



RECORD OF CONVERSATION

All persons listed were interviewed by Zoë Keliher:

The following is a summary of conversations:

JEFF SEMMIG (GOJUMP MECHNIC)

Regarding squawk sheets and maintenance,

I'm in very close contact with the pilot of the day, each day. I assist with preflight inspection and do post flight debrief and aircraft post flight inspection as well. During the post flight debrief any discrepancies are reported.

I'm on the airfield everyday for aircraft starts, operations and all needed maintenance. We have consistently repaired and resolved discrepancies before next operation by anticipating any maintenance issues and keeping a good supply of spare parts. Through a daily presence at the airfield, vigilance and due diligence we keep our airplane in top condition.

MARCO ANTONIO VALDIVIESO (PASSENGER)

Mr. Valdivieso stated that he is a pilot with about 2,000 hours total flight experience; he did not have experience airplanes equipped with turbine engines. He arrived several days before the accident. The airplane was in the hangar the two days before the accident undergoing maintenance including the installation of the right seat (no flight controls). He arrived the day of the accident with the expectation to observe the flight operations. The pilot was late.

After giving him a briefing, the pilot started the airplane and taxied to refuel. The airplane was fueled on one side (left) and the pilot explained that he uses the trim to compensate for one wing being heavier. Thereafter they departed on the first flight and dropped the first load of passengers. The fuel gauges were indicating low fuel and the pilot stated they were not reliable. They landed and the pilot explained that he uses beta mode on the ground and sometimes on the descent. He explained that he would demonstrate beta descents and "race the passengers to the ground." He explained that it may feel funny.

They departed on the next flight loading the skydivers without turning the engine off. The airplane climbed to altitude and dropped off the skydivers. The pilot put the airplane in beta mode and they made a steep descent back to the runway. The next flight was the accident flight. The skydivers were loaded and they climbed up to altitude. After the skydivers jumped, the pilot reduced the propeller a little and power lever all the way back with the airspeed between 90-100 kts. They began a steep descent to join the downwind about 6,000-7,000 ft.

The fuel gauges indicated the tanks were empty. He noted that the airplane was high and fast while on the base leg. Shortly thereafter, the pilot stated that he was going to make a right turn without using any rudder. They were descending faster than the skydivers.

Zoë Keliher
Air Safety Investigator
Western Pacific Region

Mr. Valdivieso further stated that the pilot initiated a steep right bank for 1-2 seconds (45° heading change with about 45° bank). The pilot then made a steep left bank (45° heading change with about 45° bank). He recalled that the turns were all uncoordinated and the auxiliary fuel pump light was illuminated. The pilot began to move the power and propeller speed levers and then stated that they “lost the engine.” The airplane impacted terrain in a nose-low attitude.

Mr. Valdivieso stated he remained conscious the entire flight. The pilot was unconscious after impact. He called for help and people were outside the airplane. He was unable to get the right door open and the people had to get

The passenger took several videos of the flights from his cell phone. The video from the accident flight showed that the fuel gauges were at empty, the propeller RPM was about 65% and the oil temperature and pressure were in the green arcs.

DARREN MOHLE (PILOT)

He’s been with the company for about 5 years now. He flies about 1-2 times a month

Current full time airline pilot

The passenger was a licensed pilot from Taiwan. They are setting up a similar program in Taiwan and the passenger was observing the operation. He had no access to flight controls.

They had done 3 flights with different takeoff and landing profiles

The 4th flight was the accident flight. They had dropped divers and were in a descent to land. Power was at idle, and he stated that it was a fast descent.

At 5,000ft he added power to slow the descent, but the engine power did not come up.

Turned toward the airport

Turned on the ignition to continuous

Fuel pump was positioned to HIGH

The propeller was spinning fast

The engine was in beta, so he had no pitch control

100 kts in the descent

Full trim and full back pressure on the yoke

Nose was pitched down 10°

He said he has not behind the flight idle gate. He only keeps the speed lever in high and doesn’t move it.

Torque was at 20° (primary power indicator)

RPM was at 0 because the gauge was broken.

Power lever was pushed forward; he was hoping to get a surge of power to arrest descent, but the engine was unresponsive

He did a 360° to the right to lose altitude but was still too high over the runway and positioned about midfield. He knew he wouldn’t be able to land and come to a stop without going off the runway.

Told the observer to brace themselves

Flaps were IN

He was not able to get the nose to come up

Recalled that he had 20-30 gallons of fuel left at the time of the accident.

He impacted hard during the impact sequence and his memory is not complete. When he starts the Supervan, the prop is initially on the anti-feather locks, which keep the blades flat. He has to release them from the locks by gradually moving to full beta, and then he can feel the blades disengage and begin to exert pull. However, if he forgets to do that and attempts to taxi, the engine produces a lot of noise and vibration, but there's no thrust; which he described as “spin your wheels.” It struck him that this sensation was similar to what he experienced when trying to apply power to slow his descent. It feels as though the engine is still operational, but all he encounters is dead drag in return.

