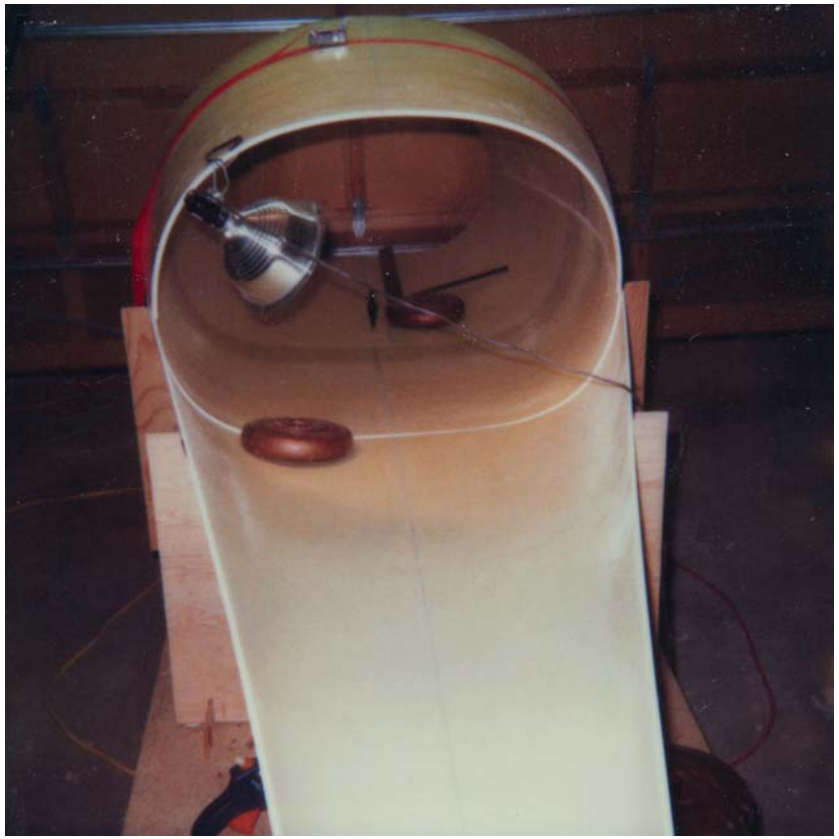
Construction:
Fuselage and Cockpit

Foam laid out and outlines from plans for bulkheads drawn on foam, then glassed and trimmed per Q-2 plans, then inverted and laid up with glass to glass as called out in Q-2 plans section, 4-2. January and February, 1985
Work performed and inspected by Jay Scheevel

Glass cutting table and plans, late 1984

November 1985

Initial alignment of rough fuselage shells. Note the rough edges (delivered condition as extracted from molds at QAC. Jigging table shown below the suspended fuselage shells. Jigging templates cut from plywood are later mounted on the table for alignment. Alignment verified by Jay Scheevel



December 22 1985

Hand trimmed fuselage sections being aligned and marked with reference points for later assembly. Jigging templates cut from plywood are shown mounted and leveled on the table. All alignments and levels executed and checked by Jay Scheevel, December 1985

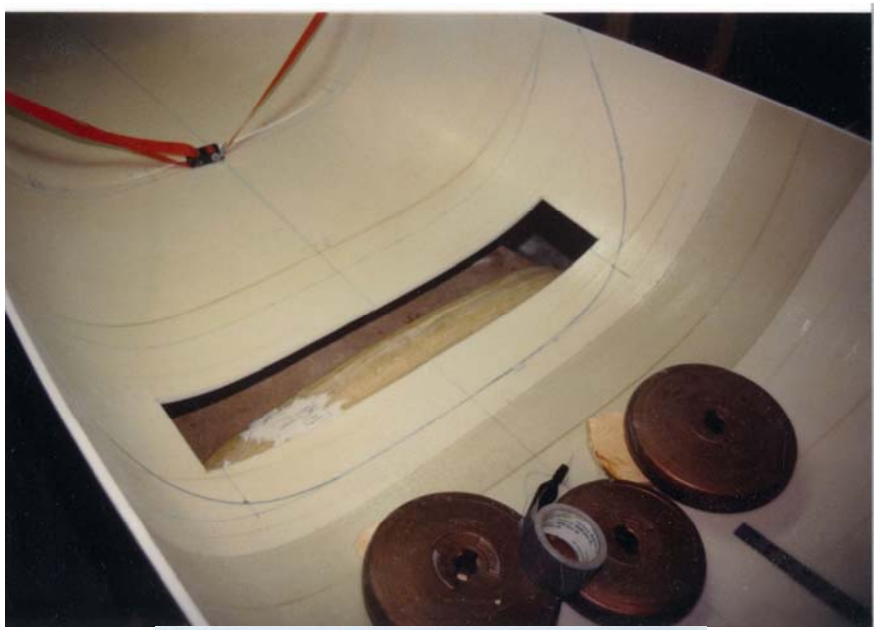
Cut and fitted fuselage quarters verified and aligned with reference marked on floor & table bonded to floor 12/1/85

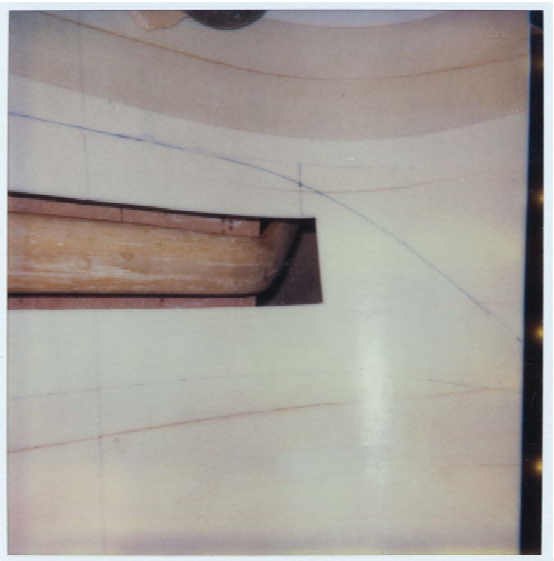
December 22 1985

Hand trimmed fuselage sections aligned and marked with reference markings for later assembly. Jigging templates cut from plywood are shown mounted to table.
All work and alignments checked by Jay Scheevel

Cut & Fitted fuselage sections from the inside 12/1/85

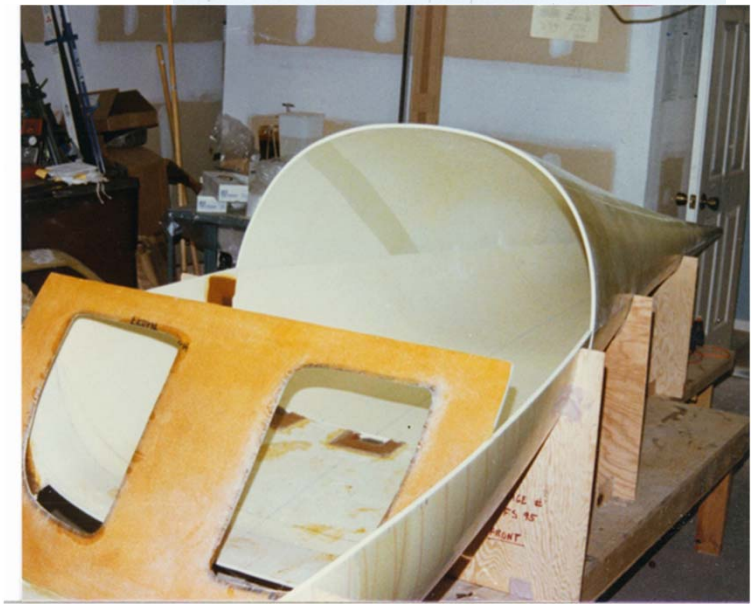
Centerline marked fore to aft alignment and joints fine sanded and lateral level verified. All steps performed by Jay Scheevel December, 1985





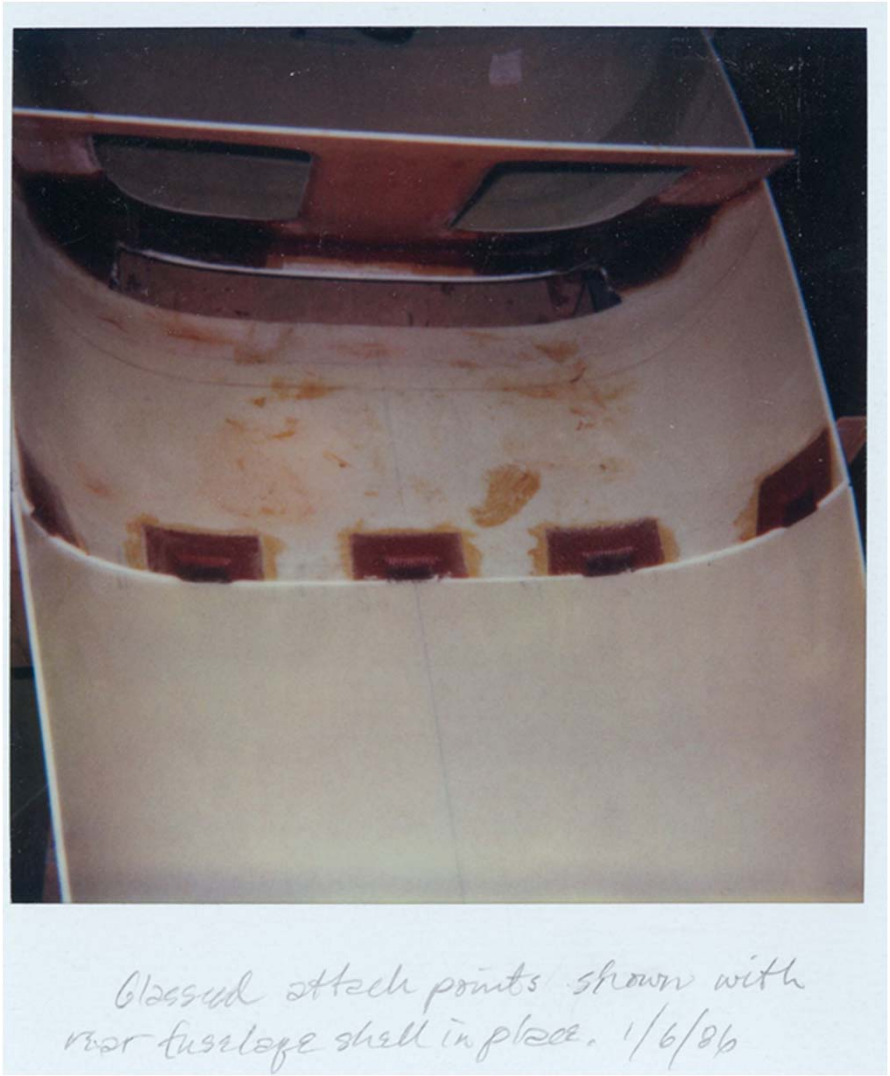
Detail gear alignment through
Cutout in fuselage – verified
square to BL 00 12/31/85

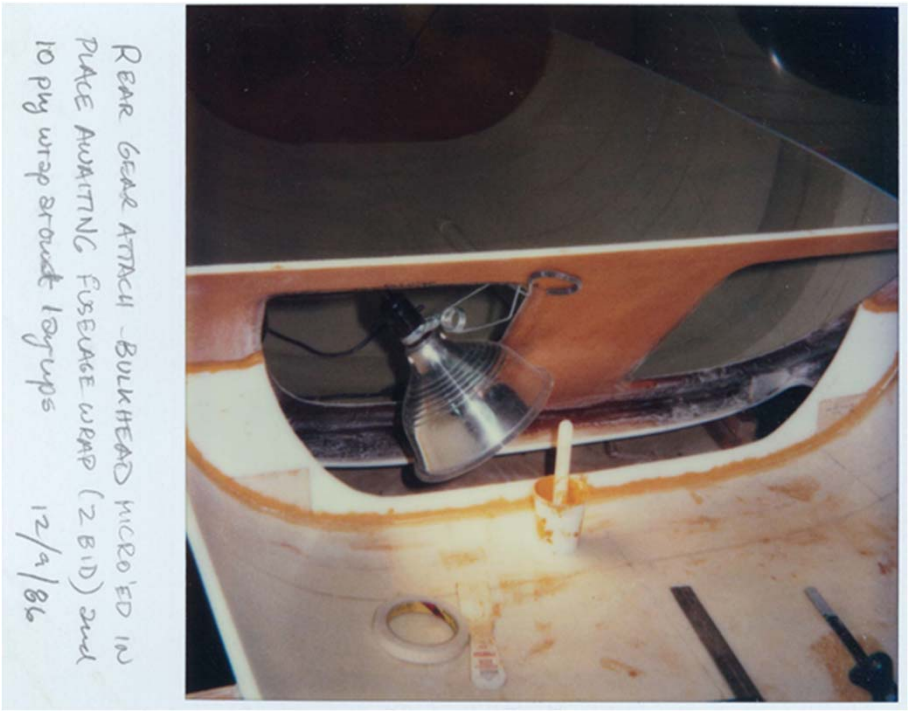
Seat back bulkhead installed w/ micro 1/2/86
Seat lug-boxes cut and fit and floxed
in Seat back bulkhead. 1/3/86



Seatback bulkhead trimmed and fit in place. Opening for main landing gear cut, plywood mount lugs built and installed. All work by Jay Scheevel – January, 1986

Firewall cut from plywood and fit to fuselage, then glassed (both sides) on flat table. Firewall positioned and floxed in place per plans. Work and layups verified by Jay Scheevel –Jan. 1986

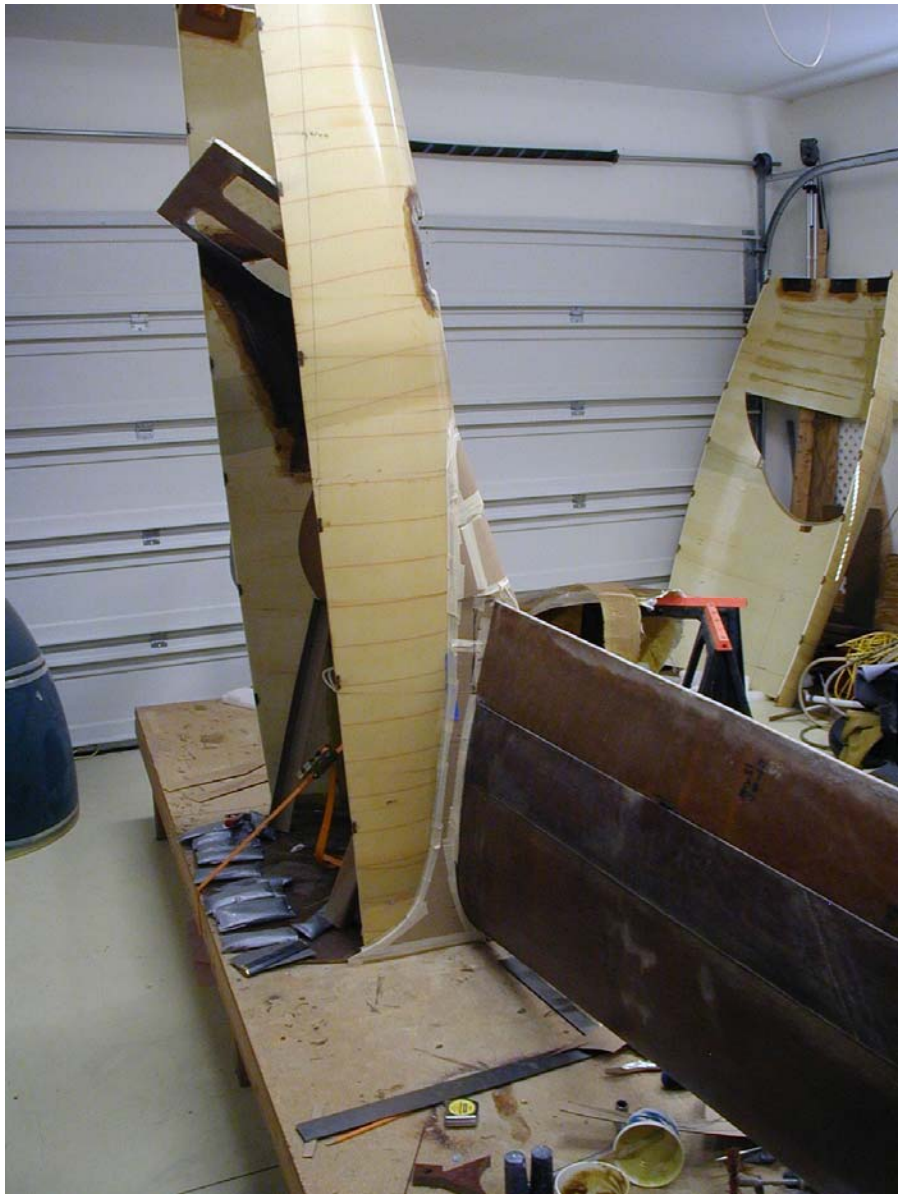




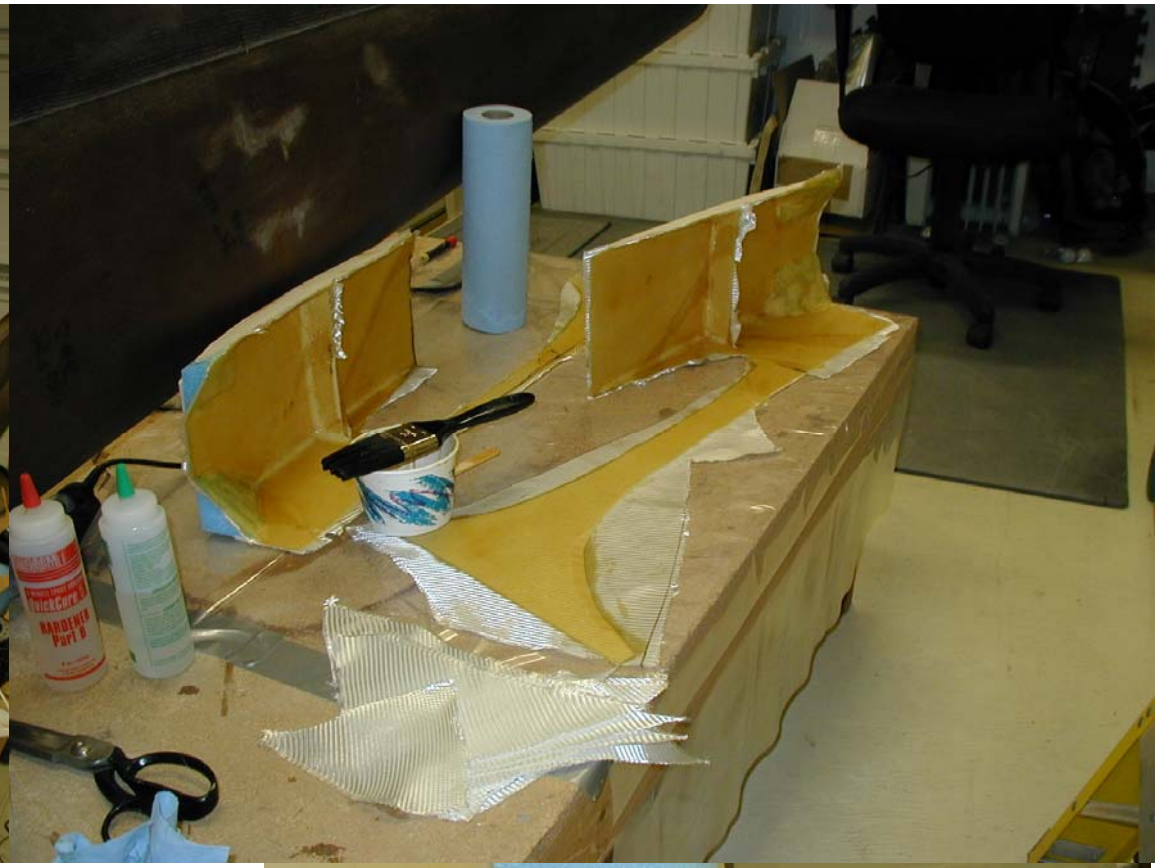
Fuselage half attachment hardpoints trimmed and glassed per plans on lower front of fuselage. Seatback layups and landing gear lug boxes installed. Rear gear attach bulkhead installed per plans. Jay Scheevel, Dec. 1986

