Hawkeye Flight Testing?

by LCdr. Jay Elliott

The skies were crystal clear over NAS Pt. Mugu, and I was looking forward to flying. I did not suspect that the flight would bring an opportunity for another Hawkeye milestone.

We were scheduled for post-maintenance functional check flight (FCF) bravo and charlie profiles. The mechs had worked on the aircraft's propeller and flight-control system: they had changed the port prop assembly, port aileron bungee, autopilot actuator, and drag brace. Prior to our flight, the aircraft underwent several turns, including high-power engine runs, with no problems. QA thoroughly briefed us on the maintenance, then we manned up the aircraft. I didn't have my FCF qual yet in the squadron. As a result, although I would be in the left seat, I wasn't the aircraft commander. The flight was supposed to be the last of my FCF syllabus hops prior to my signoff.

Everything was fine through the takeoff roll, and all the FCF checks were proceeding smoothly. However, just after we retracted the landing gear, at approximately 15 feet AGL, the aircraft began an uncommanded, rapid, left-wing-down roll. I countered the roll; I needed approximately three-quarters right lateral throw just to maintain wings level. Using ICS, I called, "We have a problem," and other than being sure that it was not engine-related, which a quick scan of the tape gauge provided, I didn't know what the source was. The CAPC and I quickly discussed that we would keep the airspeed at its current 155 KIAS and not bring the flaps up from the 10-degree takeoff setting. In the E-2, the ailerons droop with the flaps, and we did not want to test the effect of a flap change on the roll input. The copilot told tower we needed to return for landing. Although I requested he declare an emergency, the call never made it out of the aircraft. With the roll input countered, I began a climbing left turn to 2,000 foot downwind.

At the beginning of the turn, I reduced the port engine's power toward idle to help the turn rate and reduce the required aileron input. Because I didn't tell the copilot I was going to do that, it confused him. He thought we'd lost an engine.

On downwind, we completed the NATOPS flight-control-malfunction procedures, with the

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CICO backing us up from the pocket checklist. We discussed potential sources. A flap asymmetry is possible in the E-2, but we hadn't moved the flaps, and they looked like they matched. The port aileron was an obvious candidate, because of the maintenance, but the failure mode was not clear. The PCL procedures didn't work, and the aircraft still wanted to roll left. It was possible to maintain wings-level trim by using full, right-wing-down, aileron trim.

We examined controllability in a gear-down, 10-degree flap configuration. As we were turning to a long final for the runway, we got an unexpected flyby from a Tomcat coming into the field via course rules. It wasn't a near-midair, but they had to maneuver, and it could have been avoided if we had declared an emergency with tower. We continued our approach and made a straight-in landing, maintaining 150 KIAS until touchdown. A long straight-in was critical because we wanted to detect any drift early and avoid having to make large lineup corrections. Our touchdown speed was higher than the published NATOPS limit of 135 knots. However, the copilot and I were aware of a recent NATOPS conference that increased this speed to 174 knots.

photo modified by Yvonne Dawson

Post-flight inspection revealed that the follow-up push rod in the port aileron had failed. This failure caused the loss of feedback for aileron position, which put the aileron in a full-trailing-edge-up position. The original, port-aileron, drag-brace change had been required because, due to improper maintenance procedures, it had been bent during aileron rigging.

An EI response on the failed push rod said it normally has loads of about 2.5 pounds, and its failure load is approximately 1,550 pounds, a safety factor of 620. The most likely conclusion was that the push rod had been damaged at the same time as the drag brace. Maintenance personnel did not detect it from visual inspection and it didn't show up on subsequent throw-checks and engine turns before the flight.

This incident generated some important points. We proved you could fly the Hummer with only one aileron. Also, we changed airspeed very little while in this condition. From gear retraction to touchdown, our airspeed only varied by 10 knots. We checked controllability only in an airspeed range sufficient for landing.

If your aircraft is under control, don't change configuration unless absolutely necessary to make the landing. Had we changed flap settings, the aileron droop may have made the aircraft so hard to handle that it might have become uncontrollable.

Declare an emergency. This action will clear the space around you and reduce your cockpit workload by minimizing external factors while you handle your aircraft.

LCdr. Elliott, a former test pilot, flies with VAW-112.