A white COZY MKIV aircraft is shown in flight, banking to the left. The aircraft has a high-wing configuration and a T-tail. The registration number N44CZ is visible on the tail. The background is a vast, green, agricultural landscape under a clear sky.

PROP LOSS – DESERT CENTER

Emergency Landing in a COZY MKIV

Marc J. Zeitlin

July 26th, 2007

2:30 PM – 3:45 PM

Forum Tent 06 – Sporty's Pavilion

What Will I Talk About?



- Lead up to incident
- Early stage of flight
- Discussion in cockpit
- Prop Loss
- Discussion in cockpit
- Decisions / Actions / Communications
- Landing
- Post landing de-brief / Damage Pictures
- Proximal cause / effect
- Root cause / Learnings
- Questions / Answers

Lead up: Pre-Incident Flights



<u>Flight</u>	<u>Time</u>
• Marysville round trip - slight vibration	3.7 hrs
• Thermal round trip twice - no vibration	5.2 hrs
• Bisbee round trip - no vibration	5.9 hrs
• Santa Cruz round trip - no vibration	3.1 hrs
• John Wayne round trip - slight vibration	1.5 hrs

Early Stage of Flight



- First 45 minutes – slight vibration on and off
- Next 5 minutes – vibration builds, but still relatively slight and intermittent



Discussion in Cockpit

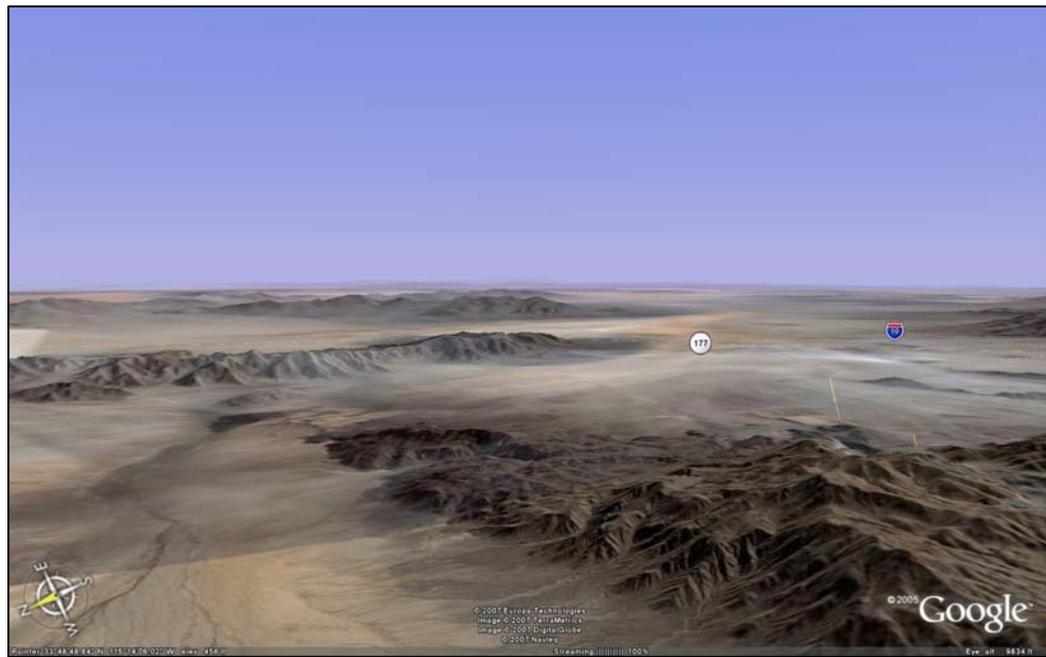


- First 30 minutes – no discussion of vibration
- Near Big Bear, first comments
- Approaching Twenty Nine Palms, more discussion – consider landing at TNP – This was where I made the big judgmental error (Deanie disagrees – thinks that even if we landed, wouldn't have found problem and then had issue at 300 ft. on takeoff).
- Discussion re: landing at Blythe in 15 minutes

Propeller Loss



- **BIG FREAKING BANG!!!!!!**
- Bolts Breaking or prop hitting winglet?