Layup glass plies on front and back of rear gear attach bulkhead with layup schedule per Tri-Q plans layup schedule. All layups checked and passed inspection by Jay Scheevel, Dec. 1986

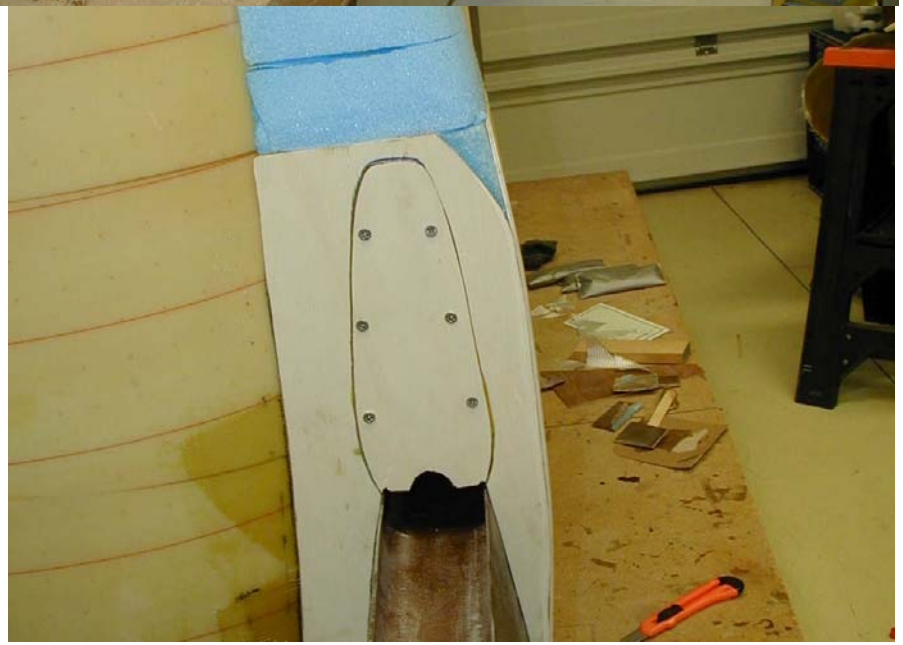
Build cardboard mock-up of canard root strake after canard is bonded to fuselage (see canard construction section). Elevators are fitted into position to verify clearance on cardboard mock-up. Note glassed opening for main gear leg hoop. Upper forward fuselage shell is leaning against the rear wall in the picture on the right. All work performed by Jay Scheevel



Final mock-up is used to design and cut 1/8” marine plywood and create hotwire templates to cut initial foam shape for canard root strake as shown on right photo. All work performed by Jay Scheevel. Video: https://youtu.be/mDo6t2kM5VM



Foam blocks comprising the rear part of the strake bonded in place on fuselage (upper left) and interior of plywood box structures reinforced and glassed with 2 BID plies for rigidity (upper right)
Elevator removal is facilitated by removable panel inboard of elevator root That panel, secured with 6 #8 screws with riveted nutplates mounted in fiberglass flange (lower right).
Work done by Jay Scheevel. May 2012

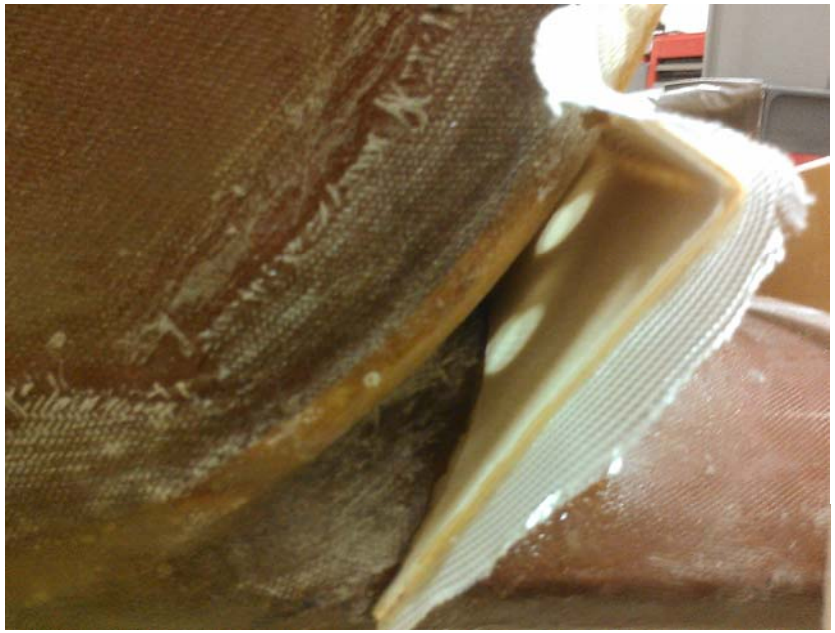


Strake “box” structure shown during fitting into position next to foam(upper left). Strake box and foam in place. Foam and seams filled with micro and sanded to shape in preparation for glassing. Work done by Jay Scheevel, May 2012

Strake assemblies glassed in place with two BID plies overlapping onto fuselage and bottom surface of canard. Overlap of glass is 1.5-2” around entire perimeter of plywood box structure and foam fairing. Canard spar trailing edge/fuselage seam is glassed per Q-200 LS-1 plans-supplement glassing instructions.
Structure and layups inspected and passed by Jay Scheevel, April 2013
Videos: *https://youtu.be/gKGtZ4oxDfo*

Work done by Jay Scheevel, June 2014

Hot and cold air entry ports cut into lower fuselage shell to accommodate both hot and cold air shutter doors and ducts to be added later.
After cutting holes in shells, the foam is routed out between the shells ¼” back from the cut edge and filled with flox for rigidity. These ports lead to channel behind plywood strakes mounted in line with the outer edge of the radiators both left and right side of firewall.



Details of the hot air plenum that takes hot air off of the back of the radiator plenum (hot exit air from radiator), then vectors that air through the hot air ports into cabin.

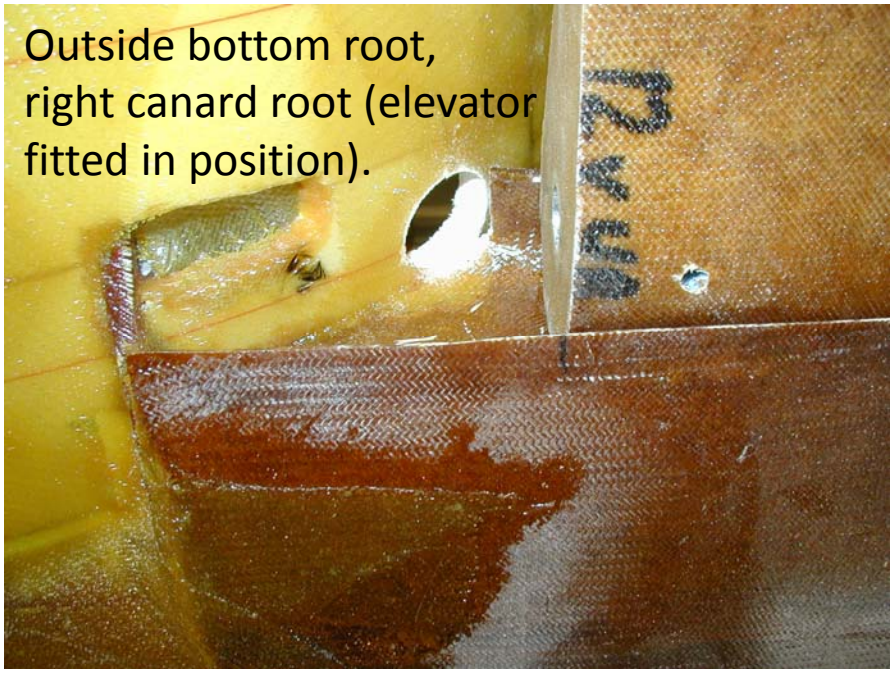
Work done by Jay Scheevel, June 2014

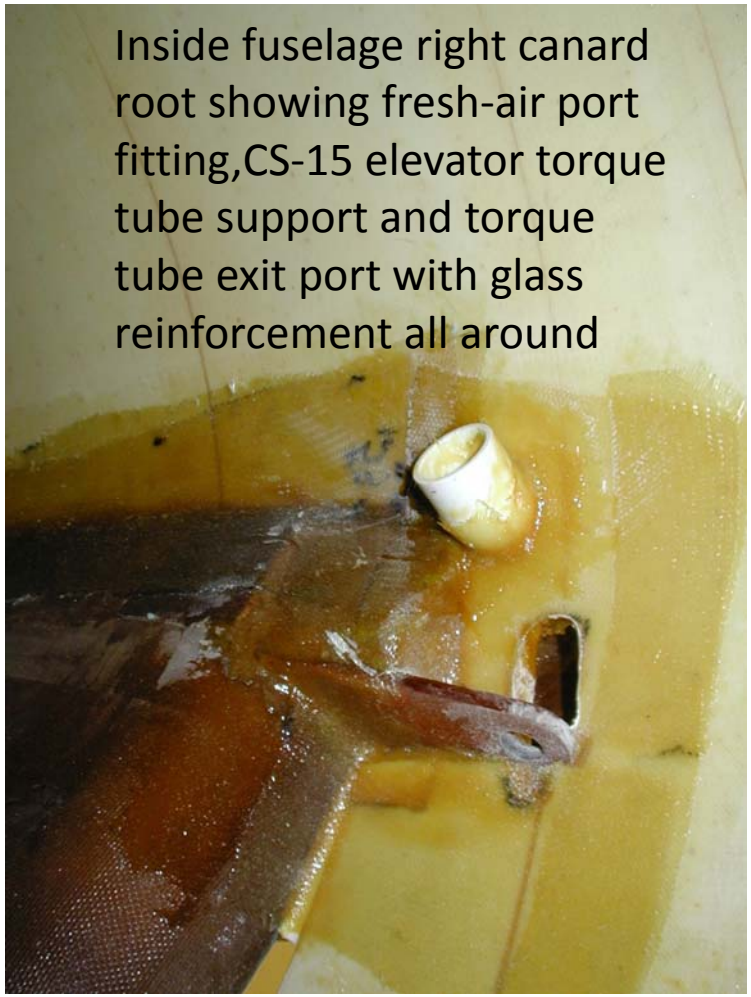
Detail of plywood duct assembly (right photo) prior to attachment to the fuselage. Radiator plenum is partially seen at the left edge of the photo. This assembly contains the hot air plenum. Cold/fresh cabin air is gathered from a vent on the leading edge of the canard moves behind the strake to the fresh air ports leading into the cabin

Photos of the strake/plenum assembly before attachment to the forward fuselage. The radiator plenum on the left end of the assembly fits flush to the firewall.

Work done by Jay Scheevel, June 2014

The smaller box plenum attached to the fuselage conducts hot air from the back of the radiator to ports in the fuselage and the interior providing cabin heat. It is entirely contained inside the larger plywood tapered section of the strake, which conducts cold/fresh air to the cabin.





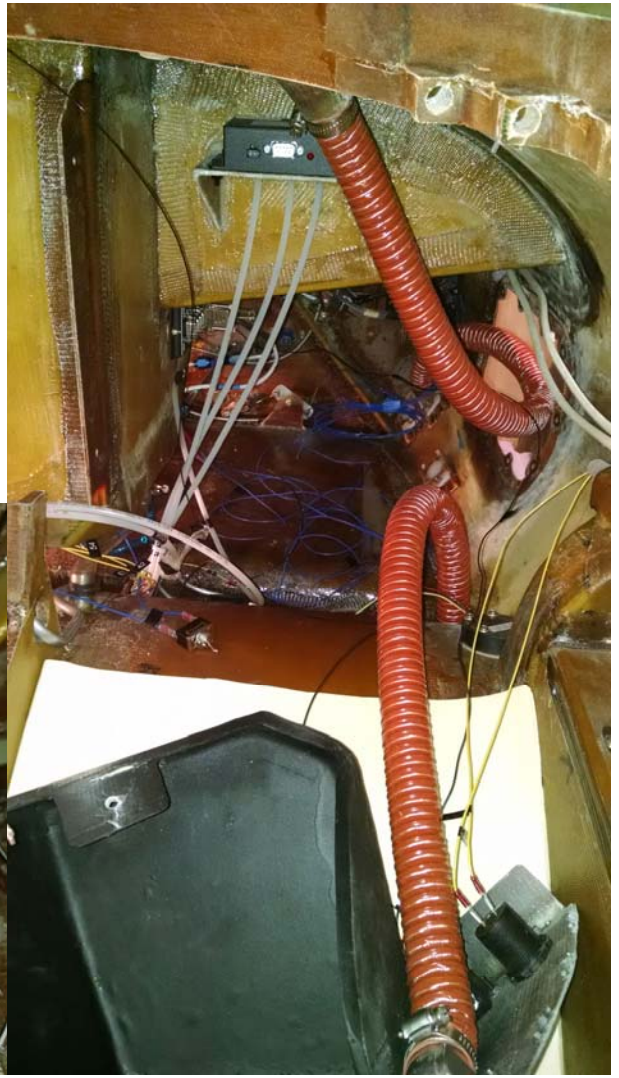
Details showing rear fresh-air port with PVC fitting in the interior of cabin near the elevator torque tube port and CS-15. Once torque tube port was properly sized, the foam was routed out around the perimeter of the opening and flox was filled between the outer and inner skins for strength. CS-15 is glassed to fuselage skin for additional rigidity.

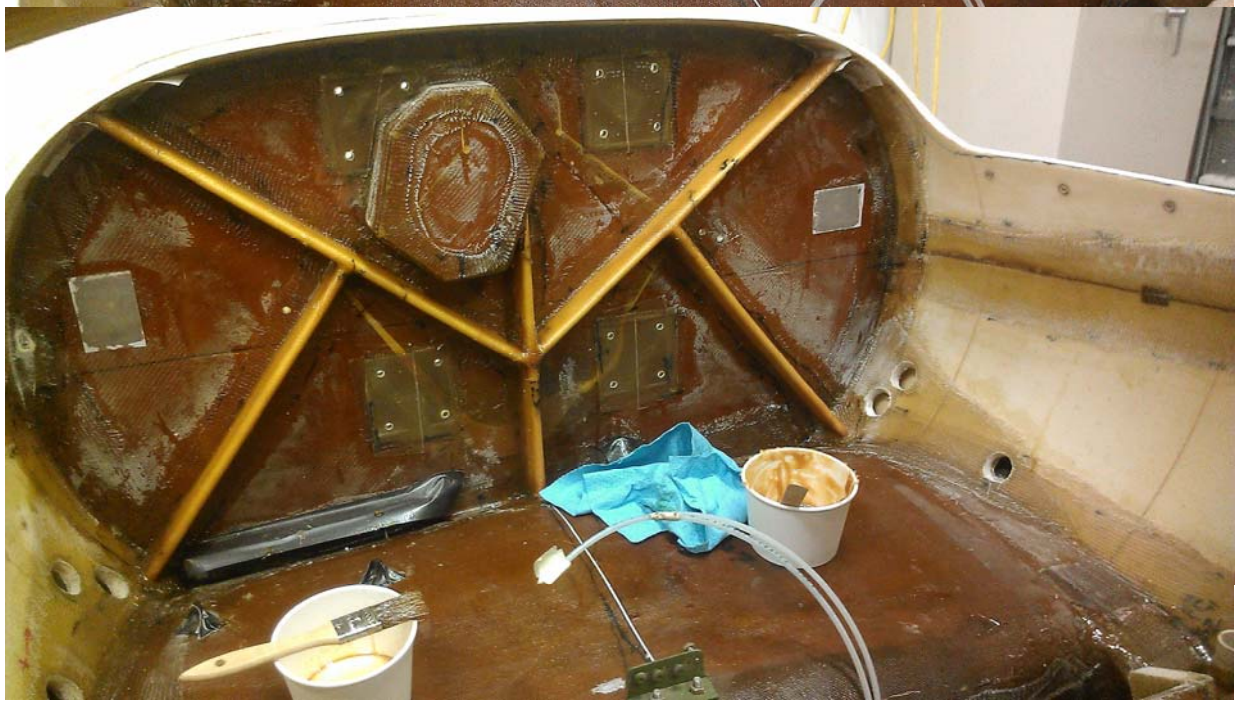
Work done by Jay Scheevel, June 2014

Fresh and hot air sliding port shutters are installed on fuselage interior shell. Port shutter doors are made from 1/8” nylon sheet. The slider frames are 1/8” phenolic joined with flox. The door is designed to be actuated by push-pull cables from the upper panel. Below, on the right side of photo is the 5-wire connector running the radiator exit door servo. Also shown is the aluminum conductor tube for routing the throttle cable. The two shutters nearest the firewall conduct heated air from the back of the radiator plenum. The other shutter handles fresh air taken off of the high pressure area on the leading edge of the canard and vents near the pilot or passenger feet. Fresh air also feeds the white PVC fitting that will go to eyeball vent in panel via SCAT tubing.

Work done by Jay Scheevel, September 2015

Tubular fittings fabricated from fiberglass and floxed in place to accommodate SCAT routing. SCAT hose attached and connected to windscreen/defog duct (hot air) or eyeball duct on panel (fresh air).



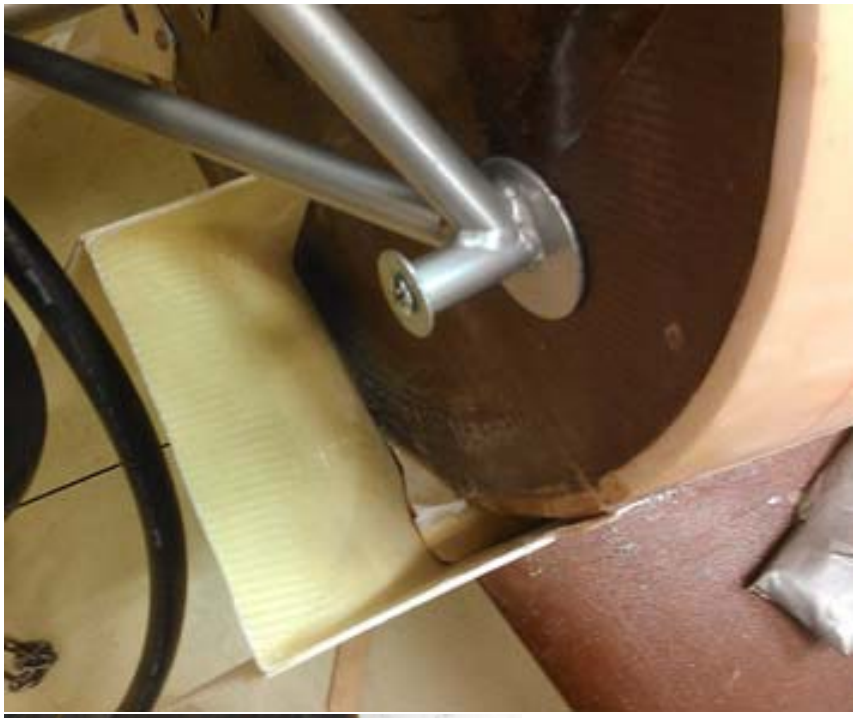


Design and layout of firewall stiffeners. First cut 3/8” urethane sheet to form2” wide cores of stiffener ribs. Then round edges and glass with 2 BID at 45 degrees overlapping onto firewall 1” and onto fuselage shells and canard where appropriate.

