filler hose.

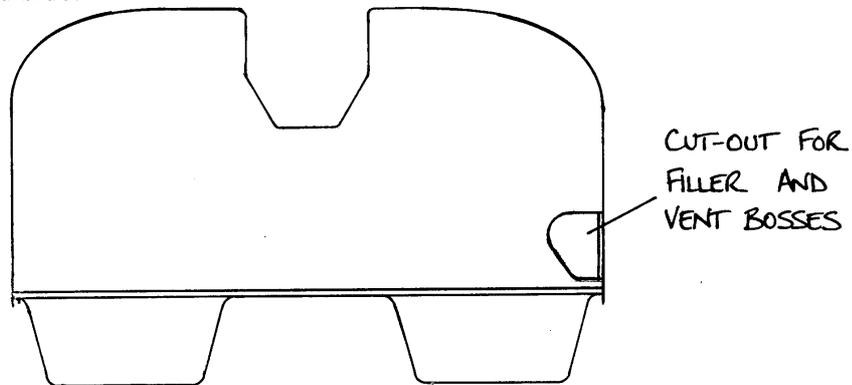


Fig 3. Baggage bay front bulkhead looking aft.

Step 3

Arrange your trestles to support the cockpit module securely, then, with sufficient packing under the tank to bring its bottom surface approx 5mm up from the underside of the cockpit module, slide the tank in from the starboard side. Before finalising the position ensure that the tank does not foul either the CS10 pitch cross tube or the wing spars. Move the tank to be equidistant from each side then strap the baggage bay up to hold it in the correct position. See figure 4.

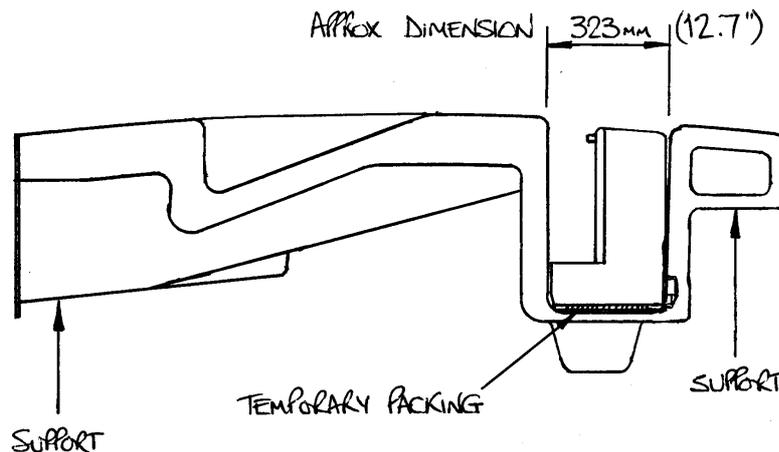


Fig 4. Strap baggage bay to maintain desired position.

Step 4

Brackets

To take loads from the tank into the cockpit module and the fuselage, brackets made from 'bid' are used and laid up directly onto the fuel tank. Figure 5 shows where they will be in a sectional view.

