HINTS FOR FEATHERLITE STRAKES

By John York:

I recently finished installation of the Featherlite strake kit. The quality of the Featherlite parts was outstanding, they were much easier to install than the plans or Task versions (so I'm told) and the final result looks great! I would not do the strakes any other way. My only complaint was about the instructions that came with the kit: a half-sheet of paper with 11 short sentences and a fourth generation Xerox of Doug Shane's Canard Pusher article (CP 54 pp 7, 8).

This article will walk you through the steps I took in my installation. CAUTION: This is not the only or maybe even the best way to go. It worked for me, but my plane hasn't been proven in flight yet. You're free to come inspect my plane if you'd like, though. Please read the plans whenever they are referenced in this article. This article is meant as a guide, and should not be used to replace the plans.

1. Read chapter 21 of the plans thoroughly. You won't always be doing things in the same order as the plans call for, so it's important to be familiar with what has to be done so you won't skip something. I forgot to drill the vent holes in the void space outboard of the fuel tanks, for example. Also read all the applicable CP articles: CP 54 pp 7,8, & 12 Doug's article, CP 50 pg 3 & pg 9 description, PVA removal CP 40 pp 7,8, procedure for installing the tank tops without leaks CP 25 pg 5, RB45 and RB23 parallel to B.L. CP 30 pg 7, have wings on to get good fit CP 31 pg 4 & 9, no flox on filter screen, photos CP 34 pg 4 auto gas caution, CP 27 pg 9 second vent line in each tank, CP 48 pg 3 & CP 35 pg 6 & 7 fuel leaks, CP 36 pg 6 & CP 37 pg 3 & CP 38 pg 4 & 7 CP 55 pg 3, 4 & 8 refueling fires, and tank grounding. This is not an exhaustive list of all the CP articles. If you don't have Stet Elliot's CP Digest, by all means get one--its a lifesaver! (Stet Elliot, 5322 W Melric Dr., Santa Anna, CA 92704, (714) 839-4156. Cost is $67, update subscription is $25/yr.)

Protect the pretty white foam on the strake leading edges with clean paper and masking tape. It takes a while to get the strakes finished, and by the time I was ready to glass the outside skins, the foam looked pretty ratty. It worked OK, but made me feel bad until the skins were laid up.

Be careful of the sharp edges on the leading edge glass. I got several paper-type cuts by rubbing up against them.

2. Mark a line on your fuselage at FS 50 (10" aft of the instrument panel, which is FS 40) and mark the centerline BL 0 on your front seat so you'll have a reference to find BL 23 (where the leading edge jink goes.) The jink in the centersection spar is also on BL 23. Layout the lines on the fuselage sides for the cutouts (21-1,2 step 1, inside AND outside lines). Trial fit the strake leading edge to the fuselage to see that it matches your cutout, and mark the forward edge of the cutout so it will be round to match the strake. If everything looks good, cut the big holes in the fuselage sides. I used a sabre saw to cut a slightly undersize hole and then sanded it to the line.

3. Trimming the strake to length: I did this with the wings attached and had a little trouble. The strake is supplied too long, so you can trim it to fit. When you hold the strake against the airplane the outboard end hits the wing, so the outboard end is rotated forward. This makes it hard to find the proper angle to trim the ends of the strake to length. Once mine was trimmed to length, the outboard end rotated aft to where it should be and I found I'd trimmed 1/2" too much off of the inboard forward corner and about 1" too much off the outboard aft corner (fig 1).

I repaired my error in cutting the leading edge too short by adding a small urethane fairing block at the outboard end after the leading edge and ribs were taped in place. This was done before the outside skins were laid up. On the inboard end, once I had the BID tape in place that joins the inside of the leading edge to the fuselage cutout, it was easy to fill

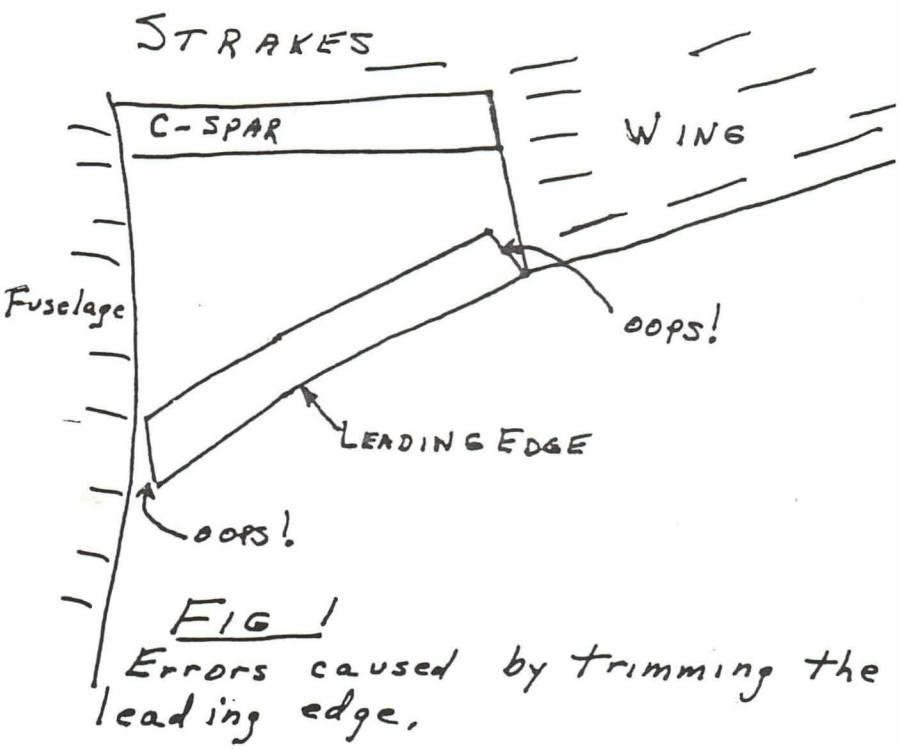


FIG 1
Errors caused by trimming the leading edge.

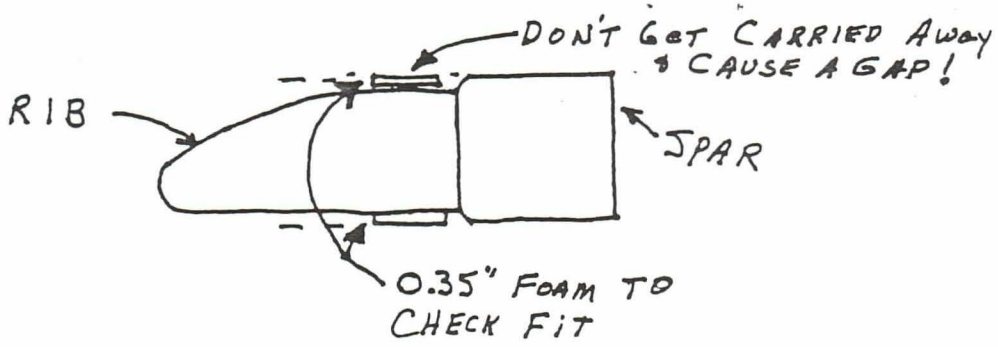


FIG 2

the void with pour-in-place or dry micro and sand it to fit.

4. Trial assembly of the leading edge: You'll use Hot Stuff to glue everything in place so you can trim the ribs to fit. I thought about trying to omit the trial assembly to save time, but was later glad I didn't. Trying to trim the ribs while everything is goopy with epoxy is not fun. Also, the final assembly with BID tapes takes a long time even when everything fits. The thick version of Hot Stuff, Super-T, with Hot Shot accelerator works great! (CP 43 pg 5) Much, much better than bondo, tape, 5 min, or anything! It's an absolute must for this job. You only need to use small little glue spots, so there won't be much glue to remove later on. (Aircraft Spruce 1989 catalog, page 33)

I chose not to use the jig table called for in the plans. My theory was that if I properly matched the leading edge to the fuselage and the wing and used straight boards to keep the aft edges from scalloping, the middle would take care of itself. Also, some of the glueing and BID tapeing was easier to do from the bottom. I talked to one builder who used the drawings in the plans appendix (A 14) to mark WL 17.4 on the ribs so he could use either use the jig table or measure down to his very level floor. My method worked OK for me. I don't know which way is better.

As a rule, most of the rib trimming was done where the ribs meet the centersection spar forward face, but most of my ribs were also a little too fat (no matter how much I diet...) I wound up sanding the ribs until the lines made by Featherlite nearly disappeared (check yours before you sand though.) I tried to bevel the forward edges of the ribs to better fit in the leading edge, but I'm not sure it was worth the effort. It was hard to get a really good fit and I found that dry micro did a good job of filling the voids anyway.

Hot Stuff the inboard end of the leading edge to the fuselage and temporarily tape the outboard end to the wing so it mates properly. Now trim the outermost rib (it's the extra rib Featherlite supplies that's not in the plans version.) I chose to put the rib about 1/2" inboard of the end so I could put BID tapes on both sides. Use a scrap piece of 3/8" H45 foam to check that you'll have a good match between the top/bottom skins and the centersection spar (fig 2). You may have to sand the top and bottom of the rib to get this. I made sure that if I erred, it would be in the direction that would cause me to sand the skin foam to meet the spar (easy) instead of having to fill a low spot (hard). When the outboard rib fits well, Hot Stuff it to the spar and to the leading edge. Use a magic marker to mark where it fits into the leading edge and spar so you can reassemble it later.

5. Trial assembly of the ribs: Hot Stuff or clamp straight 1x3 boards (hardware store aluminum angle might work better since it's lighter) to the aft part of the leading edge, top and bottom. The bottom part is straight (vertically) from the wing to the fuselage so it can be one piece. Support the board by Hot Stuffing it to the fuselage, and by putting a board "leg" to the floor at the outboard end. On my strakes the top part has a bend in the vertical direction at the BL 23 jink so I just used a straight board from the wing to BL 23.

I chose not to use the added supports called for in the Featherlite instructions. I found that if I used the straight edges and was careful in fitting the ribs, I didn't have scalloping. When I tied to force some ribs that didn't fit I got scalloping, so I took it all apart and did a better job to get rid of the scalloping. I asked Michael or Larry at Featherlite about this and he said the added supports were in there to give some margin for Grandma. If you put in the added supports, they recommend using H45 foam with one ply BID on each side (layup one big piece and cut it up, or use the scraps you cut off the ends of the ribs.)

Measure out 45" from the spar centerline to locate BL 45 on the spar and mark it. Do the same thing for the leading edge (remember that R45 will be parallel to the aircraft centerline and not perpendicular to the spar.)

The OD rib is next. The front end of it goes just outboard of the BL 45 mark (so there will be room for the R45 rib) and I wasn't sure where to put the aft end. On my right strake OD met the spar right at the outboard rib and on the left it was halfway between BL 45 and the outboard rib--mostly a function of where I could get a good fit. The OD rib requires quite a bit of cutting and sanding to fit. Again, use the foam scrap to see if the skins will fit. When it fits, cut the hole in OD shown on page 18-1, Hot Stuff it in and mark where it goes on the spar and leading edge.

Now trim, Hot Stuff and mark the R45 rib using the same procedure (except no hole like OD has--it's your fuel tank wall.) On R45 and R23 I only

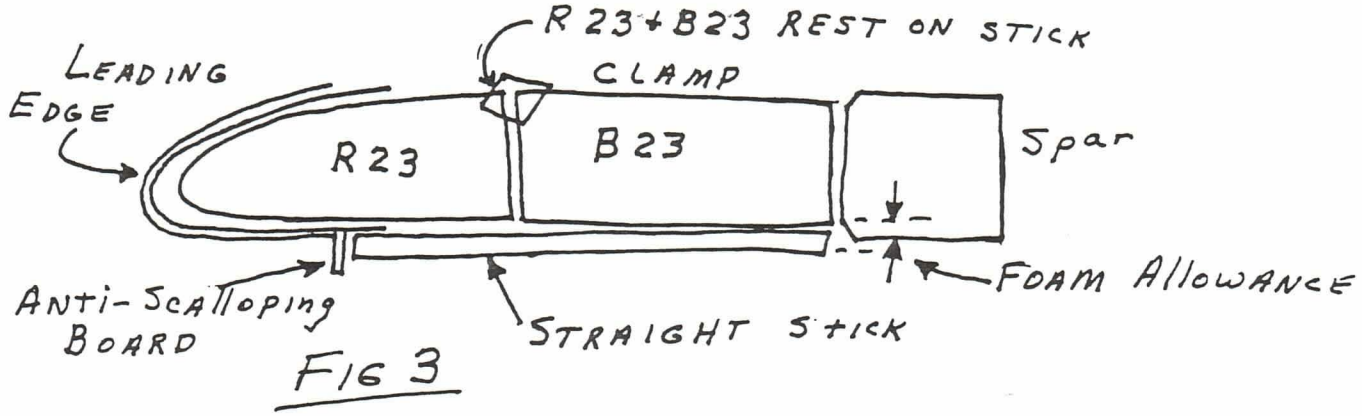


FIG 3

worried about the fit of the bottom skin foam. These ribs are easy to get at, so I waited until everything was permanently taped in place and then sanded the tops of R/B23, BAB, DB and R45 to get a good fit for the top skin.

