15 Dash Board and Windscreen

15.1 Dash Board

a) Re-check the position and symmetry of the cowlings. Use the paper template supplied with the kit to cut the shape of the two dash board parts out of cardboard.

Cut the templates oversize, except for the straight rear edges on the 912 templates.

Templates for other engine types may need to be extended at the rear to accommodate different cowling positions. Cut oversize and trim to fit.

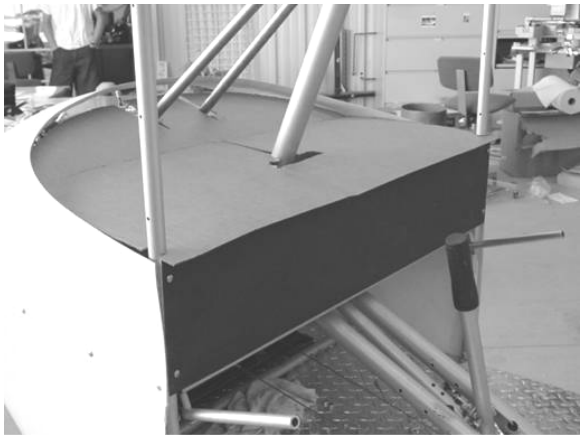


Figure 286; fitting using cardboard templates, and the result, a (well used) dash board.

b) Use them to make adjustments so that they fit nicely in place, Figure.

Use the straight rear edges of the templates as the reference lines. The rear panel reference line should align with the forward edge of the instrument panel.

The sides of the dash board towards the rear will have to be left a slightly loose fit, to allow the windscreen to pass down beneath the dash board.

Towards the front of the dash board the windscreen will normally be cut to finish above the level of the dash board. However, if the lip for riveting the screen to is rather narrow it will be necessary to allow the windscreen to pass down the sides of the front dashboard piece. This gives more room for the rivets, but will require more trimming of the dashboard.

The rear part of the dash board will require slots to be cut to pass the aileron cables through it, as marked on the template.

On the Jabiru engine the cowling is further forwards, therefore it may be necessary to use an offcut piece from the sides of the dashboard to extend the dashboard slightly further forwards in the centre.

c) Use this fitted cardboard template to cut the fibreglass parts, Figure.

The panel without the rounded edge is used to make the front part of the dash board. Lay the panel upside down, mark the template out, and cut. A jigsaw works well, cutting on the upstroke to reduce the chance of damage to the upper surface of the panel. Take care not to damage the central cut-out, as the removed part will be put back in place to cover the hole.

d) It may be desirable to thin the forward edge of the panel to fit more easily between the underside of the cowling and the top of the firewall.

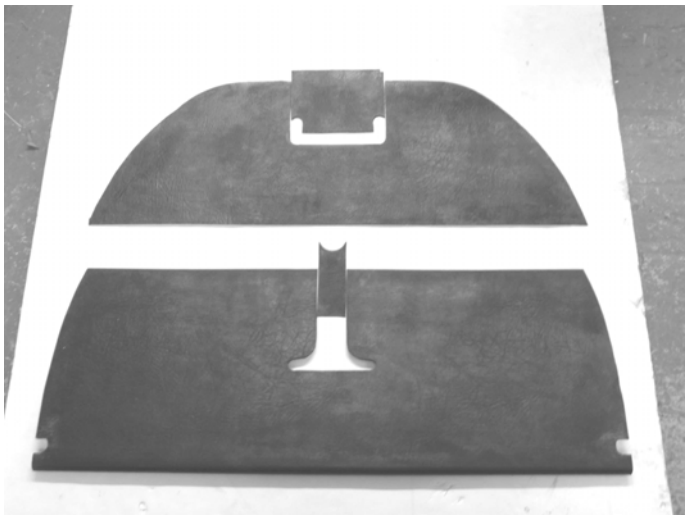


Figure 286; dash board components after cutting.

e) With the main panel upside down, draw a line on the flat part 3mm forward of the edge of the curved part above it, to mark the forward side of the instrument panel. Align the template with this line and cut out.

Figure 287; dash board attachment bracket.

f) Fix the dash board to the aluminium angle behind the instrument panel and to the top of the firewall, Figure,

Use the light gauge aluminium angle in 50mm lengths to form brackets to fix the dash board to the top of the firewall.

Two bolts at the front and two bolts at the rear should be sufficient, although more should be used if you wish to mount any instruments, such as a GPS, on top of the dash board.

To fit the dashboard it may be necessary to temporarily undo the instrument panel and allow it to lie against the throttle levers.

g) Glue, or secure with bolts, the cut-out parts back into their holes.

Ensure that edges of the glassfibre dashboard and instrument panel do not rub on any of the tubes, as the glass will abrade the tubes in the same manner as glasspaper, damaging them surprisingly quickly!

h) Sand all edges smooth and use a black felt tipped pen, or paint, to colour the visible edges.

15.2 Windscreen

Do not allow threadlock (Loctite etc.) or other solvents to come in contact with the Lexan as it will damage it severely.

a) Apply the supplied strips of thin self-adhesive foam strip to the tubes supporting the top part of the windscreen.

This will reduce noise and vibration.

b) Cut the Lexan sheet to Figure.

For engines other than the Rotax 912 do not cut the forward end of the windscreen (the 1720 and 1900 measurements) but leave this full length and cut to fit in situ.

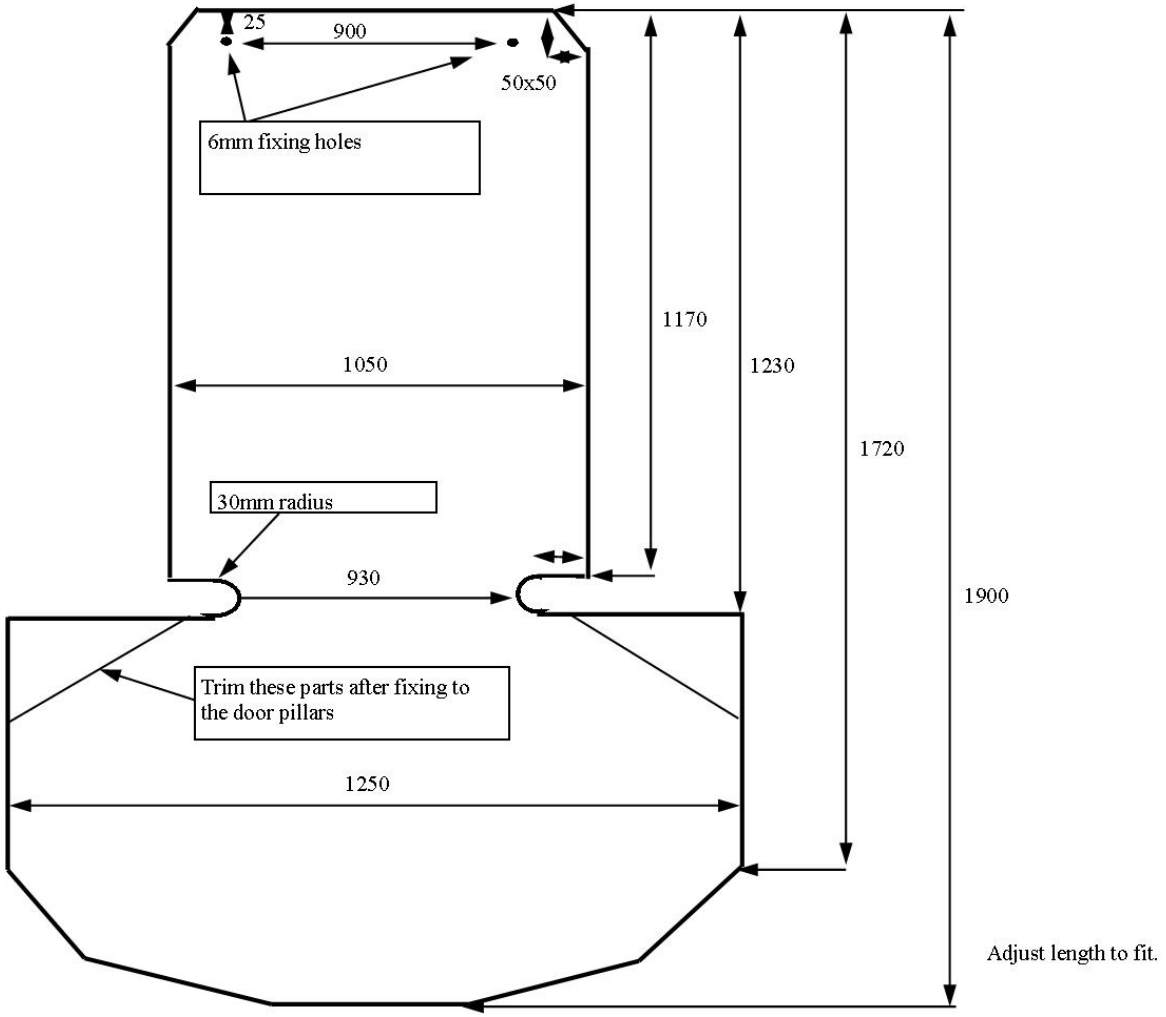


Figure 288; windscreen cutting pattern.

Figure 289; cutting the Lexan.

c) Drill the two rear holes marked on the rear part of the Lexan.

d) Lay the Lexan over the cockpit, locating the holes in the Lexan over the two bolts sticking up at the rear of the cockpit.

Check that you have not left the leading-edge securing pins in place, as if you do, and they are incorrectly inserted from the front instead of their proper insertion from the rear, you will not be able to get them out again when you have fitted the windscreen!

Figure 290; drilling for the rear mounting bolts.

e) Push the windscreen into position behind the cowling lip.

The windscreen must go inside the lip of the cowling and stop above the dash board at the front, and pass down the sides of the dash board towards the rear, Figure.

If there is not enough material along the cowling lip to secure the rivets then the windscreen may pass down the sides of the dashboard even at the front, although the dashboard will need further trimming to allow this.

The windscreen pattern is intended to be oversize at the front: insert the screen and position carefully, then if it is too long mark along the inside a short distance above the dash board (hold a pen flat against the dash board). Remove the screen and trim to this line, and repeat until the windscreen fits nicely above the dash board at the front and passes down the side of the dash board towards the rear.

*Take care that the tubes **tu34** supporting the windscreen do not get knocked out of position, check them regularly, and check that the shape of the cowling remains as it should be otherwise you may build a strange shape into the windscreen and the cowling!*

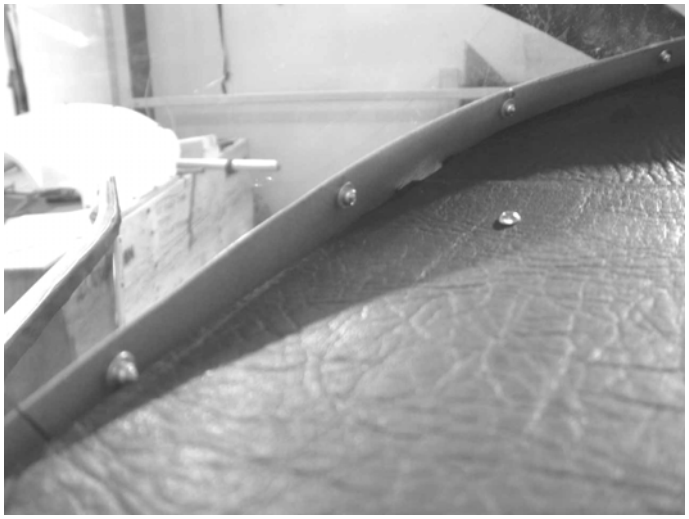


Figure 291; windscreen passing down side of dash board.

f) Rivet the Lexan every 15cm or so to the large curved tubes on the top sides of the fuselage.

Use the pre-drilled holes, start at the rear and work towards the front of the Lexan.

g) Get two helpers, one on each side of the fuselage pushing the Lexan tightly into the inside of the curved part of the cowling.

