

Custom Flight Creations, Inc. Access Panel Construction

By Bud Yerly

I make access panels differently than the manual, but the basic construction is the same.

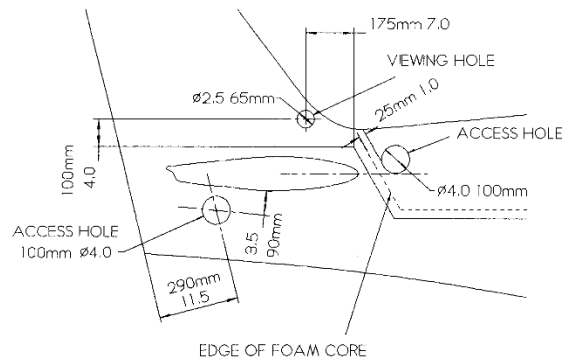
My customers access panels are large enough to actually use, the panels are perfectly smooth with the exterior, the attachment screws are fully countersunk and the countersink is hard enough to prevent the screws from denting the skin. I use countersunk washers and glue them into the countersink so after years of service, the panel still looks like new.

This is not a quick process. I prefer to do this with the top off, but I've built a flange, then reduced it to the inner skin when it was impossible to access the area to make a flange.

Background:

I was once told that the way to patch thin skin fiberglass panels was to put the same number of plies you lost. If the plies are only put on one side, then tie the inner and outer skins together. Well, that is essentially what we do in making an access panel. Don't get me wrong, the access panel construction method that Europa has in the manual is adequate. Using a thin metal access plate is typically rather wonky looking in that it requires metal fabrication and the install is made with 525 type screws and is not conducive to a good looking high speed look. At CFC, I borrowed a method by Flight Crafters and improved on it. The Flight Crafters method of construction was fine, but it is essential to reinforce the bare foam edges to assure proper transfer of the load from the inner to outer skin by floxing the exposed area between the skins layers and make a hard edge for durability. Of course another issue was the screws collapsed the foam in the access panel and it was important to flox reinforce those areas also.

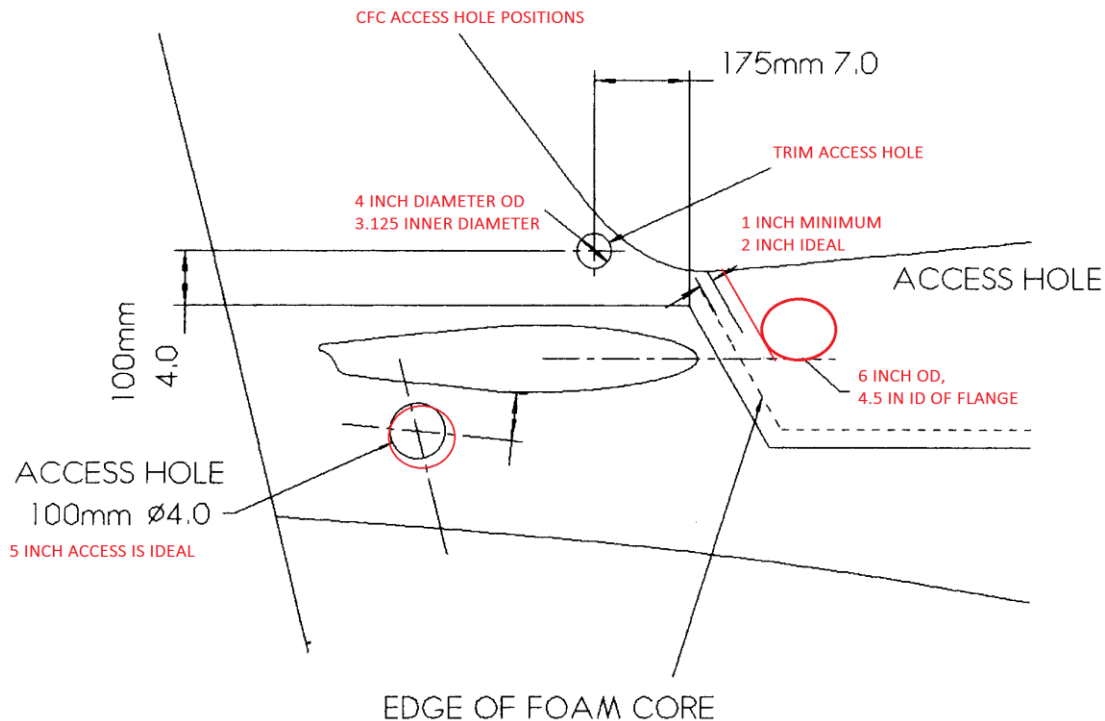
The first thing to do is plan your access panel location. Europa provided access panel locations, however, they were a bit small and great for viewing, but virtually impossible to work through.