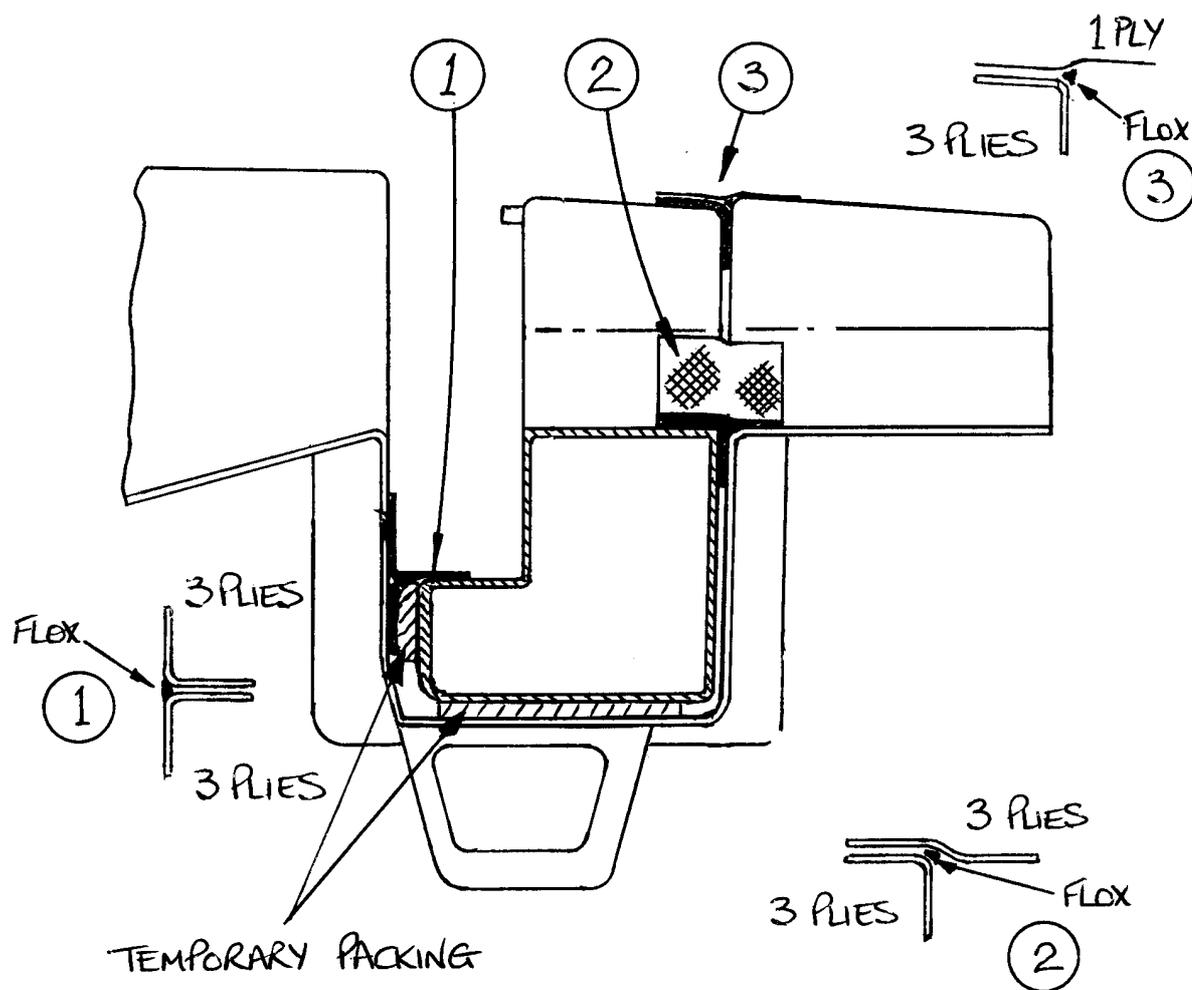


Fig 5. Sectional view through centreline of fuel tank.



Layup 1

Scuff sand the relevant areas of the cockpit module for bonding then lay-up pieces of 'bid' to form two 3 ply laminates on polythene sheet to make the long, full width brackets, marked No 1 in figure 3. Lay them in place, removing the plastic between them, to lap a minimum of 5 cm onto the cockpit module and a similar amount onto the tank to form a 'T' shape. Make a floc fillet in the vee between the brackets to prevent air bubbles forming.

Layup 2

The second layup (No 2) is made up of 3 plies in the saddle area of the fuel tank which laps onto the baggage bay's forward bulkhead, between the tank and the bulkhead, to form a 90° bracket, then a 3 ply strip lays over the saddle areas of both tank and cockpit module to form a 'T' shaped bracket where possible. Admittedly there are awkward shapes to contend with here but the object is to create a bracket which takes loads from the tank into the vertical bulkhead of the cockpit module. Make all flanges to lap 5 cm onto the tank and 5 cm onto the cockpit module.

Layup 3

Two final 3 ply layups (No 3) are to be laid up either side of the saddle which run from the bottom of the tank down onto the bulkhead and is closed off by laying up 1 ply from the tank to the bottom of the cockpit module to make a 'T' shaped bracket. Make these layups to be at about 30 cm (12") to 35 cm (14") long and again make each flange 5 cm wide.

Fuel fitting installation

Cut the 25 mm (1") bore rubber hose to make three 40 mm (1 9/16") long pieces.

Note: *Be sure that the hose you use has a red stripe. Hose without the stripe is NOT fuel resistant.*

Screw an FPA903A union into the starboard side fuel outlet fitting F09C on the port side for the fuel gauge, and an FPA903B into the port side F09C. Insert the two F09C fuel outlet fittings, with the screw-in fitting biased towards inboard, into the bosses on each side of the saddle, and the vent fitting F09B into the boss on the rear face of the fuel tank. Ensure that the vent tube is in the upper front corner of the tank. Slide over the rubber hose and add two hose clamps to each fitting, one clamping the boss, the other clamping the metal fitting. Ensure the clamps are tight.