Also note the 4 ply beef-up backing for engine mount pads per Q-200 plans supplement.

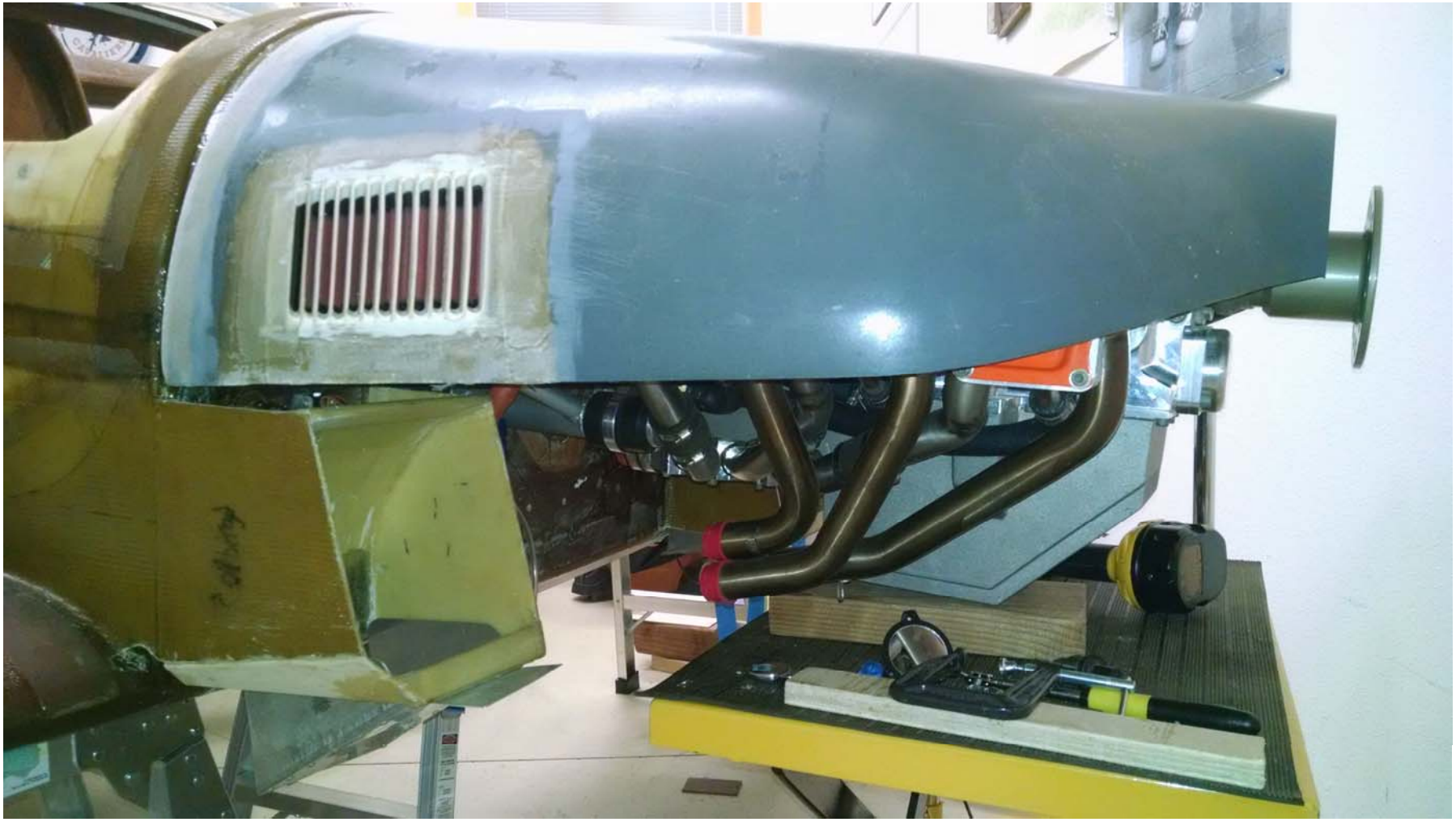
Note forward fuselage halves have been fitted and joined with 2 plies BID at 45 inside and out per Q-2 plans.

All layups inspected by Jay Scheevel



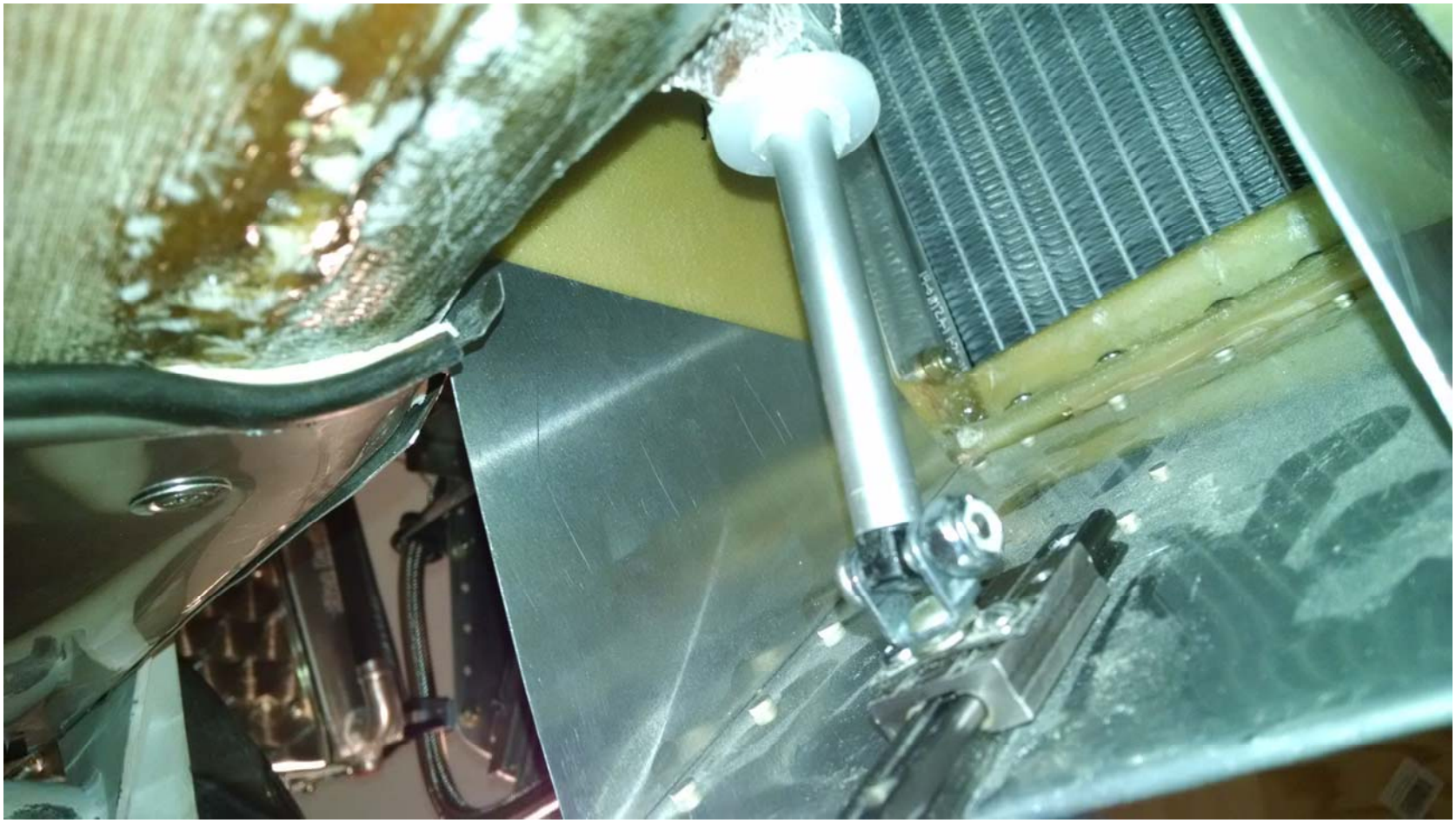
Fit radiator plenums to the firewall and trim to fit, then bond to firewall. July, August 2014.

Complete glassing plenum in place and fabricate reinforced frames glassing to plenums with 2 BID. Gerry Miller built doors and hinges for exit air doors. Installed and tested by Jay Scheevel. Fabricated and mount cowling flange per Q-2 plans.



Initial fit of upper cowl section to engine and cowl flange at firewall. Louvered intake is designed to fit filter retaining airbox on inside of cowl section. This portion of the upper cowl is later cut from cowl and mounted permanently to the airframe in order to allow the engine to run filtered air with the cowl removed from the airframe. September, 2015

Fit and install radiator exit door servos, seal in place. Build and align guide rails on doors and mount to servo arm. Route cables through removeable coaxial 5-conductor connector which connects to electronic controller box near panel and sliding potentiometer on panel. Test and adjust servo function and range of motion in using pot adjustments on controller module. March, 2017. Inspected Jay Scheevel. All functions OK



Fit and install radiator exit door servos, seal in place. Build and align guide rails on doors and mount to servo arm. Fabricate nylon servo arm guide-supports and mount on pylon to firewall. Nylon guides are safety wired to pylon anchors. Test servo function and range of motion in servo. March, 2017. Inspected Jay Scheevel. All functions OK

Fresh air intake is designed to take high pressure air off of the leading edge of the canard root, then channel it through the hollow strake fairing on the top of the canard root into the cabin. A stiff screen is desired to prevent large debris or insects from entering this fresh air system in flight.

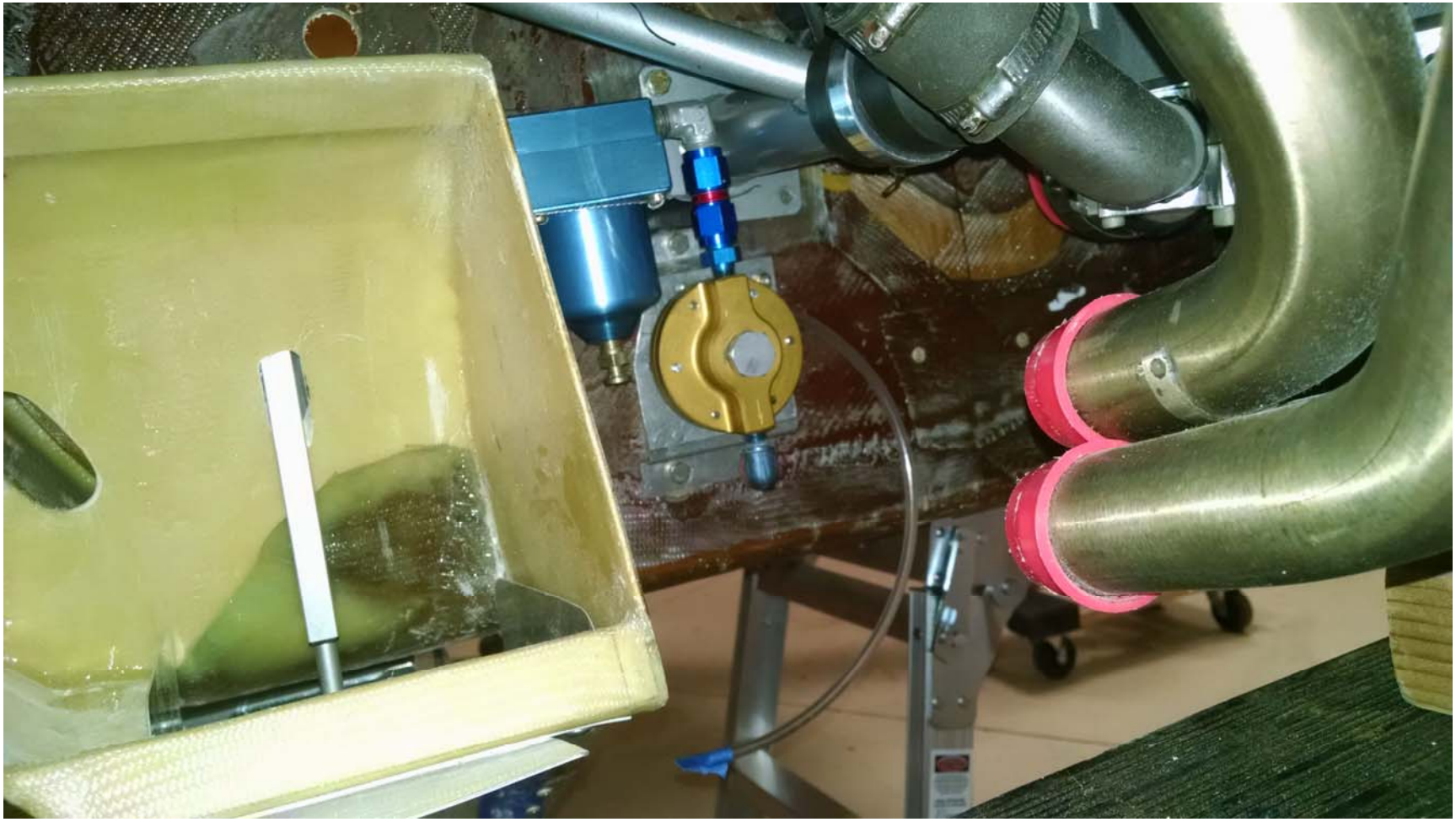
First, two plies of glass are laid up over duct tape shaped to make a smooth transition between the leading edge of canard to the radiator plenum and strake. The fiberglass is trimmed to create a frame with an opening for the. Screen is formed to the contour of the glass frame, then bonded to the inside of the frame. The frame is floxed in final position prior to contour filling and painting the fuselage. Built by Jay Scheevel, April 2017

Phenolic hardpoints are fabricated then floxed in place on bottom of the canard and the fuselage shell, aft of firewall. Stainless sheet is trimmed, bent, and drilled to serve as an engine exhaust gas heat shield on bottom of the canard. It is fit in place and phenolic hard-points are tapped for 8-32 screws. Fiberfrax is glued in place on bottom of canard and fuselage beneath each stainless sheet. Neoprene edging is installed on perimeter of sheets to prevent chafing of fuselage. Sheets are installed with 8-32 stainless screws and finishing washers in oversized holes to allow for heat expansion. Tested for security. OK. (White covering is peel-off plastic scratch protection for stainless, removed after fitting). Stainless is then drilled to accommodate nose gear rear mount bolts. Installed gear mount and test for fit, OK. June 2014. Inspected by Jay Scheevel

View of stainless steel heat shielding in place, just prior to fuselage filling and priming. Leading edge of stainless sheet fits in behind stainless firewall to completely protect leading edge of canard from any engine heat. October, 2017

Stainless firewall template is created using CAD drawings and supplied to All Metals fabrication for waterjet cutting. After stainless sheet is water cut, it is hand burnished using electric drill and burnish alignment template provided by Gerry Miller. Metal is bent using hand break and installed on firewall and also on exposed radiator plenums. Fiberfrax is cut, fit and bonded to firewall before installing stainless and mounting engine mount. Work done by Jay Scheevel, November 2015

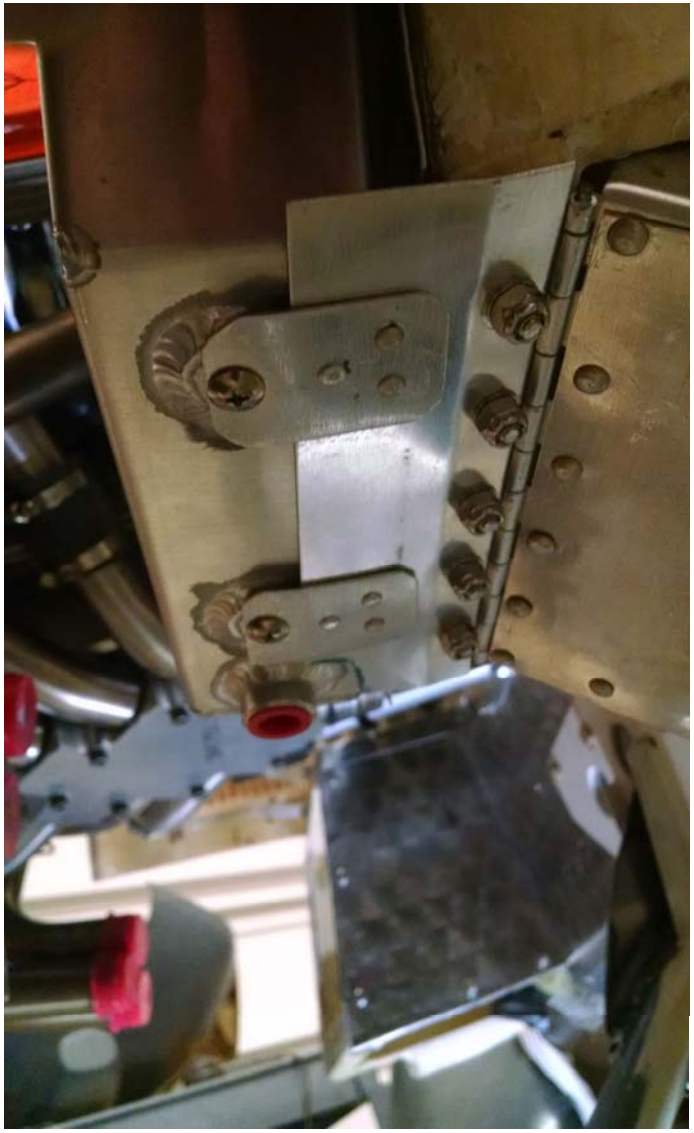
After installing firewall, all connectors, pass throughs, engine mount stiffeners, AN4 engine mount eyebolts. The eyebolts along with AN3 securing bolts, eliminate the need for wrench on back side of firewall when installing engine mount nuts on front of firewall. Also note the angle bracket for forward security on rudder pedal/brake cylinder platform. Upper left of firewall is B&C “forest of fast-on” connectors ground buss (G2 FWL on electrical schematics). All pass through circuits tested for electrical isolation and security. OK. December, 2015. Jay Scheevel



Layout and design fuel routing through firewall to Rotec TBI Regulator which is mounted on the firewall. This preliminary design was later revised to eliminate the gascolator at recommendation of several experienced builders who experienced vapor lock from heat soaked gascolators. With elimination of the gascolator, a sump drain was added to header sump allow elimination of water from the header sump. This is conducted out of the cockpit via a rubber and aluminum line exiting the right strake box on the belly of plane. Work done by Jay Scheevel, December 2015