The R23 & B23 combo was a little harder--it would have been easier if they were one piece. I cut a small, straight piece of plywood and Hot Stuffed it to the bottom of the leading edge and the spar, along the line of BL 23. This showed me where the bottom of B/R23 should be and gave them something to rest on. Remember to leave an allowance for the bottom foam skin (fig 3). Use spring clamps to hold R23 and B23 together, then trim, Hot Stuff and mark as before. You should have a nice, straight line from the wing inboard edge to the jog in the spar at BL 23 and along B/R23 (well, mine was almost straight.)

6. Trial assembly of BAB and DB: BAB goes between the R23-B23 joint and the aft end of the fuselage cutout (see page 21-7). BAB and DB both have a top and an inboard side, so be careful to observe the proper orientation. When you install BAB, remove the stick along BL 23 and use a long straight edge to be sure that the bottom of BAB and all the ribs make a straight line from the fuselage cutout to the wing. Hot Stuff BAB in place. Do DB the same way.

7. Destruction of your beautiful handiwork: Be sure you've made plenty of marks on the spar and the inside of the leading edge so you can reassemble everything. Marks on the ribs don't do much good, since they'll disappear when you tear off all the peel ply before final assembly. Take some photos, take a deep breath, sigh, and then disassemble the leading edge and ribs.

8. Prepare for assembly: Every rib and bulkhead has peel ply on both sides. REMOVE ALL PEEL PLY FROM BOTH SIDES OF ALL BULKHEADS AND RIBS. Remove the Hot Stuff from the spar and leading edges. (If you want to remove it using your Dremel and sanding drum, be VERY careful. The glue emits a terrible, acrid gas when sanded, probably a cousin to what they use to kill people in gas chambers.) Wash the inside of the leading edges with soap and water to remove any PVA. Sand the areas where the BID tapes will join the ribs to the spar and leading edge, and scuff sand the inside of the leading edge between R23 and R45 to prepare for the epoxy paint job that prevents fuel leaks. Also sand the aft 1" of the bottom part of the inside leading edge; this is where the tape to hold on the bottom skin will go.

9. Put the outboard rib into the leading edge: to make it easier to jig the leading edge to the airplane, I chose to permanently install the outboard rib in the leading edge and let it cure while everything was sitting still on the table. Paint a light coat of epoxy on the rib and inside the leading edge where the BID tapes will go. Coat the foam edge of the rib with a good bead of dry micro and squoosh it into the leading edge. Hold the rib in place by drilling small holes and sticking nails in them. Make sure you have a nice fillet of dry micro in the rib leading edge joint (the round end of a tongue depressor works well for this.) Lay a one ply BID tape into the joint, both sides. If you have a large void and the micro tends to run out, just lay up a tape on one side of the rib. Let it cure for a couple hours so it won't move on you, and then pack the void with micro and layup the tape on the other side. (The tin foil or Visqueen technique for BID tapes (CP 38 pg 5) is the only way to go. Eric Davis tells me he also puts a layer of Visqueen on top of the layup so he can squeegee it better and then cuts the tape with a "pizza cutter" rotary cutter. I did not bother to peel ply the tapes that weren't in the baggage area, although I see now that CP 29 pg 8 says I should have.) Anyway, let this cure.

10. Install the leading edge on the airplane: I taped the inside leading edge to the fuselage cutout and the outboard rib to the spar and then let it cure. That way the leading edge was held firmly in place when I installed the rest of the ribs. Be sure to peel ply the tape on the fuselage end--it's part of your baggage compartment. (I used the standard foam preparation and flox corner techniques for the tape over the fuselage cutout. Terry Schubert tells me that any sharp corner of fiberglass will quickly saw a hole in your arm while flying. Instead of the flox corner, I should have sanded a generous radius on the inside edge of the cutout and glassed that.) Hold the leading edge in place until cured, with nails, 5 min, Hot Stuff (if you left a small dry place for it), or whatever

works.

11. Install the rest of the ribs: Put the straight edges back in place along the aft part of the leading edge, top and bottom, and along BL23 on the bottom. Reassemble the ribs just like you did before, being careful to leave the right amount of space for the bottom foam skin. Use a straight edge in the spanwise direction to check that the rib bottoms are in a straight line. Tape all the ribs in place the same way you did in step 9, above. Let it cure.

12. Cut the foam for the top skin: Put the foam sheet on top of the strake and butt the long edge up against the fuselage. Put the end of a ruler up against the fuselage and firmly hold a pen at the 1.5" mark (or whatever's needed) and trace the line of the fuselage curvature onto the foam. Cut the foam along this line and it should fit the fuselage nicely. I used a yardstick and an eyeball to cut the forward edge of the foam to match the leading edge (remember the kink at BL 23.) Once this was cut to fit, I weighted the foam in place, climbed under the strake and used a steel rule pressed up against the forward face of the spar to scribe a line in the aft edge of the foam. NOTE: this line is NOT the aft edge of your foam, it is where the bevel starts! (See page 21-2 section X-X, and pg 21-6 section A-A.) Measure 1" aft of the scribe line and make your cut. Bevel the edge as shown in section X-X, removing foam from the side with the scribe line. Check which side to bevel by putting the foam on the strake, if need be. I beveled the wrong side once, and I was NOT HAPPY! Use the scraps from the big piece of foam to fill in the outboard end of the strake and the little hole at the forward inboard corner.

13. Use the same technique to cut the bottom foam skin, except that its more awkward. Hold the foam in place with boards along the leading and trailing edges, and board legs down to the floor. Cut the 1 1/4" hole in the foam where the finger strainer will go (21-3 step 4, section H-H, and page 21-7). Make the hole somewhat oversize so you'll have room for the glass to glass bond shown in section H-H.

14. Even up the top ribs, if necessary: My ribs were too fat so I sanded them down so the top foam skin would match the spar. Note that the tops of R23 and R45 are not flat, but still have a little curvature. Use a ruler, your eyeball and trial fittings of the top foam skin to get a nice fit. Again, sanding some of the top foam skin is easier than trying to fill low spots.

15. Paint two thick coats of epoxy in the leading edge between the R23 and R45 ribs, and on the ribs only where they are inside the leading edge (don't paint where your BID tapes to the bottom skin will go or else you'll have to sand it.) This area will be a little more awkward to paint once the bottom skin is on. Paint the first coat and let it cure at least to knife trim before you paint the second. Use a squeegee to push the epoxy into any pinholes (see the CP's on fuel leaks.)

16. Install the quick drain inserts (page 21-3, step 2 and 3). Drill and tap the 1/8-27 NPT in the aluminum insert on your workbench. Park the airplane nose down and toss a marble in the leading edge. Where the marble stops is the low point. Drill the hole through the leading edge from the inside (its awkward, but every time I tried from the outside, I missed.) Dremel away foam on the outside of the hole until the insert fits. Put the 1/8" NPT plug in the insert and then flox the insert into the strake (I used flox so the insert wouldn't pop out if I had to re-tap it.)

17. Lay up one ply BID on the inside of the top and bottom skins (the inside has the bevel on it.) (In the original plans this is done in steps 3 and 5. I laid up both top and bottom skins with the foam laying flat on my table. The flat skins will require a little extra sanding when they're mounted to the strakes, but this is a lot less effort than heating the foam and building the lumber assembly used in the plans step 5. Mine looked great.) Lay up a two ply UND strip 2" wide on the top skin where the OD rib will go (21-3 step 5, section F-F). The bottom skin is also supposed to get a 2" UND strip, but it may be better to wait until the bottom skin is taped in place so you can lap the strip 1" onto the spar and up inside the leading edge (21-3 step 3.) Make sure you have an adequate overlap area for what will be the 1 1/4" hole (page 21-3 step 4 and section H-H. A piece of peel ply under the hole will save some sanding later on.) I chose to peel ply the entire layup. My theory was that it would help prevent fuel leaks, and also I wouldn't have to worry about sanding where the skins meet the ribs, etc. Turns out Colin, up in WI, did the same thing. It took me two rolls of 3" peel ply to do these layups and (later on) the outside of the leading edge.

18. Prepare to mount the bottom skins: Check the fit of the bottom skins to the strakes, and sand the ribs and skin edges as necessary. REMOVE THE PEEL PLY FROM THE BOTTOM PART OF THE STRAKE LEADING EDGE. REMOVE THE PEEL PLY FROM THE BOTTOM SKIN. Sand the fuselage where the BID tapes will join it to the bottom skin. Sand the beveled part of the spar where the bottom skin will mate, and 1" up the spar forward face for the BID tapes. Hot Stuff several small pieces of wood to the fuselage along the line that marks the OUTSIDE edge of the bottom skin--these will keep your skin from sagging at the fuselage. Cut the lumber and practice bracing the bottom skin in place (see step 19 below.)

19. Mount the bottom skins: This step takes a while. I wouldn't try to do both sides at once unless I had a lot of help. Double check that the peel ply has been removed from the outside bottom of the leading edge. Paint a light coat of epoxy on the bottom skin everywhere it will mate the ribs, leading edge, spar and fuse-

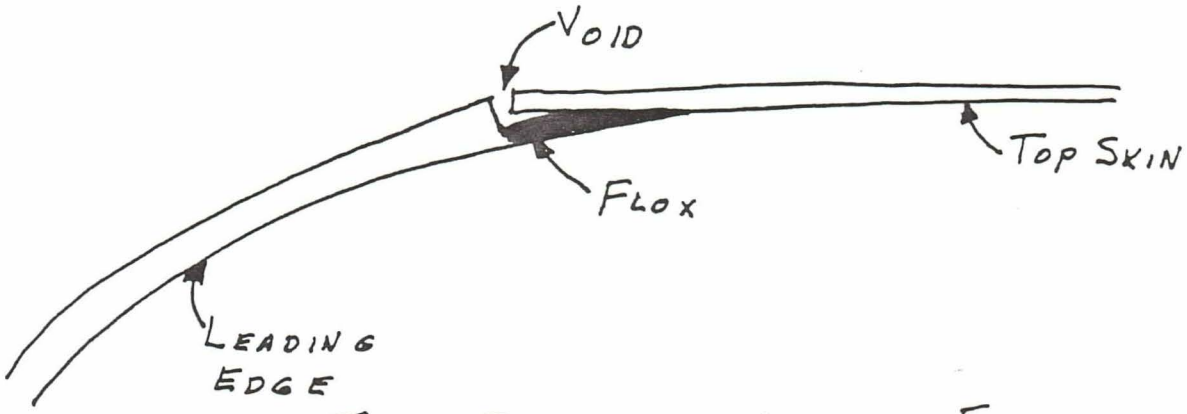


FIG 5 – TOO LITTLE FLOX AT TOP SKIN JOINT WITH LEADING EDGE

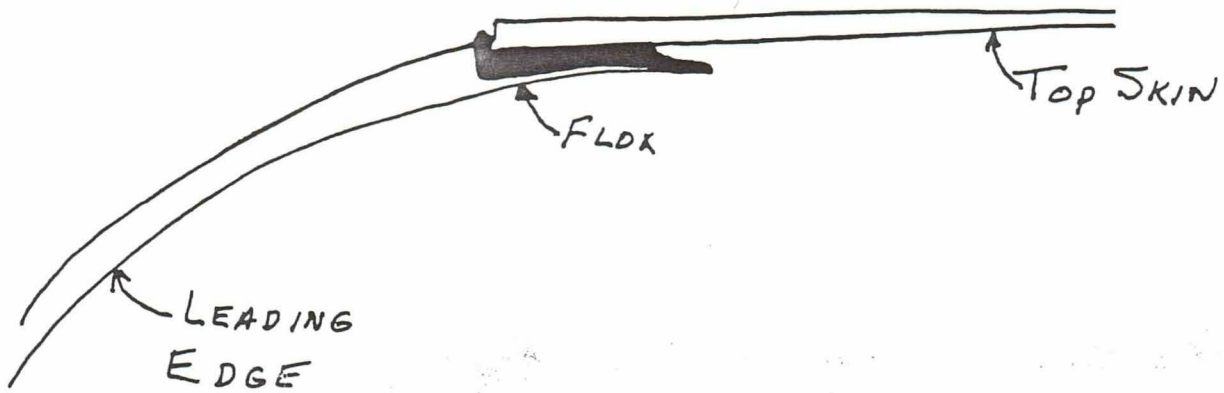


FIG 6 – TOO MUCH FLOX

fuel leak along the junction of the top skin and the leading edge (see fig 5). I wanted to avoid this so I really loaded that area with flox in the hope that the excess would squeeze out leaving a perfect fit. What I got was fig 6, which is why I recommend using light coats of flox and doing it a couple times. You could use sheet metal screws (cleco's might get flox in them) to hold the top skin on for cure, but when you removed them you'd have to repair the holes in your fuel tank.