*Make sure there are no gaps, and that the Lexan is evenly positioned with respect to the cabin upright tubes **tu34** on each side, and that these are in their correct positions too.*

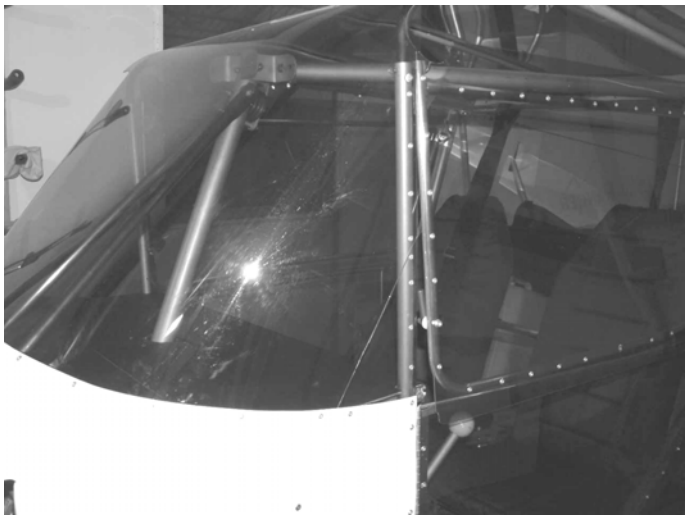


Figure 292; finished windscreen.

h) While the two people hold the cowling in place, drill holes through the cowling and the Lexan to hold it in place with rivets.

Check that the cowling has not distorted, particularly with reference to the minimum 10mm clearance from the spinner – the bonnet must be secured in position before riveting on the lexan, or it may not fit afterwards!

The curvature of the cowling can be increased slightly by lifting it in the middle before fixing the windscreen, to increase space for the carburettors etc. . Don't over-do this however, as you will distort the rest of the cowling.

Use washers on the inside to spread the rivet loads against the Lexan. Space the rivets evenly, every 100mm or so, starting with one rivet in the exact centre (this will be used later for the screen bracing batten).

i) Drill and rivet the sides of the windscreen to the cabin uprights ***tu34***.

The spacing of the rivets should be around 60mm or so, and for best effect it should be matched to the doors.

j) Trim the excess Lexan so that it is even with the rear of the tubes.

k) Drill holes in the windscreen centre batten for rivets, matching the spacing on the adjacent windscreen supports

The batten will need careful bending to precisely match the curve of the windscreen.

While one person holds the batten against the underside of the top of the windscreen, another person can drill from the top, through the Lexan.

l) Rivet it in place with a layer of self-adhesive foam between it and the Lexan.

Note, if the optional Screen centre batten is to be fitted, before riveting in place follow the instructions in 15.2.1

m) With the left over Lexan, cut a triangular piece to fit in the corners of the windscreen and tube ***tu34***. Secure in place with rivets through tubes ***tu34*** and through the cowlings.

The join can be covered with another strip of Lexan riveted in place, if desired, however it looks best left as is.

A pair of vents such as those available from Light Aero Spares may be fitted across the joins if desired.

n) The rear of the windscreen should be secured to the upper rear cabin tube using 3 or more rivets or self-tapping screws and a strip of aluminium between the bolts holding the rear of the windscreen, Figure. Use self-adhesive foam strip between the windscreen and the tube to get a good seal otherwise the rain will blow down your neck!

Figure 293; strip along rear of windscreen.

o) It is important to get a good seal between the lexan roof panel and the upper surface of the wings. This affects glide performance and stall characteristics. Where the lexan overlaps the upper surface of the wing the gap should be sealed using the self adhesive foam strip supplied. This should be fitted with the self adhesive side against the lexan. It may be necessary to use more than one thickness to close the gap on the front ¼ of the chord. It will be necessary to fit the wings to mark the position to attach the foam, and remove them again to fit it. You can wait for final rigging to do this – but don't forget!

15.2.1 Screen centre batten

At high cruise speeds the windscreen distorts slightly. This can be prevented with the installation of the optional Screen centre batten. This is part of the mandatory build standard for the Swift model, recommended for the standard 912S model, and may be fitted to all models.

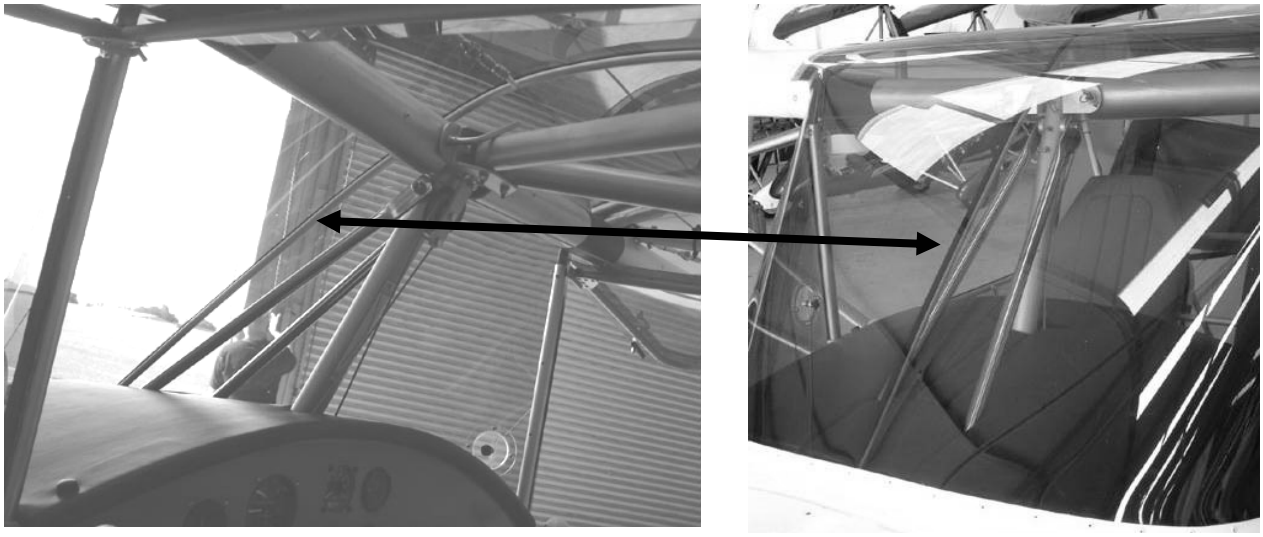
a) Cut the end off the roof centre batten to expose the hollow tube end.

b) Fit the small tube plug inside the end of the tube so that half its length is exposed. Plug onto this the screen centre batten tube

c) Curve the ensemble to match the curve of the roof and windscreen as precisely as possible. It may be necessary to trim the length of the screen centre batten to fit.

d) Apply the thin self adhesive foam strip to the batten ensemble where it will touch the lexan.

e) Fix into position. Use 4mm aluminium rivets to fix to the roof area as per 15.2 k). Do not use any rivets down the forward windscreen portion – use only one rivet in the screen centre batten just beyond the join. Secure the bottom end of the screen centre batten using a 4mm rivet or 4mm bolt to pass through the glassfibre upper rear cowling piece, the lexan and through the batten.



Screen centre batten

16 Doors

The doors should be made to fit, with the wings in place for the final trimming. Care with cutting and positioning the doors will reduce the number of draughts!

Check and double check the fit before cutting the parts, especially the Lexan. The exact measurements depend upon a number of factors, such as sills, floor etc. . Use the drawings as a guide only.

16.1 One Piece Door

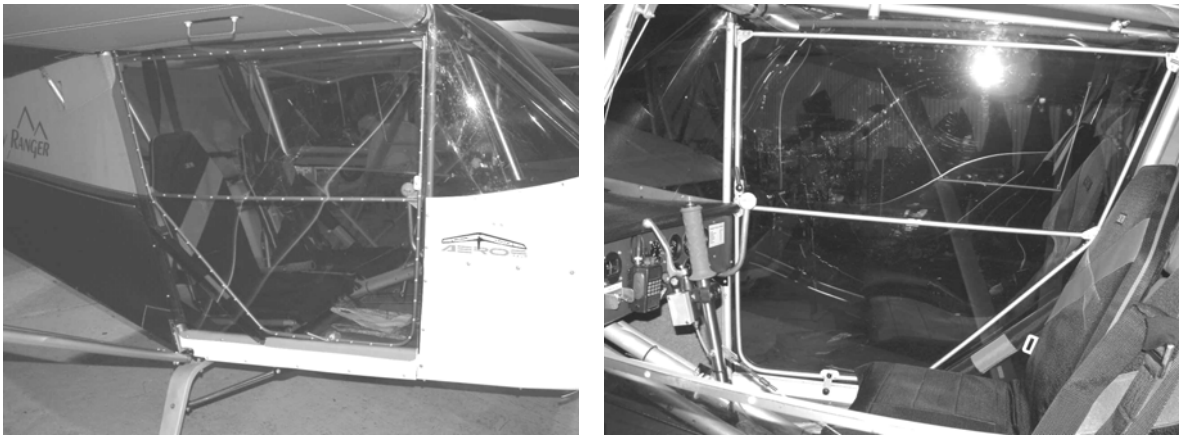


Figure 294; one piece door.

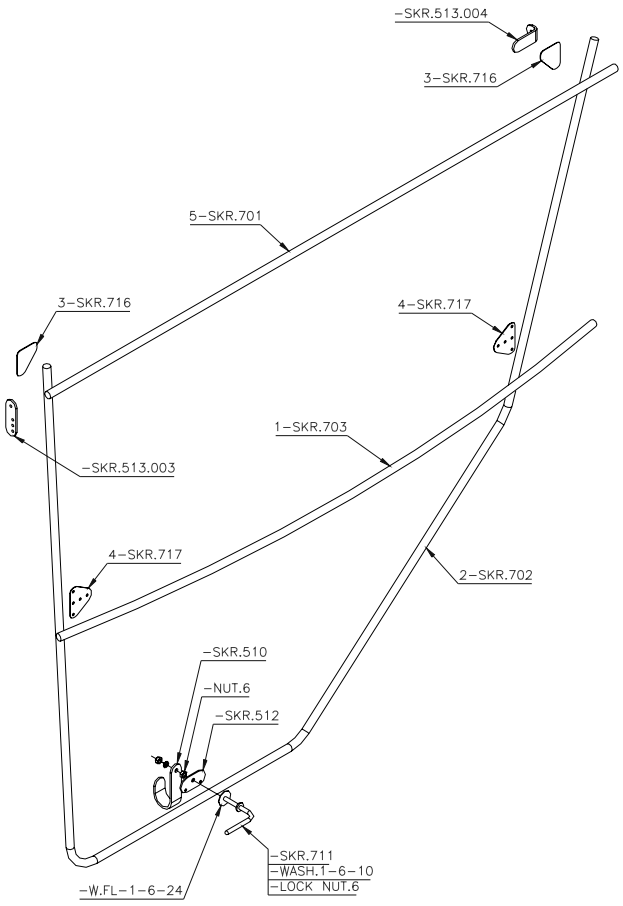


Figure 295; one piece door frame.

16.1.1 Door sills

a) Trim the fibreglass door sills to fit around the undercarriage drag link and to fit inside the cowling at the front.

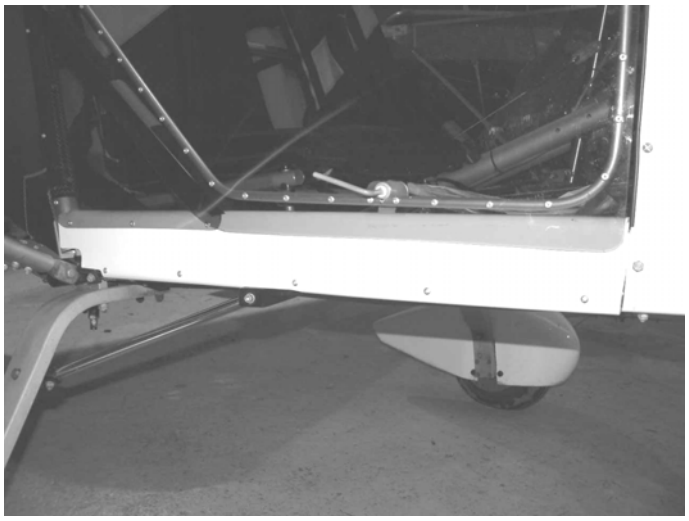


Figure 296; door sill.

b) Secure them by the bolt at the bottom of the side of the ***tu34*** cabin upright tubes.