The Rotax 912 and 912S engines require an FPA903B in the other F09C for the fuel return line. The 914 engine requires an FPA903A for its return line.

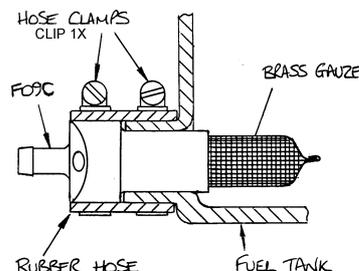


Fig 6. F09C outlet fitting installed in fuel tank.

Finally, cover over all inlets and outlets to prevent debris or anything else from entering the tank until you're ready to install the fuel hoses, but be sure not to make air tight seals to cater for atmospheric pressure changes. With the tank installed the aileron quick-connect system can be re-assembled.

Fuel tank spacers

The forward face of the fuel tank has a tendency to bulge forward with the weight of fuel. In certain cases the bulge will contact the aileron tie-rod and even the pitch torque tube. To prevent this from happening, spacers are added.

Spacer Assembly

Two spacers, one fitted each side of the central tunnel, are to be made. See figure 7. Make the spacers as shown in the drawing .

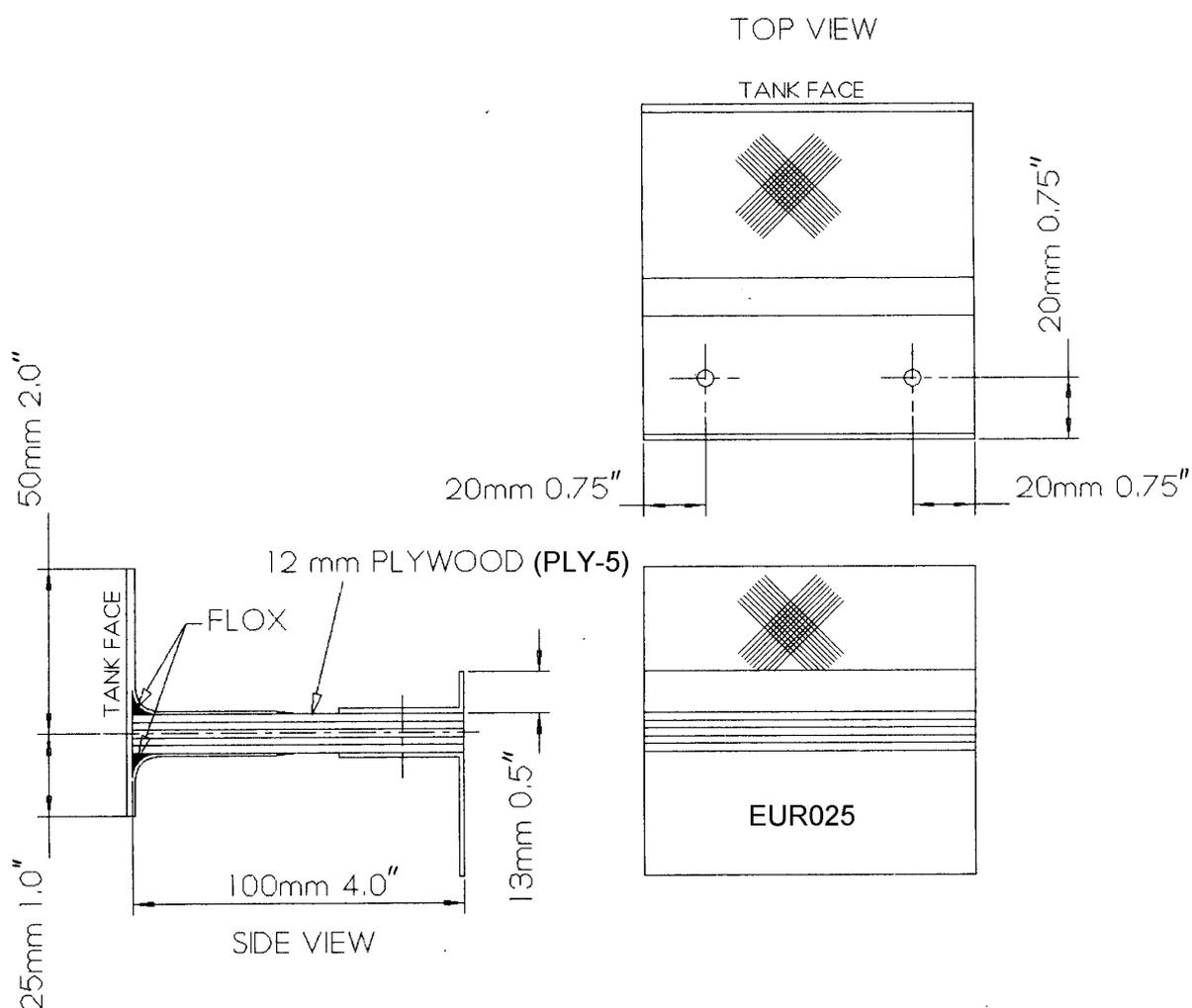


Fig 7. One spacer assembly.



Cut the light alloy angle EUR025 into four 10 cm (4") pieces then mark out and drill one each for the uppermost brackets according to the figure. Cut the upright flange of these two brackets to be 13 mm (1/2") wide.

Fitting the parts together as shown, drill through the wood PLY-5 and into the light alloy angle on the other side. Bolt the two pieces of angle to the plywood using AN3-7A bolts and MS21042-3 nuts.

