

# Simplex Zing and Cloudster Service Bulletin

## April 2017

**The following additional items have been added to all plans purchased after December 2016. Plans owners who purchased their plans prior to this date should print a copy of this bulletin and enclose it within their plans set.**

### Fuel Tank

All plans issued prior to January 2017 included a section about fuel tank selection and installation. These instructions were essentially the same instructions provided with the original Cloudster plans created in the late 1990's. More recent versions (late 2016) also included a section citing FAR 23.975. After careful review with both mechanical and aeronautical engineers we have determined that the prior instructions which prescribed the use of non-aircraft quality hardware and materials was ill advised. Please review your current set of plans and cross out all line instructions prescribing the use non-aircraft grade eye bolts or any use of bungee cords. At this time we are not prescribing one specific way to mount the fuel tank, nor are we recommending one particular fuel tank to use.

We anticipate that in the near future we will make a change and alter this section of the plans to include a precise detail of fuel tank selection and installation. In the mean time we recommend that the builder use caution and careful thinking to determine the best tank to install, and the most secure method of installation.

For builders who have already installed their fuel tank or are fortunate to have a flying airplane, we recommend review of this section and consider changes to your fuel tank installation as needed to ensure continued safe flight.

**The fuel tank, no matter what size, shape, or material; must be connected in a secure and solid way with no chance of movement in both positive and negative "G" environments up to +4/-2 G's.**

The support structure by which the tank is attached must be capable of supporting the fuel tank under both extremes. For a typical 5 gallon tank with an empty weight of 2 lbs along with the added weight of fuel (roughly 6 lbs per gallon), the +1 G weight of the tank is roughly 32 lbs. With a 150% safety margin added to the +4/-2 G's advertised maximum loading, the structure supporting the tank must be able to support 192 lbs of downward force (4 g's x 1.5) and 96 lbs of upward force (-2 g's x 1.5). Since some tanks weigh more than 2 lbs these forces should be averaged to 200 lbs downward force and 100 lbs upward force respectively. If your tank structure and corresponding mechanical attachment method cannot support these loads then changes must be made to ensure safe flight.

*As a general reminder the Zing and Cloudster have not be tested in aerobatic flight. Nor has either design been spin tested. Though the structure is quite strong and well proven, we do not recommend aerobatic flight or intentional spins. Fortunately, the wings, tail surfaces, and fuselage are of the same general construction of other designs that have been proof tested well beyond +4/-2 G's without damage or failure. Thus at this time there is no incentive to perform destructive testing.*

We also recommend a review of **FAR 23.975** along with direct application to your installation.

#### 23.975 Fuel tank vents and carburetor vapor vents.

(a) *Each fuel tank must be vented from the top part of the expansion space. In addition—*

- (1) Each vent outlet must be located and constructed in a manner that minimizes the possibility of its being obstructed by ice or other foreign matter;
- (2) Each vent must be constructed to prevent siphoning of fuel during normal operation;
- (3) The venting capacity must allow the rapid relief of excessive differences of pressure between the interior and exterior of the tank;
- (4) Airspaces of tanks with interconnected outlets must be interconnected;
- (5) There may be no point in any vent line where moisture can accumulate with the airplane in either the ground or level flight attitudes, unless drainage is provided. Any drain valve installed must be accessible for drainage;
- (6) No vent may terminate at a point where the discharge of fuel from the vent outlet will constitute a fire hazard or from which fumes may enter personnel compartments; and
- (7) Vents must be arranged to prevent the loss of fuel, except fuel discharged because of thermal expansion, when the airplane is parked in any direction on a ramp having a one-percent slope.

*The following section on the "Cowling" has been added to all plans*

## **Cowling**

First, you can skip this entirely as a cowling is not required. Second, you can skip fabricating one by simply buying a cowling from Simplex Aeroplanes. Third, you can't begin the cowling until you have chosen the motor you want. The motor also needs to be mounted and an initial weight and balance completed. The reason for this is that making a cowling means creating something that fits perfectly around the existing motor and its mount. If you need to move the engine forward or backward to gain a better CG then the cowling would need to be adjusted or possibly remade. It is much easier to simply have the weight and balance already correct, and then make the cowling. The cowling should weigh less than a 1 lb hopefully, so the additional weight on the nose will make hardly any difference on the center of gravity. If the motor is not mounted then skip this step and return at the end of construction!