The bolt must pass right through the cowling, the sill and the tube.

c) Use rivets or self-tapping screws to fix the sills to the horizontal tubes ***tu16*** at the base of the door openings, at a maximum spacing of 150mm.

These can be fitted vertically to the underside of the tubes, to keep them out of sight, but at least three should be fitted to the sides, with equal spacing, to help rigidity.

16.1.2 Lexan fixed gussets

a) Cut the two triangular pieces of Lexan required to attach in the area to the lower rear of the door, between ***tu144*** and ***tu6***,

The rear and lower edges can be cold folded to 45 degrees 10mm from the edge to form a neat finish. This can be done in a bending brake, or by clamping between two bits of stout timber.

Figure 297; triangular piece of Lexan..

Attach them using Rivets. Only rivet along the lower and rear tubes, don't rivet to the steel diagonal tube. Use a minimum of three rivets per edge.

16.1.3 Door frame

a) Drill out the hole at the top of the cabin uprights ***tu34*** to 5mm.

b) Take the door frame and offer it up to the opening.

*Aim for a final position with an even 10mm spacing from the cabin uprights **tu34** and the top of the door sill. The rear edge should be approximately 20mm from the rear cabin uprights **tu6** and due to its shape rather more from the steel diagonal brace **tu144**.*

c) Carefully bend the frame as required to ensure the best fit.

*The relative positions of the rear cabin uprights **tu6** and the cabin uprights **tu34** requires that the rear edge is also bent outwards slightly relative to the front.*

d) With the frame supported in position mark the front edge of the door frame 10mm lower than the pivot bolt centre in the cabin upright ***tu34***.

*The pivot bolt will pass through the hole at the top of **tu34**.*

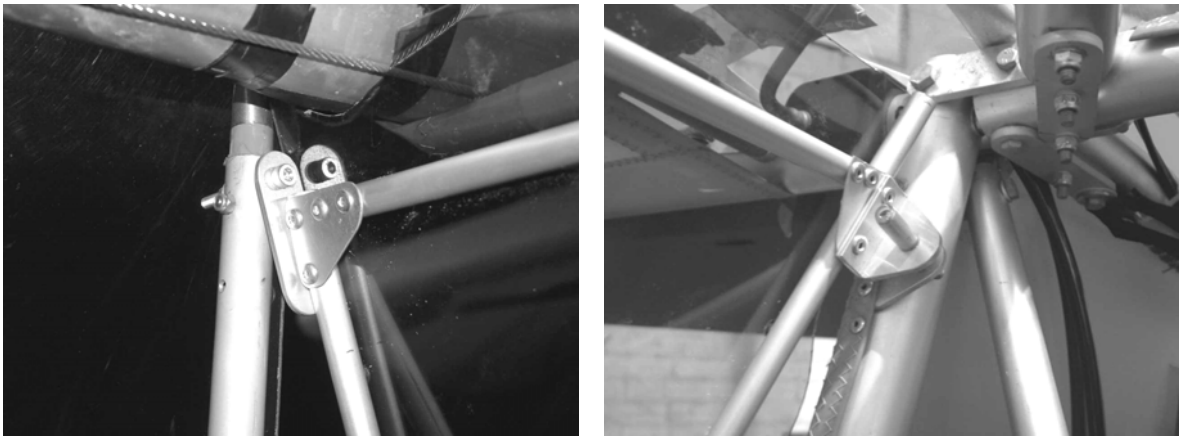


Figure 298; forward and rear pivots.

e) Mark the rear edge 15mm up from the lower edge of the rear spar attachment bracket.

f) Remove the door frame and carefully hacksaw to these marks and dress with a file.

g) Fix in place the upper rear hinge piece to the rear cabin upright ***tu6***.

*This attaches at its top with a 5mm bolt through the hole already in **tu6**. Secure the lower fixing with a 4mm rivet. Slide the L-shaped part of the hinge assembly onto the spigot.*

h) Temporarily fit the front hinge plate onto the hinge bolt though ***tu34***.

i) Offer up the door frame to the correct position. Mark the forwards edge with the correct position for the hinge plate drillings.

j) Remove, drill and rivet in place the hinge plate.

Use 4mm steel rivets.

k) Refit the door frame. Offer up the top cross-piece of the doorframe and mark to attach it to the doorframe.

Its forward edge should be positioned so the upper edge is flush with the top of the doorframe tube. The rear should be positioned so the that the top of the tube is level with the top of the rear hinge plate (5mm above fixing bolt centre).

l) Offer up the rear gusset plate (found in the bag of door fittings) to the L-shaped part of the hinge assembly. Mark their positions.

m) Drill and rivet the top cross-piece, gussets and hinge piece.

Use 4mm steel rivets.

n) Fit the door frame and check satisfactory fit and opening.

o) Offer up the centre cross-piece tube and mark the length to trim.

This piece has a slight curve, trim from the straight end. It should fit to align with the top of the cowling at the front and sit just above the bend in the frame at the rear.

p) Drill and rivet the centre cross-piece and gussets, Figure and Figure.

Use 4mm steel rivets.

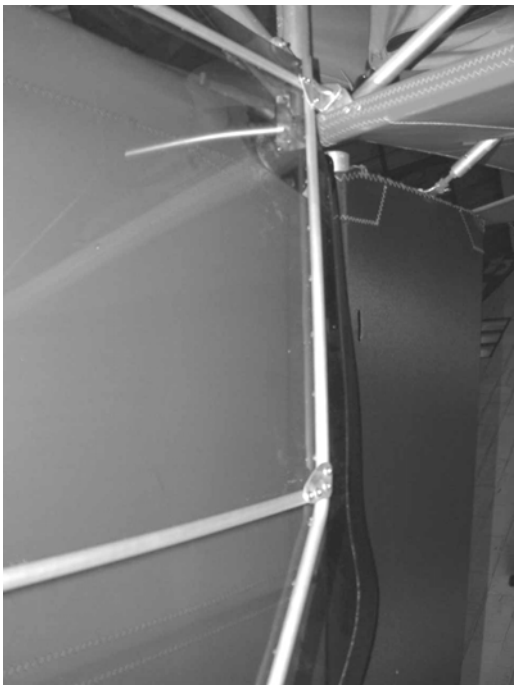


Figure 299; rear of centre cross-piece.

q) Do a final check of fit and operation of the doorframe.

16.1.4 Fitting the Lexan

a) Cut out the Lexan sheet from the patterns.

Use a large pair of tin snips. The patterns are supplied as a guide, and your individually constructed doors may vary slightly, so cut oversize initially to be safe.

b) With the door in position offer up the Lexan and mark some reference points to align with the door frame.

The Lexan can be fitted flush or overlapped with the windscreen and cowling at the front edge and overlap at the lower edges by approximately 25mm. The rear edge should be overlapped to at least the centre of the rear cabin upright ***tu6****. The upper edge should sit inside the wing root and should be 50mm or so above the wing undersurface. It may have to be trimmed slightly lower than this at the rear to avoid fouling the structure during opening.*

c) Before riveting mark the holes on the doorframe.

Use a nominal rivet spacing of 60mm. Remove the protective coating from the inside face of the Lexan, leave it in place on the outside but remove it using your fingernail around each point to clear the rivet heads.

d) Drill and rivet in place using 4mm aluminium rivets.

Work from the upper front corner, and rivet the front edge first. Follow this by riveting the lower edge. Due to the curve in the central cross-piece the rear edge will have to be worked around the curve, to avoid a wavy edge.

It may be necessary to drill out some rivets and reposition the tension in the Lexan slightly to get the best fit. Do not be tempted to put more curve in the central cross piece to give greater shoulder room or you will turn this into an impossible task! Finish by riveting the upper cross piece and then the central cross piece.

When drilling angle the drill slightly away from the last rivet. When squeezing the rivets bring the rivet upright. This then applies some light tension to the Lexan and prevents the Lexan bulging between rivets. Take care when drilling to ensure the tube is drilled centrally.

e) Fit the door and check its fit and operation.

f) Trim the rear edge of the Lexan to match the line of the triangular pieces behind the lower doors.

g) Trim the Lexan to accurately fit around the forward wing spar and the aileron cables, and trim the top edge to miss the wing tension bolts.

h) Fit the thin self-adhesive foam strip around the lower and rear edges.

16.1.5 Fittings

a) Fit the lower catch assemblies as per Figure and Figure.

*It should be positioned so that the 6mm hole is drilled 300mm rearwards from the rear edge of the cabin uprights **tu34** and the cowlings.*

Use two 4mm steel rivets to attach the aluminium plate to the doorframe.

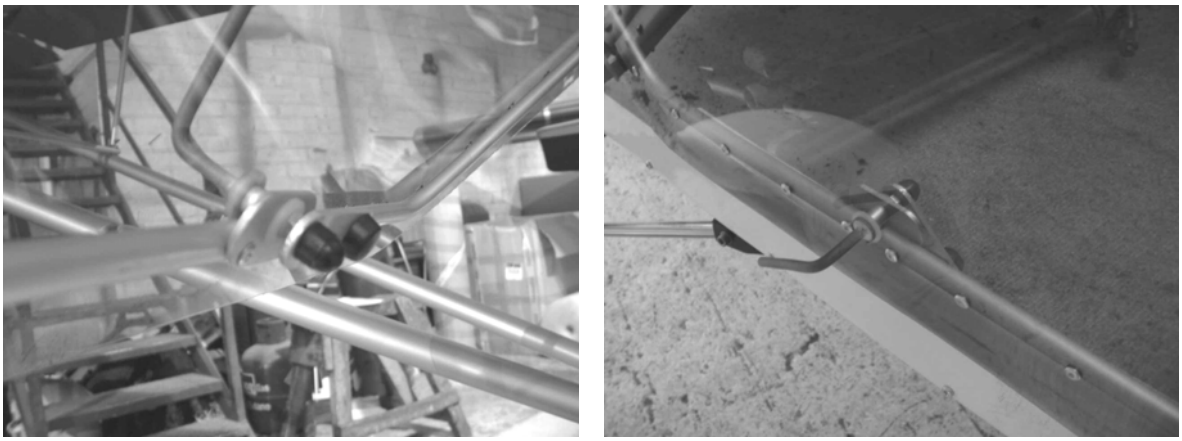


Figure 300; lower catch.

b) The inner edge of the sill should be positioned so the latch it a tight fit to lock into place.

The fibreglass can be filed a little to achieve a slight indent to prevent the lever from inadvertently rotating to the open position, or an aluminium piece can be riveted on to protect the fibreglass from wear.

c) Position the front catch just above the gusset plate for the forwards edge of the centre cross piece.

*UKMOD: this is an additional catch for UK aircraft to secure the front of the doorframe to the cabin uprights **tu34**.*

*It should be fitted with the bolt tightened to ensure enough friction to prevent inadvertent rotation. A convenient hole in **tu34** can be used as a detent, or one drilled for the purpose.*

Figure 301; front catch.

d) With the wings fitted and in place fit the open door keeper, Figure.

This should be positioned so that the door handle can be rotated into it. It is fitted to the wing surface with two screws (cut these to length) with spreader plates made from two rectangles of scrap Lexan 30mm X 150 (15mm radius at each end) either side of the wing fabric. This job will require two people or very long bendy arms!

Figure 302; open door keeper.