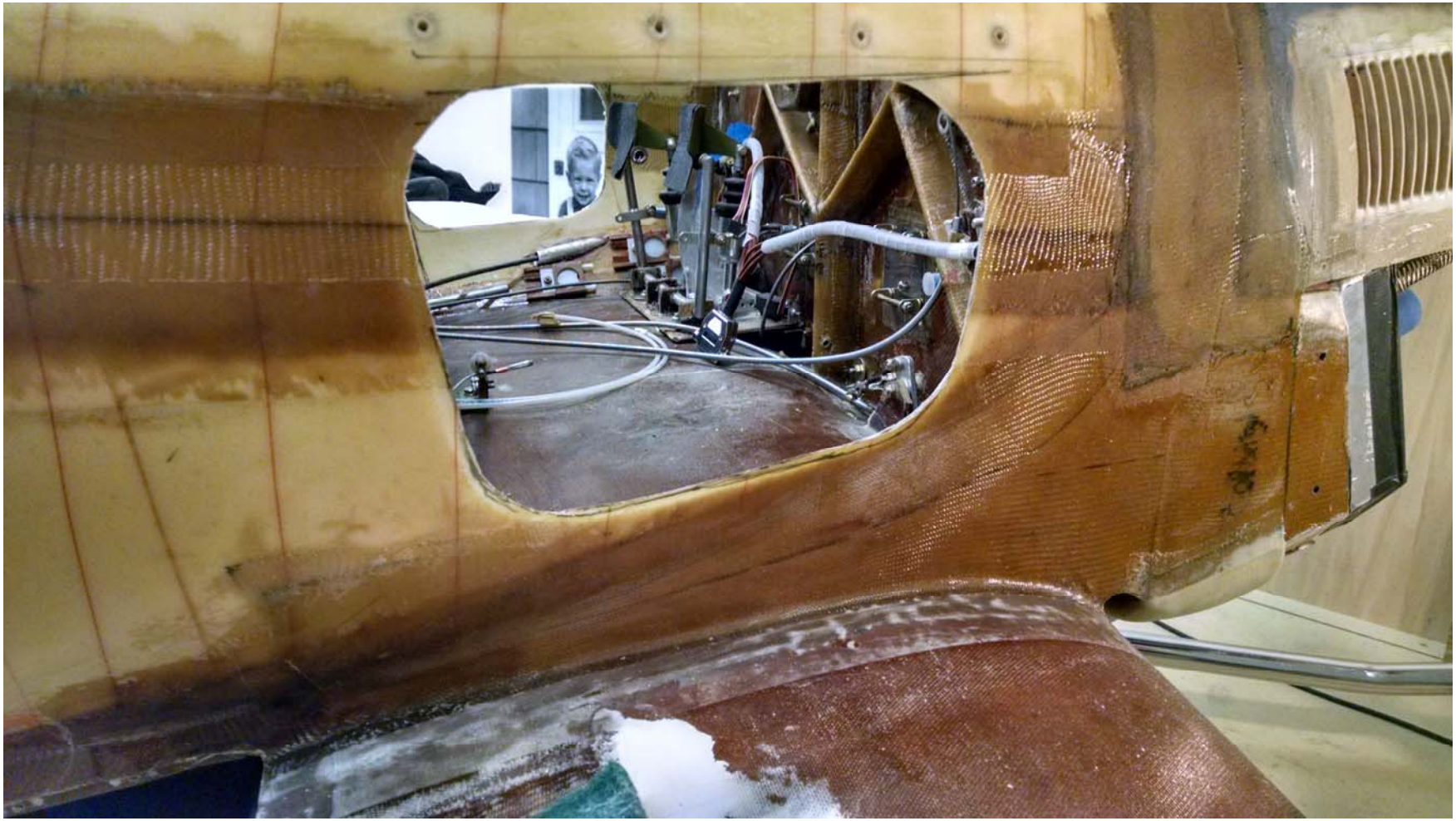
Throttle cable is a push pull cable that routes behind the hollow left strake fairing between fuselage shell and canard, then threads through radiator plenum box. The end of the push-pull rod fits through a hollow brass bolt (guide) connecting to a bellcrank actuating the Rotec TBI throttle slide. Two phenolic blocks are glassed to radiator plenum with 4 small hose clamps and fuel hose cut to cushion and hold the push-pull cable conductor shell securely in place. Throttle and bellcrank are tested for smooth and free motion. Checks OK by Jay Scheevel.

Install (rivets) radiator mounting tabs fit to radiators. Radiators custom designed by Jay Scheevel and fabricated by Ron Davis Racing, Phoenix. Left and right radiators are mirror images. Each radiator handles cooling for only one side (bank) of cylinders. Radiators fit flush against plenums with silicone foam tape to seal and isolate from stresses and airframe vibrations. Installation hardware built by Jay Scheevel and installed and tested for security. All OK.



Lower radiator mount detail seen from below at left. Mounts are 10-32 female lugs welded into the tank of the radiator. Aluminum sheet radiator mount support/mount tabs are designed to flex so as to not over stress the radiator tank lug welds.

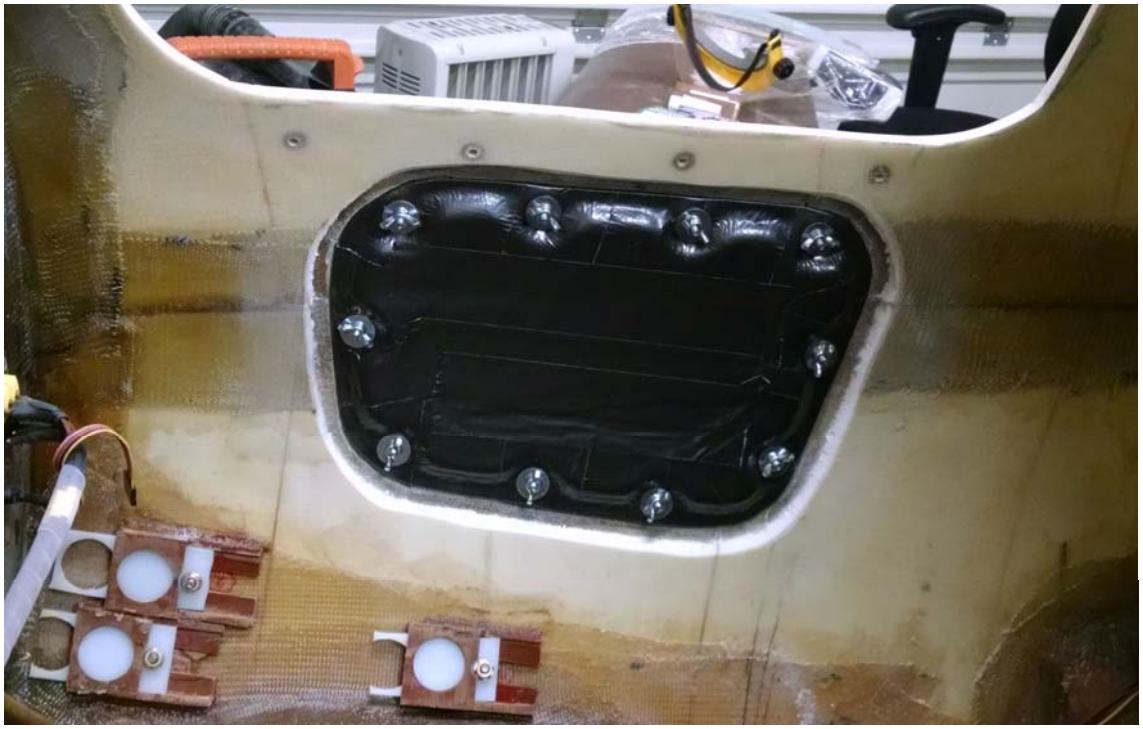
Radiator, water pump and plumbing detail view from top is shonw at right. January, 2016



Design, layout and cut access ports in forward fuselage above canard. These ports serve allow maintenance and inspection of all items on the firewall and forward portion of the cockpit without having to climb under the panel to do so. Also facilitate installation and removal of the elevator torque tubes and elevators.

Cutouts and foam trimmed back, Ten 8-32 EZ-point studs are positioned on the perimeter. Threads are protected by tape, then the stud bases are installed with flox to the glass perimeter and the edge is glassed with 2 BID plies at 45 degrees to the edge ensuring glass to glass on the outside perimeter of the piece.

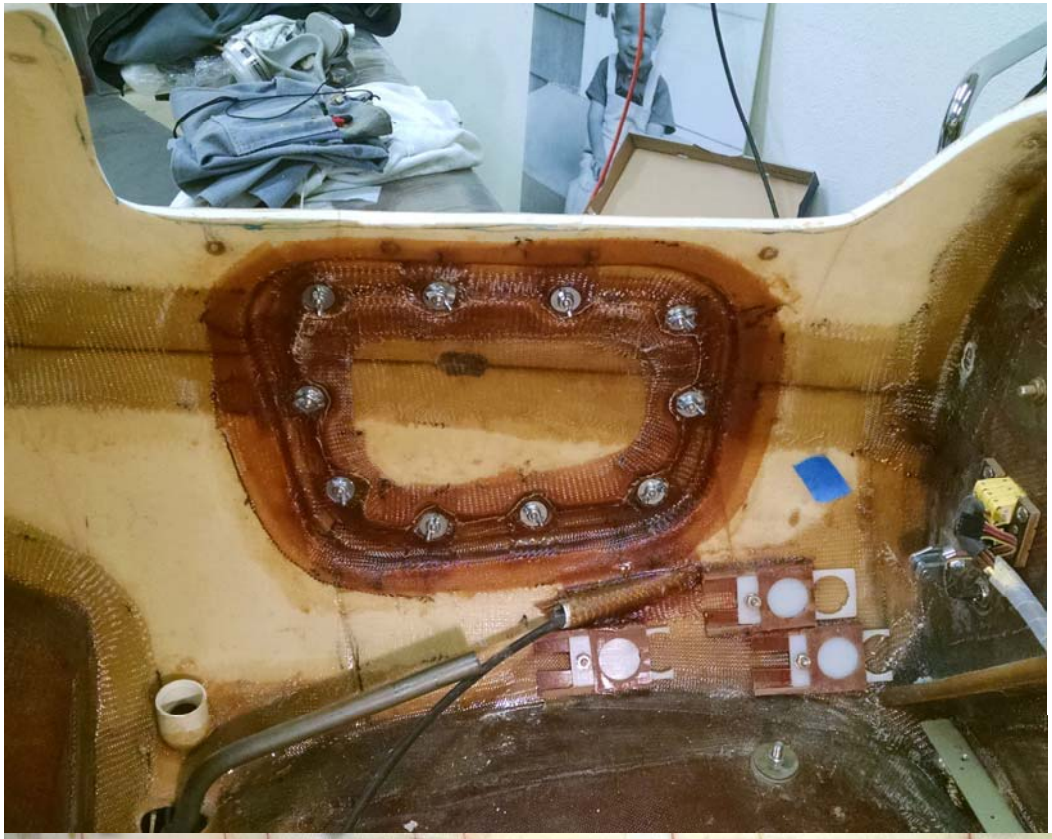
During final cure, waxed washers are installed on studs to press the seating area around the stud flat and normal to the stud, ensuring a good contact area for the mating mount flange on the fuselage. January 2017.



Cured port is lined with duct tape as a mold release and fitted back into position in the opening, so outside surface is flush with fuselage skin. The foam on the interior of the fuselage has been trimmed back and a 3/8” for glass to glass perimeter and has been layup of a glass perimeter mount flange on fuselage.

Wing nuts and washers are removed and threads protected, then 2 BID tapes are laid up around perimeter, with 2 additional 1” wide BID strips laid up over each stud/flange contact point and lapping onto the fuselage for glass to glass contact plus one inch minimum of overlap.

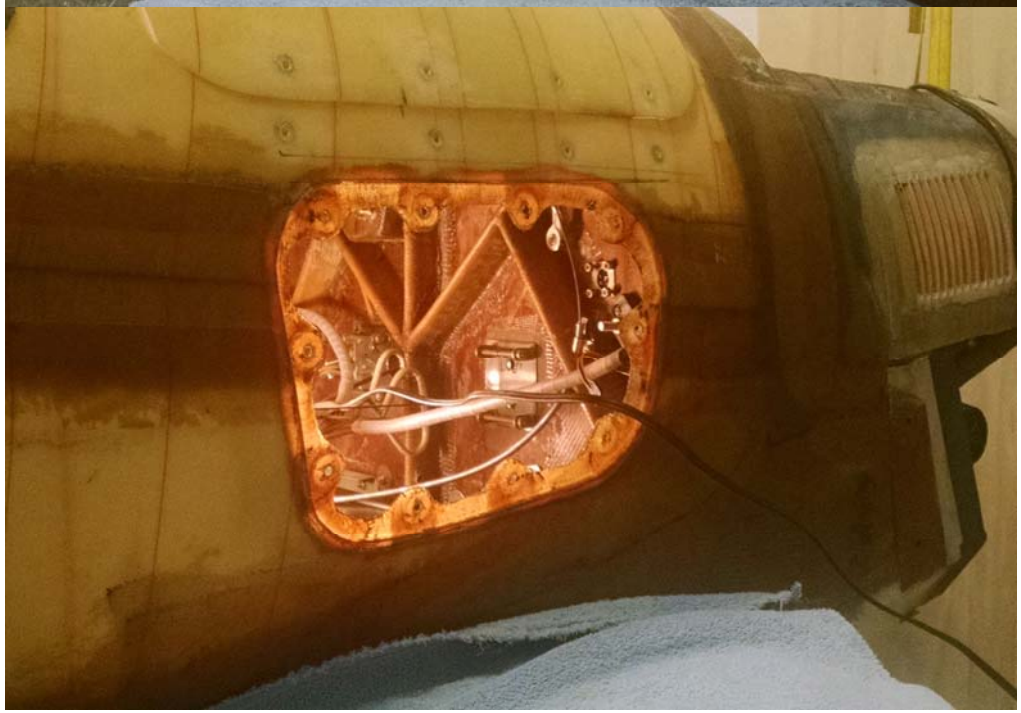
January, 2017 inspected by Jay Scheevel, no flaws



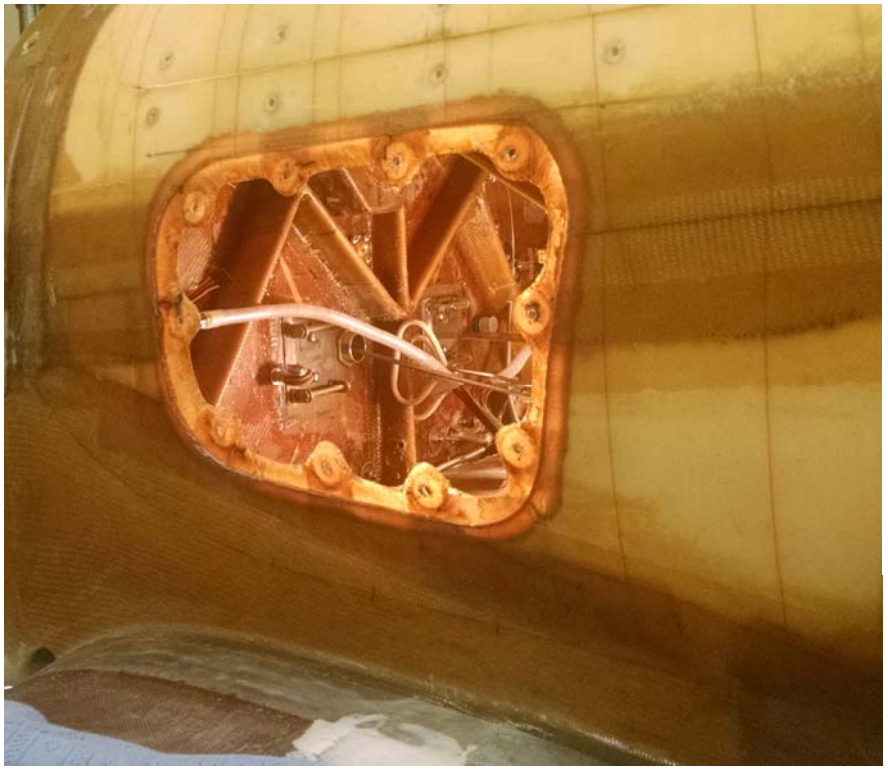
Prior to full cure (green stage), thread protectors and duct tape mold release are removed. Then waxed washers with wingnuts are installed over laid up flanges and tightened to ensure flush and full contact surface between port mounting studs and fuselage mating flange at all 10 mount locations.

Completed port, seen from the outside, with light located inside the fuselage highlighting location of flox, studs, glass to glass perimeters and extra plies at location of flange stud contacts. Design is intended to be a flush skin on the outside with no fasteners visible on outside of aircraft. Fastener access is from the inside.

After full cure wing nuts and washers are removed and door flange are aligned to match for solid engagement with full strength when fasters are in place.



Port location on either side provides good access to both firewall and elevator control linkages, fuel tank plumbing, fuel pumps filters and avionics items, cable controls as well as wiring on both sides of the fuselage.



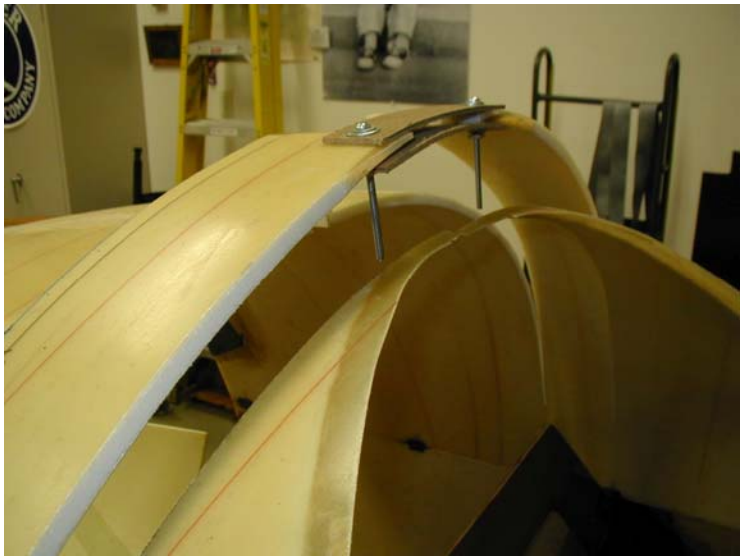
Custom modification to Q-200 Plans to allow 2” of additional headroom.

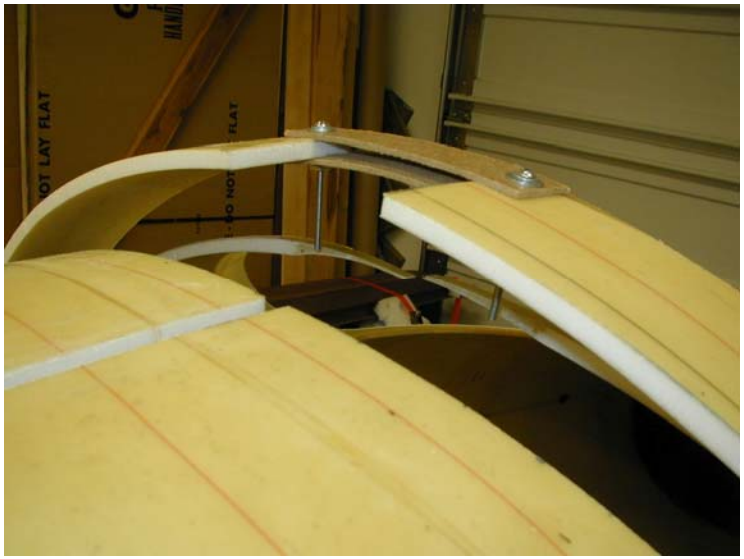
Modification of Fuselage by relofting aft of the seat back bulkhead (FS 78.5).

The initial alignment and cut is made in the upper fuselage using laser alignment tool, then a central cut is made aft to approximately FS92 along the top of the fuslelage shell.

