Team Rocket
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Team Rocket 12-05-2024 newsletter

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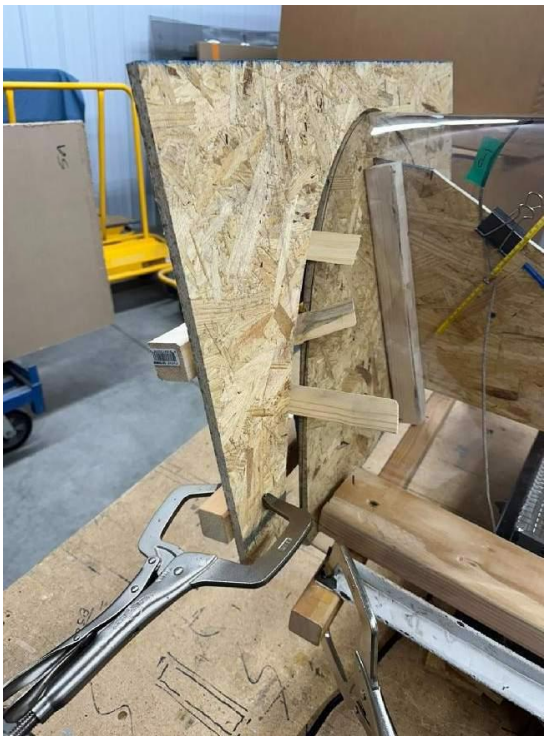

Annealing Plexiglass to remove stresses

Jeff Rodgers, from Airplane Plastics, helped me put this information together. It may be useful to those who have a Plexiglass (canopy) bubble that seems to resist staying in the desired location while you are fitting it to the frame. This procedure is designed to relieve the stresses that may be present in the blown Plexiglass.

It is not necessarily a required procedure, and it is not without a certain amount of risk. Vince

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It is sometimes useful to anneal your formed Plexiglass canopy parts. It can remove stresses, which may allow an easier fitment, or even prevent you from damaging the Plexi. However, it is NOT always required. If your Plexi needs only light force to pull it in where it goes, don't worry about it.

If you're uncomfortable with the force required to get the Plexi to maintain the shape you want, then you might consider annealing the Plexiglass. But first, let's talk about Plexiglass forming... a very general overview!

OVERVIEW:

If you're a real geek, you can see typical Plexiglass properties (aka extruded acrylic sheet) at this URL: https://www.usplastic.com/knowledgebase/article.aspx?contentkey=533

Plexiglass is formed by heating the material up to its forming temperature. This temp varies, but is about 300 F. Let's be clear here... if you get your canopy anywhere near that temperature, it will be ruined. That temp is for blowing bubbles, not for annealing.

Annealing will occur at temps up to 190 F. If you looked at the URL above, you saw that the deflection point under load temp is 195 F. It's safe to assume that we don't want to go past that temp during annealing. You also saw that the maximum recommended continuous service temp is listed as 160 F. So, we can infer that annealing should be done between 160 F and 190 F. If you choose a temp lower than 190 F, the annealing simply takes longer. If you go above 195 F, you risk damaging the bubble.

You might also infer these things from the data above:

- Using a black canopy cover in the hot sun is a very bad idea. You might return to an airplane with a very flat canopy.
- Having a polished aluminum airplane might do similar bad things under certain conditions.
- Leaving your Plexiglass splayed out on a shelf for extended periods of time may result in it taking a set. In other words, try to store it in the shape you'll need later, .e.g store it with the sides restrained to maintain the width you'll want later.
- Overheating a canopy bubble will return it to a flattened state. Ugh.

ANNEALING:

Calibrate your thermometer(s) first. Checking it in boiling water should suffice for the temps we're interested in.

Having multiple thermometers is a good idea. Having thermometers with a display that is outside the oven is a great idea.

To anneal your Plexiglass canopy you'll need some sort of frame to hold the desired shape. As you can see in the photos, it doesn't need to be complicated, just sturdy enough to do the job. Using scrap lumber is a good way to restrain the canopy sides.

If you don't have a huge, walk-in industrial oven... and who does?... then you'll need to make some sort of large box that can withstand 190 F temps for 12 hours or so. In other words, be careful about just taping some cardboard together lest the tape adhesive weaken and the whole thing may collapse onto your work. You'll also need a door of sorts, and maybe a

window or two to monitor the progress.

It is best, almost an absolute must, to warm the oven to the desired temp before putting your work piece in there. You want to eliminate as many hot, or cold, spots as possible.
When the oven is ready, roll the Plexiglass into the oven. A cheap Harbor Freight dolly, or similar, is the ticket.

Important: Monitor the temps while your Plexi is annealing. 2 hours should be long enough. Then turn off the oven and let everything cool in place. There's no need to rush anything! Come back tomorrow after everything is cool.

That's it. At this point you should have a Plexiglass bubble that is stress-free and holds the desired shape without any unusual force required.

