

Holy Crap - you actually have been FLYING that thing?

**What you should care about from a safety standpoint
when building your airplane, and what a buyer should
check when purchasing a previously built canard aircraft**

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Columbia, CA Canard Fly-In

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4:30 PM – whenever you get sick of me

What Will I Talk About?



- *Who Am I?*
- *Introduction*
- *Aircraft with Issues*
- *Control System Issues*
- *Other Issues*

- *Aircraft Modifications – Margin? (Thanks to Dick VanGrunsvan)*
- *Lessons?*

- *Builder/Flyer/Buyer Support Methods*
- *Questions and Answer / Discussion (ANY topic)*

Who The Heck Am I?



- Biography / Resume'
 - <http://www.mdzeitlin.com/Marc/bio.html>
- Built Quickie Q2
- Built COZY MKIV #386, N83MZ – ~945 flying hours
- Started / Administer Unofficial COZY Builders Web Page and COZY Mailing List (~680 members)
- Principal in Burnside Aerospace Consulting – Affiliated with Freeflight Composites

- Since May 1st, 2011, I provide **OFFICIAL** technical support for **COZY** aircraft to all builders, flyers and prospective builders

Introduction



- Recently began doing more pre-buy/Condition Inspections
- Realized that many aircraft are NOT built/rigged per specifications – even those flying for hundreds/thousands of hours
- Not a surprise to others in repair/upgrade business (FFC, Owl Eagle, etc.), but prevalence of issues (at least in aircraft brought to me for inspection) was an eye-opener

Aircraft I inspected with Issues



- Long-EZ at FreeFlight Composites in Co. Springs, CO
(Flying with hundreds of hours)
- Quickie at FreeFlight Composites in Co. Springs, CO
(Under restoration – previously flying)
- VE in Lancaster, CA
(Flying with hundreds of hours)
- COZY III in Placerville, CA
(Flying with hundreds of hours)
- Long-EZ in Inyokern/Tehachapi, CA
(Flying with ~1400 hours – Currently in my shop for refurb)
- Long-EZ in Inyokern, CA
(Flying with ~600 hours)

Control System Issues



- Poorly balanced flight surfaces (ailerons, elevators)



Control System Issues, cont.



- Incorrectly balanced flight surfaces
- Pushrods in engine compartment not steel
- Pushrods in engine compartment bent
- MM3 rod-ends not upgraded to XM-3
- Hinge pins no retention mechanism (safety wire, cotter pins, crimped ends, etc. – silicone and/or recess NOT acceptable)
- Device interfering with rudder pedals
- Wires/tubes interfering with rudder pedal access
- Soft rudder stops (flutter issue)
- Excessive friction in control surface hinges (flutter issue)
- Rudder cable rubbing on engine mount
- Control surface bearings/bushings wrong material – deteriorating
- Insufficient control surface clearance for motion under load
- Insufficient control surface motion capability
- Control surface hinges mis-aligned
- Insufficient control stick motion for full control surface motion



Other Issues



- No known W&B
- Canard alignment pins/bushings corroded
- Canard lift tab holes elongated
- GUNK in fuel sump blocking fuel line
- Navman Fuel Flow Meter Sender installed – killed Glen Saunders
- Wires, tubing, brake lines, etc. not tied down (chafing and rubbing)
- Firewall pass-throughs not sealed
- Copper primer lines / AL MP lines not supported (fatigue danger)
- Wheel spacers incorrectly mounted on Cleveland wheels/axles
- NG-6 loose – nose gear excessive play
- Bolts too long/short
- Wires below fluid lines



Aircraft Modifications – Margin?



- August, 2011 **Sport Aviation** article by **Dick VanGrunsven** (designer of all RV aircraft) addresses overweight/overpowered aircraft – specifically an award winner RV-10 written up in Sport Aviation!
- A couple of quotes from Dick:
 - ...Any “penciled in” gross weight increase is just wishful thinking. **The laws of physics are not repealed by wishful thinking.**
 - **WHO OWNS THE MARGIN?**
It seems common practice among homebuilders to second-guess the factory engineers, particularly regarding gross weight increases. Because of all of the added features, empty weight creep erodes the aircraft’s useful load. The simple solution for the homebuilder is to “pencil in” a new gross weight limit. “It’s only 100 pounds (3.7 percent) more; how much effect can that possibly have?” Imagine this example: You are on a mid-size airliner with a gross weight of 270,000 pounds. Just before leaving the gate, the captain comes on the PA system and says: “We’ve overbooked more than usual today, so we’re going to assume that the factory engineers over-designed this airplane and allowed an abundant safety margin. We’re going to take off at 280,000 pounds instead. So move over, there are 50 more passengers coming on board.” Run the numbers; it’s the same over-weight ratio as simply pencilling in an additional 100 pounds to the gross weight of an RV-10.

Along with gross weight increases, some builders take the same liberties with horsepower increases and speed increases, betting their lives on the assumption that the airplane is designed with a huge margin of safety—it is really far stronger than it needs to be. This is not really true. **Certificated aircraft, and well-designed kit aircraft, are designed to withstand limit loads at specified maximum weights. During testing, they are subjected to ultimate loads, which are higher than design limit loads by a specified margin. Yes, there is a margin between the design and ultimate strengths. But that margin belongs to the engineer. He owns the margin. It is his insurance against the things he doesn’t know or can’t plan for, and the pilot’s insurance against human error, material variations, and the ravages of time.** Wise pilots respect this design safety philosophy and leave this insurance policy in effect by operating strictly within established limits.
- Emphasis in **red** MINE...

Lessons?



- **Builders**

- Pay attention to the damn plans
- If Burt/Nat say something's important, mandatory, or critical, DO IT RIGHT!
- If you did it wrong, do it OVER!
- At all points in the build, ask yourself truthfully:

“Do I know more about this plane than the designer?”

The answer will almost always be **“NO”**

- Document anything discrepant for future use/owners

- **Flyers**

- Keep track of any changes to the aircraft that may in any way affect safety – i.e., repaint (control surface balance), additions, modifications, etc.
- Re-rig if there's ANY question
- Test all changes

- **Purchasers/New Owners**

- Ask a lot of questions
- Investigate ALL safety related issues
- Hire qualified canard-knowledgeable inspector for pre-buy inspection
- Use published CI inspection criteria for pre-buy inspection
- Use AC43.13-1B criteria for pre-buy inspection
- Perform FULL Phase I flight test regime after acquisition to verify flight characteristics
- Caveat Emptor

Builder/Flyer/Buyer Support Methods



- **Official COZY support from me (my contact info on last slide), afforded by ACS (thanks, Jim Irwin!)**
- Freeflight Composites (Burrall Sanders)
 - <http://www.freeflightcomposites.com/services.htm>
- COZY Newsletter archives (All Nat Puffer information for COZY's)
 - <http://www.cozybuilders.org/newsletters/>
- Canard Pusher Archive (All RAF information for canards)
 - http://cozybuilders.org/Canard_Pusher/
- COZY Mailing List
 - http://www.cozybuilders.org/mail_list/
- Unofficial **COZY Builders Web Page (UCBWP)**
 - <http://www.cozybuilders.org/>
- Canard Aviator's Mailing List
 - <http://groups.yahoo.com/group/canard-aviators/>
- CSA Newsletter (should be mandatory for all canardians)
 - http://www.cozybuilders.org/ref_info/other_news.html
- Other builder's web pages (links from **UCBWP**)
- Other canard build/repair assistance

Questions? (& Answers) / Discussion



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