Radial cuts are made 4” aft of the initial canopy opening cut and flexed outward by about 4 inches at center. A temporary Masonite brace is pinned in place to hold the re-shaped “ribs”. Approximate increase in headroom is 2” and increased side-room is 1”

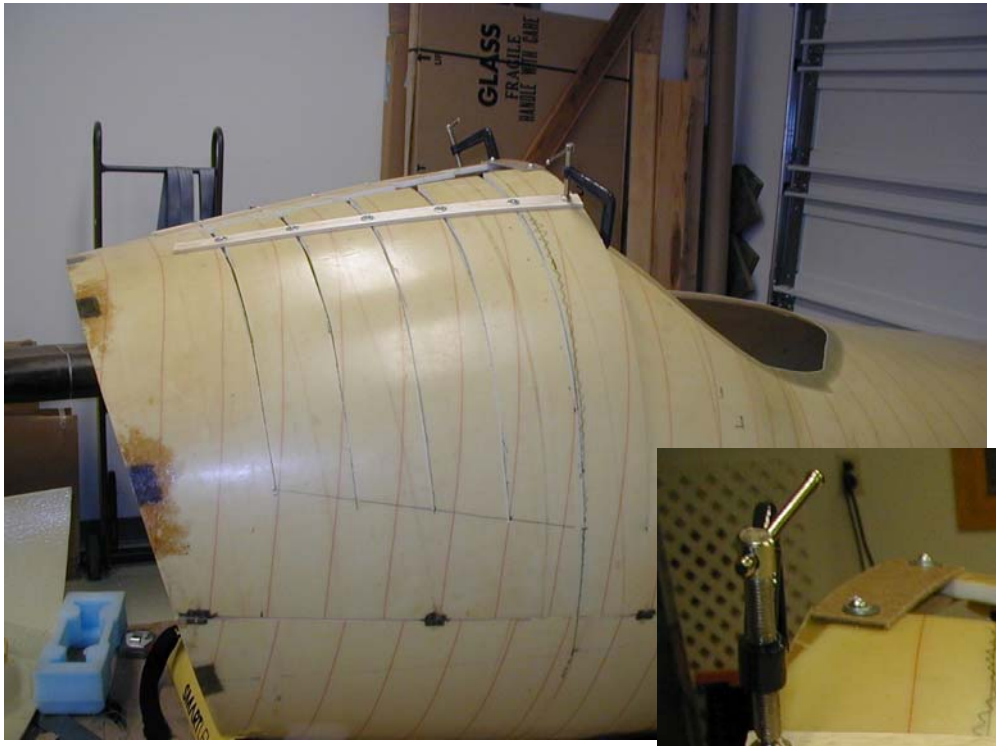
Work all cuts and alignment performed by Jay Scheevel, Sept. 2010



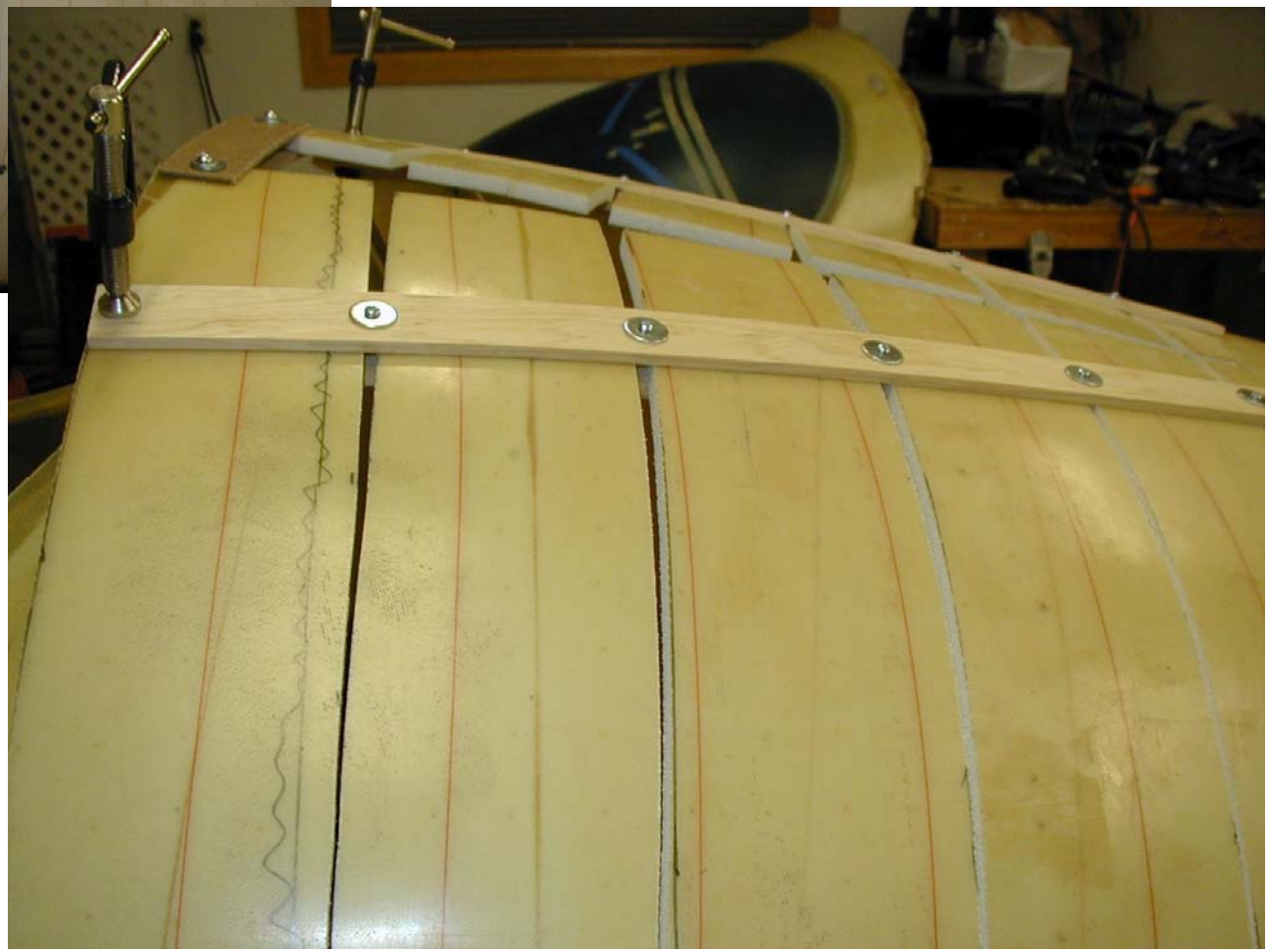


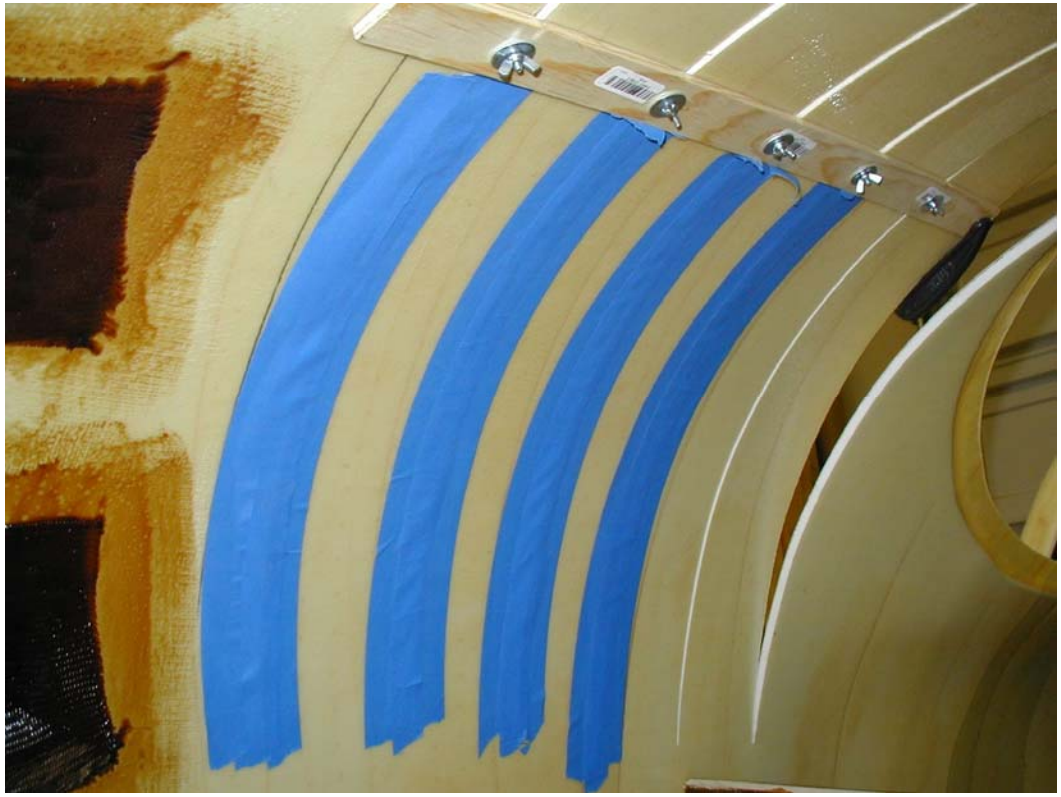
Modified fuselage loft is shown with brace in place on first “rib. Original canopy is shown fitted near new lofted rear fuselage top.

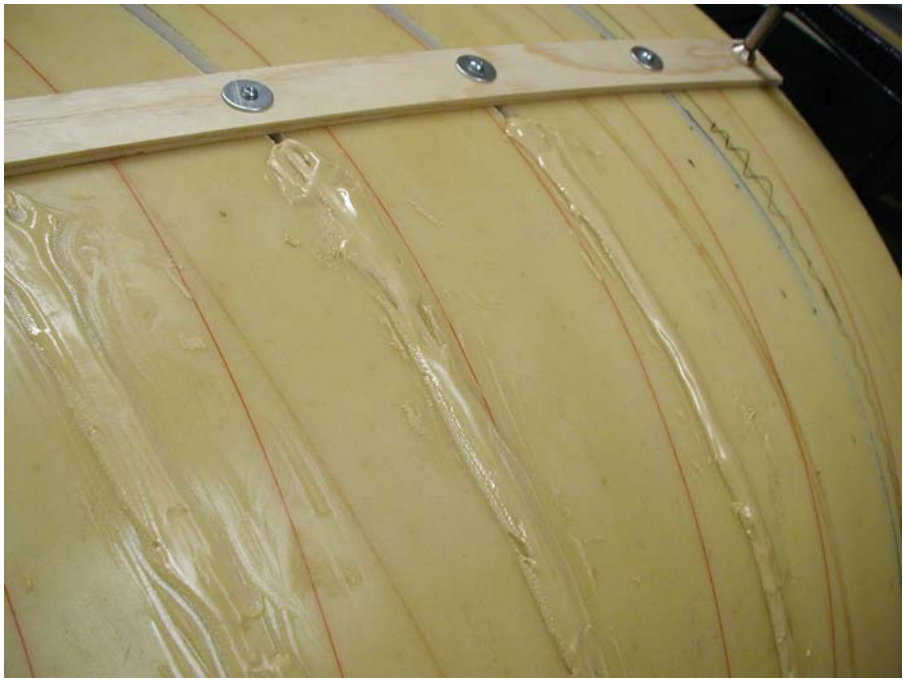
Sept. 2010



Additional cuts and bracing are shown. Profile remains unchanged at FS 94 location (wing shearweb mount location) and aftward. Total of 5, 4” wide “ribs” are braced in place to taper back to the original profile. Sept. 2010. All work by Jay Scheevel







Open cuts created by cutting and bracing are filled with mico. Tape on the inside of the shell retains the micro above. Once cured, the braces are removed and the cuts are filled in a similar way up to the central seam. Sept. 2010. All work, Jay Scheevel

Completed profile with canopy placed adjacent to estimate the final profile.

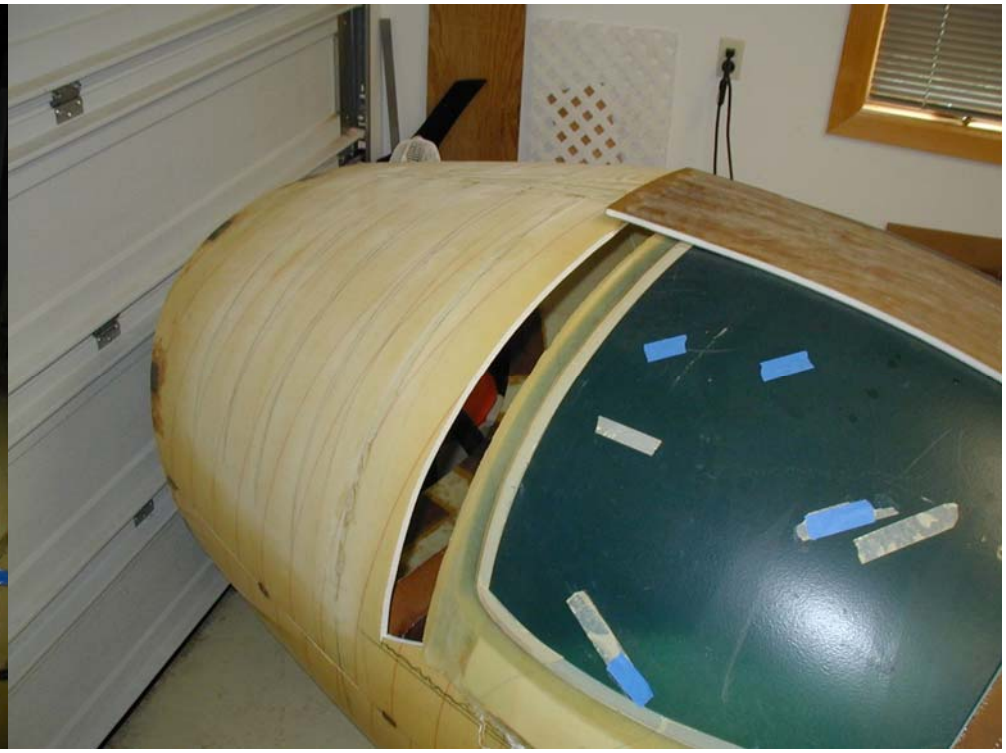
Filled seams are sanded flush with outer skin and urethane foam is cut to fill central seam, then bonded in place.

In preparation for splitting canopy to accommodate overhead cockpit frame (also designed to be a console/rollover structure). The canopy will later be split into 3 parts:

1. Permanent forward windscreen.
2. Two doors

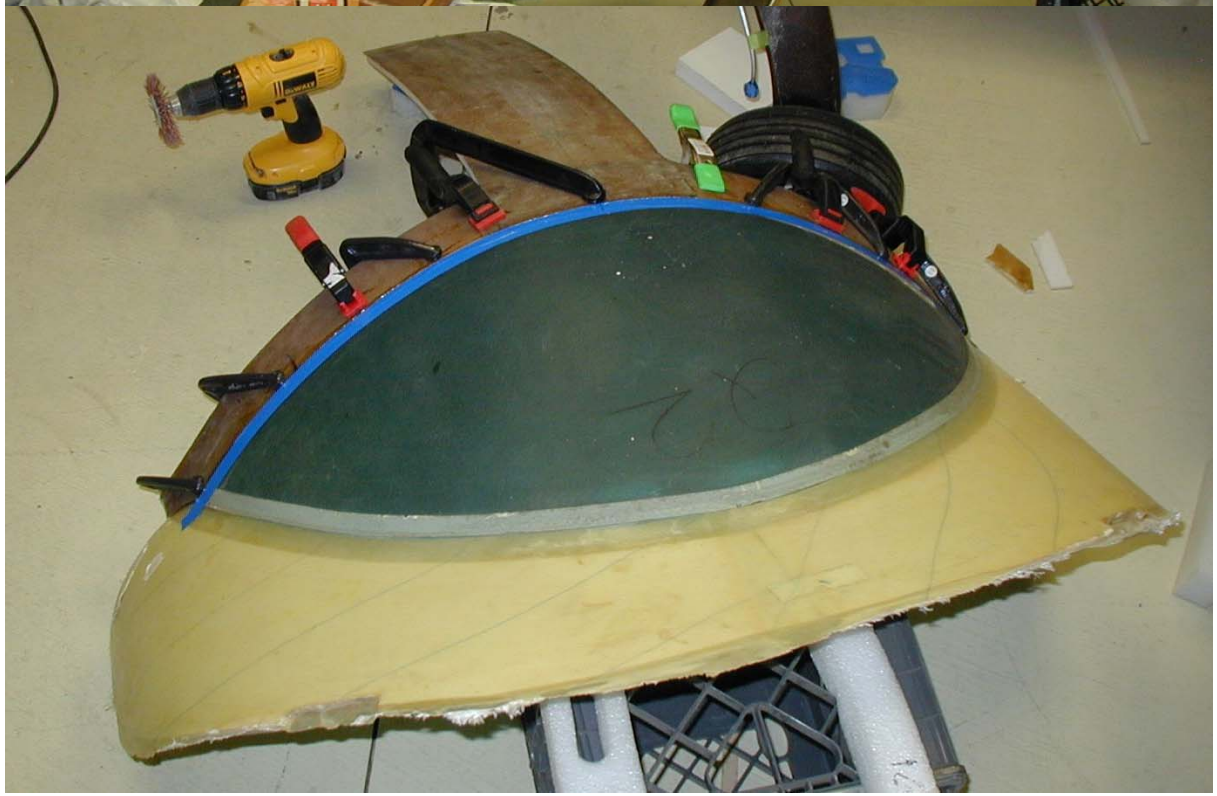
For now the uncut canopy is used as a form to lay. The canopy is protected with plastic wrap. The overhead structure and peel ply are located where overhead frame/console will be laid up.

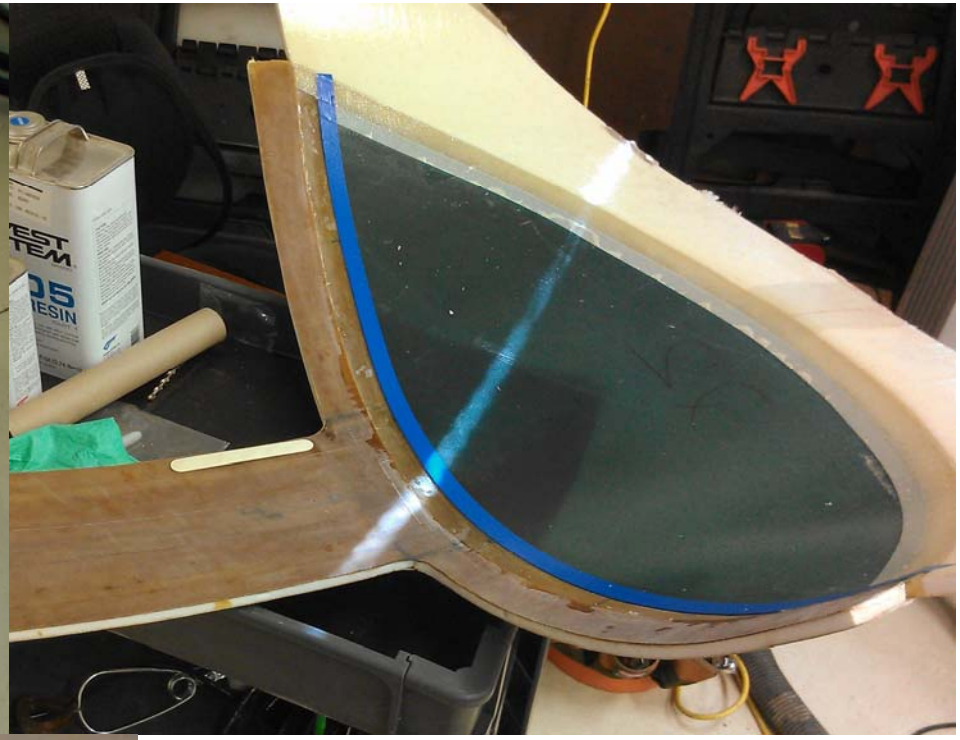
The layup structure for the rigid overhead structure is as follows:
Bottom (directly against canopy/mold), 2 BID, then 2 UNI (parallel to longitudinal overhead spar and 2 BID parallel to forward screen frame. On this is places 3/8” Urethane foam, coated with micro. On top of the foam go 3 UNI and 2 BID along both the longitudinal section and the windscreen frame. Peel ply is applied over this with shot-bag weights holding the structure in place for cure. The structure is trimmed and load tested for integrity (strong!). Trimmed structure is shown.



