AMD-35
(04/10)

Department of the Interior

Lessons Learned

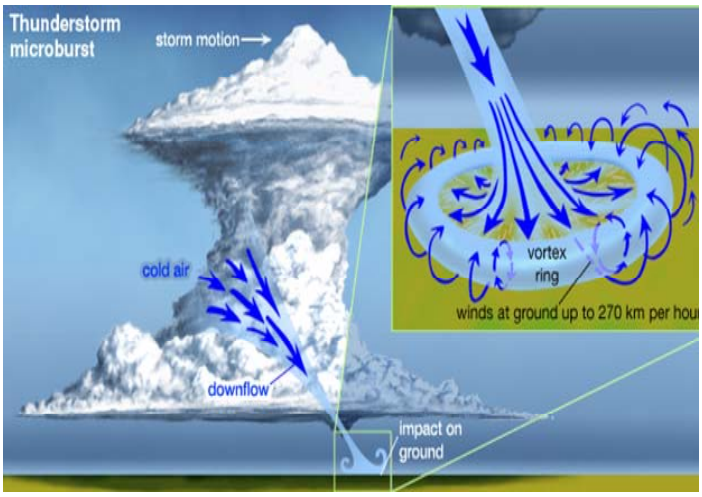
No. DOI LL 12-02 **Date: June 1, 2012**

Subject: Quest Kodiak Mishap

Area of Concern: Damage From High Winds

Distribution: All Kodiak Activities

Discussion: In March of 2012, a FWS Quest Kodiak was parked at a fixed based operator (FBO) at the Titusville, Florida airport. The aircraft sustained significant damage as a result of microburst and thunderstorm activity that moved through the area. There were no injuries.



This aircrew monitored the weather and made the right decision to divert to a preplanned airfield in order to avoid the approaching hazardous weather. After landing, the pilot inquired about hangar space for the aircraft, but none was available. Two jets were parked over the only tie-down spots available but were not tied down. The Kodiak was fueled with 560 lbs of fuel (bringing plane to an approx weight of 6,700 lbs), control surfaces and parking brakes were locked, and all four tires were chocked front and back. The pilot and aircrew were in the FBO building when the storm hit minutes later. One of the line personnel witnessed the aircraft being tipped up from the right and toppling on its left wing and float and pushing it 18 feet across the ramp, narrowly missing a Lear jet. Mooring lines were aboard the aircraft but were not long enough to reach any available tie-down spots.

LESSONS LEARNED:

Engineers at Wipaire calculated that a 70 mph direct crosswind and a small upward flow to the relative wind is all that's required to start the aircraft rolling (assuming no fuel imbalance is present.). After the rolling moment has commenced, the flat plate area under the upwind wing increases and is pushed all the way over. A 300 pound fuel imbalance reduces this wind speed to approximately 67 mph . 70 mph sounds significant however, microbursts, in spite of its small horizontal scale, can produce damaging winds as high as 168 mph. Jet/prop blast from other aircraft far exceed this figure as well.

Kodiak pilots have commented that the Kodiak (configured with amphibious floats) feels "top heavy" during turns. There are three primary factors associated with ground handling stability on the Quest Kodiak.

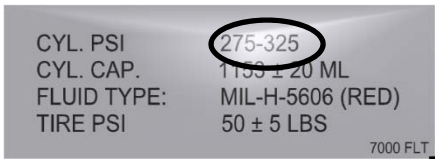
1. Adding the Wipline 7000 amphibious floats **increased the aircraft height above the ground** by 4 feet, to a total height of 18'-5" which raised the aircraft's vertical center of gravity (CG).
2. The type of landing gear used with these floats **decreased the tread width** of its wheels from 137" to 120".
3. The main landing gear struts (oleo) possess significant travel when serviced at the lower range. This provides forgiving landing characteristics but negatively impacts the aircraft's stability as the upwind strut extends and the leeward strut squats.

These three conditions combined, decrease the aircraft's lateral stability on its wheels and increase its potential to tip over under high crosswind conditions. Full fuel tanks raise the CG even higher and subsequently increases the aircraft's vulnerability to roll even more.

For the Kodiak configured with amphibious floats during high winds, engineers at Wipair recommend the following conditions from most favorable to least favorable:

1. Minimum fuel - this will provide the most stable condition in high wind
2. Full fuel - this is the next most preferable condition.
3. Mid fuel - this is the least favorable condition because once the aircraft is "leaning" all the fuel can transfer to the low side causing the largest imbalance.

One way to mitigate one aspect of the rolling motion is to increase the pressure in the shock strut to 325 psi which can be accomplished without removing the shock strut from the float. According to the Wipaire engineers, there is no danger that operation on the high end of the placard range will cause any mechanical or structural problems as they have performed dozens of drop tests with this shock strut design at pressures over 500 psi.



7000 shock strut placard

/s/ Keith C. Raley

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