Our Massive Prop-Overspeed Flight

by Lt. Brendan Berry

The day started out quietly: a routine NATOPS check for the flight engineer (FE), an observer NATOPS check, then landing practice for the IP and me.

After takeoff from runway 6, we encountered an overcast layer around 1,400 feet, breaking out VFR on top around 4,500 feet. We started negative-torque sensing (NTS) checks, completing No. 1 and No. 4 engines with no problems.

Passing 6,200 feet in a left turn, the FE started to pull back the No. 2 power lever for the NTS check when all hell broke loose. The aircraft lurched to the left as if a speed brake had deployed on that side, and the plane started buffeting and shaking heavily.

The flight station was instantly filled with a deafening, rasping, angry noise, as if a chainsaw had been started at full throttle. At the same moment, smoke and fumes started to build up in the flight station and in the tube, followed by loud popping noises along the fuselage. A scan of the gauges for No. 2 engine and quick investigation revealed that we had a pitchlocked, decoupled, gauge-limit propeller overspeed. The prop–rpm gauge was pegged at 129 percent.

We had no internal and external communications. The FE and IFE quickly turned off the No. 2 generator, then fully opened the oil-cooler flaps because of the instant OIL HOT light on No. 2. Then they disconnected the No. 2 engine-driven compressor (EDC), which, as a result of being mounted on the No. 2 reduction gearbox, had oversped and come apart, causing the smoke and fumes. Screaming was the only way to communicate with the FE in the seat; cross-cockpit communication between the pilots was limited to hand signals.

The IP in the right seat took the controls, and I took the comms. Turning to look out the window at No. 2, I was shocked to see that the its prop-spinner cover was gone, as were parts of the propeller deicing cuffs and islands. There was a large gash in the top of the No. 1 engine nacelle, but all cockpit indications showed that engine was operating normally.

We declared an emergency and requested vectors for a GCA back to runway 6. After a couple of transmissions, we finally understood to turn right to 270 and descend to 3,500 feet for a PAR to runway 6, which I had to pass to the other pilot with hand signals.

We were only 5 miles from the field. Although we had already done the initial steps of the emergency procedures, the FEs broke out NATOPS and started going through the prop procedures, which was extremely difficult because of the noise level. We slowed the aircraft, dramatically reducing the noise and vibration, improving control, and allowing us to talk, even though the rpm was still pegged at 129 percent.

We briefly discussed donning our helmets but decided against it because we were close to the field and the decreasing airspeed had lowered the noise level. Once we had finished the emergency procedures, we went through the descent and approach checklists and briefed our approach and landing.

We broke out around 1,100 feet, acquired the field, and requested a visual straight-in. The flaps were already at approach, so we dropped the gear and did a slow-flight check. The prop rpm finally came off the peg, slowing through 145 knots, 3 miles out on final, and the other engines had 2,000 SHP set to overcome the drag from the overspeeding prop.

We touched down before the 10-board, smoothly lowered the nosewheel, and fuel-chopped No. 2 once we were firmly in control of the aircraft on rollout, as briefed.

Postflight revealed the prop had oversped to 165 percent, although the gearbox is only guaranteed to 115 percent by the manufacturer. The spinner and much of the deicing cuffs and islands had separated and struck the fuselage at several points, causing dents and the popping noises we heard. The No. 2 EDC had had an uncontained failure, sending shrapnel throughout the inside of the No. 2 nacelle, puncturing the nacelle in several places, and also sending a large piece through the top of the No. 1 nacelle, bouncing off the oil tank mounted on top of the engine.

One important lesson we learned as a crew is how difficult aircrew coordination becomes when a large barrier to communication is introduced, as the noise level was in this scenario. Overcoming both the initial shock at the sudden nature of this extreme malfunction and the confusion caused by the various, simultaneous events was a formidable challenge, which made ACT hard. Once we figured out exactly what had gone wrong, we adapted to the situation and got back on deck.

This emergency also emphasizes the importance of knowing your systems and emergency procedures. Although the P-3 community trains to "break out" the NATOPS manual and read and review the procedures, the racket and subsequent difficulty communicating forced us to depend on our knowledge of emergency procedures to complete the steps and land the aircraft.

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