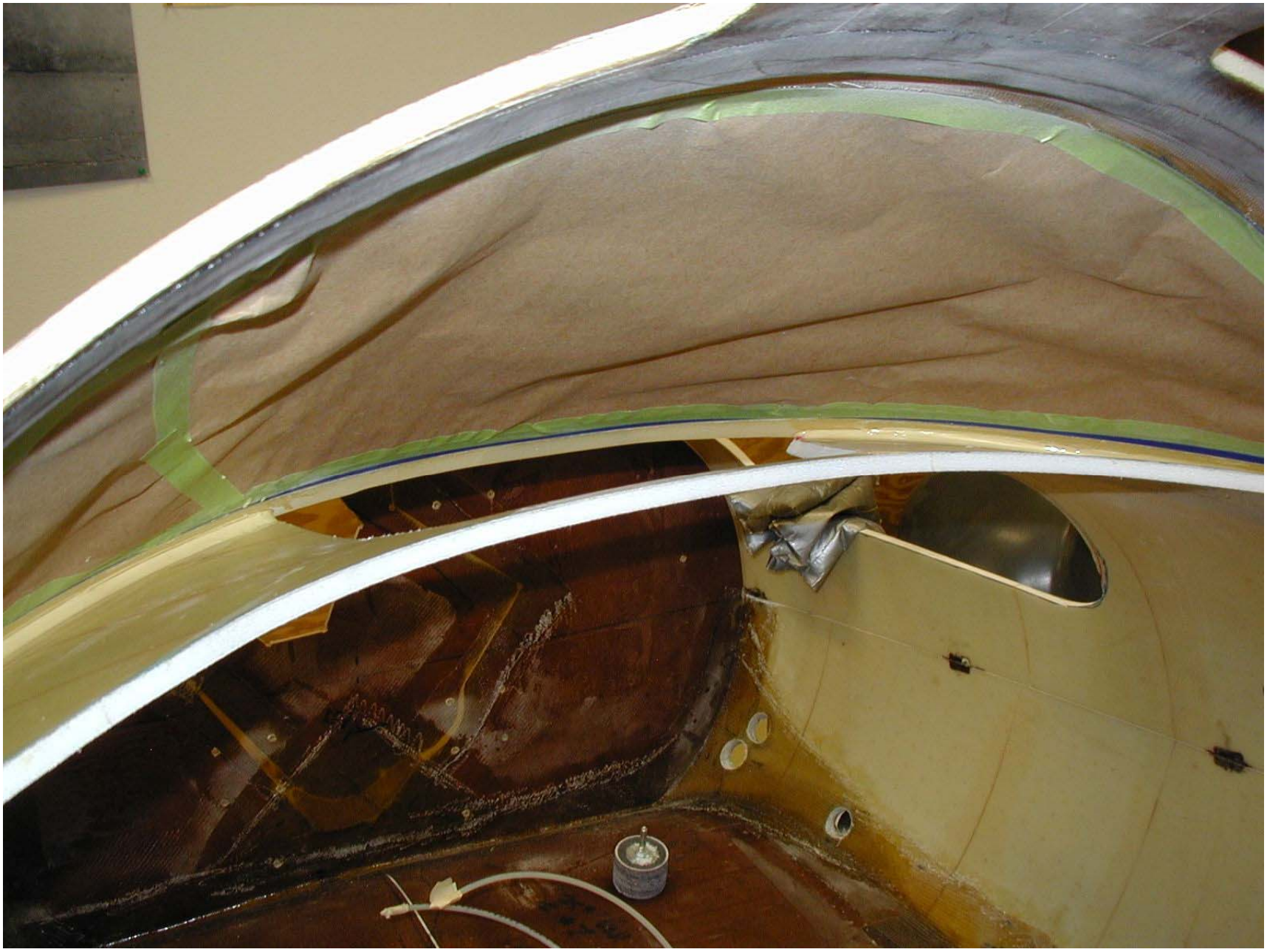
Overhead structure is shown test fitted in position to demonstrate contour and fit to relofted fuselage. Canopy is then split into 3 parts and forward portion has 3/4” sanded and fit to into a carved foam recess in the forward portion of the overhead frame piece. This is bonded in place with flox and then two BID layers to make a permanent frame. The forward edge of the windscreen frame, is tapered and fit to the forward fuselage shell and bonded in place

Carefully cut canopy into three parts to be: 1. permanent forward windscreen, 2. Left cockpit door, and 3. Right cockpit door. Trim glass and foam on bottom of forward edge of overhead structure and sand fiberglass skin that matches up with corresponding edge of windscreen. Peel back protective wrap from plex, sand edge, drill 1/4” holes to capture “pillars” of flox bond squeezed out from skin to plex laminate with overhead structure. Fill lamination with flox, squeeze to bond with skin of overhead structure, then layup 2-BID over flox fillet on interior of plex. Final bond is glass-flox-plex-flox-glass on ¾” wide union.





After cure, trim forward edge of windscreen sandwich frame to fit on outside skin of upper forward fuselage quarter. Verify contour and make initial cockpit opening. Feather forward windscreen frame to match curve of fuselage, then bond with wet micro squeeze-out between sanded fuselage skin and foam of windscreen frame.

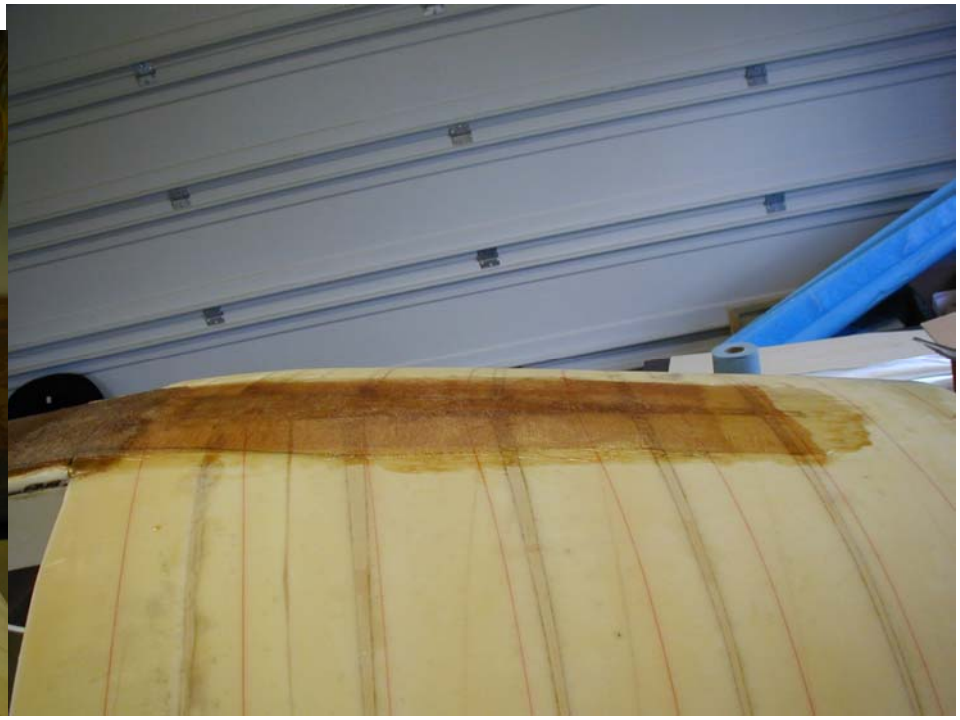


Interior fillet of wet micro bonds forward windscreen to the upper fuselage shell.

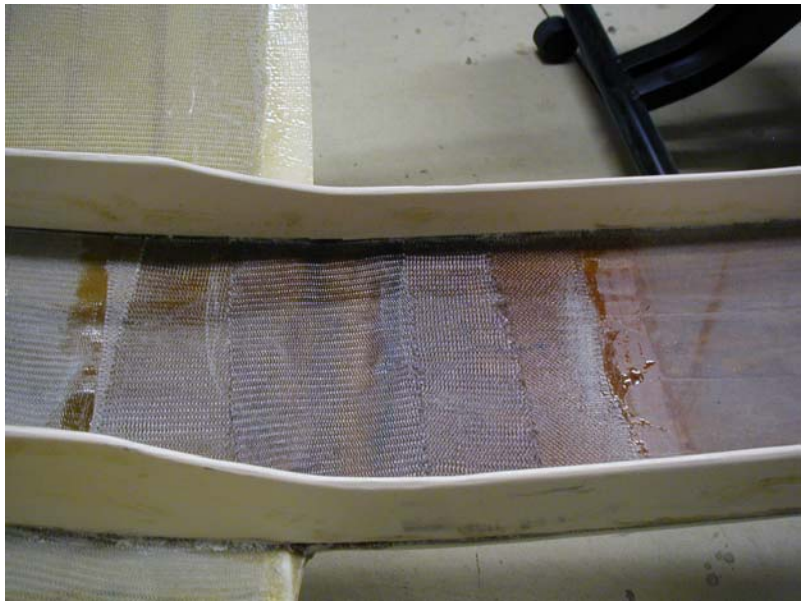
Check alignment of overhead structure and trim interior glass and foam from read edge of central panel to tie into fuselage shell at rear of cockpit. Sand outer glass of fuselage skin and upper skin of central panel. Bond with glass to glass using wet flox, then clamp. This puts the overhead structure in its final position, permanently bonded to the upper fuselage shell. July, 2013. All bonds inspected OK, Jay Scheevel

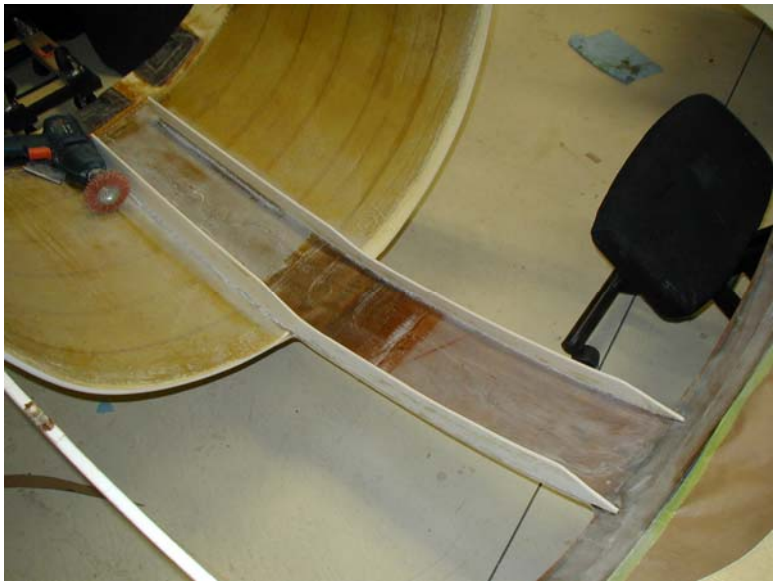
Urethane foam sheet is cut and bonded to outer skin of fuselage with micro, then Urethane foam is sanded to make final fillet shape from original canopy frame contoured to match fuselage contour. Once shaped, the foam is coated with micro and sanded to make fine contour improvements.

Then 2 BID plies are applied to entire area lapping onto windscreen frame just below the Plexiglass and onto the fuselage 1-2”. This adds stiffness to the whole assembly and the fuselage in particular.



Central seam foam on relofted fuselage is bonded in place wit 2 BID both outside and inside shell, overlapping original skin by 3-4". The overhead console structure is fit and bonded to the rear fuselage with the same BID plies using 5" of overlap.



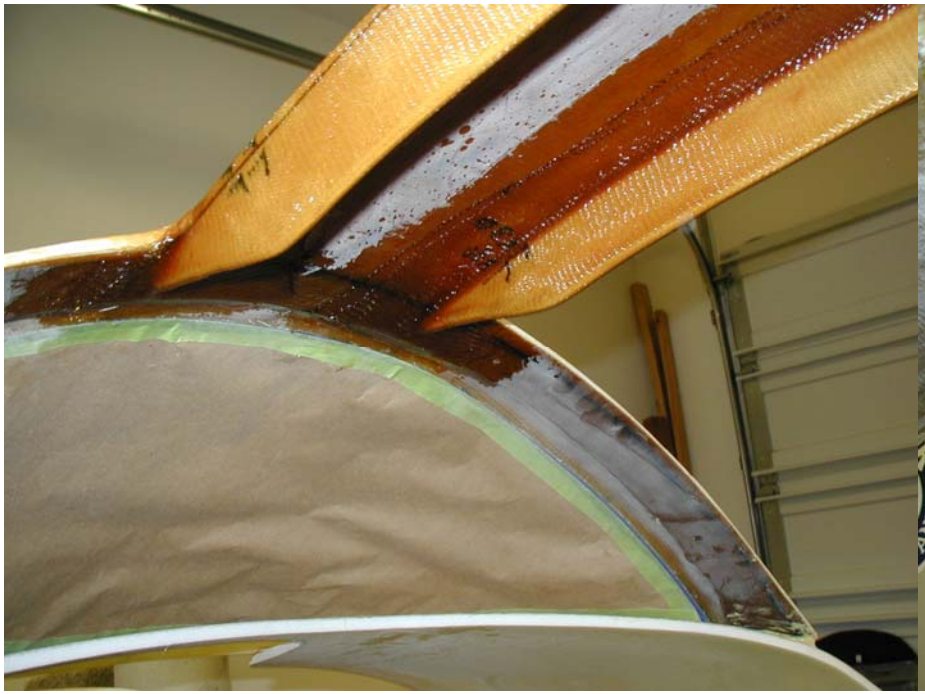


The inside of the relofted portion of the fuselage shell is reinforced with 2 BID sheets that cover the entire relofted “rib” area. This results in a skin that is substantially stronger than the original shell.

The upper fuselage shell is removed and inverted. The 1/8” aircraft grade birch plywood is cut into 4 longerons that form-fit the overhead console structure and the relofted fuselage section. These are designed to extend from the fixed windscreen frame back to FS 94. Pairs of plywood are bonded together form two ¼” thick stiffened longerons. These are floxed in place and allowed to cure. On the inside edge of the overhead console/stiffener.

Once cured, the plywood longerons are sanded, edges radiused, then bonded to the fuslelage and overhead structure with 2 BID wraps that overlap onto the fuselage and overhead structure by 1” inside and out. This forms a very stiff C beam overhead structure.

The outside of the relofted portion of the fuselage is reinforced, like the inside with two plies of BID covering the entire relofted portion of the turtle deck shell.



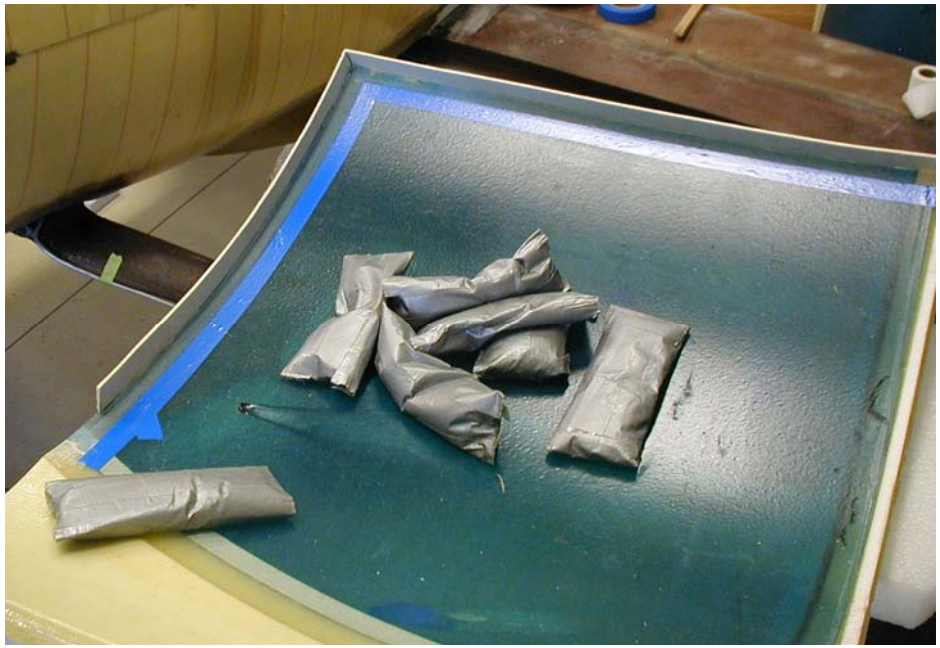
The overall C-beam structure is shown from various angles. This structure is later tested for strength and stiffness. Loads in excess of 200 pounds centered on the cockpit portion of the beam demonstrate no measurable deflection.

In addition to increasing cockpit headroom, this modification serves to significantly improve rollover structure strength and torsionally enhance stiffness of the fuselage in the cockpit area relative to the original design.

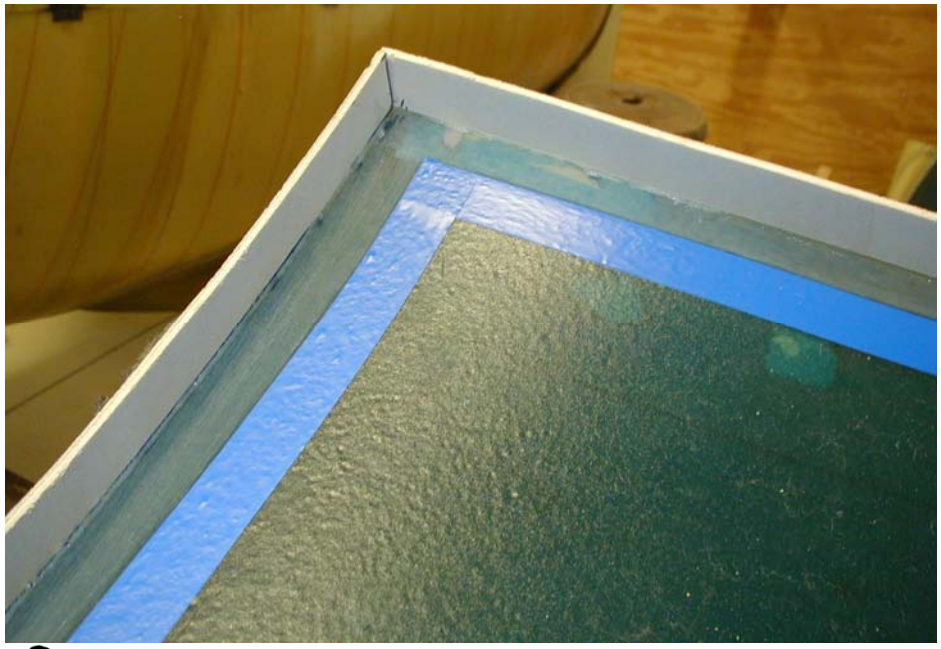
After trimming the cockpit entry to the desired profile, interior skin is removed and foam is trimmed to create a channel with clean outer glass for spruce longeron, per Q-2 plans. The longeron is installed with adequate flox for good squeeze-out all around, then secured with clamps and trim strips to ensure the proper bond.