We will detail how to make a cowling out of FIBERGLASS. You can also make one out of aluminum or thin plywood if you make an internal frame to hold it. However, experience has shown that a fiberglass version can be made easier and lighter than any other option. At this stage you want to make a template that shows a silhouette of the cowling profile, and get a good idea how long the cowling is to be. You want to make absolutely sure that you build a cowling that reaches to the back side of the prop flange. Leave about a 1" space between the back of the flange, and the cowling exterior.

- 1) Remove the engine and possibly the motor mount and set them aside.
- 2) You are going to build up the cowling mold out of 1" or 2" foam. Either blue or pink insulation foam from your favorite hardware store.
- 3) Attach the foam pieces together using T-88 epoxy, or whatever you have on hand. Just remember that some glues attack foam, while epoxy usually doesn't. Keep in mind that less joints are better as it is hard to sand if you have a glue line you must sand through.

- a) Don't permanently glue the foam to the firewall. Find a temporary means of attachment.
- 4) Fill the entire space for the cowling with foam, larger than the cowling you want to make.
- 5) Start shaping the foam to whatever shape looks good and practical. Make sure you leave enough all around so you can sand down to contour.
  - a) There is a 'shurefoam' tool you can find at some hardware stores or through an easy Google search. This tool removes a lot of material and is used for rough shaping.
  - b) When shaping foam, make sure that you are wearing a respirator (dust mask), and have adequate ventilation. Foam dust gets everywhere!
  - c) The shape of the cowling is entirely up to you. It is not structural, its only function being to keep the wind out of the cockpit. Just remember to keep the lines the same on each side, and match the rear cockpit shape.
- 6) Once the rough shaping is finished, use finer and finer sandpaper, until the surface is as smooth as possible.
  - a) One of the best (and cheapest) sanding tools is another piece of foam.
  - b) Make sure that there are no dents or scratches in the cowling, as this will show up later.
- 7) Now coat the entire cowling with wax mold release, found at most nautical supply stores, and fiberglass stores. This will allow the lay ups of fiberglass to easily be pulled off the mold.
- 8) To lay up the fiberglass, use light or medium weight boat cloth found at any hardware store, West Marine, or even Walmart.
  - a) You can use your preferred resin and hardware, but the basic "Bondo" brand polyester resin and hardener found next to the cloth is usually just fine.
- 9) Lay up at least three layers of glass on the entire cowling.
  - a) **IMPORTANT:** Make sure that you extend the fiberglass onto the front of the fuselage at least 1" so that you can attach it with pk screws later.
  - b) **Or** add two thin aluminum angle brackets on both sides of the firewall at the left and right edge that act as a securing point for the cowling.
- 10) Let cure for the time specified by the manufacturer of the resin.
- 11) To separate the mold from the fiberglass part, slide a butter knife between the foam and glass, and working your way around the part, apply pressure until it pops free.
- 12) Clean up the outer surface of the cowling with sandpaper, until it is smooth and free of dents and knicks.
  - a) You can use small amounts of bondo, but they must be small as this adds weight, and bondo is not very flexible, so any part where bondo is added could eventually crack.
  - b) Clearly its better if your finished cowling is sanded smooth with no fillers added.
- 13) Carefully measure the cutouts for the engine and prop, and draw them on the cowling.
- 14) Carefully cut away larger and larger sections of the cowling, until your motor and prop flange clear the cowling, with enough room left for vibration, without the cowling touching any part of the engine.

- 15) You can bolt the engine back into place, and test fit the cowling. Make any changes necessary, then attach the cowling to the airframe using PK screws.