Always plan to have the hole with at least two inches of overlap for the glass flange. An access panel inside diameter should be at least 4 inches for a thin hand and nearly 5 inches for guys with larger hands. It is also advisable to have a non circular hole for inserting drills, and tools plus give a bit more room for one to put their whole arm into the hole. I have found a cruciform hole to be the best but simply modifying the hole to allow sufficient meat around the nutplate and still allow sufficient flange to support the cover.

To install a larger hole, the distances for the hole need to be carefully planned and not just whacked in. I prefer to do my planning while installing the top. The top is carefully installed and removed probably 5 times so why not mark and plan the install carefully. Pay attention where the foam core ends and the

flange begins. This transition between the foam and glass is an important transition of the forces to assure the flange transfers torsional and transverse loads smoothly.



Next is to make the initial hole.

For a full sized access panel I use a 6 inch hole saw. Sounds large doesn't it. Well it is. A six inch hole will allow a 3/4 inch flange which with some shaping will allow most guys to insert their tools or in some cases the whole arm in the hole for maintenance in the area of the mass balance arm and trim. I open up the viewing hole also as I make my trim motor and anti servo system maintainable and removable especially in the taildraggers if the tail end of the plane is damaged in a ground loop. This allows easy trim wire install, servo install or replacement, adjustments to the trim or Singleton type rudder pushrod etc.

Procedure:

1. Plan the hole location and mark orientation lines for the removed panel.
2. Cut the hole with a hole saw.
3. Scuff sand the inner fuselage skin.
4. Remove the cut piece of fuselage out of the hole saw carefully. It will be your removable panel.
5. Cover the inner side of the cutout panel with release tape.
6. Place the cutout access panel back in the hole and carefully center in the hole aligned with the orientation marks and use tape and sticks to install it level in its original position.
7. Make a 4 ply tape covering the entire inner side and removable panel.
8. Peel ply and allow to cure.
9. Using the same sized bit as the six inch hole saw arbor, drill the center hole through the flange prior to removal of the cover.

10. Remove the panel by rapping firmly with a rubber mallet on the glassed area centered on the access cover. It will pop out.
11. Remove the panel and the release tape.
12. Replace the panel into the hole and plan the screw hole placement. The screws should be planned to be far enough inboard to prevent the outer edge from being compromised by a torque zealot over-torquing the screw in. Six inch cover should have 4 screws and the smaller 4 inch can use 3 screws.
13. Drill the planned screw holes and cleco the panel in place.
14. The most common screws are #10 AN stainless machine screws. Although a #6 or 8 will work also as the actual cover is not a structural member. The flange can be structural, but it will take 4 #10 sized screws to allow the cover to add to the skin strength.
15. Countersink the screw holes slightly deep. I like to use a decorative stainless countersink washer as a hole liner once the panel is filled and painted for a very neat look.



16. Using a 4.5 inch hole saw, drill out the 4 ply flange.
17. Using a Permagrafit/Dremel cutoff tool or pick, clear out 3/32 to 1/4 inch on both the fuselage and the access panel raw edges.
18. Clear out the foam from the countersink. Use a pick, or a deep Permagrafit wheel to simply grind out the foam at the screw holes.



19. Fill the edge with flox, peel ply and allow to cure.
20. Sand off any squeeze out.
21. Nut plate using the K1000-3 or similar and ensure the hole is not too close to the edge of the flange.
22. Fill the screw holes at this time then install the panel in place and allow to cure.
23. Remove the panel. Grind and fine tune the countersunk screws.
24. Install release tape on the panel again.
25. Install release tape or plastic electrical tape around the panel perimeter
26. Install the screws and trim washers if used.
27. Fill the gap around the removable plate with expand cell and allow to firm up.
28. Use a knife to cut vertically down the edge tape, to allow the panel to be easier to remove and prevent chip out of the expand cell after cure.

29. Once cured, remove the screws and pop out the panel.
30. Reinstall the panel and sand the filler smooth.

This method makes a very solid and light weight panel that is quite robust, and due to the extra technique of reinforcing stress areas, cup washers and the like, the panels will retain their look for years without chipping or distortion.