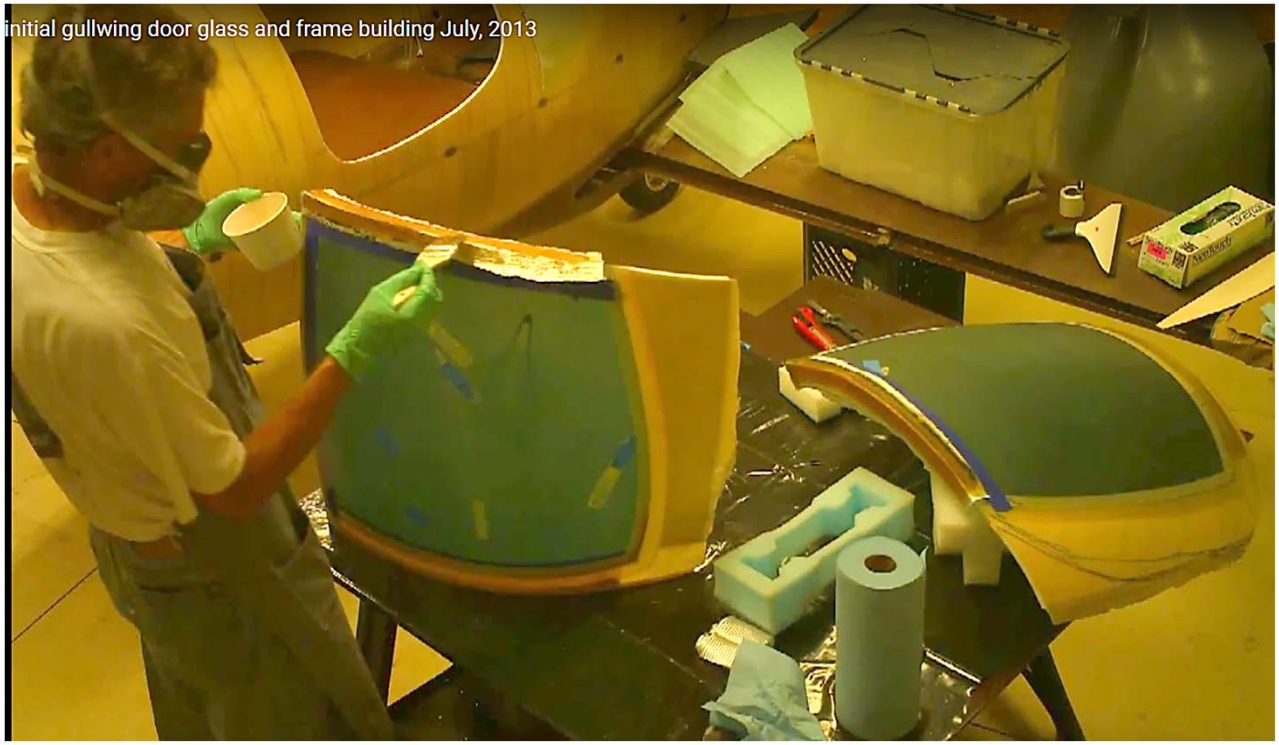
After bonding in place unidirectional and bidirectional plies were applied to the longerons per Q-2 plans section 8-5. Inspected OK, June, 2015. Jay Scheevel

After final door geometry is determined and trimmed unidirectional and bidirectional plies are applied to the longeron and interior and exterior fuselage skins per Q-2 plans section 8-5. Inspected OK, August, 2015. Jay Scheevel



Cut and fit 1-1/4” x 1/8” plywood stiffener frames for cockpit doors. Retain equivalent urethane bulkhead on aft end of original canopy and trim to same profile as plywood and glas stiffeners. Peel back protective coat 1” and sand plex front and back, then flox plywood into place on perimeter of glass. Bottom of glass is retained by original canopy frame. July, 2013 Inspected by Jay Scheevel

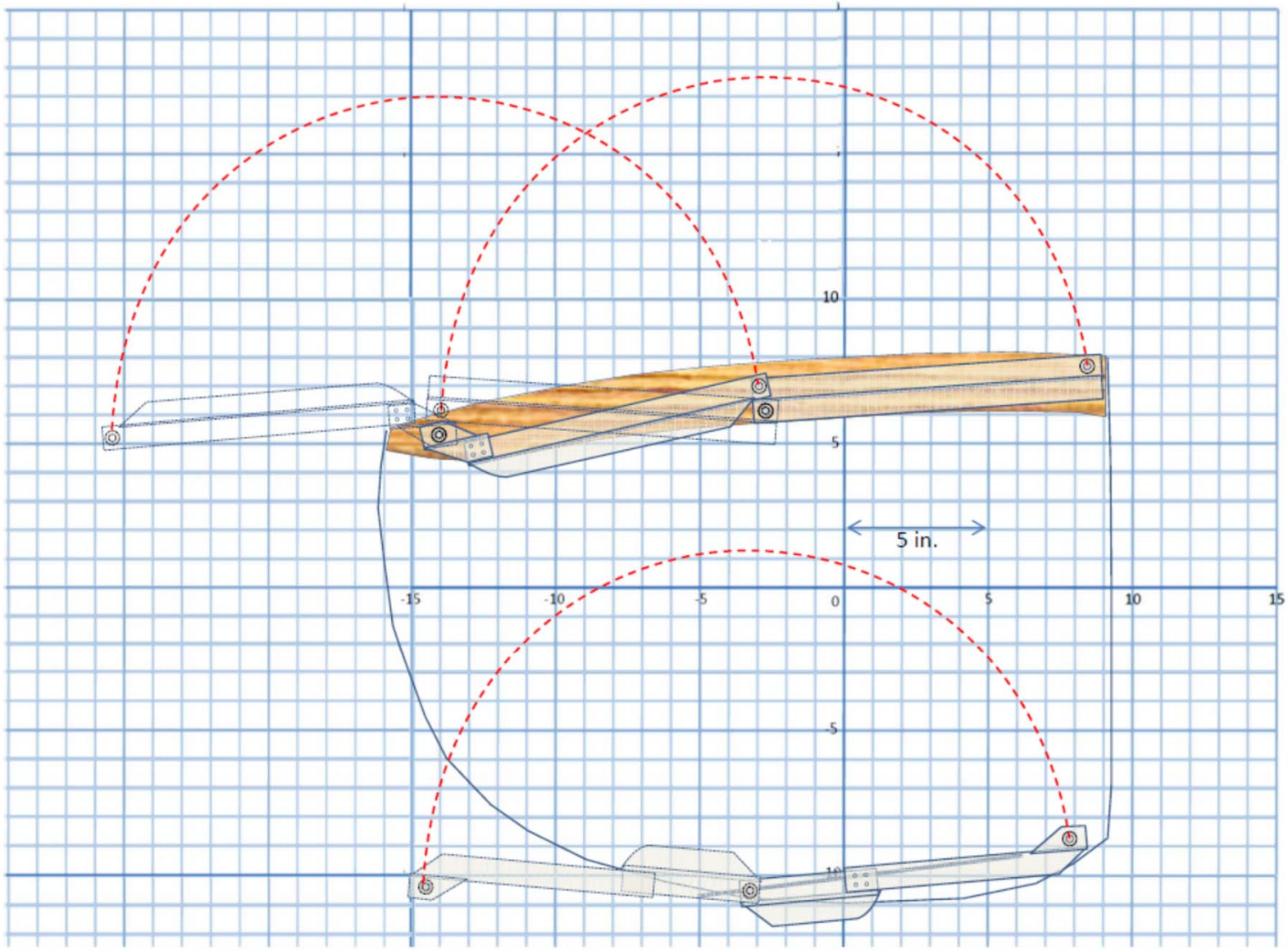




Once cured, the inside of the frame is laminated with 2-BID tapes lapping onto plexiglass with flox fillet and wrapping onto radiused plexiglass on the exterior of each door.
July, 2013 Inspected by Jay Scheevel

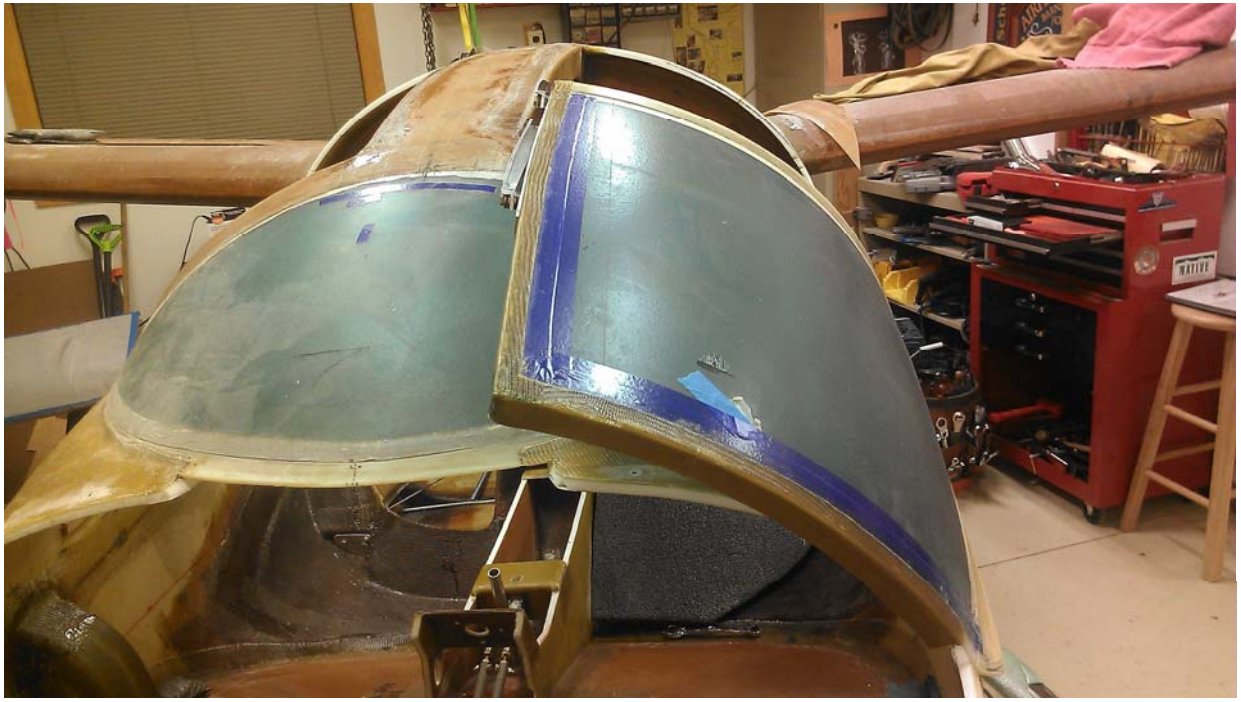
Forward portion of door frame extending plywood stiffener to cover door opening is made from 3/8” urethane foam to be laid up with 1 BID on each side. This will later be bonded to the cockpit door stiffener frame to create the final door shape and sealing flange.

Urethane foam strips are laid over previously formed 1-BID sheet to match compound curve of overhead structure and windscreen frame. Once cured, this curved frame matches both the door shape and windscreen shape so the door will close flush. Shot bags and duct tap hold assembly in place on the overhead structure, while it cures. July, 2013



Forward opening swing arms designed to accommodate the overhead structure C-beam walls and the dimensions of the cockpit doors and door sill longeron. Dimensions verified in 3D model of fuselage. Parts cut from aluminum Z-rail (McMaster Carr) and final construction by Gerry Miller. Lower swing arm later replaced by single ¼" X 1" wide aluminum bar. October, 2014. Jay Scheevel

Initial fitting of cockpit door on pilots side. Lower swing arm was replaced with aluminum tube and rod ends. Later the attach point on the canopy frame was beefed up using plywood and phenolic and the tubular swing arm replaced with a simple aluminum bar.



View from front shows open position of the cockpit doors. Also note the fiberglass wrap on the outside of the door frame that is the stiffener to hold the shape of the door, both when open and closed.

Inside glass on forward frame sections is trimmed and frame is attached to the plywood stiffener frame with flox and pressed agains the cockpit opening frame for shape. June 2015

Trim and fit upper portion of seat back bulkhead against leading edge of main wing. Once fuselage cutouts around mounted wing are installed, then seatback bulkhead is bonded in position with flox to the leading edge of the main wing and bulkhead is bonded to the fuselage with 2 BID per plans. March, 2015.

Apply micro to area below overhead structure bow, behind fixed windscreen, and below door sill. Then shape foam to match contour of rear of windscreen-to-fuselage transition and base of door frame to fuselage transition. August, 2015

Fill glass with micro and glass 2 plies of BID on foam transition area overlapping onto fuselage and onto windscreen fairing area. Final contour matches door profile on the sill area and matches windscreen fairing. August, 2015

Trim and fair foam and glass edge to smooth sill, then cut 1/16” plywood to match top surface of sill then flox into place to follow sill opening and hold in place with duct tape. Apply identical second 1/16 plywood to build laminated sill, then sand radius on inside and out to prep for 2-ply glass veneer.

Build similar 2-layered 1/16” plywood reinforcements on fuselage forward cutout (later will be upper panel component, and rear limit of windscreen frame. All of these components will be glassed with 2 BID to strengthen and stiffen upper fuselage in the cockpit area, and will structurally support larger header tank capacity.

Reinforcement cores of two laminations of 1/16” plywood on edge of foam. These are rounded and glassed on both sides with 2-BID overlapping onto fuselage shell on the back side to stiffen edge as a T-beam for additional stiffness and strength supporting the header tank (shown fit into position temporarily for clearance).

Entire enclosure of door opening is glassed with 2-BID overlapping onto adjacent fuselage structure. Rear portion of opening is fuselage shell that is rounded and then wrapped with 2-BID tapes that lap onto inside and outside skin to create a rigid, rounded edge.

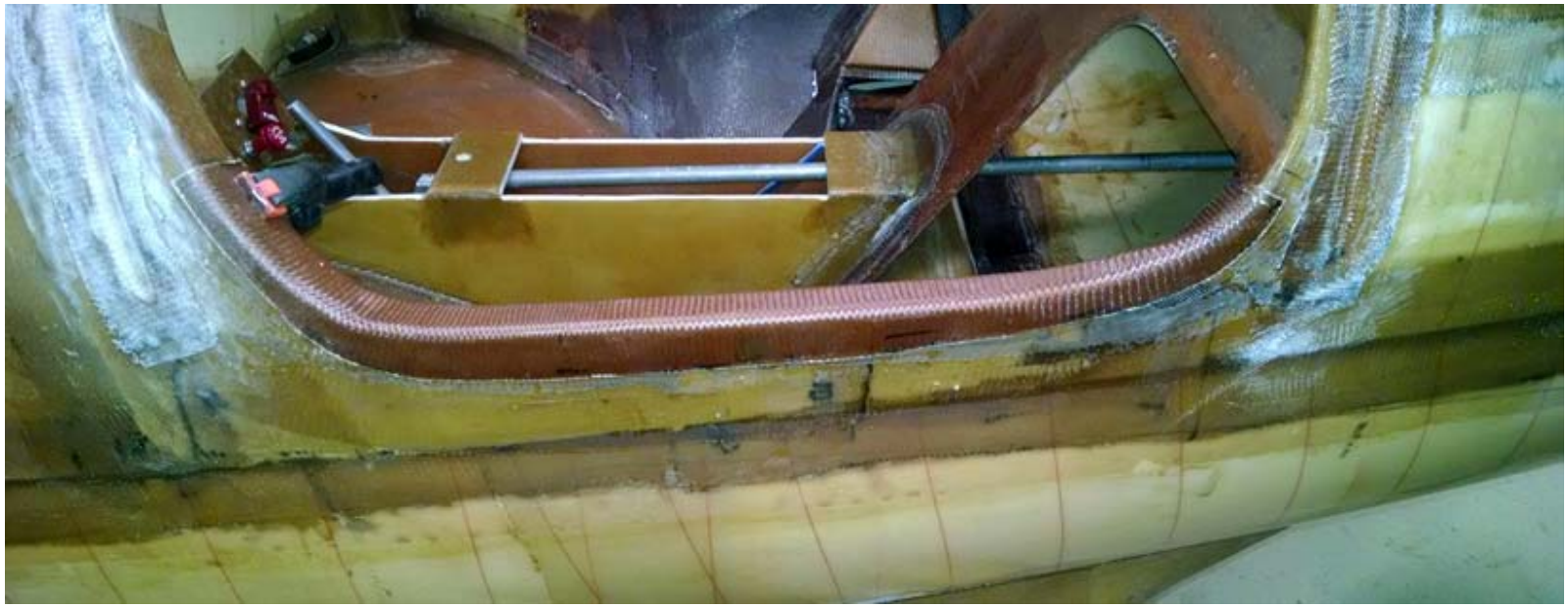
Peel ply is applied around the edge transition of layups.
August, 2015

Router is used to form channel through glass and into the urethane foam sandwich continuously around 3 sides of the door opening in order to make a rounded sunken channel for foam-cord sealing the door. Door frames have a matching half-round silicone foam seal that fits into the channel to seal door surround. The channel serves both as a seat to the foam seal and also as a conduit to capture any moisture and channel it away from the cockpit opening and down the side of the fuselage below the cockpit opening level.

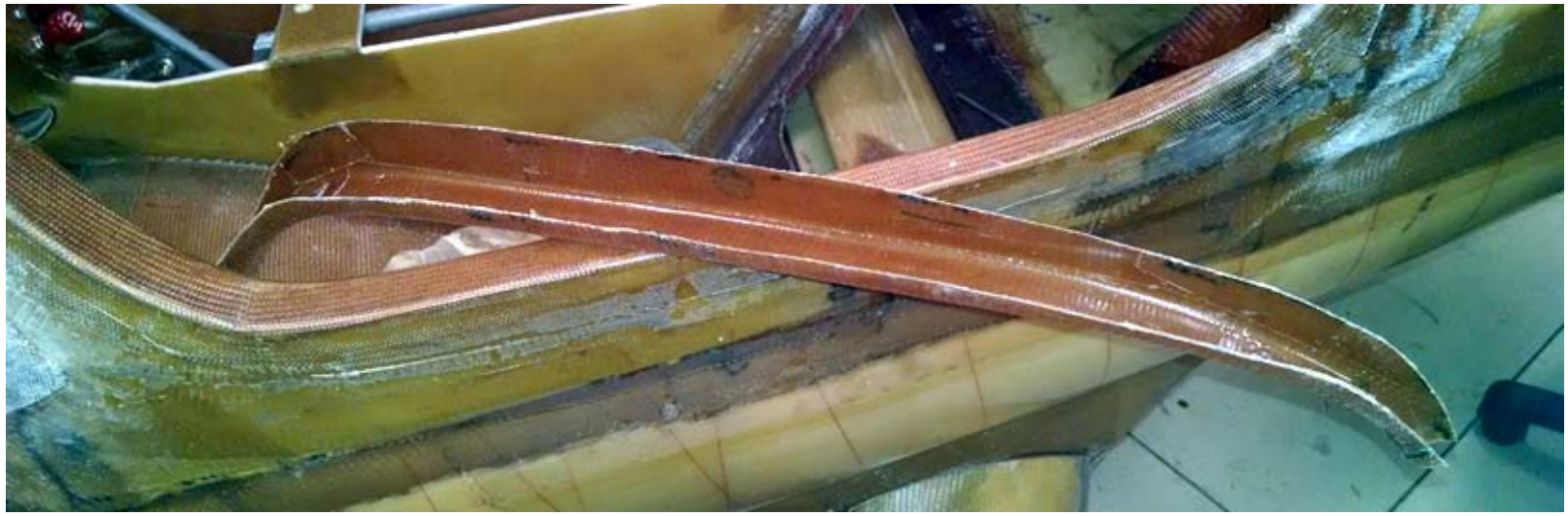
Use router to route channel through glass and part of the urethane foam sandwich all the around 3 sides of the door opening. This channel is cleaned and sanded, then partially filled with micro to make a rounded sunken channel for sealing the door-frame silicone foam seal. The micro is sanded smooth in preparation for glass closeout.

Use router to route channel through glass and part of the urethane foam sandwich all the around 3 sides of the door opening. This channel is cleaned and sanded, then partially filled with micro to make a rounded sunken channel for sealing the door-frame silicone foam seal. The micro is sanded smooth in preparation for glass closeout.

Micro-filled channel is overlain with 2-BID tapes for closeout and strength. The channel geometry is maintained by bonding the BID laminations to the micro in the channel, which has been sanded to a uniform rounded shape and smoothed to give a consistent channel depth. After cure, the 2-BID is sanded and filled with micro to create smooth contour for foam seal. January, 2016.



Door sill is laid over with duct tape as mold release, then 4 plies of BID tapes are laid up over the sill to form a “cuff” that will be bonded to the bottom of the cockpit door. Once in place this cuff will assure alignment and security to the door closure, sealing the cockpit and providing extra strength to the door and the fuselage.



