By LCdr. John Richmond

It started out as a good-deal ACM hop. It would end as a day that a young, 250-hour, Cat I pilot and I never would forget. It was a cold, clear and blustery January day at NAS Oceana, with the winds at a steady 25 knots out of the northwest. After briefing an SFWT 1 v 1, we put on our exposure suits and manned-up aircraft 106.

Visibility was unlimited—perfect for ACM. After clean and dry checks, we contacted Giant Killer and kicked out into combat spread for routine G-warm and weapons checks. After a quick snapshot drill, we rolled into the butterfly sets. The flight was going like clockwork.

The first set started at 22,000 feet and 350 knots. After a gentleman's left to left, the fight was on. As we passed through 180 degrees of turn, we called, "Knock it off" because of a master caution light and an associated CIU (converter interface unit) advisory light. We reset a circuit breaker and were ready to go. Again it was a left to left. We reversed to a right-hand turn and dug hard, nose low. The bandit was making a nose-low, left-hand turn. Merging at the bottom of the circle, the bandit made a check-turn left across our tail. My pilot once again reversed right, unloaded the jet, and, with as much right stick and rudder as he could muster, started a max-performance split-S across the circle. It was classic, one-circle, nose-low, aggressive pressure.

At first the jet performed well, but around 17,000 feet and 280 knots, it seemed stuck in a nose-low, right-hand turn. At 60 degrees AOB and 45 degrees nose low, the master caution light suddenly illuminated. I called, "Knock it off," as my pilot battled the aircraft. Seeing an uncommon hyd press light, he looked over at his hydraulic gauges only to find the flight-side needle resting comfortably at zero. I instinctively reached down, started squawking emergency, and switched the TACAN to Oceana. My pilot said the bi-directional hydraulic pump was secured, the wings were manually full forward, and flight isolate was selected. Throughout all of this, he had difficulty setting the wings straight and level. The true nature of our problem eluded us for only a few more moments.

Rudder Hardover: This Time I Saved the Jet

I was digging out the PCL to begin emergency procedures, but my pilot was having difficulty getting the aircraft to head home. We bottomed out at 13,000 feet, and, while in a semi-controlled turn towards home, we discovered our port rudder was fully deflected starboard. We had a rudder hardover. This occurs when a rudder has deflected to full throw because of an actuator failure.

At this point, we started to take stock of what we knew was working. The combined side still was pressurized, so our landing gear and brakes were OK. I radioed the situation to our lead and began coordinating with approach control. As our lead got a closer look at our rudder, we could see the problem in our mirrors: The port rudder was deflected full-throw to the right, and our starboard rudder was neutral. To make things worse, the starboard rudder would not oppose the bad rudder—the left pedal would not budge. Now it all made sense, and it wasn't good. The plane was flying about 15 degrees, left wing down, in a very uncomfortable slip.

We were dumping fuel and almost had finished the hydraulic section of the PCL, so I called base and asked for the skipper. Deep in the back of my mind, I had a feeling we eventually would be forced to eject. Another Tomcat squadron had lost a jet to the same rudder-hardover condition. They had tried to divert but the engine failed after prolonged, uncoordinated flight. We had 60 miles to go in the same condition.

At 30 miles from Oceana, we were at 15,000 feet, 250 knots, and crossing the beach line. That was comforting—an ejection over land in January was far more appealing than an ejection over a rough ocean. We were tracking toward Oceana and decided to try for Fentress Airfield, figuring that aircraft wreckage in the open countryside was better than in some neighborhood around Oceana. The skipper was now on the radio and his recommendation was Oceana. It made sense; medical attention existed there, and the winds were right down runway 32 at 20 knots (there was too much crosswind for Fentress).

Could we even attempt a landing? Any attempt at turning the airplane to the left was futile. With the other rudder unable to counter the bad one, more left stick only increased uncoordinated flight. Anybody who has missed a

To make things worse, the starboard rudder would not oppose the bad rudder–the left pedal would not budge.

TARPS point and stands on top rudder can understand how we were flying.

We were now 15 miles east of Oceana at 18,000 feet (over the ocean for controllability checks), still trying to figure out how to land with the wings roughly level. Every time we went wings level, the jet picked up a little more than a standard-rate turn to the right. Our gas was now 7,500 pounds (having secured dumps at 9,000 pounds). Gas was not critical, but time was. We were operating on a single hydraulic system, and who knew how long that would last? If we lost hydraulics, we were shelling out. We and the guys in the ready room were trying to think of anything. We thought of trying asymmetric thrust. With the Tomcat engines 9 feet apart, asymmetric thrust was a known contributor to out-of-control flight. Every Tomcat pilot was intimately familiar with keeping the throttles matched to avoid those destabilizing inputs. In the last Tomcat rudder-hardover mishap, the engineers in the aircraft division at NAWC (the guys with the 20-pound heads) had found that in the trainer, asymmetric thrust helped alleviate the uncoordinated flight of a rudder hardover. It now became the plan and our only hope.

Reciting out loud as he did it, my pilot slowly retarded the left engine to idle, since it was the one contributing to the right yaw. It was working! With the wings roughly level, full-asymmetric thrust, and half-throw left lateral stick, the jet tracked straight.

Now to dirty up. With airspeed at 230 knots, we put down the gear. Three down and locked, and the hydraulic system was holding. Tire speed was 190 knots—we needed to get below that. As we decelerated through 180 knots, the flaps were set to half. We had three down and locked, with an approach speed of 155 knots. Time to land. Performing three, 360-degree, right-hand turns out of 18,000 feet, we arrived on extended centerline at 5,000 feet, 17 miles from the field. Heading inbound, we emergency extended the hook and now addressed what we would do once on deck.

We were staying on deck—arrestment or not. We were certain the jet, once on deck, would immediately veer right when both engines went to idle. Nosewheel steering would not be functional because of the stuck rudder pedals. Since it was January and the ground was frozen, we were confident in the jet's off-road capability. A hook skip and go-around was not an option.

Paddles was now on the radio, and we briefed him. We were still tracking straight, and the winds were right down the runway. Our groundspeed at touchdown would be about 135 knots. Calling the ball with 5.5, my pilot flew the pass of his life. The jet caught the wire, veered hard to the right, and came to a full stop with the left mainmount 15 feet off the right side of the runway. We had pulled it off.

The engines on post-flight were FOD-free. We discovered that a catastrophic failure of a bolt and stop plate in the rudder actuator had caused the port rudder to go full-throw to the right. The other rudder was never going to oppose the bad one.

By far, the biggest lesson learned was that mishap investigations work. We all read the last Tomcat rudder hardover and learned from it. Some smart engineers had examined asymmetric thrust as a possible way to reduce uncoordinated flight, and that nugget of information was critical.

Compound emergencies will put you in uncharted waters. This emergency was not in NATOPS (although it is now). We did nothing strictly by the book, except the hydraulic-failure procedures. Everything else was an attempt at common sense.

The ready room and our lead stayed out of our cockpit and only came in when asked. They were there when we needed them and were never a hindrance.

In our haste to land, we didn't do a practice waveoff for fly-away characteristics. The asymmetric-thrust-limiting system still was engaged. If we had needed full burner on the starboard engine, it would not have been there.

LCdr. Richmond flies with VF-213.