LES DOUD (HARTZELL)

Likely the propeller on N10JA was in beta, specifically, at the mechanical reverse stop of -13 deg. A single-acting, pressure-to-decrease, reversing propeller will aerodynamically lock when certain conditions are met. Using our empirical method I estimated a reverse thrust (drag) of ~1900 lbs. with the prop at -13 deg and my ballpark estimate for power and RPM. This happens to be approximately a 0.2 drag coefficient at 100 KTAS, SL, ISA.

Just to be clear, when I say “beta” I mean the prop has traveled below the FI blade angle (whether commanded or not). I understand Bobby’s definition of “BETA” can mean when the propeller reaches the FI blade angle and the beta switch/light comes on. That is what Bobby means when he says a “BETA descent.” This is caused by the pilot valve on the propeller governor completely closing (essentially an “underspeed” condition as viewed by the propeller governor) and thus allows the propeller servo pressure to build up to the switch point. It does not always mean the propeller traveled below the FI blade angle. The BETA light will come on with the propeller running at the FI blade angle, and it will stay on if the pilot commands blade angle below FI because the switch is seeing full governor pump output pressure.

My analysis suggests the airloads on the propeller at the combination of airspeed and RPM overpowered the counterweights (near-zero angle/ineffective) and the feathering spring and pulled the blade angle down to the reverse mechanical stop. With the speed lever at MIN, prop at the FI blade angle and relatively high airspeed, the propeller can become “uncontrolled,” which means it no longer requires oil pressure, it now requires oil suction to keep it at the FI blade angle. A single-acting, pressure-to-decrease system is incapable of sucking oil, so the propeller can travel all the way down the reverse stop on its own... If the pilot moves the power lever below the FI gate, it increases the likelihood this will happen.

So as I see it, the contributing factors to finding the propeller stuck in beta (below FI blade angle) are:

1. Speed Lever MIN
2. What appears to be a low FI blade angle setting (3.7° vs 5.5°)
3. Relatively high airspeed incompatible with 1 and 2
4. The pilot moved the power lever below the FI gate

With the prop on the reverse stop, the RPM decreases until the engine underspeed governor adds fuel to keep running. That would do two things; increase reverse thrust and aero-lock the prop even more. One of the only scenarios I see to escape a condition like this is to shut the engine off.

It is normal that the engine can go into BETA if the airspeed is low enough to allow the engine to transition (typically around 80 knots or less with the power lever at flight idle). Remember that BETA doesn't necessarily mean reverse. The flight idle blade angle is 5.5 degrees in BETA, but, if the pilot moves the power lever behind the gate, then the angle can change to anything back to -13 degrees.

Remember that hundreds of pilots have done BETA descents with the airplanes for tens of thousands of hours with the Supervans with no issues as long as they have not transitioned below the flight idle gate. It is highly unlikely that the engine rpm would have sagged to 60% ish in the descent if the pilot truly left the power lever at flight idle and speed lever low. The engine rpm is normally around 85% at flight idle in BETA with the Speed Lever low and would be maintained by the underspeed governor on the fuel control unit. It could vary some by air loads on the propeller, but the underspeed governor has a lot of fuel that it can put into the engine to maintain rpm. If the pilot had the power lever around the ground idle position (behind the FI gate), the underspeed governor would be looking to maintain an rpm around 68% plus/minus depending on air loads which is closer to what we saw during the descent. Once the engine approaches 60% rpm with a heavy air load, the rpm droop starts to become unrecoverable for the engine, although the underspeed governor will dump fuel in trying to recover the rpm. This was evident in the videos as the engine was decelerating.

In the video, the engine temperature was fairly low and fuel low until the rpm reached in the 60's, then the temperature rose into the 600 degree plus range which would indicate that the underspeed governor was trying to bring the engine back up on speed by adding fuel. I believe that the air load on the engine with the rpm being so low made it difficult or impossible for the engine to recover rpm. If the propeller had transitioned to the reverse stop at some point, then adding rpm and power would have just made the drag worse.

The pilot said that he was not able to raise the nose. When I did the BETA descent (power lever flight idle speed lever high), I was able to achieve descent rates around 5000-5500 fpm and still had full authority with the elevator to easily pull the nose of the airplane up above the horizon with only minimal elevator input.

I believe in this accident, the pilot had pulled the speed lever toward the low position (how much is hard to tell). The low speed lever setting in the first will give substantially different drag/thrust reactions with power lever changes and BETA mode. In BETA mode with speed lever HIGH, the underspeed governor (USG) will be trying to maintain 96-97% rpm. With speed lever LOW in BETA mode the USG will be trying to maintain 68% or some rpm less than 96% depending on speed lever placement.

I believe in the first accident, the pilot was behind the flight idle gate so he could get the engine to go into BETA faster since he had the speed lever lower than the HIGH position.