28. Last chance to work inside the tank: Sand any flox overflows or excess flox from step 27, above, so you don't have to carry extra weight with you. Sand the tops of the flox for bonding. Sand the fuselage sides (top longerons, actually) for bonding. Thoroughly clean/vacuum the tank, and the sumps. Paint the two coats of epoxy (standard fuel leak prevention procedure) on the tank bottom, fuselage side, spar forward face, R45, R23 and BAB. I only painted the tank interior walls (only the inside face of BAB, for example) and did not paint the baffles, except: paint all the bare foam where the holes are cut in the baffles. Install the screen per plans step 4, page 21-3 (Gary Holmes gave me the idea of using the screen from a tea strainer instead of screen-door aluminum. It has a finer mesh and is made of stainless.)

29. Glue the top on: TAKE THE PEEL PLY OFF OF THE TOP SKIN. Cut a 2" wide BID tape from dry glass (NO epoxy, yet.) Lay up this tape along the top skin, inside, where it will join the fuselage, but leave the 1" of BID that hangs over the edge DRY (see step 5, page 21-3.) Let the BID tape cure for 2-4 hours (4 is probably better.) Paint epoxy on all the mating surfaces of the inside skin and put a good coat of wet flox on the tops of the ribs and leading edge. Don't paint any epoxy on the fuselage where the dry BID tape will go--it's easier if you do that after the top is on. (I had NOT left part of the BID tape dry and had also painted epoxy on the fuselage sides. The BID tapes stuck to the fuselage sides as I was putting the top on, and came off of the top skin--a real mess.) Put the top on and weight it in place. Now paint epoxy on the fuselage side and lay up the dry part of the BID tape onto it. Peel ply the BID tape since the top skin

lage. Also paint the ribs, leading edge, spar and fuselage mating surfaces plus 1" to allow for the BID tapes. Butter the mating surfaces on the bottom leading edge and the spar with a thick coat of micro, and butter the skin where it will mate the leading edge and spar (Don't be afraid to pile it on thickly, you can squeeze out and remove the excess.) Put the bottom skin in place and brace it with one board along the leading edge and two near the spar (the spar has a bend in the vertical direction at BL 23.) Bondo the legs to the supports and to the floor (see photo.) You may want to protect your boards with plastic wrap or tape, in case squeezed out micro glues them to the skin. (Make sure your support structure is firm--if it falls on the floor halfway through your BID taping, you will not be pleased.) Now reach inside the strake and press down on the bottom part of the leading edge to squeeze out the excess micro. Use one ply BID tapes with micro fillets to permanently join the bottom skin (inside) to everything it touches- fuselage, ribs (both sides whenever you can), leading edge and spar. If you did not put the 2 strips of UND on the bottom skin when you laid them up (step 17 above) put them in now, alongside the OD rib lapping 1" onto the spar and into the leading edge. Be sure to peel ply the BID tapes, especially those in the baggage compartment.

20. Put the fuel lines through the fuselage per page 21-4, step 6 of the plans. I used one of the spring tube benders from Wicks or Aircraft Spruce--when I tried to bend the tube with bare hands I kinked it. I left the tube sticking more than 0.4" out of the fuselage and cut it to length with a hacksaw blade after the flox cured. The 13" dimension on the plans drawing for the distance from the firewall to the tube worked out to be 12" on my airplane, don't know if its me or the plans. While you're bending tubes, this would be a good time to put the vent lines in the tank per page 21-3 step 4. Remember to add the second vent line to each tank per CP 27 page 9 and CP 48 page 3 (I've seen several EZ's spit fuel on the canopy when it gets hot on the ramp because they don't have these.) Lots of folks tie the four vents together with a ply of BID to make one big 4-barreled vent above the canopy--don't do that now because it makes the fuel leak tests harder. Also don't put the screens in the fuel tank yet, so you can vacuum out the sump area just before you install the top skins.

21. Turn the fuselage over: You have to have the wings and canopy removed, of course. I bolted a 1x12 board to the three wing attach bolts on one side. If the board extends past the end of the spar by 18" or so it's easy to put the nose on a foam pad (gear retracted) and turn the plane over. (This idea is in the CP's somewhere, but I couldn't find it.)

22. Prepare the bottom skins for glassing: If the forward and aft edges of the bottom skin have big lumps of squeezed out micro, don't dispair. The Dremel sanding drum makes short work of it--remove the micro until it's at or just below the level of the leading edge skin. You probably have the edges of your skin foam sticking up above the level of your leading edge foam and spar. This is fairly easy to sand to an excellent shape by using 40 grit sandpaper on a sanding spline--make like you're contouring your wings. I didn't have a spline handy so I used a straight 1x4, about 3' long, with a sheet of sandpaper wrapped around the middle. Don't sand with anything smaller or you'll probably mess up the contour. Sand the 4" of the centersection spar and the part of the fuselage the skin layup will lap onto (page 21-4 step 7). Now would be a good time to vacuum the skins clean and lay the UND on the strakes (dry) so you can cut it to approximate size while you don't have goop on your hands. (See page 21-4 step 7 and step 24 below for glass size.) I had small trenches along the skin leading edges where I'd removed excess micro. I had much better luck if I squeegee'd micro in at this stage, let it cure and lightly sanded it just before the layup. When I did it at the same time as the layup I got bubbles.

23. Paint epoxy in the inside of the fuel sumps and on the fuselage side where the sumps will go. Standard fuel leak prevention procedure: paint one coat and squeegee out pin holes, let it cure to knife trim or so and do it again. I did this just before I started the skin layup (next step.) The layup took long enough that the first coat was tacky and ready for the second coat when I finally got to installing the sump.

24. Layup the bottom outside skin and sump per plans page 21-4 step 7. It doesn't say how to handle the bottom and top skin overlap for the Featherlite kit. I stopped the first (parallel to tank leading edge) ply on the bottom leading edge where it was still fairly flat. The second (fore and aft) ply went almost all the way around the leading edge (see fig 4). The final result will be three crossing plys of UND on the leading edge. Peel ply the area of the leading edge shown in the figure, which is almost the whole thing (3" peel ply helps here.) I had some slurry on the leading edge foam past where the glass ended--I put peel ply on that too, and it worked fine. Remember to lay up the third UNI ply--a 5" wide strip that goes over the skin over the OD rib. Wait! Don't forget to install the sump blister (per plans) before the glass cures! Peel ply the blister's tapes and where then skin layup laps onto the fuselage.

25. Cut the 1 1/4" hole to size after the skin has cured. Do this before you turn the airplane right side up. That way the debris falls on the floor and not in the sump. Stuff a rag in the hole and turn the plane right side up.

26. Get ready to close out the tanks: Make sure your vent lines are installed and clear, and that the hole in the spar forward face (for the inboard wing attach) has been filled with a foam plug and patched with two ply BID. If you want, you may wish to

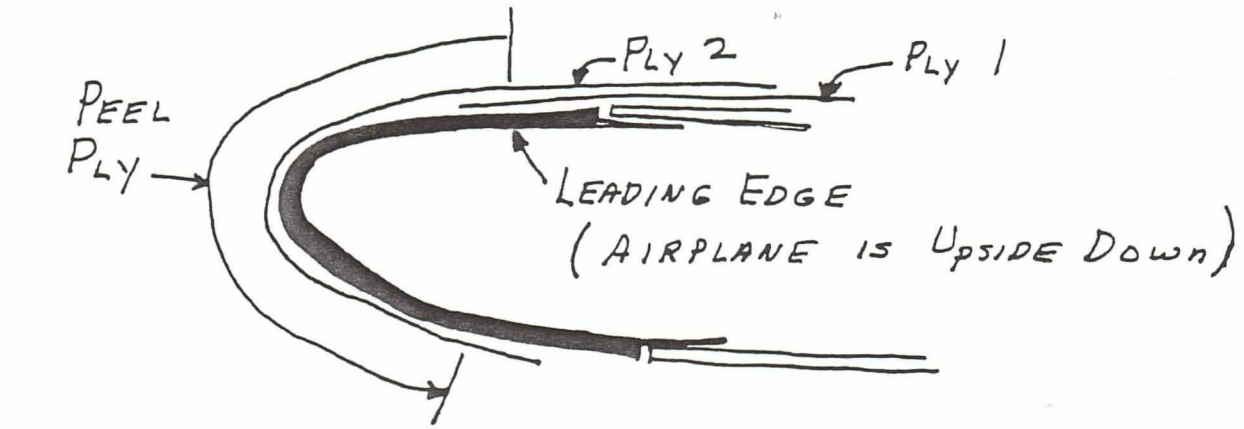
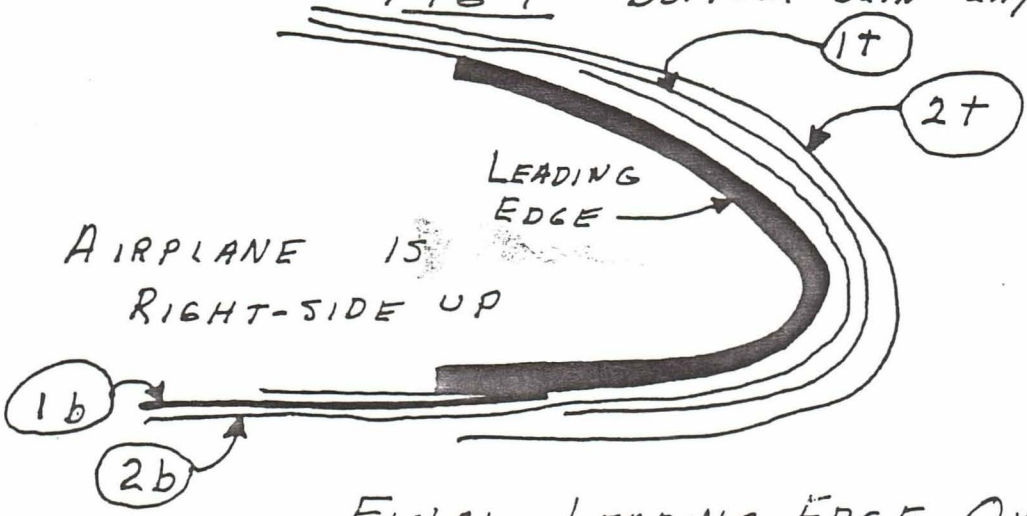


FIG 4 BOTTOM SKIN LAY UP



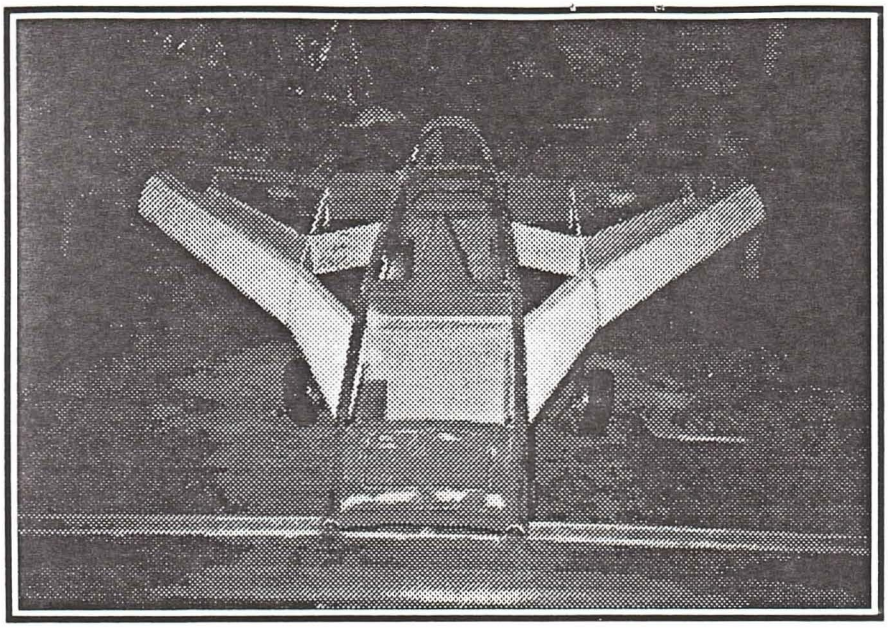
FINAL LEADING EDGE OVERLAPS

1t - top skin ply 1. 1b - bottom skin ply 1.
2t - top skin ply 2. 2b - bottom skin ply 2.

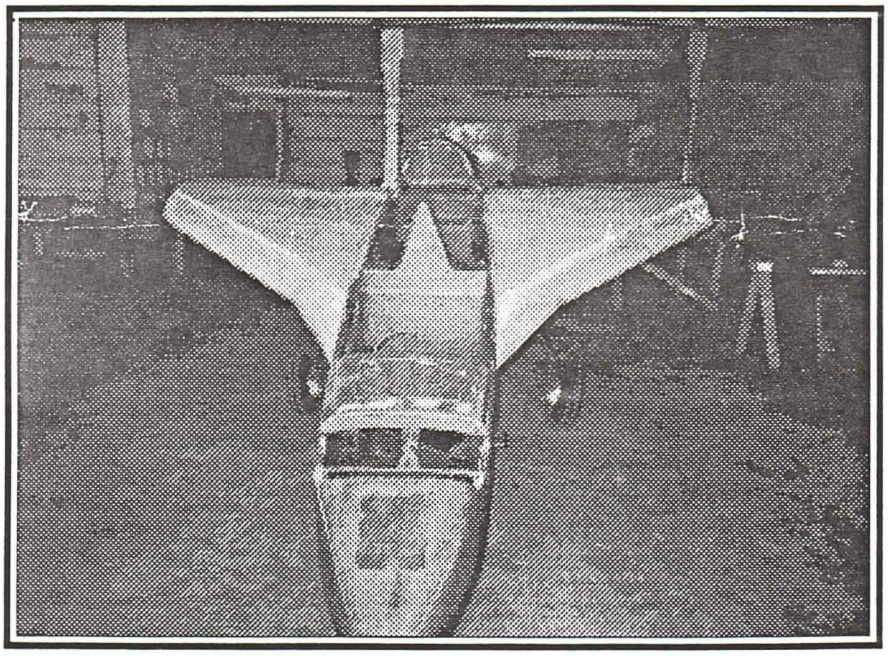
make windows in the baggage portion of your strakes so the backseater can see out. Now is the time (the windows were highly recommended by EZ backseaters, Jan Schubert for one. The windows cost me about 2 lbs and two days work. I'm pleased with the result. Drill the vent hole through the bottom skin near OD as shown in page 21-5 step 10 and page 21-7.

