What I'm Going To Change When Skyote Gets Recovered

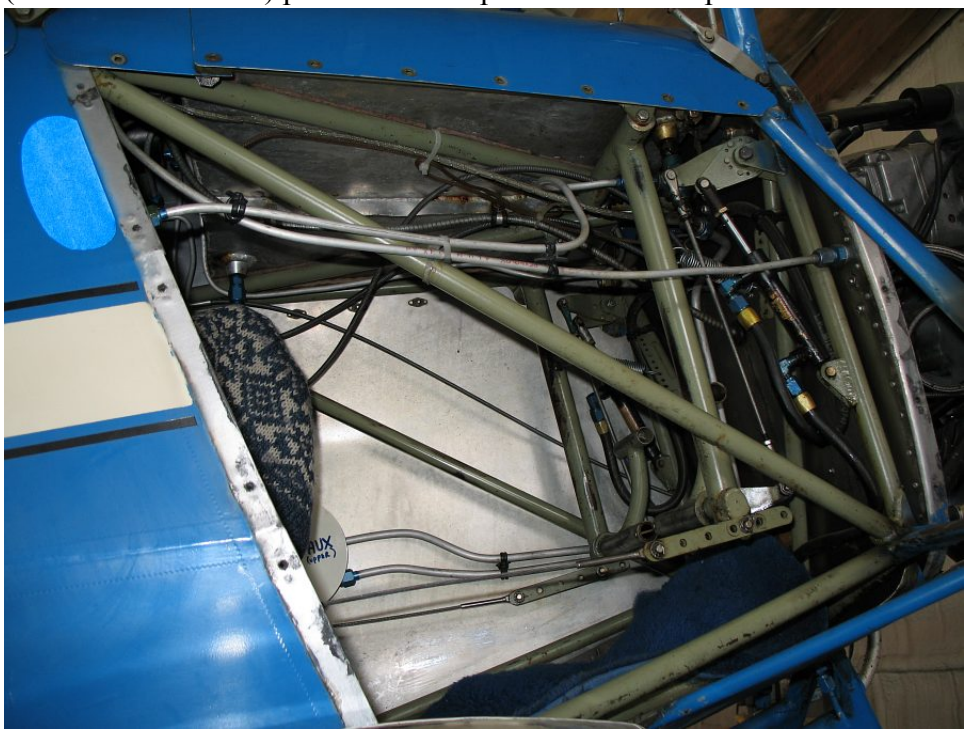
By Hawkeye Hughes, Polson MT

The Skyote is a wonderful design, and I love 8XX dearly, but there are some aspects of her construction that I believe can be improved. Some changes that seem worthwhile are described below, and I would hope that most of them might be considered as up-front changes by those individuals still constructing their airplanes.

1. Increase Total Fuel Capacity

Even with the choice of a small engine (C-90) and using aggressive leaning, the realistic range of my Skyote is about 150 Statute Miles in still air. That makes the logistics of cross-country flying here in the West pretty difficult. It would *really* be nice to have another 3 or 4 gallons that could be gravity fed.

Utilizing the space under the current fuselage tank requires dealing with some complications. The diagonal fuselage structural tubing members below the current tank (see Picture 1 below) prevent the simple addition of depth to that tank.



The size of an additional tank suspended below these tubes is limited in the fore-aft dimension by the Rudder Pedal suspension points and cross tube as well as the aft swing of the rudder pedals themselves. The depth is compromised by the reduced head pressure which will result as the bottom of the tank is lowered.

I think it is reasonable to relax the requirement that an additional lower tank must feed adequately at high power and nose-high climb angles when close to empty. As long as it will feed in a cruise-climb, it would function adequately without requiring any complicated fuel management issues. I have not yet run any numbers as to possible depth and volume, but Cubs and Champs only have 10 inches or so of vertical drop from the tank bottom to the Carb inlet in level flight, and perhaps 7 to 8 inches is close to a reasonable design limit here.

Even an additional 2.5 Gal in total fuel capacity would probably be worthwhile. Of course, another alternative is a removable lower centerline aux (external) tank (attached to the CL landing gear attach fittings) for flights requiring maximal range, but that requires a manual or electric pump, check valves, and attendant plumbing.

2. Incorporate Two-Piece Bolted-On Main Landing Gear Axles

My Skyote uses a single piece of pipe to serve as the lower gear strut attach fitting anchor and the brake-plate / wheel axle. In my case the complicated welding of the inboard axle assembly apparently resulted in "walking" of the axle tube geometry, and as a result, my airplane's feet are pretty crooked. (see Picture 2 below). The right gear has almost 3/8" of toe-in at the tire leading edge, and the left gear has a goodly amount of extra camber.