16.2 Two Piece Door

16.2.1 Lower door frames

Figure 303; two-piece door.

a) Fit the fibreglass door sills if desired.

The Skyranger UK two-piece doors can be fitted with or without the fibreglass doorsills supplied in the main kit. The standard patterns and some of the hardware assume that the doorsills are not fitted (the recommended option for weight reasons, they weigh 1kg). If you choose to fit the sills then some adjustment will have to be made to the vertical position of the lower tube piece on the bottom door, plus some trimming of the gusset plates and the Lexan pattern for the lower doors.

*The sills require trimming to fit around the undercarriage drag link and to fit inside the cowling at the front. They should be secured by the bolt at the bottom of the side of the **tu34** cabin upright tubes, passing through the cowling, the sill and the tube. Rivets or self-tapping screws should be used to fix the sills to the horizontal tubes **tu16** at the base of the door openings, at a maximum spacing of 150mm. These can be fitted vertically to the underside of the tubes, to keep them out of sight, but at least three should be fitted to the sides, with equal spacing, to help rigidity.*

b) Ensure that the aluminium door hinges have been fitted to the cabin uprights ***tu34***.

Typically these should be fitted so that the bottom edge is above the lowest bolt on the cabin uprights, with the top edge approximately level with the bottom of the dash board lip. However this will vary depending on the positioning of the dashboard.

Remember that the doors open outwards and forwards, so the hinge "bulge" needs to be on the outside.

c) Position the lower door frame tubes so that the lower tube clears the ends of the cabin cross member ***tu15*** by at least 5mm, with the forward end of the upper door frame tube sitting snugly just under the dash board lip, and at its rear end the upper edge of the tube should align with the colour change in the rear fuselage fabric.

   If your instrument panel is non-standard use the Lexan pattern to guide you for vertical position at this point.

   Make sure that the rear part of the door frame is close enough to the rear cabin upright to allow the door catch to reach without requiring the rivets to be positioned too close to the door tubes.

d) When happy with the positioning tape the doorframe tubes to the structure in the closed position.

   Take care that the upper tube is the correct way around (bend rearmost) and not sagging due to rotation.

e) After verifying the correct positioning drill through the tubes and hinge and either attach with Cleco's (temporary rivets) or aluminium rivets (which will be removed later when fitting the Lexan).

f) Drill and rivet the gusset plates into position – six of the 4mm aluminium rivets should be sufficient.

   Make sure that the doorframes are not allowed to twist during this process.

g) Un-tape and check correct fit and opening and closing.

   Some adjustment by carefully bending the tubes may be required.

h) Fit the small fixed part of the slide bolt to the aluminium angle piece.

   Drill and countersink the rivet holes so that the rivets do not protrude noticeably from the surface of the bracket and cause misalignment with the slide bolt.

   Do not fix it to the door pillar at this stage.

i) Use the fixed part as a guide to determine the correct positioning of the main part of the slide bolt on the gusset plate.

   Use the aluminium rectangles under the slide bolt to lift it and ensure correct alignment with the fixed catch.

j) When satisfied with the positioning fix the main part of the slide bolt into place.

   The fixed catch part should be fitted to the door pillar later, after the Lexan has been fitted, as fitment of the Lexan can cause changes in the exact alignment.

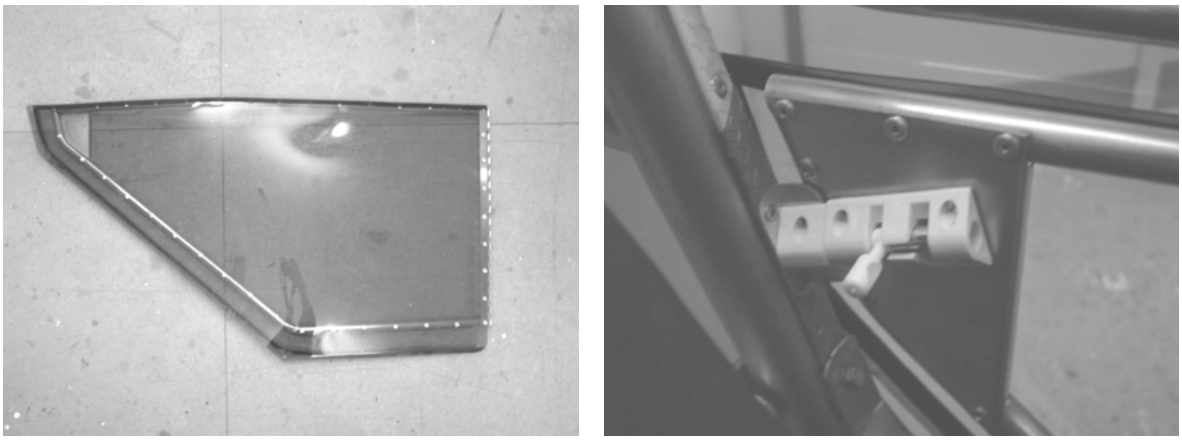


Figure 304; lower door and catch.

16.2.2 Upper door frames

d) Fit the upper rear hinge piece to the door pillar ***tu6,*** Figure.

*This attaches at its top with a 5mm bolt through the hole already in **tu6**. Secure the lower fixing with a 4mm rivet.*

e) Slide the L-shaped part of the hinge assembly onto the spigot.

f) Offer up the upper doorframe into position.

Space it evenly 20mm above the lower doorframe.

g) The rear upright part of the doorframe must be bent outwards to match the different angles of the cabin uprights and the door pillar ***tu6***.

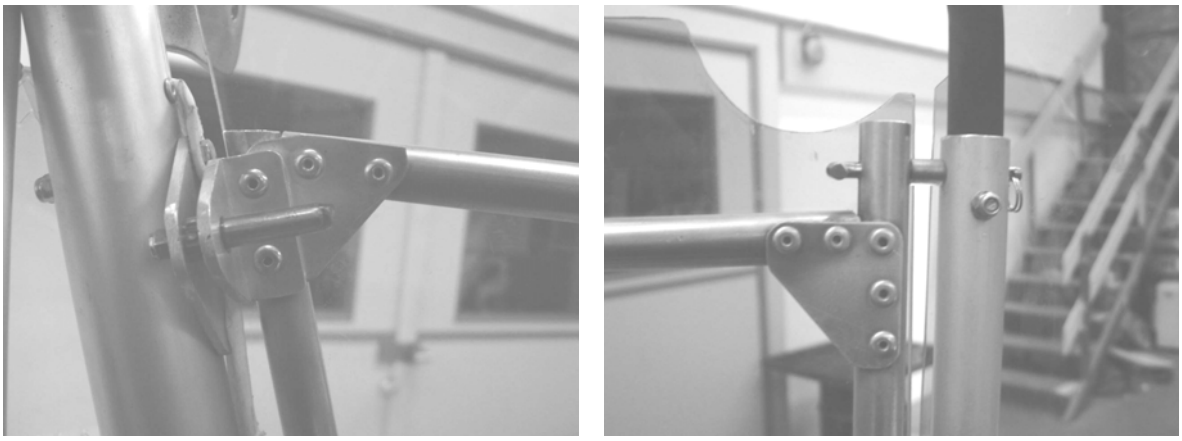


Figure 305; upper door rear and front pivots.

h) Drill out the hole at the top of the cabin uprights ***tu34*** to 5mm, Figure.

The doorframe will pivot on a bolt through this hole.

i) When happy with the fit of the upper doorframe, mark the position of the hole to be drilled in the doorframe for the pivot bolt.

j) Offer up the top crosspiece of the doorframe and mark the position to attach it to the doorframe.

Its forward edge should be positioned so the upper edge of the tube is 10mm lower than the forward pivot bolt hole centre. The rear should be positioned so that the top of the tube is level with the top of the rear pivot plate (5mm above the fixing bolt centre).

k) Offer up the rear gusset plate (found in the bag of door fittings included in the main kit) and the L-shaped part of the hinge assembly. Mark their positions.

l) Remove the door pieces.

m) Drill the hole for the forward hinge bolt.

n) Drill and rivet the top cross piece, gussets and hinge piece all together.

o) Refit the door by sliding it onto the rear hinge spigot before inserting the forwards hinge bolt, with a small piece of plastic tube used as a spacer on the bolt between door frame and cabin uprights.

p) Check satisfactory fit and opening of the door.

16.2.3 Fitting the Lexan

a) Mark out the Lexan sheets using the patterns supplied.

*The Lexan is big enough but there is not much spare space. Lay out the patterns and find the best arrangement to ensure they can all be cut from the sheet. Remember to allow for enough spare to make the two triangular pieces required to attach in the area behind the lower door, between **tu144** and **tu6**.*

b) Cut out the Lexan using a pair of large tin snips.

The patterns are supplied as a guide and your individually constructed doors will vary slightly, so cut out oversize to be safe.

c) Fit the Lexan to the lower doors first.

Use the forward and upper edges as your accurate edges and trim so that these fit nicely. Allow a generous overlap on the lower and rear edges, which can be trimmed later.

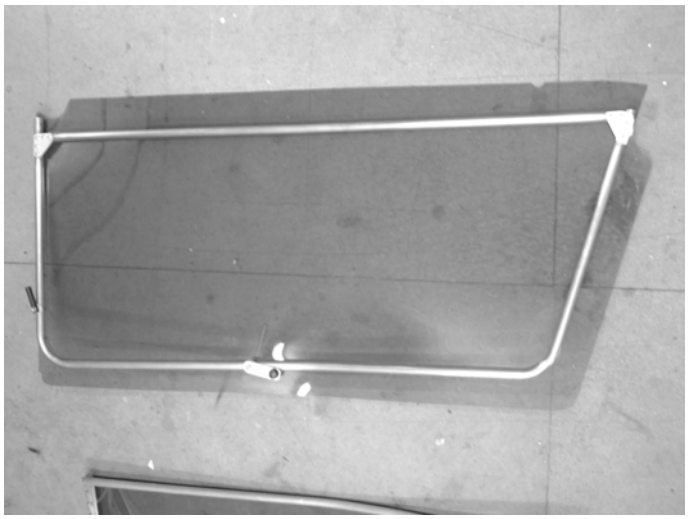


Figure 306; upper door.

d) Before riveting mark the position of the holes to be drilled on the doorframe.

Use a nominal rivet spacing of 60mm adjusted where required to provide an even spacing on each side. Remove the protective covering from the inside face of the Lexan, leave it in place on the outside, but remove it using your fingernail around each point to clear the rivet heads.

e) Drill and rivet the Lexan into place.

Work from the upper front corner, outwards and downwards together. When drilling angle the drill slightly away from the last rivet. When squeezing the rivets bring the rivet upright. This then applies some light tension to the Lexan and prevents the Lexan bulging between rivets.

Take care when drilling to ensure the tube is drilled centrally.

f) Repeat this process for the upper doors.

The Lexan should overlap the lower doors by 20mm or so. The upper edge of the Lexan will tuck inside the wing root and can be trimmed for neatness later to be 50mm or so above the wing undersurface. The forward edge can either be fitted flush or overlapped up to the windscreen. Allow an overlap at this stage anyway and trim back as desired later.

g) Repeat this process for the two triangular pieces required to attach in the area behind the lower door, between ***tu144*** and ***tu6***,.

Only rivet along the lower and rear tubes, don't rivet to the steel diagonal tube. Use a minimum of three rivets per edge.

h) When the doors have been fitted trim the rear edge of the upper door Lexan to match the line of the triangular pieces behind the lower doors. The lower edge may be cold folded if desired to form a neat return.

16.2.4 Fittings

e) Drill through the centre of the upper door frame lower tube 400mm from the forward edge of the door using a 6mm drill bit to accept the door handle.

f) Use the handle / catch parts from the main kit, inserting the handle through the hole in the doorframe.

g) On the inside fit a thin plastic washer followed by the plain nut, hooped shape handle and Nyloc nut.

h) Tighten the nuts against one another to lock the parts into position.