I also chose to install low fuel warning switches from Wicks '90 catalog page 226. I just read CP 55 pg 8,9 about Defiant float switches sinking in AVgas and wish I'd thought to test mine before I installed them. The switch has a 1/4" NPT threaded end. I made a hole in the forward face of the spar that was just barely big enough to get the thread started. Then I coated everything, the hole and threads with flox, screwed it in, and then put more flox around it for a good seal. In my location (spar forward face next to the screen, about 1" up from the bottom) it will activate at different fuel quantities depending on pitch angle/airspeed, but all I wanted was a warning "Switch tanks NOW, fool!"

27. Trial fit the top: This follows the procedure in CP 40 pg 7,8. Hot Stuff small wood blocks to the fuselage sides (in the area that will be baggage compartment) along the line for the inside top skin, to prevent the top skin from sagging, just as you did for the bottom skin. (If you want to do the same thing on the fuselage part of the fuel tank, remember that your supports will be a permanent part of the tank. I would recommend scraps from your ribs instead of wood, and flox them in place instead of Hot Stuff.) REMOVE THE PEEL PLY FROM THE TOP LEADING EDGE GLASS. Butter wet flox on the tops of the ribs and bulkheads, the top of the leading edge and the bevel on the spar where the top will mate. Cover all the flox with plastic wrap and put the top skin on. Weight it in place until cure. Remove the top and look for places where the flox did not contact the top skin (The best, lightest, way to do this is to put light coats of flox on and do this procedure a couple of times if need be, to get a perfect surface for mating the top skin.) Another EZ builder told me he had a



Before and After (a bunch of work!)
It looks like the Space Shuttle to me.



(outside) will lap over it.

30. Prepare for the top skin layup: The procedure is the same as for the bottom skin. Sand the top skin foam to contour, sand 4" of the spar for a bond and vacuum everything clean. (This is where I fixed the error I made in cutting the leading edge--I glued urethane foam into the outboard ends of the strakes with pour-in-place. This also filled in the area I made when I indented the outboard ribs.) Cut the glass for the top skin (see steps 7 & 8, page 21-4.) Remember the fourth UNI ply on the left side where the backseater gets in and out. At Mike Melville's recommendation, I added 2 plies of BID on the left side from the longeron to 18" outboard, just where the backseater might sit. A lot of planes get dented here.

31. Lay up the top skin per plans page 21-4, step 7 & 8. REMOVE THE PEEL PLY FROM THE FUSELAGE AND THE LEADING EDGES. Remember the layups lap 4" onto the spar and 3/4" onto the fuselage. Lay up the first UNI ply (parallel to the TANK leading edge), butting it with the first UNI ply from the bottom skin. Lay up the second UNI ply (fore and aft) and lap it around the leading edge to where the bottom skin joins the white leading edge foam. Layup the third UNI ply, 5" wide over where the OD rib is, lapping onto the 5" wide strip on the bottom skin and onto the spar. Lay up the fourth UNI ply and 2 plies BID on the left side. Peel ply the exposed glass edges.

32. Once everything has cured for 2 days, do the pressure check for leaks, step 9 on page 21-5. If you have any problem with epoxy allergy, flush the tanks with air for a couple days. When I blew air into the tanks for the pressure test I slipped and the tanks pressurized my lungs with epoxy vapors. My strakes flunked the first couple of times but I found that all the leaks were in my plumbing for the test and not in my tanks (HUGE sigh of relief!)

33. Finish plumbing the fuel system per the plans. Remember the plans changes about using steel fittings and fire sleeve behind the fire wall.

34. Admire your beautiful work-looks like a Long-EZ now, doesn't it? If you found any errors in these plans, please call or write to me so I can make sure they're corrected. A call to Mike at RAF and Terry Schubert at Central States would be a good idea if you can't find me and the error could possibly be dangerous.

John York
(913) 842-2049
903 W. 24th St.
Lawrence, KS 66046

BIG THANKS JOHN !

Testing Fuel For Alcohol and Vapor Pressure

Terry Crouch (IA) - People who use auto fuel might want to test their fuel supply periodically for alcohol and, as warm weather approaches, for possible vapor lock caused by high volatility/ high vapor pressure.

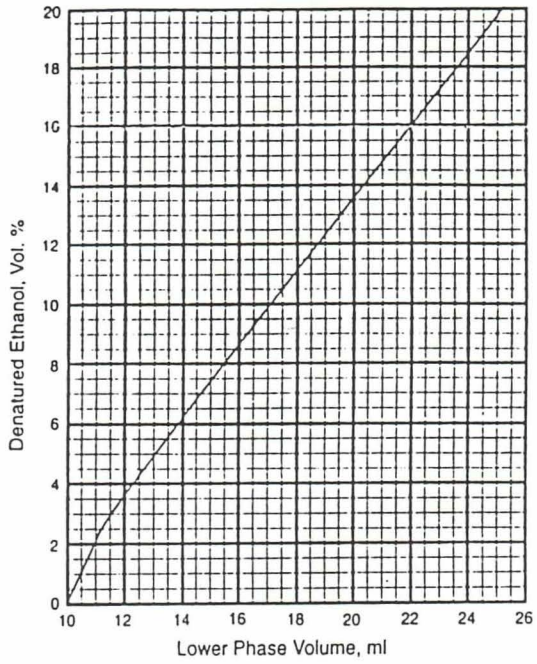
A popular method of alcohol testing is called the "Water Extraction Method". A graduated glass cylinder, usually 100 ML, is used for the test.

Place 100 ML of gasoline in the cylinder and add 10 ML of water. Shake the stoppered cylinder thoroughly for one minute and let stand for two minutes. If no alcohol is present the 10 ML of water will settle to the bottom. If alcohol is present the alcohol will drop to the bottom, along with the water, increasing the reading to more than 10 ML, depending on the amount of alcohol present.

A reading of approximately 17 ML in the lower phase indicates a presence of approximately 10% alcohol. Other levels of alcohol can be determined from the adjacent graph.

It should be remembered that while this test is reasonably accurate it does not identify the type of alcohol nor does it indicate the presence of ethers such as MTBE.

Figure 4-8 Volume Percent of Denatured Ethanol in 10% Blend Water Extraction Method



Some technicians have tried to develop "home made" vapor pressure testers. The precision of some of these devices has been called into question because of the exacting specifications required to replicate ASTM test procedures outside a laboratory setting.

Fuel test kits are also available to test the specific gravity of gasoline. Specific gravity provides a directional assessment of a fuel's overall volatility and its energy content.

To test specific gravity, simply fill the graduated cylinder with 40 ML of fuel and insert the hydrometer into the level cylinder. Allow the hydrometer to stabilize and read the specific gravity. Temperature correction tables are provided to adjust for variation.

Higher specific gravity indicates more dense fuel while the reverse indicates less dense fuel. Fuels of less than 0.730 specific gravity are more prone to cause driveability problems in autos.

Editor note: No indication was given for aircraft use.

Generally speaking, fuels of lower specific gravity are more volatile, although this doesn't necessarily correlate with vapor pressure tests. The specific gravity also gives some indication of BTU content. The higher the specific gravity the greater the BTU content of the fuel. **Specific gravity does not indicate vapor pressure or octane ratings**, however.

KCGIG 94

June 17-19 Don't Miss it !!

Canopy Latch Door Seal

Terrance Scherman (IA) - If you have the standard access door on your Long-EZ and you fly around in a colder climate like I do, this modification will greatly reduce the air coming into your cockpit. My Long-EZ had a large amount of air coming into the cockpit from the small crack where the lock, latch, and hinge are located. I did not have much air coming around the perimeter of the door.

My solution to the problem is simple and inexpensive. I cleaned the inside of the door, hinge, and latch then lubricated the areas that would move when the door was opened - around the hinge and latch. I used a small artist brush and painted a thin coating of lubricating oil onto these areas taking care not to get oil onto the non-moving surfaces. Any oil will work. I used old engine oil.

The last step is to put a bead of silicone inside of the door where the air was coming in. I did this with the door latch shut. Let the silicone seal cure for 24 hours. After the silicone is cured you will be able to open the door and latch and will have a well sealed opening.

Sky Sports Fuel Gage Probe Installation

Dick Cuttler (PA) - I described, to the fine folks at Sky Sports, that this installation was for a Vari-Eze and that the capacitance probe's base plate had to be mounted vertically. They suggested two 12" bendable probes and a dual indicator. I received two **un**-bendable probes and a **single** indicator. So much for that! The nice lady I dealt with said to send it all back and she would make it right. She did and I finally set to work on the installation.

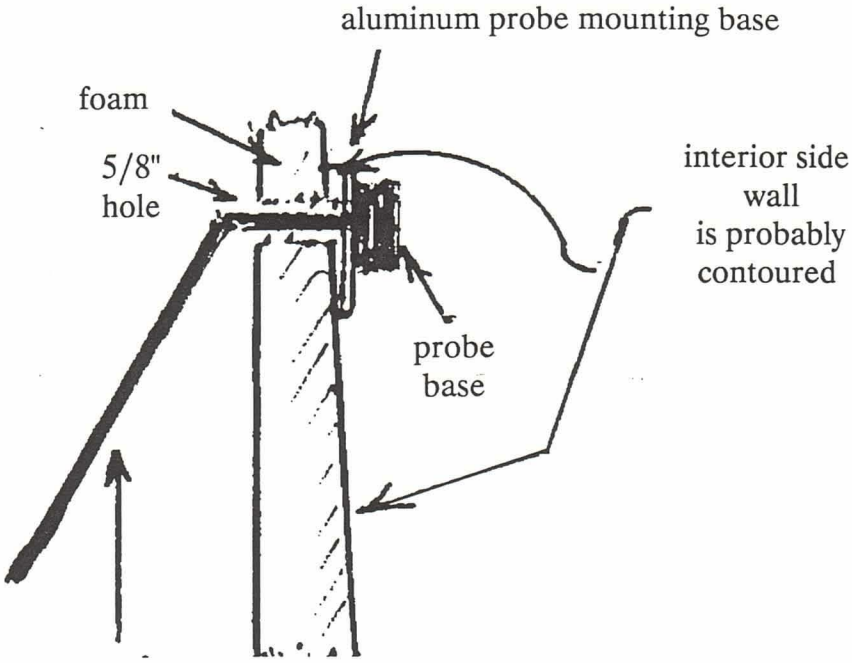
I placed my probes just slightly aft of the rear seat back which, on my airplane, is located about 8" forward of the main spar storage oval. It is made of 1/4" - 5 ply aviation grade plywood. Two 5/8" holes were drilled through the sandwich foam and glass into the tank about 1-1/2" below the top of the tank. Be sure to seal off the foam area sandwich with epoxy. It **MUST** be fuel proofed!

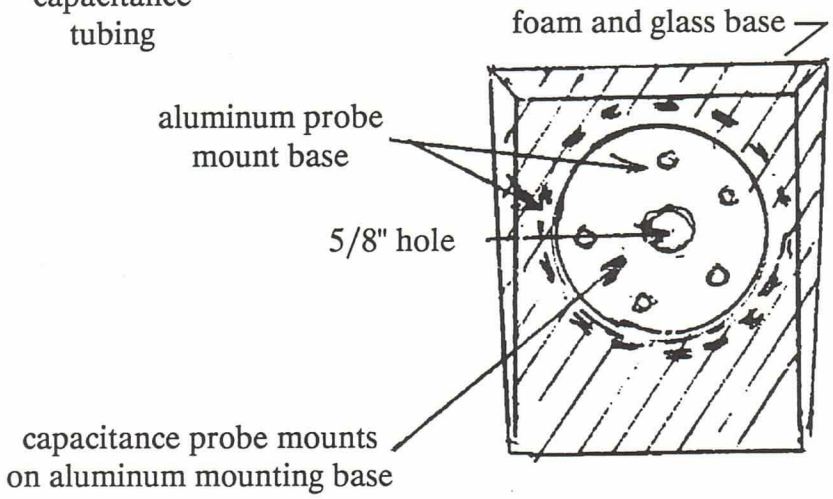
Construct a foam and glass foundation for the pre-drilled and tapped 1/8" aluminum probe mounting base. The probe will mount to this base later. Be sure the probe's base and the aluminum mounting base are oriented correctly when the capacitance tube is pointed down. After which, there is only one position it can be located.