Because the axle is a single piece, there is no easy way to shim-out the alignment errors (see Picture 3 below). Bending the gear would probably have to be done with a lot of heating, and I have not wanted to tackle this because of the inevitable damage to the gear leg fairings. However, when redoing the gear I plan to cut off each axle outboard of

the gear fittings, and weld on a more substantial steel plate (where the present welded brake flange mounting ring is located), and mount a standard 6.00X6 separate stub axle. Shims could then be placed between the axle and the base plate, and the alignment corrected like any self-respecting Cessna.

3. Insert Replaceable Bushings In The Centerline Landing Gear Attach Fittings

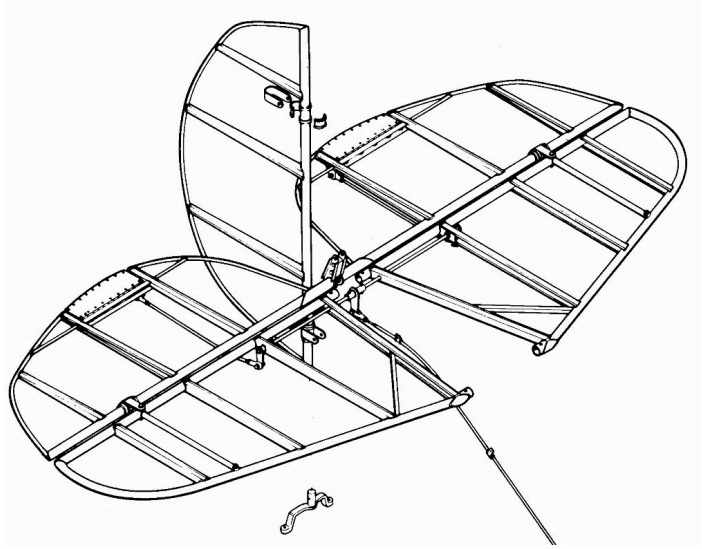
I have noticed some slight elongation of the bolt holes in the landing gear attachment tabs mounted on the fuselage centerline as shown in Picture 4 below.

Because of the acute angle geometry of the gear members in this area, these fittings take a real beating during any rough surface operations. Drilling the tabs up one size and fitting stepped replaceable bushings should make repairing the effects of wear a lot easier. There are probably other ways to improve the installation, perhaps edge-welding a large washer onto the face of each of the tabs to increase the bearing areas of the holes.

4. Reduce The Height Of The Stabilizer Rear Spar Attach Block And Revise The Bowden Cable Trim System

My Skyote, and several other early airplanes I have looked at, originally incorporated a drilled aluminum block approximately 1.4 ” high to serve as a mounting pillow for the attachment of the rear stabilizer spar to the upper fuselage longerons. For my aircraft, with a light engine (C-90-8F) and a wood prop, this resulted in an elevator deflection of about 1.5 to 2 inches trailing-edge-down in normal cruise flight. I reduced the height of the rear attach fitting to about 7/8” to achieve a more favorable stab incidence, (see Photo 5 below) but could go no further because of the increasing bending loads at the forward stabilizer attach bushings as the rear spar was lowered. One of the complications of modifying this area is that the center stab rear spar attach bolt holes will no longer align, which is why I had to go to a two-piece steel U-fitting. Additionally, the vertical fin rear spar receptacle will tend to angle aft. The old truism is really appropriate here… change one thing and everything else will change also. I plan to lower the rear spar another ¼” or so and true up the front attachment bushings to relieve any bending loads, and probably clean up the method of attachment of the rear stab spar as well.

I have never been happy with the Bowden cable trim system. Although it has functioned well enough, it is just plain ugly. I will see how an Eagle-style torque tube trim actuator might be adapted (as in Picture 6 below) although one disadvantage is that as designed it would cause the tab to function as a servo tab. This might not be a big deal, since most of the longitudinal stick loads in the Skyote come from the control system springs anyway, but it may be possible to route the actuating rod through the elevator to a tab horn on the opposite side, and thus cause the trim tab to function as an anti-servo tab, which would increase the stick forces slightly.



5. Increase The Area Of The Vertical Fin

Although some relaxation away from strong-positive directional stability is a good thing in a highly maneuverable small biplane, the Skyote carries a good thing a bit too far. My airplane exhibits very weak directional stability in the rudder-free condition. I would like to see my airplane behave in the rudder-free condition about like it does now in the rudder-fixed mode, and that means increasing the fixed vertical tail surface area somewhat. Picture 7 below shows a rough notion of how a ½ sq ft addition could be made to the vertical fin without detracting too much from the Skyote's graceful look.