OTHER TIPS:

https://www.airplaneplastics.com/faq has some very good tips also. They are the "go-to" guys for any Plexi questions.

Trimming can be done with a thin cut off wheel in a die grinder. Or similar. Saws are generally a poor choice for cutting Plexiglass bubbles as they tend to chatter and are prone to crack things

.
Always break the edges after any cutting, trimming, or drilling. The tool pictured in the Plexiglass tools pic below works well. Just don't tip it too far and scratch the Plexiglass. It is also possible to use homemade tools, made from saw blades, or other sharp-edged metal.

Never use a regular twist drill bit on Plexiglass. And never push the bit through. It is a sure way to make a crack. Use Plexiglass bits, and a light touch, or *with care*, use Unibit step drill bits (the ones that look like tiny Christmas trees). Whichever bit you use, it should scrape away the Plexiglass, not dig in. If it digs in, it will cause a crack.

Important: See https://www.airplaneplastics.com/faq for more comments on using step drills.

Deburr any drilled holes. An ordinary rivet countersinking bit in a micro-stop cage works well, as does a step bit (be careful!). Just make sure that your deburring bit scrapes the Plexiglass and doesn't bite in.

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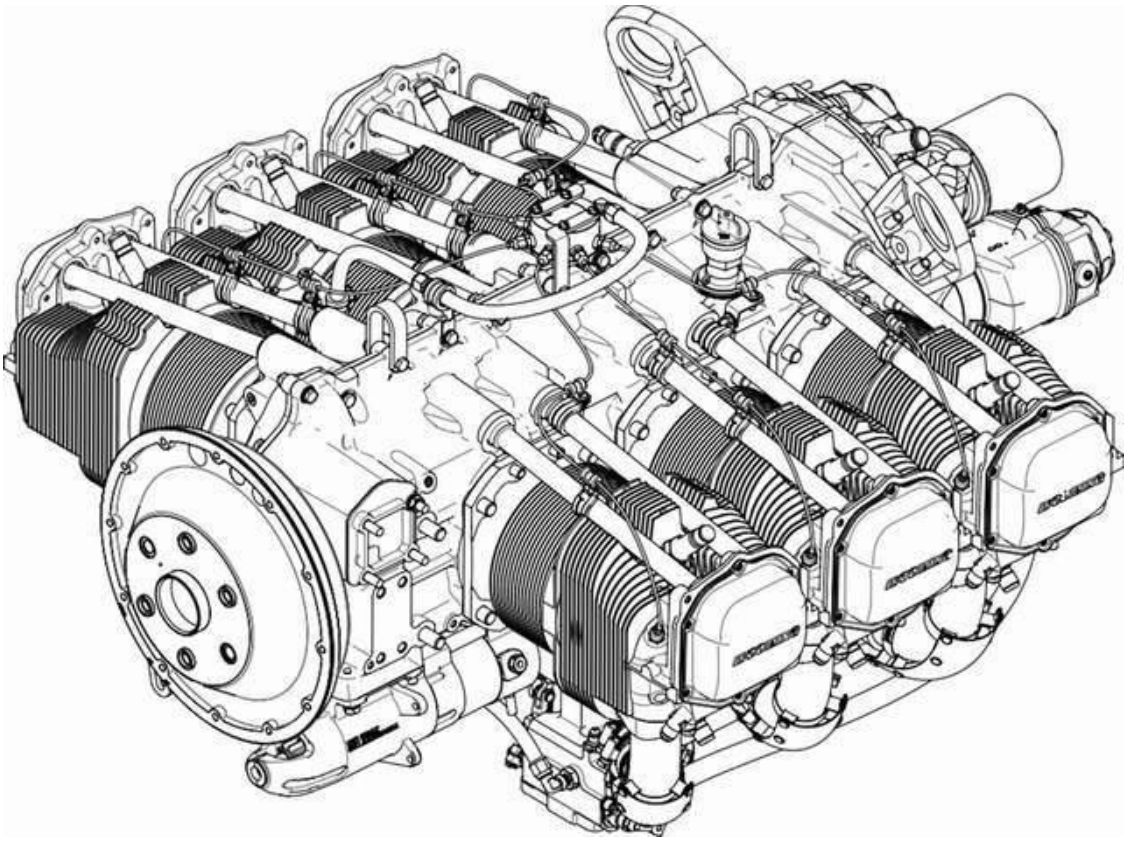
Photos (above)

Pic 1thru 5, Setting up before annealing
Pic 6, cut off wheel
Pics 7, Plexiglass bit and scraper



Paul Dye's Rocket project - Kitplanes articles

Many of you know Paul Dye, who is famous worldwide for being an F1 Rocket builder. He also is an editor for *Kitplanes* magazine, and used to work for NASA as a janitor, or something like that. Oh, wait a minute... I remember now... he was the flight director for most (all?) of the shuttle missions. Now Paul is (sort of) retired, an all-around nice guy, and very knowledgeable.

