

I believe that I've posted this before, but here's what I do:

Installation of SAE-5 flanged head capacitance fuel level senders in Long-EZ/COZY aircraft strakes

1. Referring to Chapter 21, Page 2, determine where along the BAB bulkhead you'd like to mount the sender. I generally like to put them a few inches from the intersection of the BAB with the fuselage side, so that it's reasonably accessible but not hanging out in the passenger compartment. Wiring can either run aft, under the longeron, to the spar area, or forward, inside the strake to the seatback bulkhead top to join with other wiring runs.
2. Leave 1/2" of space between the strake top inside surface and the outer diameter of the sender head. Mark the BAB bulkhead around the circumference of the head, and mark a circle 1/2" larger in radius.
3. Remove the OUTER SKIN ONLY of the BAB bulkhead inside this 1/2" oversize circle.
4. Mark the exposed foam under the removed skin with the OD of the SAE-5 mounting flange. Remove the 3/8" PVC foam inside this circle (+1/8" rad.) down to the depth of the thickness of the mounting flange (so that the flange can lay on the foam and be flush with the surface of the foam).
5. Remove ALL the foam inside the inner opening of the SAE-5 mounting flange down to the inner skin and clean the outer surface of the inner skin to remove the foam and micro residue.
6. Sand the area around the removed skin and foam to a distance of 1", to allow for BID attachment during the subsequent layup. This will include part of the inside top surface of the baggage area just above the head location.
7. Note that there is still NO hole cut into the fuel tank yet - this will come after the layup is complete.
8. Cut 2 ply BID to cover the sanded area - one at 0/90 and one at 45/45. Lightly prep sand the SAE-5 mounting flange on both sides and carefully fill the threaded holes with a small amount of grease to prevent epoxy ingress.
9. Mix wet floc with EZ10/87 for fuel resistance. Paint the exposed inner skin of the BAB bulkhead and exposed foam and sanded outer skin with epoxy. Apply a very thin layer of wet floc to the exposed foam and press the SAE-5 mounting flange in place, ensuring that it's oriented so that the wires on the head of the sender will be at the TOP of the mounting area - the flange is NOT symmetric and there is only ONE orientation that will work.
10. Fill in the area around the flange with wet floc, and put a generous fillet of wet floc inside the inner hole of the flange, leaving about 3/4" diameter in the center where the inner skin of BAB is still exposed. There should be NO exposed foam.
11. Apply the 2 BID over the whole area, ensuring a good bond to the surrounding BAB and strake top inner skin, as well as a smooth covering of the flange. The BID should smoothly transition to floc from the inner diameter of the flange, and then smoothly transition to cover the inner 3/4" area of the inner skin that has no floc on it.
12. Once you have the layup in place with no air bubbles and bumps over the SAE-5 flange, with no exposed foam and a small circle in the center that is only BAB inner skin and 2 BID, go have a beer or the functional equivalent. Steps 1 - 12 shouldn't have taken more than 2 - 3 hours/side.

13. After cure, carefully drill out the tapped holes with a drill smaller than the minor diameter of the #10 bolts - do not damage the threads, and DO NOT DRILL THROUGH THE BAB INNER SKIN. You're only trying to clear out the grease and remove some of the foam below the flange. DO NOT DAMAGE THE INNER SKIN.
14. The delicate part - using all the hand eye coordination you've developed up to this point in the build, use a rectangular rotary grinding tool such as a Perma-Grit RF-3: <https://www.aircraftspruce.com/catalog/cmpages/rotaryfiles.php> to grind a 1/2" diameter area of the center of the exposed BAB inner skin down to a paper thin wall - do not cut through the inner skin if you can help it. This will prevent any grinding dust from entering the fuel tank.
15. Once the area is very thin, use a pointy exacto knife to cut a 1/2" hole in the center of the BAB inner skin - leave a tiny attached area after cutting 95% of the way around, so you can grab the "hanging chad" with a pliers and cut it off, getting exactly zero dust or crap inside the tank
16. You're now ready to mount the sender. Carefully bend the bendable portion (mark it so that you KNOW where it's OK to bend and where it isn't) so that the probe goes UP toward the wire side of the head, high enough so that it ALMOST contacts the inner top surface of the fuel tank, and then down again so that the tip ALMOST contacts the inner bottom surface of the fuel tank. It will take a few iterations and careful adjustment of the bends to get it just right when the head is up against the SAE-5 flange. Keep dry-fitting until it's right. Make sure that there's NO contact even with a tiny bit of misalignment of the head.
17. Ensure that with the provided gasket, the bolts are NOT long enough to protrude through the thickness of BAB - they MUST just barely protrude through the SAE-5 mounting flange. Use shorter bolts or a couple of washers under the head of the 5 bolts if there's any question of the bolts going too far.
18. Install the head with the appropriate bolts and washers, using a very thin layer of gasket sealant: <https://www.aircraftspruce.com/catalog/eppages/permatexprod.php> and tighten the bolts until the gasket just begins to bulge. Tighten all five bolts equally.
19. Install a 3-pin connector to the red, black and yellow wires from the head, and complete the wiring to your EMS. Calibrate the 2-position sender (Empty and Full), and then calibrate the sender/EMS combination per the EMS instructions.
20. Voila'. I estimate about 12 - 15 hours of labor for a 2 probe installation when a customer requests this, NOT including calibration (which, admittedly for ALL the probes and EMS's with which I've ever dealt, is a PITA, but at least in theory you only have to do it once).

Hope this helps.

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