Adjust the position of the nuts so that some friction is felt when rotating the handle. The hooped handle can be left as is or the hooped part cut off to leave a flat lever as desired.

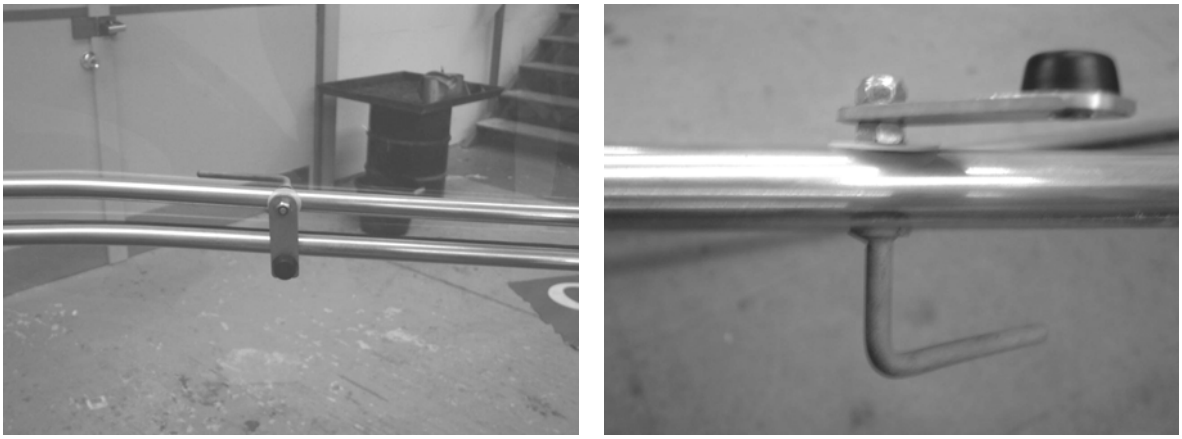


Figure 307; upper door catch.

i) Fit the forward catch by drilling a 5mm hole in the forward vertical of the upper door frame 340mm down from the hinge bolt centre.

*If a hole is present on the inside of the cabin upright **tu34** close to this position then adjust the position slightly to use the hole as a detent. Alternatively an extra hole can be drilled.*

Assemble the parts with two 2mm plastic washers between catch and doorframe.

j) Adjust the tension to achieve some friction.

Figure 308; upper door forward catch.

k) The lower door should have the self-adhesive foam strip applied to its upper outer edge, and its inner side and lower edges to suit.

l) The upper door should have the foam tape applied to its rear edge only.

m) Fix the lower door catch fixed part to the door pillar ***tu6*** in position to suit, using two 4mm rivets.

n) Fit the wings.

o) Trim the upper door Lexan to accurately fit around the forward wing spar and aileron cables, and trim the top edge to miss the wing tension bolts.

p) Fit the open door keeper, Figure.

This should be positioned so that the door handle can be rotated into it. It is fitted to the wing surface with two screws (cut these to length) with spreader plates made from two rectangles of scrap Lexan 30mm X 150 (15mm radius at each end) either side of the wing fabric. This job will require two people or very long bendy arms!

16.2.5 Type two door catches

These are optional sprung ‘slam shut’ door latches with remote opening levers.

Fig 309 and 310 type two dooor catch assembly and catch detail

a) Offer up the catch and aluminium angle. Determine the best position to fix the angle to the door pillar, so it lies flat against the gusset plate on the door, and doesn’t cross any rivet heads. Drill and rivet it in position. Use two 4mm steel rivets and snug down firmly, so that it fits tightly with no movement.

b) Determine the best position for the latch, ensuring maximum engagement when closed. Mark the position and drill and rivet in position. Note there is a standoff plate that must go between the latch and gusset plate.

c) Determine the best position for the opening lever so that at rest it is vertical. Mark and drill a 4mm hole in the door frame. Fit the lever to the door frame with its 4mm panhead securing bolt, head to the outside. A small washer should be fitted either side of the lever The lever must have a little play to avoid friction, so don’t do up the nut too tight.

17 Seats and Seatbelts

17.1 Seats

a) Assemble the frame as per the drawing, noting that the seat back piece is not fitted quite yet.

> *Note the choice of holes in the front of the side tubes, to set the seat position. If the seat is positioned forwards, a wooden spacer or similar should be made and secured with cable ties to support the seat back.*
>
> *Insert the front three tubes into the front of the seat, then lever apart the rear ends of the side tubes and secure to the rear tube.*

b) It is worth cutting the threaded ends of the eyebolts to the minimum 1.5 threads showing above the Nyloc, in order to make the seats more comfortable when getting in and out of the aircraft.

c) Fit the seat frames to the aircraft.

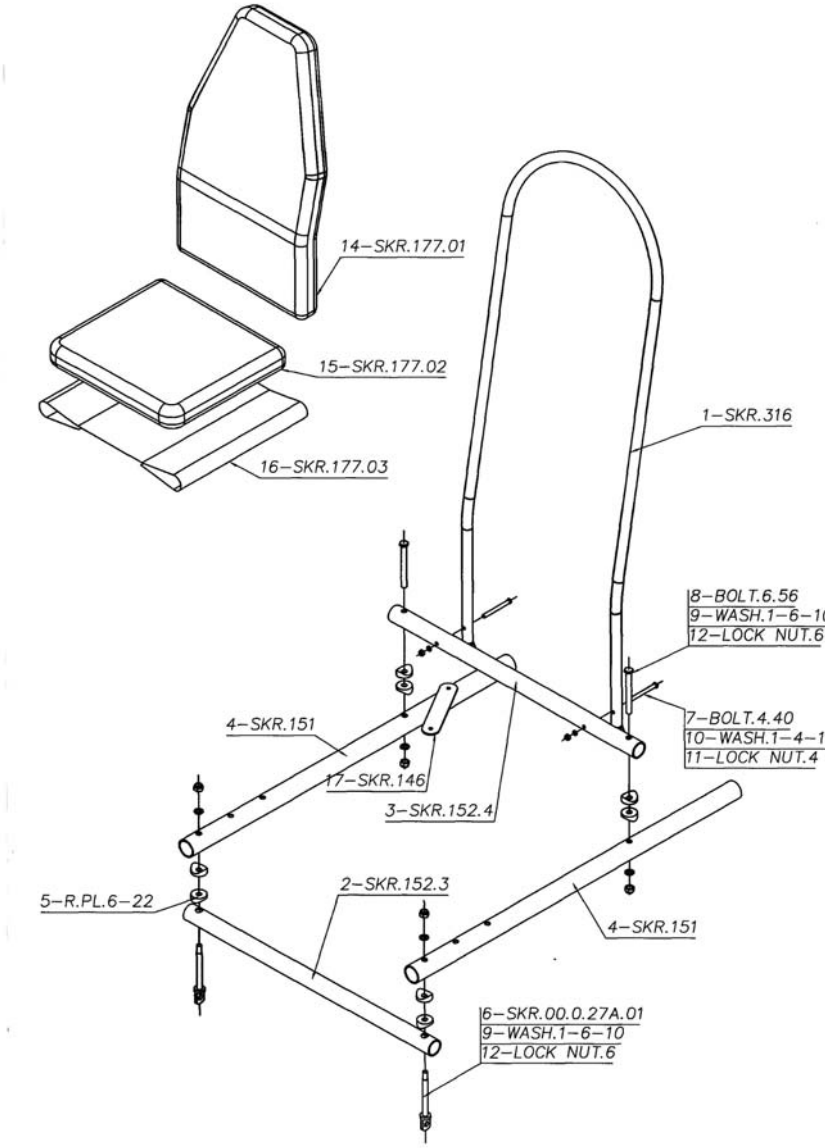


Figure 311; seat frames.

Figure 312; seat base.

d) The seats themselves have a frame inserted into the back. This should be bolted to the rear of the seat base frame with the seats in position.

Note that the seat frame threads in to holes in the seat back fabric that run most of the length of the seat. It is a common mistake only to pass the frame through the short webbing reinforcement strips..

Ensure that the securing bolts have the threads pointing forwards. It is acceptable to drill out the holes in the seat base to 5mm, which allows some movement of the bolts without straining them.

A wooden seat base is included which may be useful for shorter pilots. Taller pilots should omit this to give increased head-room.

e) Install the seats into the aircraft using clevis pins and split pins.

f) A small diagonal bracing piece should be fitted to each seat base ,Fig 313. This is a mandatory requirement specified in Service Bulletin SKR-SB-001.

The brace should be at approximately 45° to the two tubes to which it attaches. Mark the position of the brace on the seat base rear tube, and drill and rivet in place with a 4mm steel rivet. Then, with the seat in position on its supports, mark and drill the other hole to accurately hold the correct position, and secure with another 4mm steel rivet.

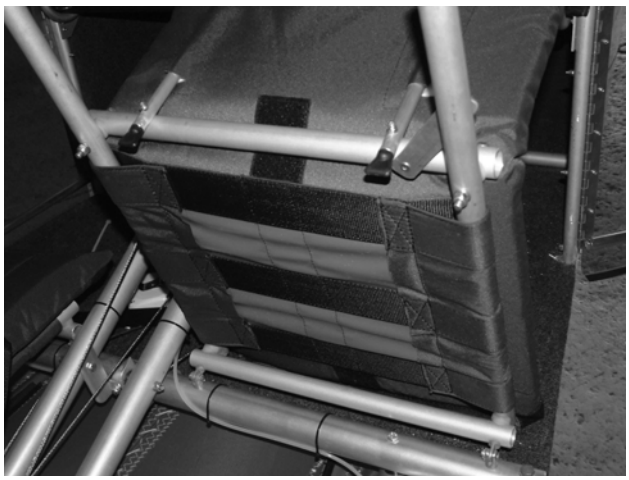


Figure 313; diagonal brace

17.2 Seatbelts

a) The seatbelts should already have their shoulder straps looped over the upper rear cabin cross-piece, Fig 314.

This was done before the covering was riveted along the front of the cross-piece – take care not to drill and rivet through the belt!.

Figure 314; shoulder strap looped over frame.

b) The lap strap part of the seatbelts should be looped around the main undercarriage cross-beam.

Take a double wrap around the beam to prevent the strap slipping under side-loads.

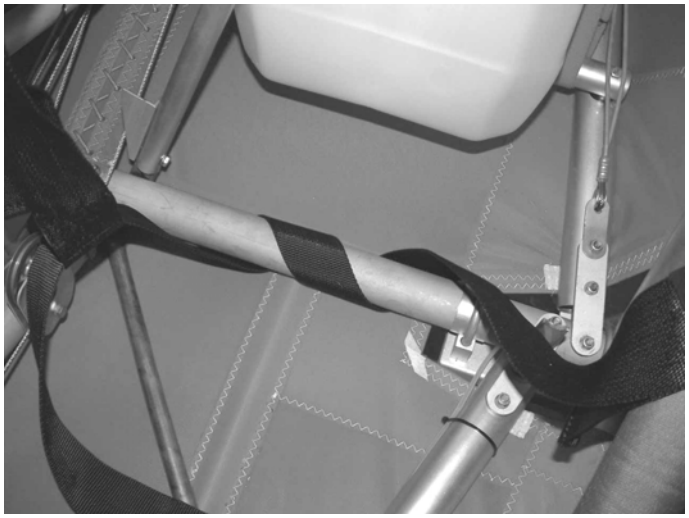


Figure 315; lap strap looped around undercarriage beam.

c) The seatbelt should be brought around the front of the seat, without passing around the drag link upper brace (the diagonal steel tube with the cover) Fig 316.

Figure 316; position of seatbelts.

18 Spats

Figure 317; spats.

18.1 Nose Wheel

a) Check that the axle is correctly positioned behind the forks.

b) The spat should be offered up to the nose-wheel, to mark the position of the hole for the nose-leg, if not already marked and/or cut-out.

