**EPP (Lidl like) glider 84-86 cm span pitcheron conversion notes**

These notes are not meant to “teach you how to suck eggs”. But may be beneficial from myself already having done a couple of these conversions. You don’t have to use these notes, and may quite likely find your own better way of doing it. If you do find a better way, please don’t hesitate to share it. I admit I’ve gone overboard with some detail that is blindingly obvious to any experienced builder (sorry).

There are photos, not necessarily in order of these notes, here:
https://photos.app.goo.gl/3Q4fK9HjQDUSBBK89

A pre note. Cutting away EPP is messy with small bits of EPP that cling everywhere with static. So it’s a good idea to clean up as you go.

A. Cutting the wing slot for the CF rod on which the wings rotate.

1. If the wing is a dark colour on which it is difficult to see a marker line, put masking tape on the underside of the wing upon which to mark the slot.
2. Draw 2 lines 5mm apart at centre chord, 46cm long. Ensure the lines are exactly perpendicular to the centre wing chord line. Tip: use the LE as a datum and measure back from the LE a half chord 23cm from the wing centre on each wing half.
3. Using a straight edge cut a 45 degree slot 5mm wide and 46cm long. Tip: it is better to space the straight edge 1 or 2mm away from the line to get the blade tip on the line, as your blade is at 45 degrees.
4. Remove the wedge of EPP.
5. Using a low grit (e.g. 80 grit) piece of sandpaper on a short piece of 4mm CF rod or wood dowel, sand out the slot to be semi-circular. The slot should be just slightly deeper than 5mm to allow covering the slot with a 1/32 strip of balsa after the CF rod and Al tube are installed. And hence have a smooth airfoil underside.

B. Assembling the CF rod and Al tube for the wing pivot

The wing pivot consists of the 4mm CF rod 46cm long and 5 pieces of 5mm OD Al tube. The Al tube lengths are 6cm (centre tube), 17.5cm (2 off, 1 for each wing) and 2cm (2 off wing retainers at each end). The retainers are essential to keep the wings in place on the pivot rod. But see the note below for alternative retainer methods.

That leaves a 5mm gap at each end of the retainer tubes to glue the retainers to the rod at the outboard ends. The reason the retainer is as long as 2cm is to ensure no adhesive (e.g. thin CA) wicks/migrates to the inboard end of the retainer and hence compromises the free rotation of the rod in the wing tubes.

1. So the Al tubes assembly order on the rod is; retainer, wing tube, centre tube, wing tube, retainer. Before gluing the retainers at each end ensure that the tubes are centred so that the exposed ends of the CF rod at each end are equal, ~5mm, and the tubes are all tight together, i.e. there are no gaps.
2. Glue the retainers to the rod at the outboard end of the retainers. It is critical that no adhesive gets past the retainer to the wing tubes that must rotate freely on the rod. So be careful.
3. Check the fit of the pivot rod tubes in the wing and that the tubes are about half mm below the wing surface to allow for a balsa filler strip.

4. (Obviously) the pivot rod/tubes cannot be glued into the wing until after the wings are separated. Do not install until step F.

Note: there are many other ways that could be used to retain the wings; e.g. heat shrink, glued O ring, pin through the rod, circlip etc.

C. Cutting each wing from the centre section.

The centre wing section inside the fuselage is 6cm span. That leaves 4mm of the centre wing protruding at the LE each side of the fuselage.

1. If necessary use masking tape so a marked chord line can be made on each wing, perpendicular to the span, 3cm from the centre of the wing, i.e. 6cm apart. It is easier to cut from the top surface of the wing because the tip dihedral makes it awkward to cut from the bottom.
2. I found it best to make a shallow cut first with a knife and then cut with a thin crosscut saw in that initial cut. Use a square to ensure the cut is perpendicular to the top surface of the wing. There is no significant taper of the wing at the cut position, so using a square will ensure a cut perpendicular to both top and bottom surfaces. Note if the cut is not perpendicular the rotation of the wings will be impeded and a gap will be required between the wing and the centre section.
3. Optional but I think advisable: Glue a 1/64” plywood rib on each of the 4 cut surfaces. After each wing is separated use the cut end to mark the rib shape on plywood. Cutout a notch in the rib where the pivot will be.