Layup on a sheet of plastic 8 plies of 'bid' at +/- 45° then position the piece of 12 mm plywood edge on to the layup as shown in the figure. Make a flox fillet both sides then lay a further 4 plies of 'bid' at +/- 45° over the existing plies and onto the plywood by about 5 cm (2") both sides. Make sure that the plywood is at 90° to the fibreglass then cover with peel-ply and allow to cure. After cure, sand the sharp edges off and remove the peel-ply. Bolt the light alloy brackets to the plywood. The spacer is now ready for installation.

Installation

With the alloy brackets against the seat bulkhead, position the spacers relative to the fuel tank as shown in figure 8. They probably won't be in contact with the tank. This is quite normal.

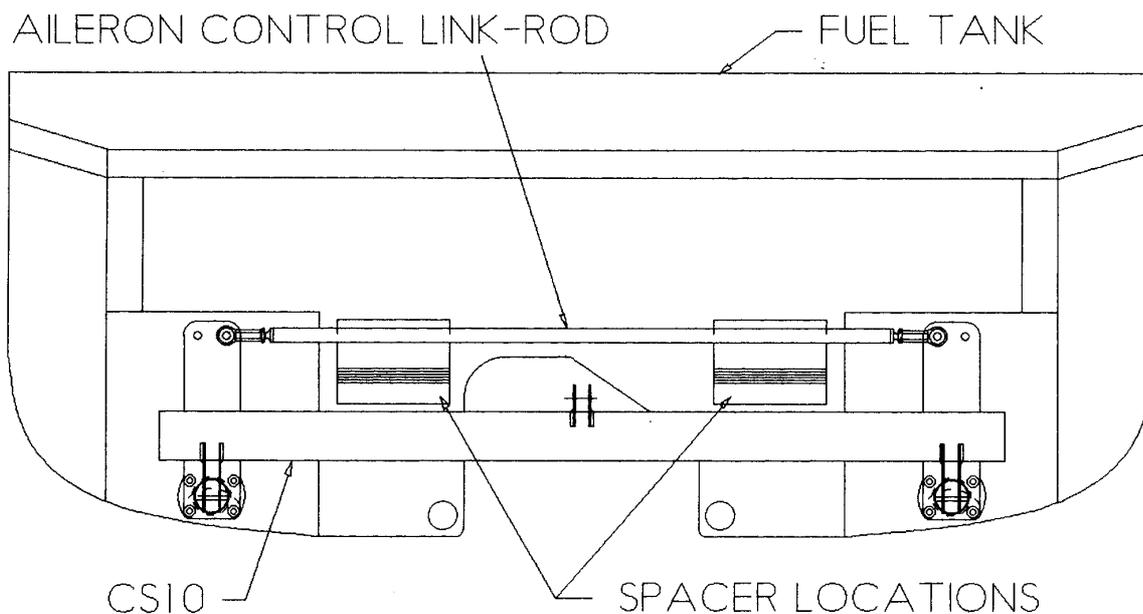


Fig 8. Location of spacers relative to tank - looking aft.

Ensure that the spacers are positioned to be just below the spars then drill two 4.8 mm holes about 65 mm (2.5") apart through the seat back and through the lower bracket for each spacer. Careful measurements will have to be made as to where the bracket is and the dimensions for the hole centres transferred to the seat back.

Install two AN525-10R10 bolts with AN970-3 washers under the heads and MS21042-3 nuts to secure each spacer.