Cut the hole using the same technique as those cut in the instrument panel, link-drilling and finishing with a flap-wheel. Cutting a little oversize and finishing the hole with rubber edging super-glued into place gives a good effect.

The spat may be positioned as per Figure317. Raising the rear of the spats a little further can give a more racy look if desired, figure 318.

Figure 318; nose wheel spat.

c) The spat should be slipped over the nose-leg, and positioned as required. Mark a point on the spat corresponding to the fork of the nose-leg, close to the bottom of the spat.

The nose-leg will have to be dropped out of the aircraft to fit the nose-wheel spat. Undo the bolt securing the nose-leg at the top of the leg, and the bolt securing the steering bar to the nose-leg. Have someone hold the tail of the aircraft down whilst you slide the nose-leg out.

The spat was not fitted earlier to protect it from all the parts which you dropped whilst fitting the engine!

d) Drill the spat and the nose-leg for a 4mm diameter steel rivet or self-tapping screw on each side, and rivet the spat in place.

A washer may be required on each side between the fork and the spat to achieve the correct spacing without distorting the spat. A washer on the outside helps spread the load.

18.2 Main Wheels

a) The spats may be positioned as per Fig 319.

Note the bulge goes to the inside to encompass the brakes, with the flat spat side outwards.

Figure 319; main wheel spat.

b) The spats will have to be cut away to clear the undercarriage leg, Fig 320.

Again note that the spats fit over the brake callipers.

c) Remove the wheel retaining tubes and attach the aluminium angle pieces to the ends.

Position them to be flush with the end of the tube. Drill through the lower surface of the tube only, and attach with the M5x20 bolt supplied.

d) Refit the retaining tubes.

Figure 320; spat cut out for undercarriage leg.

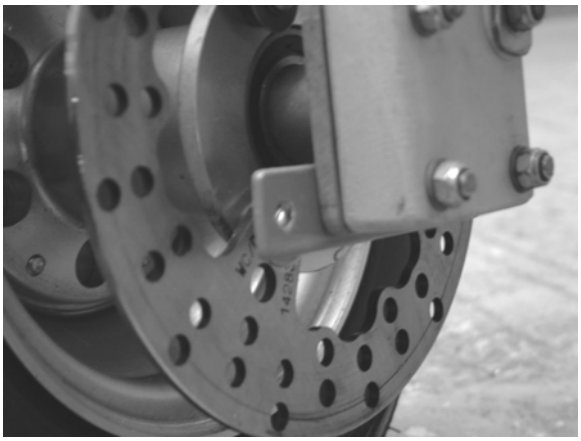


Figure 321; spat brackets.

e) Fit the spats and secure them with M5 bolts with Nylon washers under the heads to protect the fibreglass.

Three bolts secure each spat, two on the inside and one on the outside.

Figure 322; spat, showing outer mount bolt.

19. Fitting the mark II Curved top Instrument Panel Option

19.1 Fitting the instrument panel

a) Working with the panel material.

The material is polyester glassfibre. This can be cut either with a hacksaw blade or a 'Dremel' type tool. Edges can be dressed and finished using sandpaper and a sanding block. Take care when sanding and cutting not to put too much pressure on an upward stroke or the gelcoat surface finish may be chipped. Sanding along the edge of the material is recommended rather than across it for this reason.

b) Cut and fit the panel in position

Fig 323 instrument panel edges

Trim the top and bottom flanges on the instrument panel to allow it to sit flat against the cabin uprights.

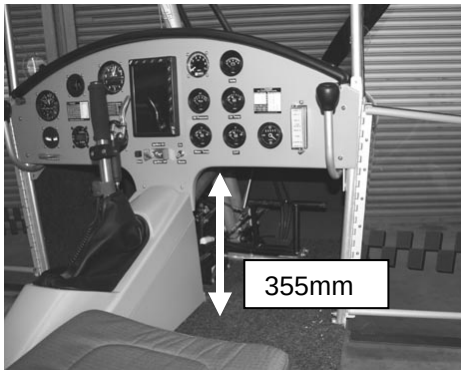


Fig 324 Vertical dimension

The panel should fit approximately 355mm measured from the cockpit floor to the lower edge of the panel. If the panel is too low the throttle level will foul the lower edge of the panel before reaching the full throttle stop. You can check this by measuring from the top of the instrument panel to the inside face of the throttle lever without the end knob. The maximum distance is 40mm.

Carefully trim the lower centre portion of the panel to allow it to fit in the correct position according to the measurements and checks above. Allow at least 3mm clearance when trimming around the control stick torque tube.

The outer edges of the panel should be trimmed to fit just inside the door hinges, overlapping the cabin upright.

When trimmed, clamp the panel in position and verify that all fits and is square. Mark the position of the lower edge of the panel on the cabin uprights. And then remove the panel.

c) Fix in place the mountings and secure the panel

The panel secures to the cabin uprights each side via a pair of mounting angles. These should be positioned as shown 20mm and 140mm respectively from the lower edge of the panel. Drill the uprights with a 4mm drill and secure the angels in place with 4mm steel rivets. Refit the panel, mark the panel through the angles, remove and drill the panel using a 5mm drill bit. Refit the panel bolting it in place to the angles with the 5mm pan head bolts.

Fig 324 securing angles and dimensions

The lower centre portion of the panel secures to the central TU19 tubes using two L brackets and hose clamps as shown. Temporarily secure the L brackets in position with the clamps and slide them up to position flat against the back edge of the panel. Check the panel is in the correct position and the lower centre portion is not flexed forwards or backwards relative to the rest of the panel. Measure upwards 30mm from the top of the tube TU19's and drill a 4mm hole each side. Mark through to the L brackets. Remove them and drill through on the marks with the 4mm drill bit. Refit and bolt in position with 4mm screws.

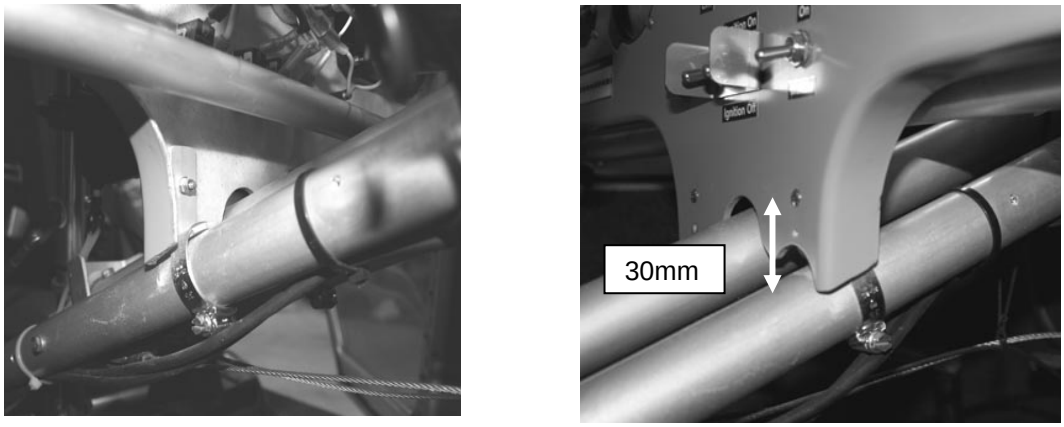


Fig 325 Securing the lower edge

d) Fit the instruments in the panel

You should now have a blank panel secured in the right position. Now is the time to plan the instrument layout, being mindful of the position of the throttle levers and their torque tube. A good tip is to cover the face of the panel with masking tape, which then can be drawn on to mark the intended position of the instruments. Once the rough layout has been decided on the panel can be removed and the exact positions and dimensions marked on ready for cutting out.

Cutting out the holes for the instruments can be done in a variety of ways. Rough cutting can be done by Dremel tool, or by link drilling (drilling a series of holes next to each other and finally breaking / cutting the centre out). Fine sanding should be used to finally open up accurately to the marking out. This can be with a Dremel sanding attachment, or an abrasive flapwheel used in a normal drill, or with sandpaper wrapped around a tube. The main thing is to take your time, be careful not to chip gelcoat, and use the actual instrument to check fit as you approach the final stage. Simple and cheap drilling templates for the mounting screw positions can be bought that are sized for the two standard instrument sizes (Light Aero Spares stock them), or you can carefully mark out and drill them. Be aware that Glassfibre dust can cause skin and respiratory irritation. Wearing overalls with sleeves taped, and a particle mask are recommended (also avoid doing this in the Kitchen!)

e) When the instruments are fitted in the panel the panel can be refitted.

The top is braced with two aluminium angles as shown. These can be cut from the aluminium angles supplied in the main kit that are used to brace across the standard instrument panel. Cut them so the rebated end will fit under the panel lip bent down to match the angle of the lip. Size them to fit as shown running from under the top lip of the instrument panel to just behind the windscreen where it joins the glassfibre scuttle piece, approximately 10mm below the windscreen edge. They should be fixed under the instrument panel lip 170mm apart measured from the inside faces of the angles. Use the two 4mm countersunk bolts, countersinking the holes in the glassfibre after drilling using a large drill bit turned slowly by hand. Secure the angles to the engine brace tubes with the P clips supplied as shown.

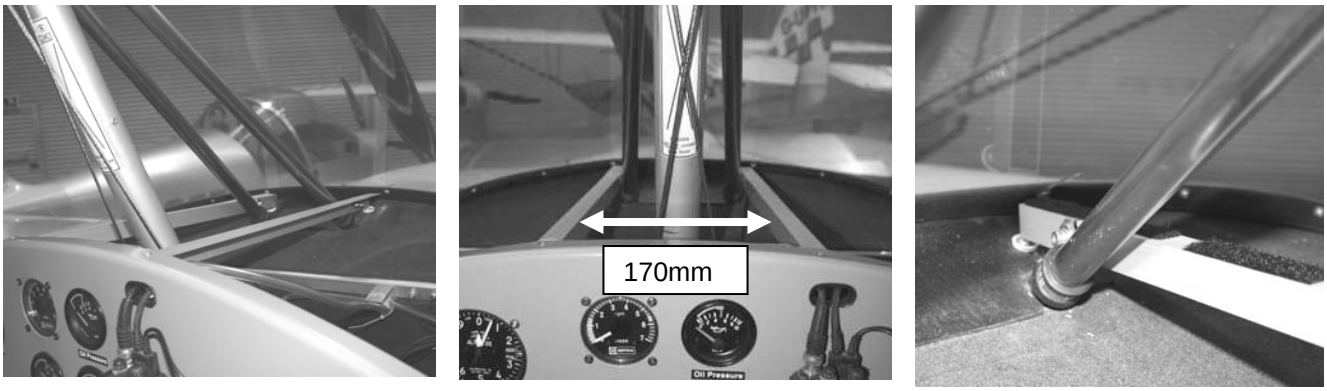


Fig 326 Upper bracing angles

19.2 Fitting the dash top

The dash top is supplied in two halves. Due to the individual nature of each homebuild aircraft these are supplied oversize, and must be trimmed to fit, prior to covering with the finishing material.

a) Trim the dash halves to fit.

Offer them in place and mark where trimming is necessary. Large areas of excess may be removed with a rough cut using a hacksaw blade or sharp 'Stanley Knife'. 80 grit sanding paper used on a sanding block can be used for precise final shaping.

When trimming do a little at a time and keep checking the fit. It is useful to mark the centre of the panel, which can be used as a reference to ensure you are not trimming too much away at the sides!

The lip protruding over the instrument panel should be around 30mm. Don't sand away too much material at the front and reduce this overhang, or the reinforced areas for the fixing screws wont be in the right place!

During the trimming process it is easy to scratch the windscreen as the dash tops are repeatedly fitted and removed. It is a good idea to protect the vulnerable areas with masking tape.

Fig 327 Trimming the dash halves to fit

b) The parts can now be covered.

When happy with the fit, the halves are ready for covering. Lay on the material and cut out allowing for a 50mm overlap around the front and sides and 70 mm on the rear edge (the edge that protrudes over the instrument panel).