D. Cutting the servo recesses

The servos reside in the fuselage underside the wing just behind the leading edge. Position them so that there will be at least 20mm between the horizontal servo arm and the control horn underside the wing. Less than this may make it difficult/awkward to have an adequate length pushrod.

1. Place the servo against the fuselage and mark a rectangle the shape of the servo, no larger than the servo.
2. Cutout a rectangle deep enough so that the servo arm is proud of the fuselage by about 5-7mm.
3. Repeat for the 2$^{nd}$ servo on the other side of the fuselage.
4. Drill an 8mm or 5/16” hole between the recesses at their front end.
5. It may be useful to cut a small indent in the recesses for the servo wire so it does not get damaged when installing the servos. Installing the servos will be easier if the wires are at the front end. Check that they fit okay but don’t install them yet.

E. Cutting the receiver/battery recess and path for the servo wires

1. Note there are a couple of protrusions on the fuselage that position the canopy. It can be useful to not cut these away as they help keep the canopy in place. Remove the canopy bolt ballast.
2. I put the Rx in the fuselage and the battery in the canopy. I use a #11 blade knife to cut initially and then a rotary tool to finish off to depth.
3. When the recess in the fuselage is to the required depth drill an 8mm or 5/16” hole at an angle from the middle rear of the recess to join the same dia. hole between the servo recesses.
4. Glue a piece of thin balsa or ply to the bottom of the recess on which to attach the Rx. It may be useful to do the same in the canopy for the battery.

E. Cutting control horn slots

It is easier to cut the slots for the control horns before the wing is inserted in the fuselage.

Decide the servo arm orientation (forward or backward), which hole in the arm to use and cut the slot in the wing accordingly. The horn needs to be slightly outboard of the servo arm. One of the horns itself can be installed before the wing is in the fuselage, but not both. I recommend waiting until the wing is installed before gluing in both control horns.

F. Gluing the pivot rod tubes in the wing and wing installation

I initially thought a washer between the centre section and wings would be necessary, but later decided it is not necessary. Plywood on the cut wing surfaces reduces friction vs foam on foam.

1. Ensure all 3 wing parts are butted together and insert the rod/tubes in the slot.
2. Ensure the ends of the middle tube are aligned exactly with the middle wing section.
3. Goop is compatible with and works well on EPP. I used Goop but make sure you keep it well clear of the cut ends of the tubes. Glue all 3 middle tubes into the wing, but not the end retainer tubes.
4. Ensure the tubes are slightly below the wing surface and wipe off any excessive adhesive.
5. Clamp all 3 sections until the glue sets.
6. Optional, glue a strip of 1/32” balsa over the slot and sand down until flush.
7. Insert the wing in the fuselage. It is quite tight and optional if you want to glue it. But if you do use an external bead, not glue between the internal surfaces,

G. Servos installation.

1. Use thread with a 1/4” washer on one end, the other end on the servo connector, to route the servo wire from the servo recess to the Rx recess. Needle nose pliers or long thin tweezers helps grab the connector from the servo hole and through the hole to the Rx recess.
2. Don’t glue in the servos until satisfied that the control horn positions in the wing are in correct alignment with the servo arms.
3. Don’t use glue between the servo body and the recess, but just use a few small dabs of Goop on the outside of the fuselage after the servo is in position. This enables servo removal/replacement if necessary. The Goop on the outside is fairly easily cut to remove the servo.
4. After making sure control rod alignment will be satisfactory, glue the control horns in the wing.
5. Suggest use DU-BRO Mini E/Z connectors on the pushrods servo arm end, which can just be a simple $90^0$ bend, no need for a Z bend. I didn’t use an adjustable connector on my first attempt of this conversion, and ended up using up a significant amount of trim and sub-trim.

H. Final notes

- If you want to add some colour, Krylon and Rust-Oleum spray paint are compatible with and won’t damage EPP. Lightly sand the surface first.
- On radio elevon setup for up and down elevator. Don’t forget that for up elevator the wing TE goes down and vice versa, i.e. for a pitcheron, opposite direction to an elevator.