

Fuel Cap Loss Causes Two Fatalities

I felt the need to issue this, first ever, Emergency Bulletin after a departure accident in a Vari-Eze. Emory and Dottie Greer were fatally injured Sunday June 13 departing from Johnson County Industrial airport outside Olathe, Kansas.

Initial reports seem to agree that the Vari-Eze, 222EG, broke ground and began a normal climb. Shortly thereafter a surge was heard and the aircraft rolled 45 degrees to the left and dropped 30 degrees nose down. It impacted the ground in that attitude.

Impact area investigation found all airframe pieces except for part of one prop blade and the right fuel cap (Thermos - expanding O-ring style). It was assumed the cap had come off and gone through the prop shortly after rotation.

Further search revealed missing pieces of the prop and the lift tab from the missing fuel cap near the intersection of runways 4 - 22 and 17 - 35 back on the airport.

The conclusion drawn by me is that the fuel cap lifted off the tank as the wing started to produce lift and was struck by the prop. The resulting prop blade failure caused excessive vibration. The vibration caused the pilot to cut the power. The aircraft was at departure weight and probably lost airspeed rapidly with such a high wing loading and nose high attitude. The roll could have been initiated by the pilot in an attempt to get back to the airport property while the nose down attitude might have been needed to regain airspeed.

The sequence of events is not as important as how the fuel cap got off the aircraft and how that could be prevented in the future on your aircraft.

This accident involved a Vari-Eze which has three fuel caps located in front of the prop arc. The Long-EZ's two caps are about 6" outside the prop arc. The COSY Classic's two caps are about 3" outside the arc and I assume the standard Cozy is nearly the same. I am not familiar with the Velocity or E-Racer fuel cap to prop arc geometry. With such small distance I believe all the popular pusher aircraft are in contention for this type of accident.

Even though the fuel cap location is outside the prop arc it is still close enough that some odd movement could allow the cap to move into the prop's arc. The resulting prop failure at early climb stage would prove very hazardous at any normal length airport.

First we need to determine why the cap did not lock and then we need to determine a way to easily contain fuel caps in case they do come off.

The fuel tank caps on N222EG were of the Thermos expanding O-ring type as sold by Sport Flight, Wicks, and Spruce. I have the Sport Flight units on my Long-EZ and have found the need to lubricate the O-rings at 25

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hour inspection intervals. If the O-rings are allowed to dry out they merely crush when the cap locking tab is pushed down flush with the top of the cap. The cap **LOOKS LOCKED** but **IS NOT!**

The O-rings must expand in diameter to fill the filler neck if the cap is to stay locked in the filler neck. If they are lubricated and can expand they do a good job of locking in place. The trick is to physically verify that the cap is really locked in place. Do not trust a visual inspection!! Place your finger in the fuel cap tab cutout and press to the right and left and try to force the cap to rotate in the filler neck. If you can move the cap that means the O-ring has crushed and not expanded to fill the tank's filler neck opening. The cap will probably not stay in the filler neck if subjected to much of a pressure drop on top of the tank.

The newer style Thermos type caps have a Teflon/Delrin plastic tapered face on the compression washer of the cap. I thought they would be impossible to bind and not lock in place. I checked a local builder's brand new caps with the low friction plastic taper and found they too would bind and not lock into the filler neck. They were no better than the old style with the flat steel washer. When the new style caps were lubed they worked just fine. It seems that all Thermos O-ring type fuel caps must be lubricated if they are to provide adequate friction to stay in the filler neck.

Some pilots feel that they have never had this problem and never will. Perhaps that is true but please at least add the cap twist to your preflight check list. I'm sure Emory Greer thought his caps were secure too.

I apply Vaseline to my O-rings at 25 hour intervals and **usually** have no locking problems. Occasionally fuel will slosh up and wash away the Vaseline. When that happens I reapply a bit behind the O-ring at the next refueling. I've found a small tube of Vaseline lip balm is the perfect size and weight for cross country touch ups. In spite of all this lubrication I suppose the caps still could possibly come off. A retention system is needed for that.

I also have noticed very few people have taken the time to retrofit a static electricity protection device on their fuel tanks. The suggested system is very difficult to install through the 2" filler hole, it is ugly, and has a high probability of causing fuel tank contamination with chips during installation.

COSY Classic plans show an interesting idea for providing static electric protection while also serving as a fuel cap retainer. It is easy to make, cheap, lightweight, will not contaminate the fuel tank. I've reprinted it for your convenience.

Fuel cap loss is easily preventable. This problem is not new.

**Check the cap's locking ability
each time you remove the cap!!
Your life may depend upon it**

**Lets put a stop to it before it
kills more friends!!.**

Terry Schubert