Kitplanes is a fabulous magazine for anyone interested in building their own aircraft. If you haven't subscribed already... you should do so immediately! It is the best money you'll ever spend on getting yourself ready to build your own plane.

Here are a few "teaser" links to recent F1 Rocket related articles that Paul has written. They accompany the photos above. To see the full story, browse to the links below.

https://www.kitplanes.com/polished-or-unpolished/?MailingID= polished rivet sets

https://www.kitplanes.com/model-what/?MailingID= Lycoming engine explanation

https://www.kitplanes.com/just-a-little-squeeze/?MailingID= squeezing the empennage skins

https://www.kitplanes.com/the-masters-kiss/?MailingID= Giving the rivet holes a kiss

https://www.kitplanes.com/the-process/?MailingID= The process. That's a lot of Clecoes.

https://www.kitplanes.com/which-control-stick/ Which control stick. Make it fit your needs.

Travis Lattin's F1 Rocket (flying) and HR2 project

After 21 months of building, I got F1 Rocket serial number 225 in the air. The build took me around 2200 hrs with approx 100 of that studying plans and pictures on Vince's Dropbox.

Along the build I had a few problem spots, like building fuel tanks and fitting fairings. Other than that, everything was really straightforward.

The plane has an IO-540 with cold air induction, high compression, upgraded camshaft, Vettermann 3 into 1 pipes, and one emag. It should make approx 330 HP while swinging a Whirlwind 3 blade propeller.

I have flown 75 or so different types of planes and this one is by far my favorite. The Rocket is everything I was wanting for a “fun” plane. It climbs easily at 3000+ fpm and cruises at 190 kts indicated at 4-6000 ft 24/2400.

I have 35 hrs on the plane now and have worked through the few squawks I had. Now I am working on different power settings and speeds at altitudes up to 10k and luckily no gear

shimmy issues. I have north of 15000 hrs of Tailwheel time and still the Insurance was a bit steep at $7200 for $225K hull value. The next renewal be more like $5500 as per the agent.

I have another wing kit and tail kit so plan to build a second F1 soon.

(More photos of Travis's F1 can be found in the Dropbox folders. Check the "flying aircraft" folder, among others. - Vince)

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Lots of good photos for a Harmon Rocket build. Visit Travis Lattin's builder's log for the HR2: https://eaabuilderslog.org?s=tlattin

Text block at your service. Replace this text with yours.

Shimmy survey results

In our last TR newsletter I asked our Rocket owners to respond to a poll on shimmy. About 1/2 reported no shimmy, and the other 1/2 reported varying degrees of shimmy.

Only one owner reported having an unusually heavy amount of shimmy, and they are working through various things to fix it. Most Rockets have no, or manageable, shimmy. (My RV-4 also has occasional shimmy... it's just another part of having Wittman type tapered rod gear.)

One respondent reported making gear leg stiffeners (dampers) out of a material called Richlite. I found those comments very interesting. Looking it up, it appears to be a plastic/wood product. If anyone else has tried it, please report back to the group.

There is still more data that needs to be collected on the various fixes tried. For example, I had a modest reduction in shimmy, which wasn't bad in the first place, when I shortened my gear legs. You can read about shortening the gear legs here: https://vincesrocket.com/Additions%20after%2010-27-04.htm

Note: I am not recommending that everyone shorten their gear legs to correct shimmy, unless everything else has been tried first. I mean, if it doesn't help, or makes things worse, then what?

More on this topic as more reports come in. This has been a problem on Wittman type gear since day one and we may never completely cure it, but we can certainly try to minimize it.

Propeller price increases coming

We have been told to expect a modest price increase for propellers next year. If you know that you need one, and have the funds to get it this year, drop me an email ASAP!!!

vince@f1aircraft.com

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F1 Rocket Sport wing partial kit and complete Mk3 tail kit This is a one time only item. When it's gone, it's gone. These parts are NOS and untouched. Probably not even dusty because they've been in the sealed boxes since January 2022.

The parts in the photos above are typical, but not the actual parts, which are in sealed boxes. Not all of the parts are shown. The Sport wing partial kit consists of:

- F-004 fuselage bulkhead set for the Phlogiston spar, with splice plates
- **Phlogiston** rear spar set
- **Phlogiston** main spar set
- Sport wing ribs - large tanks - Sport wing rib set - **55 gallon tank option** - includes additional tank ribs, 54 ribs total (*note: 42 gallon tanks are standard)
- Sport wing leading edge skins - Sport wing leading edge skins for 55 gallon fuel tanks

These are the primary components of the Sport wing. You'll need flaps, ailerons, main skins, and various other small parts, but the primary structure is there.

The Mk 3 tail kit includes:

- Everything needed to produce the current version Mk3 empennage

The buyer will be assigned a builder number.

Price $17,500 Contact Vince vince@f1aircraft.com

Vince Frazier,

Frazier Aviation Products LLC
7237 South State Road 75

Cutler, IN 46920-9617

www.f1aircraft.com
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