Cuff is bonded to bottom of door frame with flox after trimming frame. Door hinge hardware it attached to the upper plywood doorframe stiffeners, and to the rear of doorframe for trial fitting.

Lip is bonded to rear of door to fit over smooth channel in cockpit surround. With door hinge hardware it to doorframe, trial operation verifies clearance. Further beef up of design makes door and hinge system more sturdy. March, 2016

Lower door swing arm mount redesigned for security and strength, cut from ¼” phenolic and mounted to plywood mount on rear of door with flox and 2 BID.

Silicone seal tape is temporarily laid into channel and duct tape laid over to create a mold for laying up final plies in outer door frame. Flox pressed into the relief created in the tape creates a fit form for bonding the sealing foam so as to exactly matche the the door surround.

Door frame is laid up with 3-BID for stiffness, trimmed to fit door surround, door handle is shaped from plywood, glassed with flox fillet where it meets the door frame, and 3 BID top and bottom lapping onto door frame for strength. May, 2016.

Door frame is layed up with 3-BID for stiffness, trimmed to fit door surround, door handle is shaped from plywood, glassed with flox fillet, and 3 BID top and bottom. May, 2016.

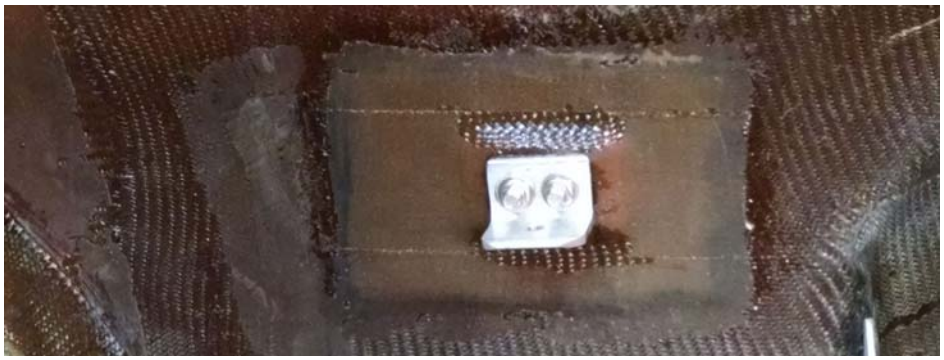
Door frame is is filled with micro and contour sanded. All fit and function is verified. Inspected by Jay Scheevel, May, 2016.

Silicone half-round foam is bonded to frame in flox channel using clear silicone. Fit into channel on door surround is verified. Creates a good seal all around. All fit and function is verified. May, 2016.

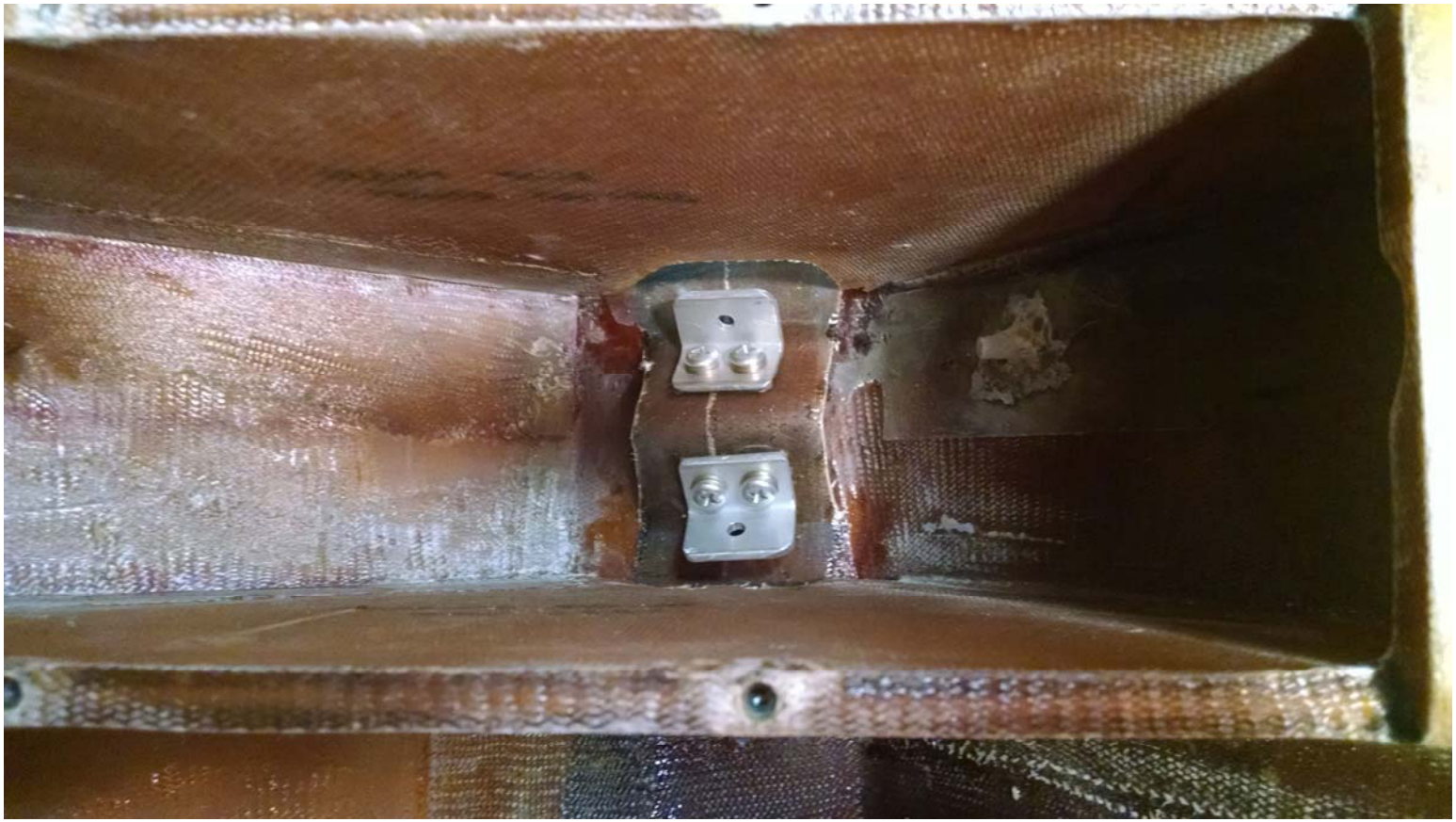
Install door latch mount blocks (phenolic floxed in place) on both door sill and door frame, align and install, verify operation (over center locking latch). July, 2016

Fabricate and install 1/8” aluminum plate upper door latch hardware on door frame stiffeners. T-handle plunger fits into mating phenolic block that is floxed to rear windscreen reinforcement. The T-handle pulls to open and locks open with half turn. Open position is shown in photo. July, 2016. Additional knob-pull plunger is installed into overhead structure side rail (not pictured). This plunger locks into ¼” aluminum block installed on swing over arm (upper door hinge arm).

Build plywood side and center seatbelt mount per Q-2 plans and bond onto side panel and center floor section per instructions and layup schedule in section 14-5 and 14-6.



Cut drill and mount aluminum angle seatbelt mounts, both side and center section with hardware per Q-2 plans section 14-6. After mounting center hardware, close out ends of “tent” per pans



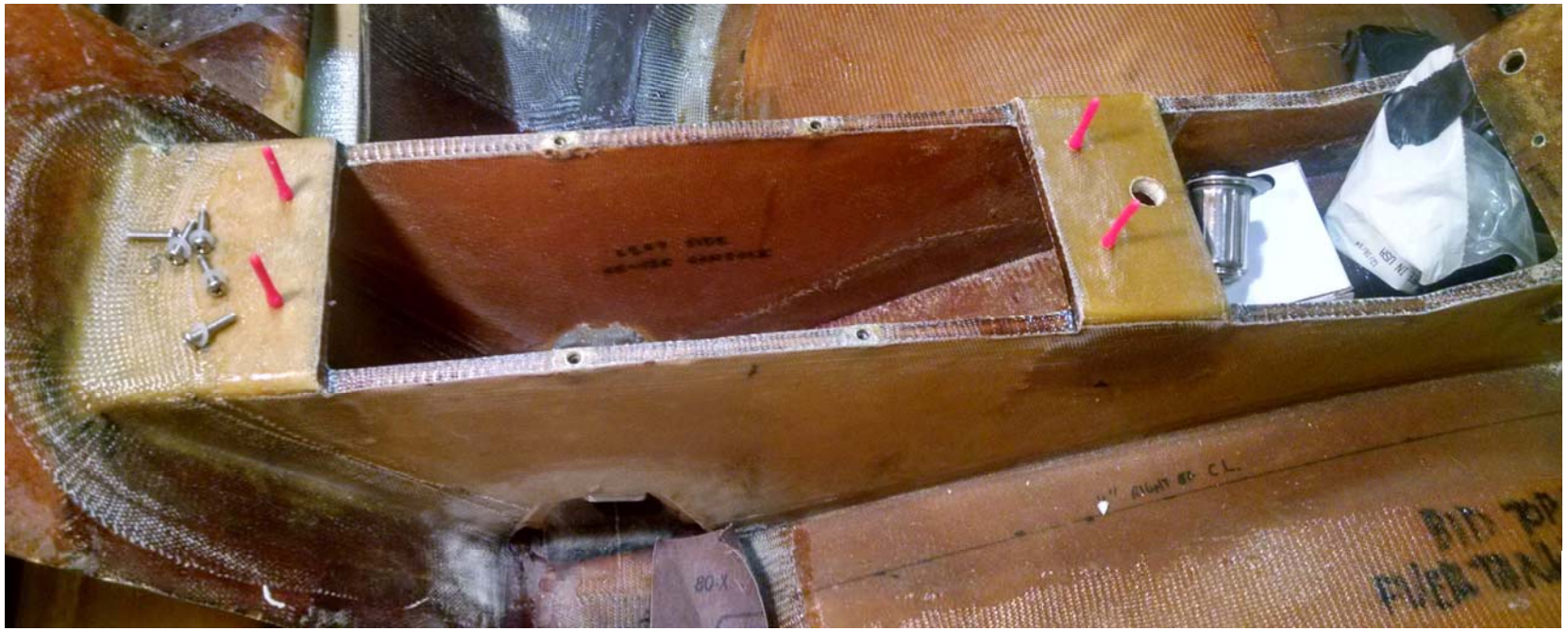
Design, cut, build reinforcement from wood dowels, then glass openings in seat back bulkhead for pass-through of shoulder harness from mount on main wing. Build mount bushing and test mount should harnesses to verify fit and function.

Trim and fit previously made side consoles. June, 2016

Glass lower console panel to main tank, fuselage and seatback with 2 BID.

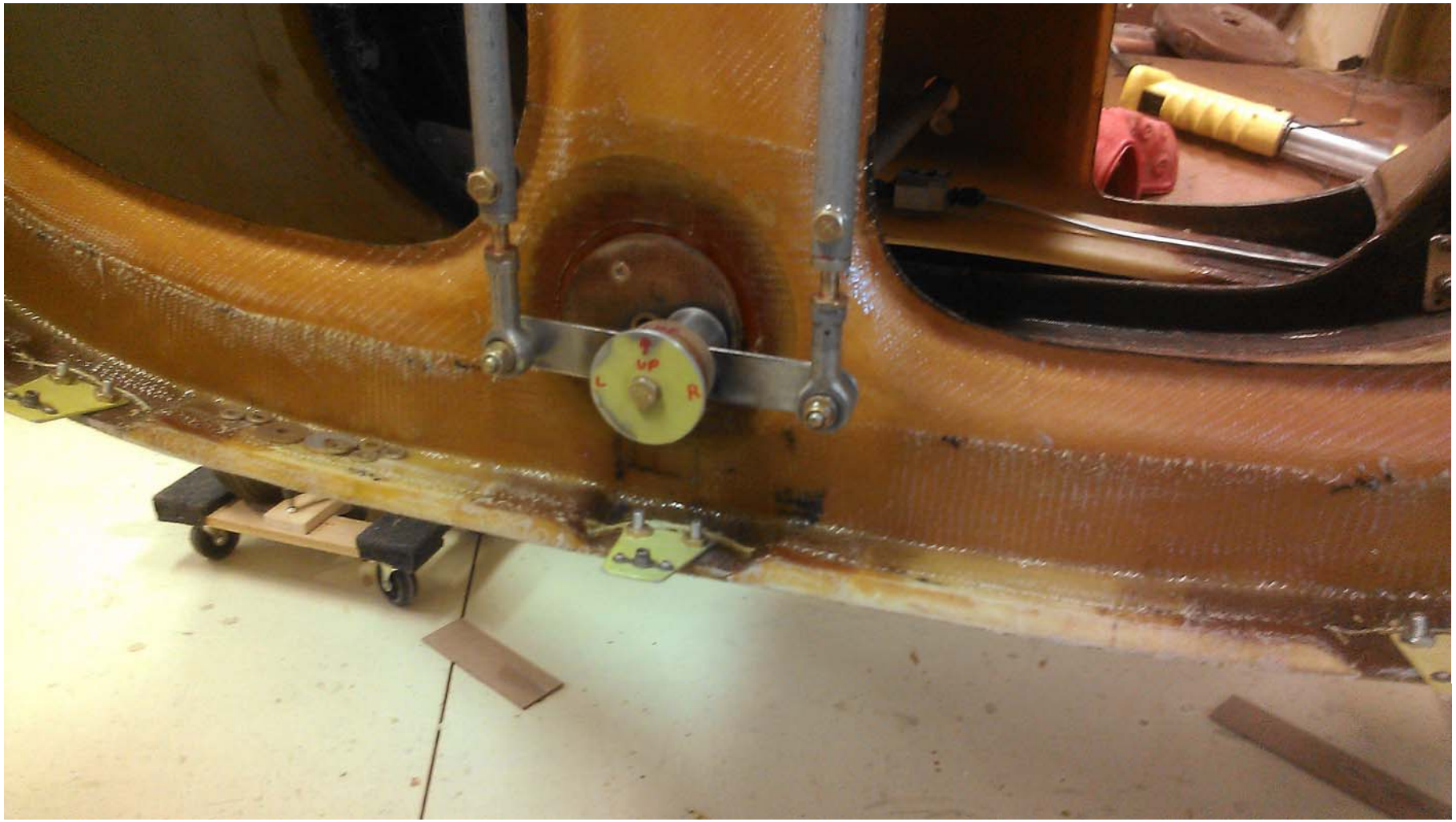
Make form to layup mounting flange for top of console, layup 2 BID lapping onto fuselage side, then trim, drill for mounting hardward and install blind sealed nutplates (ClickBond)

Install blind sealed nutplates (ClickBond)



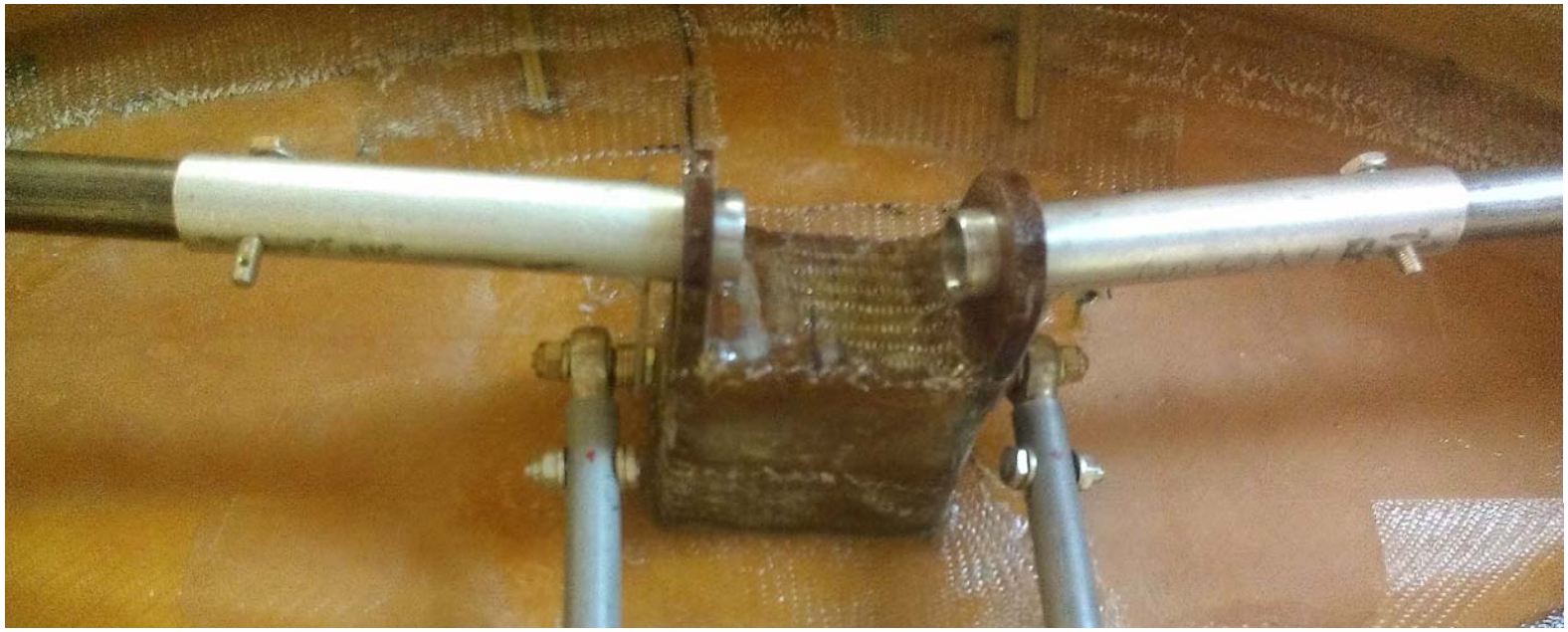
Layup console tops with 2-BID lip overlapping lower side consoles and hardware mount points (8-32 blind nutplates), trim edges, then mount in place to test for strength and security. All OK June, 2016.

Reinstall fuselage cutouts around main wing with flox, then fit FS 94 bulkhead against main wing shear web with flox, then fill gap of FS 94 with fuselage with 3/8” urethane, floxed in place then bonded with 2 BID per Q-2 plans. Also bonded with 2 BID lapping onto vertical rails on overhead structure and 2-BID overlapping onto wing surface .



Fabricate and install 5/16” phenolic “donut” into FS94 bulkhead with flox and 2-BID surround lapping onto donut and bulkhead skin, front and back. Fit reflexor core into donut with Teflon bearing tape around perimeter. Pulley on rear and aluminum sheet retainer on front side hold assembly in place.

View on left shows pully on rear side of rotating assembly and sheet aluminum on the front side of the assembly to hold the rotating component in place. A bushing is on both the front and the rear to square up the torque tube to the assembly. Oilite bronze bushings fit between the bushings and the reflexor assembly to reduce friction and wear.



Fit aileron bellcranks, drill for hardware. Fabricate pushrods adjust rod end length and test full range of operation.

Fabricate and install aluminum mount tabs with nutplates for installation of tail cone, per Q-2 plans section 18-1, 18-2. Mount with 10-32 fasteners and locking nuts

Fabricate removable reinforced plywood panel that fits tail cone attach tabs for secure hoisting rear of fuselage and also for tie down to trailer for transport (anchor loop).

Removable reinforced plywood panel that fits tail cone attach tabs shown in use on custom transport trailer.

Overwing access is through holes built into vertical portion of seat back bulkhead. The lower portion of this opening is partially closed with 1/8” plywood that extends up from original glass to glass opening by about 2”. The plywood is floxed into place and then reinforced with 2-BID plies on the front and back. Backside plies lap onto wing top surface. This leaves a rigid 2” lip on the front of the overwing access to retain items placed in that space. A headrest will be fashioned from plywood and foam and will be fastened through this rigid panel on both the pilot and passenger sides.