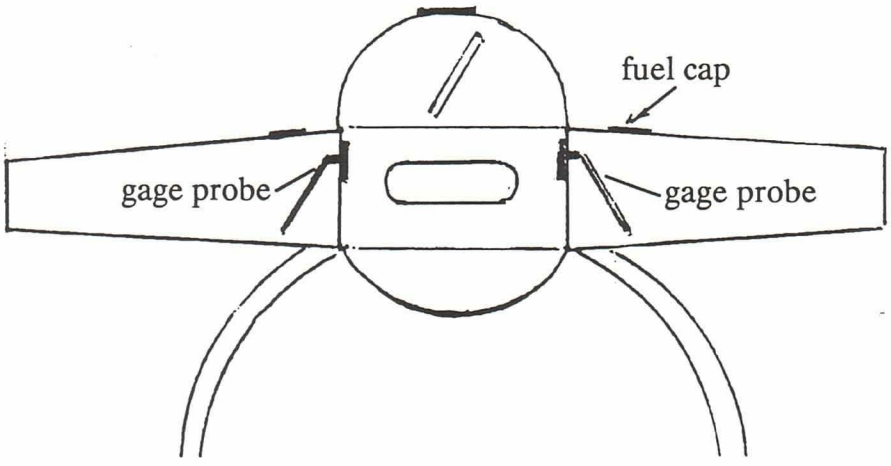
I calibrated the system at empty with the appropriate pot screw, put 6 gallons in each side and adjusted the full pot to indicate 1/2 full. That is about my usual fuel load for local flying.

Oil Analysis Experience

Ian Wilde (England) - I have had several engine oil samples analyzed and have been satisfied with the service of: Engine Oil Analysis, 7820 South 70 East Avenue, Tulsa, OK, 74133, (918) 665-6464.







Enthusiasm is like having two right hands!

To Set The Record Straight

Bruce & Bonnie Tifft (OR) - After reading a recent newsletter analysis (not CSA) of the accident that took the lives of our dear friends, Wes and Millie Gardner we felt we needed to respond and set the record straight. We were disturbed, disheartened, and angry that the article inferred that the accident was the result of Wes installing inferior "non-aircraft" parts on his newly completed E-Racer, and that he ultimately failed to "fly the airplane" during an emergency.

Those of us who built and flew with with Wes and Millie, over the past 15 years, know this is totally absurd. It is an insult to Wes' memory to allow those of you who were not fortunate enough to know this outstanding man to think that could be the case. Wes was a meticulous builder, and a cautious, cool headed, proficient pilot. He had one of the fastest Vari-Ezes going and competed in and won many, many races. He logged well over 1,000 hours in his Vari-Eze and during his miles of travels encountered several emergency situations which he handled like the professional we all know he was.

The "non-aircraft" part mentioned in the article was a ball joint assembly. This part is used on the Grumman Tiger, a certified aircraft, and can be ordered from Wick's Aircraft. It is not an automotive part. We had the same assembly on our Long-EZ, but have since replaced it with a locking-type ball joint provided by Ellison. The only "non-aircraft" part was a motorcycle twist grip throttle which is used on the prototype E-Racer. We tried to talk Wes out of using it, but he said he liked it and it was his decision and his airplane. It was suggested, in that newsletter analysis, that the motorcycle twist grip throttle on the control stick was removed in flight after the emergency was in progress to try to fix it and while doing this, Wes failed to control the airplane. That doesn't sound like the Wes Gardner we knew!!

Several EZ builder/pilots thoroughly investigated the accident site and it is their conclusion that the E-Racer developed engine problems on take-off, that Wes was "flying the airplane" for an emergency landing but failed to see power lines, that the left main landing gear hit the lines and the airplane was thrown in a left wing-down attitude when it contacted the ground. It then cart wheeled and was destroyed by fire. There are some situations that not even the most skillful pilot can save.

We were heartsick to lose such wonderful people as Wes and Millie and won't allow Wes' memory to be tainted by this hypothetical scenario as described in that newsletter analysis.

We will never definitely know what happened during this tragic accident, but we are certain it was not lack of builder expertise nor was it any lack of proficiency on the part of the pilot .

This is for you Wes and Millie -
We miss you !

1500 hours of EZ Experience

Bruce Tifft (OR) - In the first 1500 hours flying (Ezes & LONGs) I've had 15 mag failures, coils-points-gears you name it, both Slick and Bendix. I then put on one ignition from an outfit called Cavu Products in Ontario, Canada (no longer in business). This one mounted in a mag hole, is gear driven but had no spark advance. About a year later I put on one of Jeff Rose's (Electroair) ignitions with spark advance, and I have not had to do a thing to either to date. I did put in, with Jeff's help, a second battery (motorcycle) with a switch on the panel to switch batteries, in case of main battery failure. I have run 1.5 hours on the little battery with everything on, just testing and it worked very well. I'm very happy to get out of the 1940s and into the 1990s as far as ignition systems go.

The next thing to get rid of - after burning one piston on the way to the **KCGIG** and sucking an intake valve on another trip from plugged injectors, and I have two filters - was my Bendix fuel injection. I put on a reliable 4.5 Ellison throttle body injector. Not only did it even up the color on my exhaust pipes, but I picked up about 100 RPM. It burns a little more fuel at low altitude, but I'm going faster now. The changes from mags to electronic ignitions and from plugged injectors to the Ellison was well worth the extra effort for greater peace of mind. The engine is smoother running and starts "EZ", even on hot starts.

When you have an electronic ignition on your bird you get out cheap on spark plugs. I pay about $7.00 for four. The plugs I use on my O-360 take a 1" socket. On the top plug I had to trim out some of the fins to get clearance around the spark plug hole to make the socket fit. There are two plugs I have tried and I get no noise in the radio or GPS. One is a snowmobile plug. It's an NGK A-8 and the other is an AUTOLITE-2695, both available at your local auto parts store. Both plugs have a nice flat area for the gasket and are the right heat range. I set my plugs at .040" gap and it works very well for me.

Have Fun and Fly Safely

Improved Fuel Cap O-rings

Norm Dodge (AZ) - The UD3 fuel caps, sold through Spruce Aircraft are made by Usher Enterprises of Cornelius, Oregon (503) 647- 0015.

Usher told me there is an improved O-ring available for the cap. This Vitron # 75 is apparently sold through automotive stores like NAPA.

O-200 Loses Power

Al Coha (AZ) - I wish to share a recent experience I had with my O-200 powered Vari-Eze, N2CR.

While climbing through 6,500' enroute to Albuquerque from Goodyear my engine began running rough. The usual emergency procedures had no effect. I reduced power and landed at Falcon Field without incident. The engine ran fine at lower power. Upon landing I did a mag check and full power run up. Everything was normal. No roughness.

I removed the cowl and found nothing after a visual inspection. I tried to restart the engine but, after hand propping 1.5 hours in 108 degree F temperature, I gave up and headed home. (6 hours on 3 busses - not a very good day)

I returned the next day with tools and a spare carburetor. My effort was rewarded with good engine operation. I flew back to Goodyear believing my carb was the problem. I took my carb apart but couldn't find anything wrong with it.

About a week later I departed for Jackpot on the replacement carb. While climbing through 7,000', again the engine started running rough. Carb heat and mixture had no effect, but about 15 seconds after switching to the fuselage tank the engine ran smoothly. I switched back to the strake tanks to verify the problem and the roughness returned after about 30 seconds. I then switched back to the fuselage tank and returned to Goodyear airport.

It began to appear that something was restricting fuel flow from the strake tank. With the fuel line disconnected at the carb inlet fitting a flow check requires .5 gallon of fuel in a maximum of 3 minutes. My strake tank time was 16 minutes while the fuselage tank time was 9 minutes. Suspicion pointed to the gascolator located between the fuel tank selector valve and the flow sample measuring point. However, flow from the gascolator drain was vigorous.

I replaced the gascolator filter and the flow check showed 2 minutes. The problem was solved!

The filter was effectively removing particles from the fuel and slowly becoming clogged. Under full power conditions, the engine was using fuel faster than the filter could supply it. Therefore the fuel level in the carb bowl dropped, effectively leaning the mixture, until the engine ran rough.

I have added a fuel flow check to my annual inspection procedures to assure specified fuel flow for full throttle operation. I strongly recommend that everyone do a flow check during their inspection also.

Springs For Sale

Four pair of springs for the flush rudder control arms. $5 per pair. Please call me at 703-698-9576 to check availability before sending money. Thanks, Steve Rothert.

Project For Sale

Vari-Eze project ready for paint prep, 85% finished. Zero time Continental O-200, Loran, Nav-Com, primary panel w/instruments, Great American prop w/spinner. $9800 OBO.

408-422-6158 or 449-2813.
"Randy Ford"

Free Gas

Paul Adrien (NH - Come fly with the Northeast EZ Flyers. We mean it and we mean to make it easier for you to do it. At OSH 94 we will raffle off 20 gallons of fuel to some lucky new NEF EZ driver. The catch is that you have to come fly with us to collect the fuel.

Nav Aid Devices Address Change

Effective in mid January Nav Aid Devices will be moving to:

Nav Aid Devices
641 North Market Street
Chattanooga, TN 37405

Nose Gear Door Actuation

John Vukos (WI - Dave Ronneberg showed me the basic design of the actuation mechanism while he was building the Berkut. He uses a two door arrangement. I went with one door. He just made the actuation link symmetrical on both sides of the spring steel *(see sketch on next page).*

The door is made of 4 - 5 plies BID laid up over foam stuck into the NG housing.

I hinged the door with two pieces of aluminum angle, bushed on the fuselage end, pivoting on two stainless bolts buried in flox in the fuselage. I've seen piano hinge used too.

I located the optimum actuation link attachment/pivot point on the door by trial and error.

The actuation spring is made of 1" wide spring steel, the thickness depends on what width you find; I just hunted around until I found some steel that "felt right".

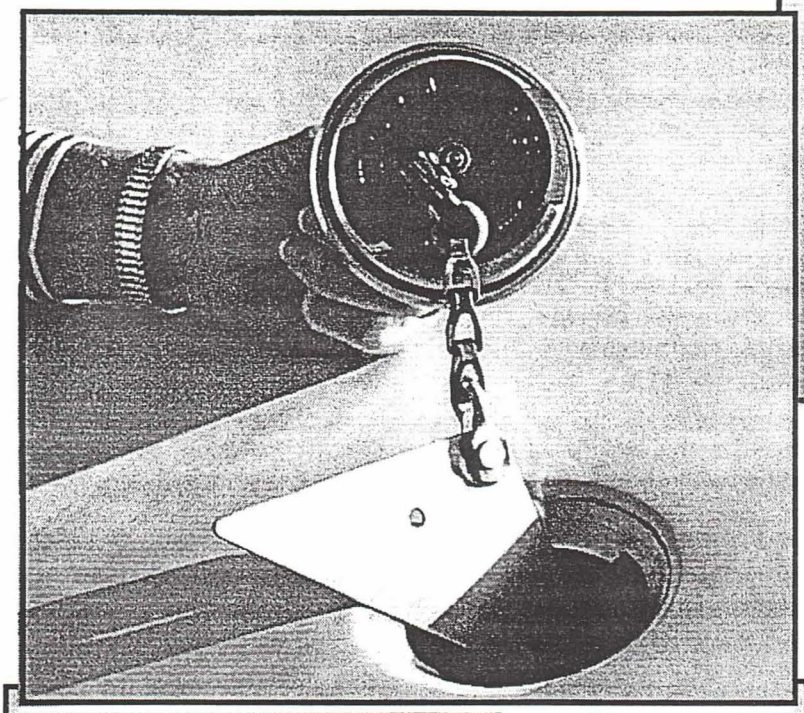
I put a gradual bend in the spring steel strap that keeps the door open when the wheel is not in the housing.

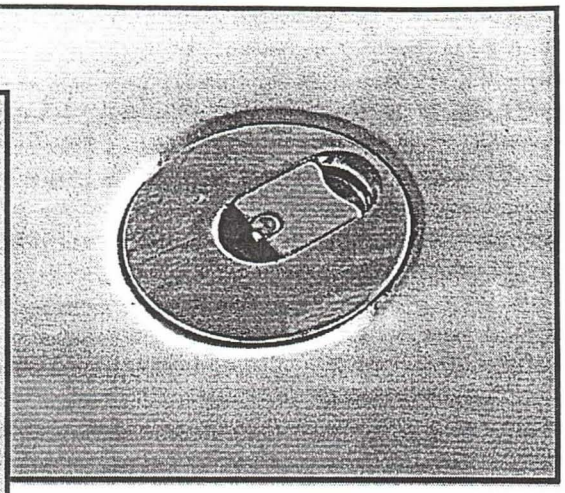
The actuation link is made of music wire, approximately 3/32" thick. The bend in the wire provides spring action in the link.

I used set collars from a hobby shop to hold the link on the spring steel and on the door hinge. I grooved an aluminum block to accept the actuation link, and riveted it to the spring steel.