Lightly sand the top of the dash halves to remove any bumps or spikes that may be present in the glassfibre – but don't sand much – it is only glass tissue and very thin.

Apply vinyl spray adhesive, or similar impact adhesive to stick the fabric in place. Try to work in a little tension to get the fabric to lay nice and flat with no wrinkles.

Wrap it around the edges, cutting darts where necessary to allow the fabric to contour around inside curves, and neatly fold edges. The same adhesive as above can be used, but something with a little better 'grab' is easier – a hot glue gun works well for this. The fabric should be anchored in place on the underside using a domestic stapler. Take care not to staple too close to the edge on the area that will overhang the instrument panel, or they will show when fitted.

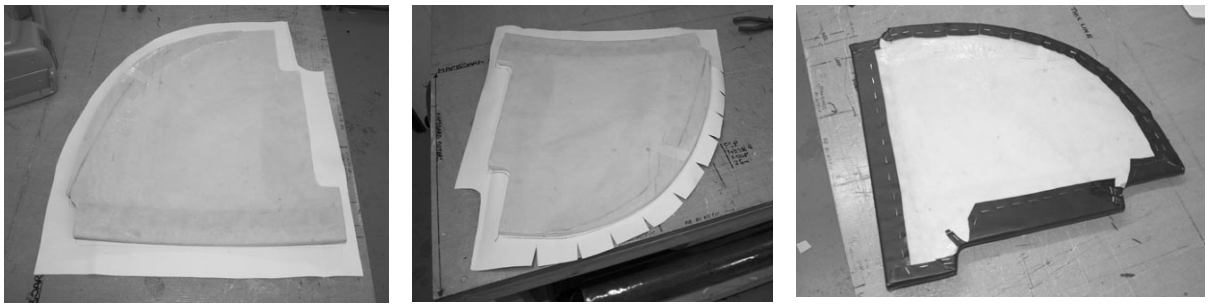


Fig 328 Covering

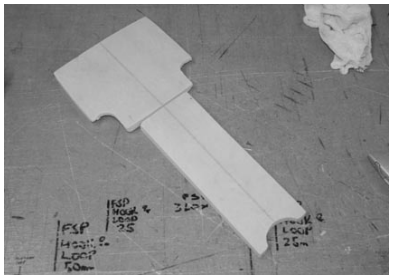


Fig 329 insert pieces

Fit the dash halves in place. Shape the insert pieces to fit. Cover them in fabric using the same techniques as above.

c) Fitting the dash parts in place.

Fit a strip of self adhesive Velcro to the underside of the insert pieces. The inserts are held in place using the aluminium strips which span the angle braces. These should have strips of Velcro applied so they can attach to the inserts and the angles.

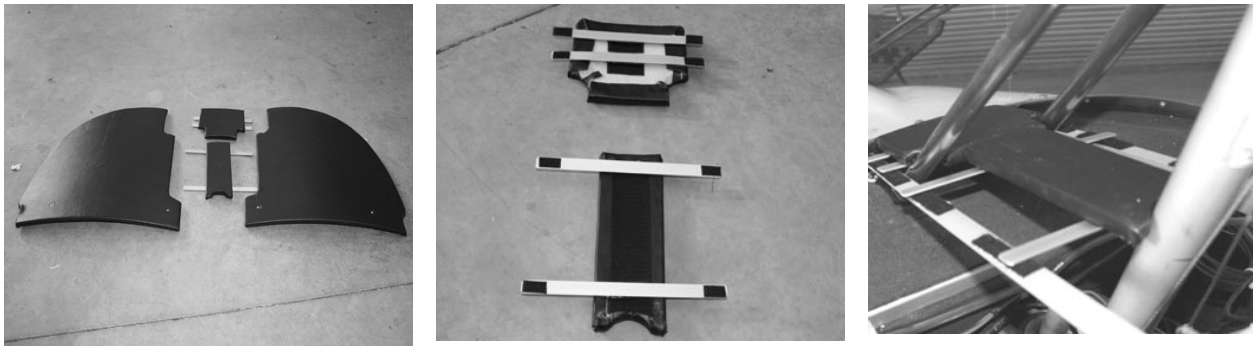


Fig 330 Insert pieces fixing method

With everything in place and positioned for best fit, drill for the fixing bolts. The holes should be positioned 35mm and 360mm from the panel centerline respectively, to pass through the panel upper lip 15mm behind the face, drilled through 5mm. Slide the captive nut clips in place on the dash lip, and then use the 5mm bolts to secure. Finish with the 'skiffy cap' covers

Fig 330 fixings for Dash halves

d) Fit the throttle stops.

Size the throttle levers as required trimming so that the end knobs are just below the dash lip. Position the throttle stops so that the end knobs contact them in the centre of their radius. Mark the position, drill and fix them in place using 4mm screws.

e) For those retrofitting this option, check that full throttle can still be achieved at the carburettors.

Fig 331 Throttle stops

20. Fitting the Centre console option.

Fig 332 Centre console overview

a) First remove the seats to gain free access, if already fitted.

b) Offer up the side panels.

It may be necessary to trim the edges so that they sit flat against the TU19 tubes. The rear edges should butt up snug against the TU15 tube. With the panels resting in place mark the forward edge position with a piece of tape.The forward mounting bracket should be fitted to align with this mark. Use the two self tapping screws to secure it in the floor positioned as shown.

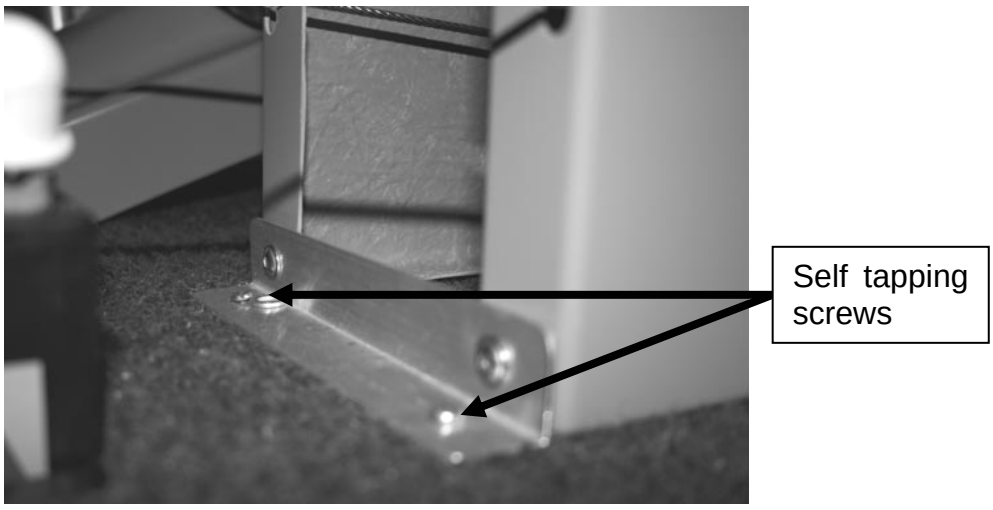


Fig 334 forward fixings

c) Fit the rear mounting bracket. It secures on the mounting bolts for the floor rear support bracket.

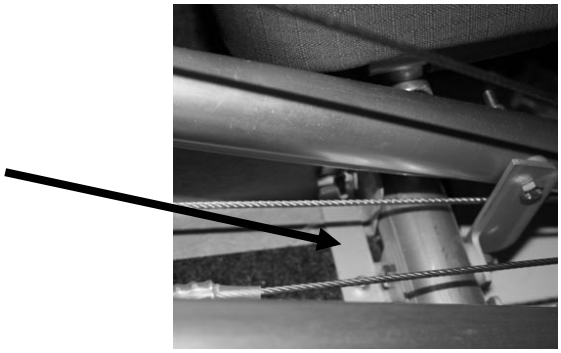


Fig 335 rear fixings

d) Put a strip of self adhesive hook Velcro on the sides of the TU19 tubes. Put a strip of the opposite loop Velcro on the inside face of the top of the side panels.

e) Fit the side panels in position. Mark the positions to drill the securing bolt holes. Remove and drill 5mm. refit and bolt in place using the 5mm pan head screws.

f) Offer up the top panel in position.

Sand the forward face as required to butt up at the right angle neatly against the instrument panel. It may be necessary to file a small angle on the forward face of the control stick torque tube support bracket to allow the top panel to sit down in position. Do not file more than 10mm off the corner.

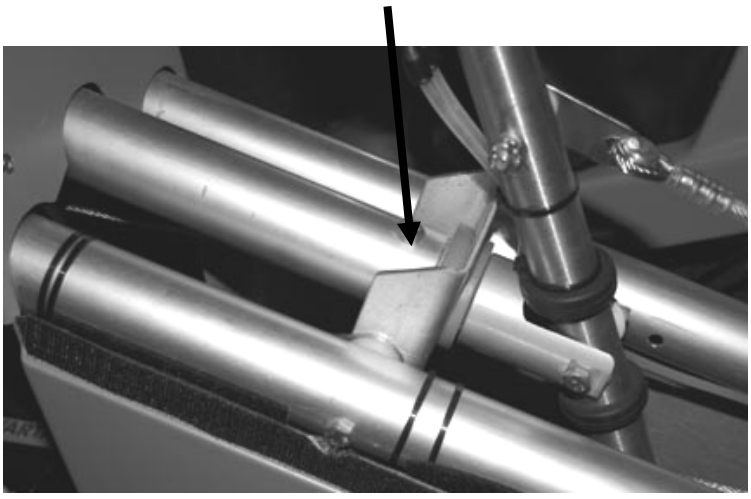


Fig 336 angle

g) When happy with the fit of the top panel, and after ensuring the stick has full and free movement without fouling anything, fit the two small securing brackets at the rear.

To do this first replace the bolts that secure the central brace angles with the slightly longer ones supplied. Then with the top panel in place offer up the brackets and mark the position for the securing rivets. Remove the top panel and drill and rivet the brackets in place using the 4mm aluminium rivets supplied.

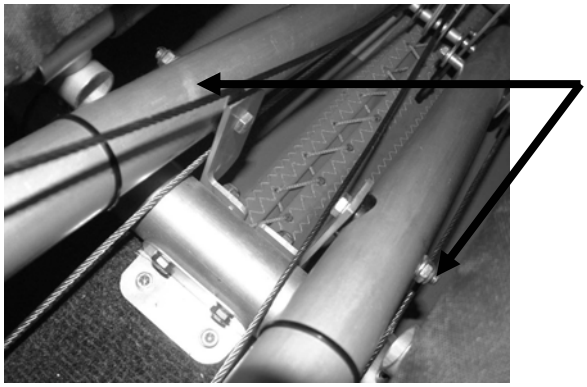


Fig 337 Bolt swap

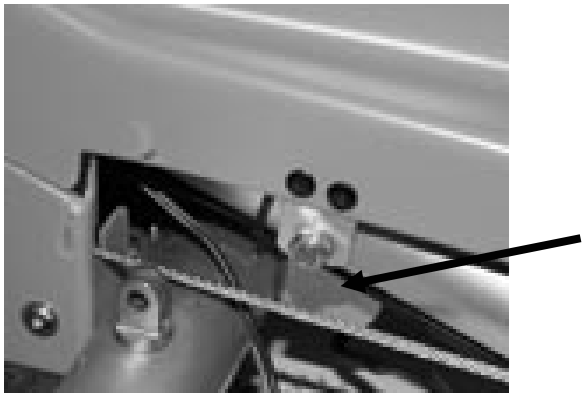


Fig 338 Console top rear fitting

h) Apply Hook Velcro to the inside edges of the top panel sides. And loop Velcro to the rebated edge of the side panels.

i) Fit the top panel in place. The rear brackets attach to the excess threaded portion of the bolts. Fit a 6mm nut and washer on each.

j) Check the clearance to be able to operate the flaps.