*The following information on the center section gap cover has been added to all plans*

## **Center Section Gap Covering**

**This detail is very important!** This aircraft will not fly correctly without the center section covered. Anyone familiar with the aerodynamics of parasol airplanes knows that there must be a smooth flow of air across the entire span of the wing without a break which would naturally occur in-between two wings if not covered. Too many people have made first flights of their parasol type airplane without the wing gap cover/center section cover. Then they complain that their plane lacks lift and feels mushy, only to learn later that with the covers installed the plane flies so much better!

- 1) Purchase 12" or 14" wide roof flashing (comes in a roll) from the hardware store. Alternatively use 6061 aluminum sheet metal (your choice of thickness). Measure and cut a piece to cover the gap between the wings. This piece should wrap around the leading edge D-cell and then go over the top of the wing to the trailing edge.
  - a) You can cut this piece to the width you prefer, but it needs to overlap the wings by at least one inch on either side.
- 2) Purchase 1" wide Velcro from your local hardware or craft store. Purchase it by the roll so you have long lengths of it. The Velcro comes with both sides connected. Some already has an adhesive backing, others do not. We prefer the type with no adhesive as it's not nearly as strong as T-88 epoxy, which we will use later.
- 3) For the aluminum flashing attach two strips of 1" wide Velcro on both sides so that it will connect to the inboard ends of the two wings. Either attach this with T-88 epoxy, or if you use the existing adhesive backing, then also drill and secure small pop rivets every 6".
- 4) For the other half of the Velcro, attach this to the inboard top edge of the wing and around the inboard section of the D-Cell on the wings. You will remember from the wing construction that the inboard area has a continuous piece of plywood around the circumference of the airfoil which makes for a perfect place to mechanically attach. Since the wings are usually painted by this point, merely gluing this to the painted inboard edge is usually not sufficient as the paint can be pulled up and away from the fabric. For this reason you should also mechanically attach the Velcro with small wood screws.
- 5) If you are confident that there will never be a reason to remove this Velcro from the inboard ends of the wings then you can permanently attach the Velcro with these small screws.
  - a) Go ahead and coat the small threads of the wood screws with a thin layer of T-88 epoxy so that they will never back out.....ever...
- 6) Paint the outside (top) of the flashing to match the wing color or some other color if that is part of your paint scheme.
  - a) Alternatively, the flashing is already quite shiny and you could simply polish it to save weight from added paint. The choice is yours!

In the **Zing Plans** the following sections were originally included with most plans. Scratch these out as they came from the Cloudster plans and are not necessary.

### Fuselage Stringers

~~Although the fuselage stringers add no structural strength, they give the airframe a "finished" look, in addition to providing a smooth transition from the cowling to the firewall. Many builders may want to place the stringers at different locations depending on their own tastes.~~

~~Glue two vertical stringers at the back edge of the aluminum channel motor mount. These will be 1" x 1/4" and are shaped to support the curvature of the cowling. Then run the stringers back along the fuselage. Attach them with small corner blocks.~~

### Pre-Assembly

~~With fuselage insides varnished, the seat bottom and back plywood sections may be cut, fit and installed. NOTE: Varnish the back sides of the seat back and bottoms except at glue locations. The seat bottom ply must have the control stick cut out prior to installation. This cut-out determines the control surface travel and Should be pre-set during the control systems installation.~~

~~The center section top may be covered with 1/16" Lexan or 1/16" plywood. Varnish the seat back and bottom and inspect the entire airframe for missed areas of varnish and touch up as required. Remove all hardware required for covering.~~

In the **Cloudster Plans**, the following sections and associated lines may be removed as they are no longer applicable.

### Pre-Assembly:

- ~~4. The center section top may be covered with 1/16" Lexan or 1/16" plywood.~~

## **CLOUDSTER PLANS Materials List (revision)**

### Raw Wood Stock

#### Fuselage

Main carry throughs (top) 3/4" x 7" x 24" (*add notation: Maple, Fir, Birch, or laminated birch plywood*)

### Plywood List

#### Fuselage Plywood

Front cabane sides ~~3mm x 24" x 24"~~ ...change to 3mm x 21" x 28"