Discussion in Cockpit



- What was that?
 - Think we lost prop
- What does it mean to lose a prop?
 - The propeller came off the plane
- Will we be OK?
 - Plane seems OK
 - Flying fine
 - We'll land at closest airport
 - Everything will be OK

Decisions / Actions / Communications



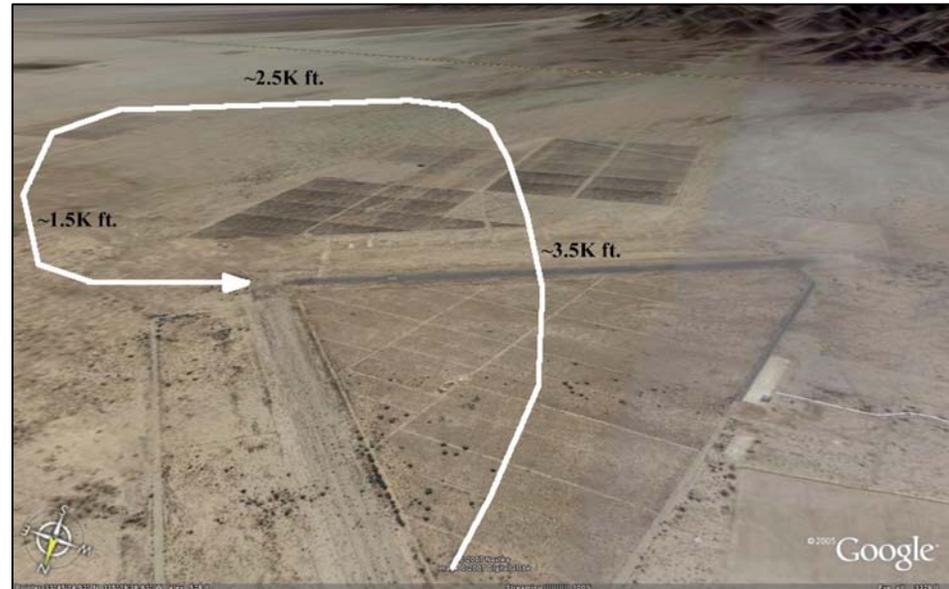
- 5 seconds post-bang: hit “nearest” button on GPS (Garmin 195) – see 3 airports reasonably close
- Begin slowing to Best Glide Speed (~95 to 100 mph) – trim to hold
- Attempt slight turns to ensure control
- Closest airport 17 NM almost due ahead (Desert Center – L64) have ~10 kt. tailwind – change heading 5 degrees
- Ask Deanie to find airport info on chart – need info, and gives her something to do. Airport elevation ~550 ft. (had info on GPS too)
- Consider altitude (9500 ft.) and airport elevation - calculate glide distance with 13:1 L/D at BG speed – should arrive at DC at least 1000 ft. above pattern altitude.
- Tell Deanie we WILL get to the airport and land normally
- Call 121.5 and declare “Mayday” – ATC collects info and tracks us on radar – asks us to call when on the ground.

- **Notice:** Aviate, Navigate, THEN Communicate

Landing



- After 11 minute glide, arrive at Desert Center (L64) 2K ft. above pattern altitude
- Check windsock and airport layout – pick landing direction
- Crosswind at 1500 ft. above pattern altitude – perform wide left pattern
- Tell Deanie we'll make a normal landing
- Drop gear on downwind, landing brake on base, retract landing brake on final
- Touch down 1000 ft. down 4200 ft. runway, roll to end and off onto taxiway
- Shut down and open canopy



Post-Landing De-Brief



- Emotional release after landing
- Get out, call ATC, inform of safe landing, no damage, no injuries
- Talk to Deanie about what happened
- Take a look at prop extension and cowl area – notice that right lower winglet is missing, as is part of trailing edge of wing
- Discuss damage to aircraft with Deanie
- Call Bill Seibold – ask for retrieval in his COZY III
- Push aircraft 3,000 ft. down taxiway to parking area and tie down
- Eat, drink, relax