If necessary remove the detent lever, clamp the riveted end in a vice and using a short length of tube slipped over the detent lever arm bend it upwards approximately 15 degrees. Inspect for a smooth fracture free bend and refit.

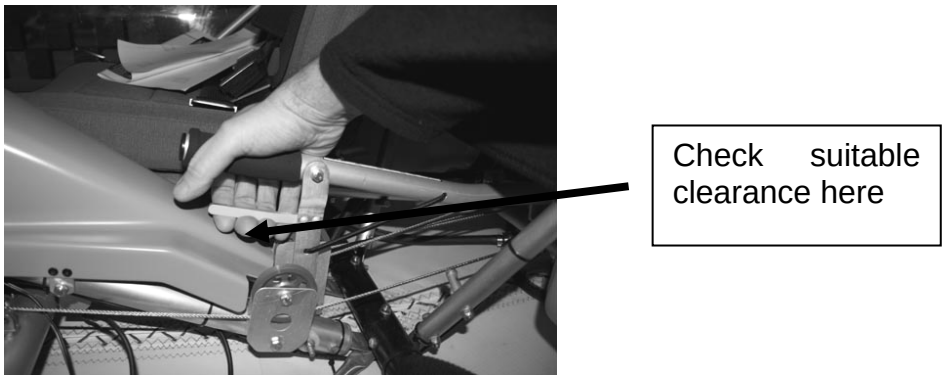


Fig 339 Detent lever clearance

Finally check everything is secure and the stick has full and free movement, and there are no cables rubbing on the glassfibre parts. Refit the seats.

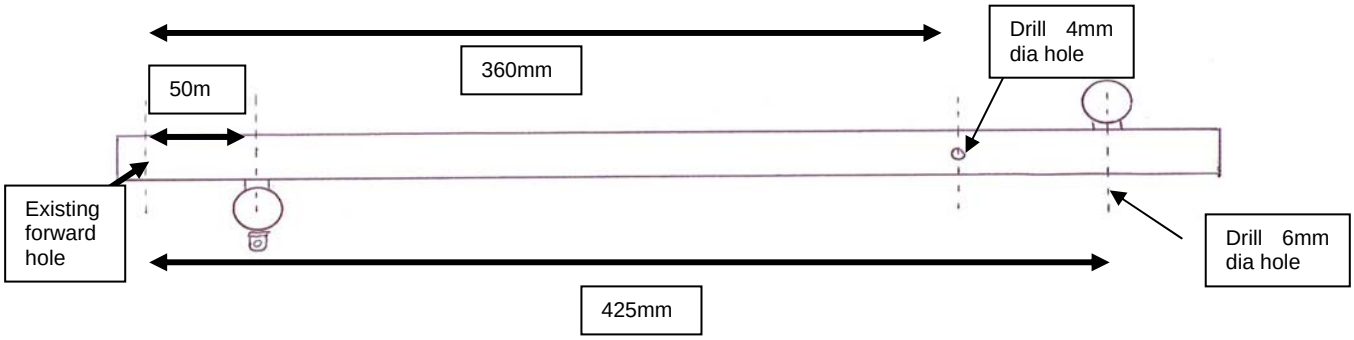
21. Fitting the Adjustable Seat Option

21.1 Description

The adjustable seat option allows rapid seat repositioning between two settings. The seat back is attached to the seat base on a pair of rotating arms. The seat is held in the forward position by a pair of webbing straps, and in the aft position by Velcro ties. In the forwards position the seat back sits forwards of the main fuselage structure supported by a bracket pivoted off the seat back and clipping to the fuselage cross member TU40.

Fig 339 Seat positions overview

21.2 Modifying the seat base



a) Move the front cross member to the second hole – 50mm behind the first

b) Drill a 6mm diameter hole in the vertical plane 425mm behind the forward hole centre. Re site the rear cross member in this position.

c) Drill a 4mm diameter hole in the horizontal plane 360mm behind the forward hole centre. This will be used as the pivot hole for the swing arms.

21.3 Modifying the seat back

a) The seat back support hoop slides into pockets that run vertically down the seat cushion. In order to fix the pivoted extension hoop, it must be modified to allow the frame to come out of the pocket at the pivot point.

Use a sharp blade and carefully cut horizontal slots in the pockets at the positions shown. If possible heat the blade so that the cut edges are not left ragged.

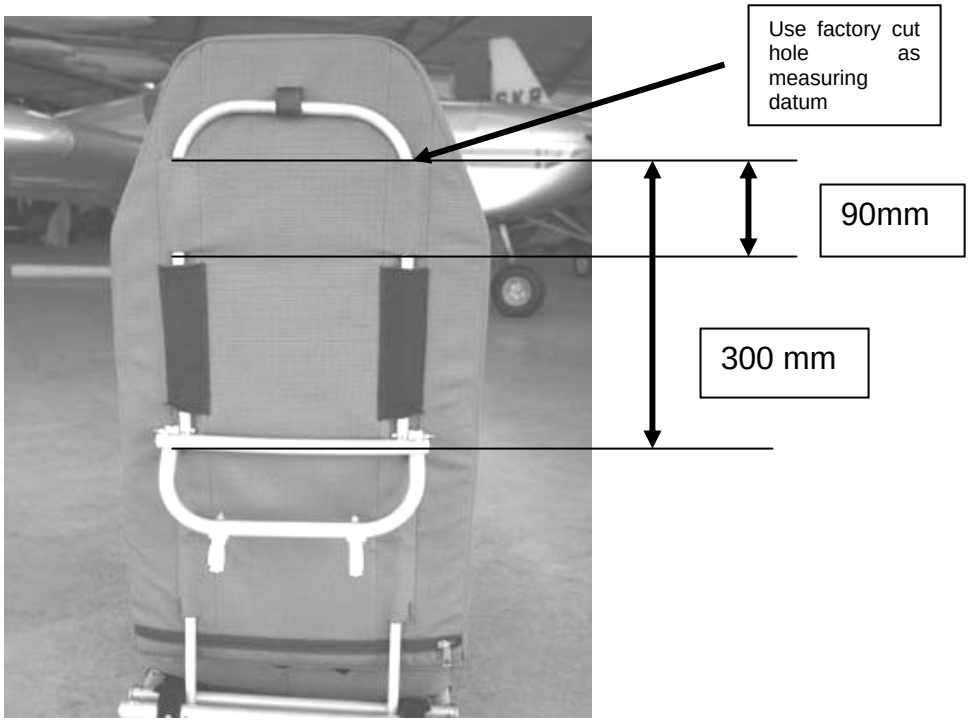


Fig 340 Seat cushion pocket modification

b) Drill the pivot holes in the seat back hoop.

Drill these 4mm diameter in a transverse orientation 310mm above the lower fixing holes

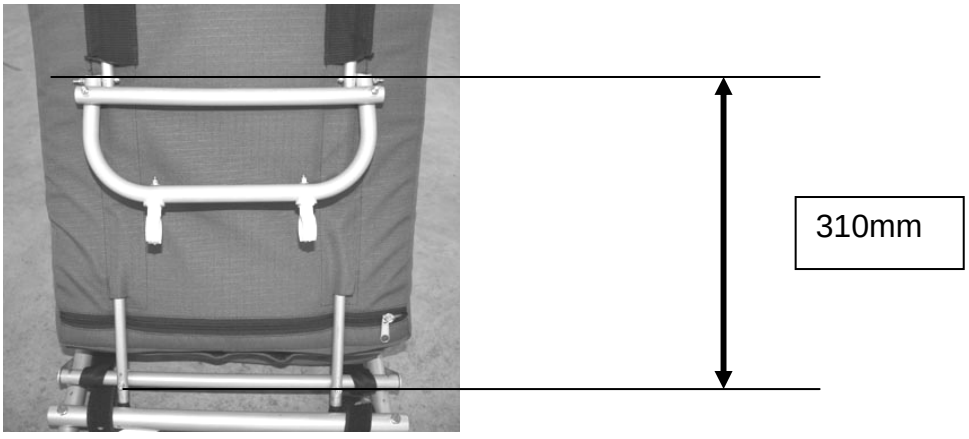


Fig 341 Drilling the hoop pivot holes

21.4 Assembly

a) Assemble the seat frame, with the fabric base in position.

b) Fix the rotating arms assembly to the base using 4mm bolts. Place washers either side of the rotating arms, and tighten only enough to take out any slack, but still permit easy rotation.

c) Assemble the seat back components, sliding the seat back support in the pockets in the seat cushion as shown in the photos. Fix in place the extension hoop, using 4mm bolts, heads to the insides.

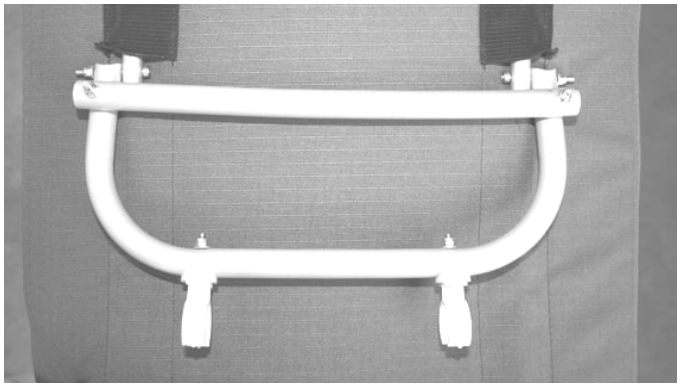


Fig 342 Attaching the hoop

d) Attach the seat back assembly to the rotating arm assembly using 4mm bolts heads rearwards.

e) Drill the rear cross member with two 4mm holes and secure the Velcro ties in position with a 4mm steel rivet each. Holes should be positioned 40mm outside the existing holes

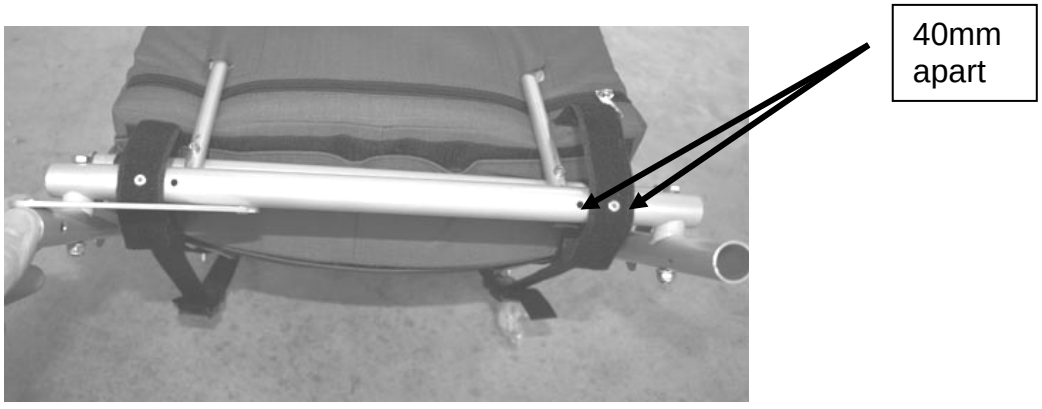


Fig 343 Securing the Velcro ties

f) Make sure the seat base is square and then fit the bracing strap in the rear corner nearest the outside of the aircraft, drilling and securing with 4mm rivets.

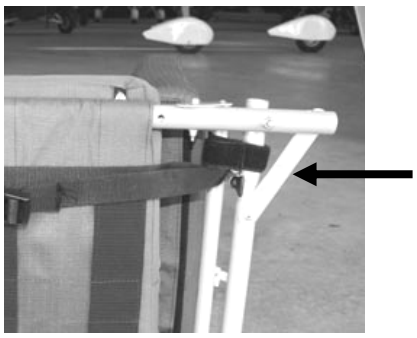


Fig 344 Bracing angle

g) Fit the webbing straps, running them under the seat, around the forwards cross member and the pivoting arm assembly cross member

Fig 345 Webbing straps

h) Finally refit the seat in the aircraft