This arrangement is simple, light, and works fine.

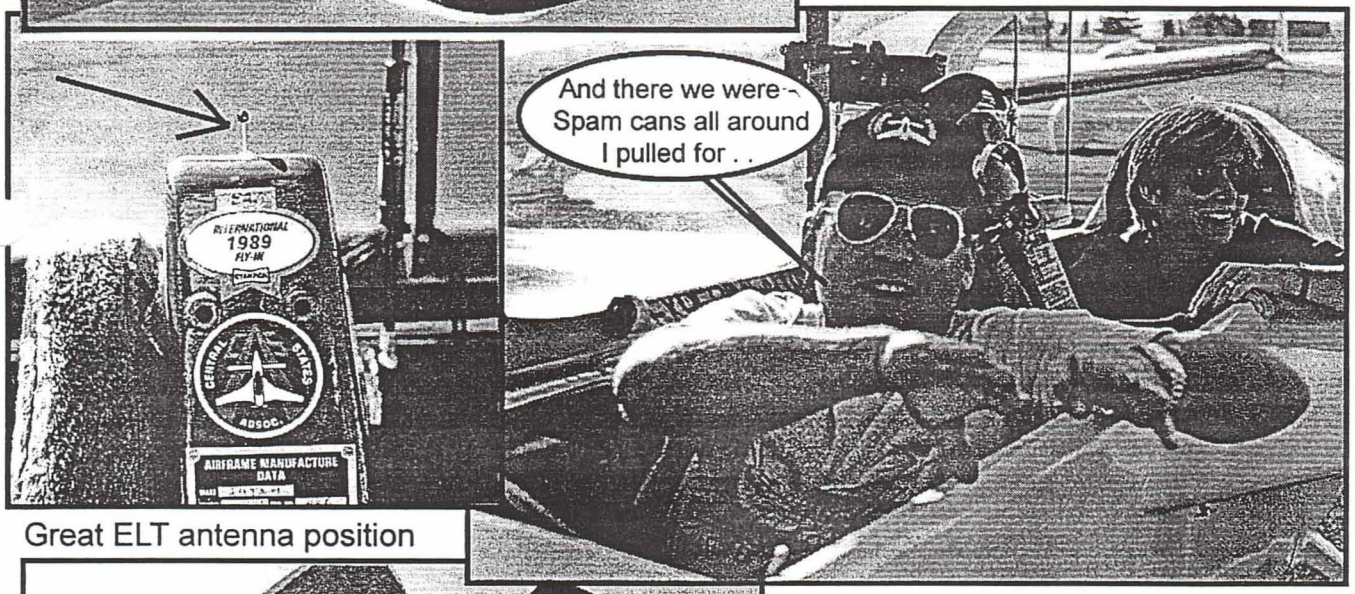
George Walters' great fuel cap locks positively and doesn't leak





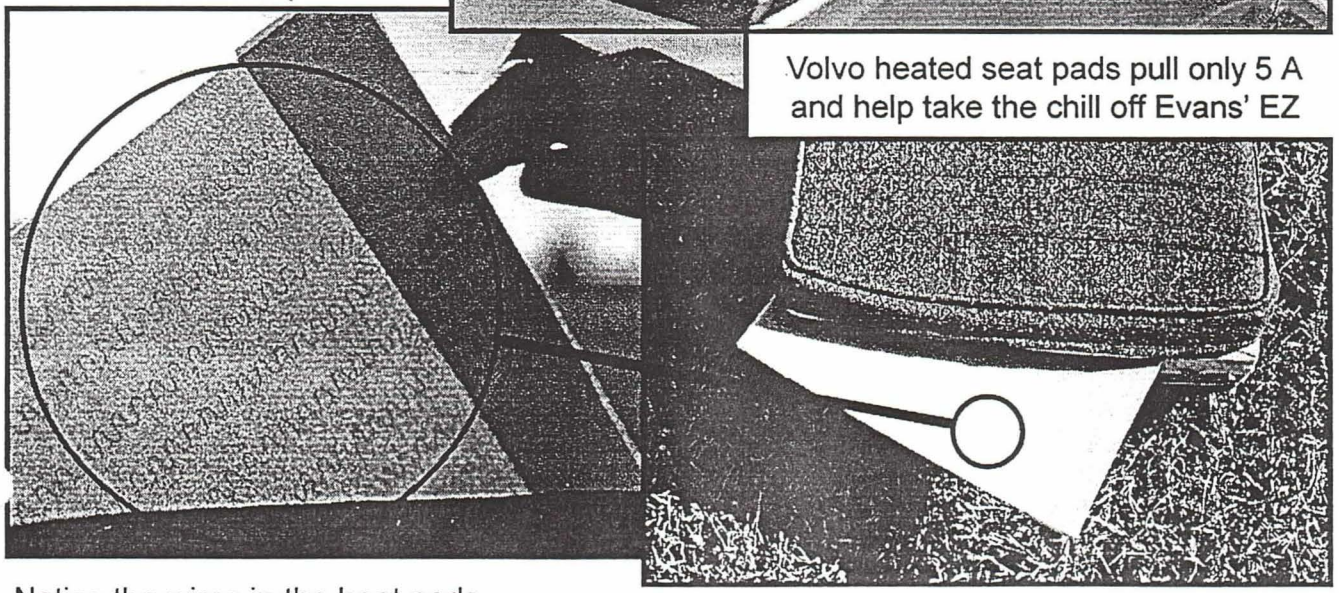
The returning heroes describe how hordes of T-18s were vanquished.

Maybe Rough River will have a Top Gun seminar next year.



Great ELT antenna position

Volvo heated seat pads pull only 5 A and help take the chill off Evans' EZ



Notice the wires in the heat pads

Sloshing Sealer Caution

Tim Doell (TX) - If you suspect that your aircraft fuel tank has ever been repaired using a sloshing sealer, do not fly until you verify that residue has not clogged the fuel screen.

I had cut an opening in the fuel tank above the sump to install a capacitance fuel probe. Much to my surprise, the screen over the hole to the sump was 80% closed with sloshing sealer. It was a thin residue, almost transparent.

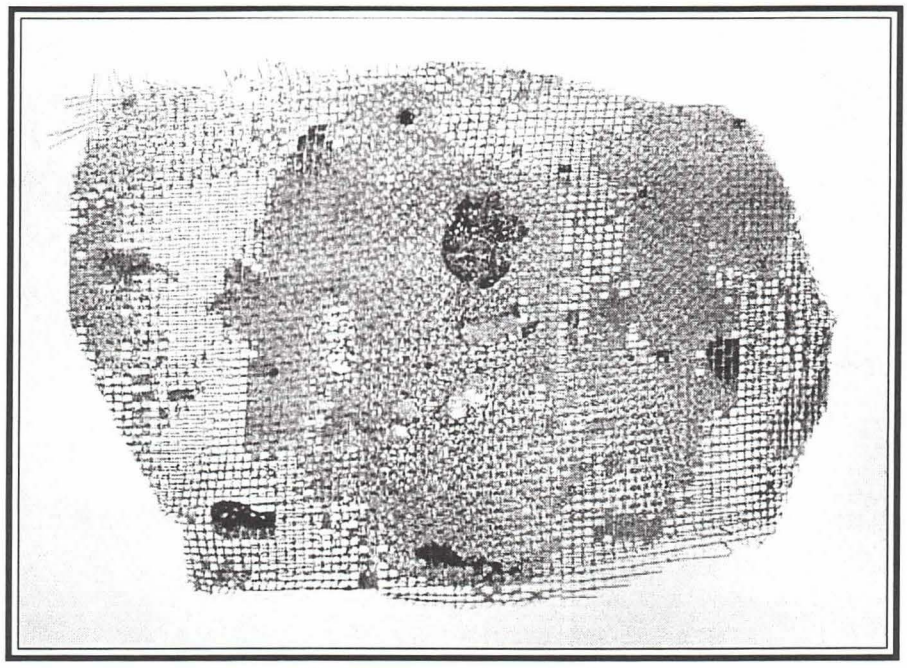
I previously suspected that someone used sloshing sealer due to the sticky residue on the tank bottom below the gas cap. It was only visible when the tank was dry.

Further investigation, using a boroscope, showed the forward section of the fuel tank to be where most of the sealer had accumulated. It was mostly concentrated in the drain valve area. After deciding it had to be removed, I cut an access hole in the forward tank section. I found that a previous repair had been attempted in the tank bottom using epoxy resin and cloth. The repair did not adhere to the surrounding structure because epoxy won't bond to the sloshing sealer.

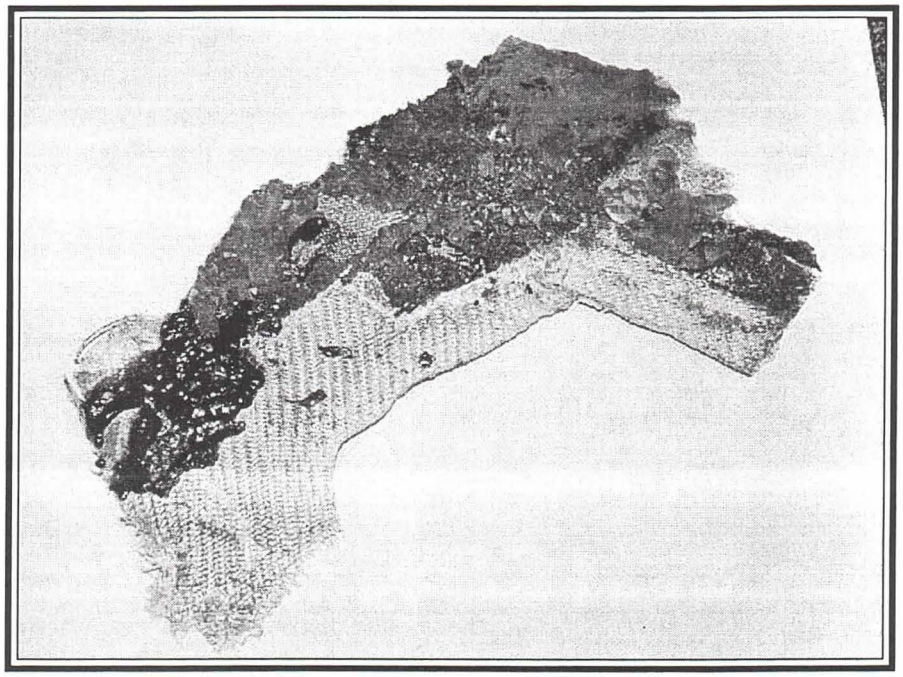
The old sloshing sealer was found in three different forms, a black tar like substance, very hard thick globes with a white surface and black center and the almost translucent very thin coating that was found covering the sump screen.

After a lot of scraping and sanding and some new wet lay ups, the tank is now ready to be re sealed.

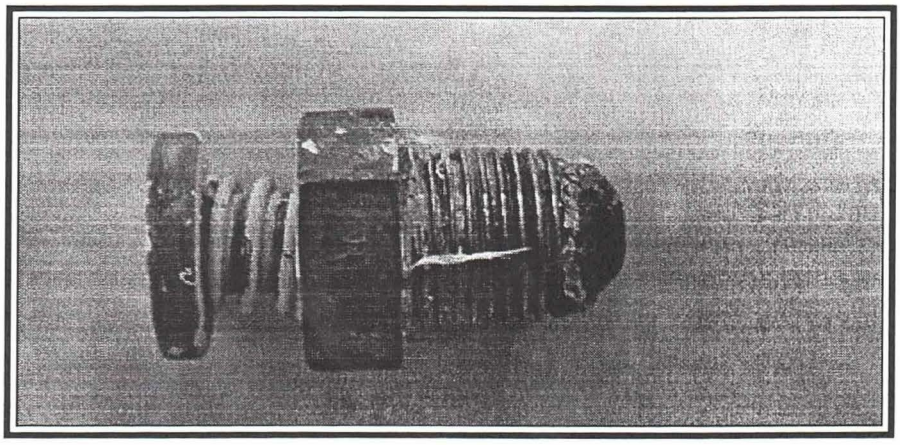
If you suspect someone has ever put sloshing sealer into your aircraft's fuel tank, it is important to immediately check your sump screens. If you have chronic fuel tank leaks, I would recommend opening up your tanks and resealing with epoxy. It will take longer than using sloshing sealer but the results will be better.



Sloshing sealer debris



Poor quality attempted repairs are dangerous

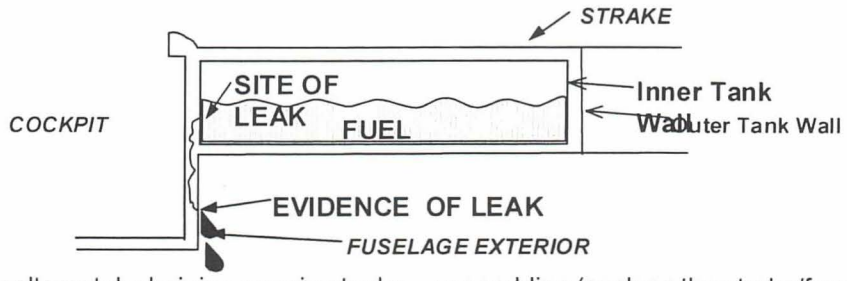


Sealer debris can clog passages

Finding and Repairing Fuel Leaks

Tom Staggs (WA) - When I first purchased my Long-EZ in 1990, the cockpit always had an odor of Avgas to it. The previous owner said that he didn't know where it came from but that there had been no sign of any leaks. What's the old saying? Ignorance is bliss.