Damage Picture



July 19, 2007

Desert Center Prop Loss Presentation

Slide #11

Damage Picture



July 19, 2007

Desert Center Prop Loss Presentation

Slide #12

Damage Picture



July 19, 2007

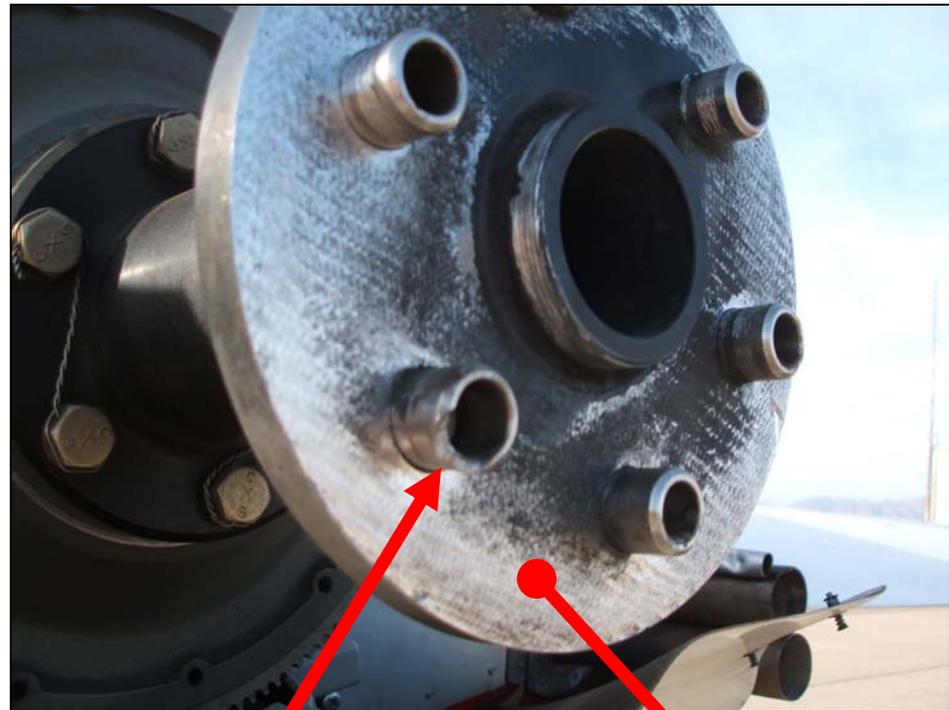
Desert Center Prop Loss Presentation

Slide #13

Proximal Cause / Effect



- Incorrect torque on prop bolts
- Low compression on wood prop
- Motion between prop and extension – possible contribution from spinner backplate softening
- Fretting of prop/extension mating surfaces
- Fatigue of bolts from relative motion
- Bang!



Bent lug

Fretted Surface

Root Cause - Learnings



- With current technology, need constant torque checking/adjustment of wood propeller bolts – generally every 25 hours, or after major humidity change
- Poor torque checking technique – only checked static torque
- Far too infrequent torque checks
- Need new design for wood prop hubs, or new method for tensioning prop bolts – folks have lived with this design defect for far too long, considering new materials that exist

Repaired Wing / Winglet

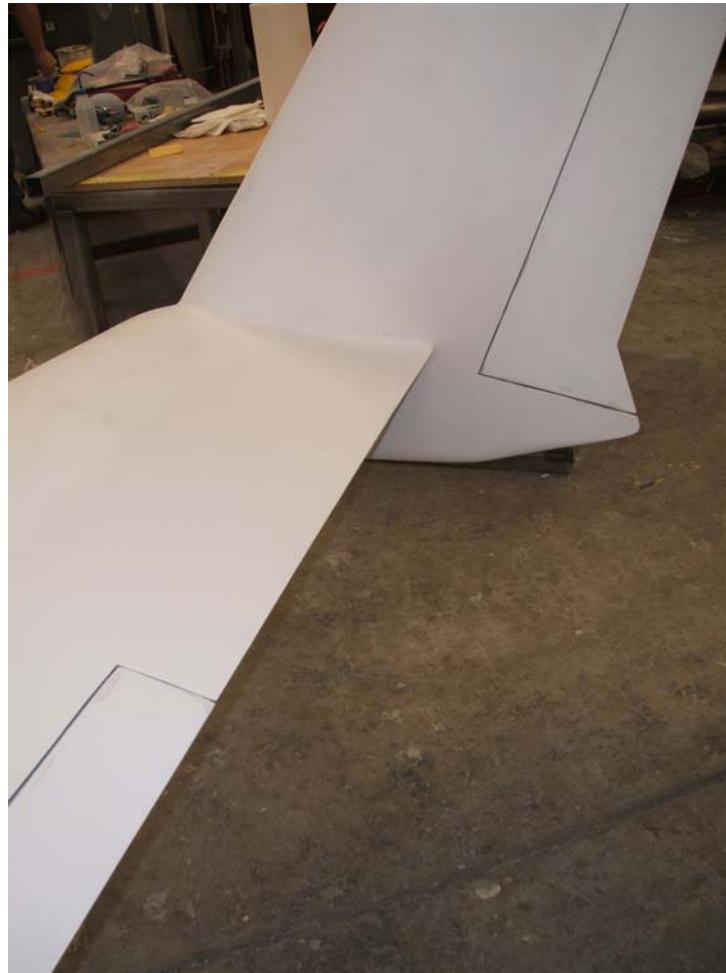


July 19, 2007

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Slide #16

Repaired Wing / Winglet



July 19, 2007

Desert Center Prop Loss Presentation

Slide #17

Questions? (& Answers)



- My Email: marc_zeitlin@alum.mit.edu
- Website: <http://www.cozybuilders.org/>
- What the heck were you thinking???
- What will you do differently due to this?