

April 17, 2019

Joshua Cawthra
Senior Aviation Accident Investigator
National Transportation Safety Board

Federal Way, WA 98003

Dear Mr. Cawthra:

This is a short narrative of what happened to N5433T an RV-7A.

N5433J was powered by 3 liter 6 cylinder Subaru engine with a gear reduction unit. I understand that there are several hundred aircraft flying with this engine, and a gear reduction unit. Usually with an electric constant speed prop, such as an MT Prop.

The engine had 6+ hours of ground run-time including high-speed taxi tests. On 11/10/18 after 15 minutes of run-up time, checking all systems and cycling the prop, the first and only take-off was executed.

I observed from one side of the runway. The take-off roll was very short, maybe two or three hundred feet. The rate of climb was incredible. However, past the end of the runway the aircraft began to level out and then began a slow descent. And then went out of sight because of the terrain. Soon black smoke could be seen.

When I arrived at the crash scene, the emergency personnel were already there, and the fire was out. There were no injuries, fortunately. The aircraft touched down on relatively flat ground and rolled for approximately 100 feet at which time the right main landing gear struck a rock, approximately one foot high, tearing it backward and allowing the right wing to contact the ground. The airplane continued another 200+ feet in a slight right arc, before coming to a stop. The engine continued to make power until the end, as evidenced by a series of slashes in the ground of the now stubby prop blades. The pilot then shut everything down and exited the aircraft. Evidently a fuel line was pulled loose near the right wing root. The on-board Halon Fire Extinguisher was no match for the ensuing fire.

According to the pilot, the initial take-off thrust was phenomenal. However, shortly after level off or maybe before, the prop RPM dropped from 2,700 to a 1700 RPM.

This low prop speed did not provide enough thrust to maintain level flight, but only a slow decent. The gauges were checked several times and all perimeters were normal, except the prop RPM drop.

After the fire crews finished, the park rangers wanted the wreckage removed. It was a habitat for migrating birds of prey. Volunteers helped with a flatbed trailer and pickups and the wreckage was taken to Cruise Air facilities at Ramona Airport.

Nothing more happened with the investigation until after the government shut down. We then met Roger Messick from the San Diego FISDO at the Cruise Air facility in Ramona. Under Roger's supervision, we removed the prop and gear reduction unit. We initially thought that the MT Prop had somehow gone to full course pitch, because there is a history of this happening in the past.

But no, the prop was in full fine pitch. Also, the gear reduction unit turned freely with no catches or noise. However, the engine appeared to be totally frozen. We couldn't move it at all even using a prybar against the starter ring gear teeth. Subsequent to this initial inspection, you authorized us to remove the engine and do a teardown inspection, as it was unlikely that the NTSB would get around to it in a timely manner.

We removed the engine and brought it to my shop. The following week we commenced the teardown. On removing the timing chain cover which faced the firewall, we found a hole melted into the timing chain cover. In addition, the nylon coating on the timing chain guides had melted into the timing chains, effectively seizing the engine. On removal of the cylinder heads, there was no evidence of scoring of the cylinder walls or damage to the pistons. There was corrosion on the steel parts within the engine. We believe that the corrosion was secondary to rain water which entered the crankcase via the oil filler opening. The oil filler cap was burned up, leaving the opening open to the rain. As you may recall, we had heavy rains during this 3 + months the engine sat exposed to the rain. There was no evidence of coolant in the internal workings of the engine, only water, The head gaskets did not appear to be breached, and were in good condition. After removing the corrosion from the cylinders, and lubricating them we were then able to turn the engine over.

Our conclusion is that the prop, gear reduction, and engine failure, was not the cause of the reduced power output prior to the crash. This leaves only one possibility. That the electronic engine controller commanded the reduced power output. Of course, this is only an educated guess, since the controller is burned up.

The controller is manufactured by S.D.S. (Simple Digital Systems). These systems are well known and are even used on certified aircraft engines, in addition to, automotive racing.

Our final conclusion is that there is no way to know what caused the power reduction on N5433T. Only speculation.

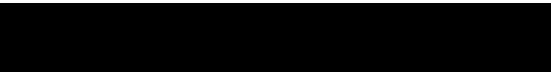
Respectfully Submitted,



Daniel J. Lee

Enclosure

Cc: Roger Messick
Mike Talmidge



Info for NTSB

1 message

Fri, Mar 29, 2019 at 1:41 PM



Hi Daniel,

Today I took the gearbox apart to see if the fire did any harm to the internals. As we noted when the FAA inspector was at Ramona, the gearbox rotated freely and the only irregularity was a lubricant leak at the rear (input shaft) seal.

I found that there was approximately 6 ounces of oil in the gearbox as well as about 2 cc's of water. I'm assuming that the water entered through the vapor vent hole when the fire fighters used water to extinguish the fire and ingress due to rain during the months the airplane was stored outside. Several inches of rain fell during this time-frame. The gearbox is isolated from the engine so this is the only explanation I have for the water.

The exterior was covered in some sort of carbonaceous material, probably soot from the burning fuel and polymer items under the cowl. The metal itself was not melted or distorted anywhere on the exterior. Removal of the filler plug, drain plug, and sight glass indicated that the Buna O ring at the drain plug was damaged by heat, the fiber gasket at the filler plug was undamaged and still the original off-red color, and the sight glass window (polycarbonate) was clouded over and opaque.

The case half screws were still tightened to the recommended torque. Removal showed that the metallic locknuts maintained their prevailing torque.

After splitting the case and removing the shafts, gears, and bearings, I found that except as noted, all components were in like-new condition. There was no sign of high temperature. None of the retaining rings were affected by heat, the bearings showed no signs of discoloration, and the gears were still hard as checked with a file. The file simply slid over the components and could not remove any metal from the teeth or bearing journals. There are some remnants of the input shaft seal adhering to the input shaft.

I've made no attempt to clean any components and have stored them unassembled. I'll keep them in a secure area for a couple of months in case anyone needs to examine them further. After this time I will destroy the components unless I am asked to continue to store them.

I'm not sure what your report to the NTSB needs to contain, but if this information is needed, feel free to include it in your report.

Best Regards,

Mike Talmadge