About a year later, I started to notice a bluish stain on the right side of the nose on the outer skin of the plane. This stain was the color of the blue dye in 100LL fuel, and the stain definitely had the odor. I couldn't figure out was how fuel got there; there were no fuel lines in the vicinity and the nearest fuel tank was over four feet away. Where was the fuel coming from, and how would I stop it? The answers were "capillary flow" and "much more easily than the first methods I tried."



By alternately draining my wing tanks and changing positions on the fuel selector, I was able to confirm that the leak was somehow coming from the tanks in the strake, but I had no idea how. I spoke with several experienced EZ "old timers", as well as those who had tracked down similar problems in the past. The consensus seemed to be to drill a series of very small holes (#50) in the outer skin of the plane a couple of inches apart and "trace" the leak back to its origin. Believe it or not, I did this starting in the nose, where the leak was evident, and trying to trace it back along my fuselage. No one said I was the bright one in the family.....

About all I got from this method was a Swiss-cheese appearance to an otherwise pretty paint job. Each hole I drilled emitted a smell of 100LL; there didn't appear to be any pattern to the path of the leak.

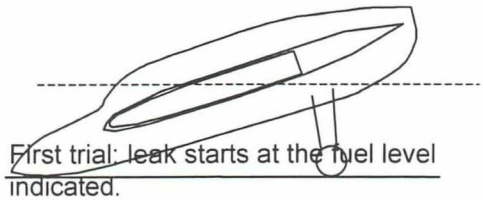
The next set of recommendations was to tear open the offending strake and re-seal them, a process that I wanted to avoid at all costs.

After thinking about the problem for a few months, I realized a couple of things about our planes and how they are constructed. First, our fuel tanks are effectively "double-hulled". In other words, fuel has to leak through two fiberglass barriers before we see it: the inner wall of the tank, and the skin (either inside the cockpit or the outer surface of the plane). Secondly, fuel can leak "uphill" through capillary flow, which is the property of liquids that they can migrate up very narrow tubes, much as in the same way that moisture flows up the trunk of a tree.
The fuel is able to leak through a wide range of places, from seams where you slurried two sheets of foam together to the joint between two major assemblies (such as the strake/fuselage joint). A path the diameter of a human hair, over time, can transport fuel to other places in the plane, creating the fuel odor and stain, not to mention a potential safety hazard due to fuel contamination of something that wasn't designed to have fuel in it.

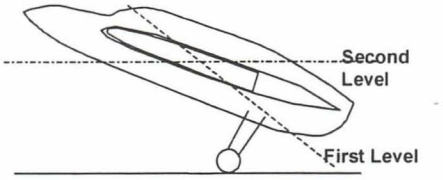
The solution was simple (ever notice we never realize the simple solution until we have tried the hard one?). Find the inner leak and ignore the path of the leak once fuel escaped the inner wall of the tank, as long as fuel didn't come into contact with foam that would dissolve.

Finding the inner leak actually turns out to be quite easy, if somewhat time consuming. The concept is to gradually fill up the leaking tank until signs of the leak appear, regardless of where they appear. Once this occurs, draw a line along the fluid level of the tank. Drain the plane and set it in a different attitude (such as nose high versus nose low), and repeat the process. Where the two fluid levels intersect is where the inner leak (the one you need to fix) is located! By repeating the process a third time, you can eliminate the two solutions of where a leak is located (there are two intersections, one on the inboard wall of the tank, another on the outboard wall). The third level line will also diminish the error in your location of the leak.

Below are a couple of sketches that illustrate the point:



First trial: leak starts at the fuel level indicated.

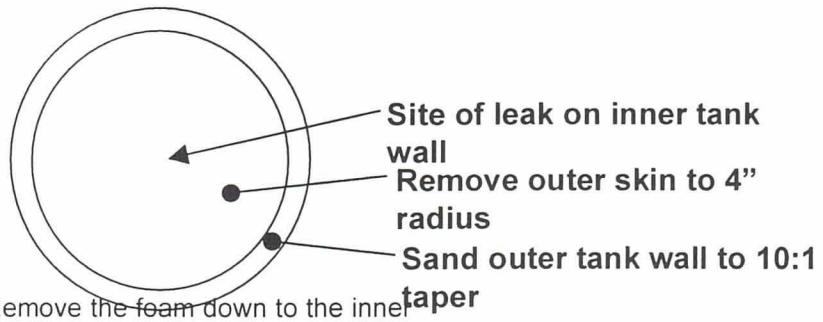


sect on the inner wall of the tank.

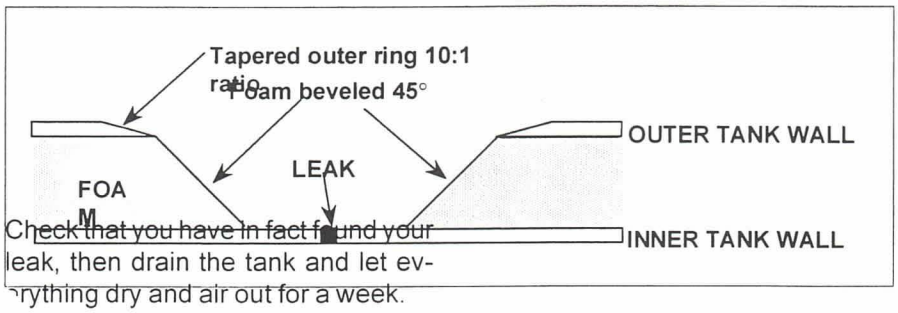
Once you find the leak, then what do you do? I have found that by carefully cutting through the outer skin over the point of the leak, then removing the intervening foam, I was able to first confirm the leak (fill it up to the level and watch fuel squirt through the hole), then repair it.

Danger Fuel vapors are an explosive mixture with air. Be very careful about sparks, including those in devices like drills and vacuum cleaners.

The repair process was simple:
Draw two circles on the outer skin with 4" and 5" radii centered on your assumed leak's position. Cut and remove the inner circle, then taper the glass in the 1"-wide band down to the underlying foam.



Remove the foam down to the inner fiberglass wall, leaving a 45° beveled edge to the foam.



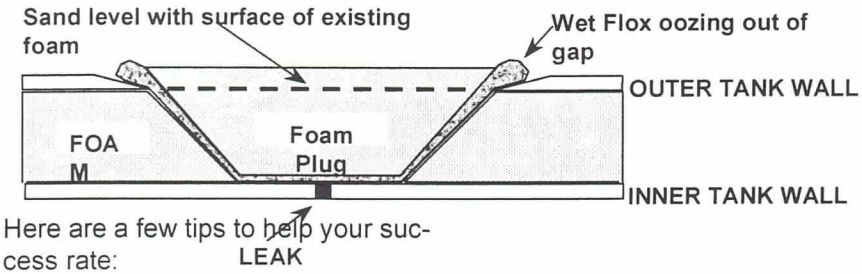
Check that you have in fact found your leak, then drain the tank and let everything dry and air out for a week.

Carefully sand the outer surface of the inner tank wall as smooth as possible (the better the job you did microing the foam when you made the tank, the harder this will be to do). Be careful not to sand through the inner wall, or you will be in a BIG mess.

Cut a foam plug that is slightly larger than the hole it will plug. Match the same 45° edges as the hole. Ensure that it is the same kind of foam as used in the original construction. For fuselage sides, 0.8" thick Dark Blue PV core was originally specified, while the surfaces of the strakes and baffles from Type 45R Rigid PV core.

Apply a wet slurry of flox to the entire inner surface of the repair area, then gently push the foam plug into the hole. Squeegee away the excess flox. Apply gentle pressure to the foam plug while allowing the repair to cure.

Sand the excess foam flush with the surrounding surface. Apply an appropriate number of layers of glass to the outer surface, feather sand the edges smooth, and re-finish. Enjoy your leak-free plane!



Here are a few tips to help your success rate:

Once you figure out which tank is the culprit, empty it and allow the tank and plane to air out for a week or two. This will make detecting the return of the leak that much easier, both through your sense of smell and by visual means.

The smaller the increment of fuel you add each time, the more accurate your locating the leak will be, as it represents a smaller rise in the fuel level. I've found that 2 gallons at a time works pretty
well.

Be patient – allow enough time after adding fuel for the leak to reappear. In my case, it took about 4 hours for the fuel to migrate from the tank to where I could see it by the nose. Had it migrated all the way to the forward part of the nose, I would have had real problems, as the urethane foam would have dissolved if exposed to fuel.

The more extreme the differences in the plane's attitude between leak detection efforts, the more accurate your location of the leak. I jacked up the wheels to increase the nose-down attitude, as well as to achieve side-to-side angles.

Using water to find the leaks didn't seem to work as well as fuel. I believe their different surface tensions make it so that fuel is able to migrate more effectively through small capillaries.

If you are like me and had the "Explosafe" mesh in your tanks, you can use a variation on this process to open holes into your tanks through the baggage areas inside.

Information Needed

Bruce Hughes (WA) - Does anyone know details on the U.S. Army experimental project done at Fort Lewis, WA about 20 years ago using a Long-EZ to fly reconnaissance missions? Contact B.Hughes at 808-250-0939 or abrucehughes@yahoo.com or av8ryx@yelmtel.com

Alternator Noise

<Canard.Com>

Scott Derrick (NM) - Here's an article on alternator noise and how to trouble-shoot it.
http://avionicswest.com/snap.html#Alternator%20Noise

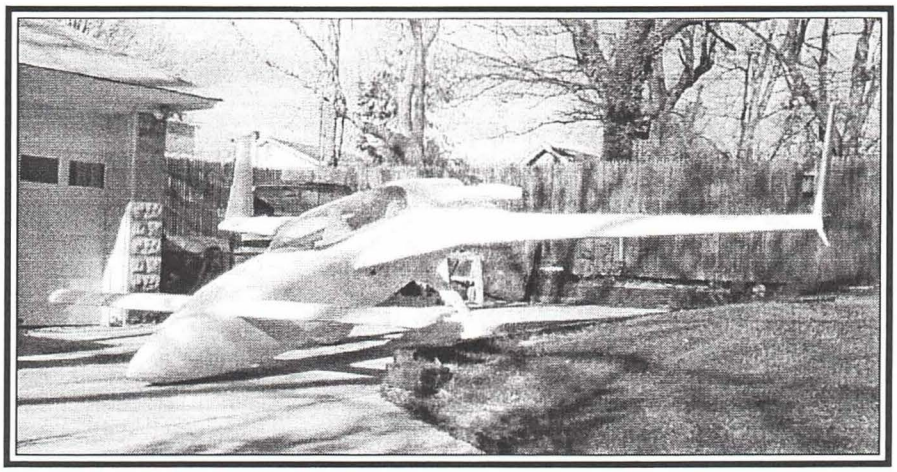
Vari-Eze Project Status

Dave Hanson (MD) - My wife Bonnie and I joined Central States last year. At that time, I was trying to buy a Long-EZ project. That deal didn't work out and I bought a Vari-Eze, parts only, project that I have been working on since February 2001.

I have made several mods on N440EZ: long nose, leg fairings of my own design, Gary Hunter wheel pants and gear doors. The attached picture shows I am getting ready to paint. I have mounted the engine and the aluminum instrument panel is done.

I have a 0 time 0-200 that has 10:1 compression pistons that I installed during the rebuild and soon hope to purchase a LSE ignition. The Catto prop is 57X67.

I am looking forward to seeing everyone at Oshkosh this coming year. Since I started my project I have met the greatest people that have offered me tips and solutions to the thousands of questions that I have asked.



