First, It Gets Better

By LCdr. Patrick Hannifin

It's a beautiful Monday morning at NAS Patuxent River, Md., and I am doing what we all love best on such days: sitting in a safety stand-down at the base theater. The day will get better, and then much worse.

The "better" part is that the stand-down ends, and I'm feeling safe. I brief in the T-45 project office with the Ops O for my afternoon flight. Today's day trainer is to maintain test currency, no testing. The Ops O is an F-14 RIO who also flies with our Hornets—this will be his first T-45 flight. We'll do our standard VFR takeoff to the local working area for a 1.5 or so, do some aircraft specifics, and do standard crew management stuff for a two-seater.

We take off and retract the flaps and gear at 170 knots. At 195 knots, we do a gear-handle check. Six pounds? I couldn't tell ya—left my hand calibrator in the other nav bag. An area fam for 15 minutes from 10,000 to 25,000 feet. Rear seat at the controls, getting a feel for the aircraft. An easy, nose-low slice turn from the low 20s and 300 knots, gradually increasing the G. I think squadron SOP requires a G-warm if we anticipate anything greater than 5Gs (I was wrong—SOP says 3Gs). I'd call or effect an ease prior to 5…4.1…4.2…4.

And then it gets much worse. At 4.3Gs, 14,000 feet, 430 knots, and 50 degrees nose low, a loud thump is accompanied by lateral movement and a door light above the gear indicators. I take the controls and hear, "You got it," from the pilot in the rear cockpit. I recover the aircraft to a slight climb in wings-level flight. The master-alert-caution light, tone, and hyd 1 caution light illuminated as hyd 1 dropped from 1,500 to 1,100

Photos by Matthew J. Thomas and PHA James P. Wagner
Photo-Composite by Allan Amen

psi, and eventually to zero. We need almost full-left rudder to balance the yaw. There are no significant G-spikes during the event or recovery. The lowest altitude we get to is 7,700 feet. Over the next several minutes, I observe the hyd 1 pressure fluctuating from zero to nearly 1,300 psi and back down again, enough to kick the master-alert light back on a few times. We are heading generally north and start a left turn to head back toward the field, 25 miles away.

The pilot in the rear cockpit broke out the NATOPS PCL while I monitored instruments and flew the aircraft. I had him read the hyd 1 procedures a couple of times without taking action on them. We announced our problem over the radio, requested an aircraft for visual inspection, and asked for an LSO on-station. SD324, a two-seat, photo-chase Hornet, was diverted from the pattern to help us while they rounded up an LSO. I had the pilot in the rear cockpit read the hyd 1 procedures again as I did the actions. We were south of the extended straight-in at 12,000 feet.

When I lowered the emergency-gear handle, some of the yaw dissipated, but I didn't hear the comforting thumps of gear coming down. Also, there weren't any gear indications. My mindset changed from hyd 1 problems to gear problems, and I was glad 324 was coming to inspect us.

They arrived shortly after we completed our hyd 1 procedures and told us the nose and left main gear appeared down and locked, but the right main-gear brace was broken, and the gear was overextended. They thought the gear would collapse on landing. After some radio-comm confusion between base, chase and ICS, and after

reviewing the NATOPS gear-malfunction table, we decided the right gear was overextended, not stubbed or cocked. A short-field arrestment was the course of action, and we prepared for the min-fuel, in-flight engagement. I lowered the flap handle to half, saw the slats light, and explained to the pilot in the rear cockpit that this was normal, because we were on emergency flaps.

We set up a racetrack pattern on the extended straight-in and discussed possible scenarios for ejecting or staying with it. We burned down fuel from 1,100 to 600 pounds. At 600 pounds, I began to intercept and fly a normal glideslope to the wire with LSO assistance. I could not maintain the glideslope at near-idle conditions, because of what I thought was lack of speedbrake drag from the hyd 1 failure. I waved off that approach and came in on a lower glideslope on the next try. I went to mil and applied left stick as we touched down and heard the bolter calls as the aircraft began to swerve right. Rudder and left stick appeared to control the aircraft, and I began to bring it back to the left while calling, "I got it." I continued to overcorrect to the left and flew it off the deck while angling left across the runway. The LSO was calling, "Keep it climbing," and he told us our gear had collapsed on landing. I began a turn to downwind.

A Hornet pilot above us, with his own emergency, called, "I have to land now." I called that I was extending on the downwind and called to make our final approach. We had between 200 and 300 pounds of fuel. We would keep a bolter on the runway for this pass—certainly better than a flameout. Again, I flew a low-ball glideslope, with LSO assistance, and made sure the endgame looked a little lower than the bolter. We engaged the gear before main-gear touchdown and rolled to a suprisingly smooth, right-wing-low stop on centerline.

I shut down the engine and called, "Get out quick," on the ICS. I then shut off the batteries and egressed.

So what do you do, as a single pilot or crew, to prepare for the unexpected? In this case, a combination of poor landing-gear-uplock design and possible proximity-switch failures caused a system failure within the established flight envelope. Not much you can do about that, is there? Well, yes and no. Although you can't prevent similar failures, you can be prepared to deal with the ones most likely to occur in your aircraft. Every aircraft has weaknesses—some more than others, as most Goshawk drivers can attest. In the Harrier, it may mean knowledge of engine systems and all Hornet drivers know the bingo numbers. In the T-45, it means knowing your gear systems and emergencies.

The current Goshawk doesn't do well with an overextended gear, a blown tire, a crosswind, or a host of other ground-handling issues. The T-45 test team is working hard with the training-wing fleet and a dedicated Boeing team to improve our aircraft's reliability and performance in these areas. Significant improvements are on the horizon. I know this is a lame answer for anyone flying the jet today, but we are trying. One quick fix—using 350-psi nose tires to improve ground handling—has already been tested with promising results. Wet runway and crosswind testing will follow shortly. Greater ground-handling improvements are expected from a yaw-rate feedback to a nosewheel-steering box that will be tested in the near future. Fuel control and inlet-design efforts will make the engine less susceptible to surging. A SAHRS replacement will improve reliability, and finally, testing is underway to remove the uplock limits resulting from this mishap.

With or without system improvements, the success of any flight comes down to aircrew knowledge, judgment, and basic flight skills. Know what a crosswind feels like in this aircraft, know when you need to take it around, and know when you can stick with it. Above all, have a plan for a landing-gear emergency. An airborne visual check is critical. Know the difference between stub, cocked, trailing, retracted, and overextended, and be able to pull that out of a wingman's description. How will you brief the ejection scenario as you burn down to min fuel for the approach? At what fuel state will you accept a bolter and keep it on the deck? I didn't expect to face that one. The brief is not in your PCL, but it's critically important to get right.

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