N440EZ nears completion

Standard Wing Velocity Fuel Gages

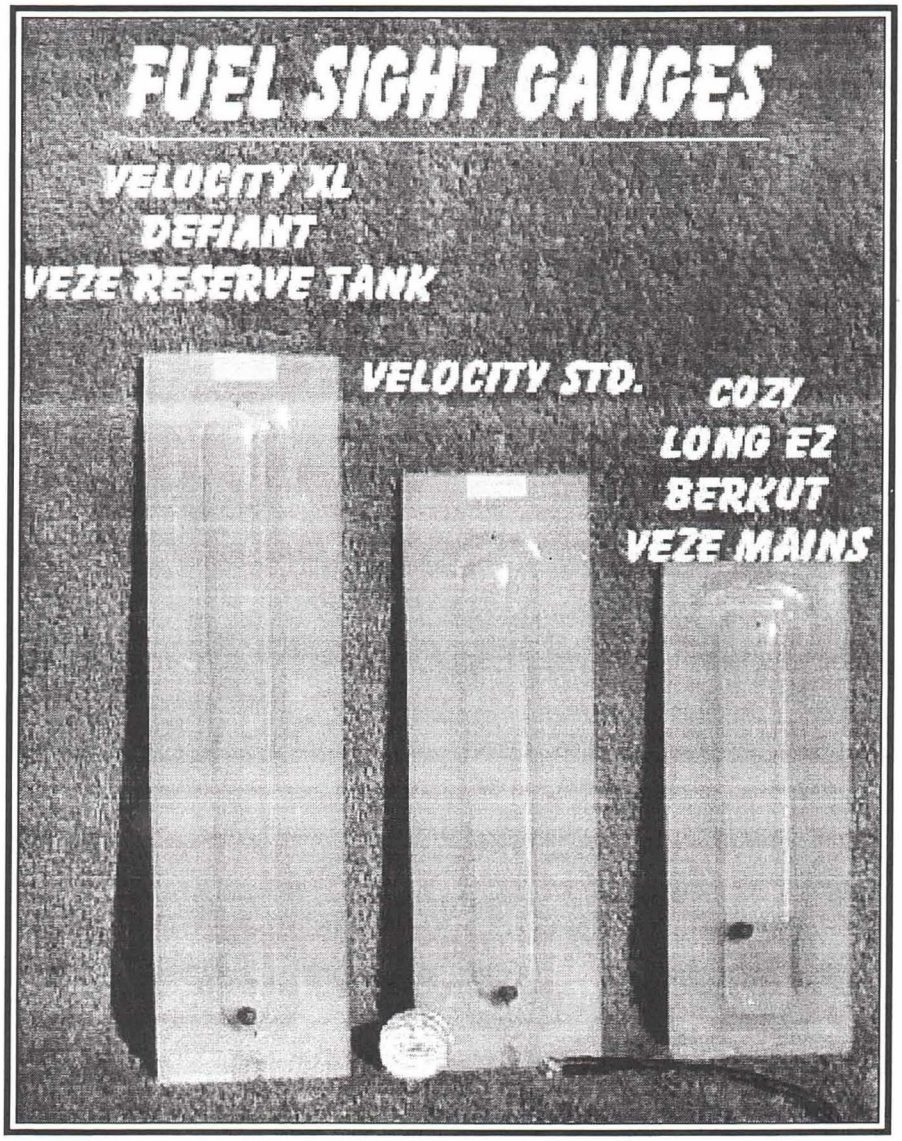
Vance Atkinson (TX) - It seems the Velocity factory has been telling the smaller winged Velocity (with smaller strakes) to put the taller "XL" sight gages at an angle, when installing the gages. Apparently, the builders are not going for it, and have been calling me. So, I have made an intermediate size gage.

Contact Vance at: 817-354-8064
nostromo56@attbi.com

Fire Extinguishers

ED: Arkansas Department of Aeronautics reported that fire extinguishers rated for use on A-B-C type fires pose a serious aircraft damage problem. The monammonium phosphate in the A-B-C formula is highly corrosive to aluminum. It can't be washed out of cracks and crevices as can the dry chemical agents found in B-C type extinguishers. Failure to disassemble effected aircraft right down to the rivets will result in corrosive destruction of the airplane.

Many of these extinguishers are found on aircraft support equipment, ramp vehicles and fuel trucks.

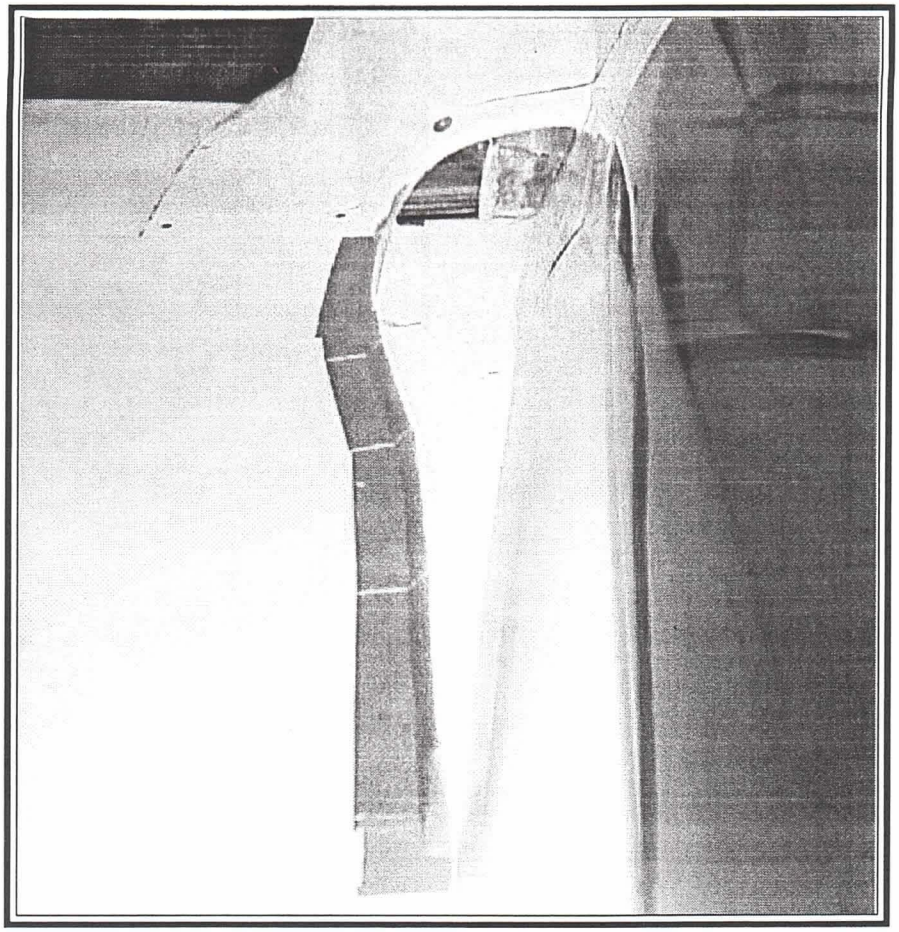


flap elimination.

I installed the NACA deflector (see photo) and conducted a flight test. The following number set was recorded.

100 - 74 - 60
110 - 80 - 66
120 - 87 - 74
130 - 94 - 81
140 - 102 - 88
150 - 107 - 95

The NACA deflector increased delta p airspeed about 4-5% which is about 15-20% increase in air pressure. The question arose, can I get by with the NACA deflector and not use the cowl flap. Presently, local air temperatures are in the 30-40s so the engine oil temperature is running about 160 F, 25 F below the vernatherm regulation of 185 F. I don't really know what will happen in warm air. I guess I'll have to head south for warmer air to see the result. It's a tough job but . . .



Switch Source

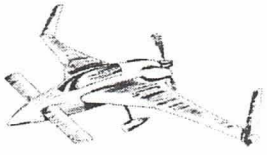
Scott Derrick (NM) - If you are looking for hat switches, etc. try:

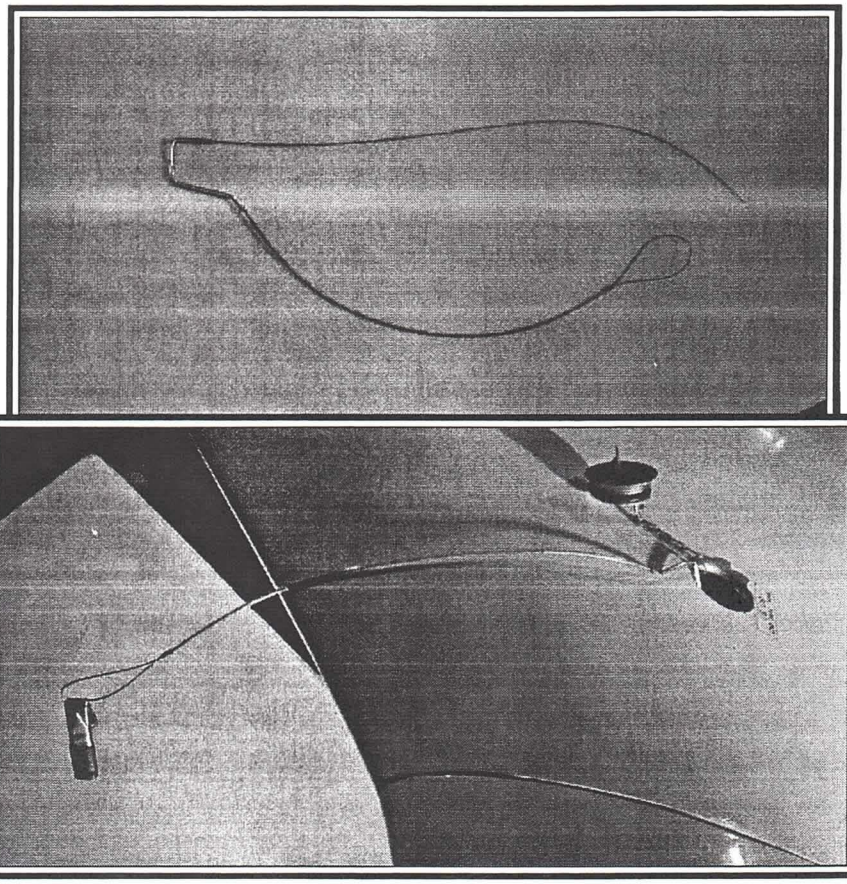
http://www.rayallencompany.com/products/switches.html

Fuel Grounding Alternative

Ion Huss (CO) - This is my solution to the plastic airplane fuel grounding problem. My plane hasn't blown up or caught fire since I've been using it 4 years, so I think it works.

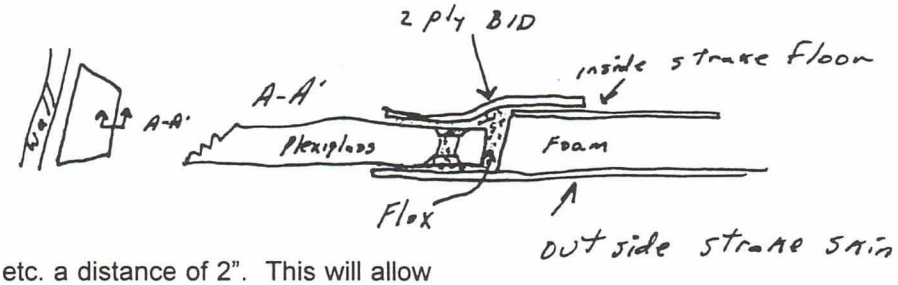
I made it up out of 1/16 stainless cable. The bend in the middle is brass tubing that I kinked on, to make it stay put. Between the kink and the loop I used heat-shrink tubing to protect the paint. When not in use, it lives under the seat cushion. (photos to right)





ground wire must penetrate the fuel surface

Strake Windows



ED: - This is how I retrofitted a strake window in my finished Long-EZ without having to repaint the exterior. Burt said anything over .060" Plexiglas was strong enough, but that looked pretty wimpy to me, especially after some use and the material started to get scratched. I choose 1/8" and that has held up fine. Some folks have used ¼" but that adds about 1 pound excess for each window. I used Lexan and found that was a mistake. It is much more expensive and scratches VERY easily. I would use Plexiglas.

Begin the project inside the strake by measuring inboard of all bulkheads, fuselage sides, leading edge curve, etc. a distance of 2". This will allow for glass overlap on the Plexiglas and interior surface area to effect a good bond. Sit in the back seat and look through the fuselage wall cut out at the strake floor where the window will appear. Mark that area and only put Plexiglas there. It is pointless to have a huge heavy window if only luggage gets to look through it.

Drill a small hole in each proposed window corner from inside the strake through the outside skin. Just hold the drill with your thumb and index finger and rotate. This now locates the edges of the hole through all structure. Move outside the airplane and draw a cut line from hole to hole. Cut the outer skin, the foam and inner skin out with a small blade saw like a X-acto etc. Larger teeth may delaminate the outer skin from the foam. Position the blade so cutting action pushes the skin against the foam and does not pull the skin from the foam.

Move inside the plane and remove the inside skin and foam an additional 1" all around the hole. This now gives you a cross section like A-A' above.

Cut Plexiglas to fit inside the strake opening with perhaps 1/8" clearance around for later flox fill. The Plexiglas will later sit in the hole on the "shelf" formed by the outer skin. Drill ¼" holes through Plexiglas and countersink both sides at 2-3" intervals around the perimeter of the Plexiglas. This allows for flox to form small rivets in the Plexiglas which helps hold the Plexiglas to the skin and to the flox fill under the 2 ply BID reinforcement.

Mask Plexiglas to protect it from resin. Sand all areas to be bonded. Sand the Plexiglas area to be attached to the fiberglass Bed the Plexiglas in flox in the strake cutout. Fill the "rivet" holes so they all bond to the flox on the outer skin "shelf". Lay up 2 ply BID at 45 degrees overlapping 1" over the Plexiglas and 1" over the inside skin. The 2 ply BID lay up is easier if you wet it out and squeegee it on a piece of Saran Wrap before putting it in the strake area. Leave the Saran in place to act as a "carrier" for the wet BID. Place the wet BID in place and remove the Saran Wrap. Peel ply and wait for partial cure. Before complete cure, remove the masking tape. Pull the tape back over the wet resin so no resin gets on Plexiglas.

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